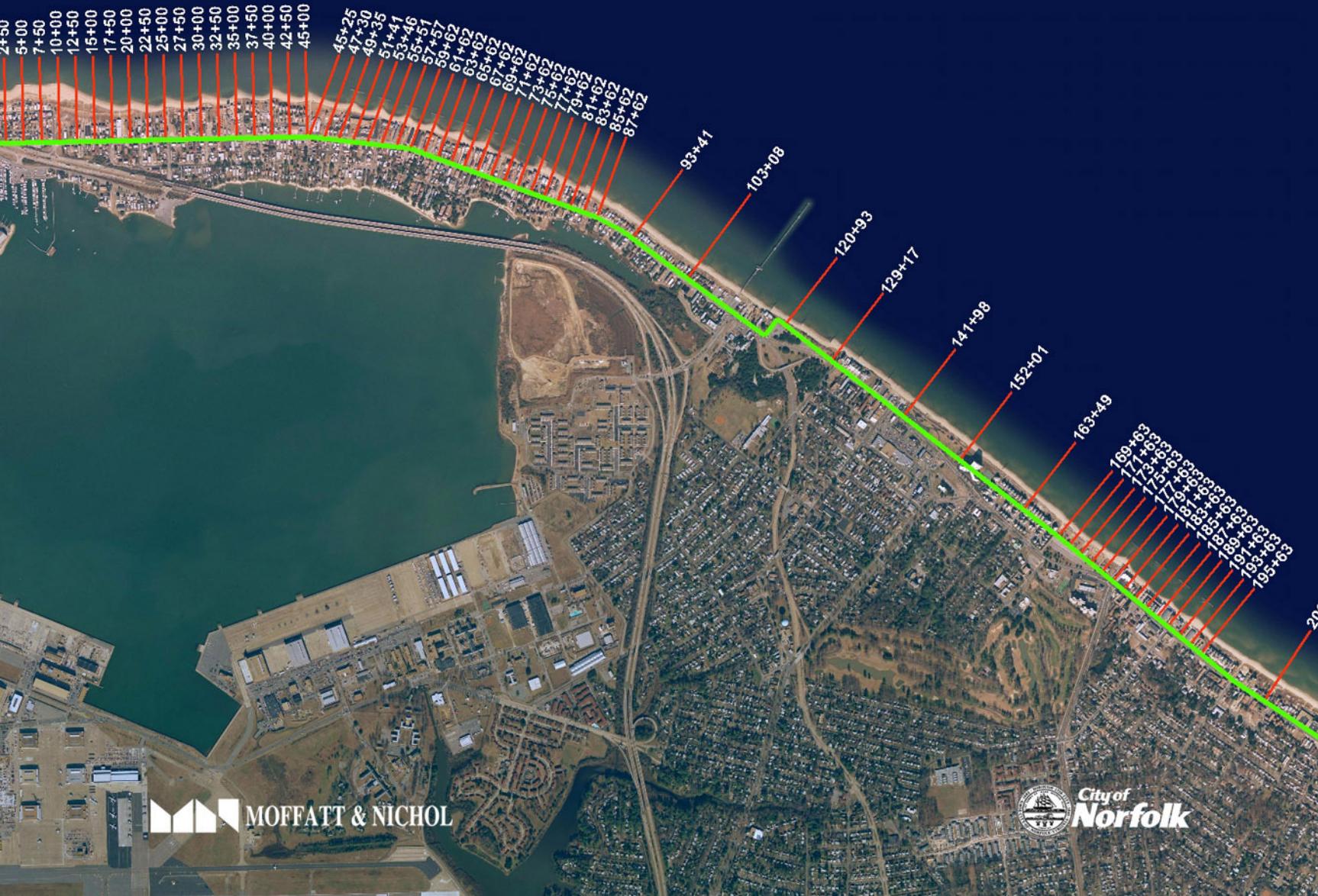


PERIODIC SURVEY EVALUATION: OCEAN VIEW BEACH



CITY OF NORFOLK, VIRGINIA

SPRING 2009



Executive Summary

The City of Norfolk, Virginia has a program of periodic surveying of the Ocean View shoreline. The study area extends from the western end of Willoughby Spit to the western edge of the Little Creek Inlet in East Ocean View. The periodic surveying data, collected by McKim & Creed, were obtained in September 2005, March 2006, October 2006, March 2007, October 2007, March 2008, October 2008, and April 2009. In addition, post-fill survey data was obtained for beach nourishment projects that were performed in regions of East Ocean View and Central Ocean View in March 2009 and January-March 2005, respectively. This report documents the data sources, methods, and results of a periodic surveying evaluation performed to compare the April 2009 survey data with previous surveys taken in March 2008 (spring to spring comparison), October 2008 (most recent surveys comparison), and the pre- and post-fill surveys from the East Ocean View and Central Ocean View nourishment projects, in March 2009 and March 2005, respectively.

Most recently, McKim & Creed conducted beach and bathymetric surveys of the Ocean View shoreline in April 2009. As done for previous surveys of Ocean View, the baseline and set of transects established for the September 2005 survey were used for the most recent survey. The transects were stationed from west to east along the shoreline from Willoughby Spit to Little Creek Inlet.

Linear and volumetric changes were calculated between the most recent survey and the March 2008 survey, the October 2008 survey, and the East Ocean View and Central Ocean View beach nourishment post-fill surveys. Linear changes were calculated at MHW (+0.98 ft NAVD88) and volumetric changes were calculated over two different extents of the profiles to provide a better understanding of the processes occurring both onshore and offshore. The two extents used for volume change comparison included portions of profiles above 0 ft NAVD88 and portions of profiles above -15 ft NAVD88.

Key statistics were computed for defined regions along Ocean View and the entire shoreline for the time period between both the March 2008 and April 2009 surveys and the October 2008 and April 2009 surveys. These values are discussed in Section 4.2 and Section 4.3.

Comparison	Parameter	Quantity
March 2008 vs. April 2009 Comparison	Average Shoreline Change Rate at MHW (+0.98 ft NAVD88)	13.91 ft/yr
	Cumulative Volume Change Rate Above 0 ft NAVD88	54,686 cy/yr
	Cumulative Volume Change Rate Above -15 ft NAVD88	258,284 cy/yr
October 2008 vs. April 2009 Comparison	Average Shoreline Change at MHW (+0.98 ft NAVD88)	15.26 ft
	Cumulative Volume Change Above 0 ft NAVD88	83,648 cy
	Cumulative Volume Change Above -15 ft NAVD88	206,455 cy

The average shoreline change rate for the entire shoreline at MHW between the March 2008 and April 2009 surveys was 13.9 ft/yr. The cumulative volume change above 0 ft NAVD88 was approximately 54,700 cy/yr between the March 2008 and April 2009 surveys, indicating an overall volumetric gain in the dune and subaerial beach over the past year. There was also a large volumetric gain above -15 ft NAVD88 of approximately 258,000 cy. Much of this is accounted for by the East Ocean View nourishment project. As is the case with previous

reports, the calculations of material gains and losses are subject to some hydrographic survey error.

In addition, comparison of the April 2009 survey was made against post-fill surveys from the East Ocean View beach nourishment and Willoughby Spit to Central Ocean View dune restoration which took place in March 2009 and January-March 2005 respectively. These values are discussed in Section 4.4 and Section 4.5.

Comparison	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
East Ocean View Nourishment vs. April 2009 Comparison	0.54 ft	-3.07 cy/ft	-16,182 cy	-5.13 cy/ft	-26,989 cy
Central Ocean View Nourishment vs. April 2009 Comparison	-21.06 ft	-6.31 cy/ft	-120,323 cy	-3.04 cy/ft	-57,542 cy

Approximately 16,000 cy of material has been lost in the East Ocean View area above 0 ft NAVD88 since the nourishment project which took place in March 2009. This is approximately 14.2% of the original amount of fill placed above the 0 ft contour (~ 113,000 cy). Approximately 27,000 cy of material has been lost above -15 ft NAVD88, leaving 86.2% of the original 196,000 cy of fill placed within the East Ocean View project region in the system above -15 ft NAVD88. The Willoughby Spit to Central Ocean View region has lost approximately 120,300 cy of material from the dune system and/or subaerial beach since the project completion in March 2005. This is approximately 37.5% of the total material placed above 0 ft NAVD88 during the dune restoration and a large loss of storm protection.

As another measure of protection being supplied by the East Ocean View and Central Ocean View nourishment projects, the pre-fill and April 2009 MHW shoreline positions were compared. Areas where the current shoreline has receded beyond or eroded within 20 ft of the pre-fill shoreline may need to be targeted for immediate nourishment. Results of this analysis indicated that the recent East Ocean View nourishment project provides ample protection to the East Ocean View shoreline. The Willoughby Spit to Central Ocean View shoreline continues to have various problem spots. A portion of the shoreline in the Willoughby Spit groinfield, the shoreline to the west of the 800 Block breakwaters and a small section within the breakwater field itself, and the shoreline between the 800 Block breakwaters and Central Ocean View breakwaters has eroded to within 20 ft of the pre-fill shoreline and even receded beyond the pre-fill shoreline in many cases.

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1.0 Objective

The City of Norfolk, Virginia has a program of periodic surveying of the Ocean View shoreline. The periodic surveying data, collected by McKim & Creed, were obtained in September 2005, March 2006, October 2006, March 2007, October 2007, March 2008, October 2008 and most recently April 2009. This report documents the data sources, methods, and results of a periodic surveying evaluation performed to compare the April 2009 survey data with previous surveys taken in March 2008 (spring to spring comparison) and October 2008 (most recent survey comparison) in the Ocean View Beach area between Willoughby Spit and Little Creek Inlet. In addition, comparison of the most recent survey (April 2009) was made to pre-fill and post-fill surveys from the Central Ocean View beach nourishment project that took place in January-March 2005 and the East Ocean View beach nourishment project that was most recently renourished in March 2009.

2.0 Data Sources

Most recently, McKim & Creed conducted a survey of Ocean View Beach in April 2009. The baseline and transects established for the September 2005 survey were used for the most recent survey. **Figure 1** shows the location of the baseline, transects, and the stationing applied by McKim & Creed for the surveying. The established baseline and transects will be used in all future surveys. As shown, transects were stationed from west to east along the Ocean View shoreline. The survey data was obtained in CAD, xyz, and ISRP (BMAP) formats allowing for compatibility with multiple programs. Previous survey data collected by McKim & Creed in October 2008 and March 2008 was also used for comparisons in this study.

McKim & Creed noted that typical survey accuracy along the hydrographic portions of the profiles is approximately ± 3 inches. 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 and long profiles near Willoughby Spit. Therefore, volumetric changes discussed herein are analyzed with regard to potential volumetric margins of error.

Also, in April 2009, the Virginia Institute of Marine Science (VIMS) flew aerial photography of the Ocean View shoreline, georectified these images, and digitized a shoreline position from the images. The April 2009 aerial photos with the digitized shoreline position are presented in **Appendix A**. Since these photos cover a limited portion of area landward and seaward of the shoreline, a previous image (2000) is underlain, for presentation purposes.

In addition, pre-fill survey data from the East Ocean View beach nourishment, taken in March 2009, and the Willoughby Spit to Central Ocean View dune restoration, taken in December 2004-February 2005, was used. Post-fill surveys taken for the East Ocean View beach nourishment and Willoughby Spit to Central Ocean View dune restoration projects in March 2009 and March 2005 respectively were also used. Pre-fill and post-fill data was available in xyz format from previous studies of these projects by Moffatt & Nichol.

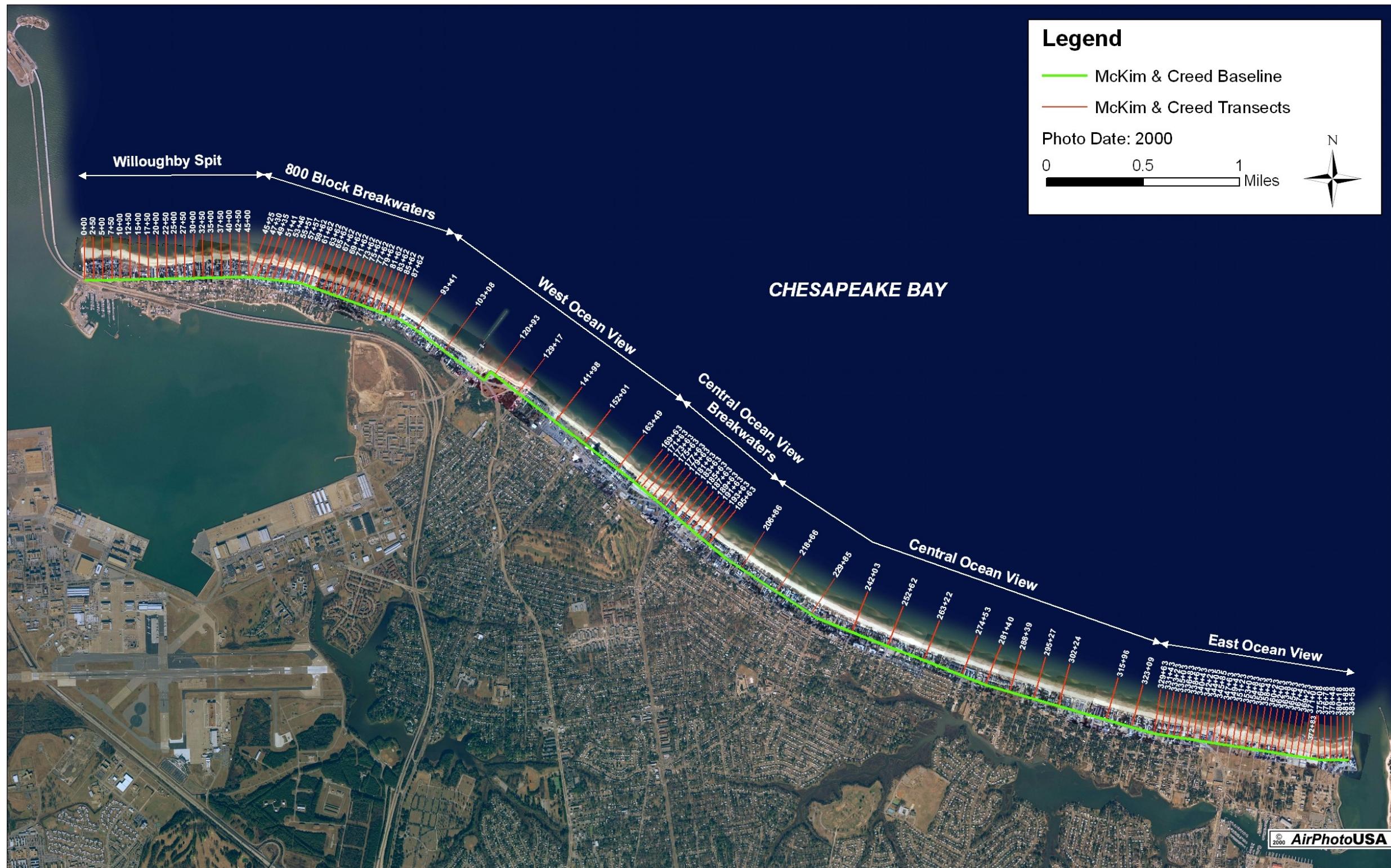


Figure 1. Survey Baseline and Transects

3.0 Methods

Survey comparisons and respective analysis were performed using a combination of Autodesk Civil 3D 2007 (Civil 3D), Autodesk Land Development Desktop 2007 (LDD), Microsoft Excel (Excel), and Beach Morphology Analysis Package (BMAP). Civil 3D and LDD are AutoCAD based programs which allow the user to create and analyze Digital Terrain Models (DTMs). BMAP is a program developed by the USACE to analyze morphologic and dynamic properties of beach profiles.

All pertinent survey data were imported into Civil 3D in xyz format. The horizontal coordinate system used was State Plane NAD 1983 (HARN), US Survey feet with a vertical datum of NAVD88 (ft). Digital Terrain Models (DTMs) were created for each set of survey data. From these surfaces, a beach profile was extracted at each survey transect in station elevation format. Individual profile plates showing the extracted profile at each transect for each date are presented in **Appendix B**. From the profiles, shoreline change and volumetric change were then calculated at each transect for the following time periods:

1. March 2008 to April 2009 (Entire Shoreline)
2. October 2008 to April 2009 (Entire Shoreline)
3. March 2009 (East Ocean View post-fill) to April 2009 (Sta 329+63-Sta 383+58)
4. March 2009 (East Ocean View pre-fill) to April 2009 (Sta 329+63-Sta 383+58)
5. March 2005 (Central Ocean View post-fill) to April 2009 (Sta 15+00-Sta 195+63)
6. December 2004-February 2005 (Central Ocean View pre-fill) to April 2009 (Sta 15+00-Sta 195+63)

First, change in shoreline position at mean high water (MHW), which was defined as +0.98 ft NAVD88 (based on NOAA tidal benchmark at Sewell's Point), was calculated at each transect for all time periods mentioned. The resulting value represents the shoreline change (ft) 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 for two different extents in order to better understand the processes occurring onshore and offshore of the Ocean View beach area. Calculations included volume change above -15 ft NAVD88 and volume change above 0 ft NAVD88. As with the shoreline change, the results represent volume change (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 between surveys based on the applicable profile extents.

Volume changes calculated for portions of the profiles above 0 ft NAVD88 are representative of changes in the amount of material in the dune system and on the subaerial beach. These areas

are highly influenced by the performance of coastal structures and the impact of storm activity. Volume comparisons for portions of the profiles above -15 ft NAVD88 allow for the tracking of sand movement offshore while reducing the amount of error associated with the survey data by eliminating changes beyond this depth related to the vertical margin of error in the hydrographic survey data (± 3 inches). This is a comprehensive way to assess the impact of coastal structures and storm activity on the subaerial beach and dune system as well as track the movement of sand offshore and quantify total gains and losses in the entire system.

It should be noted that the most recent survey took place from April 6, 2009 to April 30, 2009. Upland, surf zone, and hydrographic surveys often took place on different days for each transect. For this report, shoreline and volume change rates were calculated using the date April 15, 2009 for the most recent survey data.

4.0 Discussion of Periodic Surveying Evaluation

This section will discuss differences observed in the relative surveys, overall shoreline trends, regional shoreline trends, and the East Ocean View and Central Ocean View nourishment projects. The computed shoreline changes and volume changes at each individual transect for the time periods being covered are tabulated in **Appendix C**.

4.1. Differences in Relative Surveys

Differences in the surveys taken as part of the ongoing program of periodic surveying of the Ocean View shoreline (March 2008, October 2008, and April 2009) were minimal due to use of the same baseline and transects put in place by McKim & Creed for the initial survey in September 2005. Profile extents and alignment were virtually the same when comparing the survey data. The only discrepancy which may have impacted calculations was the vertical margin of error in the hydrographic portion of the survey as mentioned in Section 2.0.

The pre-fill and post-fill surveys taken for the East Ocean View and Central Ocean View nourishment projects did not use the same baseline and transects or cover the same extents as the periodic surveys. Therefore, the profiles extracted from the DTMs in Civil3D at the periodic surveying transects are interpolations between the actual pre- and post-fill data points. In addition, the surveys did not extend as far offshore as the periodic surveys, limiting computations and the ability to track the offshore movement of sand.

4.2. General Shoreline Trends

Key statistics were calculated to describe the average shoreline and volume changes over the entire shoreline as well as for each region of the shoreline as defined in **Figure 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 March 2008 to April 2009 comparison are presented in **Table 1**. A summary of the resulting statistics for the October 2008 to April 2009 comparison are presented in **Table 2**. Evaluation of the computed statistics took into account volume changes computed for portions of the profile above 0 ft NAVD88 and portions of the profile above -15 ft NAVD88 in order to better understand onshore and offshore processes.

Table 1. Regional Shoreline and Volume Change Statistics (March 2008 – April 2009 Comparison)

Region	Average Shoreline Change Rate (ft/yr)	Average Volume Change Rate Above 0 ft NAVD88 (cy/ft/yr)	Cumulative Volume Change Rate Above 0 ft NAVD88 (cy/yr)	Average Volume Change Rate Above -15 ft NAVD88 (cy/ft/yr)	Cumulative Volume Change Rate Above -15 ft NAVD88 (cy/yr)
Willoughby Spit (0+00 to 45+00)	-3.25	0.53	2,808	11.02	49,135
800 Block Breakwaters (45+25 to 87+62)	-1.42	0.30	1,511	0.92	4,371
West Ocean View (93+41 to 163+49)	-1.23	-1.23	-8,788	-1.91	-13,258
Central Ocean View Breakwaters (169+63 to 195+63)	2.74	0.79	3,312	0.97	4,709
Central Ocean View (206+86 to 323+09)	3.86	1.95	25,508	3.22	43,617
East Ocean View (329+63 to 383+58)	88.47	5.22	30,335	30.81	169,710
OVERALL	Weighted Avg (ft/yr)	Weighted Avg (cy/ft/yr)	Total (cy/yr)	Weighted Avg (cy/ft/yr)	Total (cy/yr)
	13.91	1.34	54,686	6.76	258,284

Table 2. Regional Shoreline and Volume Change Statistics (October 2008 – April 2009 Comparison)

Region	Average Shoreline Change (ft)	Average Volume Change Above 0 ft NAVD88 (cy/ft)	Cumulative Volume Change Above 0 ft NAVD88 (cy)	Average Volume Change Above -15 ft NAVD88 (cy/ft)	Cumulative Volume Change Above -15 ft NAVD88 (cy)
Willoughby Spit (0+00 to 45+00)	-0.81	0.72	3,477	-0.73	-4,468
800 Block Breakwaters (45+25 to 87+62)	-5.95	0.07	319	-5.57	-25,280
West Ocean View (93+41 to 163+49)	-0.56	-0.36	-3,294	-2.26	-18,703
Central Ocean View Breakwaters (169+63 to 195+63)	7.04	0.79	1,755	2.37	4,029
Central Ocean View (206+86 to 323+09)	0.39	3.80	48,044	3.20	45,735
East Ocean View (329+63 to 383+58)	103.29	5.93	33,347	37.09	205,141
OVERALL	Weighted Avg (ft)	Weighted Avg (cy/ft)	Total (cy)	Weighted Avg (cy/ft)	Total (cy)
	15.26	2.22	83,648	5.60	206,455

According to **Table 1** and **Table 2**, the Ocean View shoreline has experienced overall accretion at MHW over the past year, mostly due to the East Ocean View nourishment project which took place in March 2009 and the relatively quiet nor'easter season. Regions other than East Ocean View saw only minor gains and losses at MHW over the past year. The volume change above 0 ft NAVD88 and -15 ft NAVD88 was also positive. The recent East Ocean View project placed approximately 196,000 cy of material on the beach in the East Ocean View region. In addition to the large gains in East Ocean View due to the nourishment project, the remainder of the shoreline had accretional volumetric trends over the last year with the exception of West Ocean View which saw some slight volumetric erosion. It should be noted that the hydrographic error discussed in Section 2.0 may still have had an impact on calculated quantities.

While the overall trends over the past year are accretional and have been greatly influenced by the East Ocean View nourishment project, patterns vary within each region of the shoreline as defined in **Figure 1**. The calculated statistics with respect to each region will be discussed in more detail in the following section.

4.3. Regional Shoreline Trends

Regional shoreline trends are discussed below for the defined regions between Willoughby Spit and Little Creek Inlet (see **Figure 1**). A summary of the information in **Table 1** and **Table 2** has been created for each region of study. **Figure 2** through **Figure 5**, following the discussion of regional shoreline trends, present the shoreline and volume change at each transect within the defined regions.

4.3.1. Willoughby Spit

The Willoughby Spit region (Sta 0+00 to Sta 45+00) includes two offshore breakwaters, timber groins, and has historically been a stable and accreting region. A summary of average shoreline and volume change rates between March 2008 and April 2009 for the Willoughby Spit region along with average shoreline and volume change quantities between October 2008 and April 2009 are presented in **Table 3**.

Table 3. 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
March 2008 vs. April 2009 Comparison					
Willoughby Spit (0+00 to 45+00)	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
	-3.25	0.53	2,808	11.02	49,135
October 2008 vs. April 2009 Comparison					
Willoughby Spit (0+00 to 45+00)	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
	-0.81	0.72	3,477	-0.73	-4,468

Table 3 indicates that during the time between the two spring surveys (March 2008 and April 2009), this region experienced an average shoreline recession rate of -3.25 ft/yr at MHW. Conversely, the region experienced a volumetric gain above 0 ft NAVD88 and -15 ft NAVD88 of 2,800 cy/yr and 49,000 cy/yr respectively. Examination of the profile plots in **Appendix B** shows that accretion is occurring between the elevations of 0 ft NAVD88 and -5 ft NAVD88 at the transects closest to the terminal groin. **Figure 3** shows the area closest to Willoughby spit (Sta 0+00 to Sta 20+00) continues to accrete at the highest rate, decreasing as distance from the spit increases eastward. This is due to the natural direction of littoral drift and sediment movement from east to west, causing accretion in the direction of the spit.

4.3.2. 800 Block Breakwaters

The 800 Block Breakwaters region (Sta 45+25 to Sta 87+62) is characterized by a field of 8 breakwaters. The easternmost breakwater was built in February 2006 along with removal of the pre-existing groin spur and toe extension. This new breakwater was built further offshore since the previous structural configuration caused the beach to fill out and impair natural sediment transport to the west. A summary of average shoreline and volume change rates between March 2008 and April 2009 for the 800 Block Breakwater region along with average shoreline and volume change quantities between October 2008 and April 2009 are presented in **Table 4**.

Table 4. 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
March 2008 vs. April 2009 Comparison					
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
800 Block Breakwaters (45+25 to 87+62)	-1.42	0.30	1,511	0.92	4,371
October 2008 vs. April 2009 Comparison					
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
800 Block Breakwaters (45+25 to 87+62)	-5.95	0.07	319	-5.57	-25,280

The comparison between profiles in the 800 Block Breakwater region indicates slight erosion at MHW and slight volumetric accretion above 0 ft NAVD88 and -15 ft NAVD88 over the past year from March 2008 to April 2009 even though trends over the past six months from October 2008 to April 2009 show some erosion. **Figure 3** shows varying accretion and erosion throughout the region. The most notable point is the large erosion at Sta 71+62. Upon inspection of aerial photography, this station is immediately west of the two easternmost breakwaters which had formed tombolos as of the October 2007 periodic survey. Tombolo formation has interrupted sediment transport to the west, causing erosion at this transect and behind the breakwater to the west of it (Sta 69+62). The system seems to recover westward of these transects. Ultimately it is hoped that a large storm event would rework the shoreline and more equally distribute the sand within the system. If that does not occur soon, targeted small beach nourishment or some reworking of the beach may be required in the immediate future.

4.3.3. West Ocean View

The West Ocean View area (Sta 93+41 to Sta 163+49), between the 800 Block and Central Ocean View breakwaters, is characterized by a series of timber groins. A summary of average shoreline and volume change rates between March 2008 and April 2009 for the West Ocean View region along with average shoreline and volume change quantities between October 2008 and April 2009 are presented in **Table 5**.

Table 5. 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
March 2008 vs. April 2009 Comparison					
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
West Ocean View (93+41 to 163+49)	-1.23	-1.23	-8,788	-1.91	-13,258
October 2008 vs. April 2009 Comparison					
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
West Ocean View (93+41 to 163+49)	-0.56	-0.36	-3,294	-2.26	-18,703

The March 2008 to April 2009 comparison showed recession of the MHW shoreline as well as slight overall volumetric erosion above 0 ft NAVD88 and above -15 ft NAVD88. **Figure 2** and **Figure 3** shows that the region is fairly stable with only minor changes from erosion to accretion along the shoreline. It is apparent that the erosion is slightly worse at the eastern portion of the region which is downdrift of the Central Ocean View breakwater field and may experience some effects of the end of the breakwater field. Profile plots in **Appendix B** show that the loss is occurring slightly landward of an offshore bar located approximately 300 - 400 ft offshore.

4.3.4. Central Ocean View Breakwaters

The Central Ocean View breakwater region covers the four offshore breakwaters at Central Ocean View and approximately 800 feet westward (Sta 169+93 to Sta 195+63). A summary of average shoreline and volume change rates between March 2008 and April 2009 for the Central Ocean View Breakwaters region along with average shoreline and volume change quantities between October 2008 and April 2009 are presented in **Table 6**.

Table 6. 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
March 2008 vs. April 2009 Comparison					
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
Central Ocean View Breakwaters (169+63 to 195+63)	2.74	0.79	3,312	0.97	4,709
October 2008 vs. April 2009 Comparison					
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
Central Ocean View Breakwaters (169+63 to 195+63)	7.04	0.79	1,755	2.37	4,029

In the Central Ocean View Breakwaters region, the volumetric changes above 0 ft NAVD88 and above -15 ft NAVD88 both indicate volumetric accretion of the area as well as of the shoreline at MHW. **Figure 2** through **Figure 5** show varying accretion and erosion across the region. Overall though, the breakwaters seem to be protecting the beach in this region.

4.3.5. 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 between March 2008 and April 2009 for the Central Ocean View region along with average shoreline and volume change quantities between October 2008 and April 2009 are presented in **Table 7**.

Table 7. 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
March 2008 vs. April 2009 Comparison					
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
Central Ocean View (206+86 to 323+09)	3.86	1.95	25,508	3.22	43,617
October 2008 vs. April 2009 Comparison					
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
Central Ocean View (206+86 to 323+09)	0.39	3.80	48,044	3.20	45,735

As seen in **Table 7**, Central Ocean View has experienced shoreline accretion at MHW over the past year as well as accretion above 0 ft NAVD88 and above -15 ft NAVD88. The Central Ocean View region is unprotected and therefore more vulnerable to erosion, but has in the past been a very stable region. This trend continues to be seen. It is likely that the region will benefit from material placed in East Ocean View during the recent nourishment project. As will be seen in the Section 4.4, the East Ocean View region has lost approximately 27,000 cy of nourishment material in the month since the project was completed. Some of this material was likely captured offshore near the breakwaters and some was likely transported westward due to the direction of the natural littoral drift, causing accretion of the Central Ocean View region. A portion was also likely transported offshore as the profile equilibrates and fines are transported offshore.

4.3.6. East Ocean View

The East Ocean View region (Sta 329+63 to Sta 383+58) is characterized by 10 breakwaters of which the 3 easternmost were built in February of 2006. Most recently, a beach renourishment project took place in March 2009, adding approximately 196,000 cy of material to the beach. A summary of average shoreline and volume change rates between March 2008 and April 2009 for the East Ocean View region along with average shoreline and volume change quantities between October 2008 and April 2009 are presented in **Table 8**.

Table 8. 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
March 2008 vs. April 2009 Comparison					
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
East Ocean View (329+63 to 383+58)	88.47	5.22	30,335	30.81	169,710
October 2008 vs. April 2009 Comparison					
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
East Ocean View (329+63 to 383+58)	103.29	5.93	33,347	37.09	205,141

As a result of the recent nourishment project, there have been large gains in material since the previous survey. In addition to the nourishment, construction has also begun on 5 new breakwaters which will be added to the western end of the existing breakwater field. This will help to alleviate a previous problem concerning the end effects of the existing breakwater field causing erosion to the western portion of East Ocean View (Bay Oaks hotspot). **Figure 2** through **Figure 5** show that the erosion hotspot which was evident at the western end of the breakwater field in the previous report has been adequately filled with new material and construction of the new breakwaters is expected to help hold this material in place. The figures also show the large gain in material from the nourishment project. A large amount of fill was placed behind the 3 easternmost breakwaters which are normally starved for material since the jetty blocks natural sediment transport to this area. The area just to the west of the existing breakwater field also received some extra material as this was previously a hotspot.

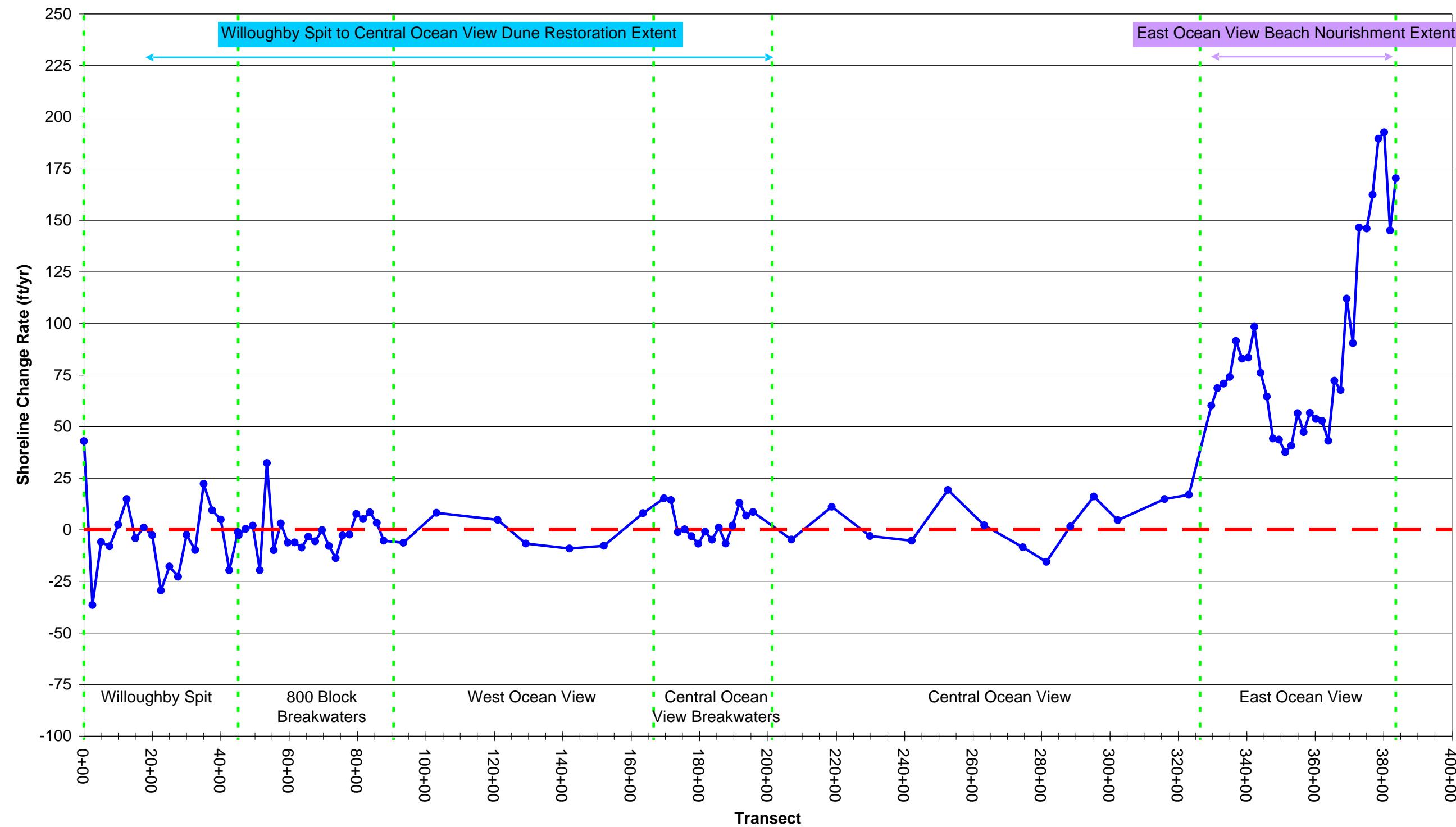


Figure 2. Shoreline Change Rate (ft/yr) At Mean High Water (+0.98 ft NAVD88) For March 2008 to April 2009
(Note: Positive=Accretion, Negative=Erosion)

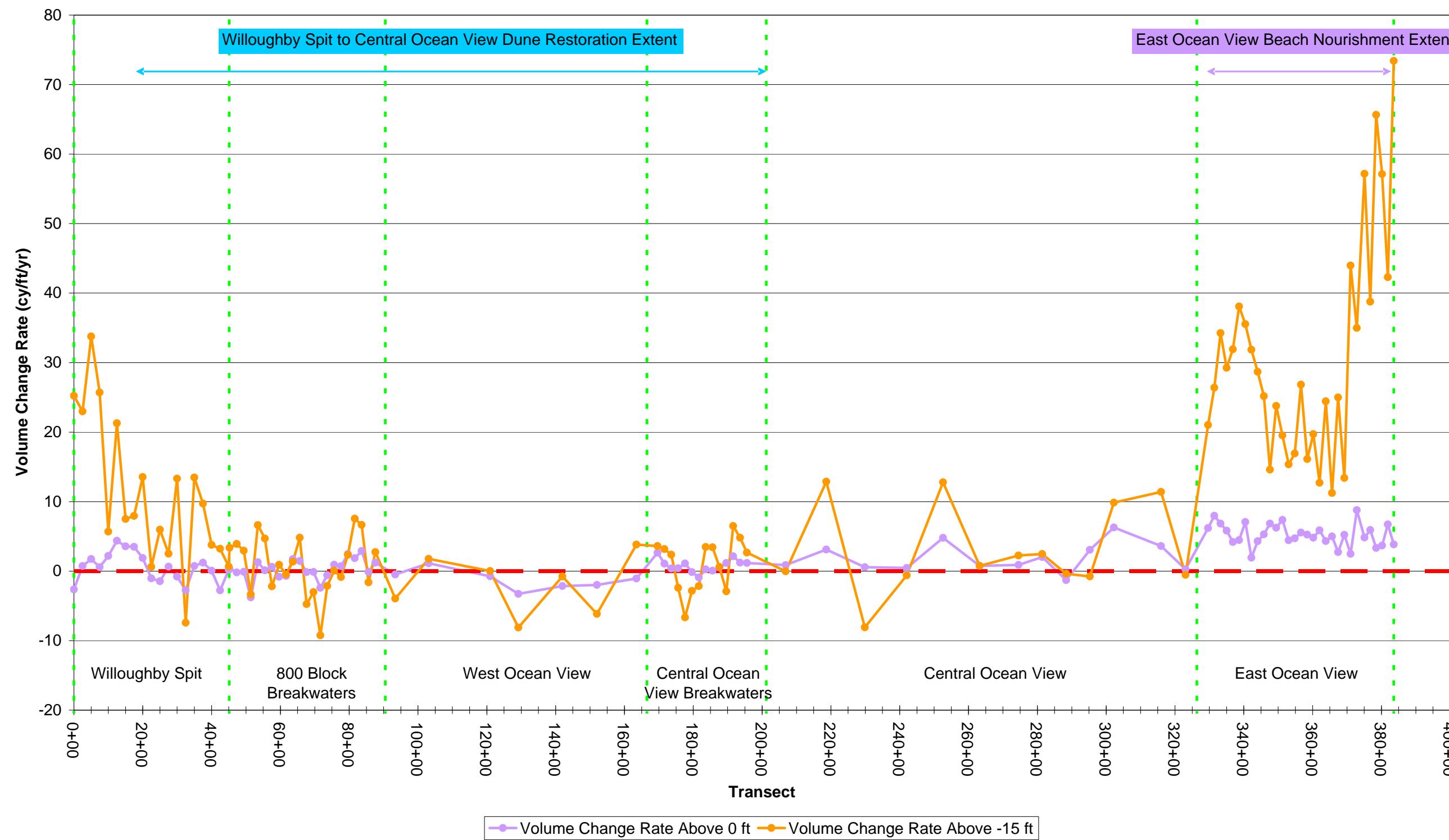


Figure 3. Volume Change Rate (cy/ft/yr) For March 2008 to April 2009
(Note: Positive=Volume Gain, Negative=Volume Loss)

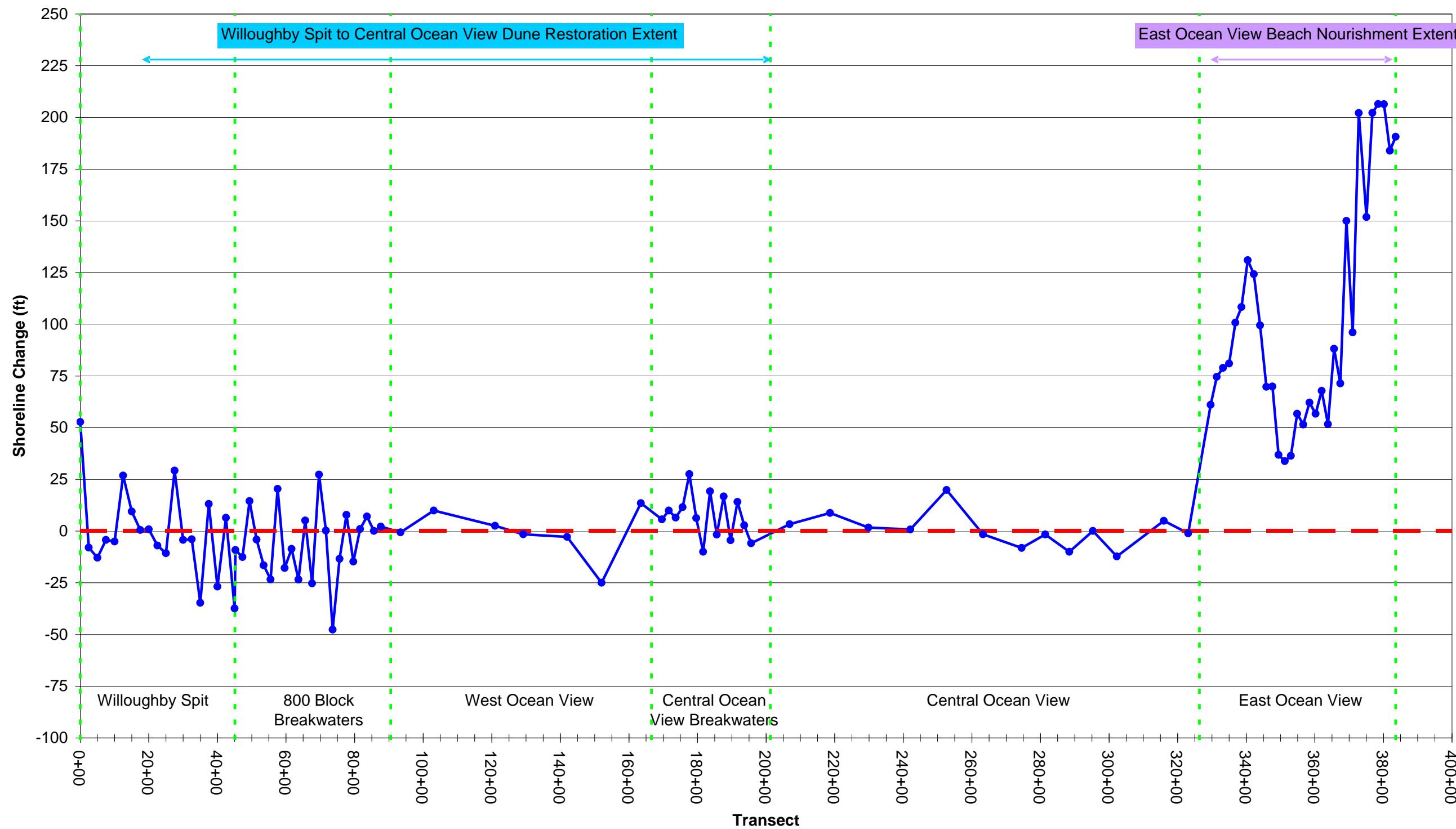


Figure 4. Shoreline Change (ft) At Mean High Water (+0.98 ft NAVD88) For October 2008 to April 2009
(Note: Positive=Accretion, Negative=Erosion)

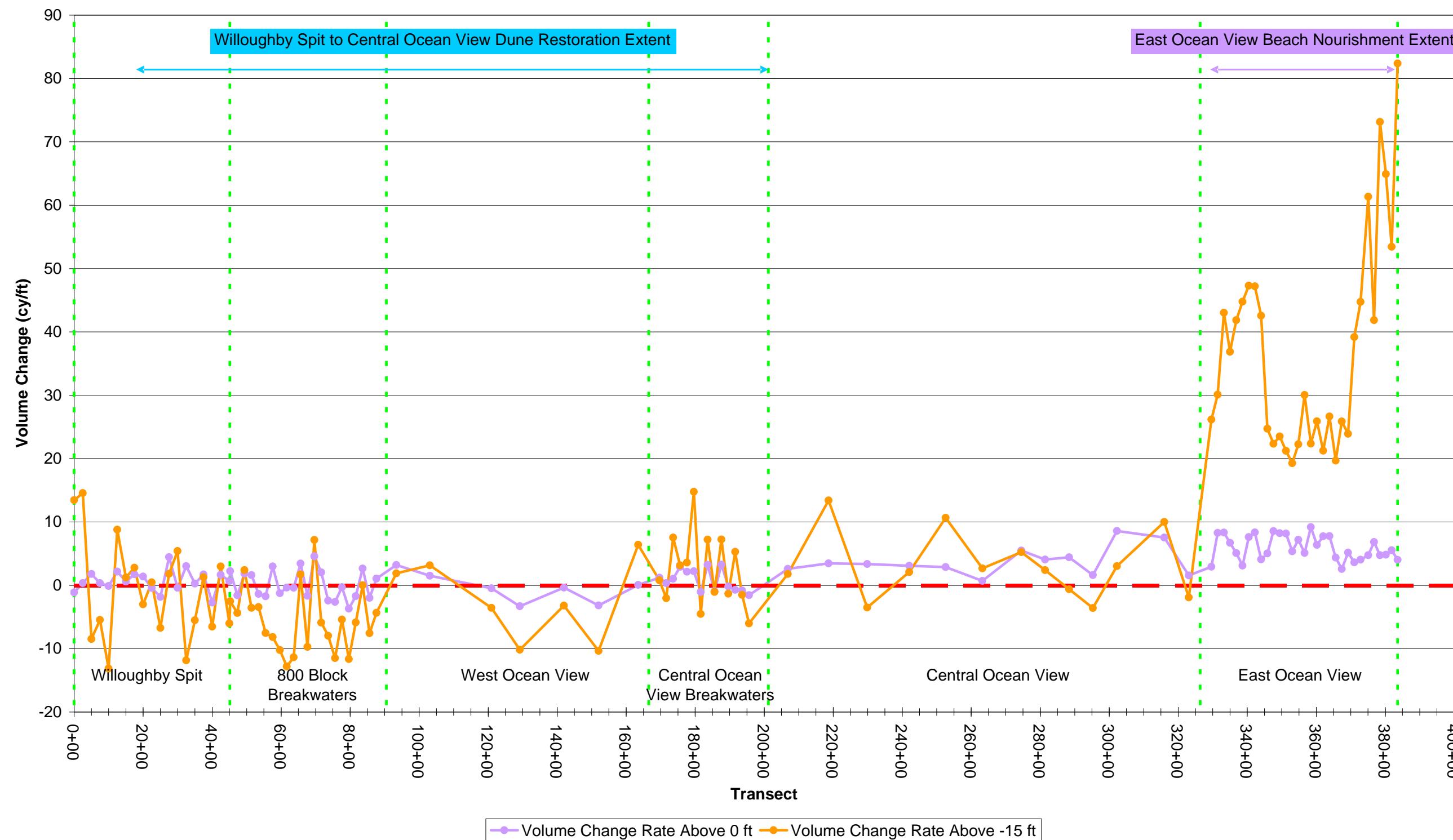


Figure 5. Volume Change (cy/ft) For October 2008 to April 2009
(Note: Positive=Volume Gain, Negative=Volume Loss)

4.4. East Ocean View Beach Nourishment Project (2009)

Previously, a beach nourishment project took place along the East Ocean View shoreline in November 2003. Approximately 359,000 cy of material was placed on the beach between Sta 329+63 and Sta 383+58. Most recently, the East Ocean View shoreline was renourished with approximately 196,000 cy of material in March 2009. The most recent periodic survey, taken in April 2009, was compared to the post-fill survey taken in March 2009. **Table 9** presents the shoreline and volume change statistics comparing the two surveys.

Table 9. Overall Shoreline and Volume Change Statistics – East Ocean View Nourishment Project (Post-Fill – April 2009 Comparison)

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
East Ocean View (329+63 to 383+58)	0.54 ft	-3.07 cy/ft	-16,182 cy	-5.13 cy/ft	-26,989 cy

Results indicate that the East Ocean View shoreline at MHW has not moved much since the nourishment project was completed one month prior. Roughly 16,000 cy of material has been lost above 0 ft NAVD88, or approximately 14.2% of the 113,000 cy originally placed above 0 ft NAVD88. Approximately 27,000 cy of material has been lost above -15 ft NAVD88, leaving 86.2% of the original 196,000 cy of fill placed within the East Ocean View project region in the system above the elevation -15 ft NAVD88. This loss is the result of the expected increased erosion over the short term due to profile equilibration of the recent nourishment project. Over the course of the next few surveys, these rates should decrease as profile equilibration is achieved. **Figure 6** shows areas of volume gain and volume loss between the post-fill survey and the April 2009 survey. As can be seen in the figure, there has been erosion of the beach face and nearshore, which is to be expected after a nourishment project as profiles equilibrate. It is notable that the eroded material from the beach face and nearshore appears to be caught offshore in the vicinity of the breakwaters.

In addition, the April 2009 MHW shoreline was compared to the pre-fill MHW shoreline as another way to measure the amount of protection being supplied by the March 2009 nourishment project. Areas where the current shoreline is within 20 ft of the pre-fill shoreline may need to be targeted for nourishment. **Figure 7** shows the MHW shoreline position difference between the pre-fill and April 2009 shorelines. As can be seen, the recent nourishment project has provided ample protection along the East Ocean View shoreline. The portion of the shoreline closest to the original pre-fill position occurs at Sta 353+03 and is 44 ft away.

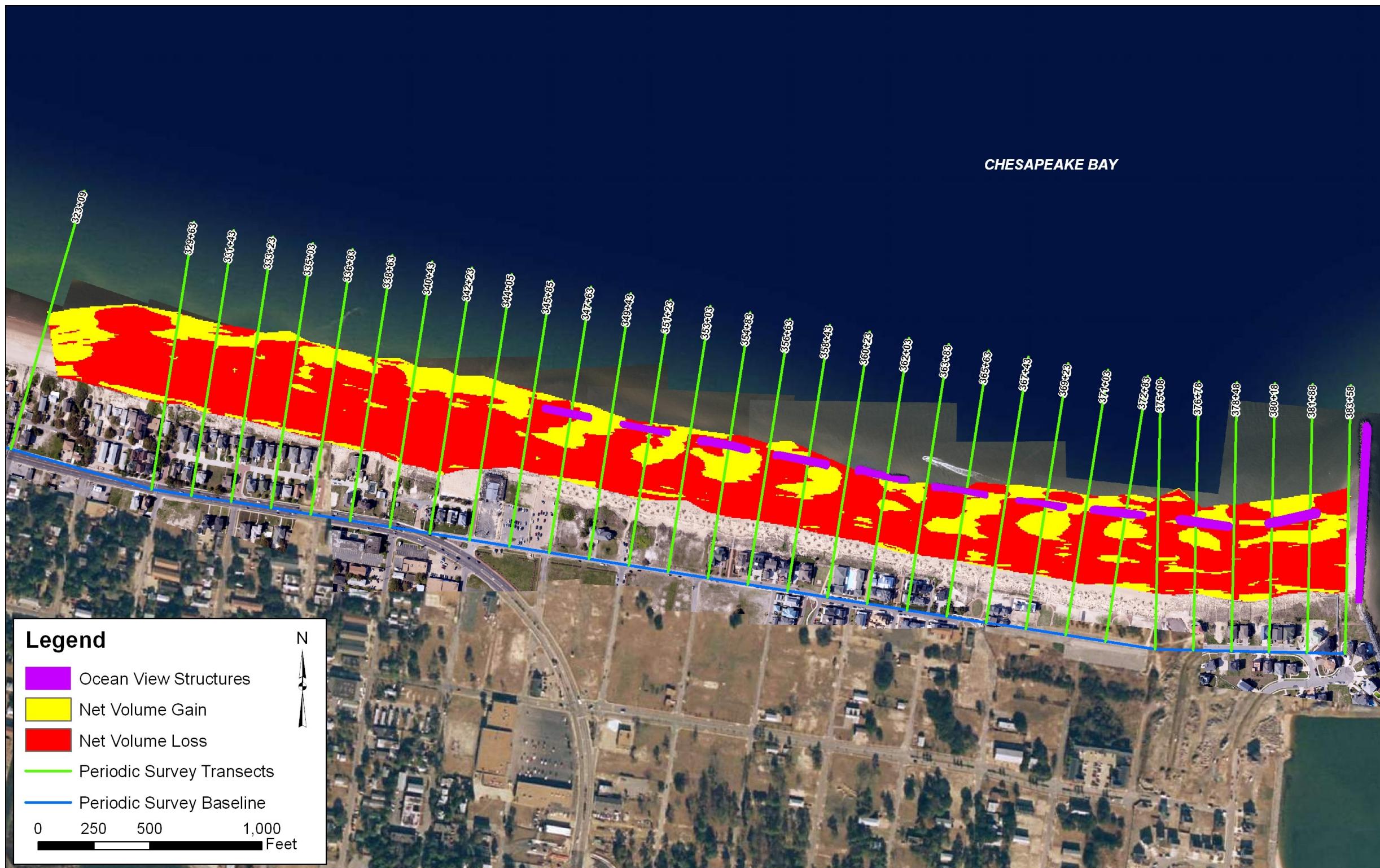


Figure 6. Net Volume Change Since the East Ocean View Nourishment Project (March 2009)

Periodic Survey Evaluation
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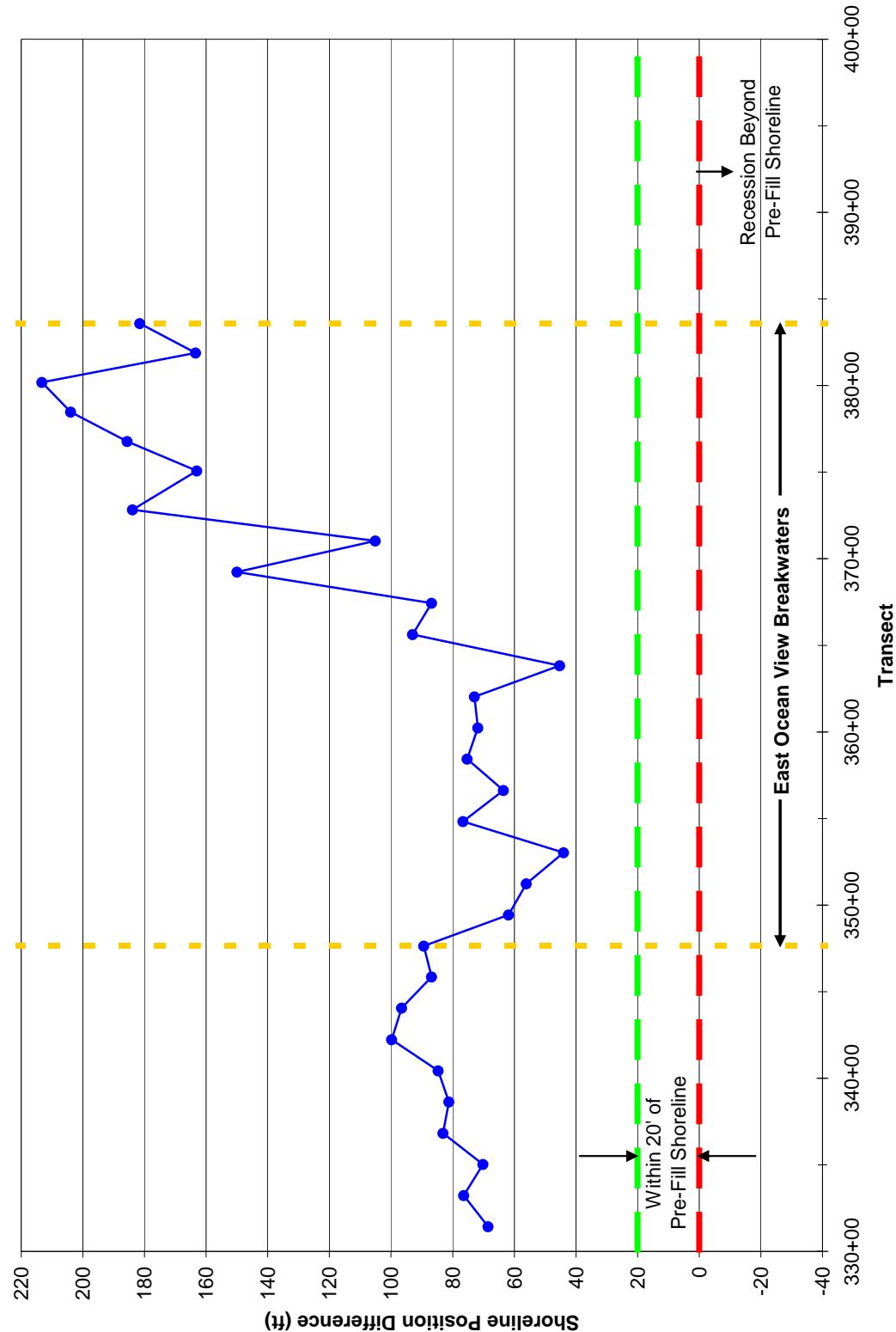


Figure 7. Shoreline Position Difference (ft) at MHW Between Pre-Fill and April 2009 Shorelines for East Ocean View

4.5. Central Ocean View Dune Restoration Project (2005)

The most recent periodic survey, taken in April 2009, was also compared to the post-fill survey taken in March 2005 after completion of the Willoughby Spit to Central Ocean View Dune Restoration project. A total of 504,300 cy of sand was placed from Sta 15+00 to Sta 195+63. **Table 10** presents the shoreline and volume change statistics comparing the two surveys.

Table 10. Regional and Overall Shoreline and Volume Change Statistics for Central Ocean View Nourishment Project (Post-Fill – April 2009 Comparison)

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
Willoughby Spit (0+00 to 45+00)	Rate per Year	-4.48 ft/yr	-1.83 cy/ft/yr	-5,614 cy/yr	-2.03 cy/ft/yr	-5,972 cy/yr
	Total	-18.30 ft	-7.47 cy/ft	-22,947 cy	-8.30 cy/ft	-24,413 cy
800 Block Breakwaters (45+25 to 87+62)	Rate per Year	-5.74 ft/yr	-0.78 cy/ft/yr	-3,239 cy/yr	-2.10 cy/ft/yr	-8,957 cy/yr
	Total	-23.47 ft	-3.19 cy/ft	-13,240 cy	-8.60 cy/ft	-36,612 cy
West Ocean View (93+41 to 163+49)	Rate per Year	-6.49 ft/yr	-2.38 cy/ft/yr	-18,965 cy/yr	-0.60 cy/ft/yr	-5,220 cy/yr
	Total	-26.55 ft	-9.72 cy/ft	-77,522 cy	-2.47 cy/ft	-21,336 cy
Central Ocean View Breakwaters (169+63 to 195+63)	Rate per Year	-2.05 ft/yr	-0.45 cy/ft/yr	-1,618 cy/yr	1.90 cy/ft/yr	6,072 cy/yr
	Total	-8.37 ft	-1.86 cy/ft	-6,614 cy	7.75 cy/ft	24,820 cy
OVERALL		Weighted Avg	Weighted Avg	Total	Weighted Avg	Total
Rate per Year		-5.15 ft/yr	-1.54 cy/ft/yr	-29,435 cy/yr	-0.74 cy/ft/yr	-14,077 cy/yr
Total		-21.06 ft	-6.31 cy/ft	-120,323 cy	-3.04 cy/ft	-57,542 cy

The beach from Willoughby Spit to Central Ocean view shows a net loss of material above -15 ft NAVD88 since the post-fill survey in March 2005. However, it is more important to consider changes above the 0 ft contour since the project was primarily a dune restoration, placing the majority of sand above the water. **Table 10** shows that there has been significant loss of material in the dune system and subaerial beach above 0 ft NAVD88 since the project was completed. Roughly 120,300 cy of material has been lost above 0 ft NAVD88, or approximately 37.5% of the 320,700 cy originally placed above 0 ft NAVD88. This is slightly more than what was stated in the previous report. **Figure 8** supports the calculated statistics by showing more losses to the dunes and subaerial beach than offshore. This dune/subaerial beach material is likely being transported offshore but remaining within the system, as evidenced by the smaller cumulative material loss quantities above -15 ft NAVD88. Although the material remains within the system, storm protection is being lost as material is moved offshore from the dune and subaerial beach system.

In addition, the April 2009 MHW shoreline was compared to the pre-fill MHW shoreline as another way to measure the amount of protection still being supplied by the January-March 2005 nourishment (dune restoration) project. Areas where the current shoreline is within 20 ft of the pre-fill shoreline may need to be targeted for nourishment. **Figure 9** shows the MHW shoreline position difference between the pre-fill and April 2009 shorelines. As can be seen, the April 2009 Willoughby Spit to Central Ocean View MHW shoreline comes within 20 ft of the pre-fill shoreline in various locations and has even receded past the pre-fill shoreline at a few locations. One area of concern is the shoreline to the west of the 800 Block breakwater field as well as portions of the breakwater field itself which exist westward of the tombolo formation at Sta 73+62 and Sta 77+62. The breakwaters are most likely inhibiting the transport of sand to the western portion of the field and shoreline beyond. Portions of the shoreline in the groin field of the Willoughby Spit region also appear to be retreating to the pre-fill shoreline position. The shoreline between the 800 Block breakwater field and the Central Ocean View breakwaters is also of concern as most transects either show recession beyond the pre-fill shoreline or shoreline

positions within 20 ft of the pre-fill shoreline. Targeted nourishment projects should be planned for these areas in the near future.

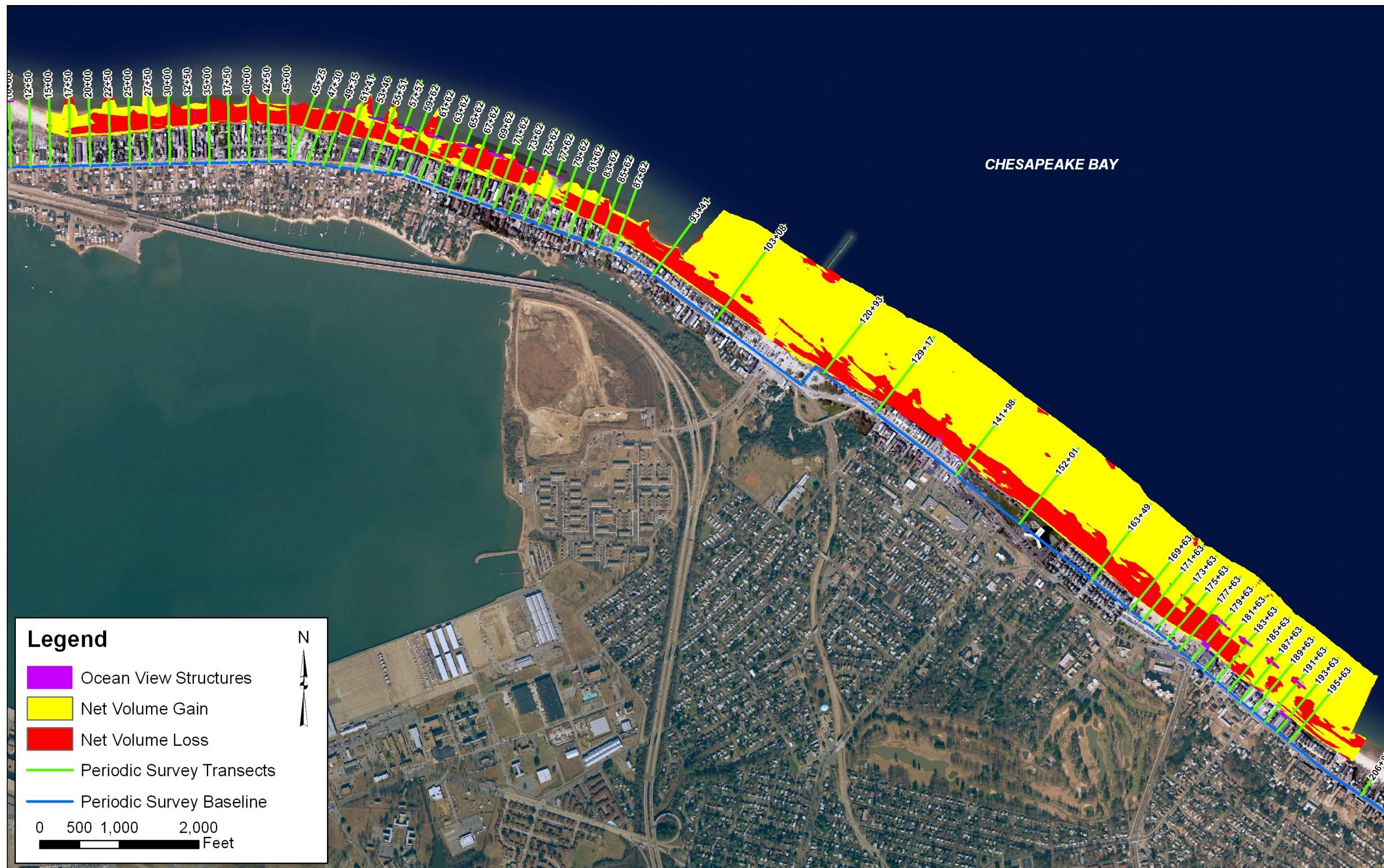


Figure 8. Net Volume Change Since the Willoughby Spit to Central Ocean View Dune Restoration Project (March 2005)

Periodic Survey Evaluation
Ocean View Beach

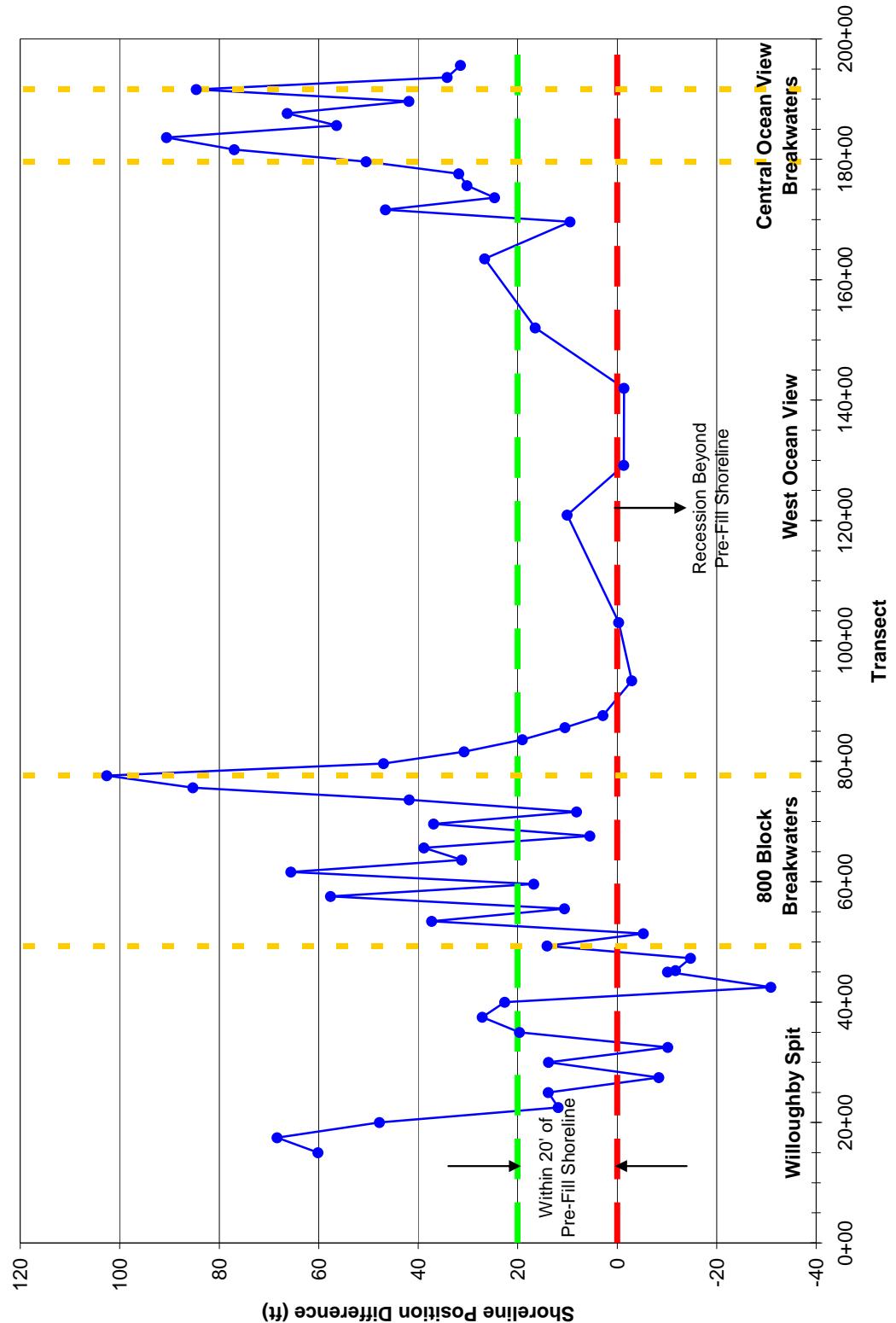


Figure 9. Shoreline Position Difference (ft) at MHW Between Pre-Fill and April 2009 Shorelines for Central Ocean View

5.0 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 2009. Subsequent surveys are planned to be conducted and evaluated every six months, in March/April and September/October. The beach and bathymetric surveys, performed by McKim & Creed, utilized baseline and transect positions established in September 2005 which will be used for all future periodic surveys. For this periodic evaluation, the April 2009 survey was compared with both the October 2008 and March 2008 surveys. The surveys were used to compute shoreline change at MHW and volume change above 0 ft NAVD88 and above -15 ft NAVD88. In addition, the most recent survey in April 2009 was compared to pre- and post-fill surveys taken after the East Ocean View beach nourishment and Willoughby Spit to Central Ocean View dune restoration projects in March 2009 and January-March 2005 respectively. This was done to quantify the amount of material loss since the projects were completed and condition of the shoreline with respect to pre-fill conditions.

Key statistics were computed for defined regions along Ocean View and the entire shoreline for the time period between both the March 2008 and April 2009 surveys and the October 2008 and April 2009 surveys.

Comparison	Parameter	Quantity
March 2008 vs. April 2009 Comparison	Average Shoreline Change Rate at MHW (+0.98 ft NAVD88)	13.91 ft/yr
	Cumulative Volume Change Rate Above 0 ft NAVD88	54,686 cy/yr
	Cumulative Volume Change Rate Above -15 ft NAVD88	258,284 cy/yr
October 2008 vs. April 2009 Comparison	Average Shoreline Change at MHW (+0.98 ft NAVD88)	15.26 ft
	Cumulative Volume Change Above 0 ft NAVD88	83,648 cy
	Cumulative Volume Change Above -15 ft NAVD88	206,455 cy

The average shoreline change rate for the entire shoreline at MHW between the March 2008 and April 2009 surveys was 13.91 ft/yr. The cumulative volume change above 0 ft NAVD88 was approximately 54,700 cy/yr between the March 2008 and April 2009 surveys, indicating an overall volumetric gain in the dune and subaerial beach over the past year. The gain above -15 ft NAVD88 was approximately 258,000 cy of material. The East Ocean View nourishment project accounts for 196,000 cy of this gain. In the previous report, the gain in material over the past year was approximately 52,000 cy, which is very similar to numbers calculated for this report. It seems that the system may have recovered from losses seen previously above -15 ft NAVD88 due to a large storm in December 2007, continuing the trend of offshore accretion which has been seen in previous reports. As is also the case with previous reports, the calculations of material gains and losses are subject to some hydrographic survey error.

Overall, regional erosion/accretion patterns as have been seen in previous reports are similar with this monitoring study. The Willoughby Spit region, although showing recession at MHW, is mainly accreting (receiving sand from the 800 Block area) with losses only occurring in the dune/berm area during significant storm events. The 800 block region has shown evidence that the breakwater field is decreasing erosion of the area. However, tombolos have formed behind the two easternmost breakwaters, interrupting littoral drift to the immediately adjacent area to the west. The region seems to recover towards the middle of the breakwater field with worsening

erosion at the western end of the breakwater field. This region will benefit from localized nourishment in the future or some reworking of the existing beach if a storm does not break up the tombolos that have formed, reinstating the historical littoral drift pattern. The West Ocean View region still remains fairly stable with some slight erosion, especially in the eastern portion of the region. This could be the result of the end effect of the Central Ocean View breakwaters. The Central Ocean View Breakwaters region appears to be fairly stable with some highly localized erosion/accretion patterns based on breakwater location. Like the eastern portion of the West Ocean View region, the western portion of this region is possibly seeing a slight end effect from the breakwater field. Focused nourishments may be required here in the future. The Central Ocean View region continues to be fairly stable. Usually, some slight erosion is seen at the eastern portion of the region, which is most likely attributed to the end effect of the East Ocean View breakwaters. For this monitoring period, the Central Ocean View region has most likely seen some benefit of material placed at East Ocean View due to natural littoral drift, lessening the downdrift impact of the breakwater field. Finally, the East Ocean View area underwent a large gain in material from nourishment, especially in the area behind the three easternmost breakwaters (which do not receive sediment from natural transport due to the jetties) and the area immediately westward of the existing breakwater field (which was previously designated as an erosion hotspot). New breakwaters are currently being built in this area to address this problem and help retain the recent nourishment.

In addition, comparison of the April survey was made against post-fill surveys from the East Ocean View beach nourishment and Willoughby Spit to Central Ocean View dune restoration which took place in March 2009 and January-March 2005 respectively.

Comparison	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
East Ocean View Nourishment vs. April 2009 Comparison	0.54 ft	-3.07 cy/ft	-16,182 cy	-5.13 cy/ft	-26,989 cy
Central Ocean View Nourishment vs. April 2009 Comparison	-21.06 ft	-6.31 cy/ft	-120,323 cy	-3.04 cy/ft	-57,542 cy

Approximately 16,000 cy of material has been lost in the East Ocean View area above 0 ft NAVD88 since the nourishment project which took place in March 2009. This is approximately 14.2% of the original amount of fill placed above the 0 ft contour. Approximately 27,000 cy of material has been lost above -15 ft NAVD88, leaving 86.2% of the original 196,000 cy of fill placed within the East Ocean View project region in the system. The Willoughby Spit to Central Ocean View region has lost approximately 120,300 cy of material from the dune system and/or subaerial beach since the project completion in March 2005. This is approximately 37.5% of the total material placed above 0 ft NAVD88 during the dune restoration and a large loss of storm protection.

As another measure of the protection being supplied by the East Ocean View and Central Ocean View nourishment projects, the pre-fill and April 2009 MHW shoreline positions were compared. Areas where the current shoreline has receded beyond or eroded within 20 ft of the pre-fill shoreline may need to be targeted for immediate nourishment. Results of this analysis indicated that the East Ocean View nourishment project has provided ample shoreline protection for the entire shoreline. The Willoughby Spit to Central Ocean View shoreline continues to have various problem spots. A portion of the shoreline in the Willoughby Spit groin field, the

shoreline to the west of the 800 Block breakwaters, portions of the 800 block region to the west of the easternmost breakwaters, and the shoreline between the 800 Block breakwaters and Central Ocean View breakwaters has eroded to within 20 ft of the pre-fill shoreline and even receded beyond the pre-fill shoreline in some locations. Targeted nourishment should be planned for these areas in the near future.

This is the eighth periodic survey report completed to date, and seventh evaluation of a consistent survey period utilizing beach and bathymetric surveys collected by McKim & Creed. 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 assure that results are not falsely interpreted. Comparison of seasonal surveys (i.e. March 2008 to April 2009) eliminates seasonal variation of profiles in volumetric change analyses. It is also useful to continue comparing consecutive surveys to assess the direct impact of extreme events which may occur during the six month period between surveys. Future periodic survey evaluations will continue to improve on analysis techniques so that the rich survey data sets are best utilized.

Appendix A: Aerial Photography and Digitized Shorelines

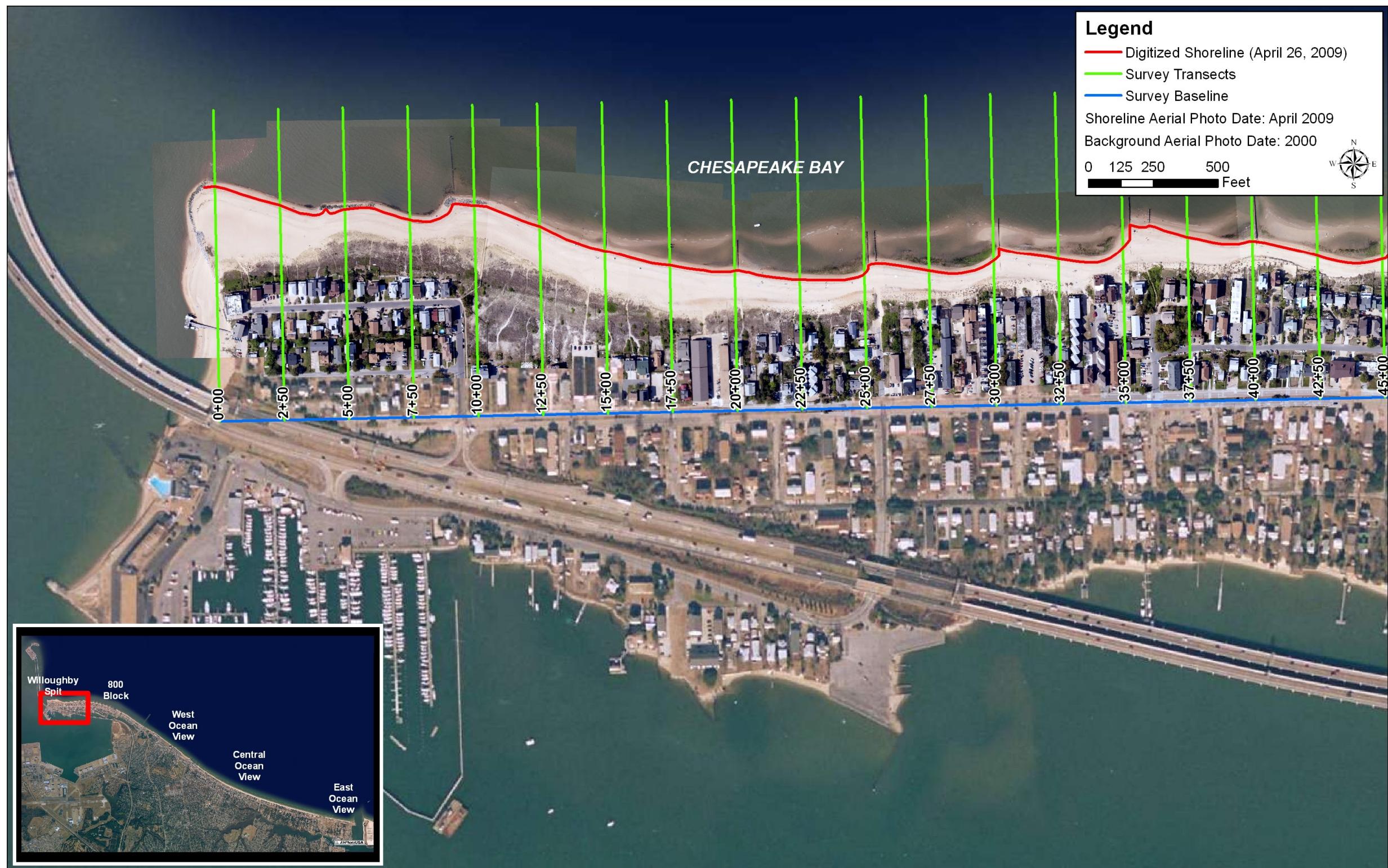


Figure A-1. April 2009 Aerial Photography and Digitized Shoreline (1 of 8)



Figure A-2. April 2009 Aerial Photography and Digitized Shoreline (2 of 8)

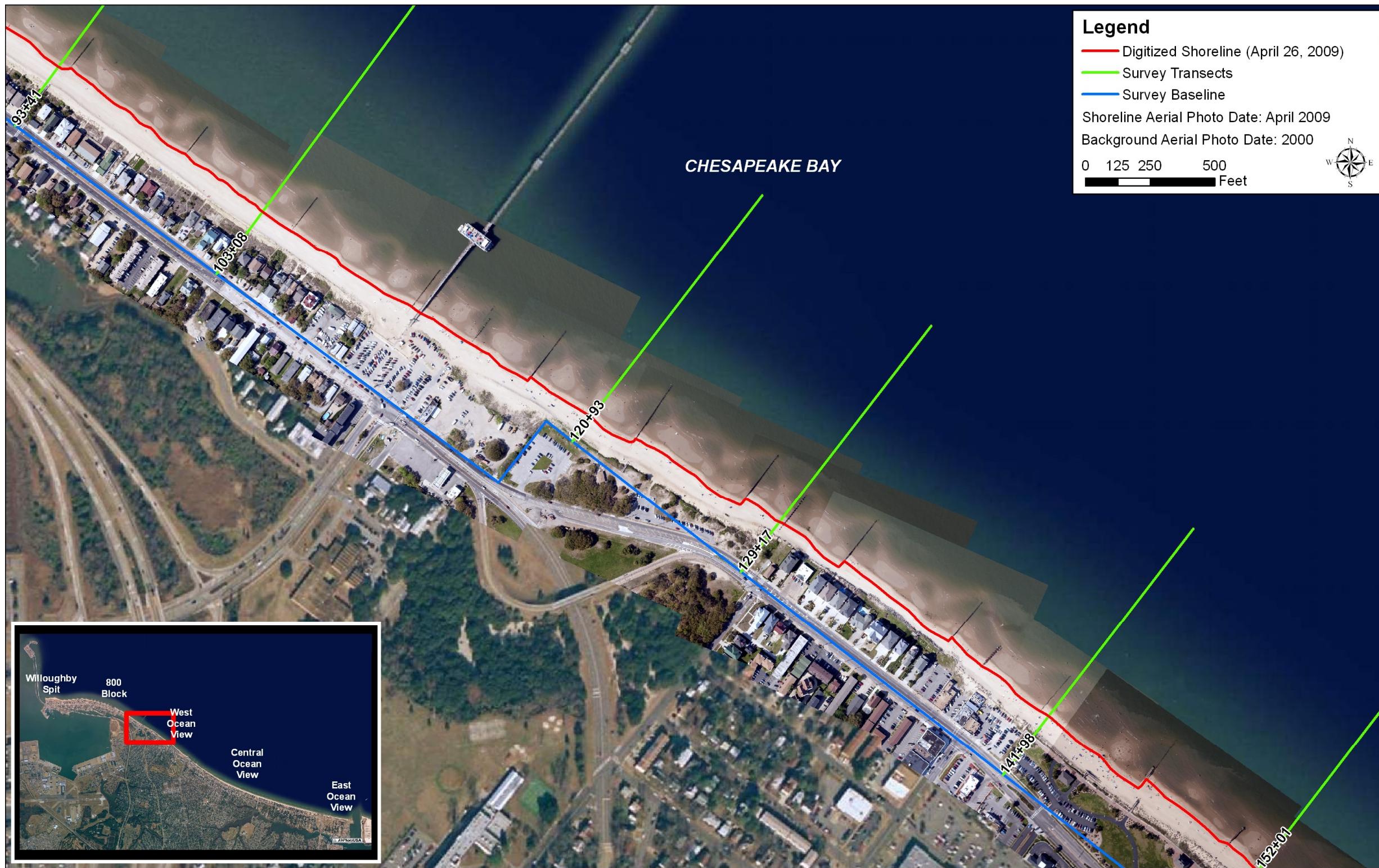


Figure A-3. April 2009 Aerial Photography and Digitized Shoreline (3 of 8)

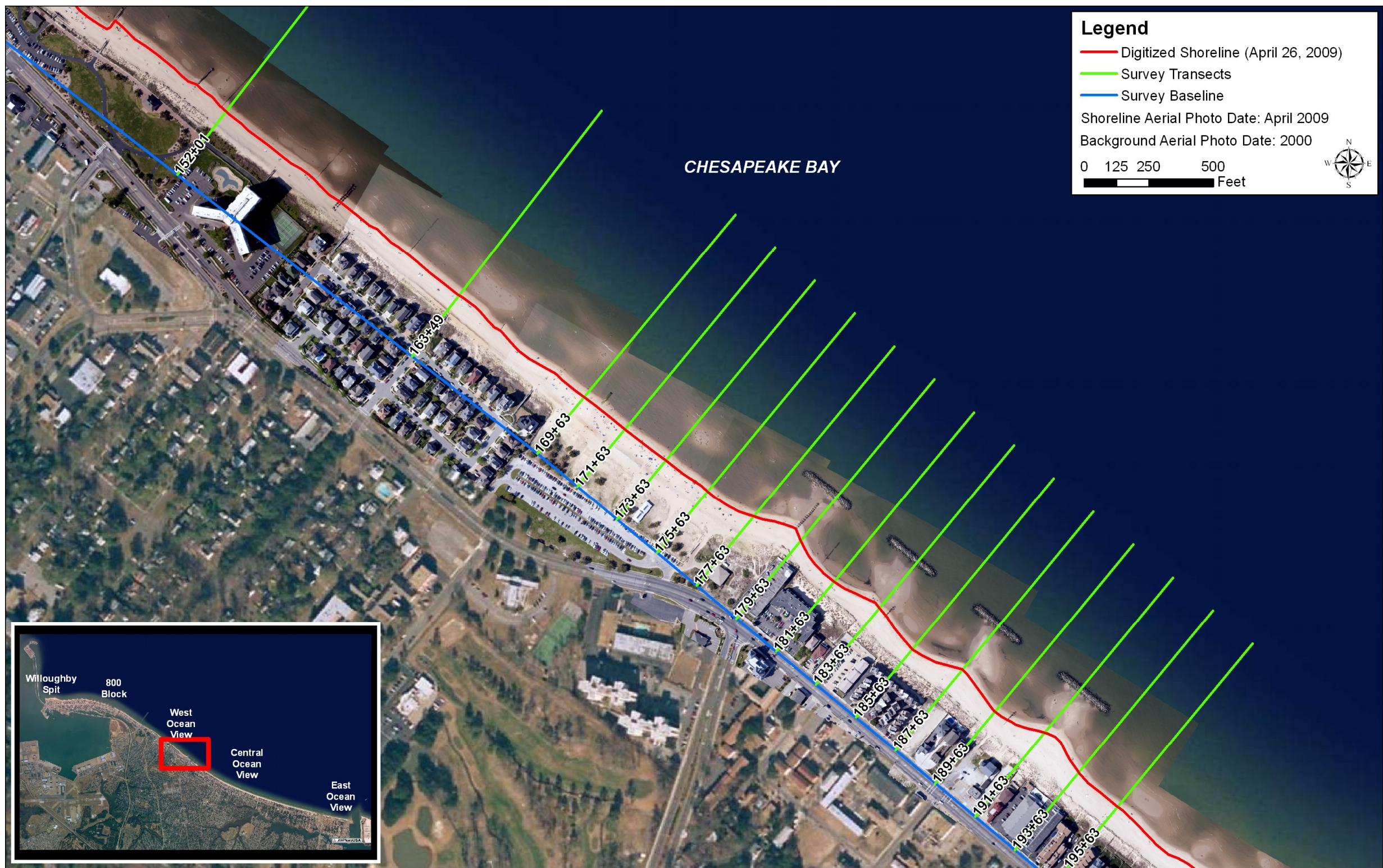


Figure A-4. April 2009 Aerial Photography and Digitized Shoreline (4 of 8)



Figure A-5. April 2009 Aerial Photography and Digitized Shoreline (5 of 8)



Figure A-6. April 2009 Aerial Photography and Digitized Shoreline (6 of 8)

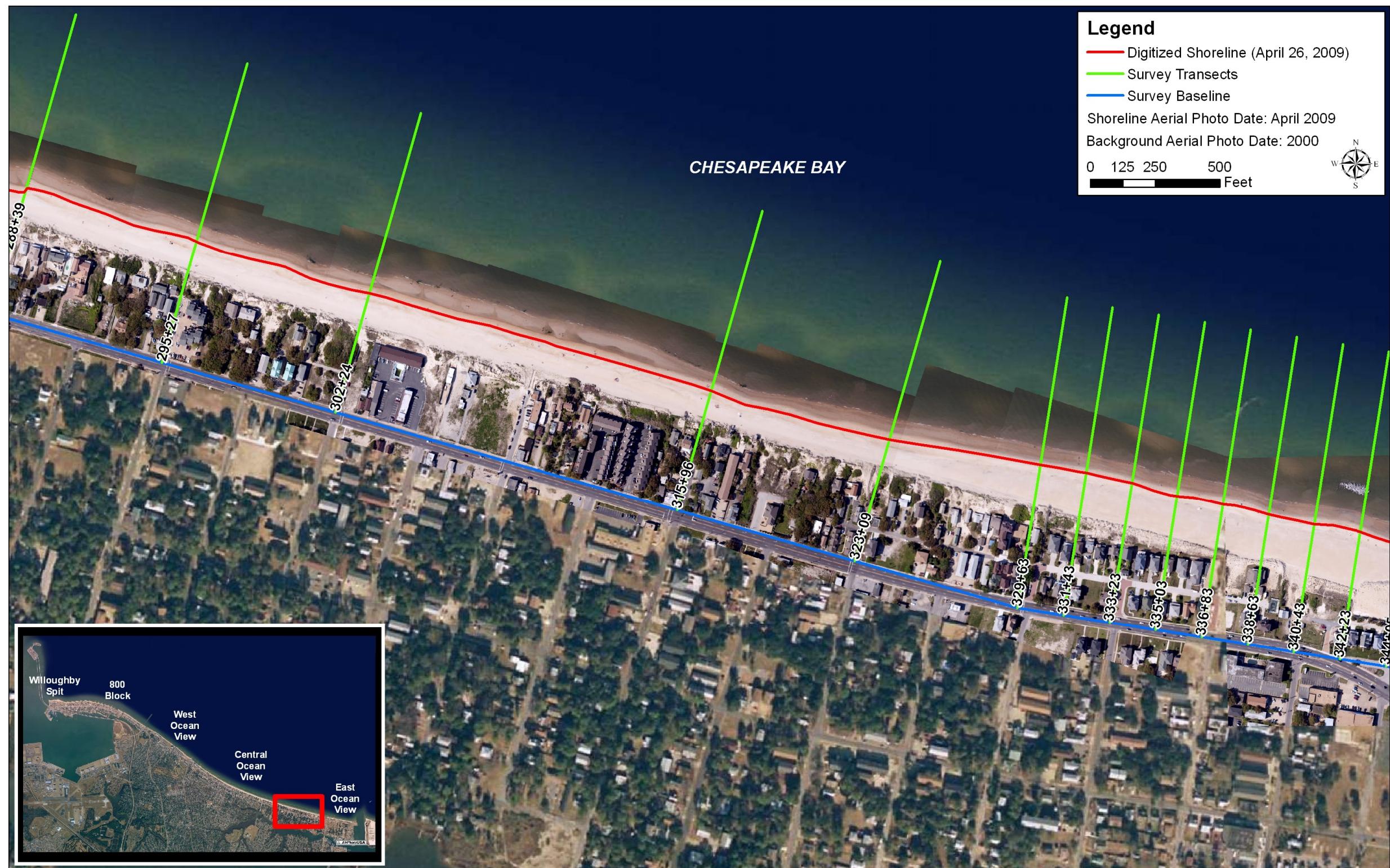


Figure A-7. April 2009 Aerial Photography and Digitized Shoreline (7 of 8)

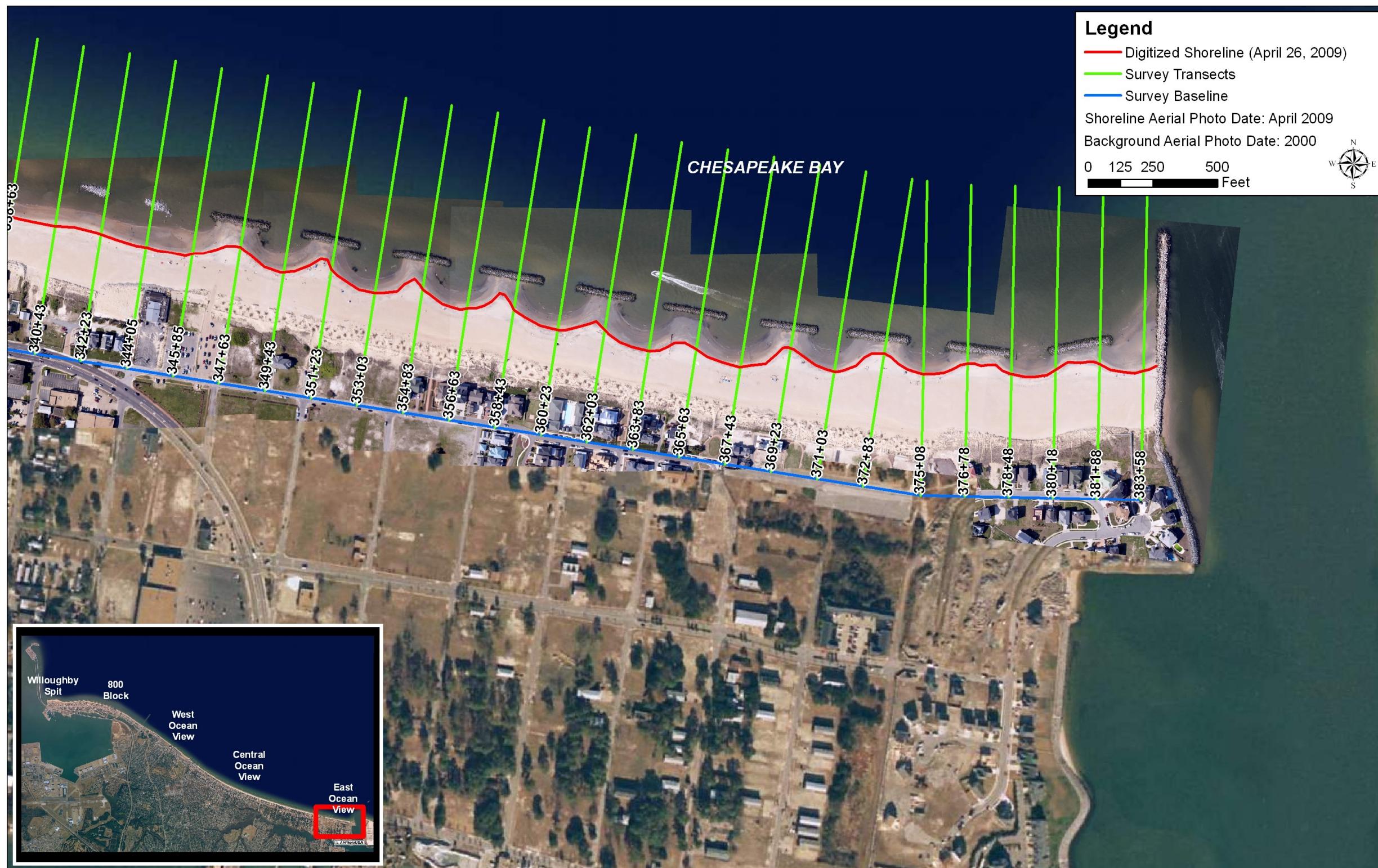
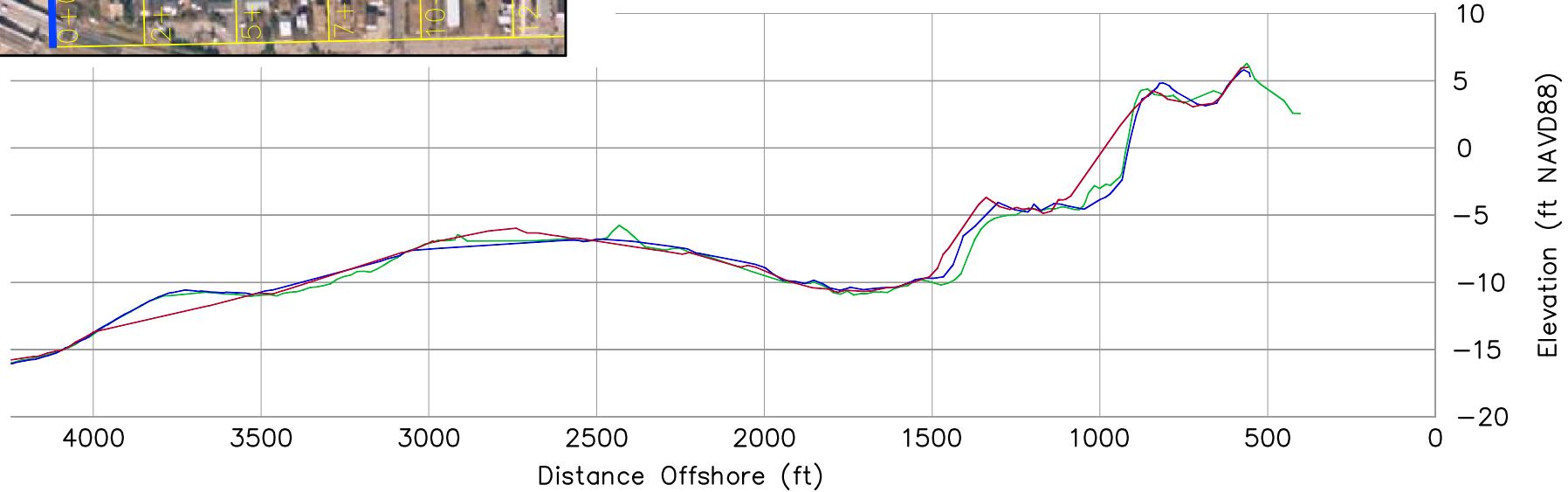
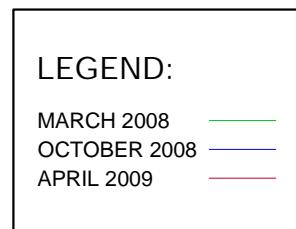


Figure A-8. April 2009 Aerial Photography and Digitized Shoreline (8 of 8)

Appendix B: Survey Comparison Plots

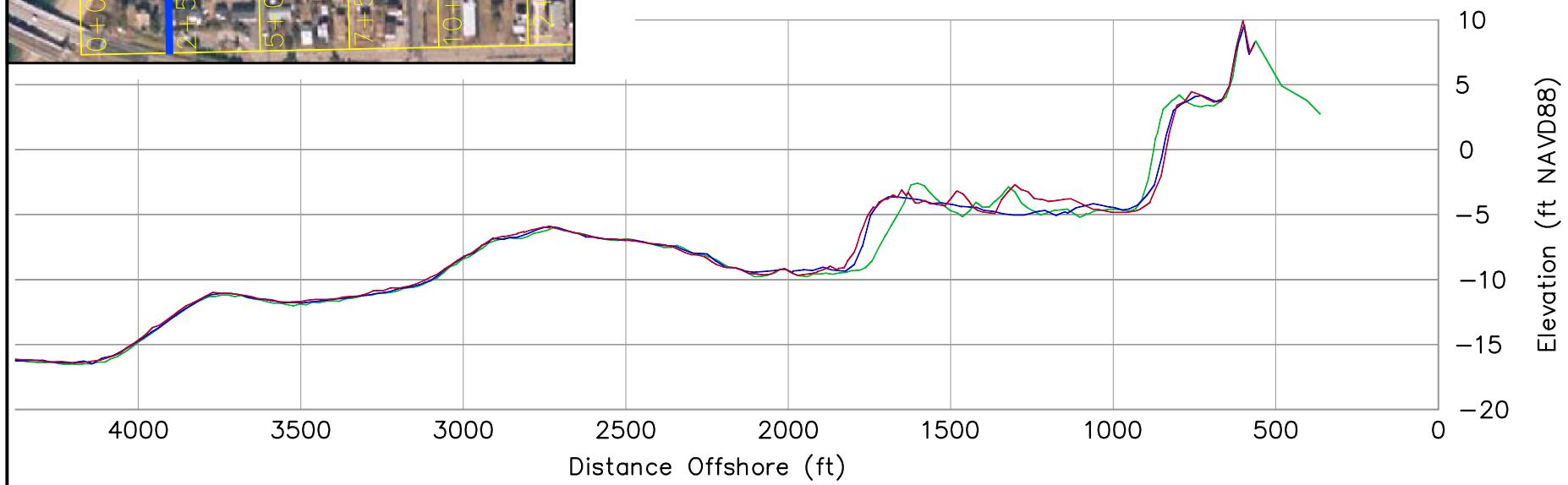


Survey Transect 0+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at MHW (0.98 ft NAVD88)	43.01 ft/yr	52.80 ft
Volume Change Above -15 ft NAVD88	25.21 cy/ft/yr	13.46 cy/ft
Volume Change Above 0 ft NAVD88	-2.62 cy/ft/yr	-1.13 cy/ft

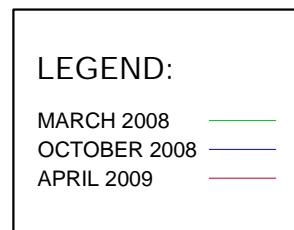


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-36.46 ft/yr	-7.97 ft
Volume Change Above -15 ft NAVD88	23.00 cy/ft/yr	14.56 cy/ft
Volume Change Above 0 ft NAVD88	0.74 cy/ft/yr	0.34 cy/ft

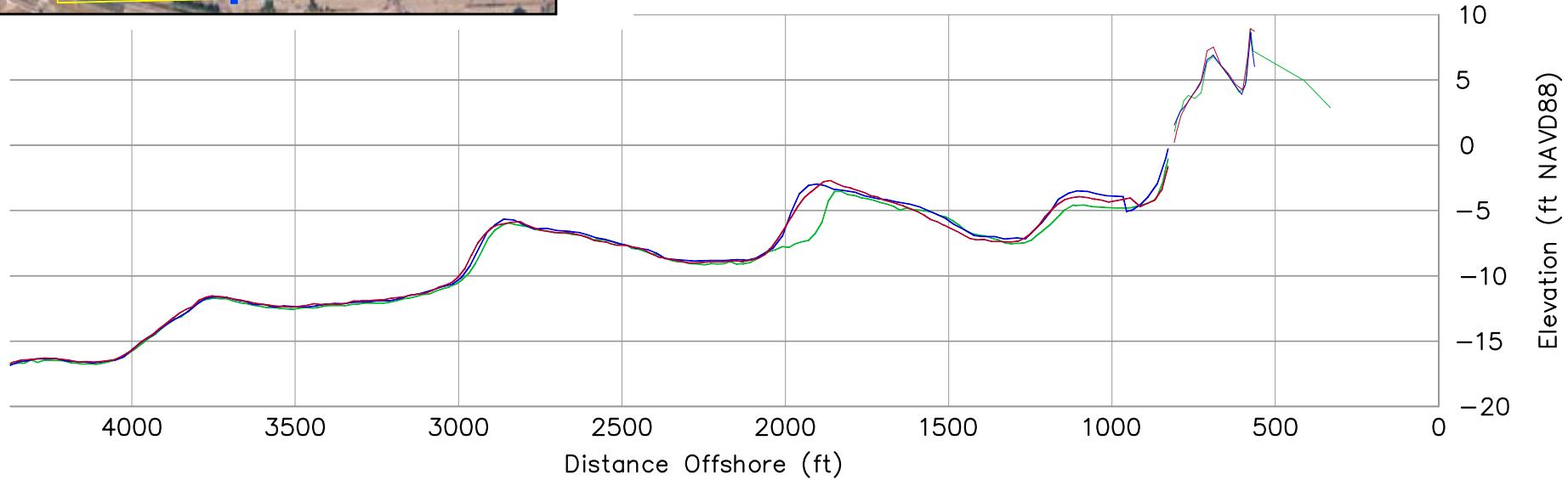


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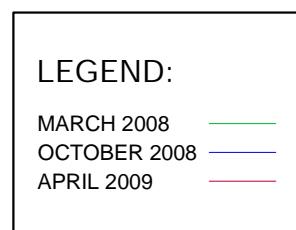
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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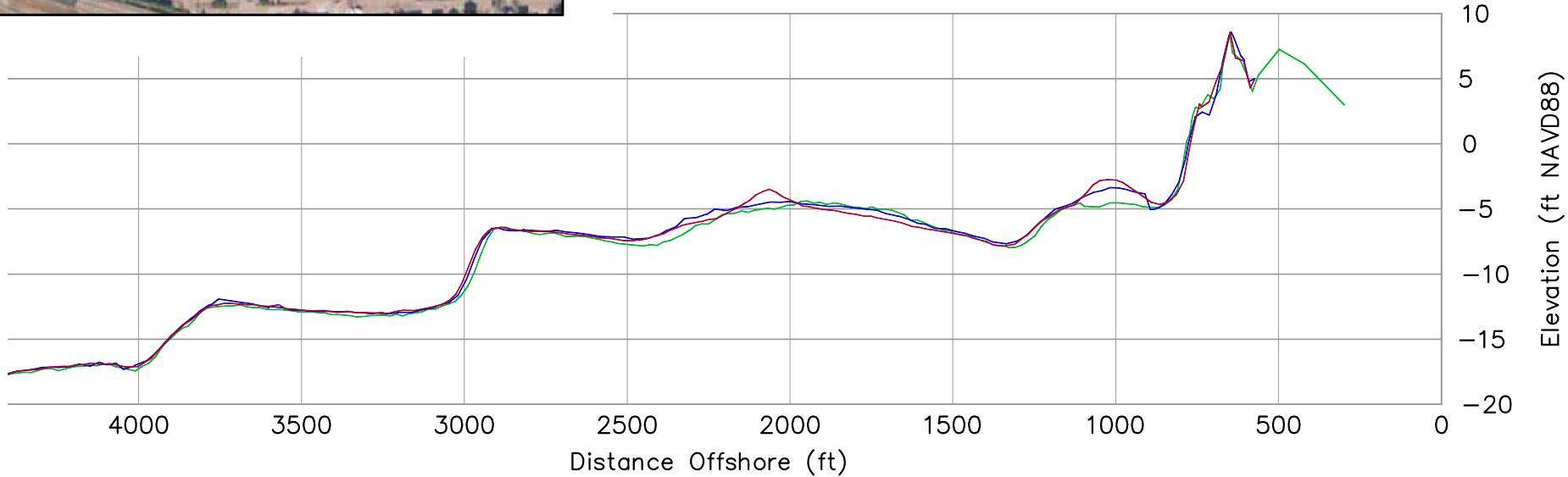


Survey Transect 5+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at MHW (0.98 ft NAVD88)	-5.89 ft/yr	-12.87 ft
Volume Change Above -15 ft NAVD88	33.77 cy/ft/yr	-8.47 cy/ft
Volume Change Above 0 ft NAVD88	1.76 cy/ft/yr	1.80 cy/ft

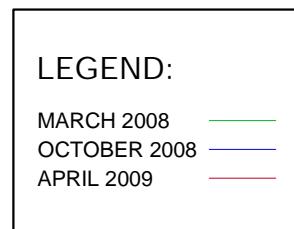


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-8.01 ft/yr	-4.29 ft
Volume Change Above -15 ft NAVD88	25.71 cy/ft/yr	-5.46 cy/ft
Volume Change Above 0 ft NAVD88	0.57 cy/ft/yr	0.36 cy/ft

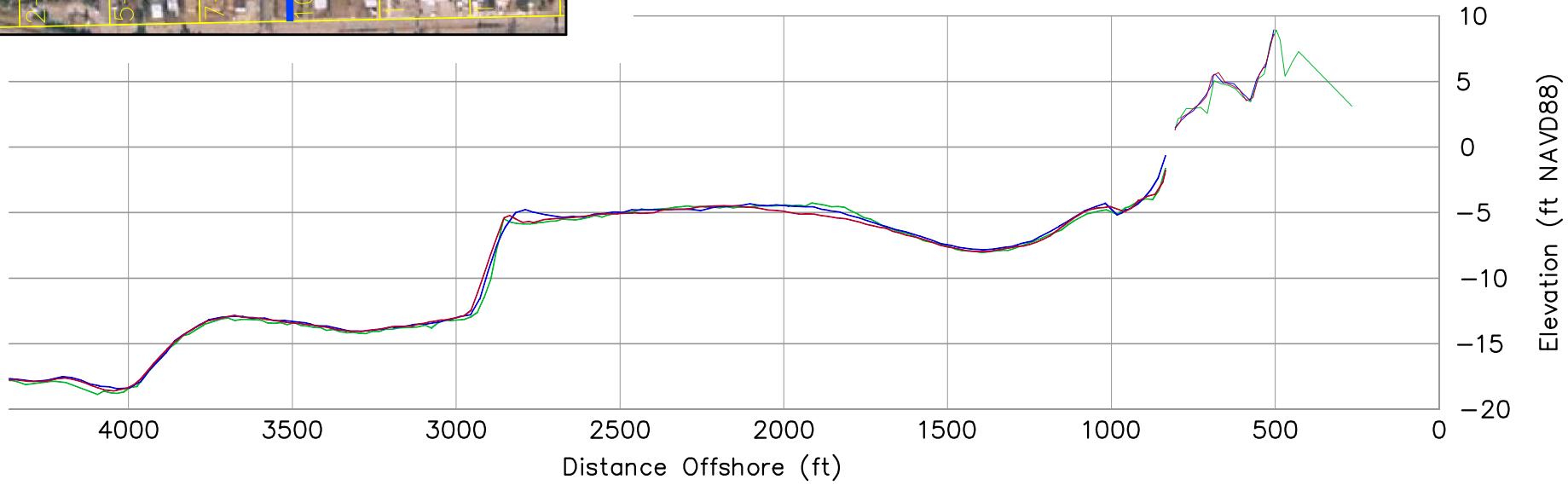


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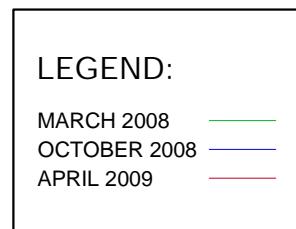
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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Survey Transect 10+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at MHW (0.98 ft NAVD88)	2.35 ft/yr	-5.02 ft
Volume Change Above -15 ft NAVD88	5.69 cy/ft/yr	-13.12 cy/ft
Volume Change Above 0 ft NAVD88	2.18 cy/ft/yr	-0.10 cy/ft

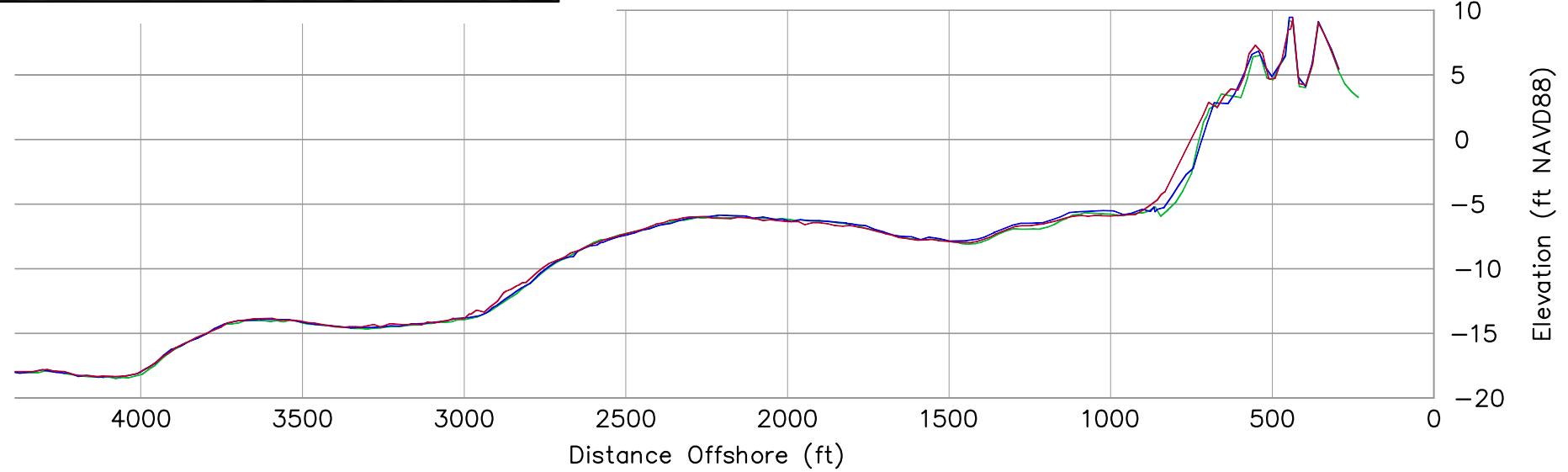


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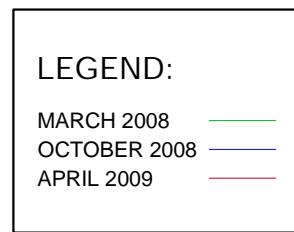
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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Survey Transect 12+50	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	14.89 ft/yr	26.84 ft
Volume Change Above -15 ft NAVD88	21.28 cy/ft/yr	8.79 cy/ft
Volume Change Above 0 ft NAVD88	4.38 cy/ft/yr	2.18 cy/ft

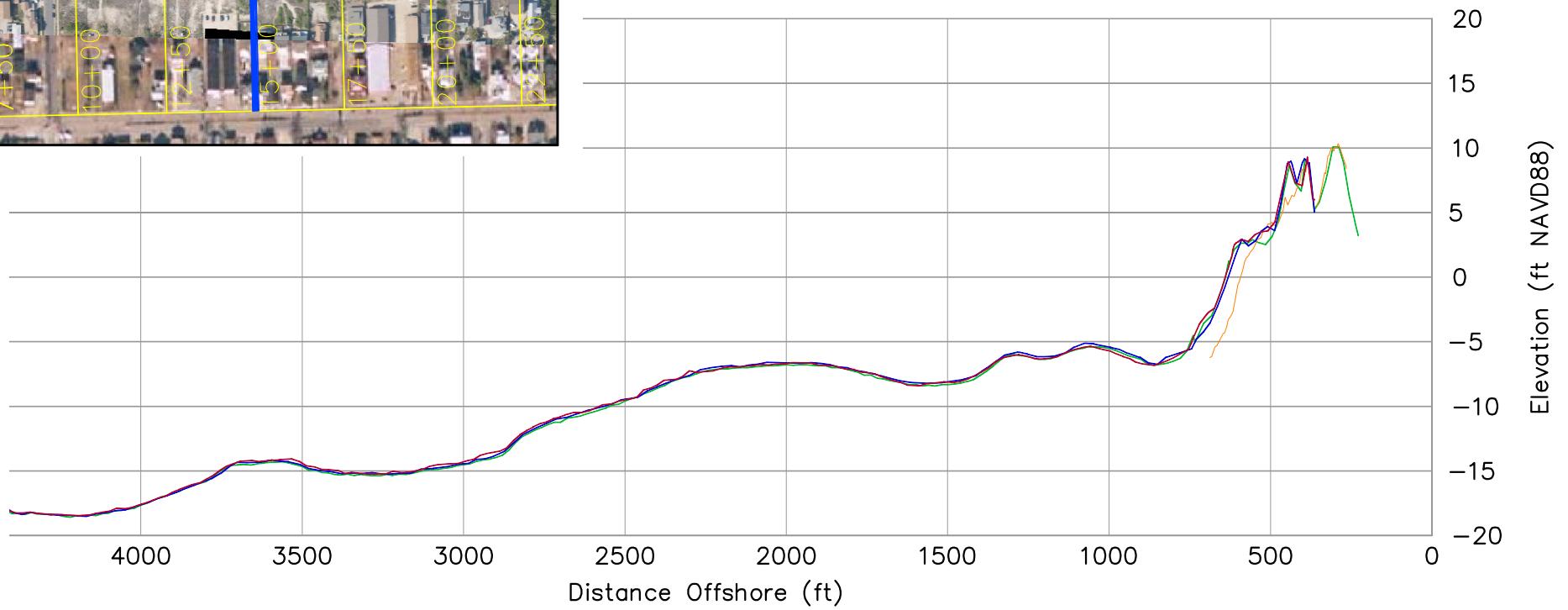


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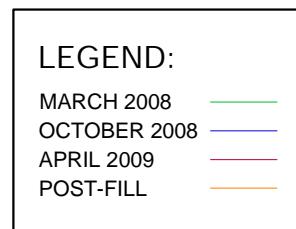
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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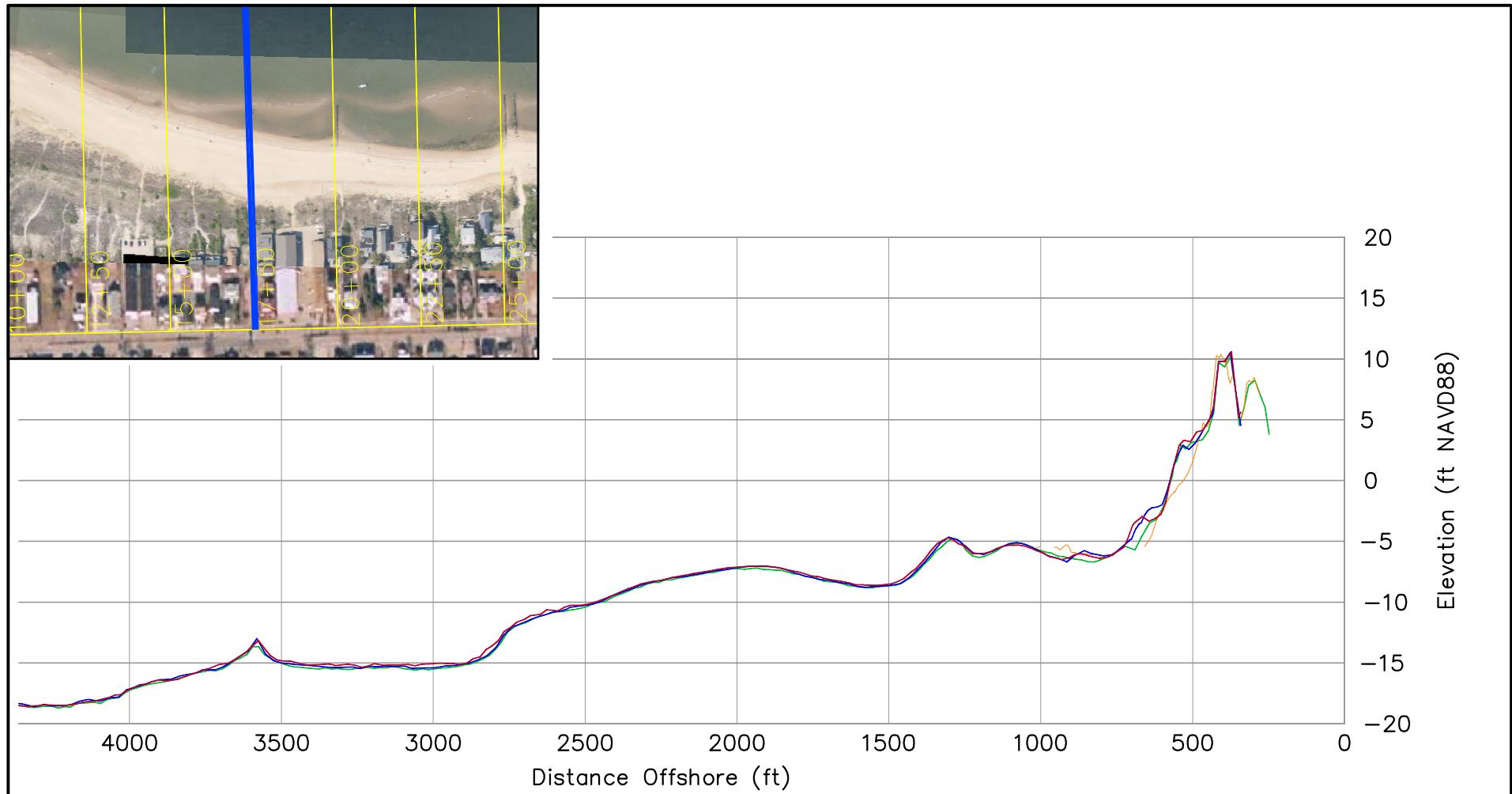


Survey Transect 15+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-4.10 ft/yr	9.48 ft
Volume Change Above -15 ft NAVD88	7.51 cy/ft/yr	1.23 cy/ft
Volume Change Above 0 ft NAVD88	3.56 cy/ft/yr	0.59 cy/ft

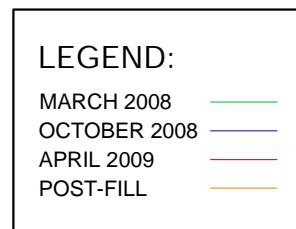


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	1.08 ft/yr	0.53 ft
Volume Change Above -15 ft NAVD88	7.94 cy/ft/yr	2.78 cy/ft
Volume Change Above 0 ft NAVD88	3.50 cy/ft/yr	1.74 cy/ft

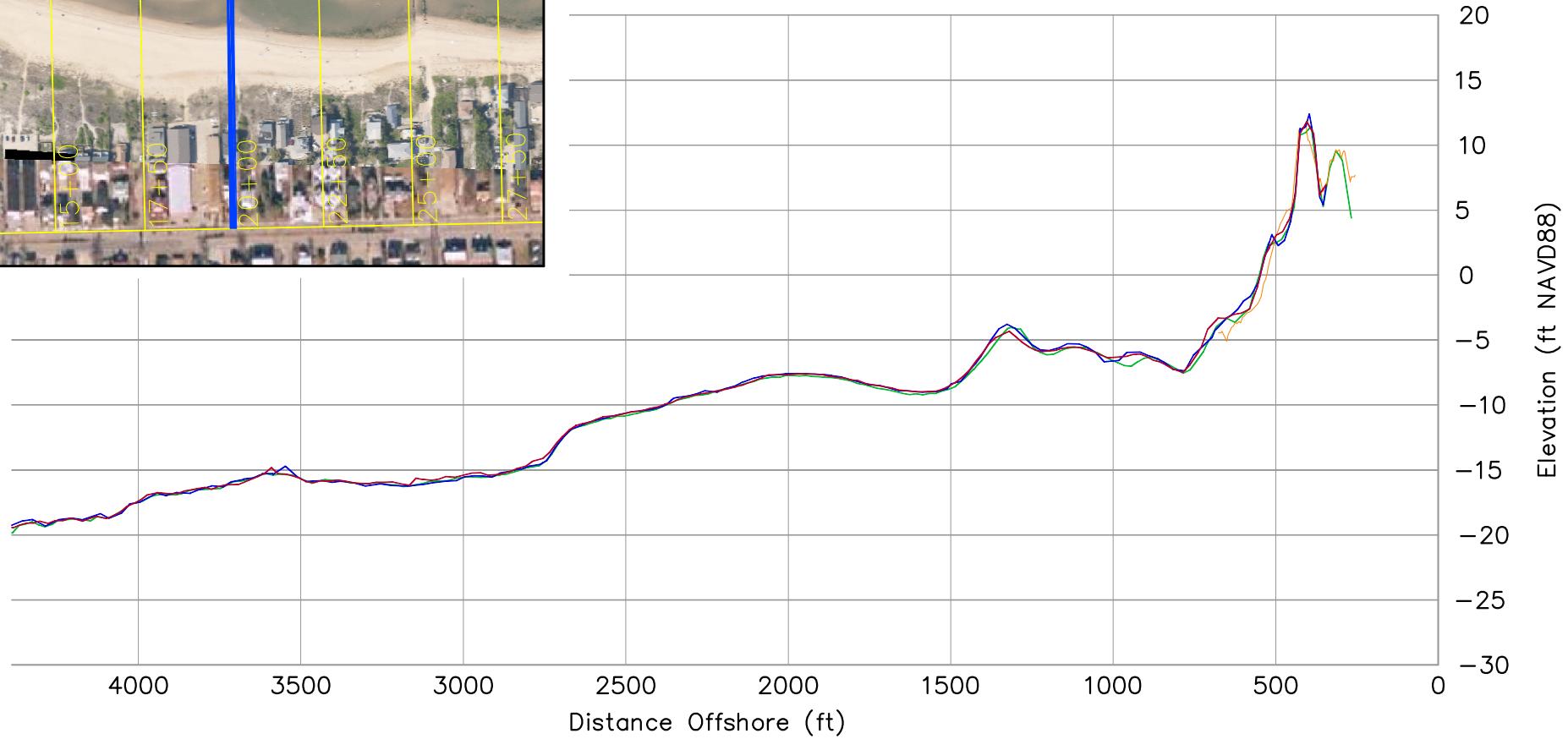


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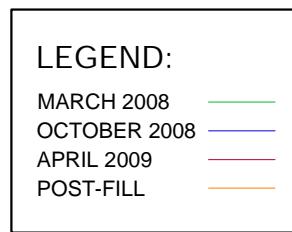
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



OCEAN VIEW PERIODIC
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ANALYSIS

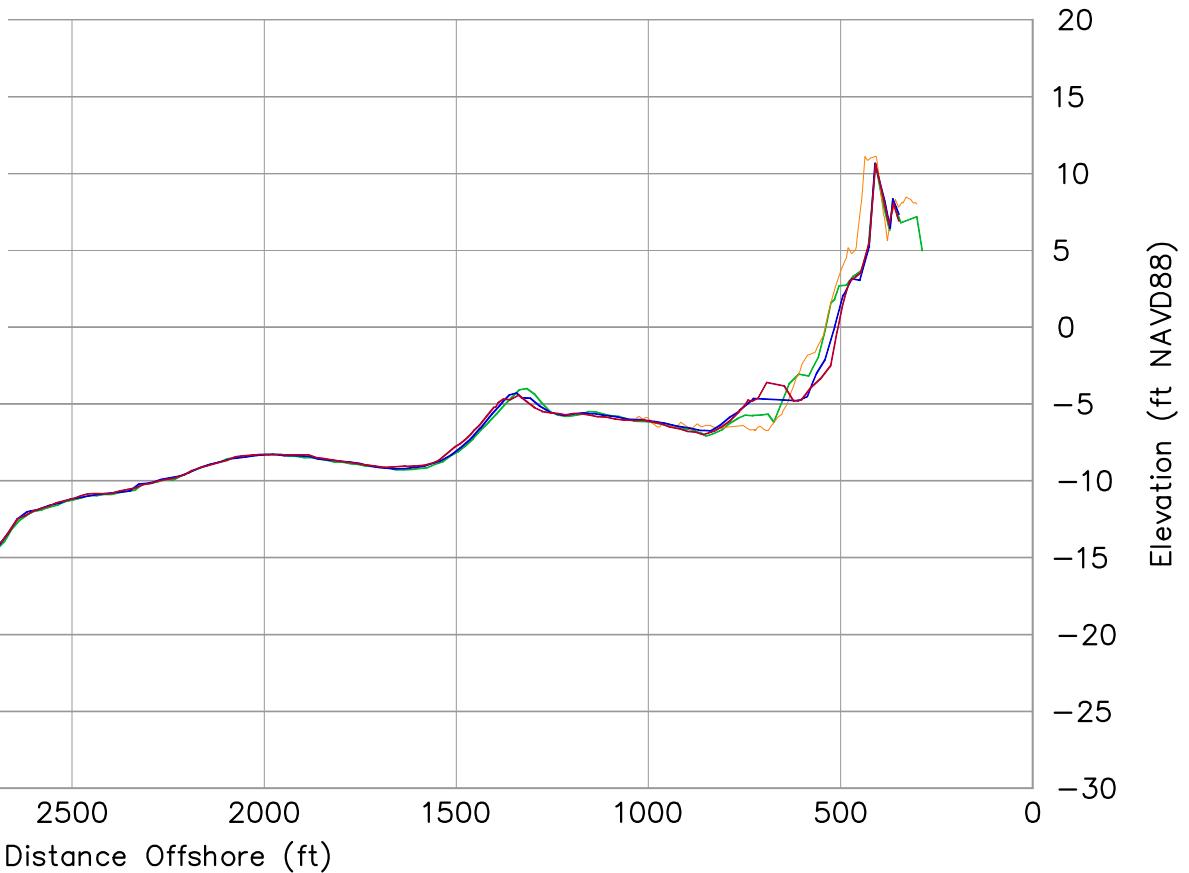


Survey Transect 20+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-2.64 ft/yr	0.90 ft
Volume Change Above -15 ft NAVD88	13.55 cy/ft/yr	-3.00 cy/ft
Volume Change Above 0 ft NAVD88	1.89 cy/ft/yr	1.39 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



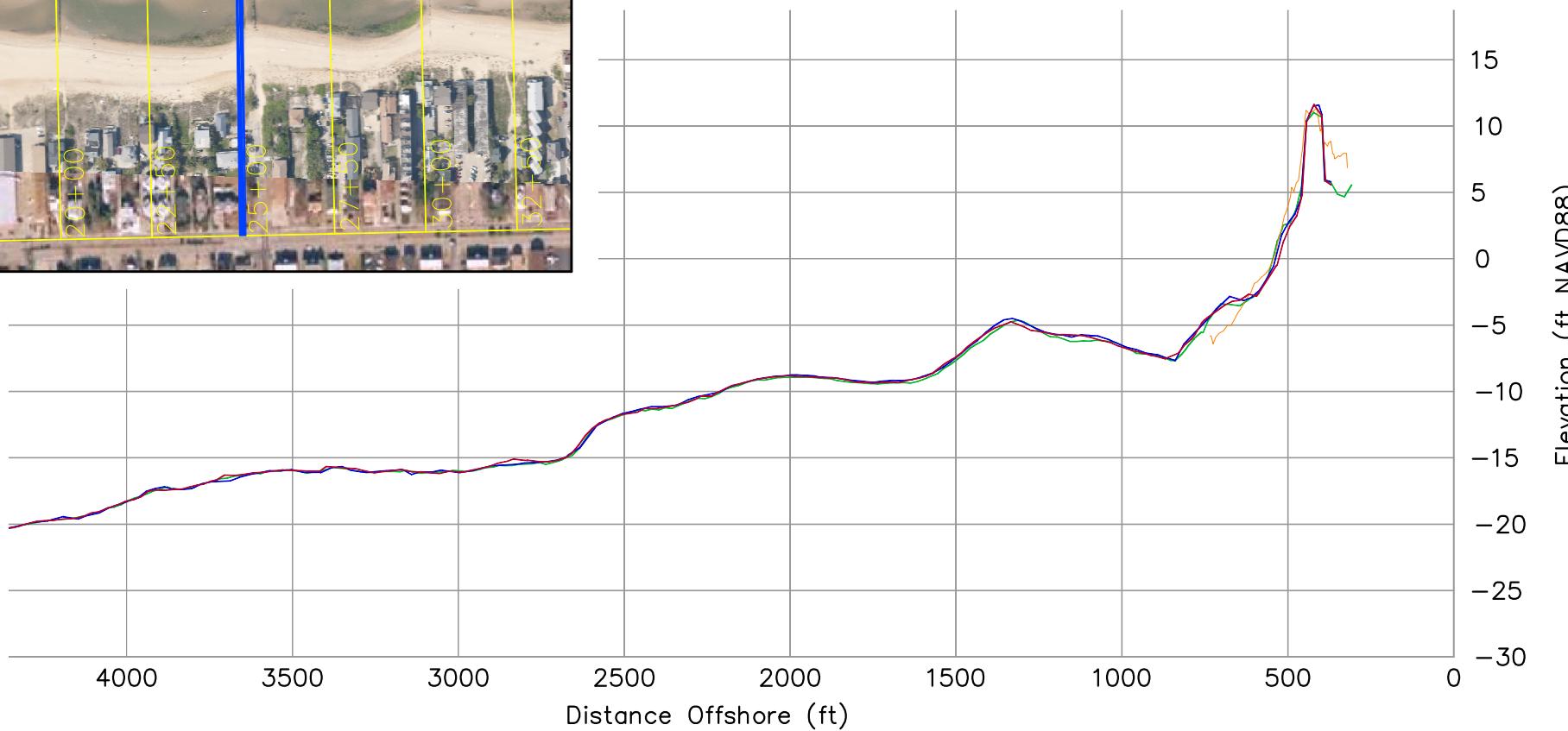
Survey Transect 22+50	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-29.38 ft/yr	-6.95 ft
Volume Change Above -15 ft NAVD88	0.63 cy/ft/yr	0.48 cy/ft
Volume Change Above 0 ft NAVD88	-1.03 cy/ft/yr	-0.41 cy/ft

LEGEND:

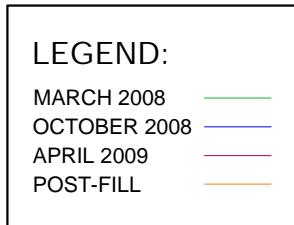
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-17.78 ft/yr	-10.69 ft
Volume Change Above -15 ft NAVD88	5.95 cy/ft/yr	-6.72 cy/ft
Volume Change Above 0 ft NAVD88	-1.45 cy/ft/yr	-1.83 cy/ft

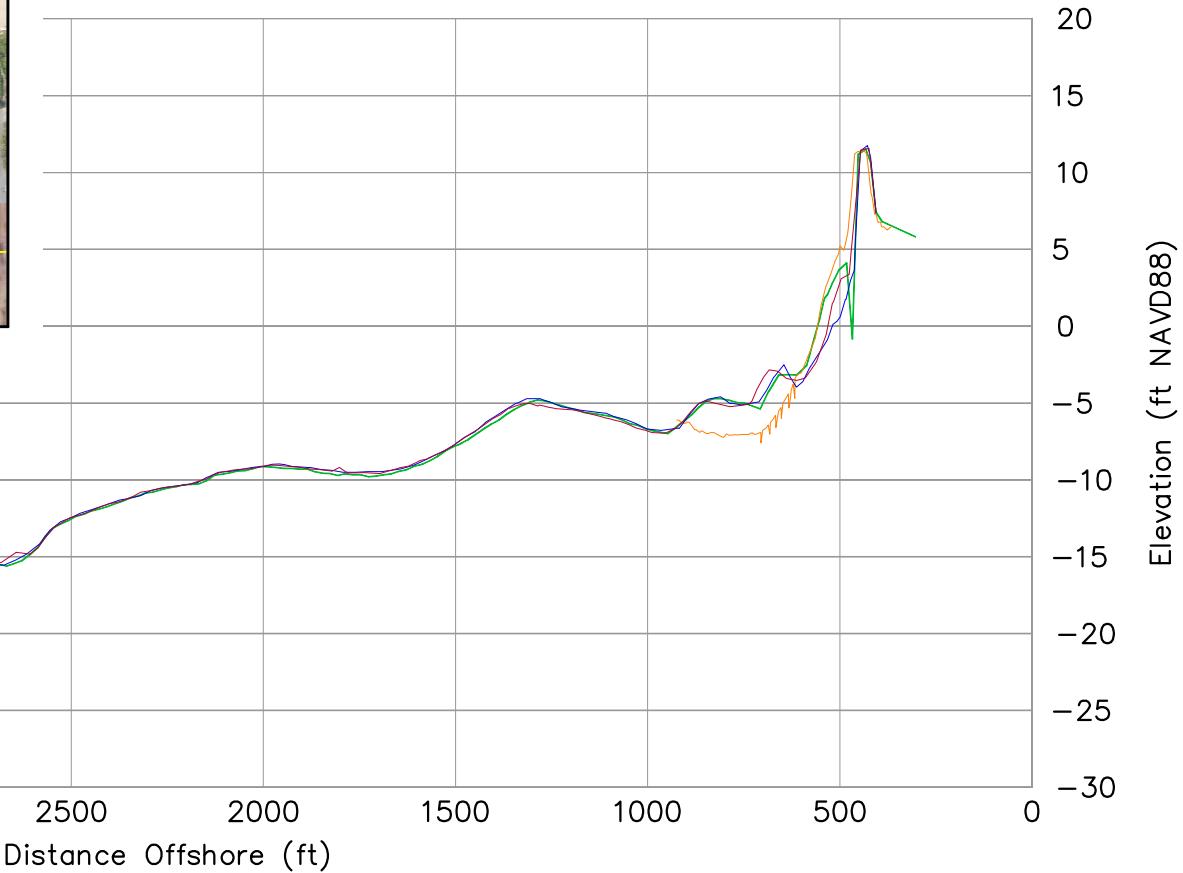


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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Survey Transect 27+50	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-22.73 ft/yr	29.24 ft
Volume Change Above -15 ft NAVD88	2.50 cy/ft/yr	1.81 cy/ft
Volume Change Above 0 ft NAVD88	0.64 cy/ft/yr	4.46 cy/ft

LEGEND:

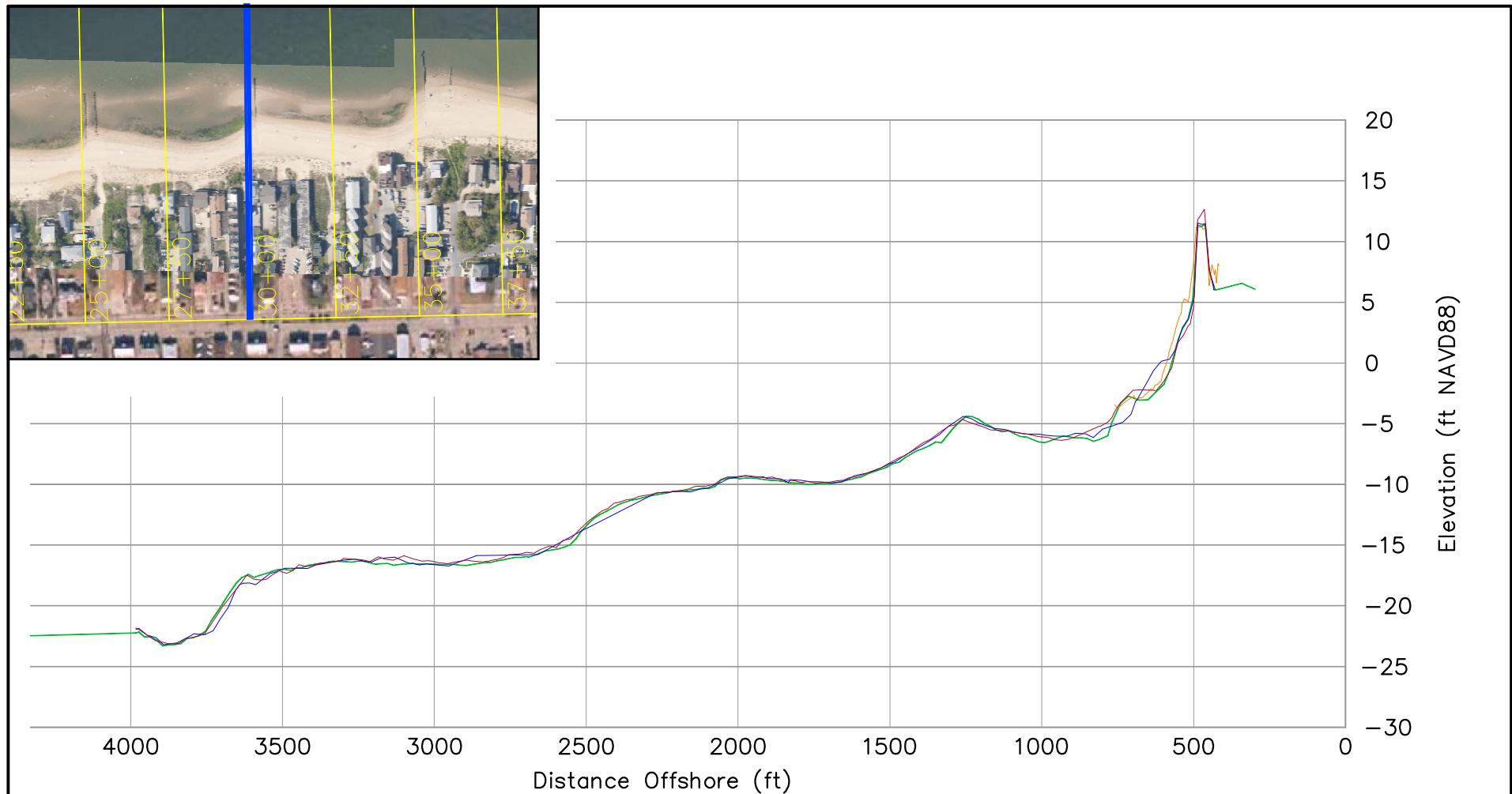
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

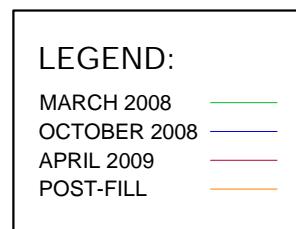
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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ANALYSIS

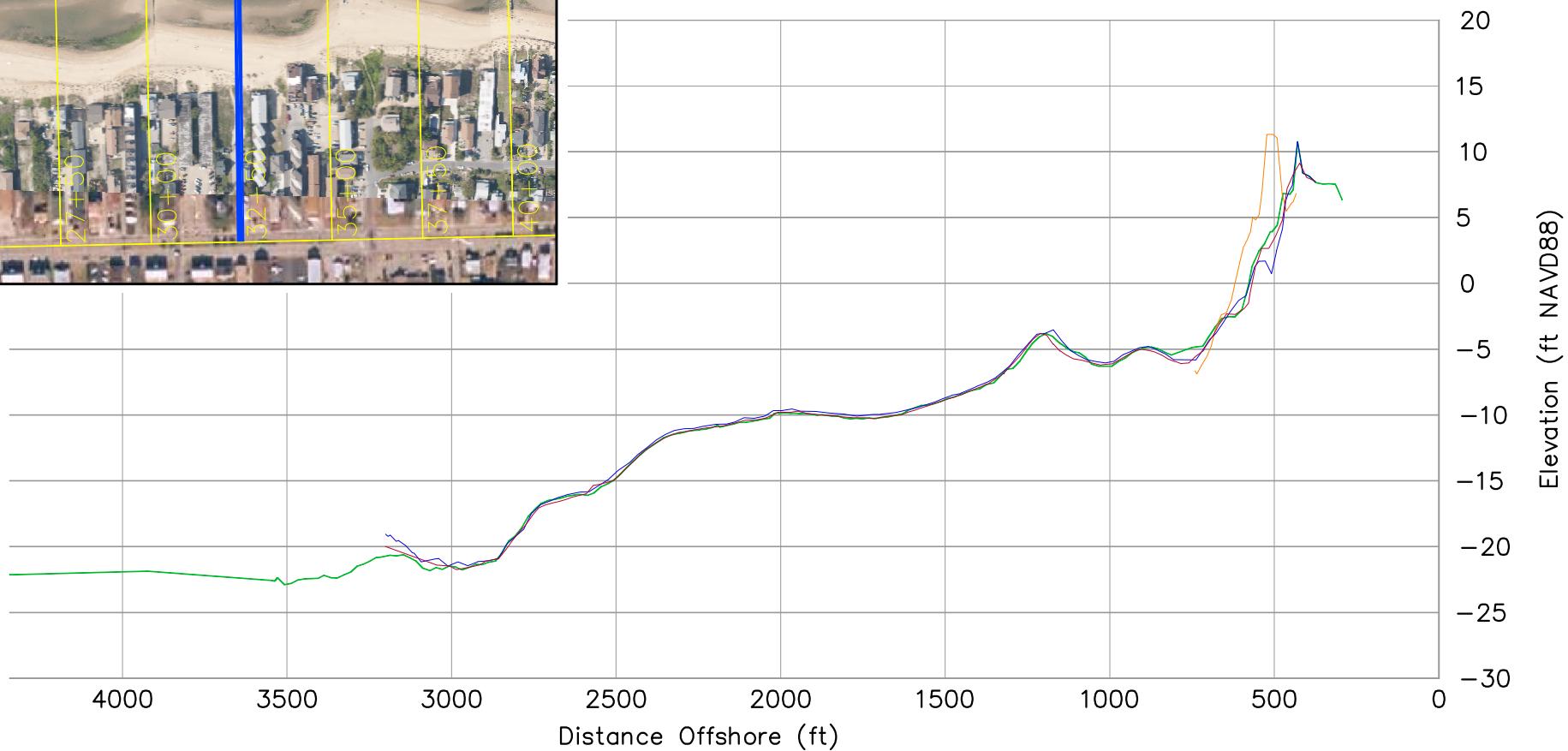


Survey Transect 30+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-2.50 ft/yr	-4.23 ft
Volume Change Above -15 ft NAVD88	13.30 cy/ft/yr	5.42 cy/ft
Volume Change Above 0 ft NAVD88	-0.79 cy/ft/yr	-0.39 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



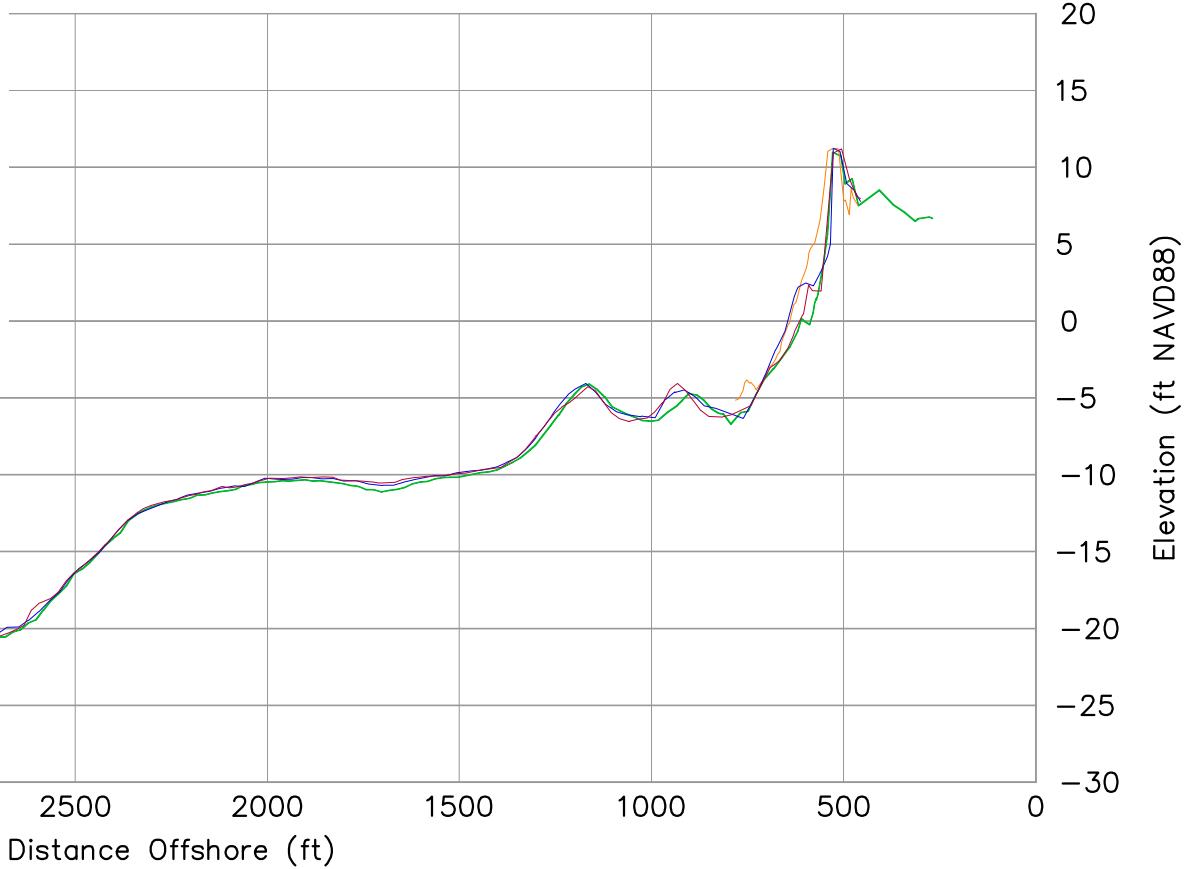
Survey Transect 32+50	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-9.76 ft/yr	-3.91 ft
Volume Change Above -15 ft NAVD88	-7.43 cy/ft/yr	-11.85 cy/ft
Volume Change Above 0 ft NAVD88	-2.76 cy/ft/yr	3.03 cy/ft

LEGEND:

MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	22.28 ft/yr	-34.69 ft
Volume Change Above -15 ft NAVD88	13.47 cy/ft/yr	-5.51 cy/ft
Volume Change Above 0 ft NAVD88	0.73 cy/ft/yr	0.28 cy/ft

LEGEND:

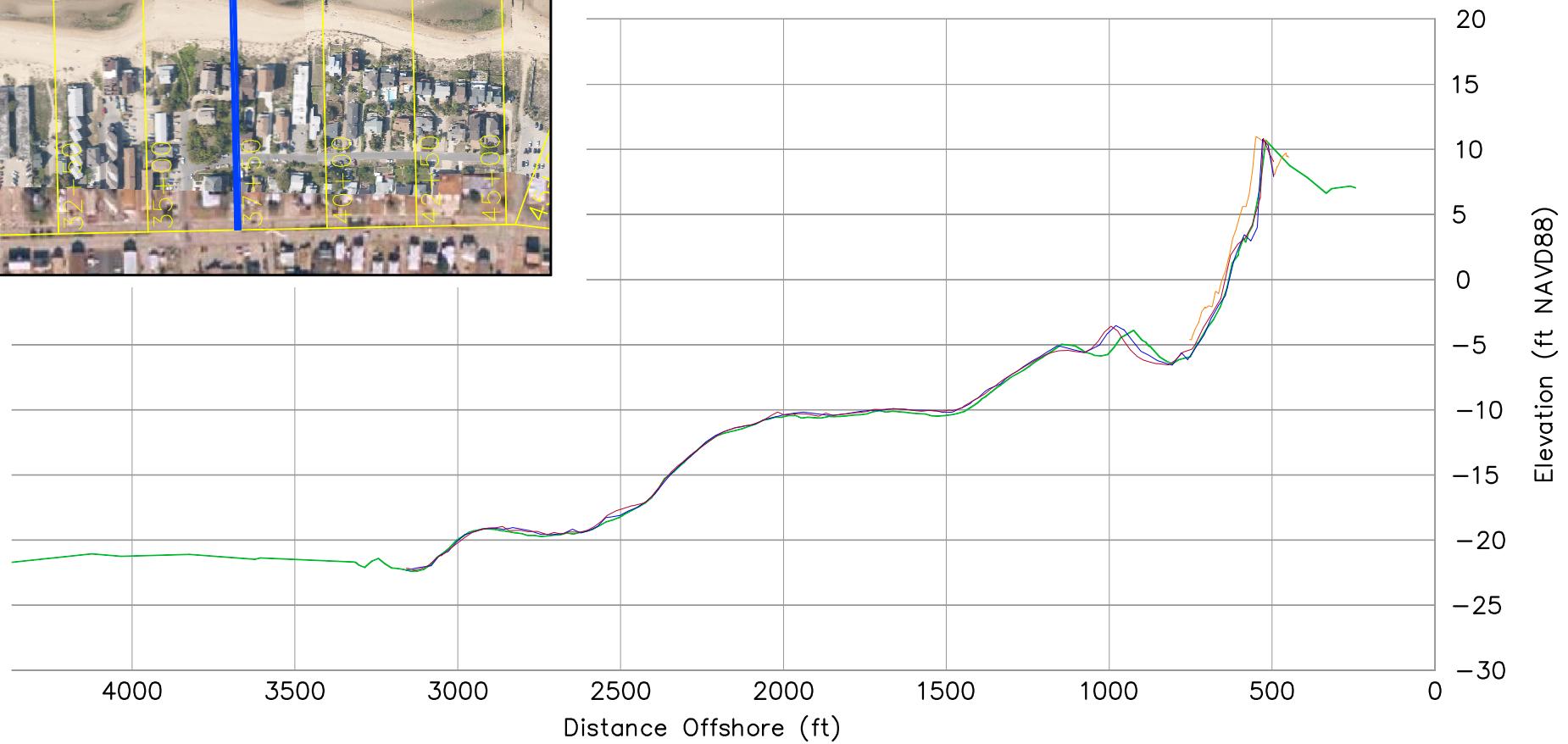
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

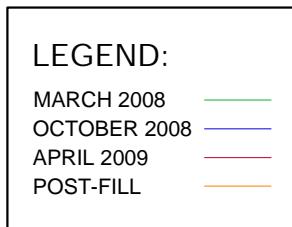
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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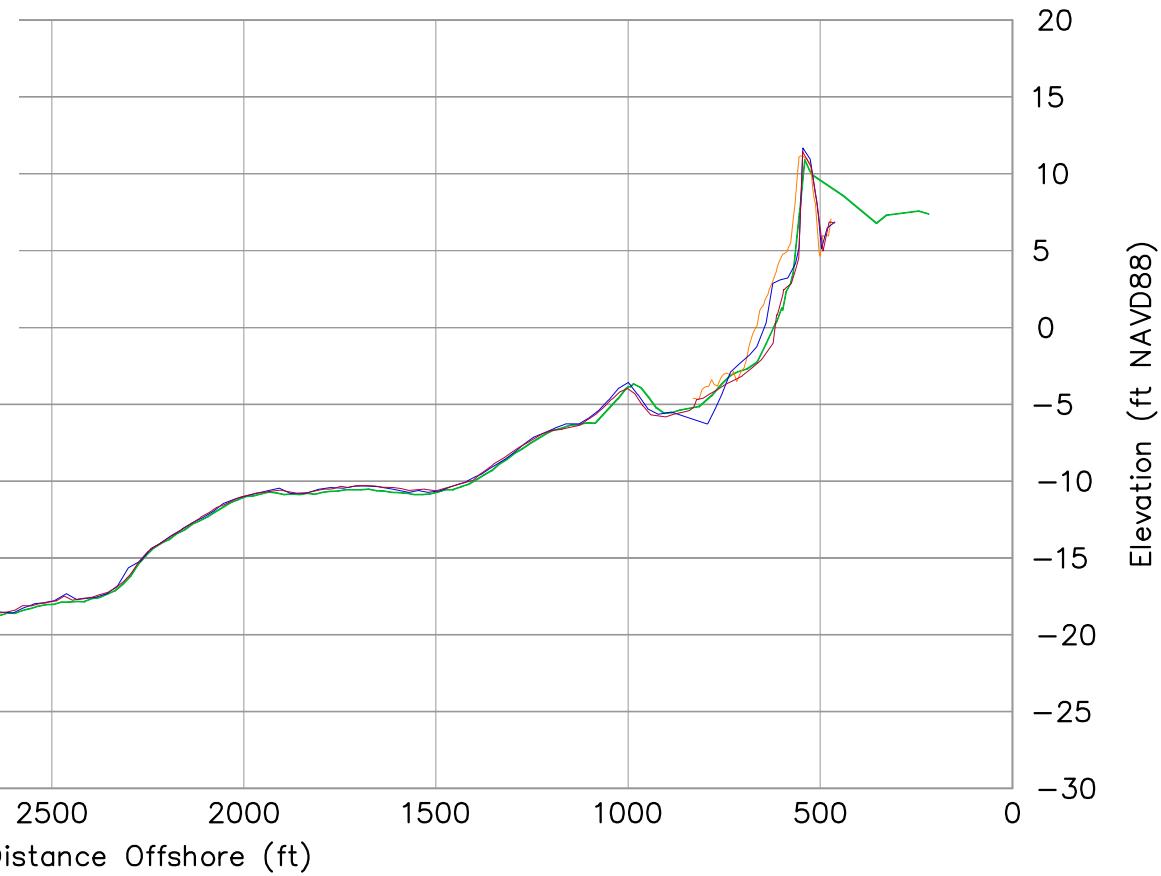


Survey Transect 37+50	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	9.45 ft/yr	13.16 ft
Volume Change Above -15 ft NAVD88	9.71 cy/ft/yr	1.28 cy/ft
Volume Change Above 0 ft NAVD88	1.22 cy/ft/yr	1.72 cy/ft

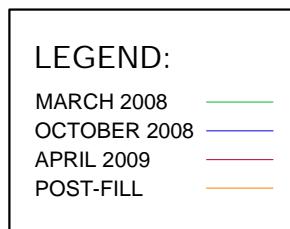


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

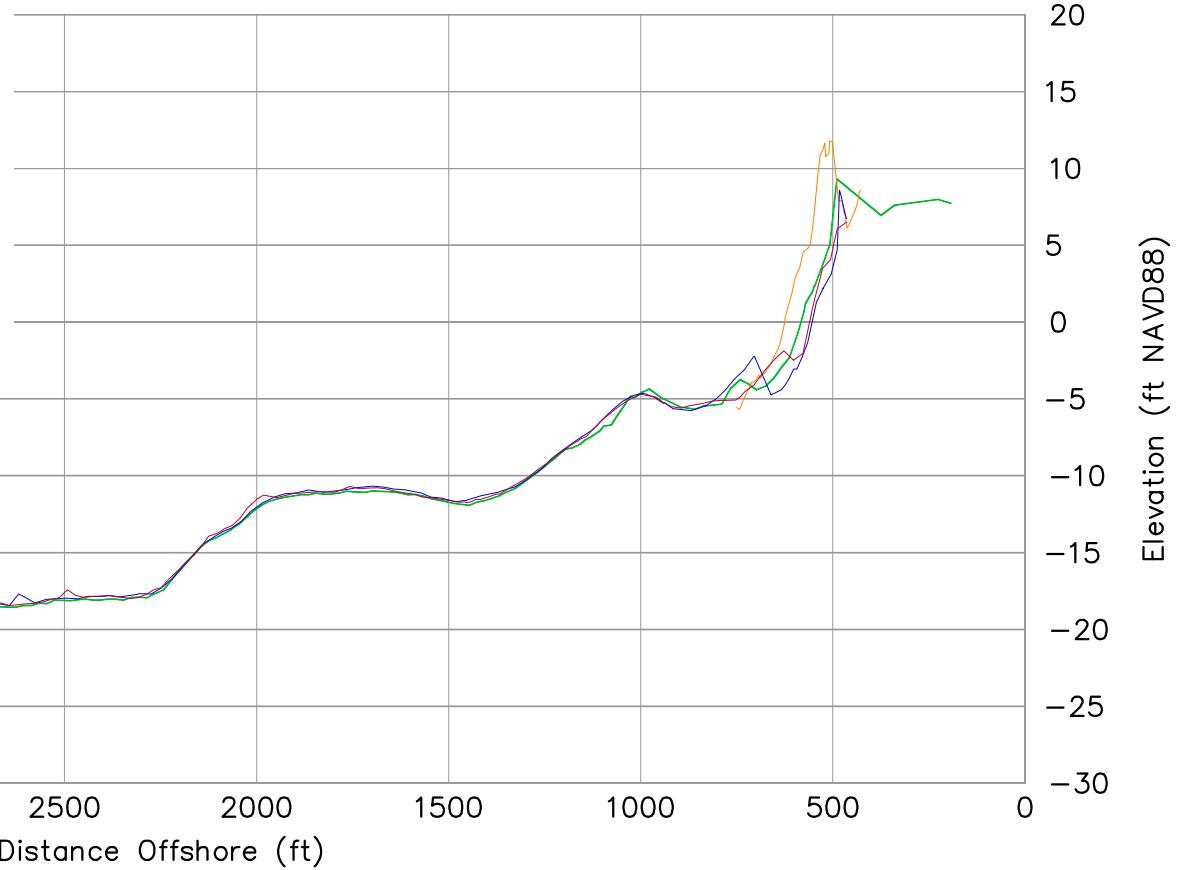


Survey Transect 40+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	4.95 ft/yr	-26.82 ft
Volume Change Above -15 ft NAVD88	3.77 cy/ft/yr	-6.51 cy/ft
Volume Change Above 0 ft NAVD88	0.07 cy/ft/yr	-2.73 cy/ft

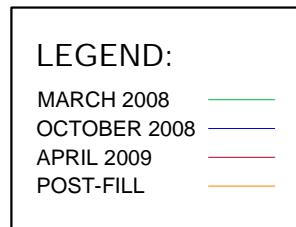


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-19.60 ft/yr	6.45 ft
Volume Change Above -15 ft NAVD88	3.22 cy/ft/yr	2.99 cy/ft
Volume Change Above 0 ft NAVD88	-2.78 cy/ft/yr	1.66 cy/ft

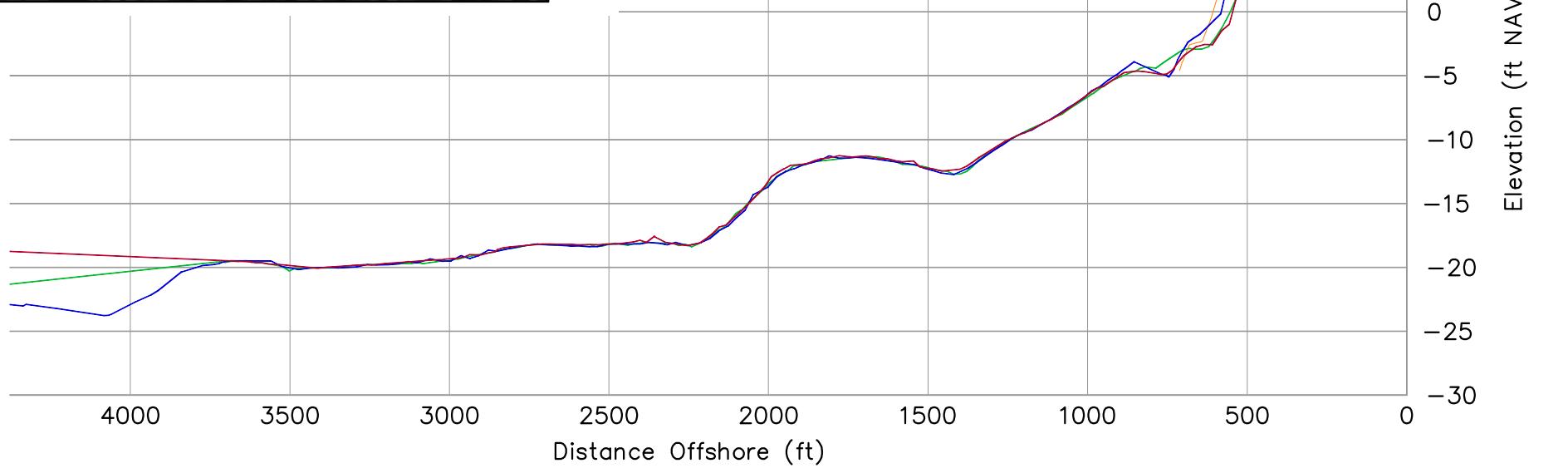


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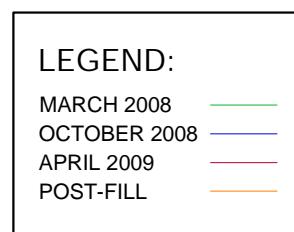
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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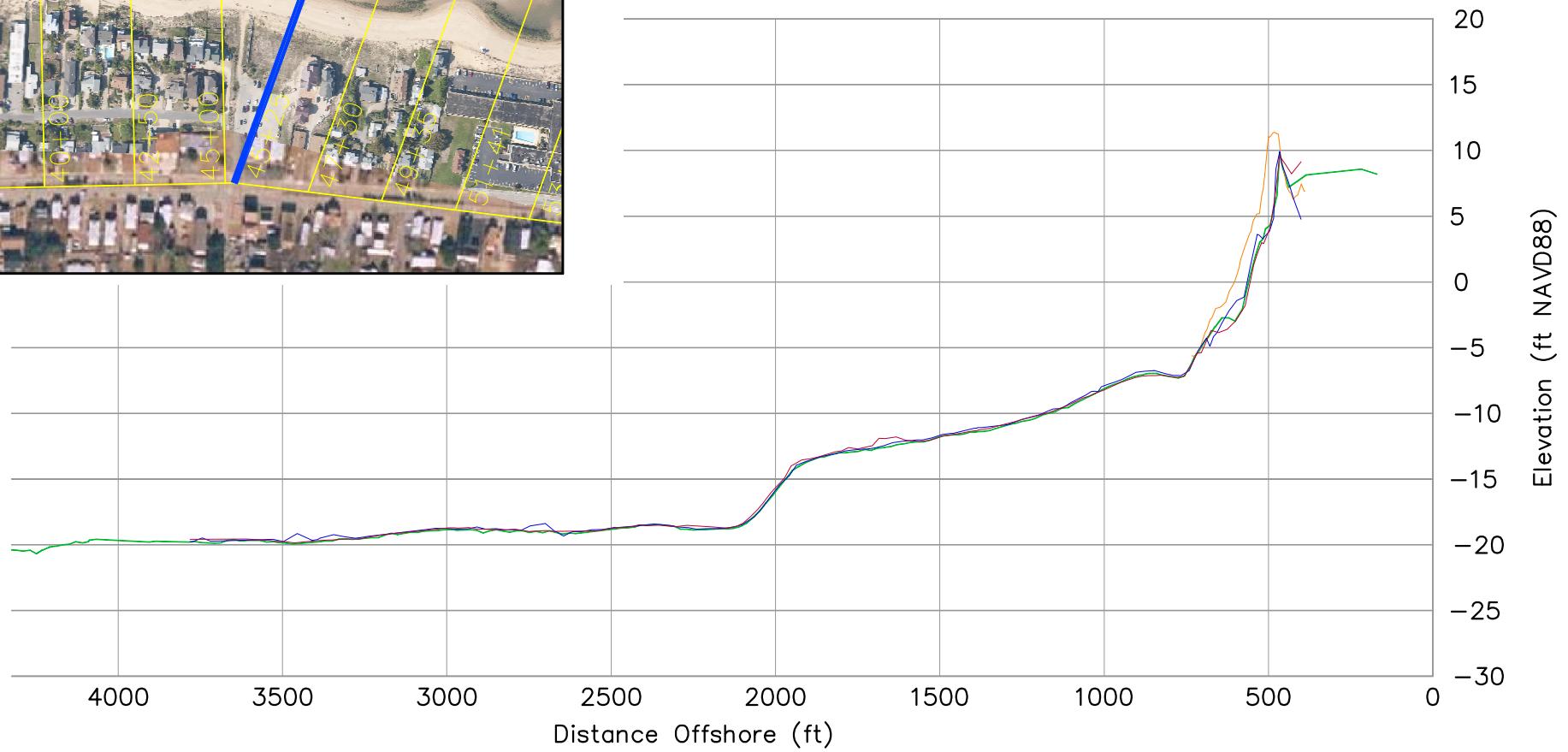


Survey Transect 45+00	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-1.09 ft/yr	-37.41 ft
Volume Change Above -15 ft NAVD88	0.67 cy/ft/yr	-6.02 cy/ft
Volume Change Above 0 ft NAVD88	0.18 cy/ft/yr	0.69 cy/ft

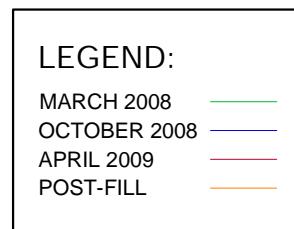


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

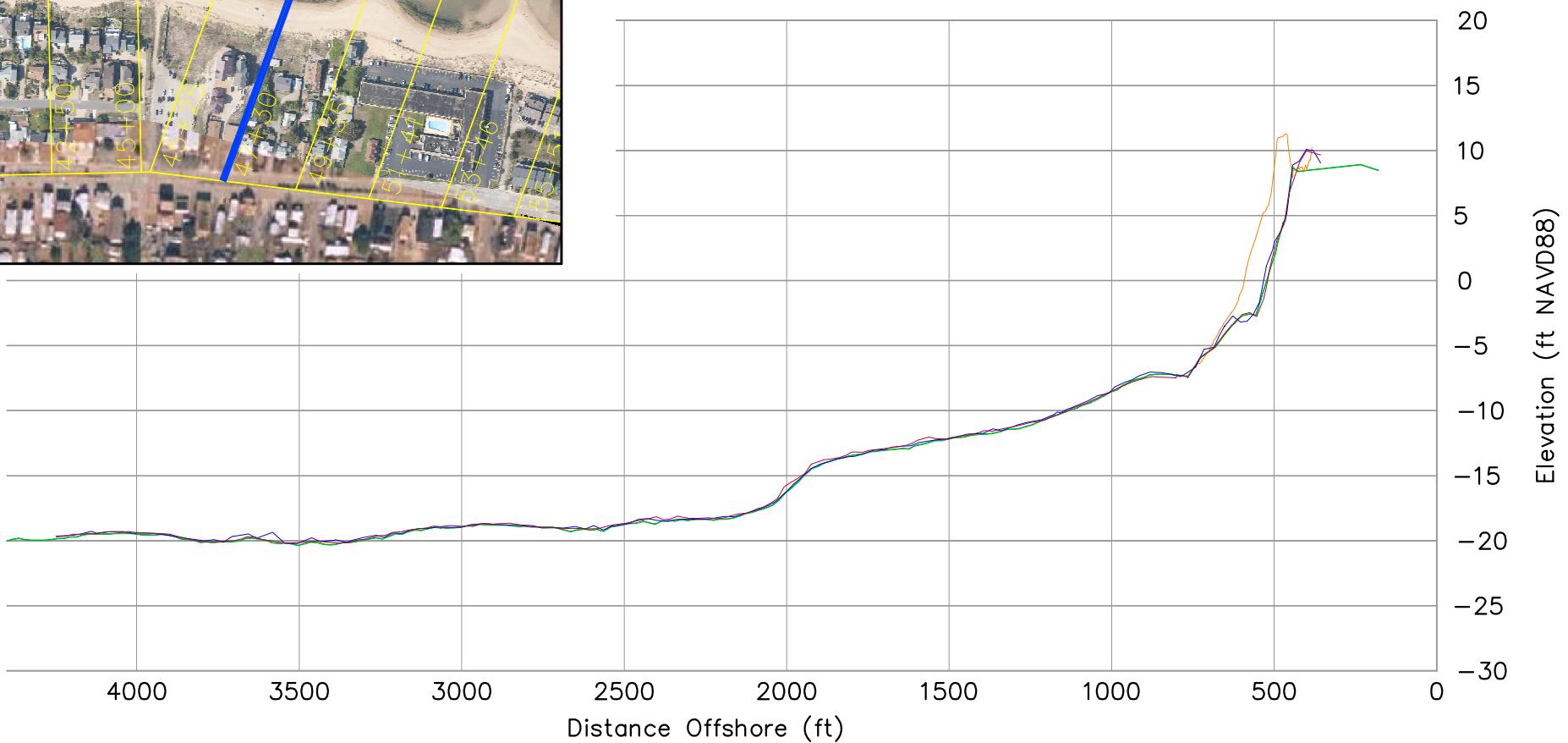


Survey Transect 45+25	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-2.61 ft/yr	-9.16 ft
Volume Change Above -15 ft NAVD88	3.35 cy/ft/yr	-2.51 cy/ft
Volume Change Above 0 ft NAVD88	0.33 cy/ft/yr	2.26 cy/ft

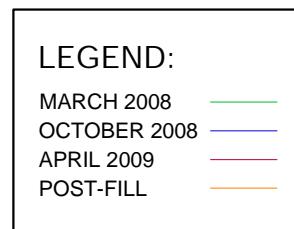


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

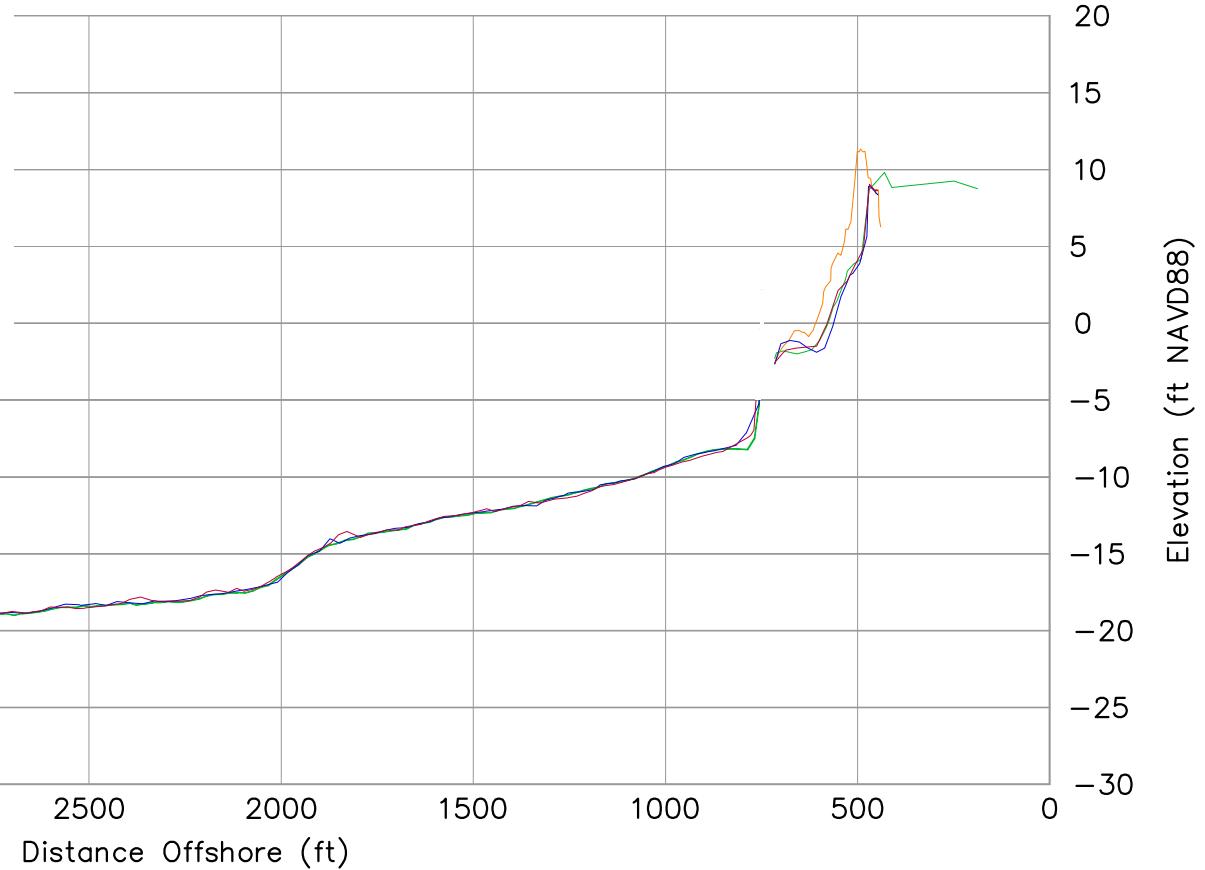


Survey Transect 47+30	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	0.51 ft/yr	-12.57 ft
Volume Change Above -15 ft NAVD88	3.91 cy/ft/yr	-4.37 cy/ft
Volume Change Above 0 ft NAVD88	-0.20 cy/ft/yr	-1.59 cy/ft



Notes:

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3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



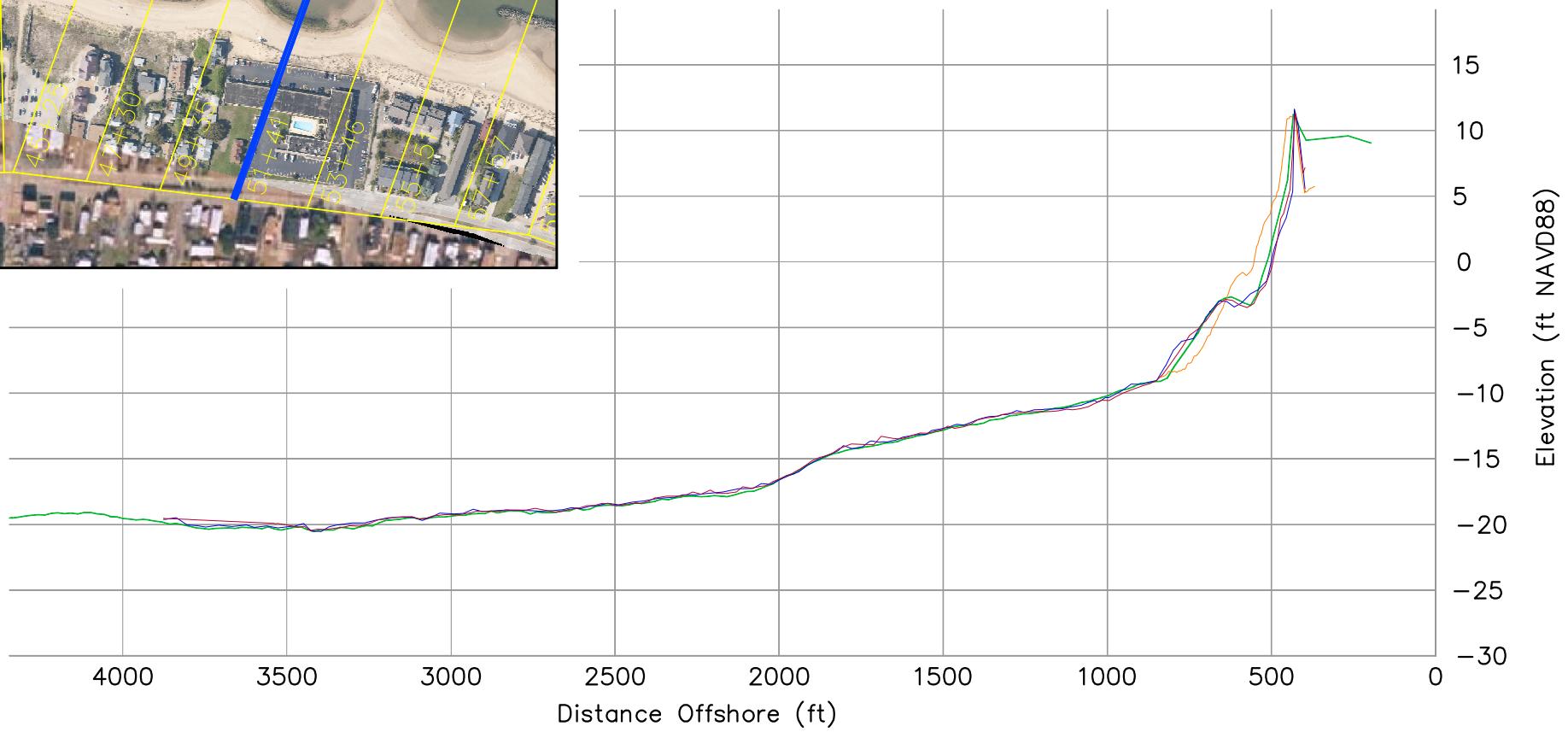
Survey Transect 49+35	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	2.01 ft/yr	14.51 ft
Volume Change Above -15 ft NAVD88	2.95 cy/ft/yr	2.40 cy/ft
Volume Change Above 0 ft NAVD88	-0.11 cy/ft/yr	1.85 cy/ft

LEGEND:

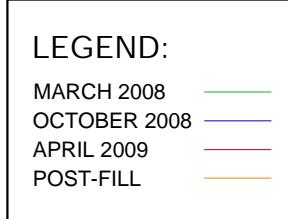
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-19.58 ft/yr	-4.10 ft
Volume Change Above -15 ft NAVD88	-3.36 cy/ft/yr	-3.55 cy/ft
Volume Change Above 0 ft NAVD88	-3.78 cy/ft/yr	1.63 cy/ft

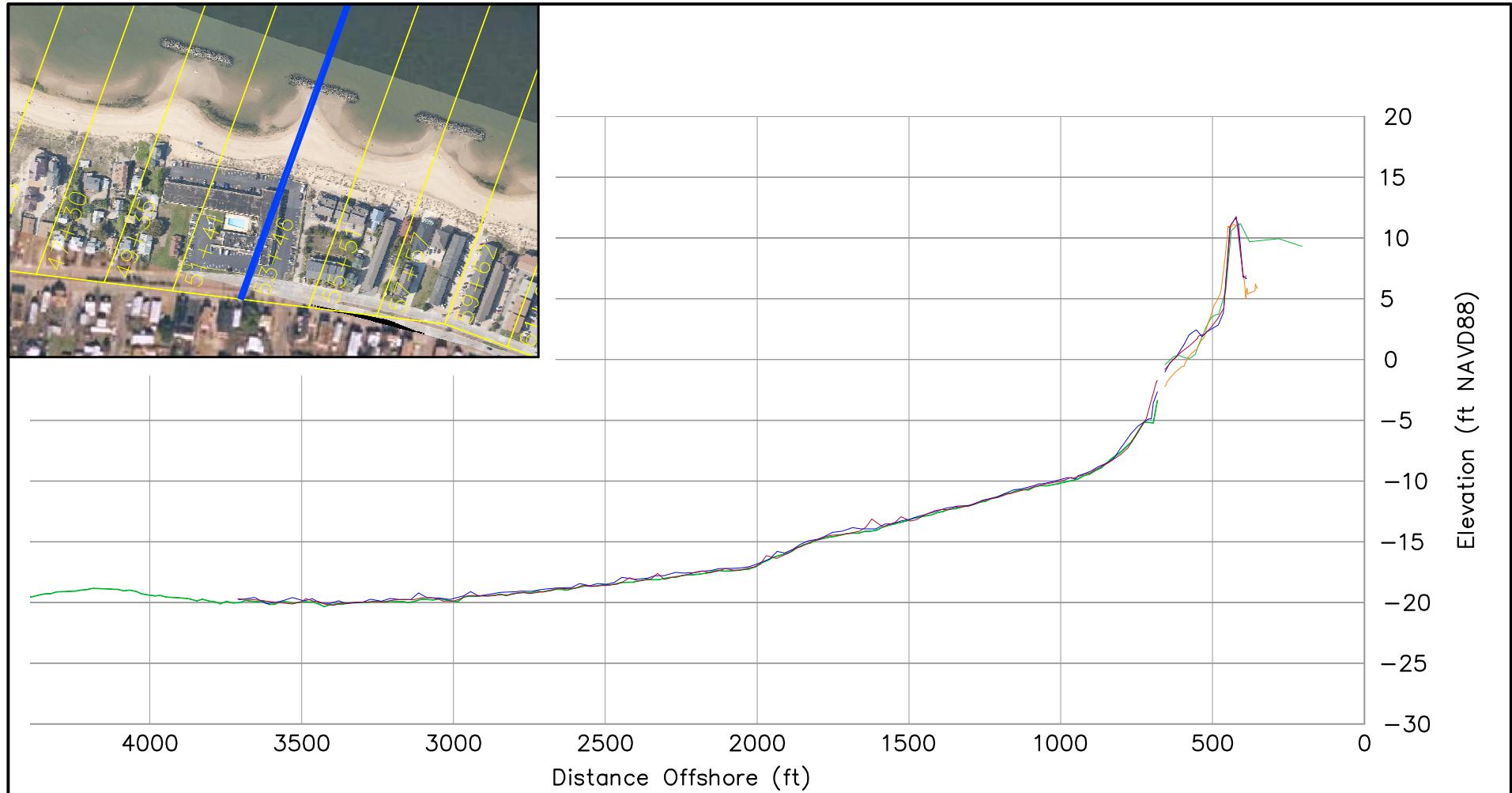


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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Survey Transect 53+46	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAV D88)	32.37 ft/yr	-16.55 ft
Volume Change Above -15 ft NAV D88	6.64 cy/ft/yr	-3.43 cy/ft
Volume Change Above 0 ft NAV D88	1.28 cy/ft/yr	-1.34 cy/ft

LEGEND:

MARCH 2008

OCTOBER 2008 —

APRIL 2009

POST-FILL

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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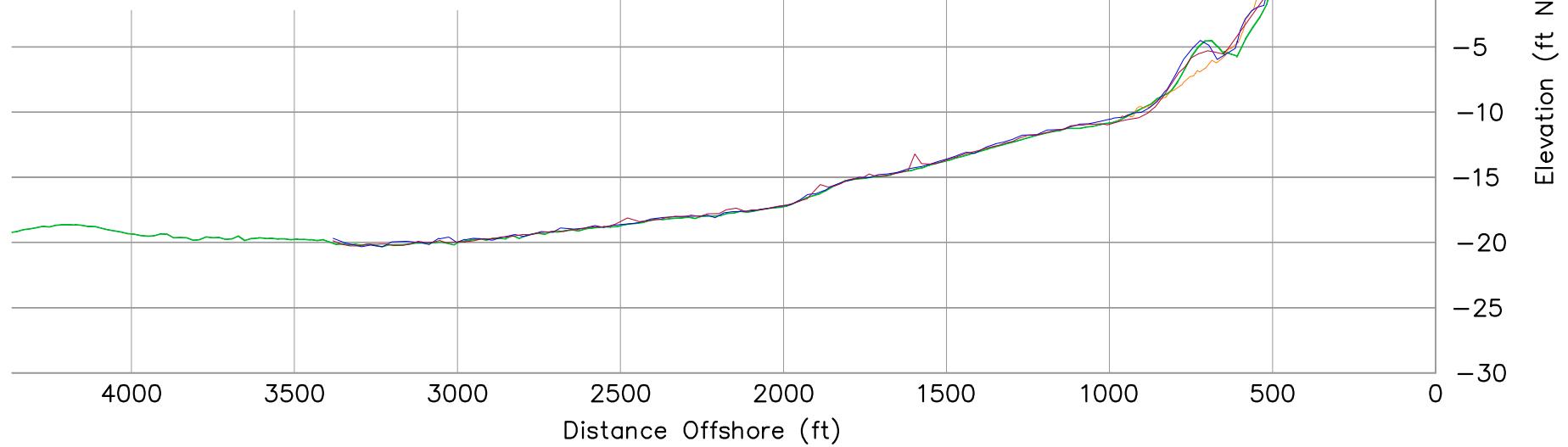
City of
Norfolk

OCEAN VIEW PERIODIC SURVEYING DATA & ANALYSIS

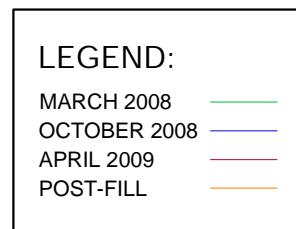
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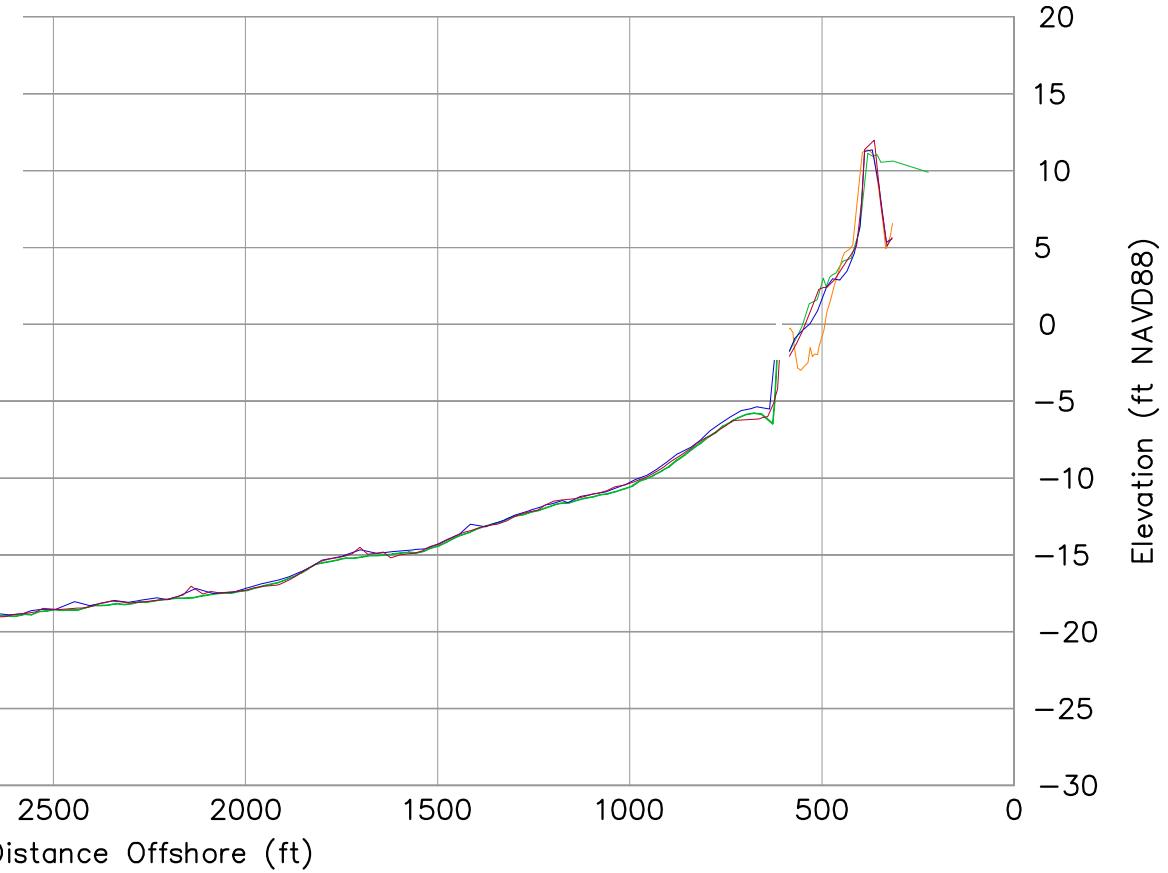


Survey Transect 55+51	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-9.81 ft/yr	-23.32 ft
Volume Change Above -15 ft NAVD88	4.69 cy/ft/yr	-7.54 cy/ft
Volume Change Above 0 ft NAVD88	0.11 cy/ft/yr	-1.73 cy/ft

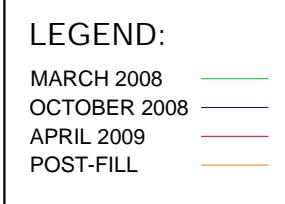


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	3.11 ft/yr	20.39 ft
Volume Change Above -15 ft NAVD88	-2.19 cy/ft/yr	-8.17 cy/ft
Volume Change Above 0 ft NAVD88	0.62 cy/ft/yr	2.99 cy/ft

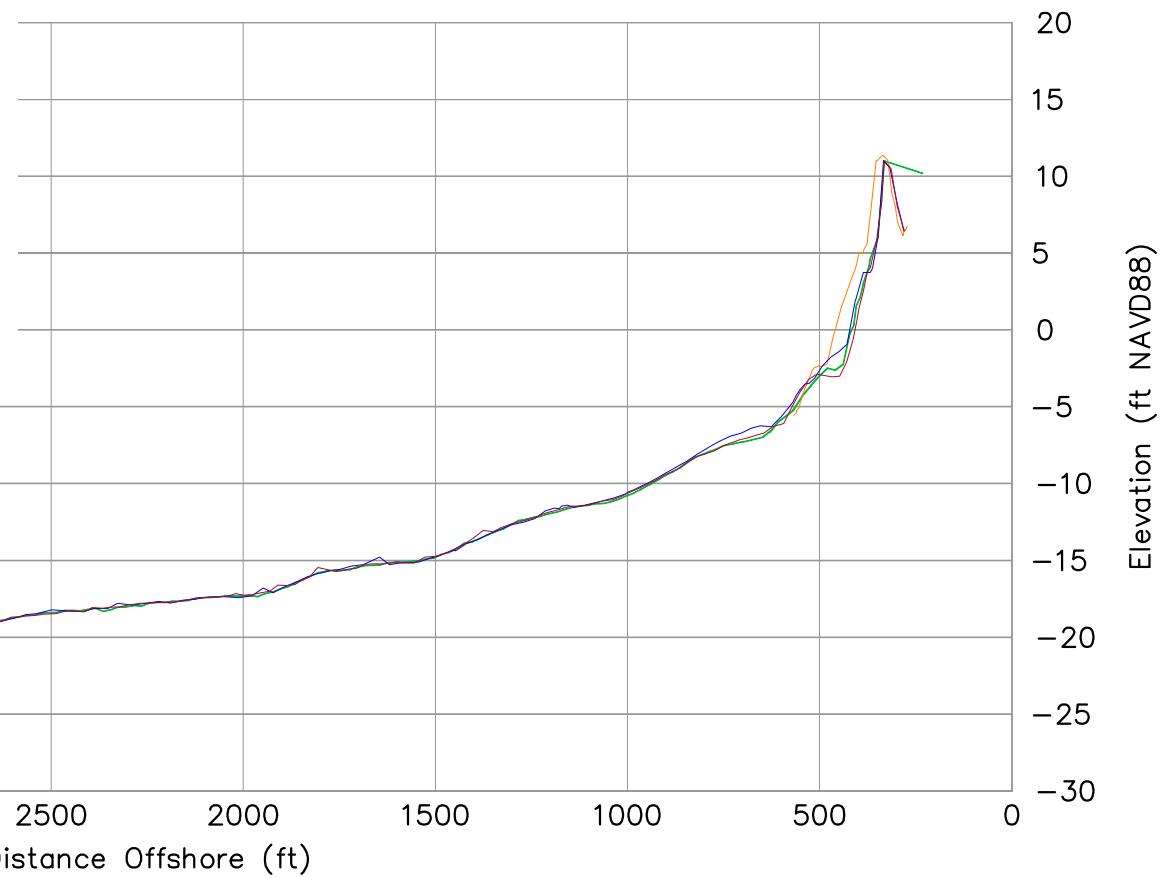


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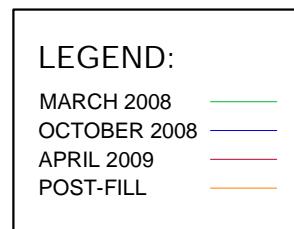
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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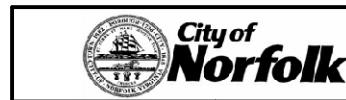


Survey Transect 59+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-6.21 ft/yr	-17.87 ft
Volume Change Above -15 ft NAVD88	0.92 cy/ft/yr	-10.21 cy/ft
Volume Change Above 0 ft NAVD88	-0.81 cy/ft/yr	-1.25 cy/ft

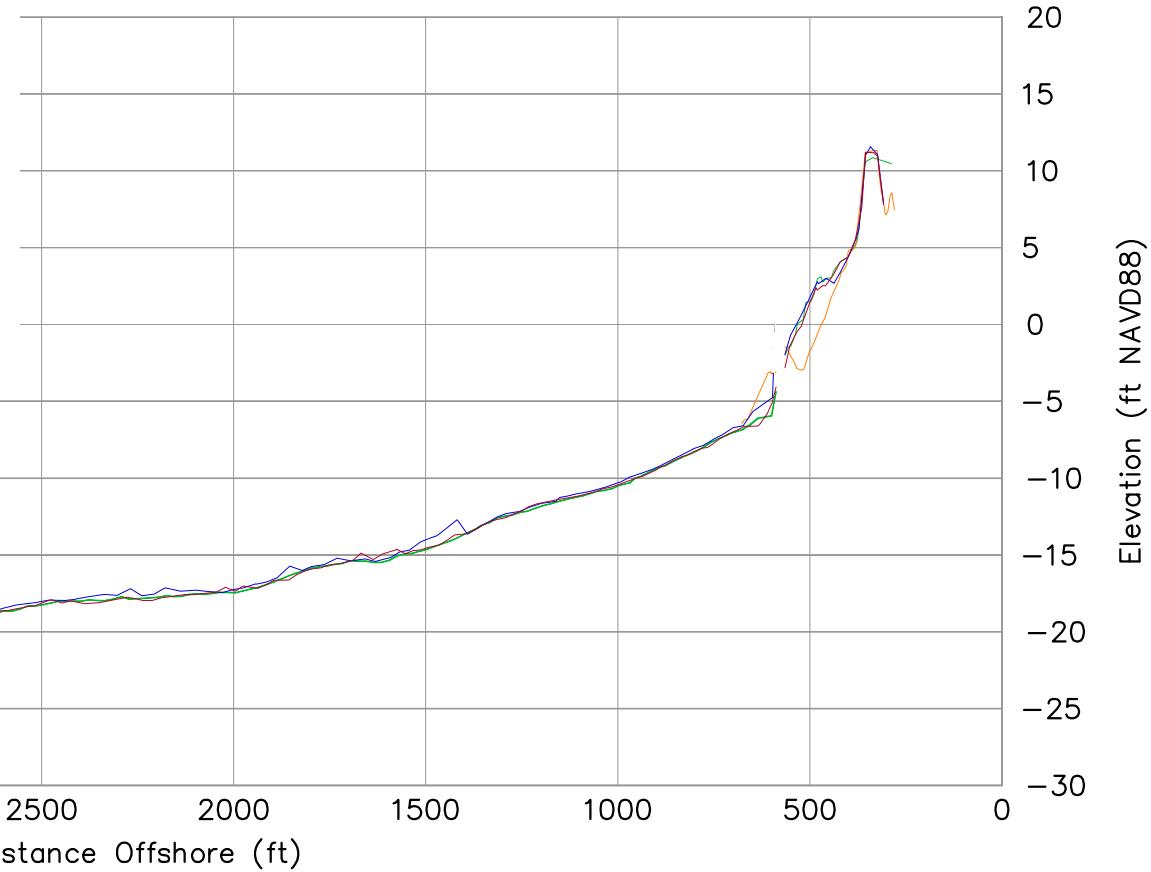


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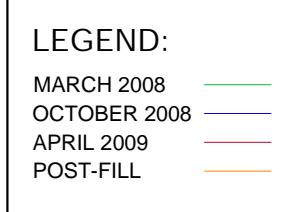
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OCEAN VIEW PERIODIC
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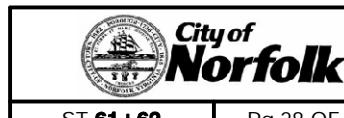


Survey Transect 61+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-6.15 ft/yr	-8.61 ft
Volume Change Above -15 ft NAVD88	-0.47 cy/ft/yr	-12.81 cy/ft
Volume Change Above 0 ft NAVD88	-0.70 cy/ft/yr	-0.37 cy/ft

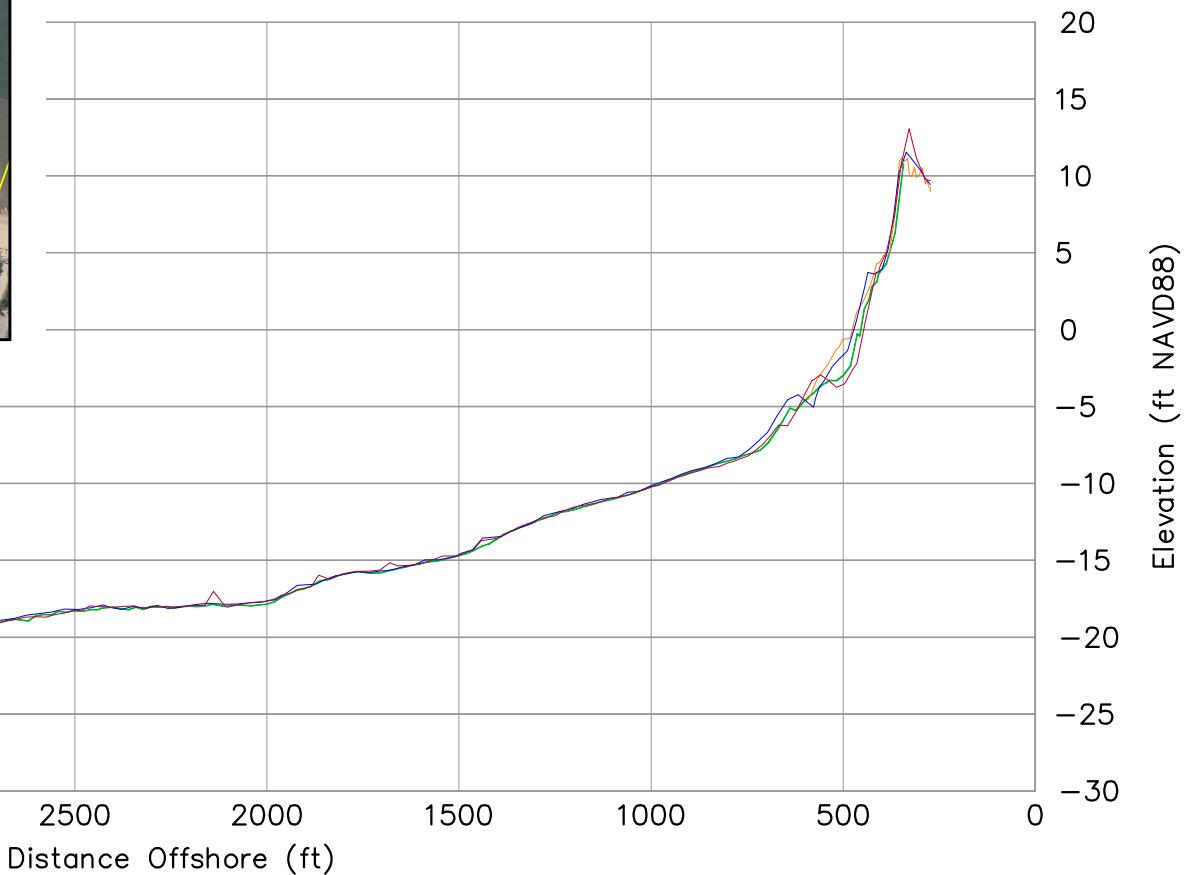


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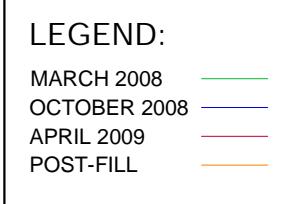
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Survey Transect 63+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-8.61 ft/yr	-23.39 ft
Volume Change Above -15 ft NAVD88	1.35 cy/ft/yr	-11.36 cy/ft
Volume Change Above 0 ft NAVD88	1.73 cy/ft/yr	-0.38 cy/ft

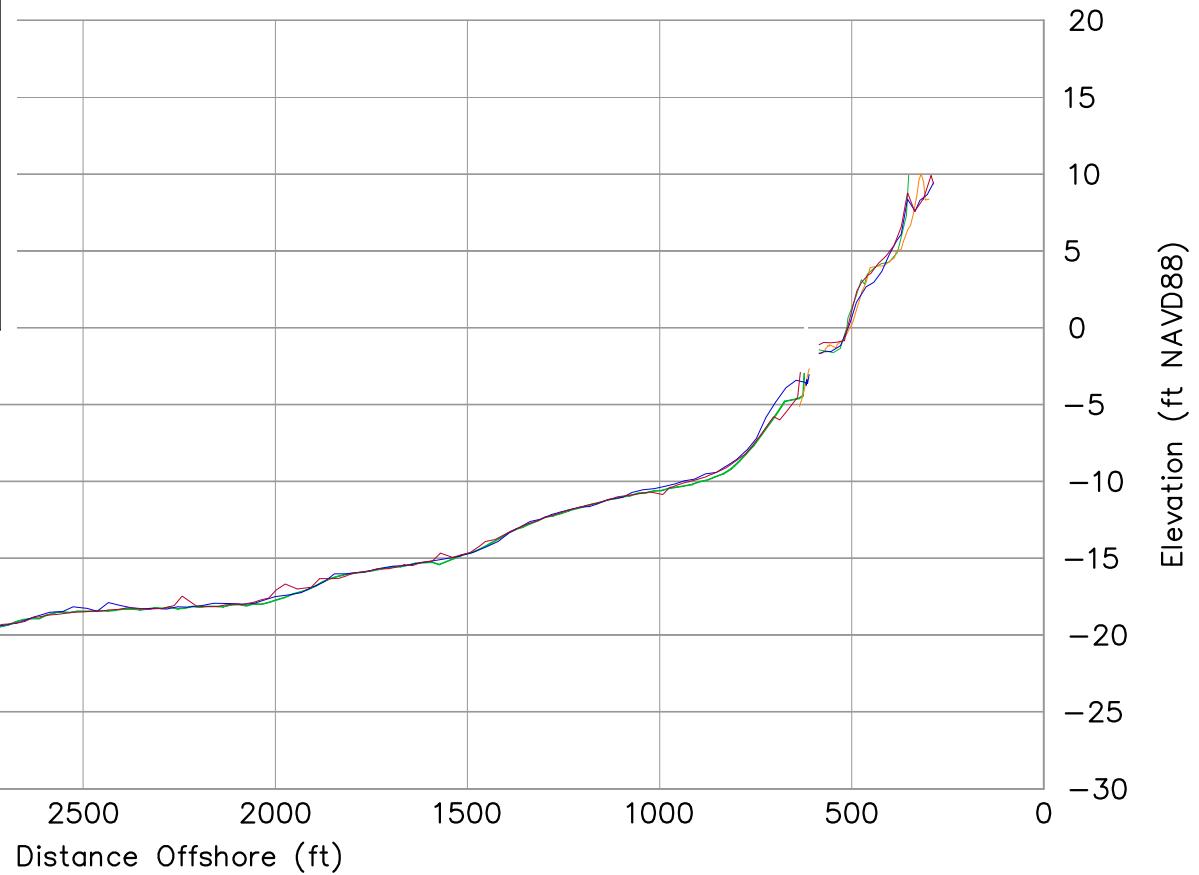


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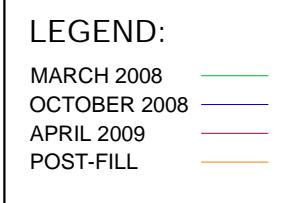
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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Survey Transect 65+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-3.29 ft/yr	5.13 ft
Volume Change Above -15 ft NAVD88	4.81 cy/ft/yr	1.72 cy/ft
Volume Change Above 0 ft NAVD88	1.44 cy/ft/yr	3.45 cy/ft

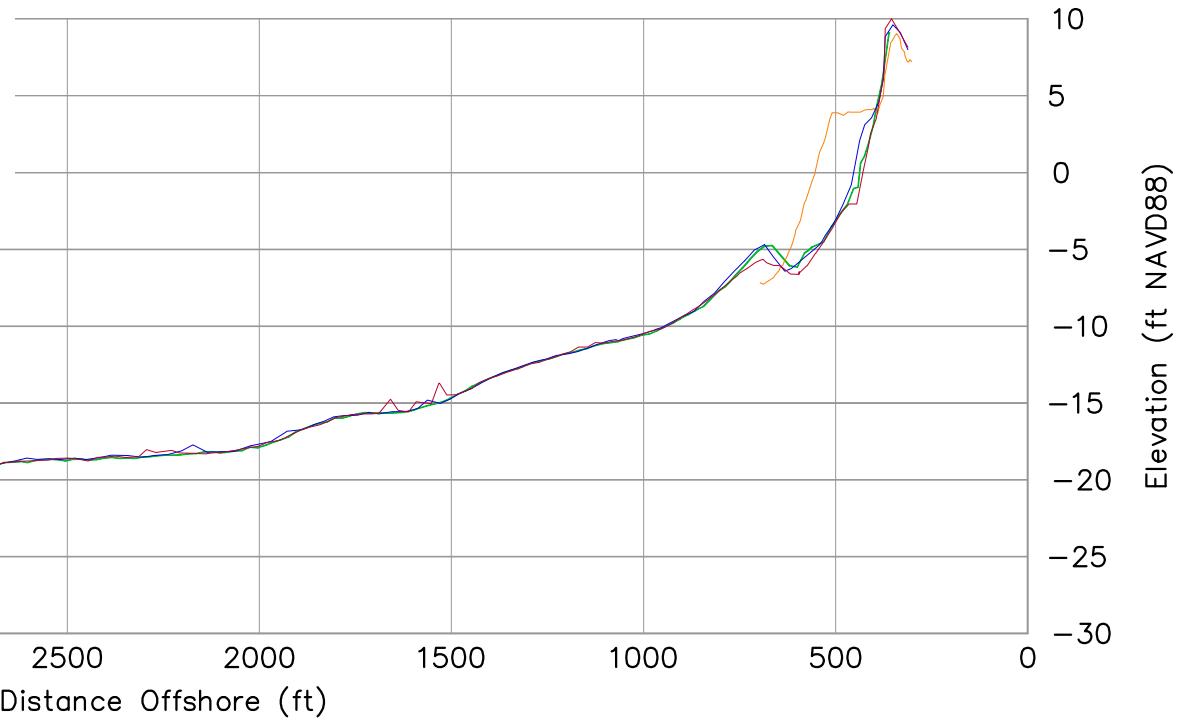


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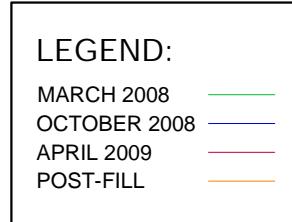
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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Survey Transect 67+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-5.59 ft/yr	-25.25 ft
Volume Change Above -15 ft NAVD88	-4.74 cy/ft/yr	-9.72 cy/ft
Volume Change Above 0 ft NAVD88	-0.13 cy/ft/yr	-1.65 cy/ft

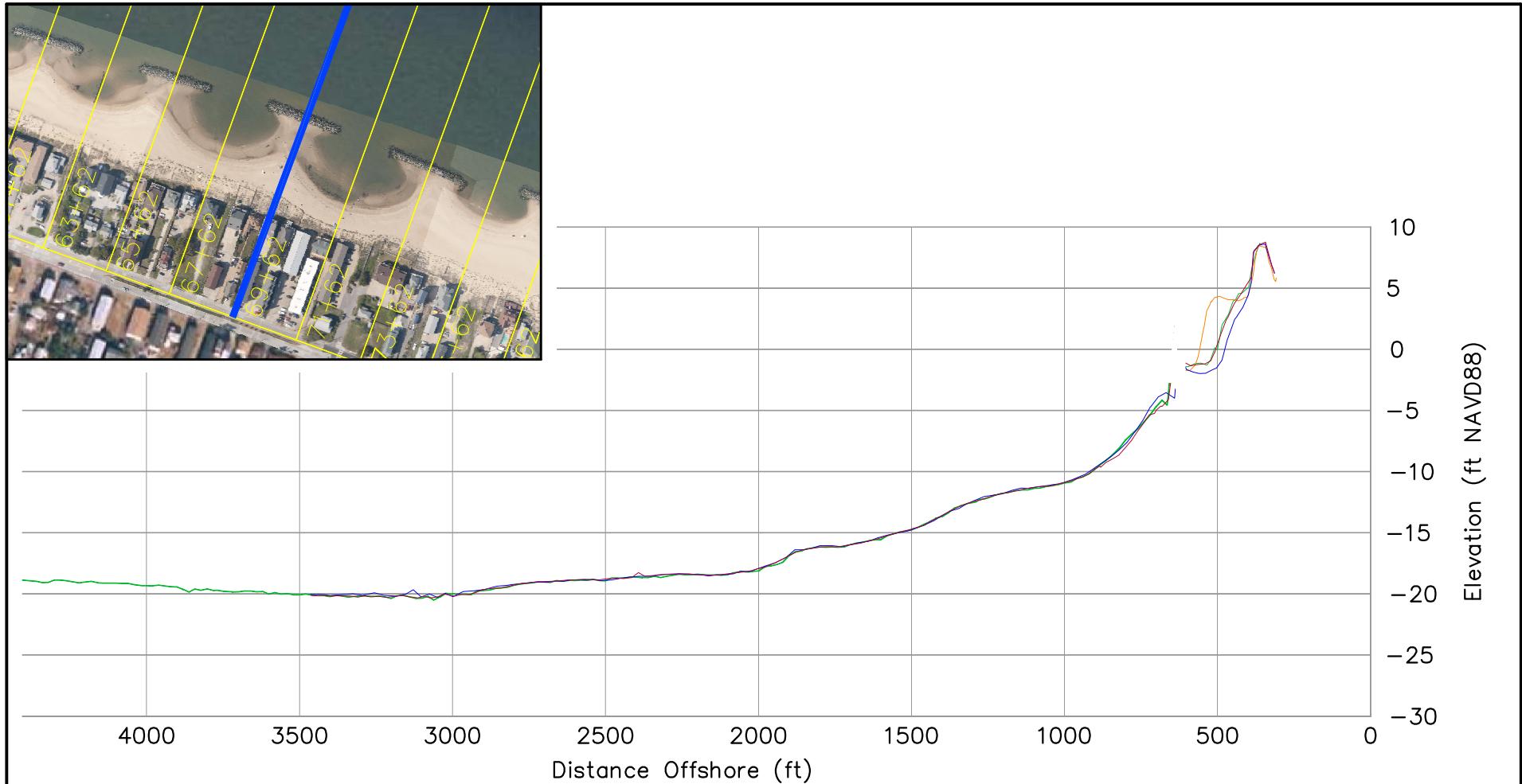


Notes:

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2. Sections Are Viewed Toward Increasing Stationing.
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Survey Transect 69+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAV D88)	-0.13 ft/yr	27.30 ft
Volume Change Above -15 ft NAV D88	-3.03 cy/ft/yr	7.16 cy/ft
Volume Change Above 0 ft NAV D88	-0.12 cy/ft/yr	4.59 cy/ft

LEGEND:

MARCH 2008 OCTOBER 2008 APRIL 2009 POST-FILL

Notes:

1. Stationing From West To East At Varying Intervals.
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4. Survey Comparison Made To March 2008 and October 2008.
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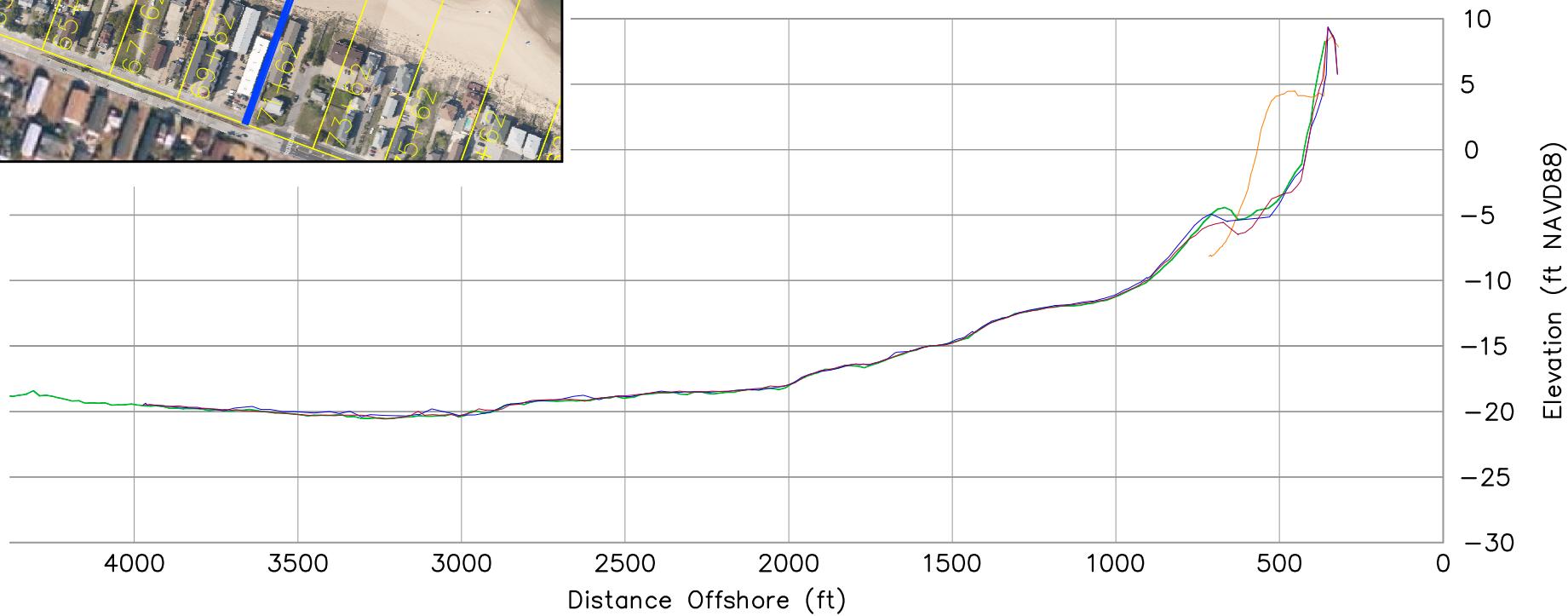
City of **Norfolk**

OCEAN VIEW PERIODIC SURVEYING DATA & ANALYSIS

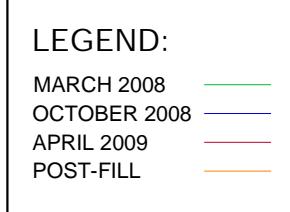
ST 69+62

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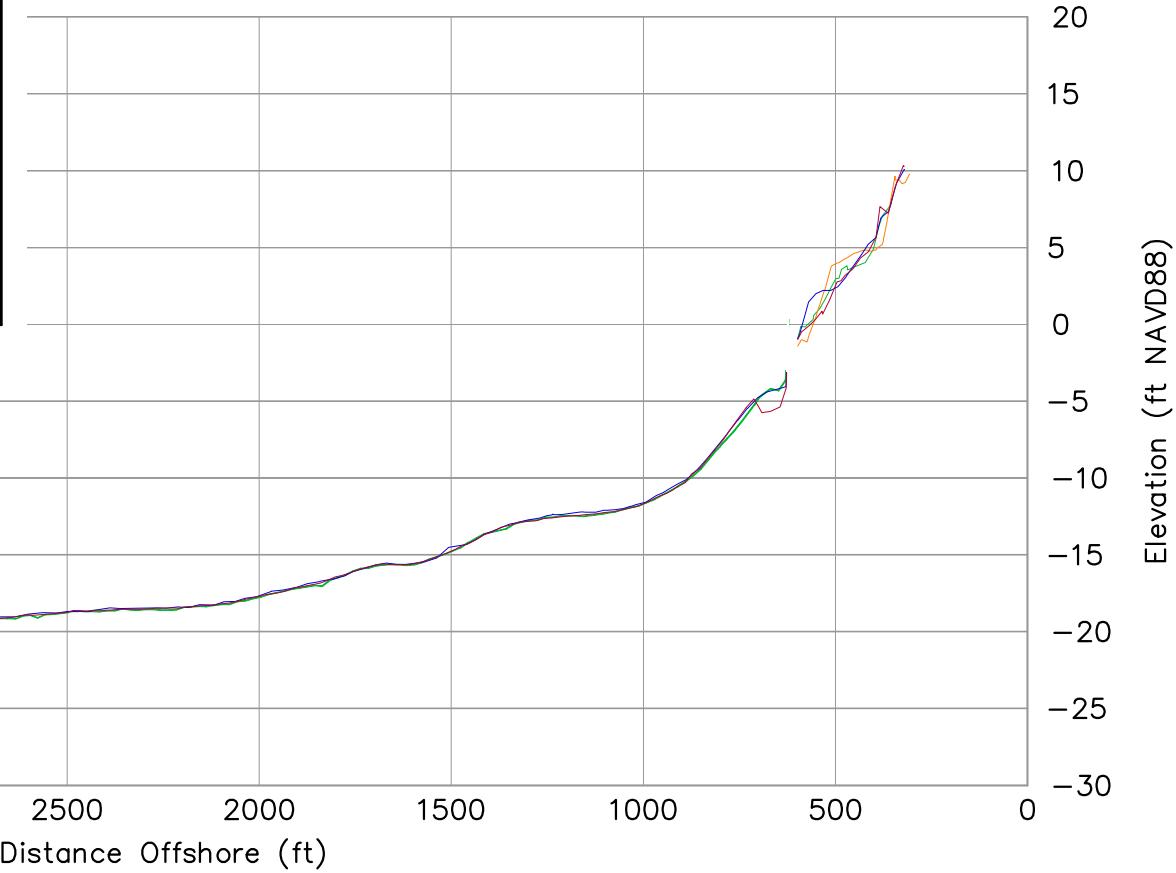
Survey Transect 71+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-7.83 ft/yr	0.24 ft
Volume Change Above -15 ft NAVD88	-9.25 cy/ft/yr	-5.90 cy/ft
Volume Change Above 0 ft NAVD88	-2.40 cy/ft/yr	2.04 cy/ft



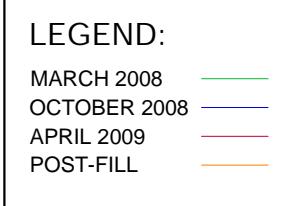
Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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ST <u>71+62</u>	Pg 33 OF 106



Survey Transect 73+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-13.73 ft/yr	-47.61 ft
Volume Change Above -15 ft NAVD88	-2.12 cy/ft/yr	-7.97 cy/ft
Volume Change Above 0 ft NAVD88	-0.57 cy/ft/yr	-2.42 cy/ft

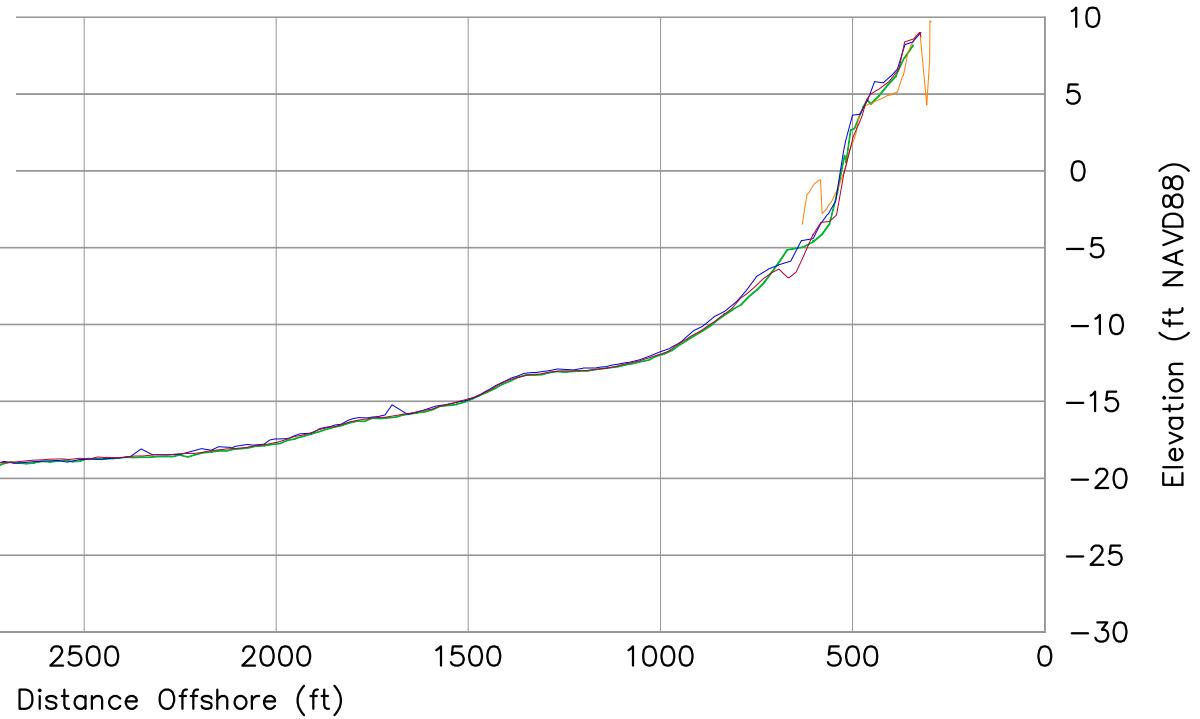
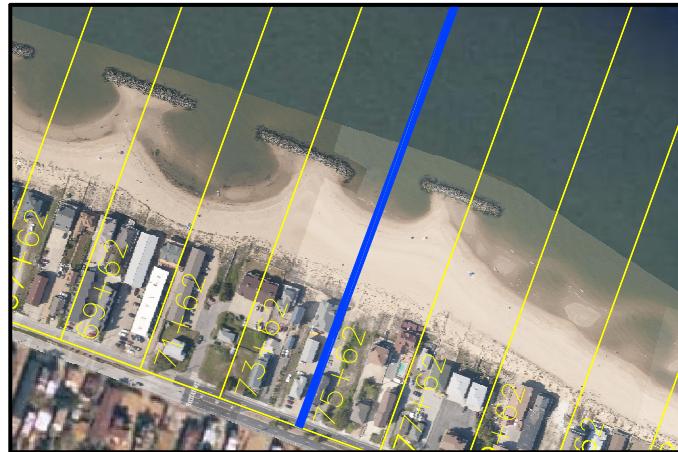


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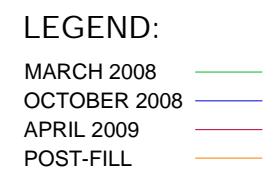
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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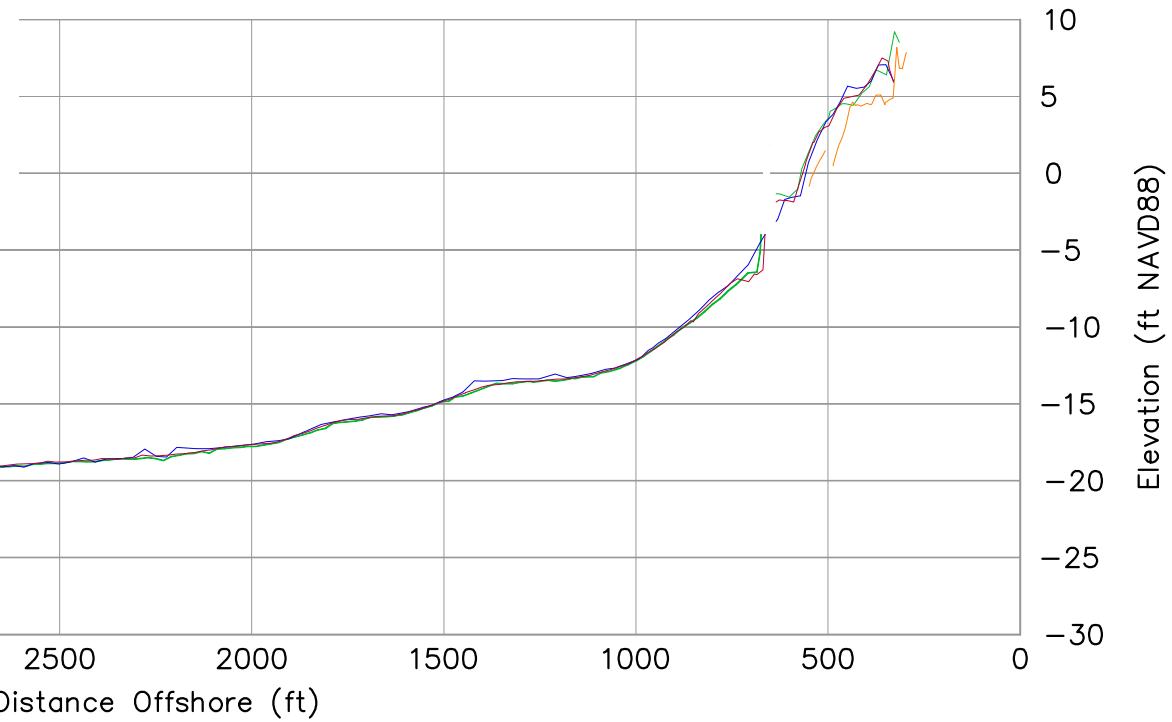


Survey Transect 75+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-2.71 ft/yr	-13.45 ft
Volume Change Above -15 ft NAVD88	0.06 cy/ft/yr	-2.63 cy/ft
Volume Change Above 0 ft NAVD88	0.91 cy/ft/yr	-2.63 cy/ft

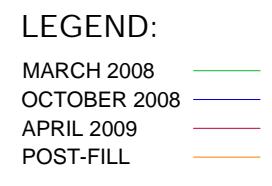


Notes:

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3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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Survey Transect 77+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-2.29 ft/yr	7.84 ft
Volume Change Above -15 ft NAVD88	-0.85 cy/ft/yr	-5.42 cy/ft
Volume Change Above 0 ft NAVD88	0.71 cy/ft/yr	-0.27 cy/ft

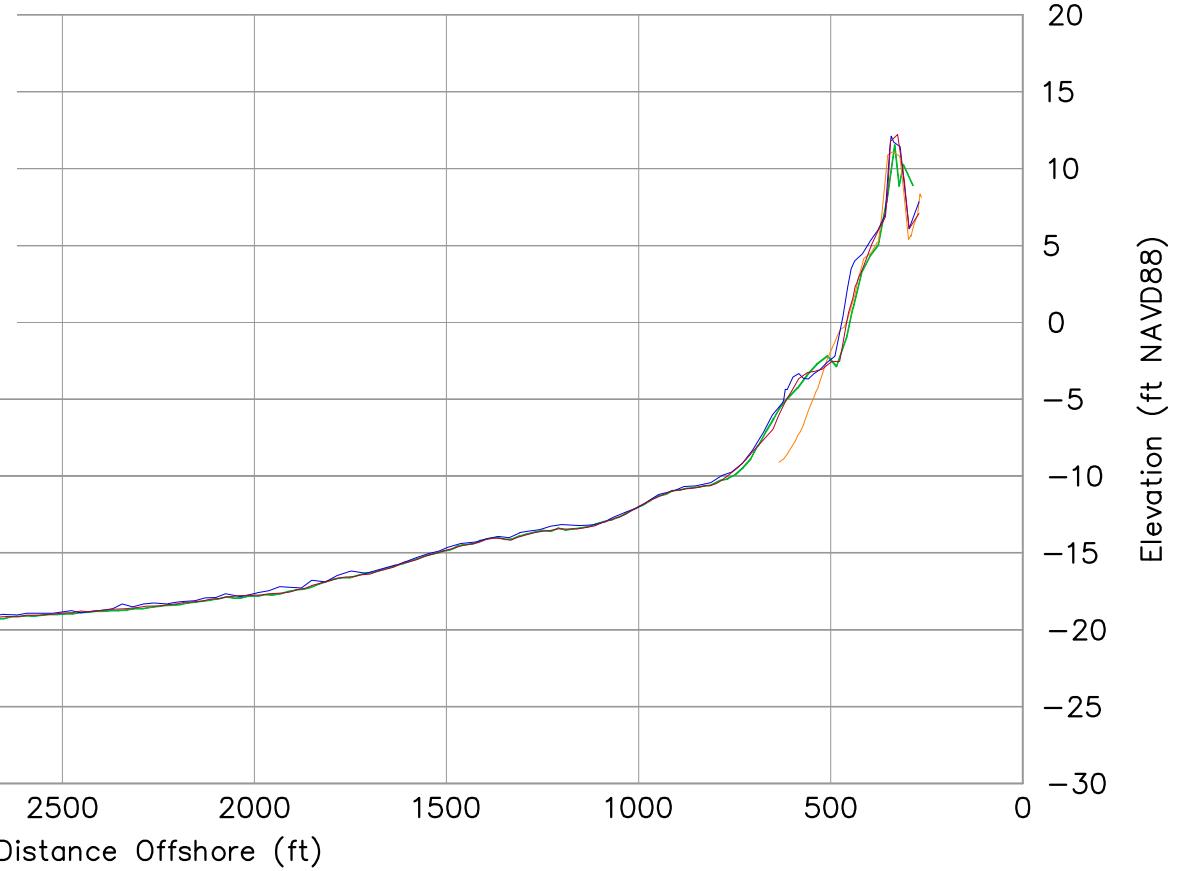
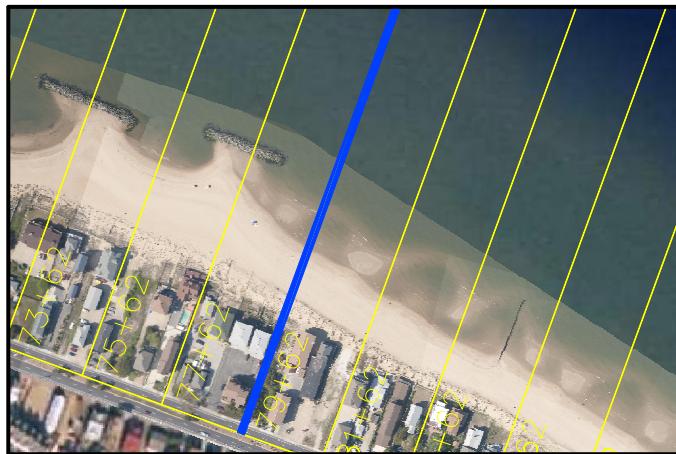


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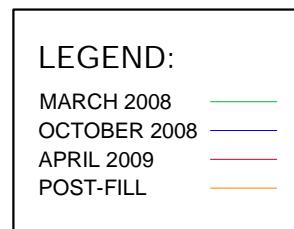
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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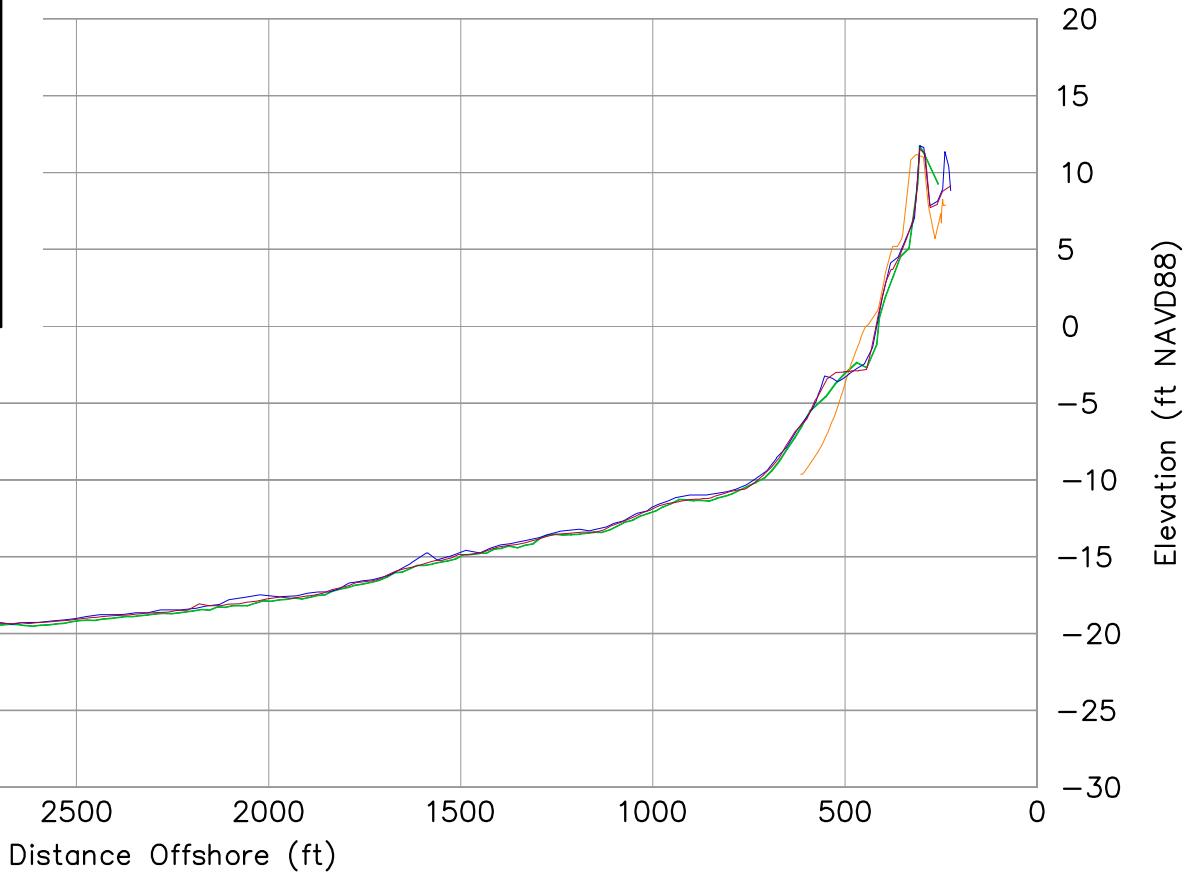
Survey Transect 79+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	7.66 ft/yr	-14.74 ft
Volume Change Above -15 ft NAVD88	2.34 cy/ft/yr	-11.64 cy/ft
Volume Change Above 0 ft NAVD88	2.46 cy/ft/yr	-3.69 cy/ft



Notes:

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3. All Survey Elevations In Feet Referenced to NAVD88.
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ST <u>79+62</u>	Pg 37 OF 106



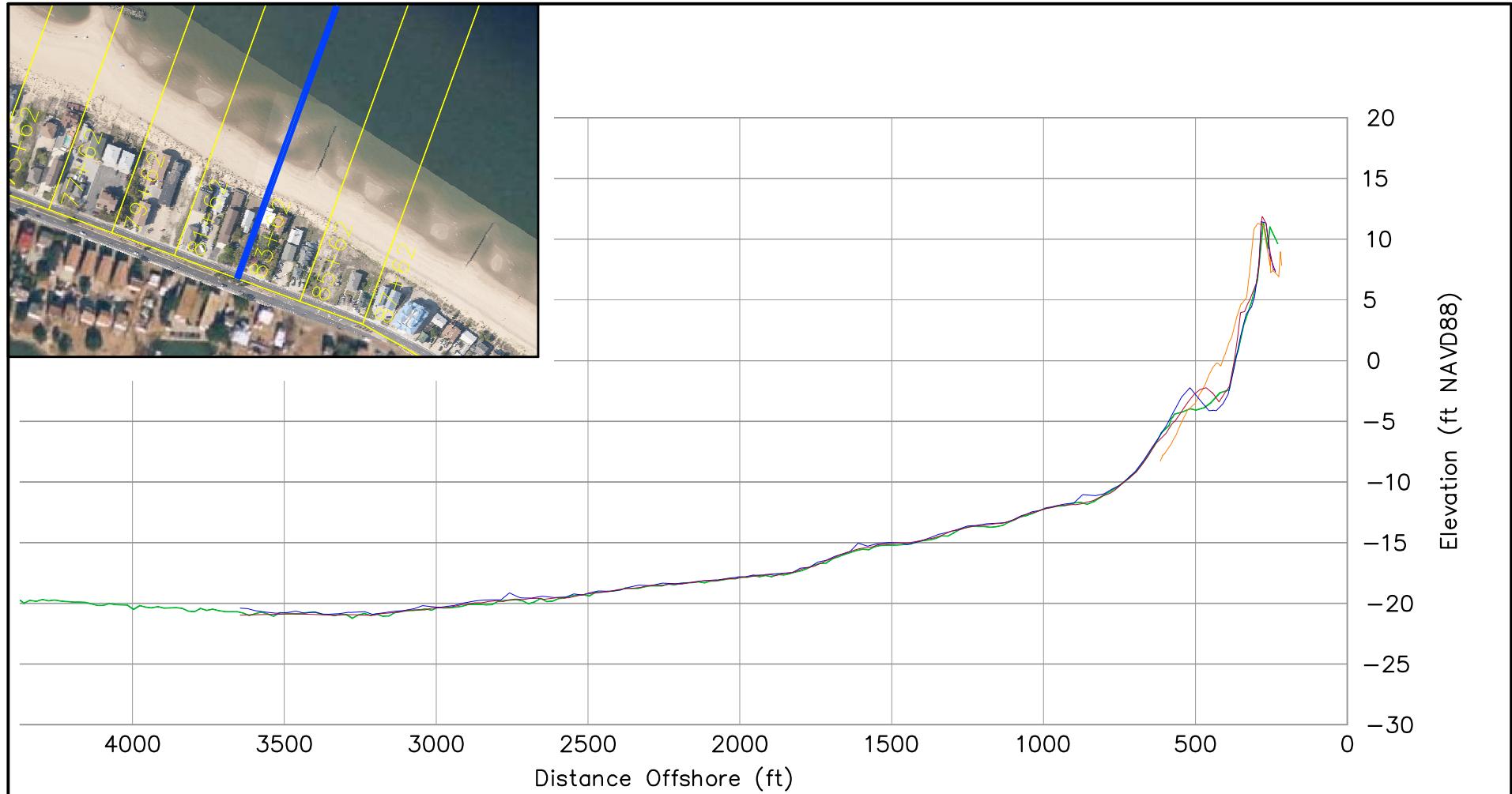
Survey Transect 81+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	5.20 ft/yr	1.05 ft
Volume Change Above -15 ft NAVD88	7.55 cy/ft/yr	-5.87 cy/ft
Volume Change Above 0 ft NAVD88	1.85 cy/ft/yr	-1.70 cy/ft

LEGEND:

MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

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4. Survey Comparison Made To March 2008 and October 2008.
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Survey Transect 83+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAV D88)	8.44 ft/yr	7.08 ft
Volume Change Above -15 ft NAV D88	6.64 cy/ft/yr	0.02 cy/ft
Volume Change Above 0 ft NAV D88	2.89 cy/ft/yr	2.65 cy/ft

LEGEND:

MARCH 2008 
OCTOBER 2008 
APRIL 2009 
POST-FILL 

Notes:

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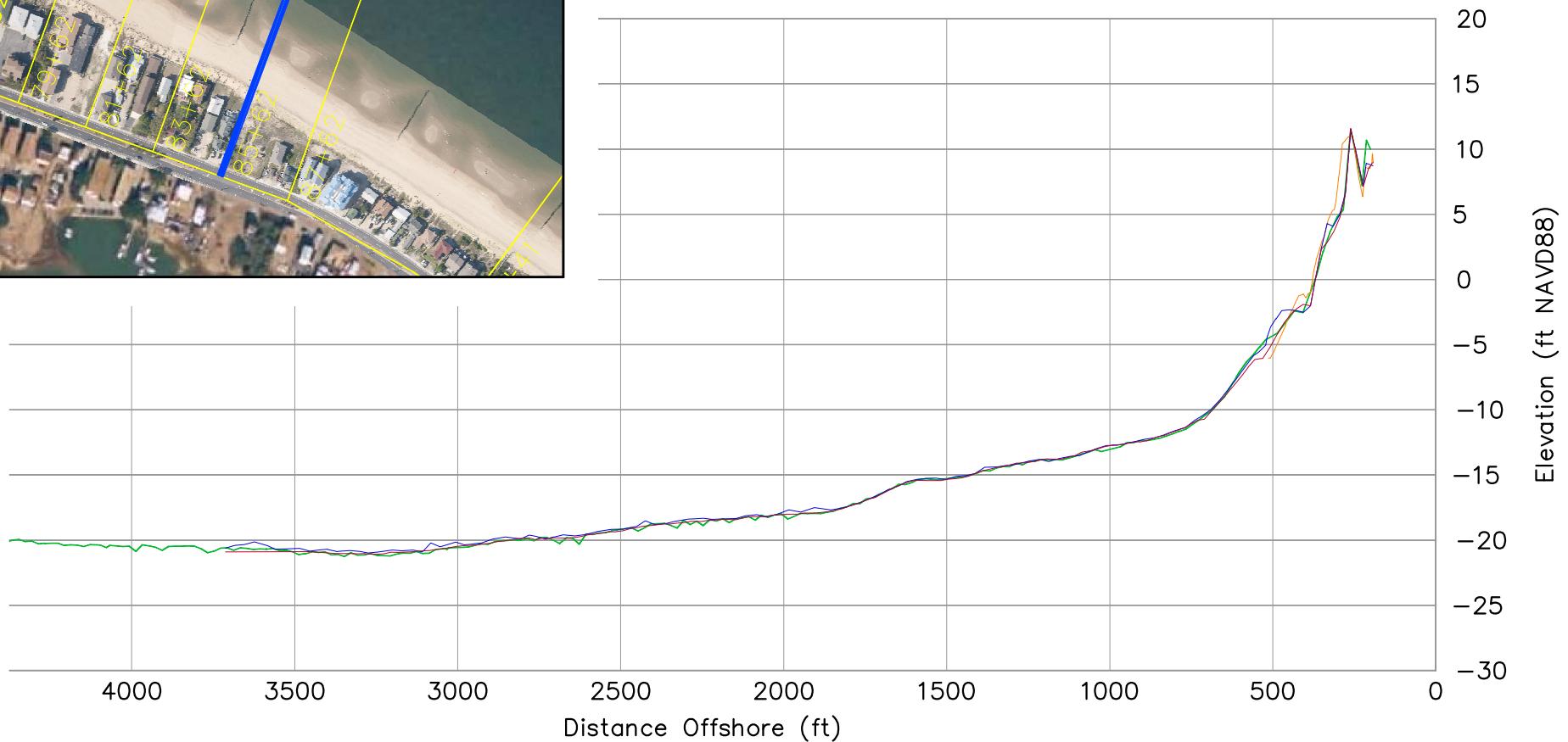
City of
Norfolk

OCEAN VIEW PERIODIC SURVEYING DATA & ANALYSIS

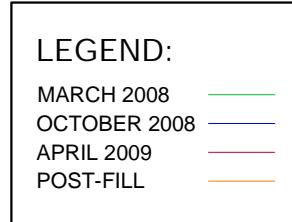
ST 83+62

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SPRING 2009



Survey Transect 85+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	3.35 ft/yr	0.06 ft
Volume Change Above -15 ft NAVD88	-1.63 cy/ft/yr	-7.55 cy/ft
Volume Change Above 0 ft NAVD88	-0.12 cy/ft/yr	-1.98 cy/ft

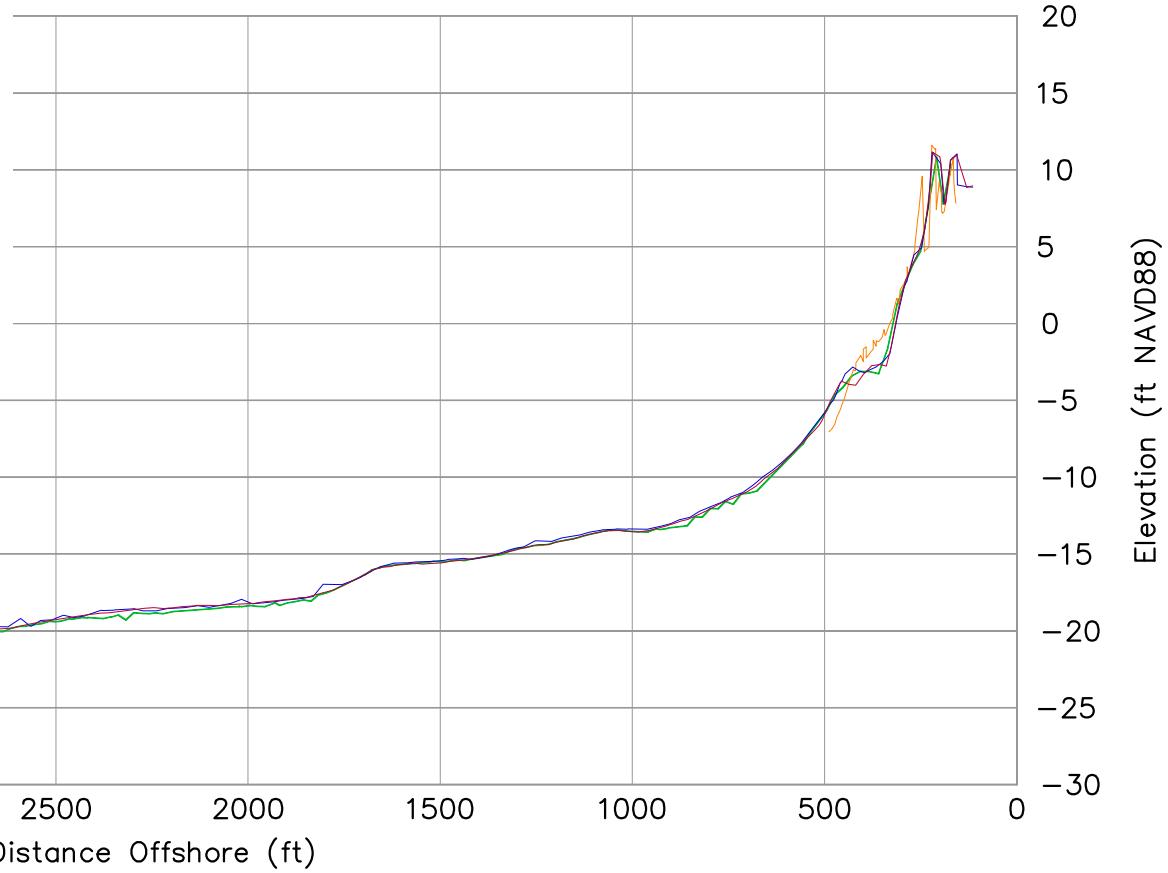


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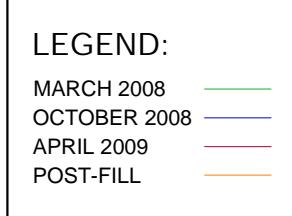
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Survey Transect 87+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-5.26 ft/yr	2.16 ft
Volume Change Above -15 ft NAVD88	2.75 cy/ft/yr	-4.34 cy/ft
Volume Change Above 0 ft NAVD88	1.22 cy/ft/yr	1.06 cy/ft

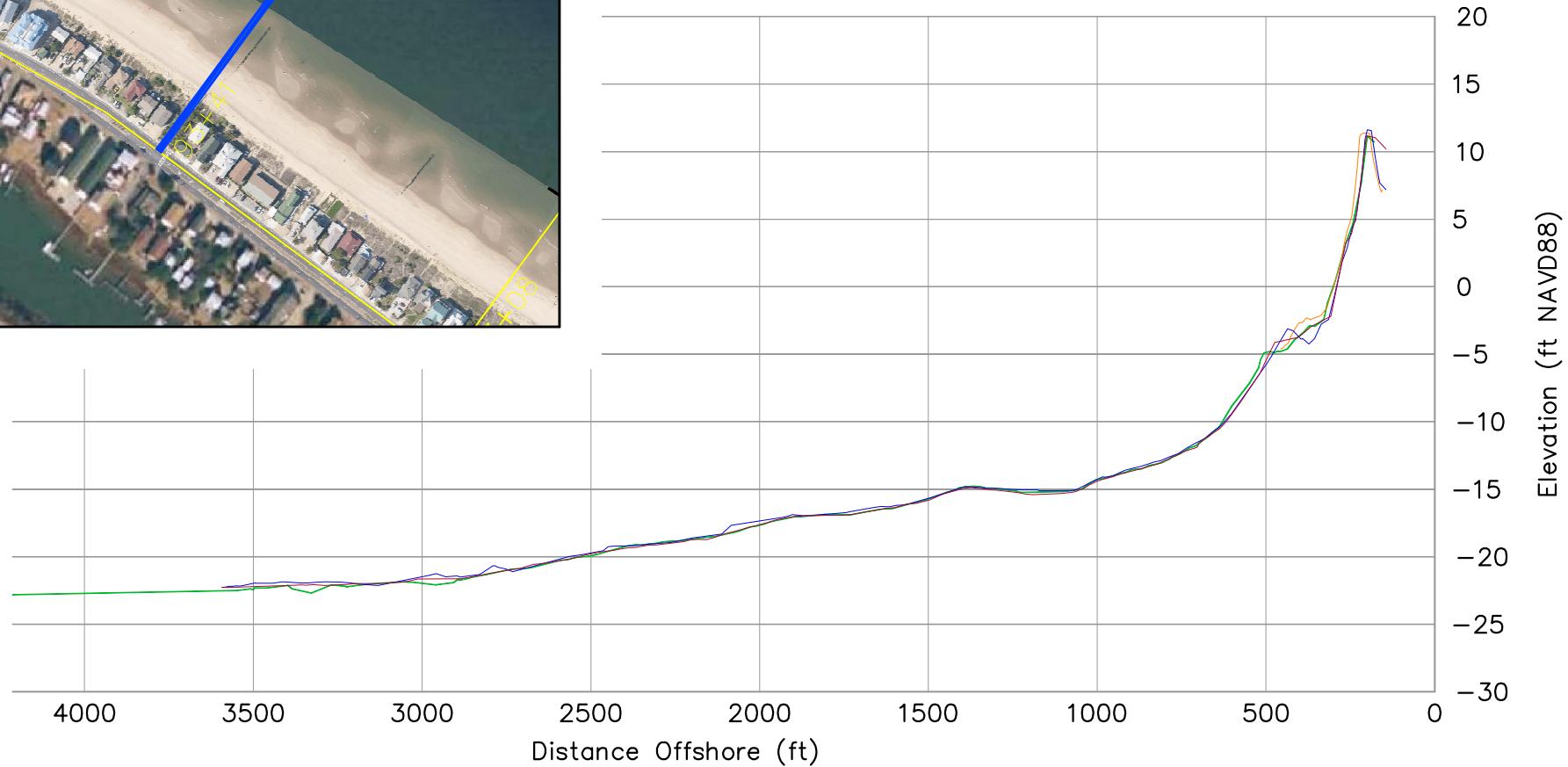
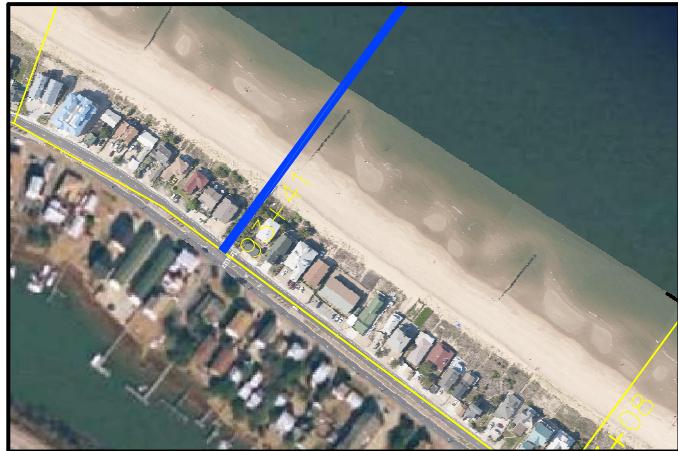


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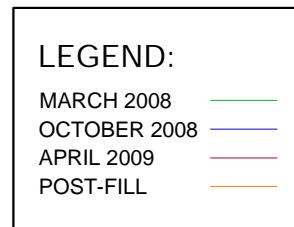
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Survey Transect 93+41	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-6.24 ft/yr	-0.58 ft
Volume Change Above -15 ft NAVD88	-3.94 cy/ft/yr	1.88 cy/ft
Volume Change Above 0 ft NAVD88	-0.48 cy/ft/yr	3.22 cy/ft

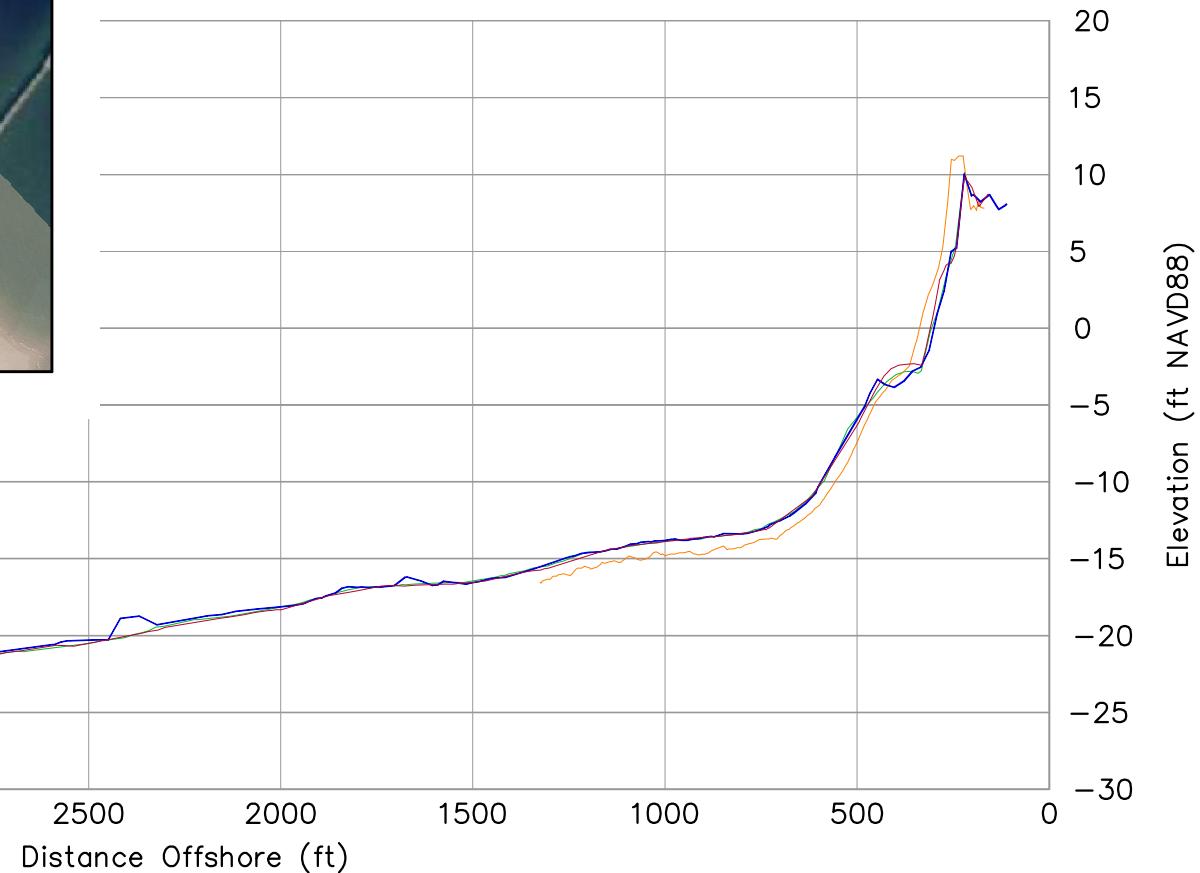
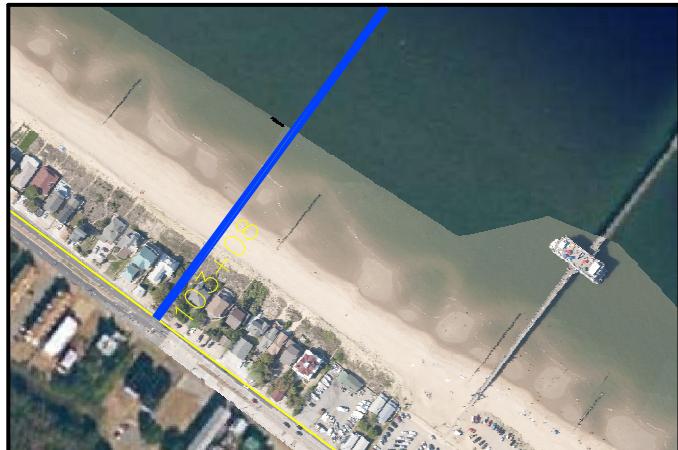


Notes:

1. Stationing From West To East At Varying Intervals.
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4. Survey Comparison Made To March 2008 and October 2008.
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Survey Transect 103+08	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	8.24 ft/yr	9.92 ft
Volume Change Above -15 ft NAVD88	1.77 cy/ft/yr	3.17 cy/ft
Volume Change Above 0 ft NAVD88	1.11 cy/ft/yr	1.51 cy/ft

LEGEND:

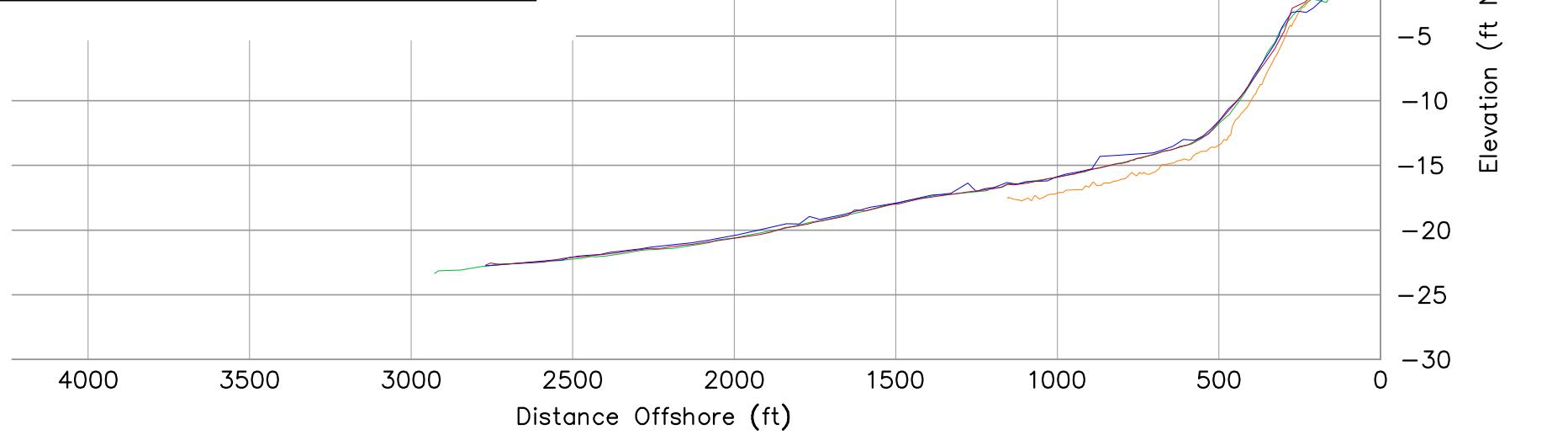
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

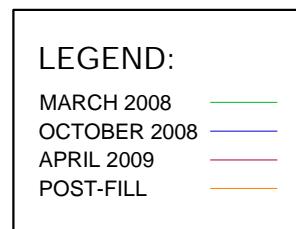
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4. Survey Comparison Made To March 2008 and October 2008.
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Survey Transect 120+93	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	4.80 ft/yr	2.57 ft
Volume Change Above -15 ft NAVD88	0.01 cy/ft/yr	-3.56 cy/ft
Volume Change Above 0 ft NAVD88	-0.74 cy/ft/yr	-0.45 cy/ft



Notes:

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3. All Survey Elevations In Feet Referenced to NAVD88.
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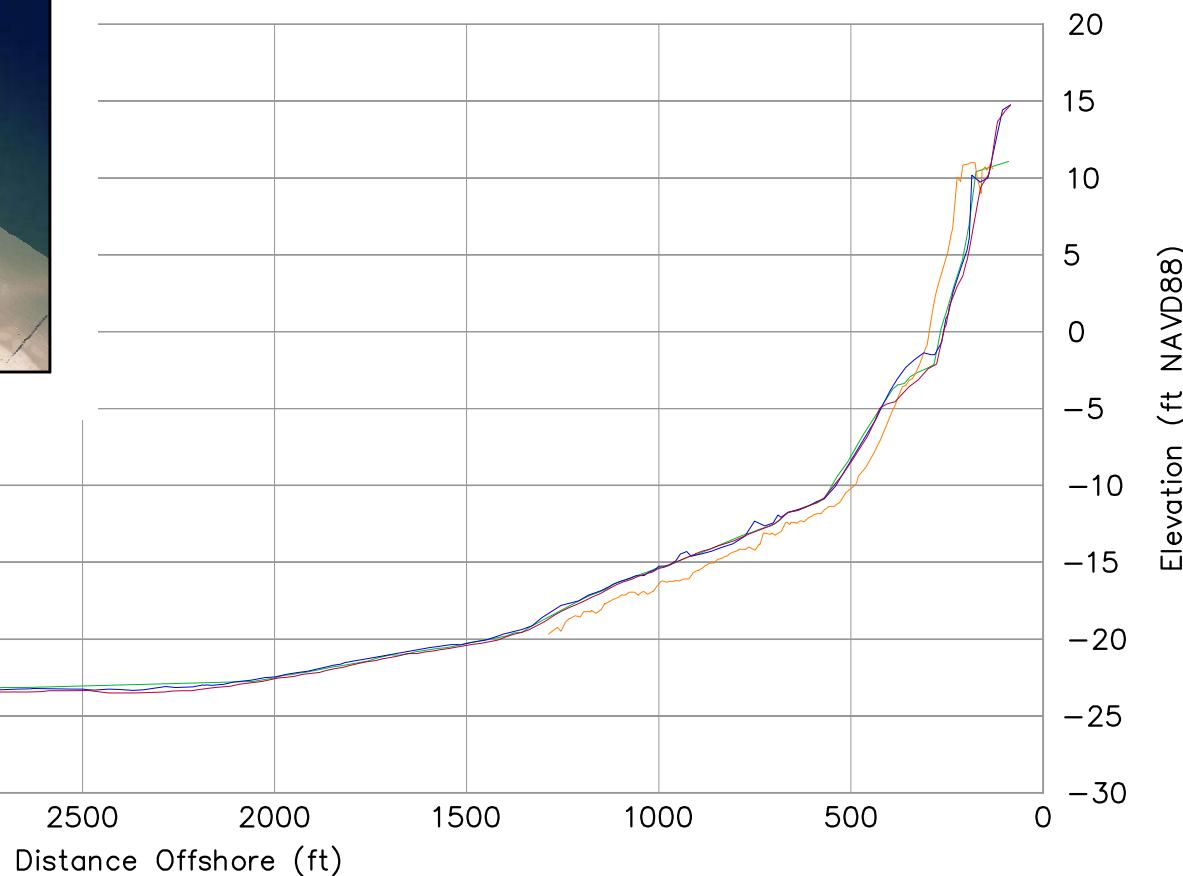


OCEAN VIEW PERIODIC
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4000 3500 3000 2500 2000 1500 1000 500 0

Distance Offshore (ft)



Survey Transect 129+17	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-6.69 ft/yr	-1.55 ft
Volume Change Above -15 ft NAVD88	-8.11 cy/ft/yr	-10.18 cy/ft
Volume Change Above 0 ft NAVD88	-3.28 cy/ft/yr	-3.30 cy/ft

LEGEND:

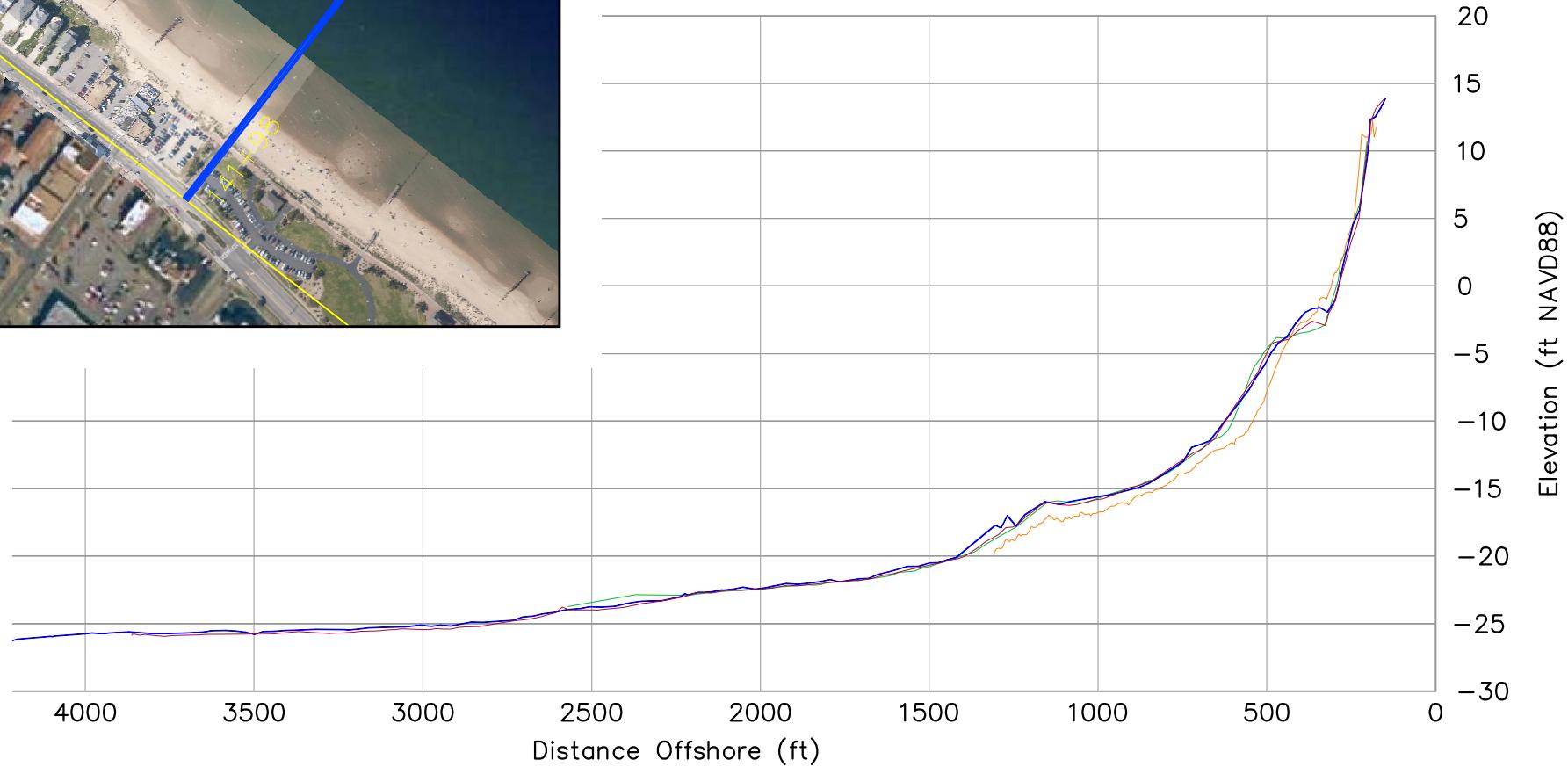
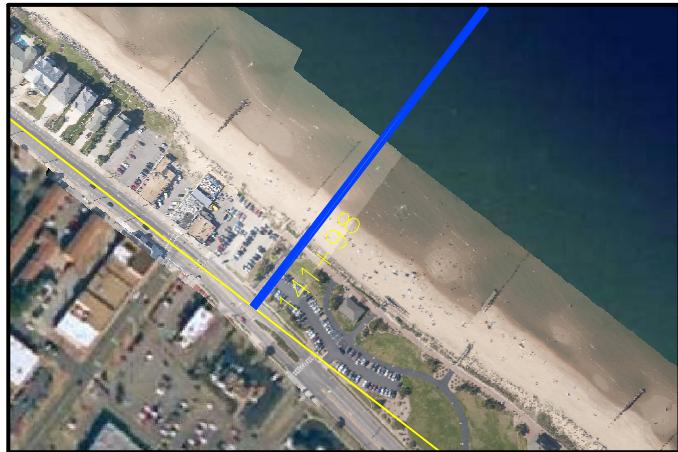
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

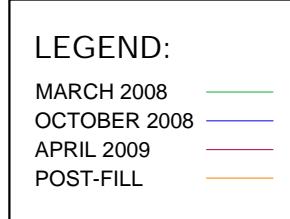
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ANALYSIS

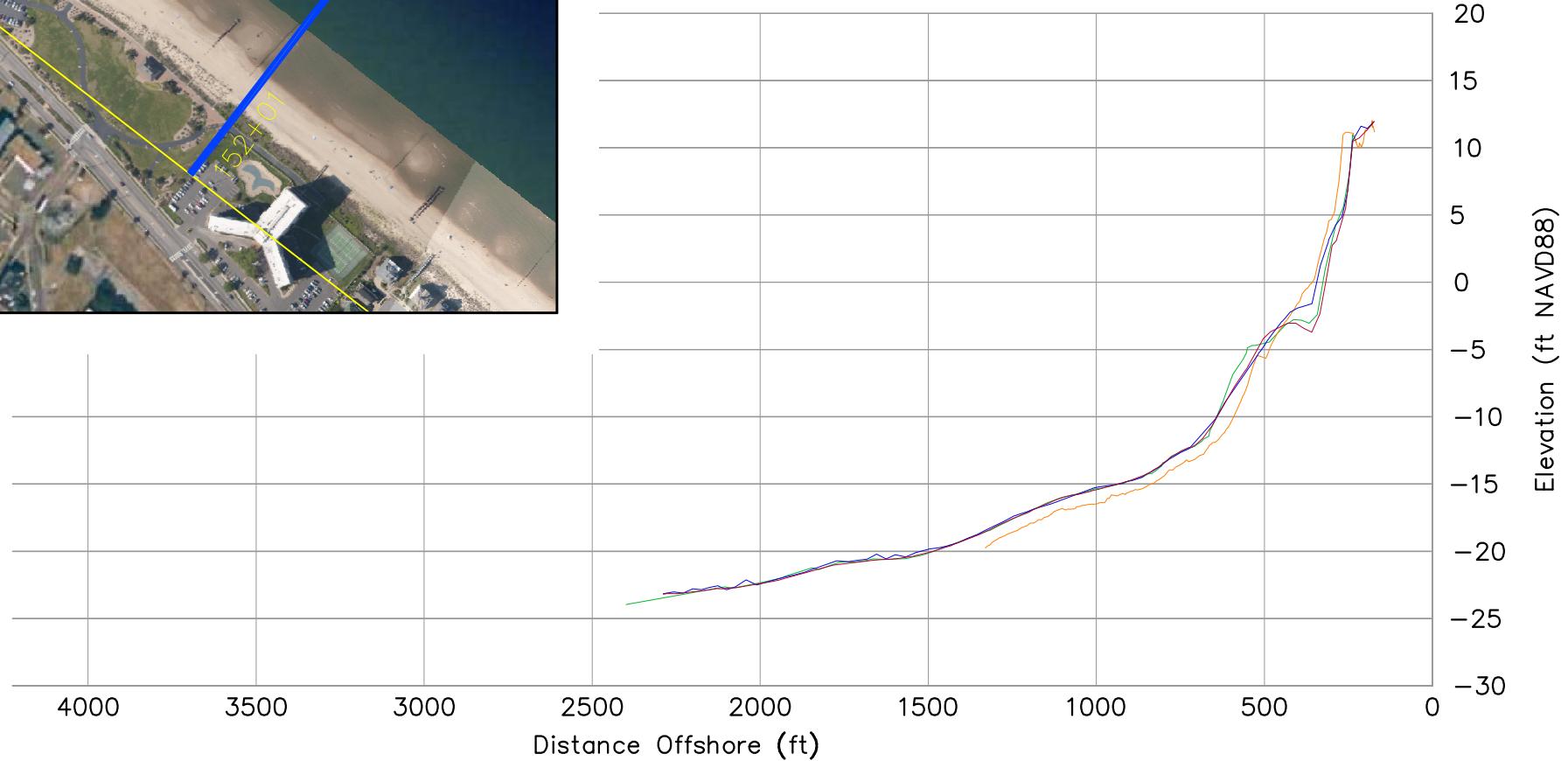
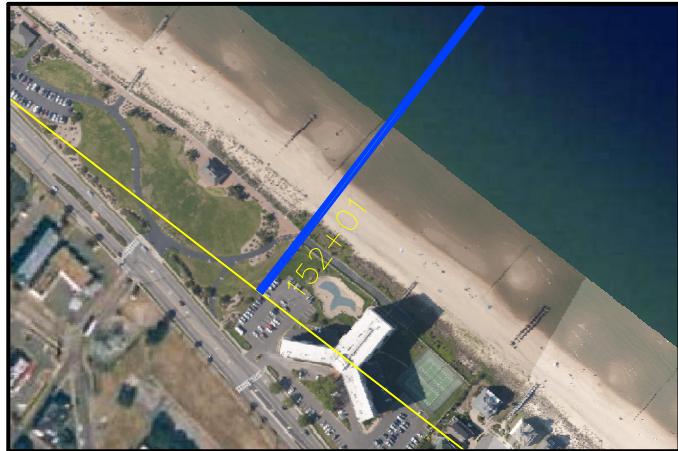


Survey Transect 141+98	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-9.10 ft/yr	-2.79 ft
Volume Change Above -15 ft NAVD88	-0.76 cy/ft/yr	-3.21 cy/ft
Volume Change Above 0 ft NAVD88	-2.14 cy/ft/yr	-0.37 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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 152+01	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-7.74 ft/yr	-25.00 ft
Volume Change Above -15 ft NAVD88	-6.15 cy/ft/yr	-10.35 cy/ft
Volume Change Above 0 ft NAVD88	-1.99 cy/ft/yr	-3.19 cy/ft

LEGEND:

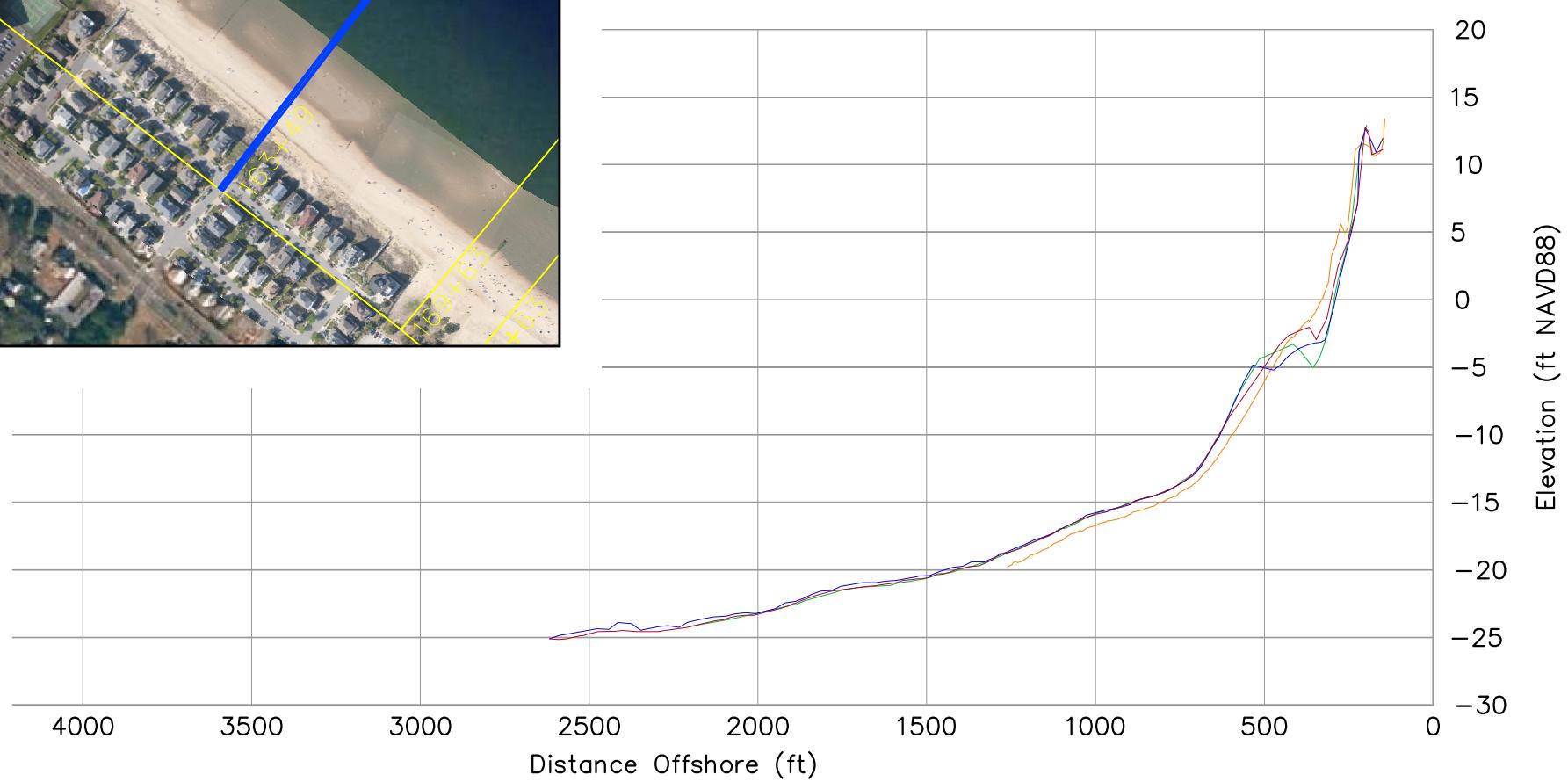
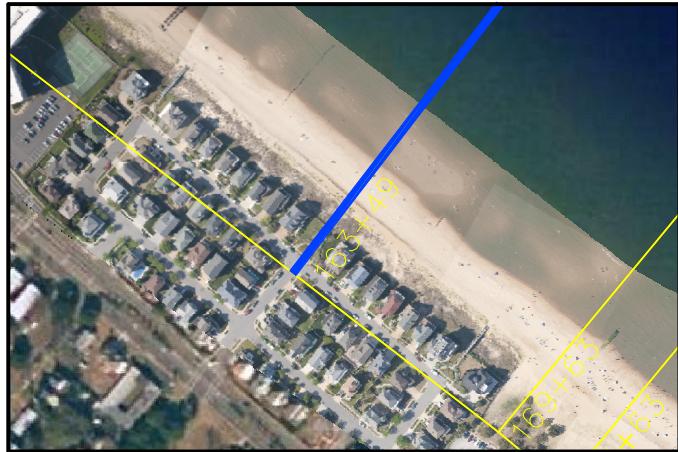
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

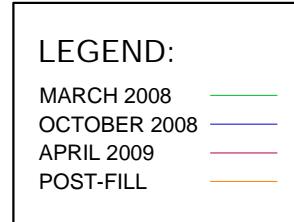
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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OCEAN VIEW PERIODIC
SURVEYING DATA &
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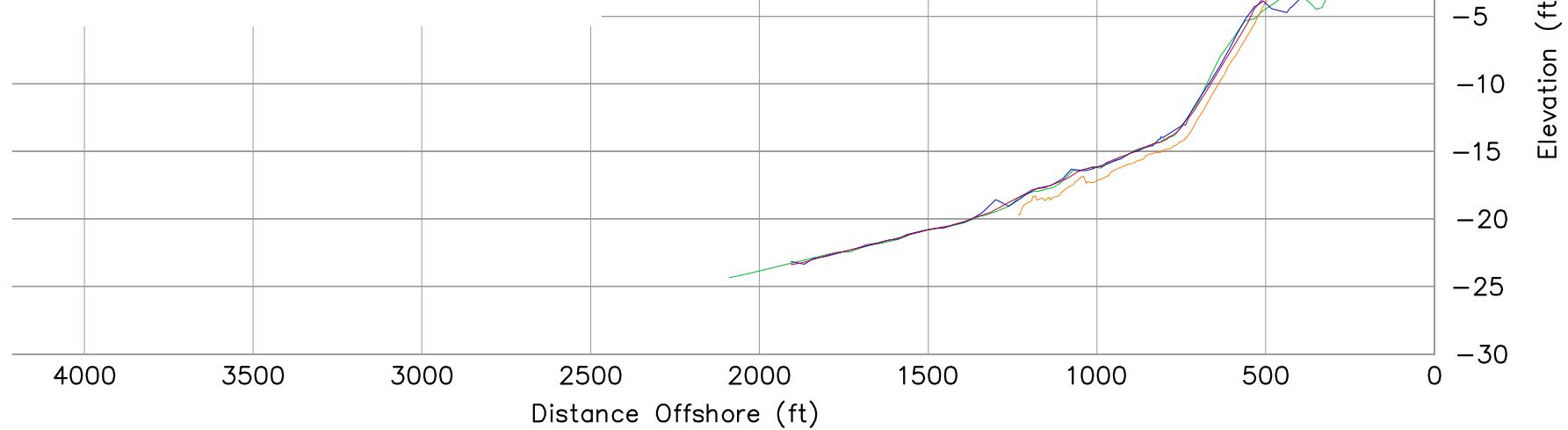


Survey Transect 163+49	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	8.10 ft/yr	13.54 ft
Volume Change Above -15 ft NAVD88	3.81 cy/ft/yr	6.40 cy/ft
Volume Change Above 0 ft NAVD88	-1.07 cy/ft/yr	0.07 cy/ft

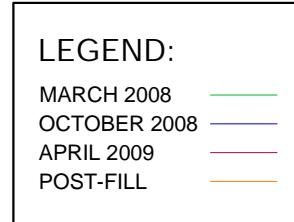


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	15.32 ft/yr	5.68 ft
Volume Change Above -15 ft NAVD88	3.62 cy/ft/yr	0.81 cy/ft
Volume Change Above 0 ft NAVD88	2.64 cy/ft/yr	1.22 cy/ft

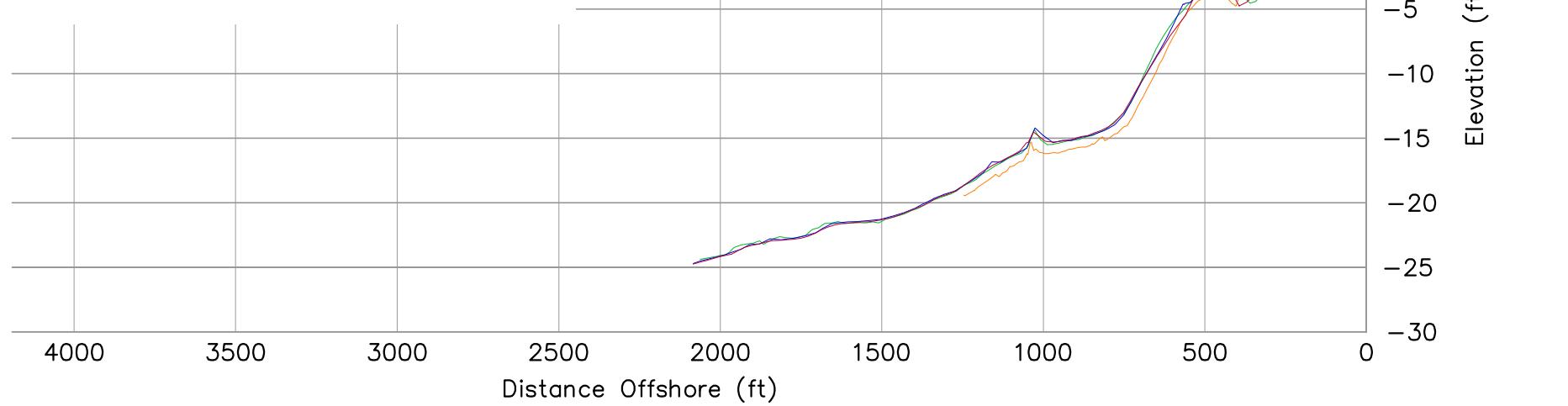


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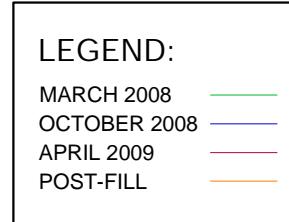
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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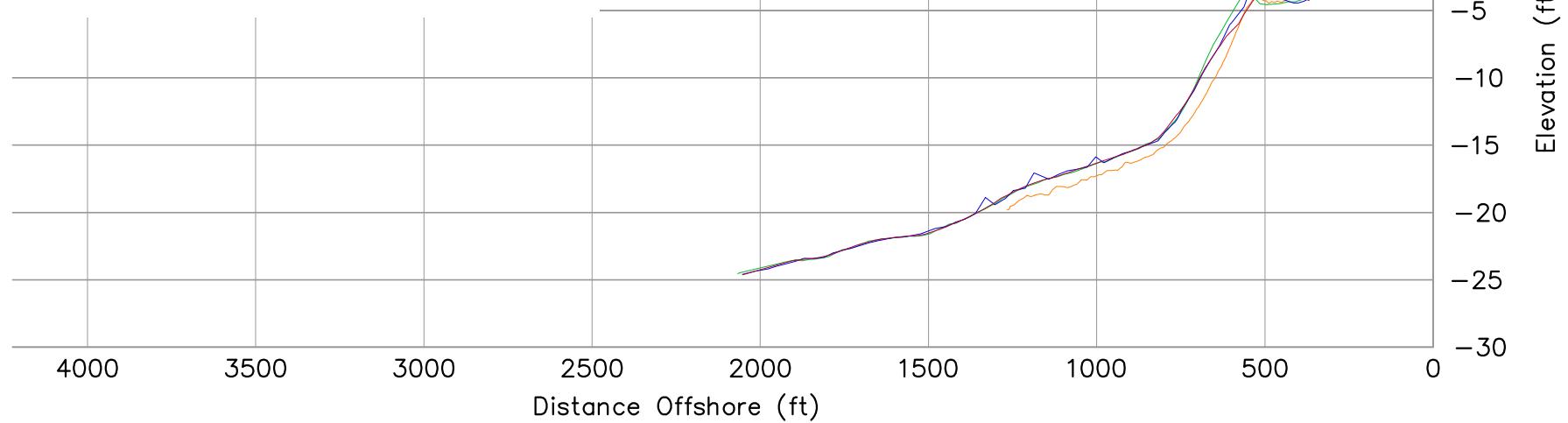
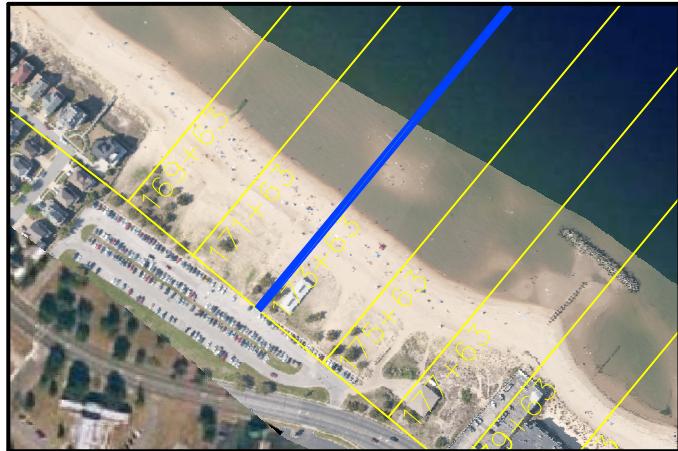


Survey Transect 171+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	14.47 ft/yr	9.93 ft
Volume Change Above -15 ft NAVD88	3.18 cy/ft/yr	-2.04 cy/ft
Volume Change Above 0 ft NAVD88	1.09 cy/ft/yr	0.35 cy/ft

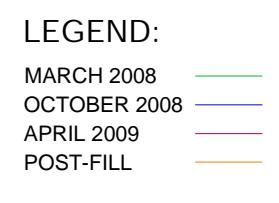


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

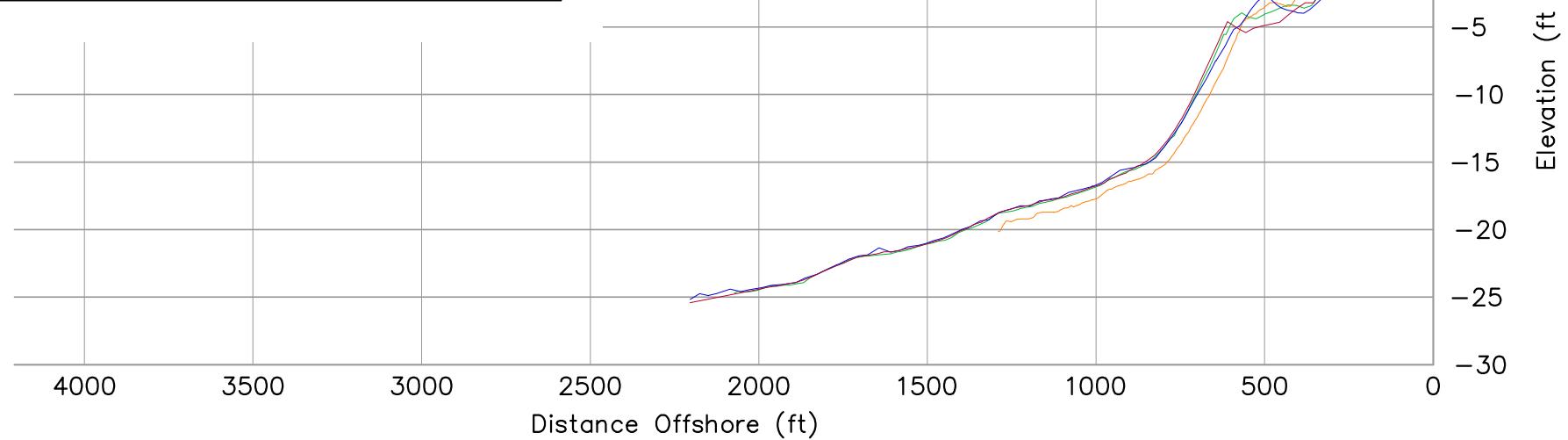


Survey Transect 173+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-1.12 ft/yr	6.50 ft
Volume Change Above -15 ft NAVD88	2.36 cy/ft/yr	7.55 cy/ft
Volume Change Above 0 ft NAVD88	0.40 cy/ft/yr	1.03 cy/ft

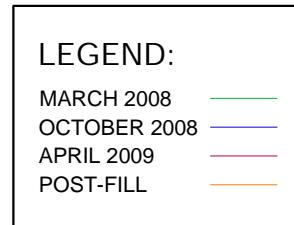


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

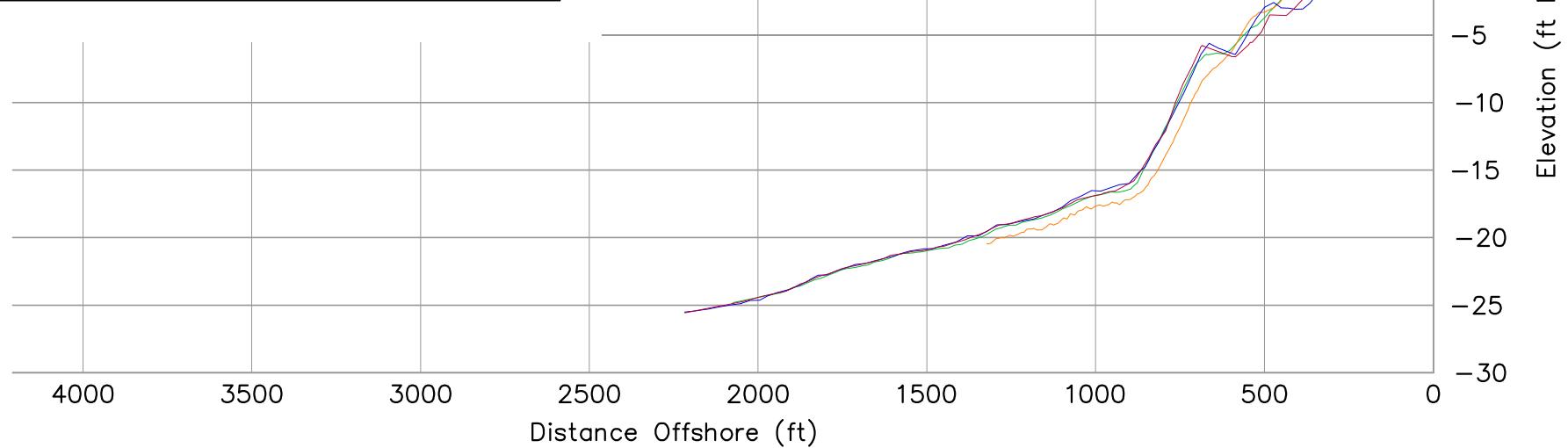


Survey Transect 175+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	0.23 ft/yr	11.60 ft
Volume Change Above -15 ft NAVD88	-2.39 cy/ft/yr	3.16 cy/ft
Volume Change Above 0 ft NAVD88	0.41 cy/ft/yr	2.91 cy/ft

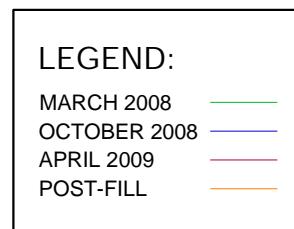


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

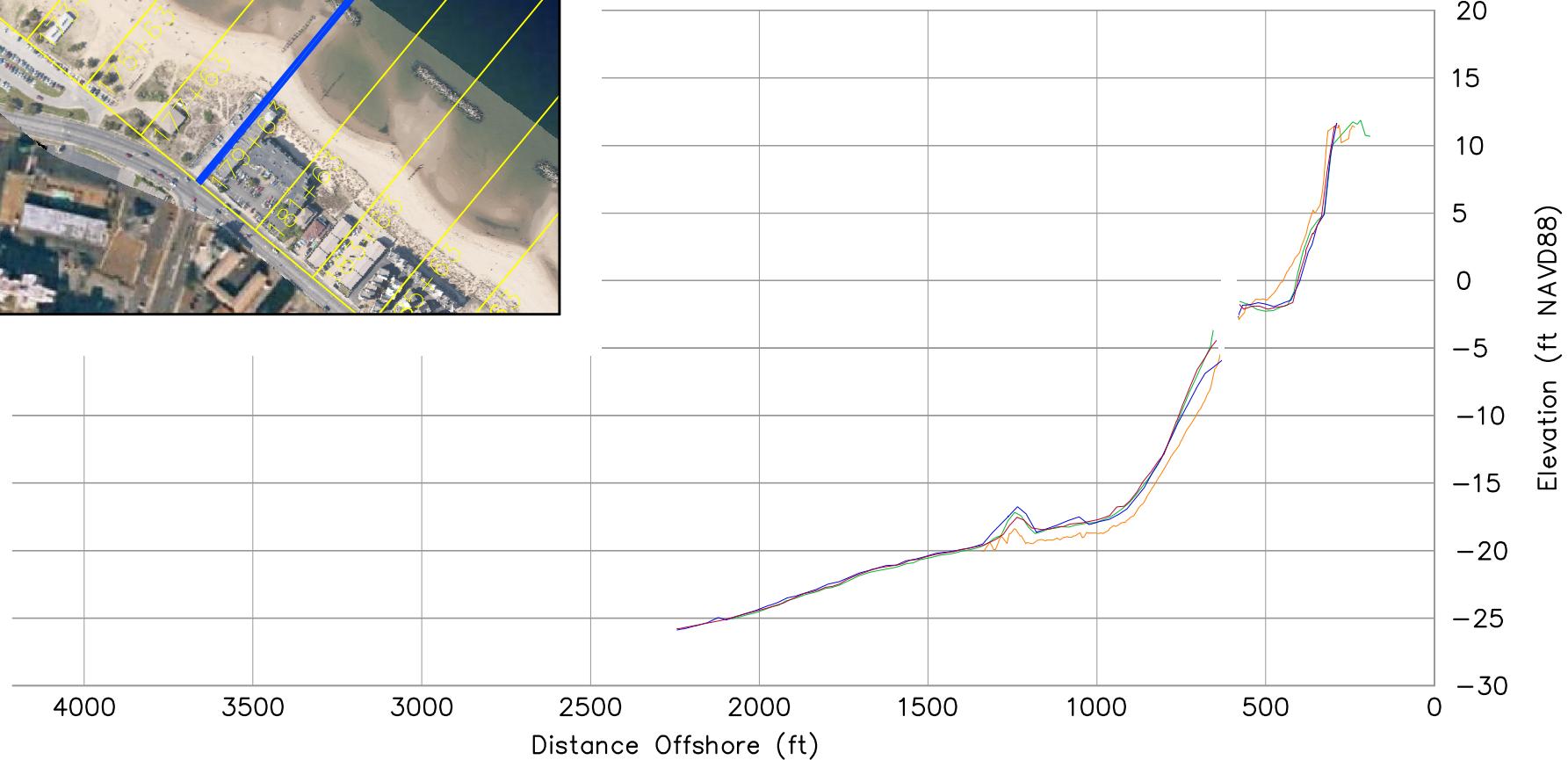


Survey Transect 177+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-3.09 ft/yr	27.53 ft
Volume Change Above -15 ft NAVD88	-6.66 cy/ft/yr	3.59 cy/ft
Volume Change Above 0 ft NAVD88	1.09 cy/ft/yr	2.14 cy/ft

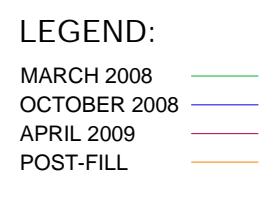


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

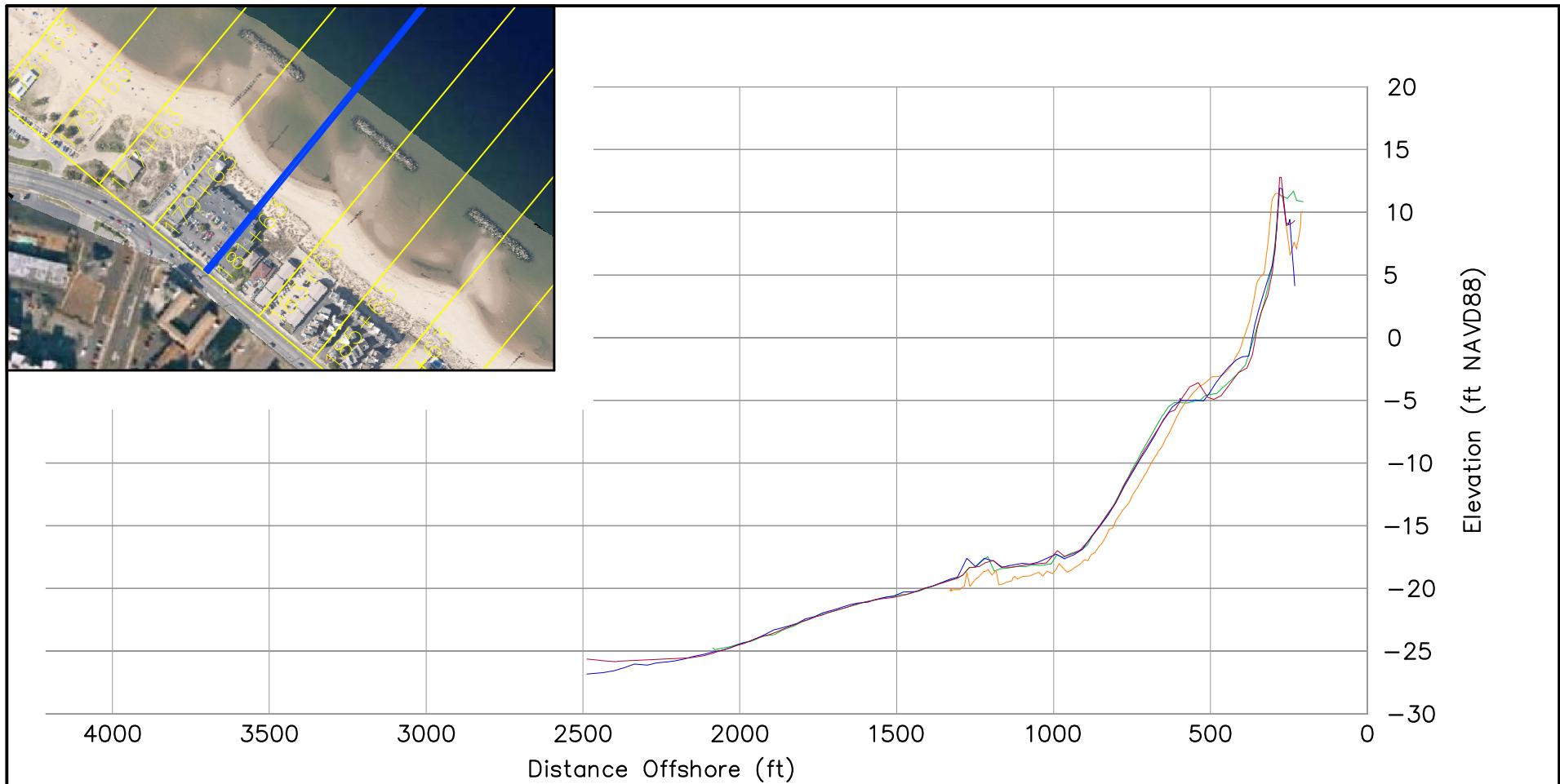


Survey Transect 179+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-6.75 ft/yr	6.29 ft
Volume Change Above -15 ft NAVD88	-2.84 cy/ft/yr	14.76 cy/ft
Volume Change Above 0 ft NAVD88	-0.15 cy/ft/yr	2.23 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-0.92 ft/yr	-9.97 ft
Volume Change Above -15 ft NAVD88	-2.15 cy/ft/yr	-4.50 cy/ft
Volume Change Above 0 ft NAVD88	-0.90 cy/ft/yr	-1.04 cy/ft

LEGEND:

MARCH 2008
OCTOBER 2008
APRIL 2009
POST-FILL

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



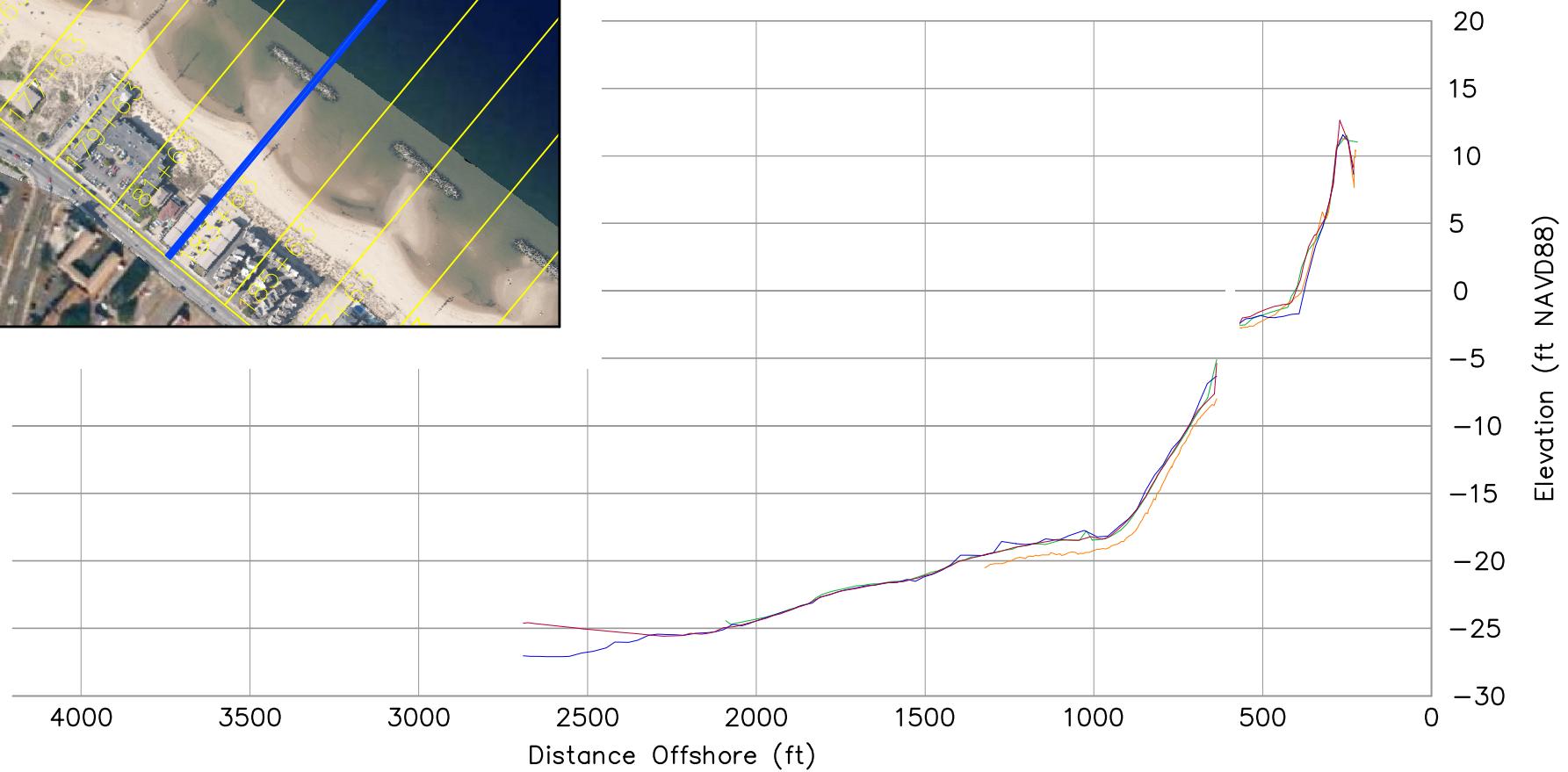
City of
Norfolk

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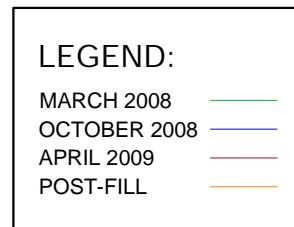
ST 181+63

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Survey Transect 183+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-4.82 ft/yr	19.27 ft
Volume Change Above -15 ft NAVD88	3.46 cy/ft/yr	7.21 cy/ft
Volume Change Above 0 ft NAVD88	0.25 cy/ft/yr	3.24 cy/ft



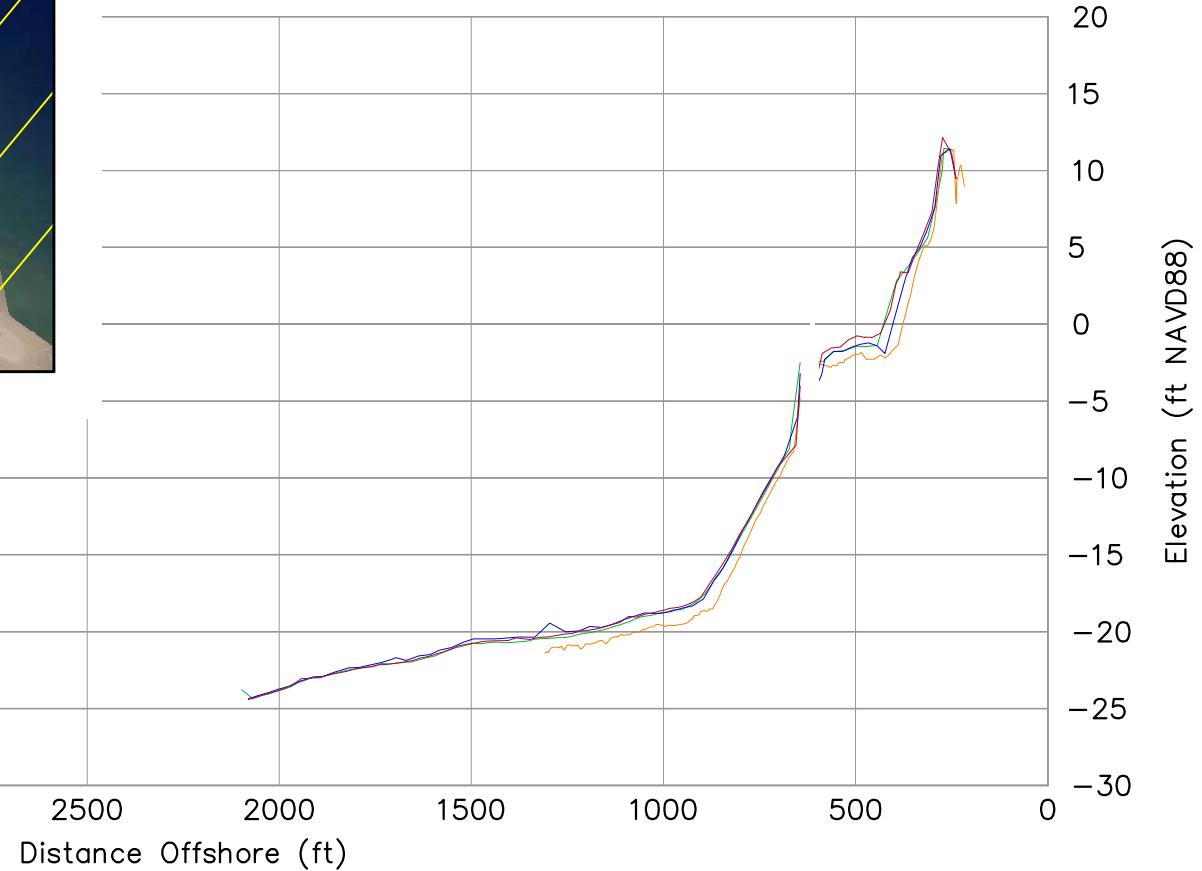
Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

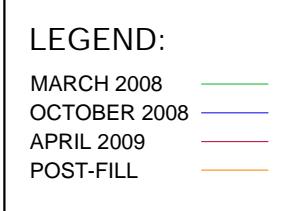


OCEAN VIEW PERIODIC
SURVEYING DATA &
ANALYSIS



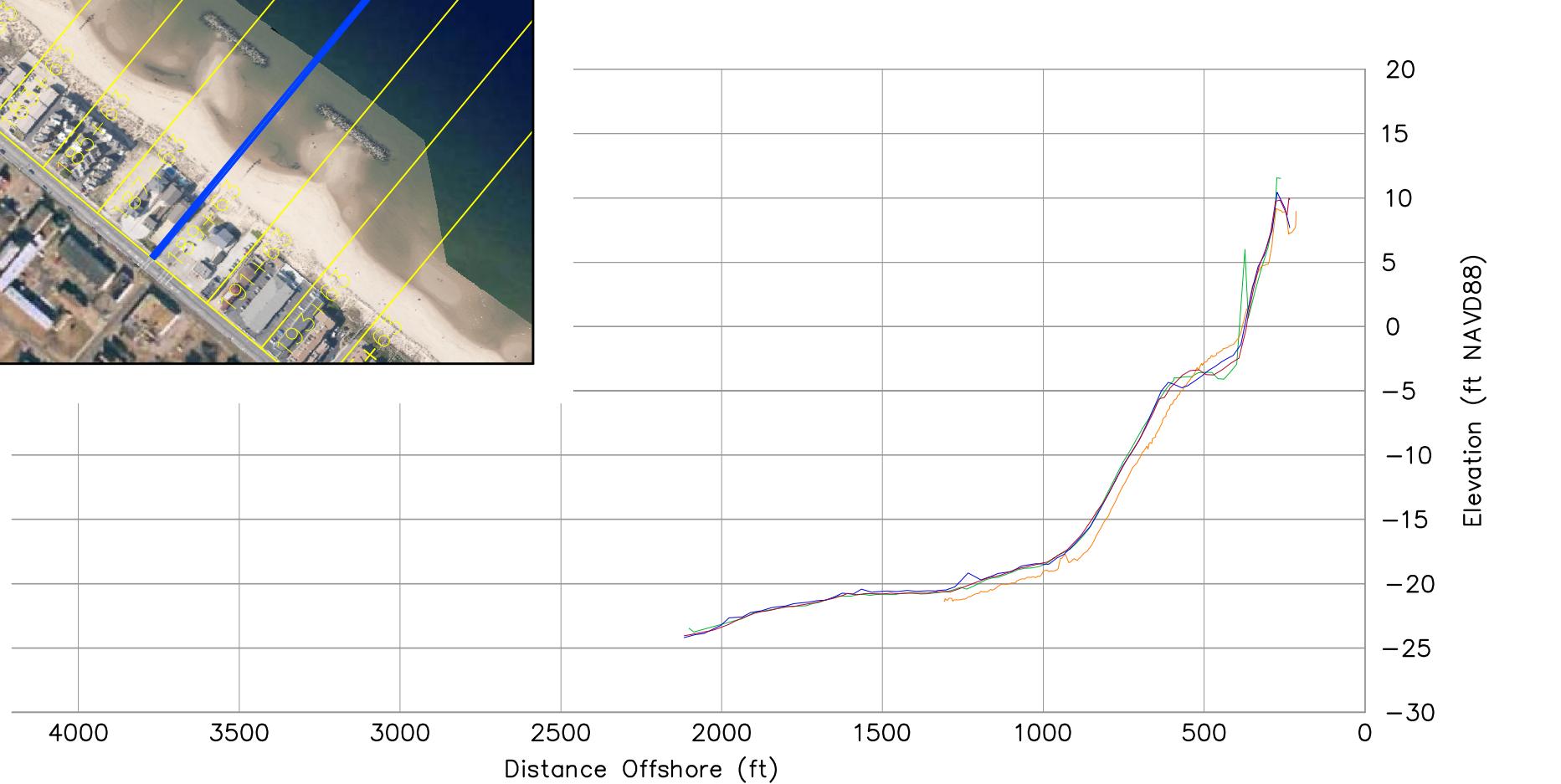


Survey Transect 187+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-6.67 ft/yr	16.77 ft
Volume Change Above -15 ft NAVD88	0.60 cy/ft/yr	7.24 cy/ft
Volume Change Above 0 ft NAVD88	0.53 cy/ft/yr	3.26 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

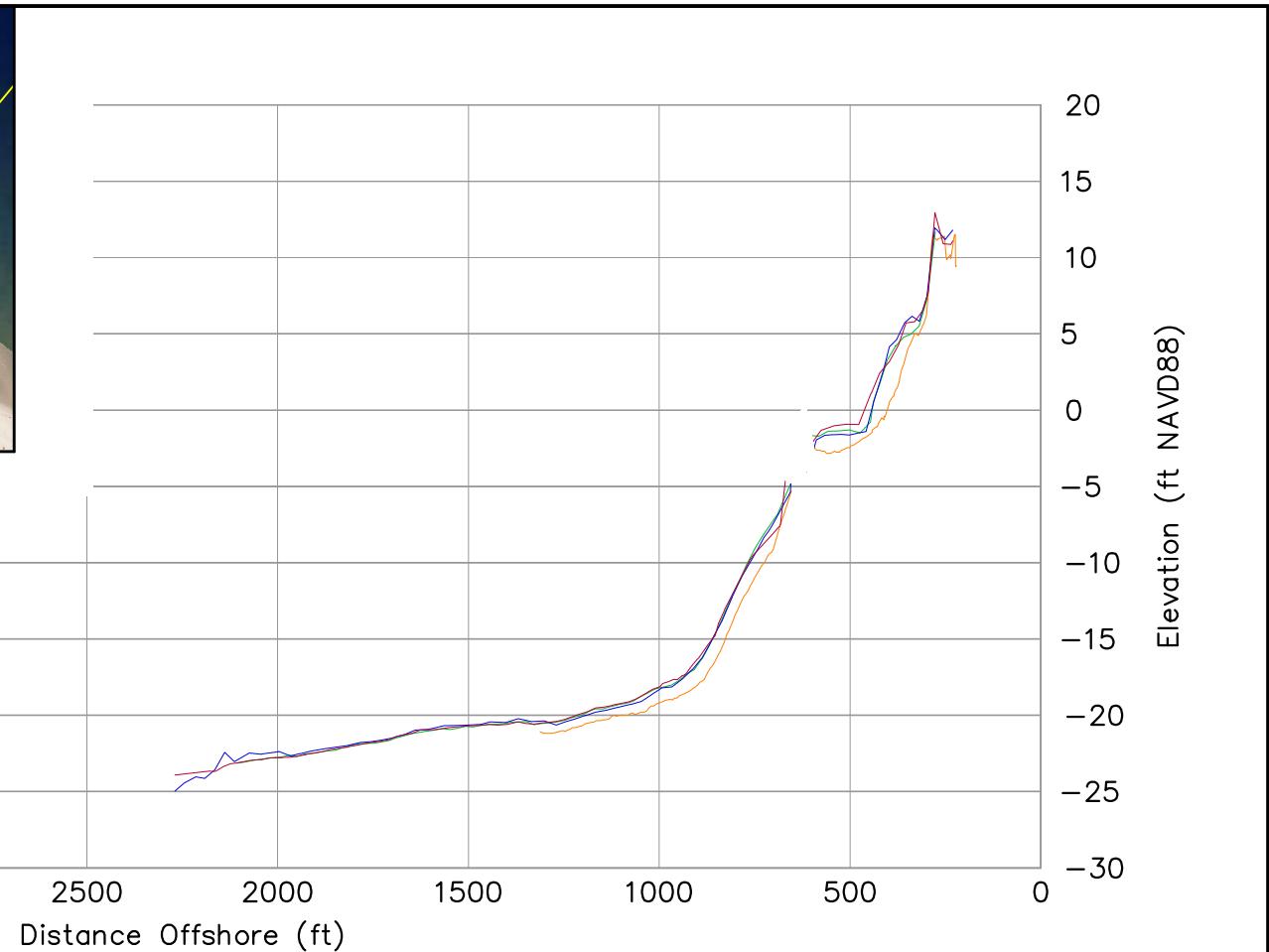
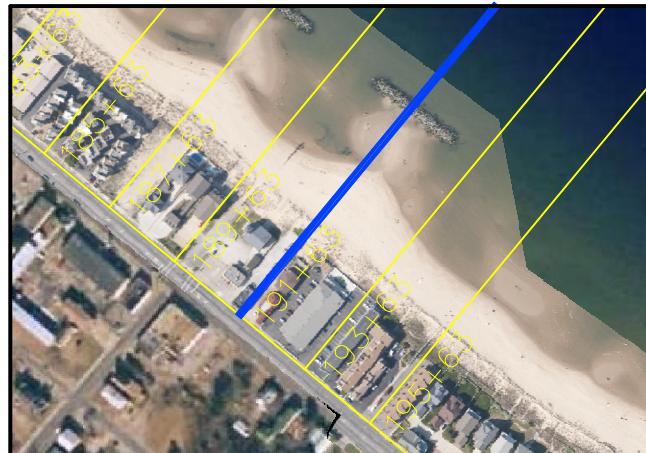


Survey Transect 189+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	2.01 ft/yr	-4.43 ft
Volume Change Above -15 ft NAVD88	-2.90 cy/ft/yr	-1.32 cy/ft
Volume Change Above 0 ft NAVD88	1.16 cy/ft/yr	-0.19 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAV D88)	13.07 ft/yr	14.14 ft
Volume Change Above -15 ft NAV D88	6.49 cy/ft/yr	5.28 cy/ft
Volume Change Above 0 ft NAV D88	2.14 cy/ft/yr	-0.71 cy/ft

LEGEND:

MARCH 2008
OCTOBER 2008
APRIL 2009
POST-FILL

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



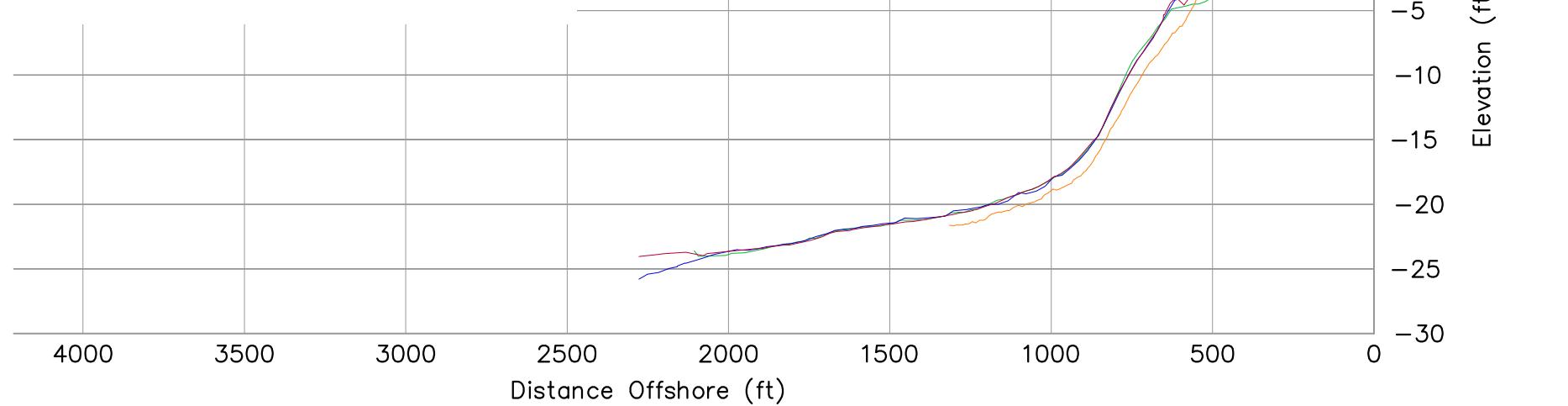
City of
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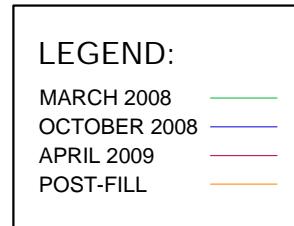
ST 191+63

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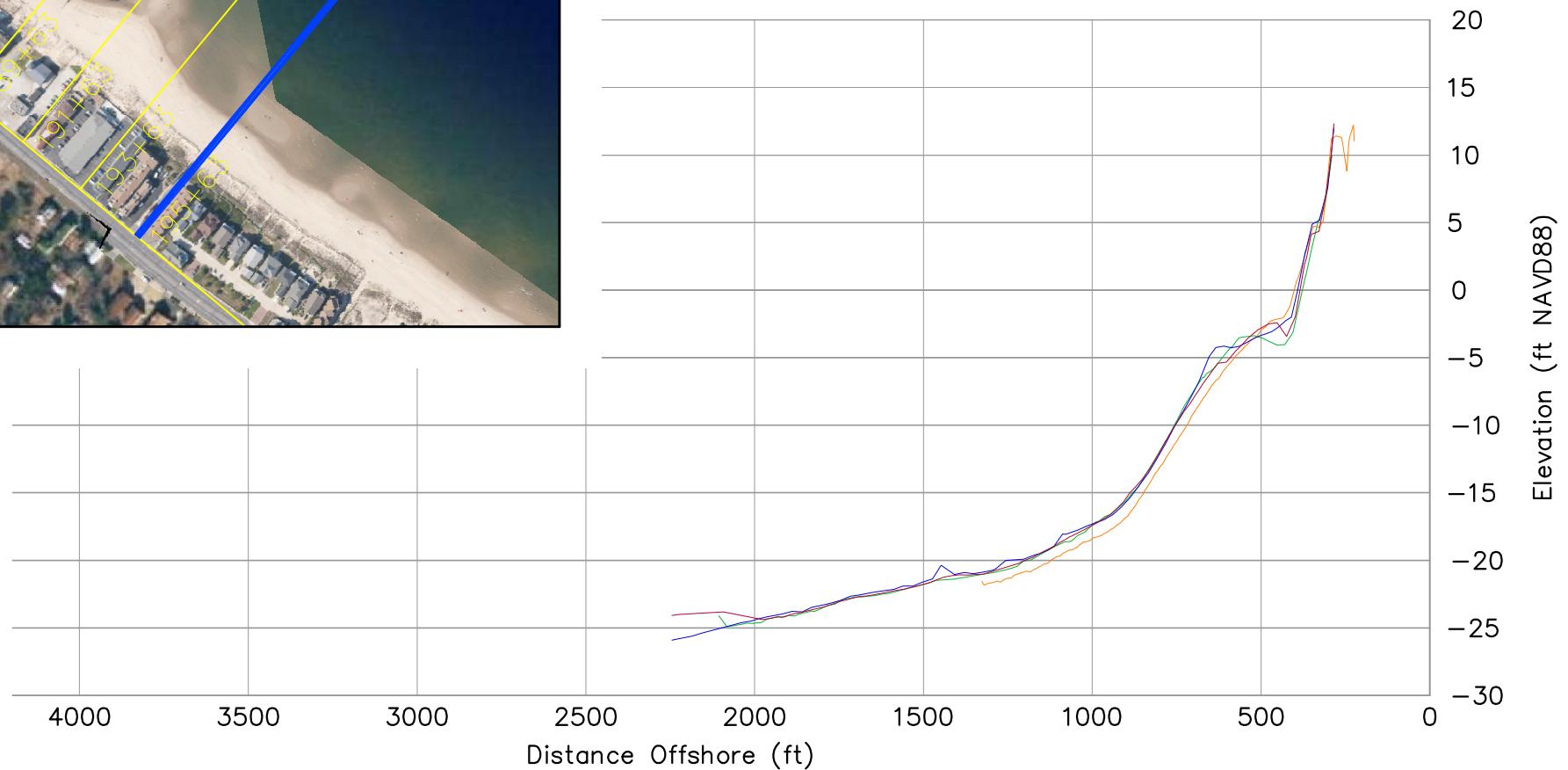


Survey Transect 193+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	6.94 ft/yr	2.77 ft
Volume Change Above -15 ft NAVD88	4.81 cy/ft/yr	-1.50 cy/ft
Volume Change Above 0 ft NAVD88	1.21 cy/ft/yr	-0.81 cy/ft

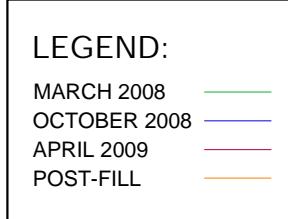


Notes:

1. Stationing From West To East At Varying Intervals.
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3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

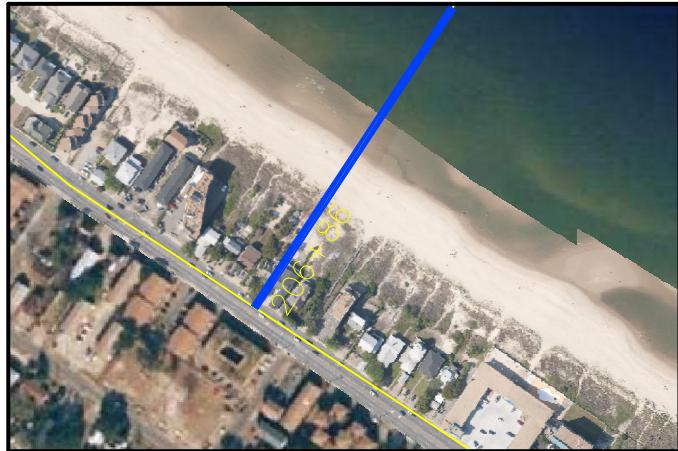


Survey Transect 195+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	8.62 ft/yr	-5.86 ft
Volume Change Above -15 ft NAVD88	2.66 cy/ft/yr	-6.01 cy/ft
Volume Change Above 0 ft NAVD88	1.17 cy/ft/yr	-1.56 cy/ft

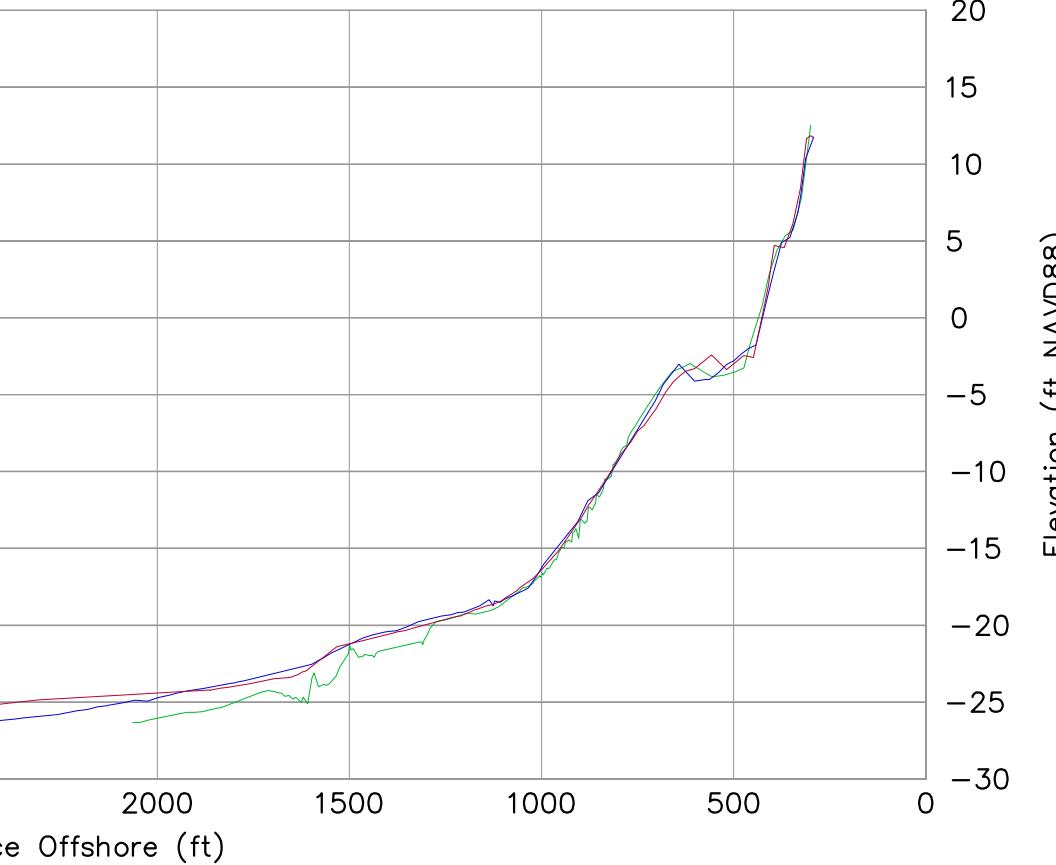


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-4.76 ft/yr	3.33 ft
Volume Change Above -15 ft NAVD88	-0.03 cy/ft/yr	1.78 cy/ft
Volume Change Above 0 ft NAVD88	0.87 cy/ft/yr	2.61 cy/ft



LEGEND:

MARCH 2008
 OCTOBER 2008
 APRIL 2009

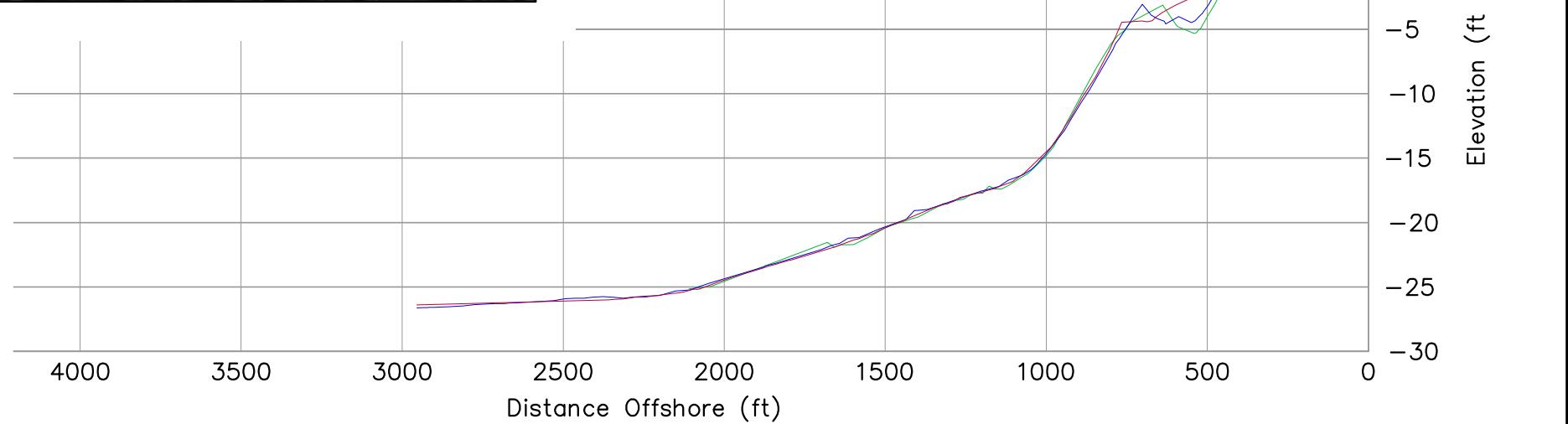
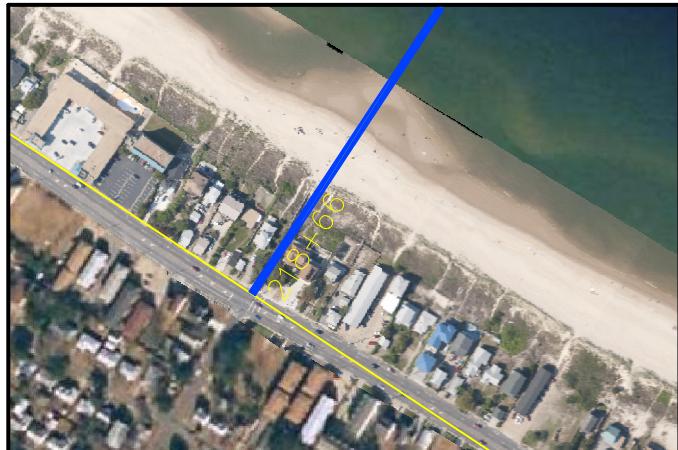
Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

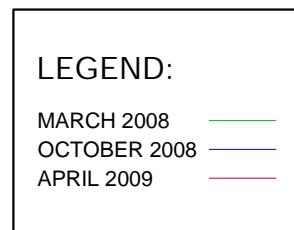


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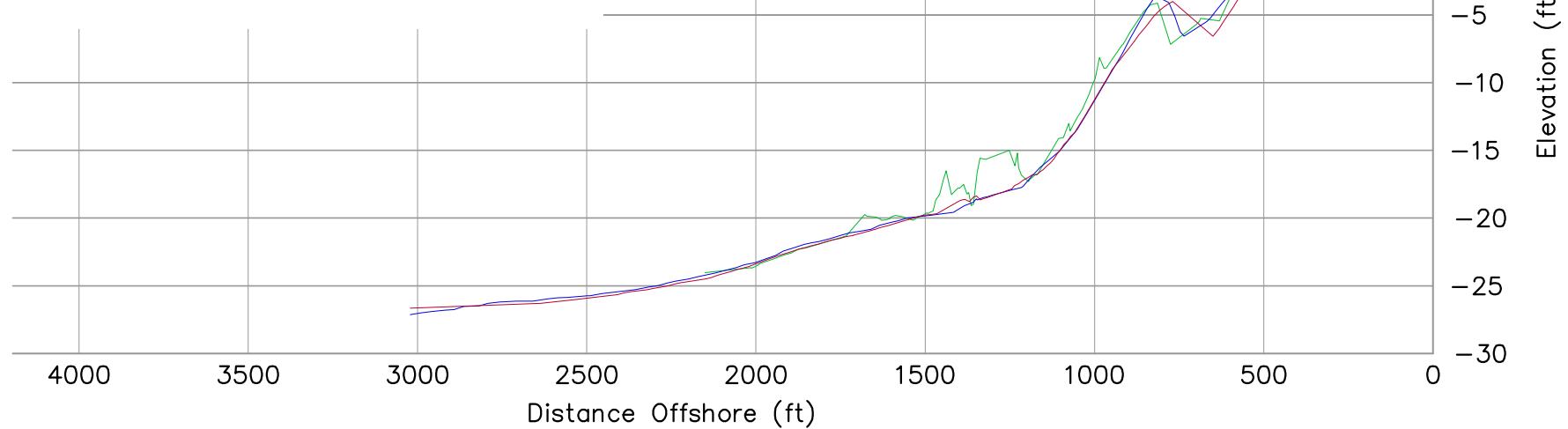
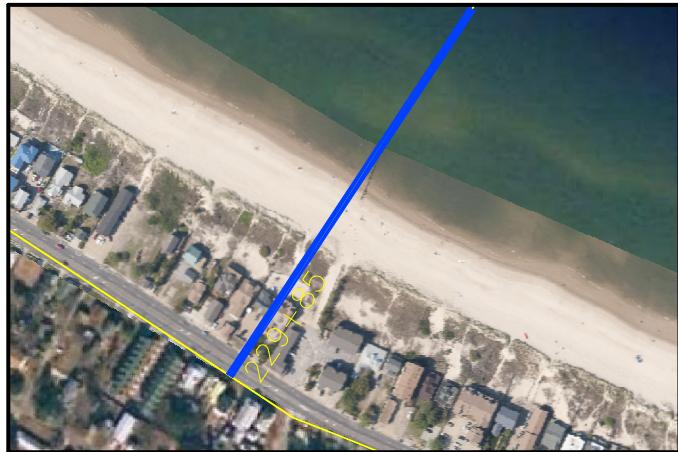


Survey Transect 218+66	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	11.22 ft/yr	8.81 ft
Volume Change Above -15 ft NAVD88	12.86 cy/ft/yr	13.39 cy/ft
Volume Change Above 0 ft NAVD88	3.10 cy/ft/yr	3.46 cy/ft

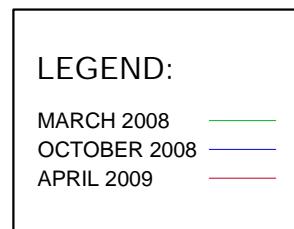


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

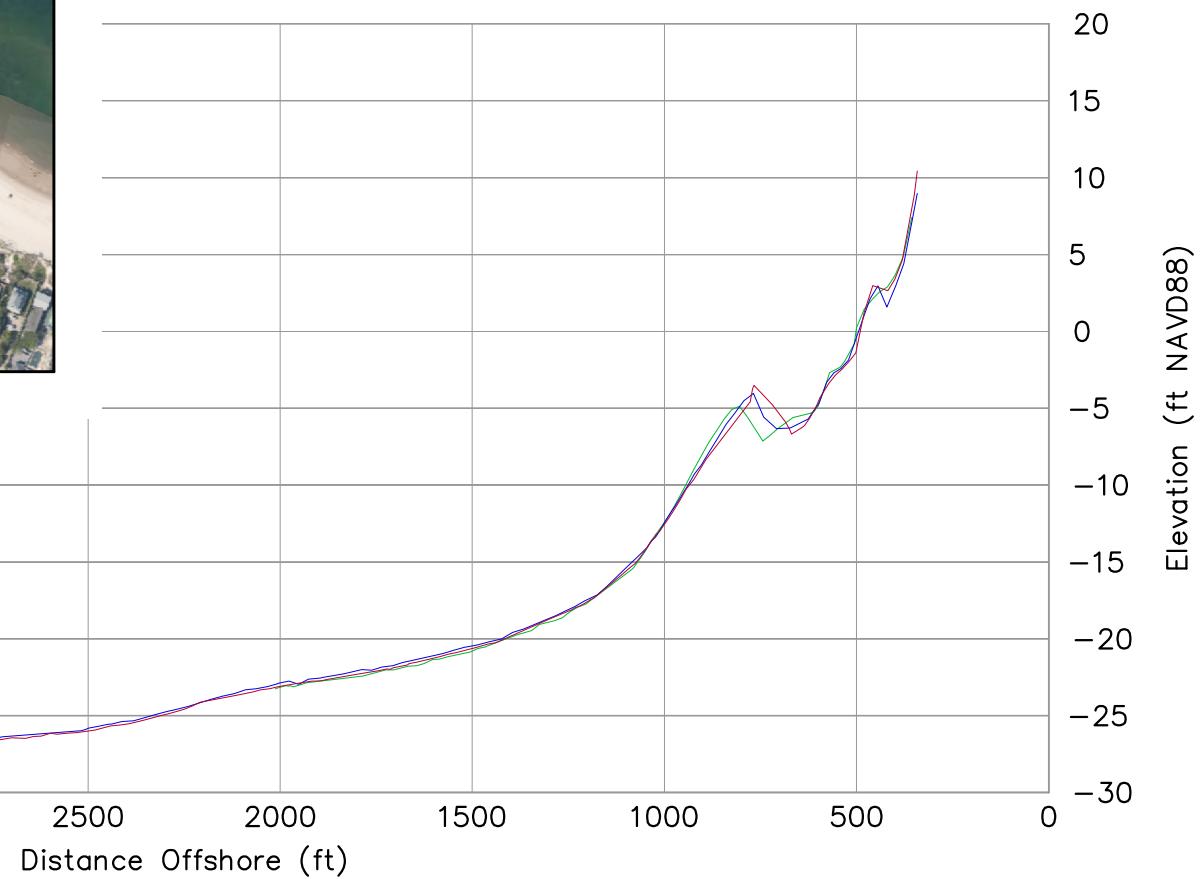
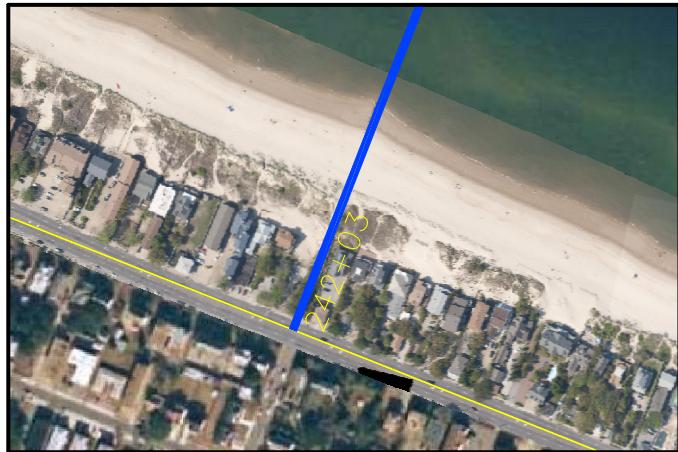


Survey Transect 229+85	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-3.03 ft/yr	1.68 ft
Volume Change Above -15 ft NAVD88	-8.10 cy/ft/yr	-3.50 cy/ft
Volume Change Above 0 ft NAVD88	0.56 cy/ft/yr	3.36 cy/ft

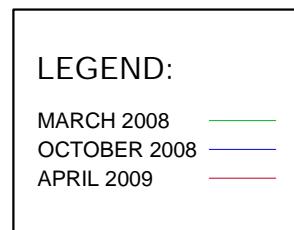


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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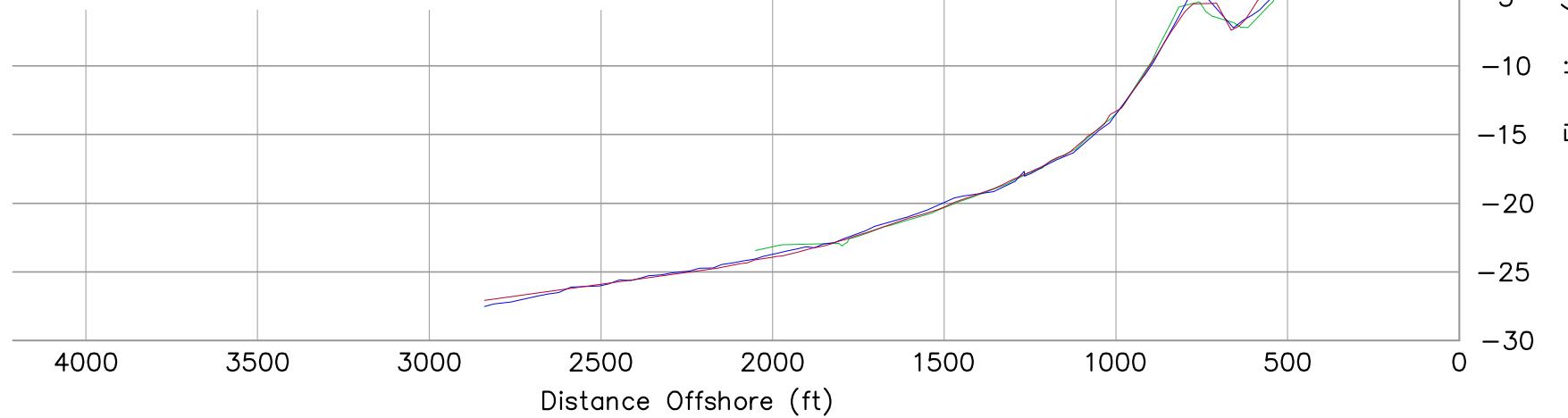
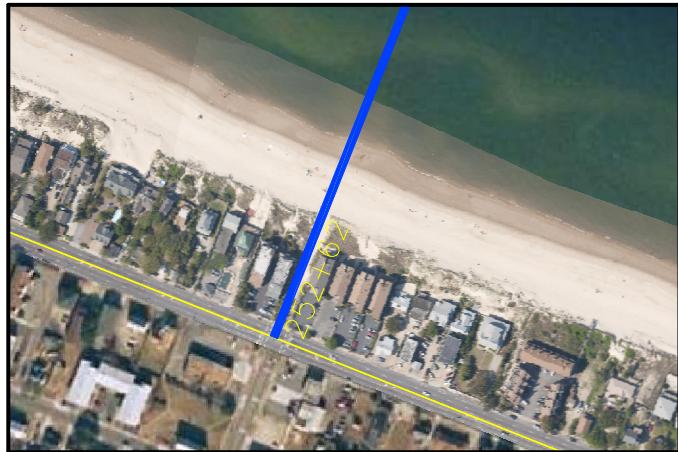


Survey Transect 242+03	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-5.25 ft/yr	0.79 ft
Volume Change Above -15 ft NAVD88	-0.60 cy/ft/yr	2.09 cy/ft
Volume Change Above 0 ft NAVD88	0.46 cy/ft/yr	3.08 cy/ft

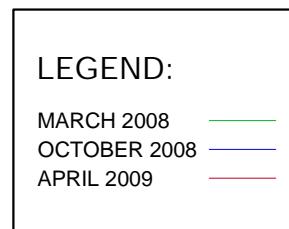


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

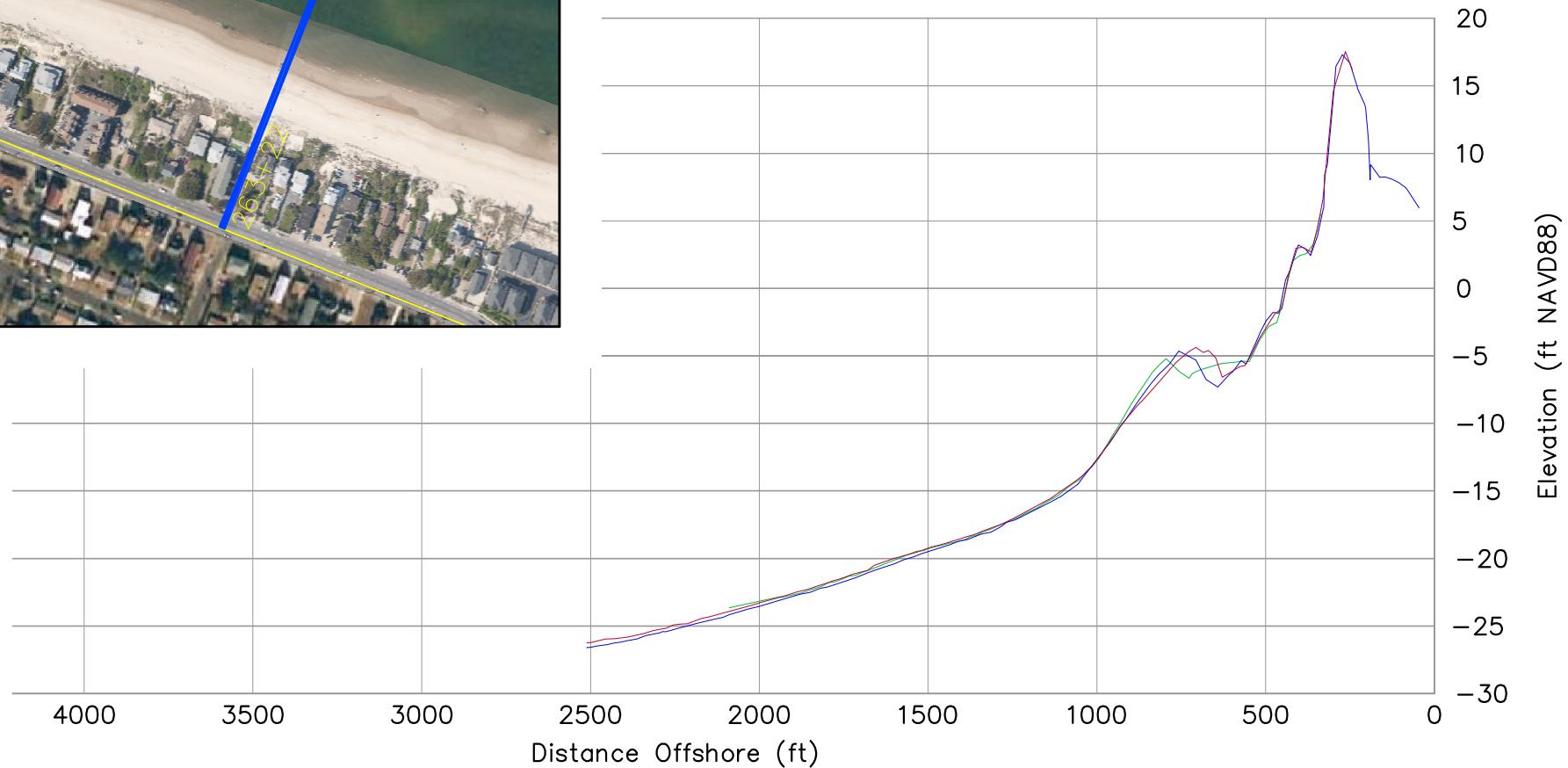
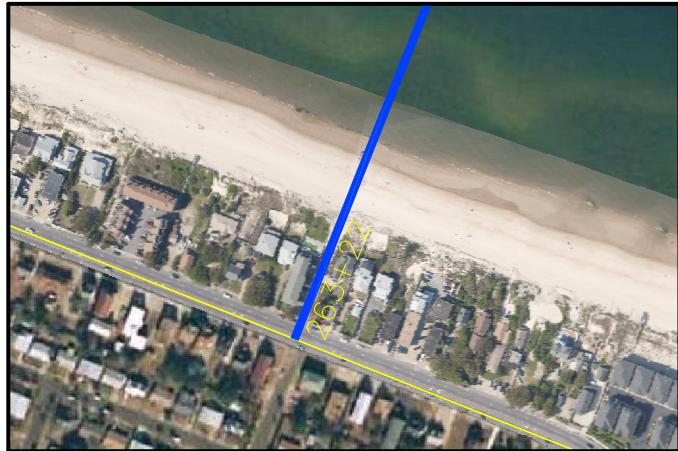


Survey Transect 252+62	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	19.33 ft/yr	19.86 ft
Volume Change Above -15 ft NAVD88	12.79 cy/ft/yr	10.66 cy/ft
Volume Change Above 0 ft NAVD88	4.78 cy/ft/yr	2.87 cy/ft

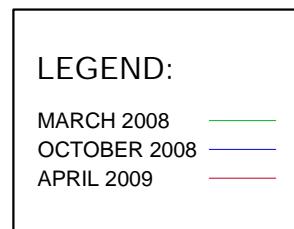


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

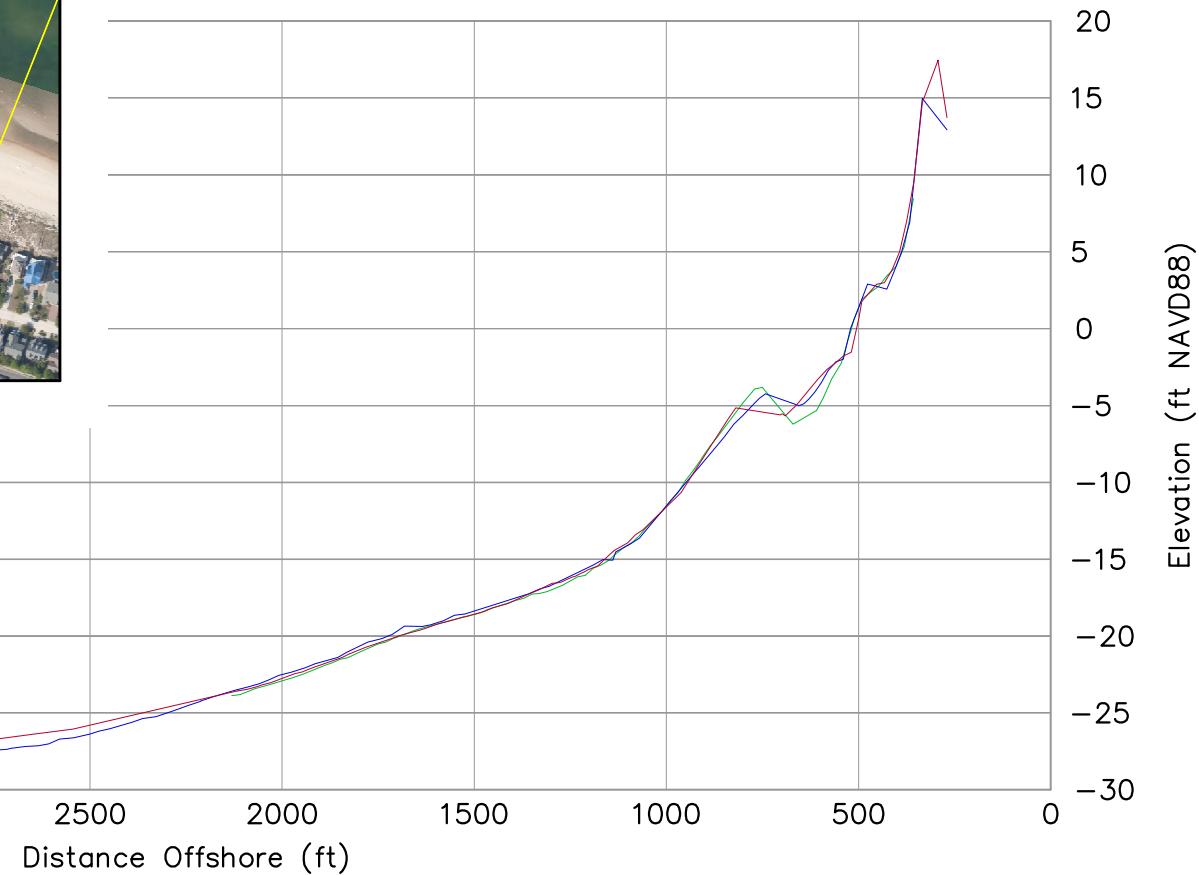


Survey Transect 263+22	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	2.21 ft/yr	-1.53 ft
Volume Change Above -15 ft NAVD88	0.75 cy/ft/yr	2.69 cy/ft
Volume Change Above 0 ft NAVD88	0.75 cy/ft/yr	0.69 cy/ft

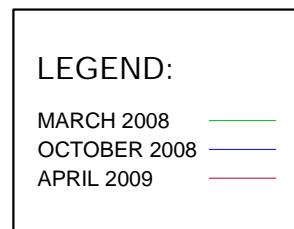


Notes:

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2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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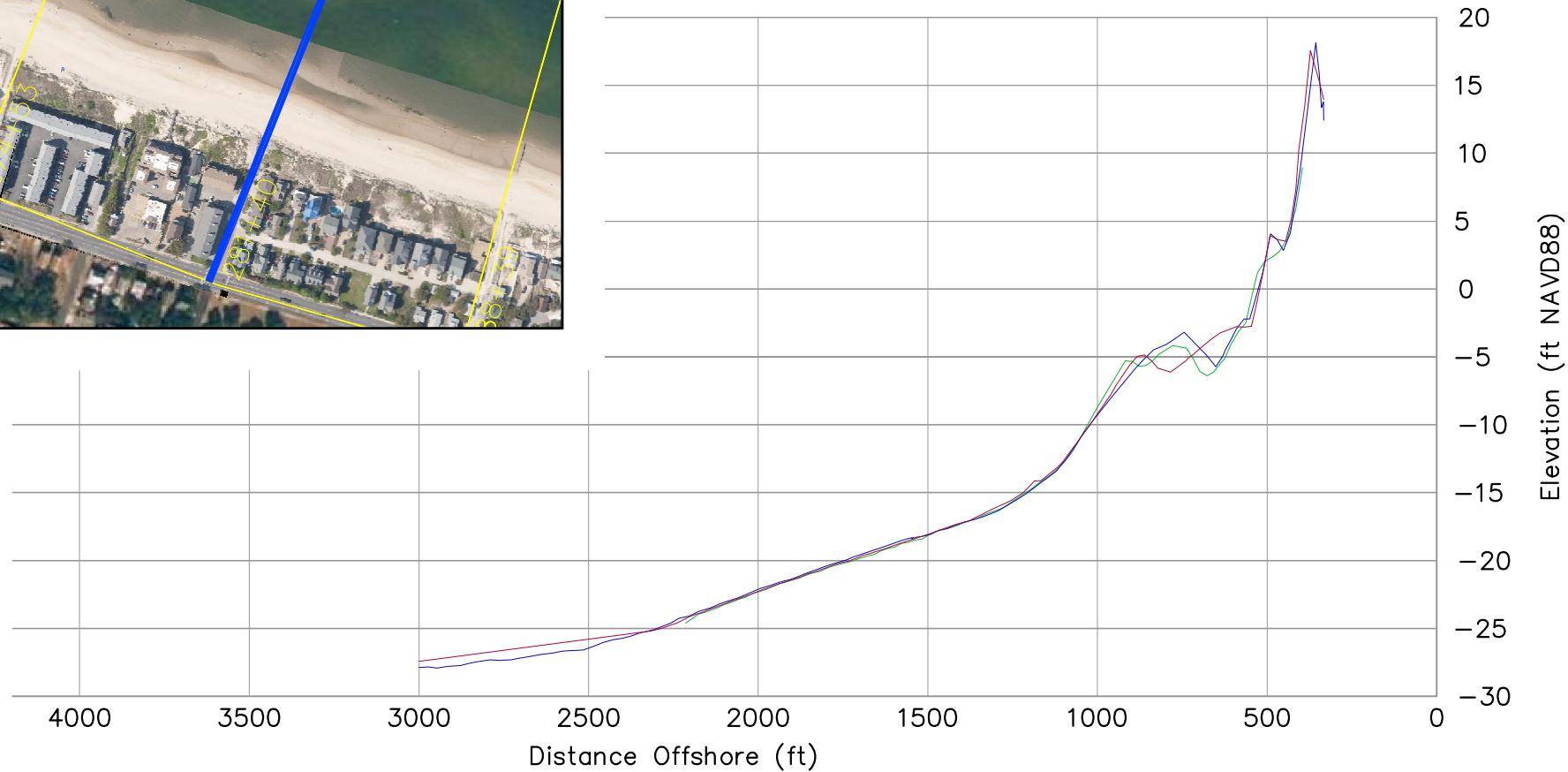
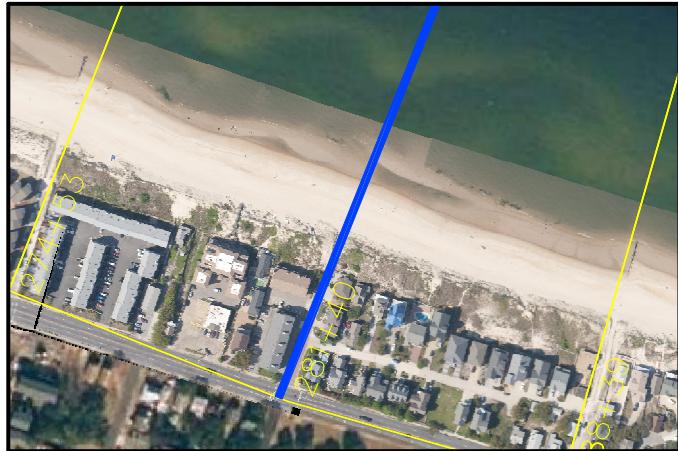


Survey Transect 274+53	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-8.44 ft/yr	-8.16 ft
Volume Change Above -15 ft NAVD88	2.26 cy/ft/yr	5.25 cy/ft
Volume Change Above 0 ft NAVD88	0.89 cy/ft/yr	5.50 cy/ft

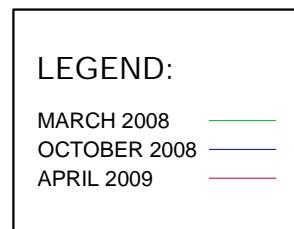


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

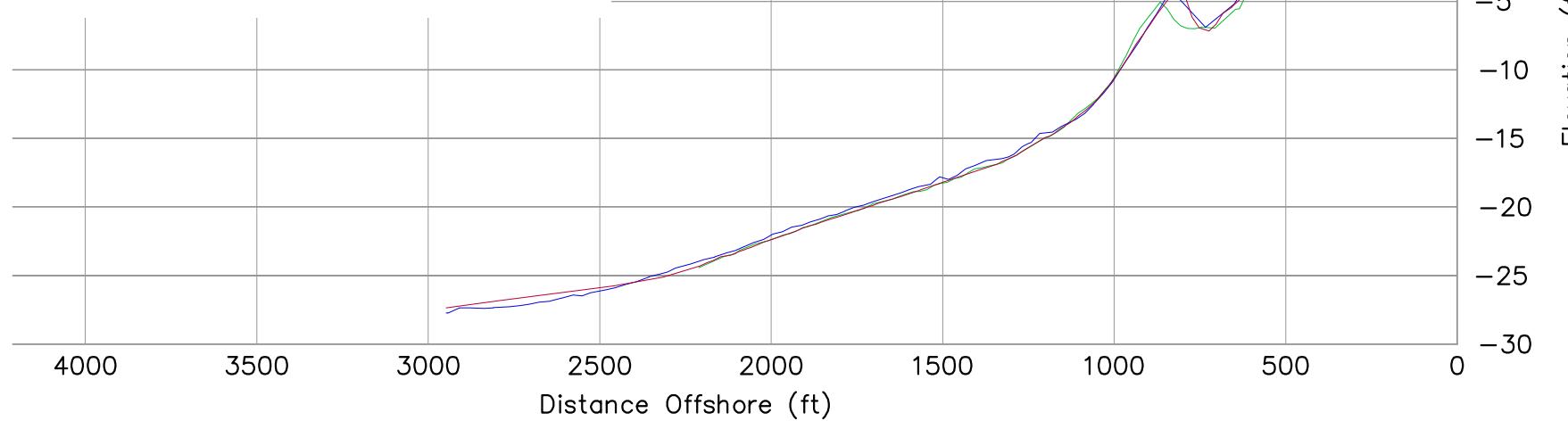
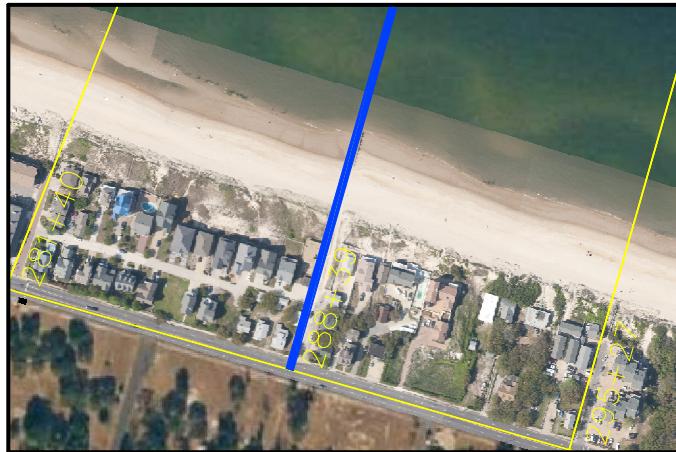


Survey Transect 281+40	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	-15.49 ft/yr	-1.60 ft
Volume Change Above -15 ft NAVD88	2.45 cy/ft/yr	2.40 cy/ft
Volume Change Above 0 ft NAVD88	2.03 cy/ft/yr	4.08 cy/ft

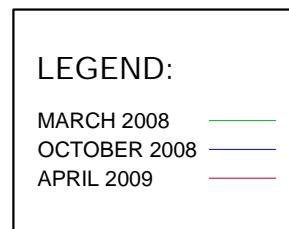


Notes:

1. Stationing From West To East At Varying Intervals.
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3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

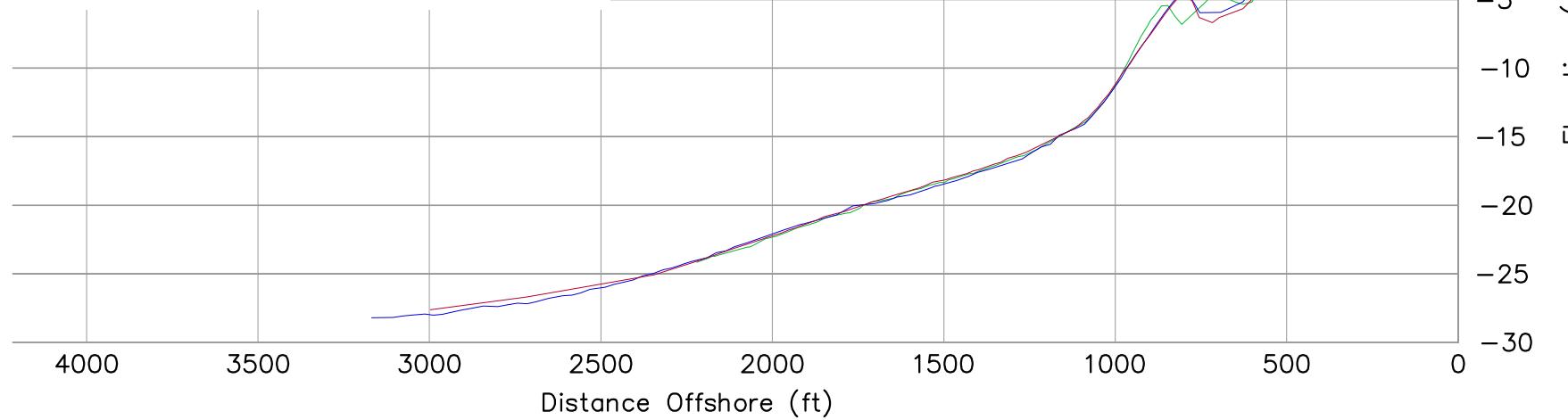
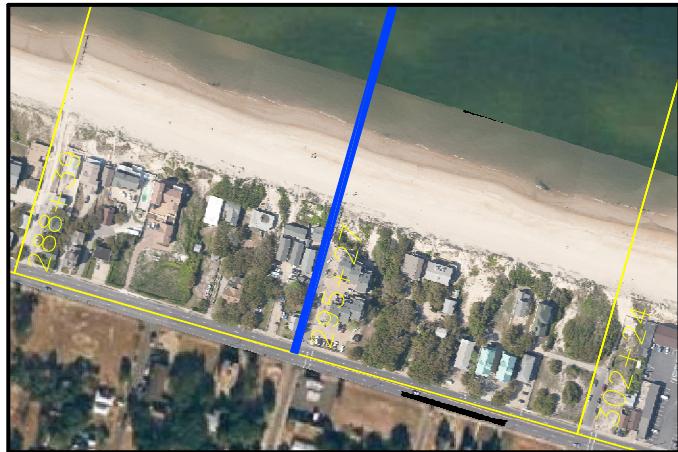


Survey Transect 288+39	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	1.63 ft/yr	-9.96 ft
Volume Change Above -15 ft NAVD88	-0.38 cy/ft/yr	-0.63 cy/ft
Volume Change Above 0 ft NAVD88	-1.30 cy/ft/yr	4.42 cy/ft

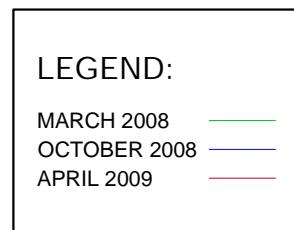


Notes:

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3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



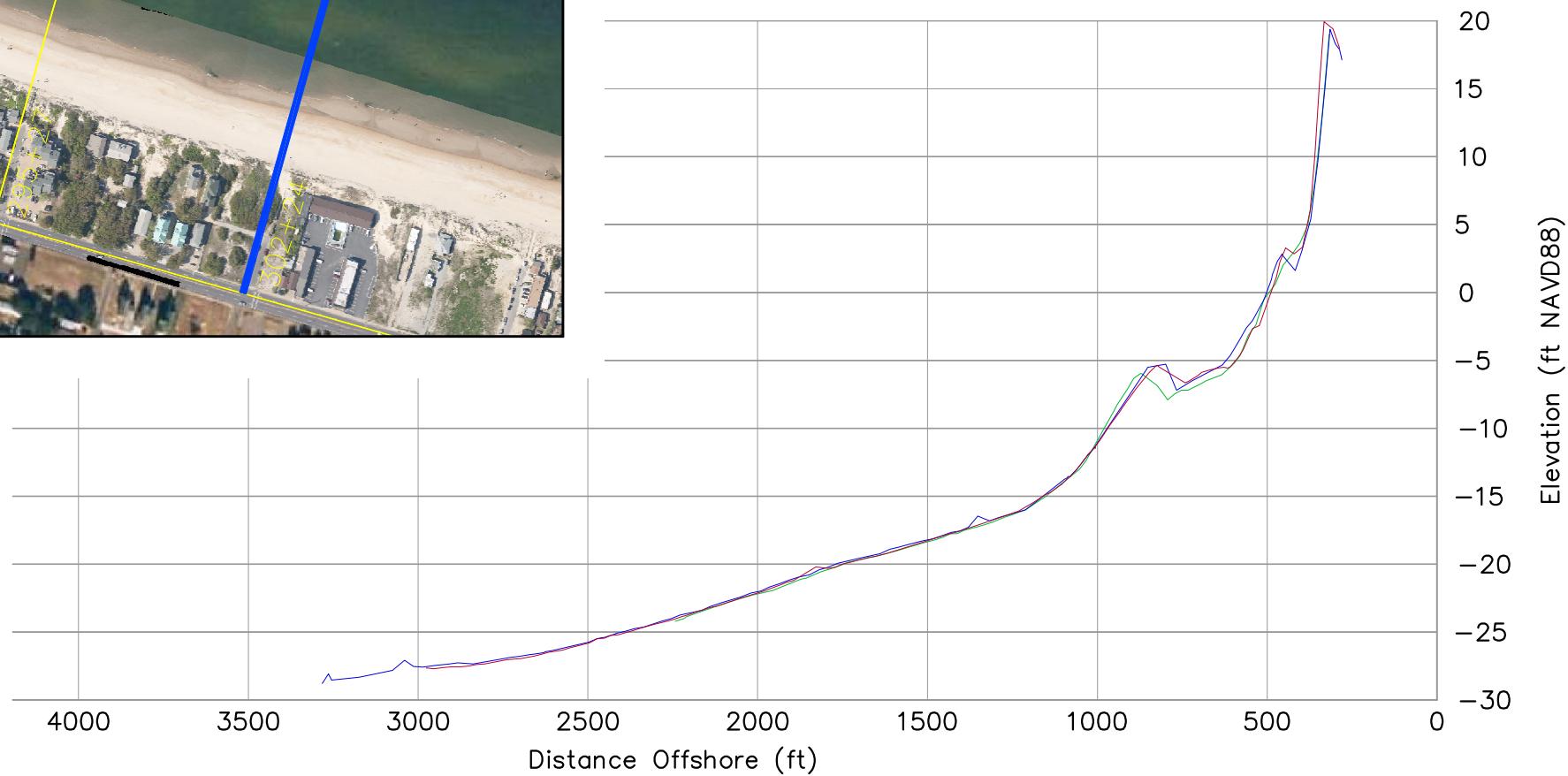
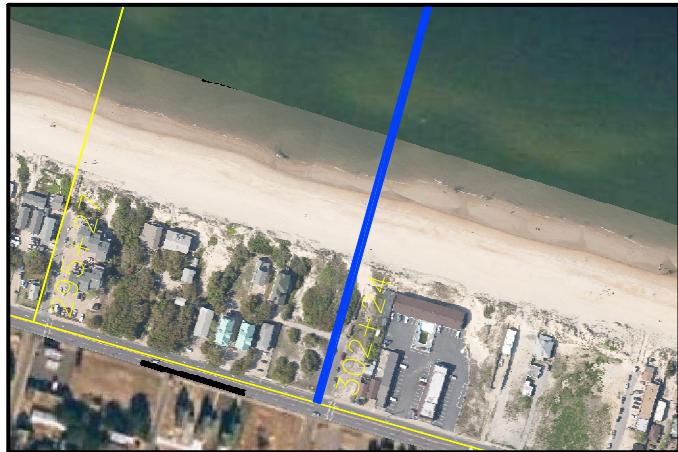
Survey Transect 295+27	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	16.18 ft/yr	0.06 ft
Volume Change Above -15 ft NAVD88	-0.76 cy/ft/yr	-3.57 cy/ft
Volume Change Above 0 ft NAVD88	3.05 cy/ft/yr	1.62 cy/ft



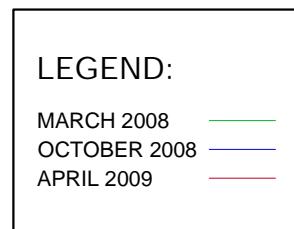
Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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ST 295+27	Pg 72 OF 106



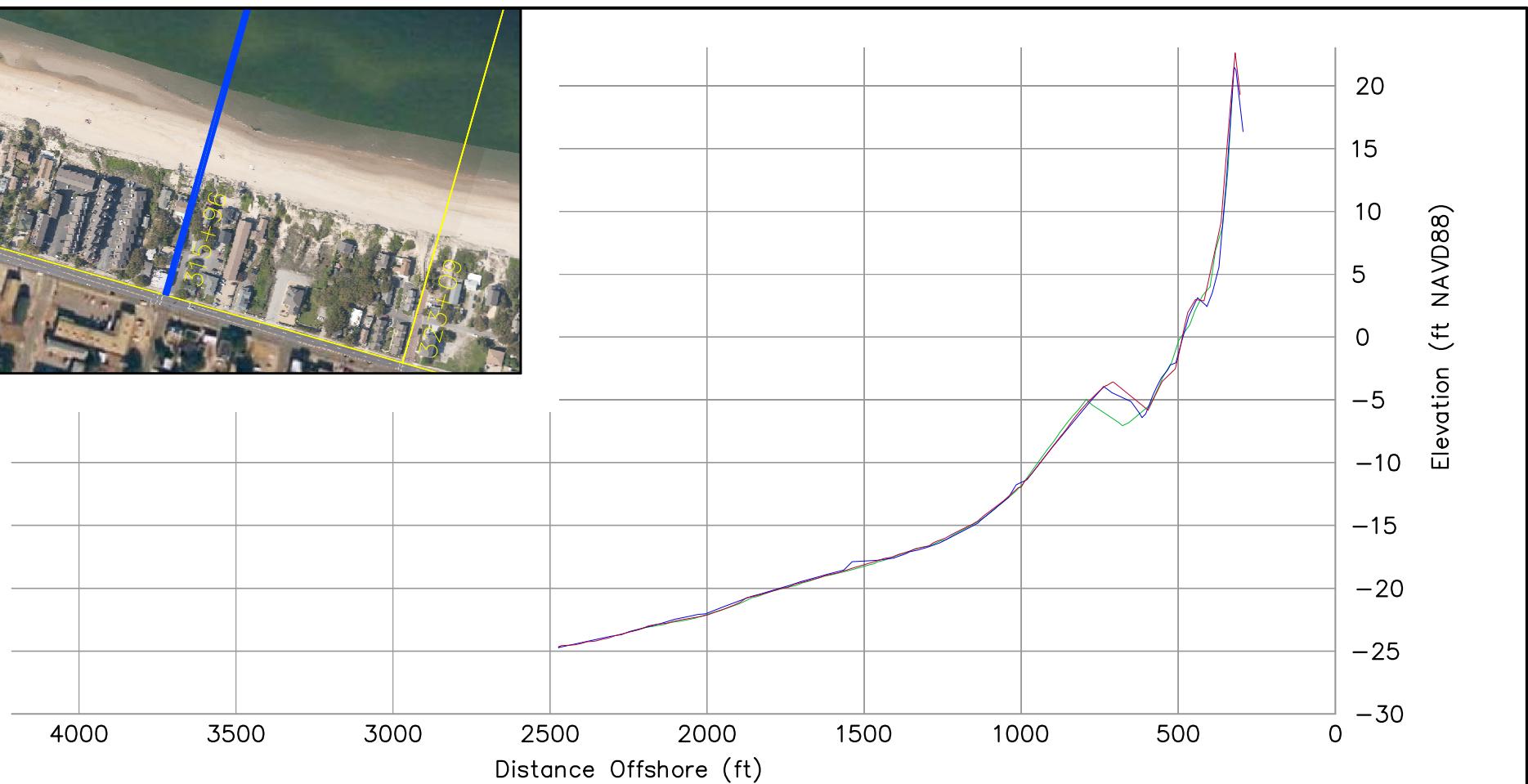
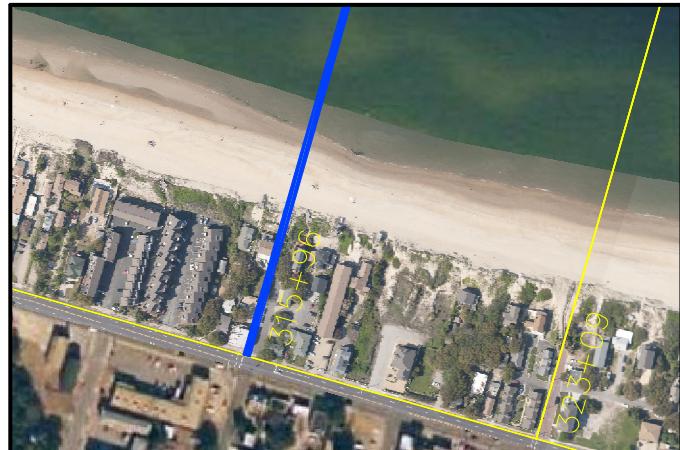
Survey Transect 302+24	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	4.67 ft/yr	-12.21 ft
Volume Change Above -15 ft NAVD88	9.85 cy/ft/yr	3.03 cy/ft
Volume Change Above 0 ft NAVD88	6.29 cy/ft/yr	8.59 cy/ft



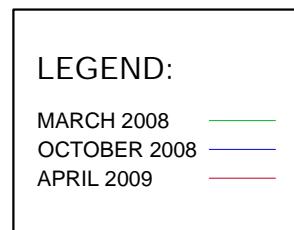
Notes:

1. Stationing From West To East At Varying Intervals.
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 City of Norfolk	OCEAN VIEW PERIODIC SURVEYING DATA & ANALYSIS
ST <u>302+24</u>	Pg 73 OF 106

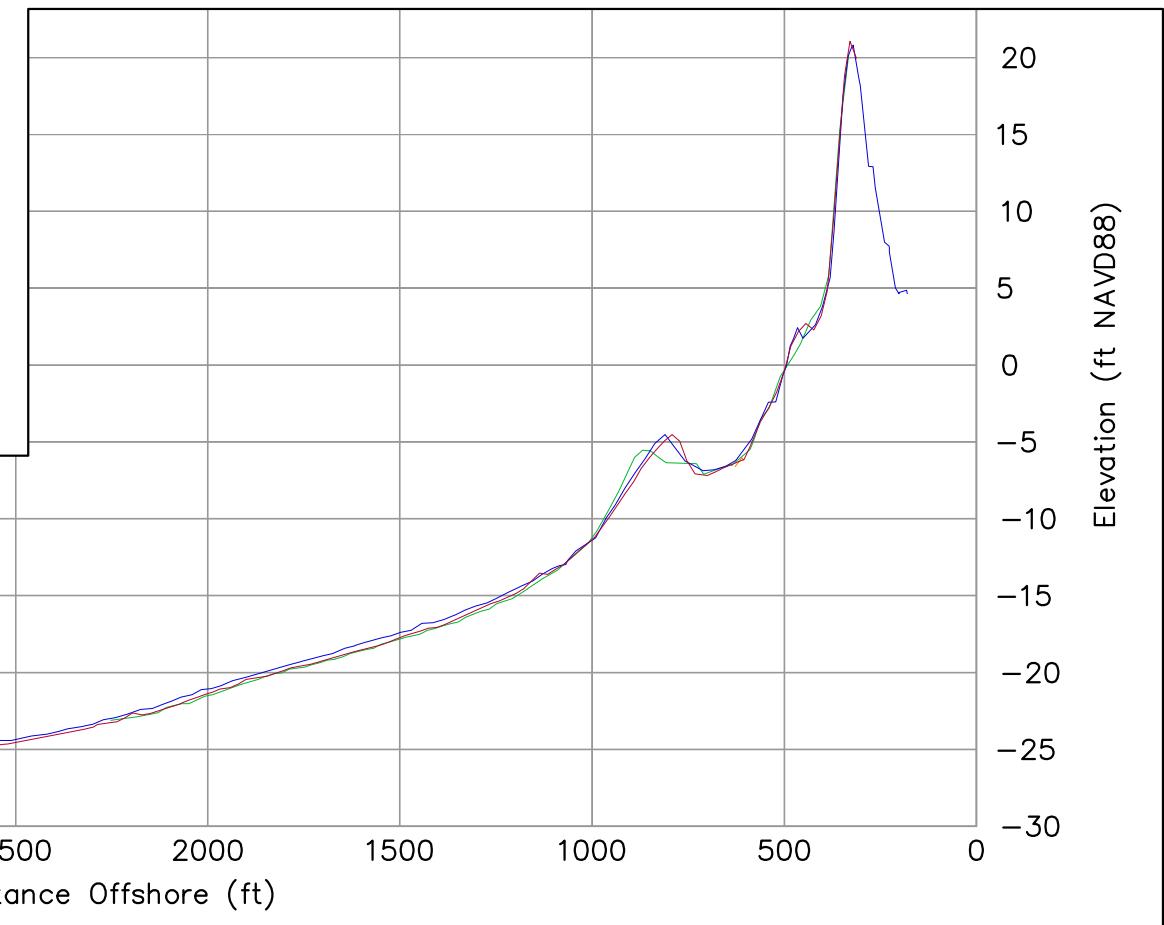
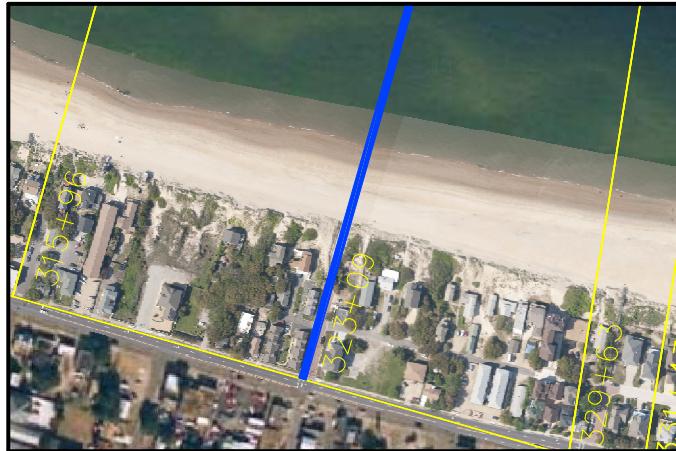


Survey Transect 315+96	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at MHW (0.98 ft NAVD88)	14.90 ft/yr	5.01 ft
Volume Change Above -15 ft NAVD88	11.39 cy/ft/yr	9.99 cy/ft
Volume Change Above 0 ft NAVD88	3.61 cy/ft/yr	7.54 cy/ft

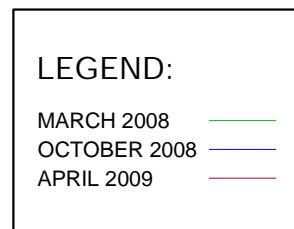


Notes:

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3. All Survey Elevations In Feet Referenced to NAVD88.
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Survey Transect 323+09	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	17.01 ft/yr	-1.06 ft
Volume Change Above -15 ft NAVD88	-0.55 cy/ft/yr	-1.92 cy/ft
Volume Change Above 0 ft NAVD88	0.26 cy/ft/yr	1.56 cy/ft

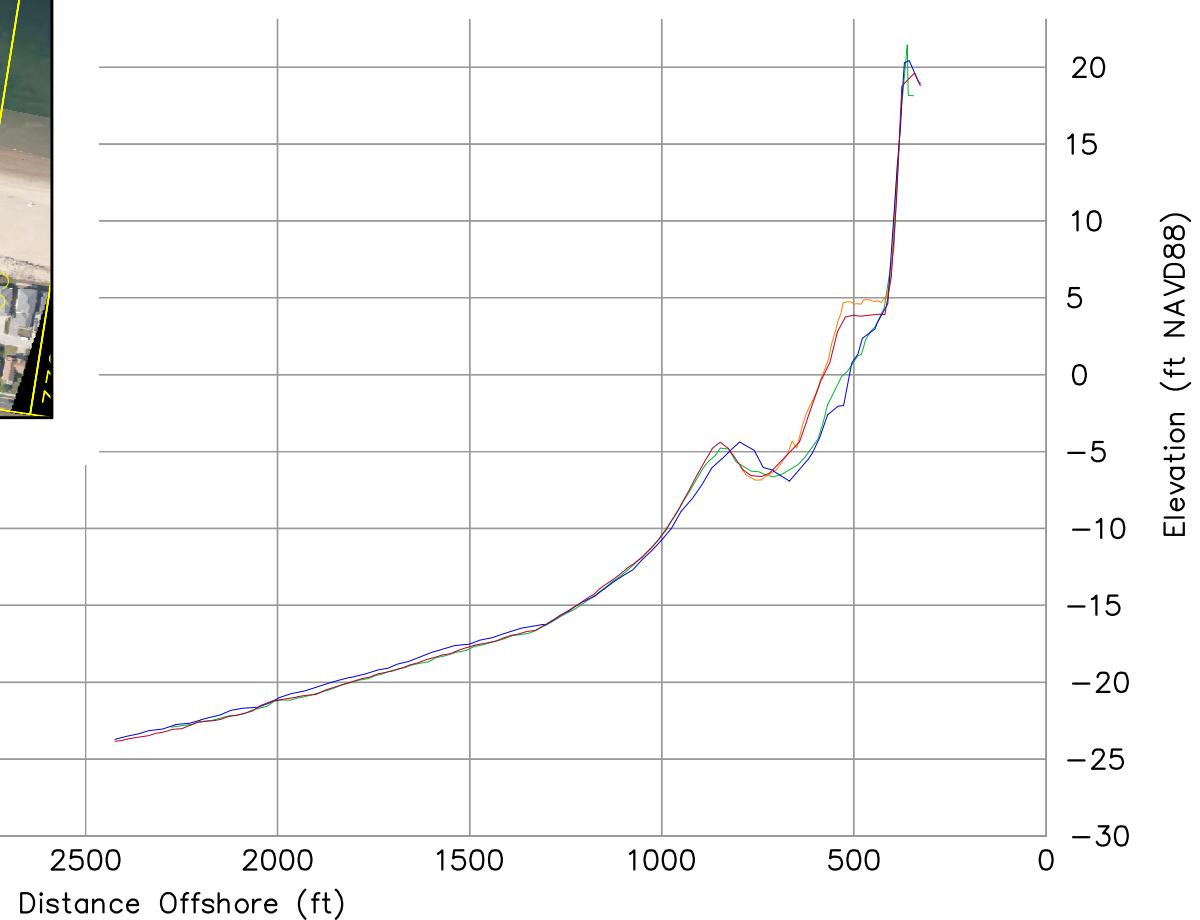


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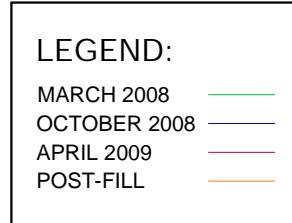
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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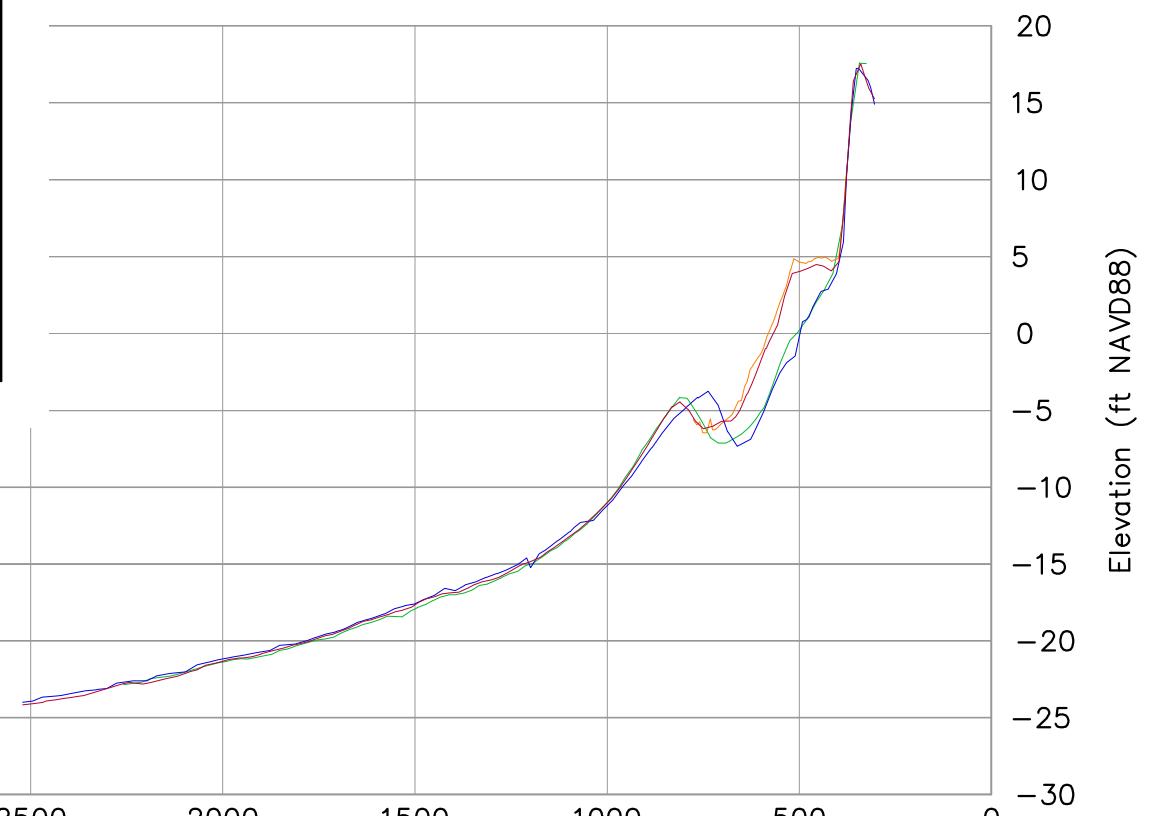


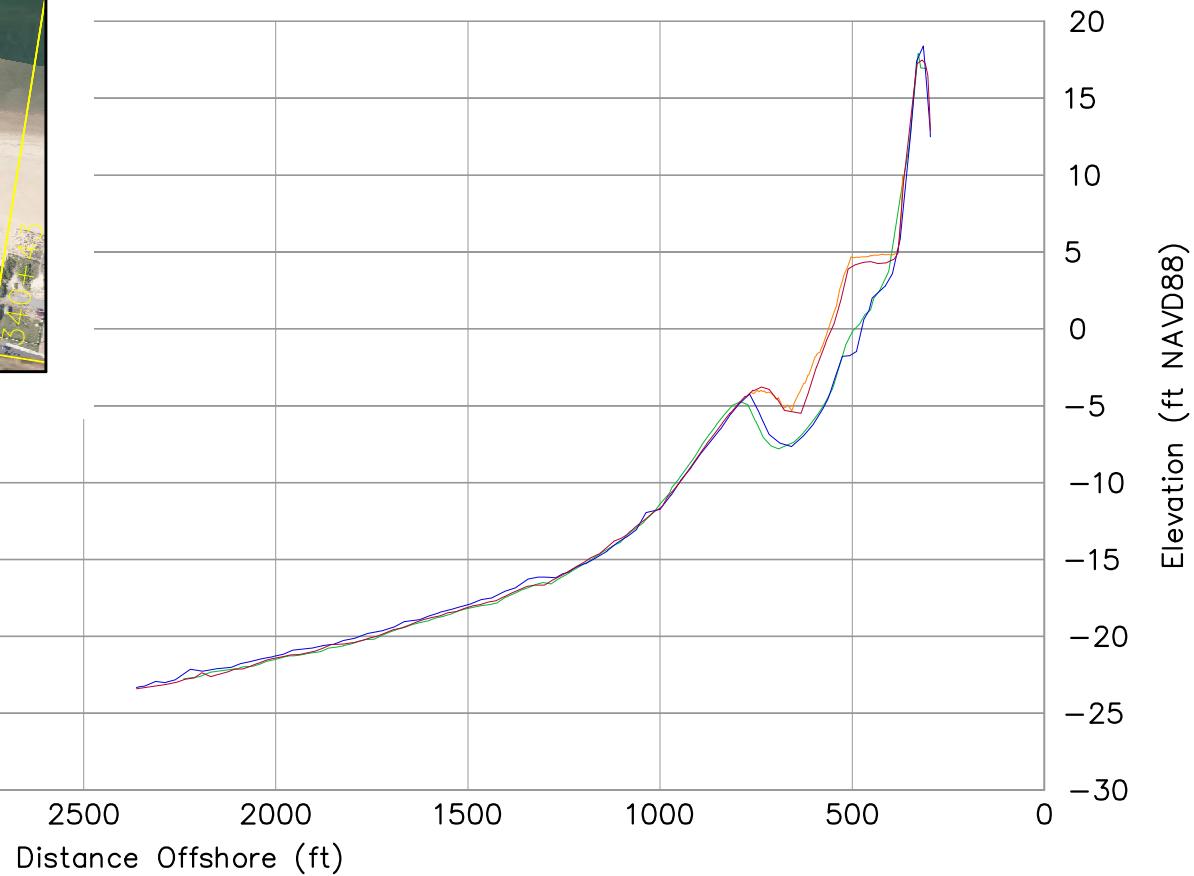
Survey Transect 329+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	60.25 ft/yr	61.11 ft
Volume Change Above -15 ft NAVD88	21.04 cy/ft/yr	26.17 cy/ft
Volume Change Above 0 ft NAVD88	6.19 cy/ft/yr	2.93 cy/ft



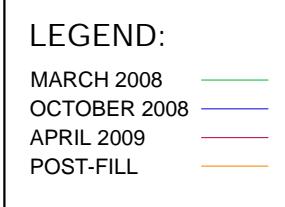
Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



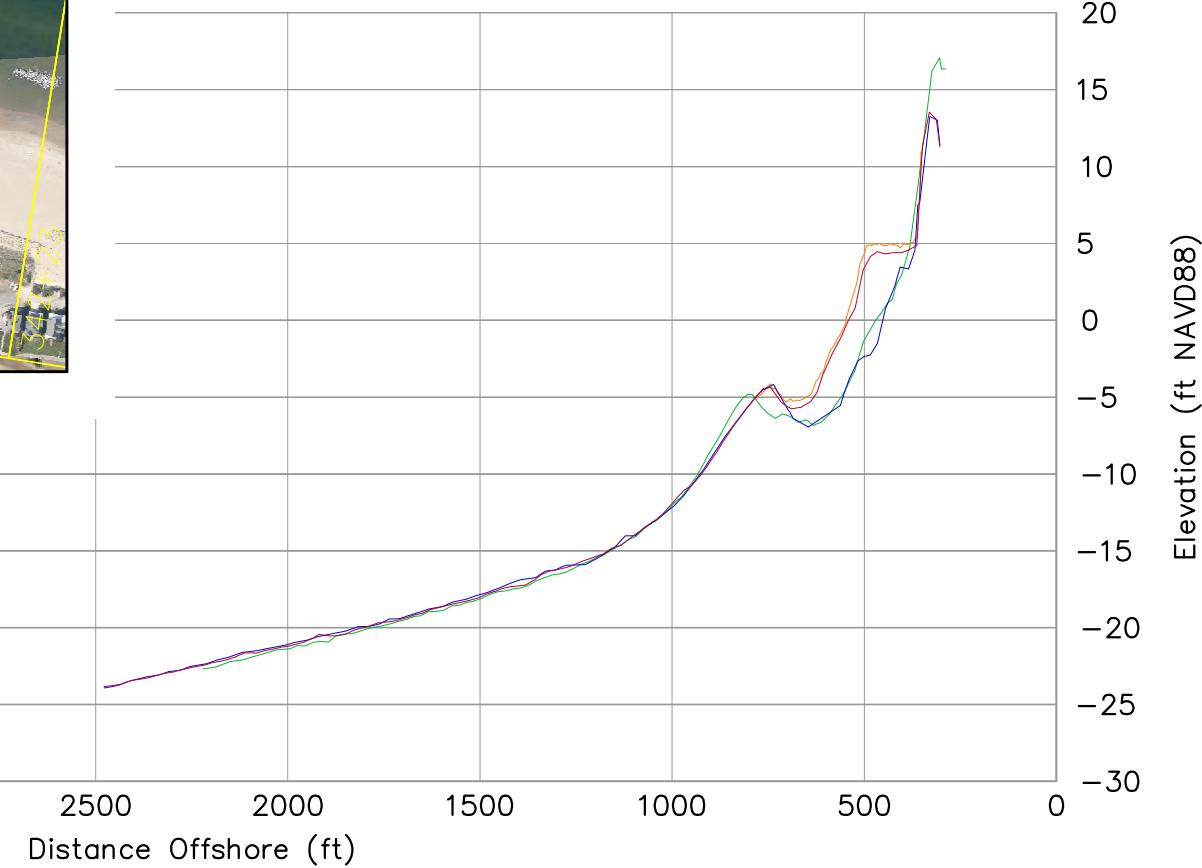


Survey Transect 333+23	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at MHW (0.98 ft NAVD88)	70.87 ft/yr	78.94 ft
Volume Change Above -15 ft NAVD88	34.25 cy/ft/yr	43.01 cy/ft
Volume Change Above 0 ft NAVD88	6.85 cy/ft/yr	8.33 cy/ft

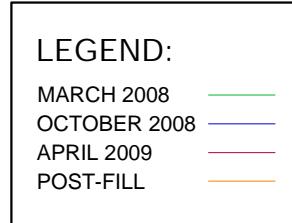


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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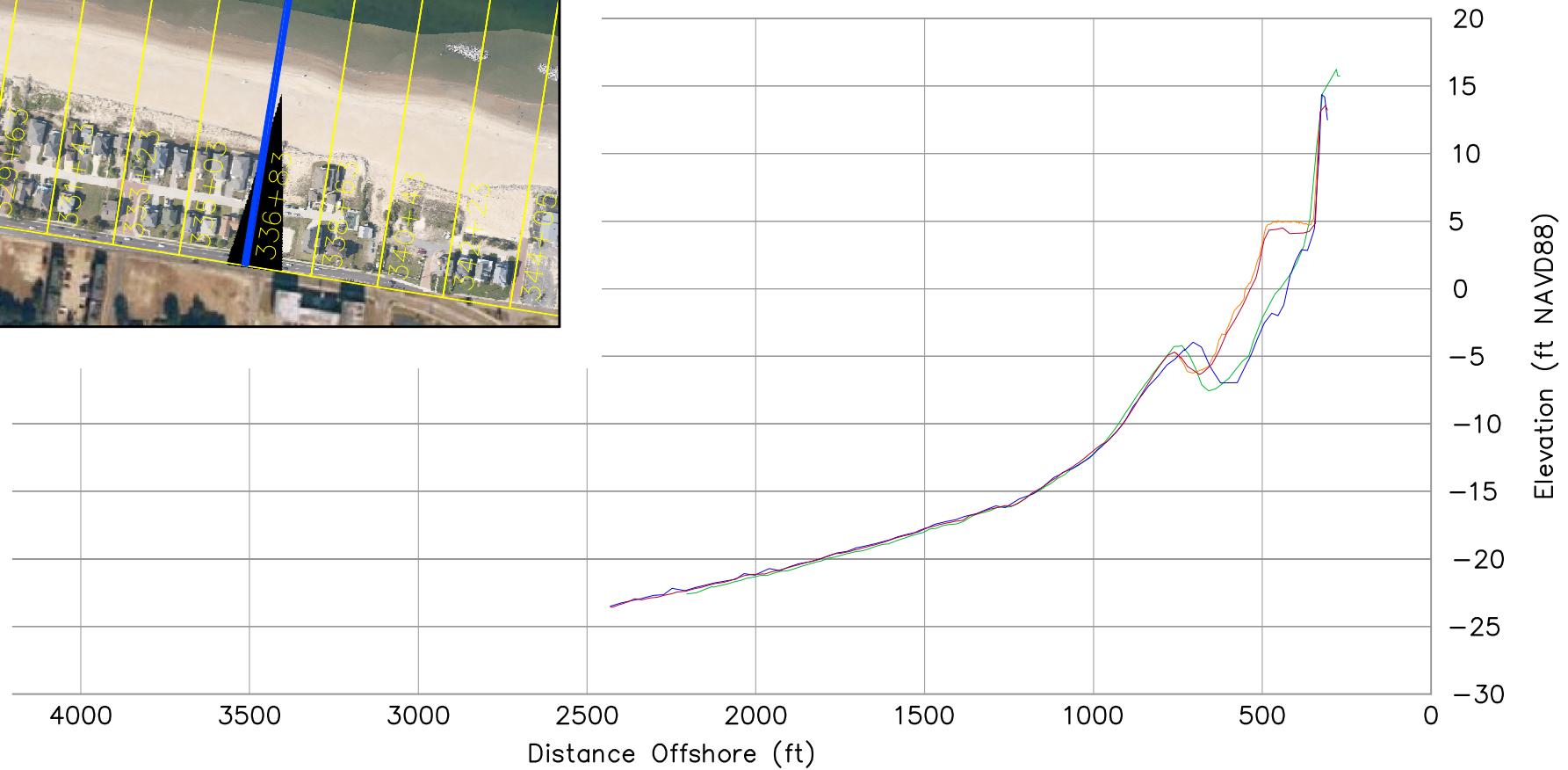


Survey Transect 335+03	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	74.09 ft/yr	81.01 ft
Volume Change Above -15 ft NAVD88	29.25 cy/ft/yr	36.87 cy/ft
Volume Change Above 0 ft NAVD88	5.81 cy/ft/yr	6.70 cy/ft

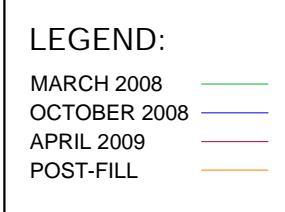


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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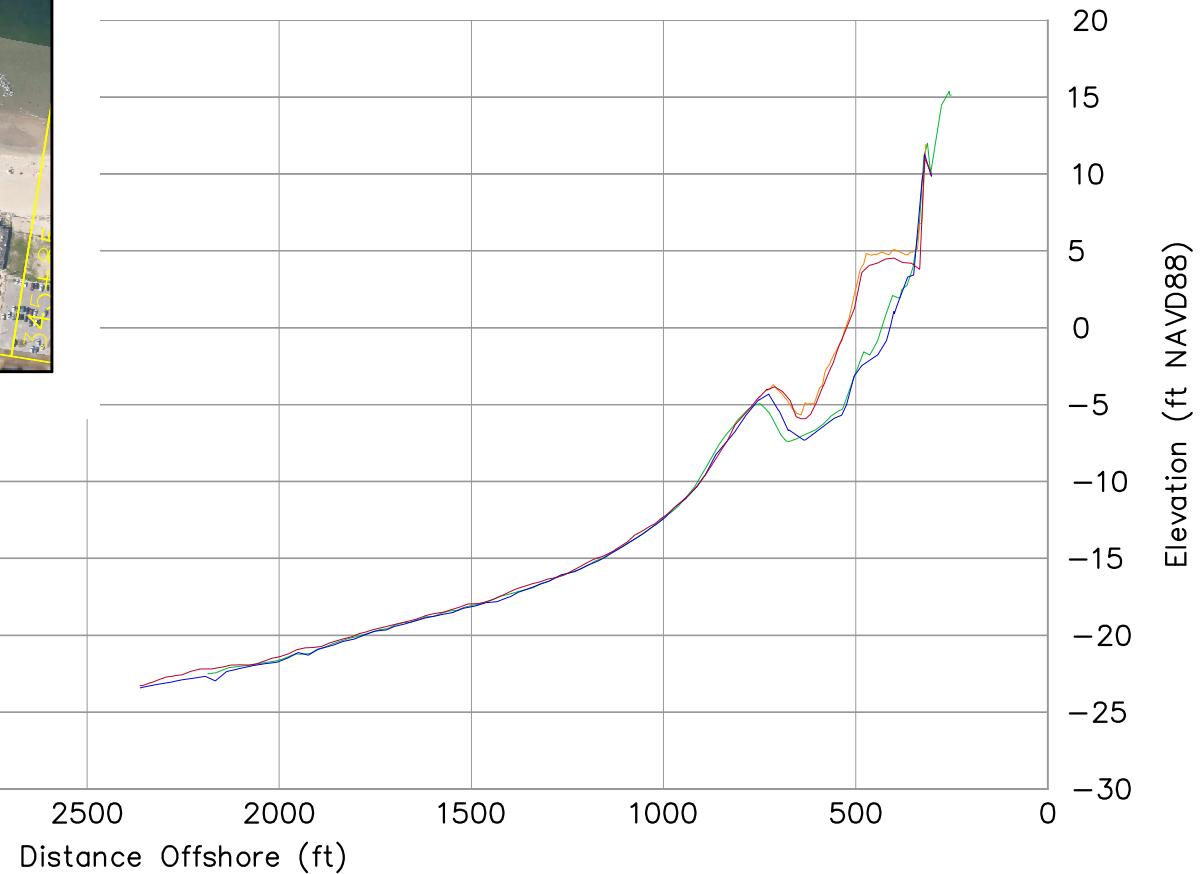


Survey Transect 336+83	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	91.57 ft/yr	100.82 ft
Volume Change Above -15 ft NAVD88	31.93 cy/ft/yr	41.85 cy/ft
Volume Change Above 0 ft NAVD88	4.19 cy/ft/yr	5.08 cy/ft



Notes:

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4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



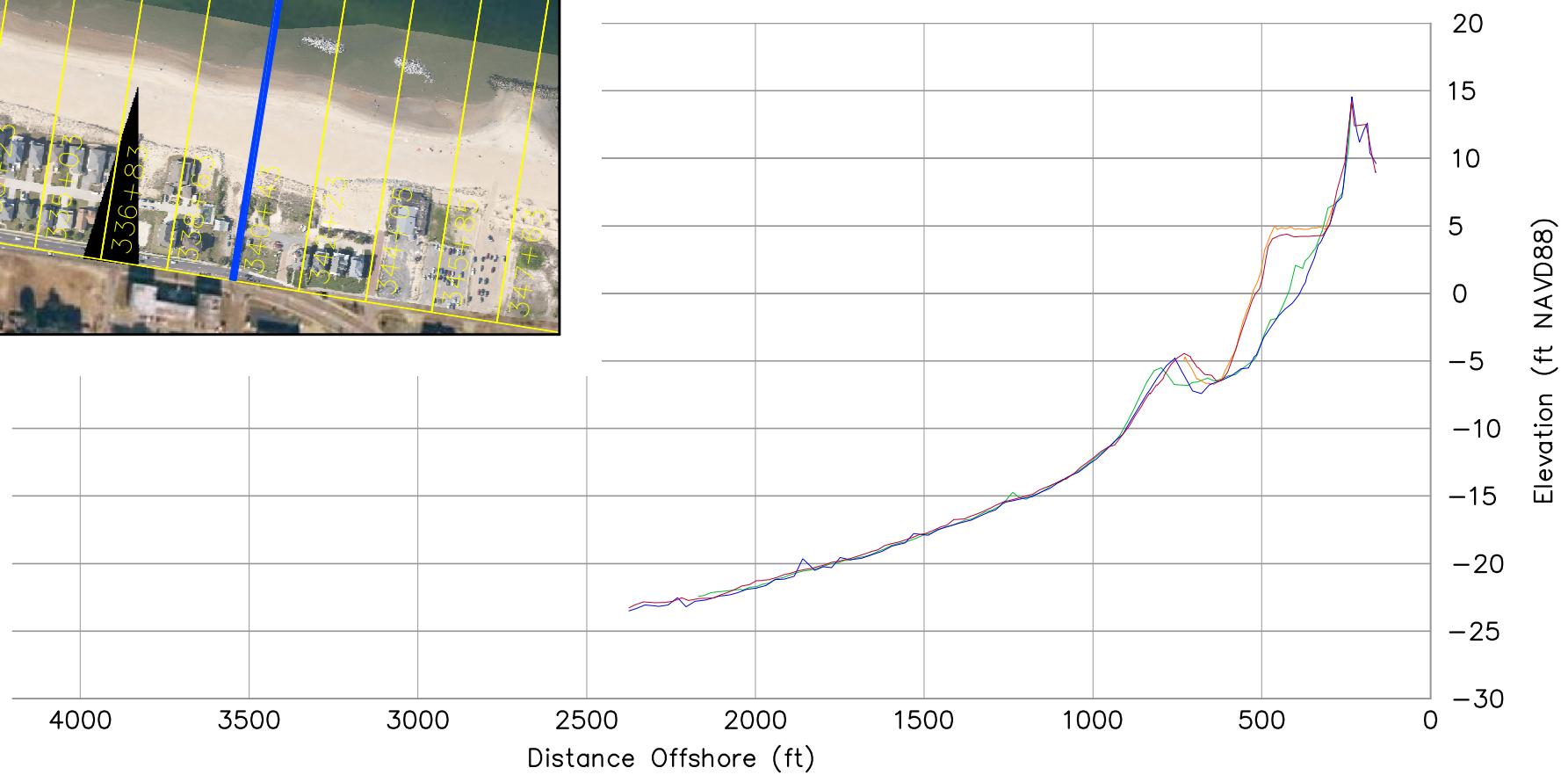
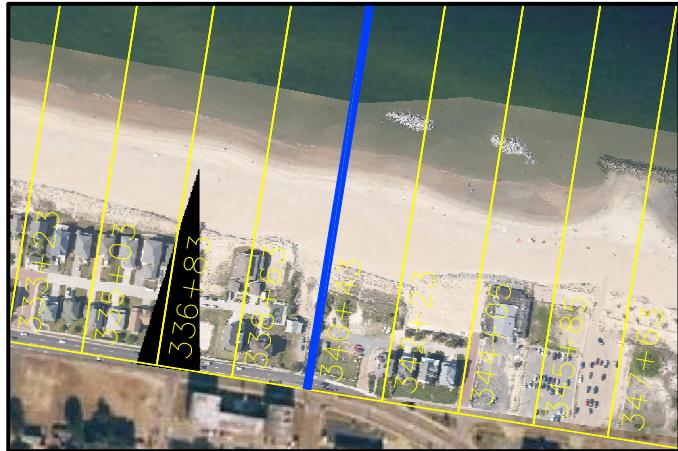
Survey Transect 338+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	82.98 ft/yr	108.31 ft
Volume Change Above -15 ft NAVD88	38.06 cy/ft/yr	44.78 cy/ft
Volume Change Above 0 ft NAVD88	4.47 cy/ft/yr	3.11 cy/ft

LEGEND:

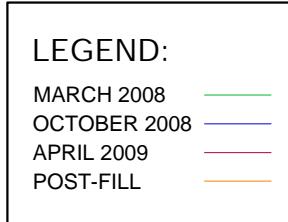
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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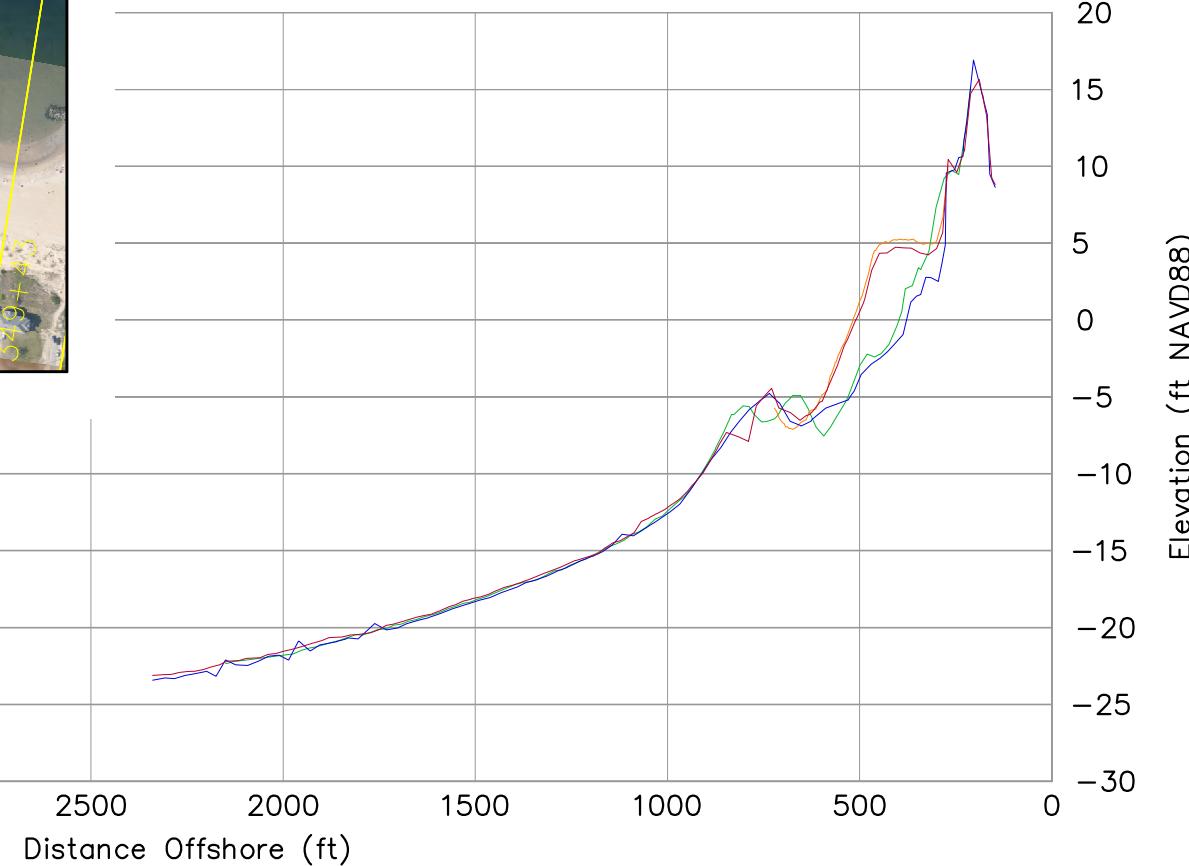


Survey Transect 340+43	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	83.47 ft/yr	130.98 ft
Volume Change Above -15 ft NAVD88	35.54 cy/ft/yr	47.30 cy/ft
Volume Change Above 0 ft NAVD88	7.07 cy/ft/yr	7.63 cy/ft



Notes:

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4. Survey Comparison Made To March 2008 and October 2008.
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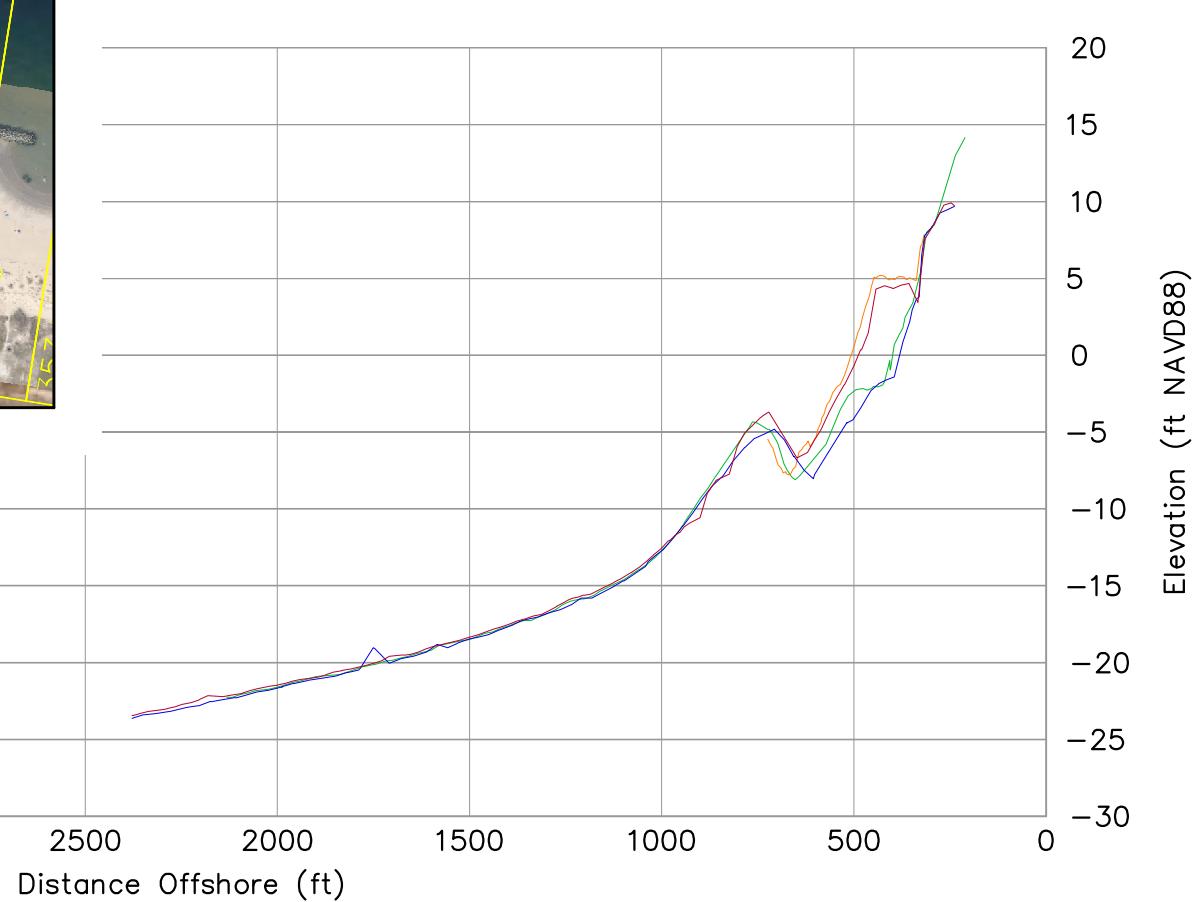
Survey Transect 342+23	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	98.40 ft/yr	124.23 ft
Volume Change Above -15 ft NAVD88	31.85 cy/ft/yr	47.21 cy/ft
Volume Change Above 0 ft NAVD88	1.92 cy/ft/yr	8.35 cy/ft

LEGEND:

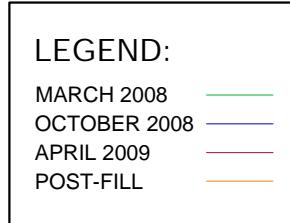
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

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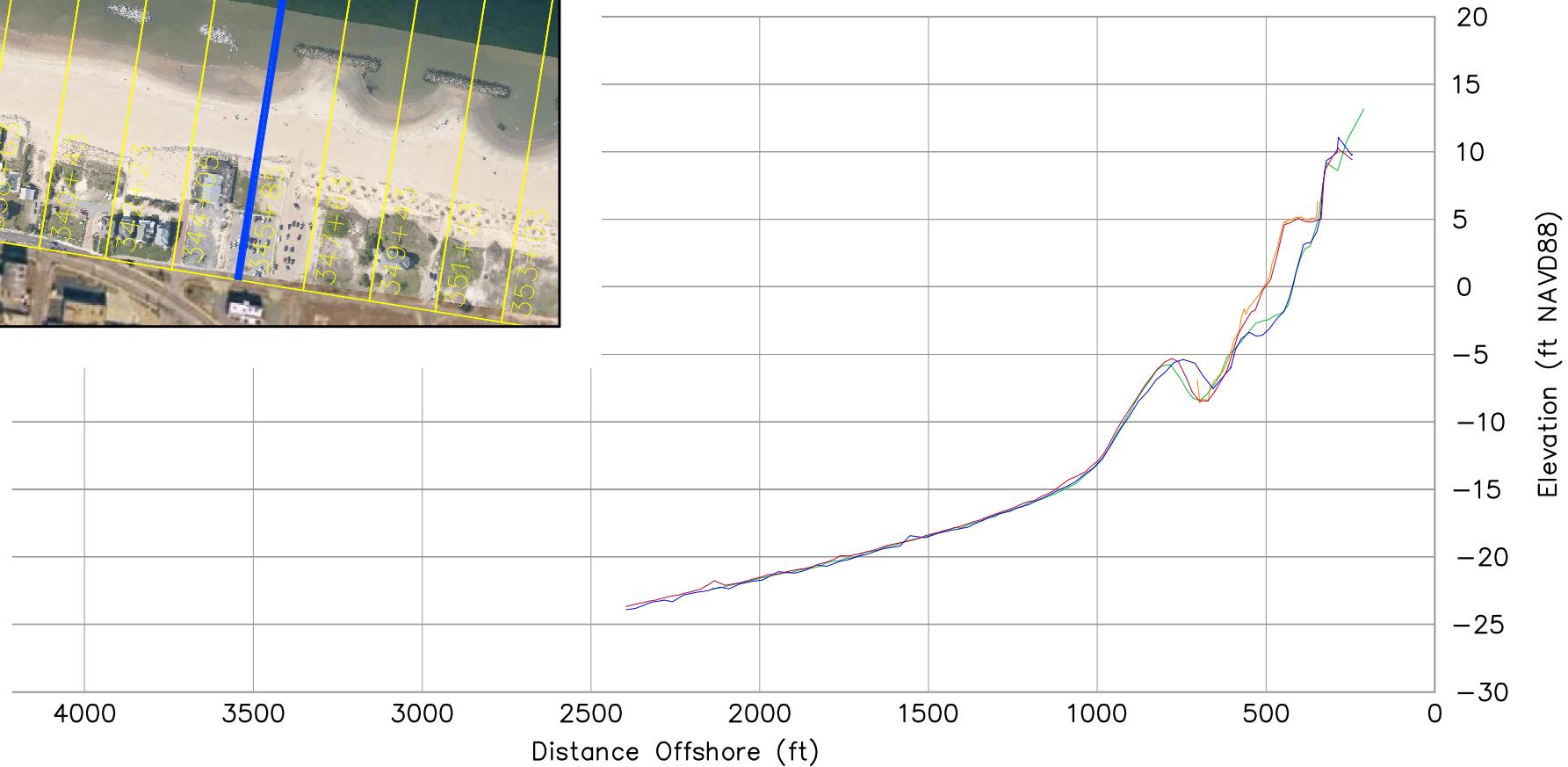


Survey Transect 344+05	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	76.04 ft/yr	99.45 ft
Volume Change Above -15 ft NAVD88	28.67 cy/ft/yr	42.56 cy/ft
Volume Change Above 0 ft NAVD88	4.31 cy/ft/yr	4.10 cy/ft

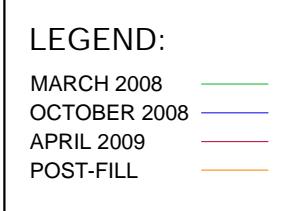


Notes:

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4. Survey Comparison Made To March 2008 and October 2008.
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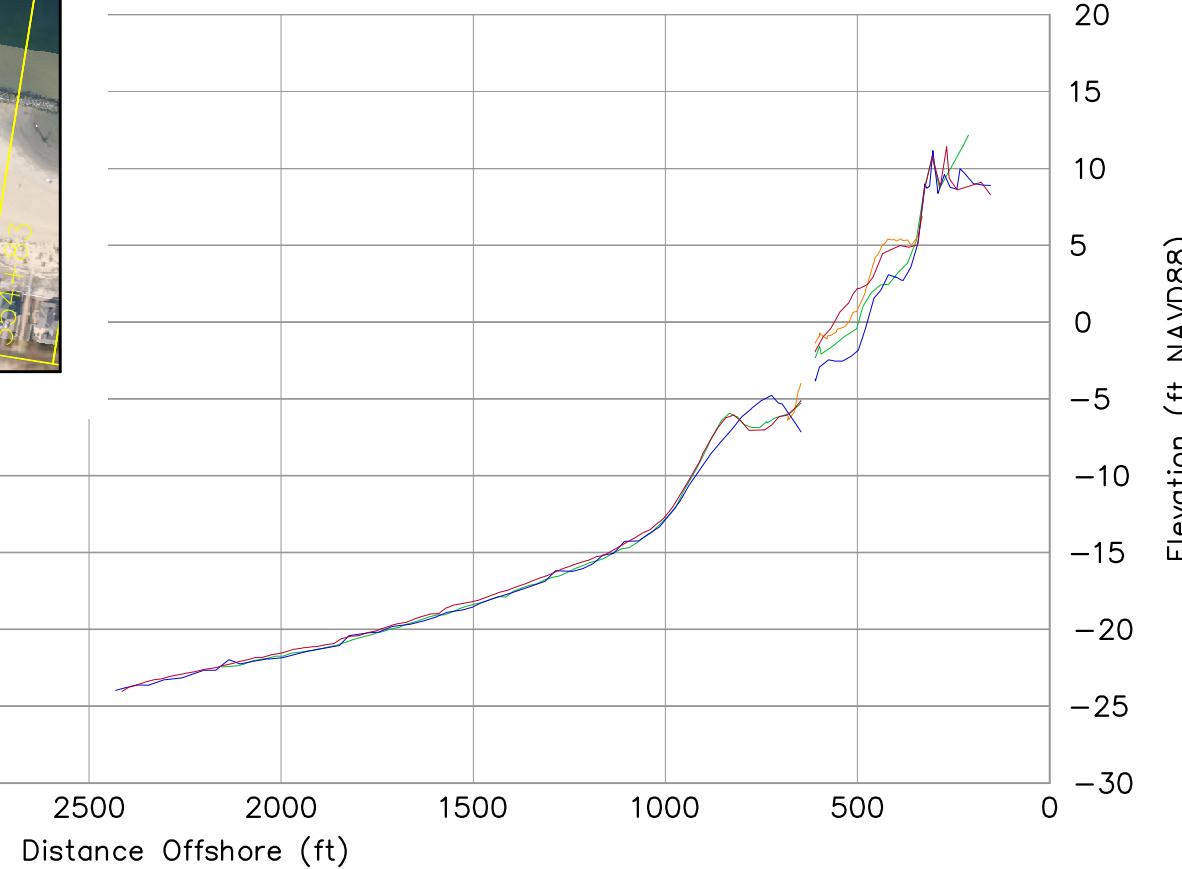


Survey Transect 345+85	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	64.59 ft/yr	69.73 ft
Volume Change Above -15 ft NAVD88	25.18 cy/ft/yr	24.72 cy/ft
Volume Change Above 0 ft NAVD88	5.30 cy/ft/yr	5.03 cy/ft

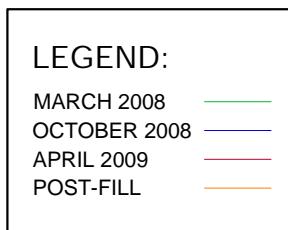


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3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



Survey Transect 347+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	44.22 ft/yr	69.95 ft
Volume Change Above -15 ft NAVD88	14.59 cy/ft/yr	22.34 cy/ft
Volume Change Above 0 ft NAVD88	6.84 cy/ft/yr	8.56 cy/ft

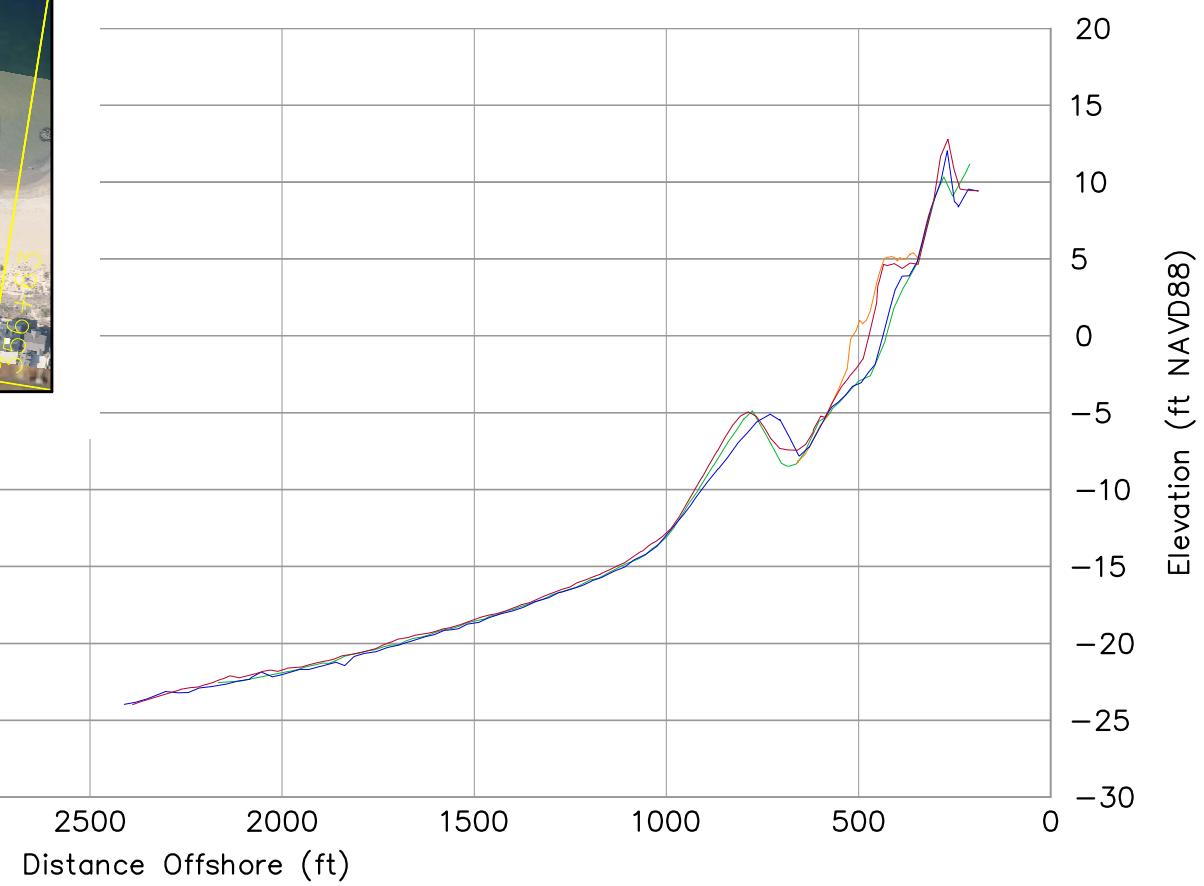


Notes:

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2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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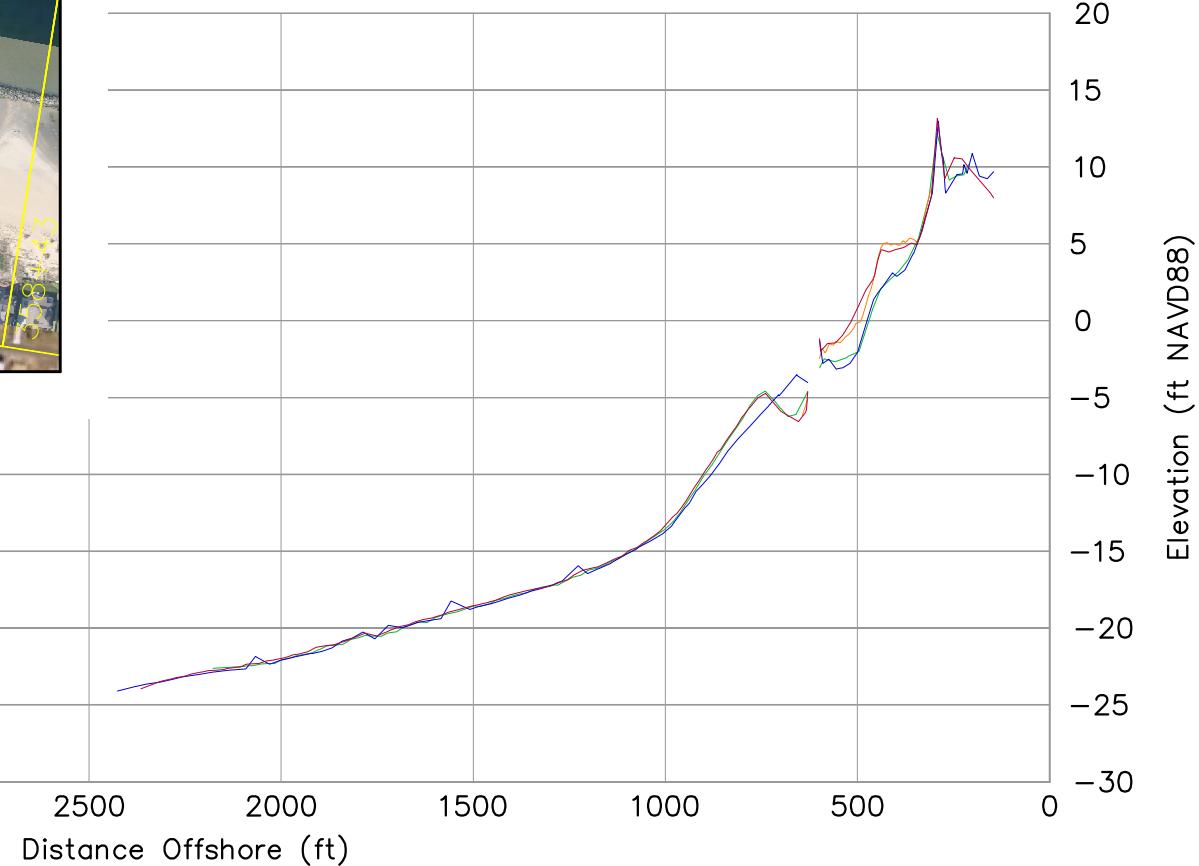


Survey Transect 349+43	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	43.68 ft/yr	36.87 ft
Volume Change Above -15 ft NAVD88	23.78 cy/ft/yr	23.50 cy/ft
Volume Change Above 0 ft NAVD88	6.23 cy/ft/yr	8.22 cy/ft

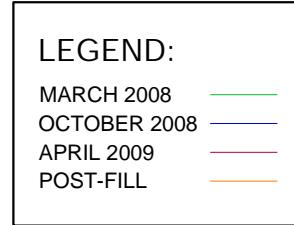


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

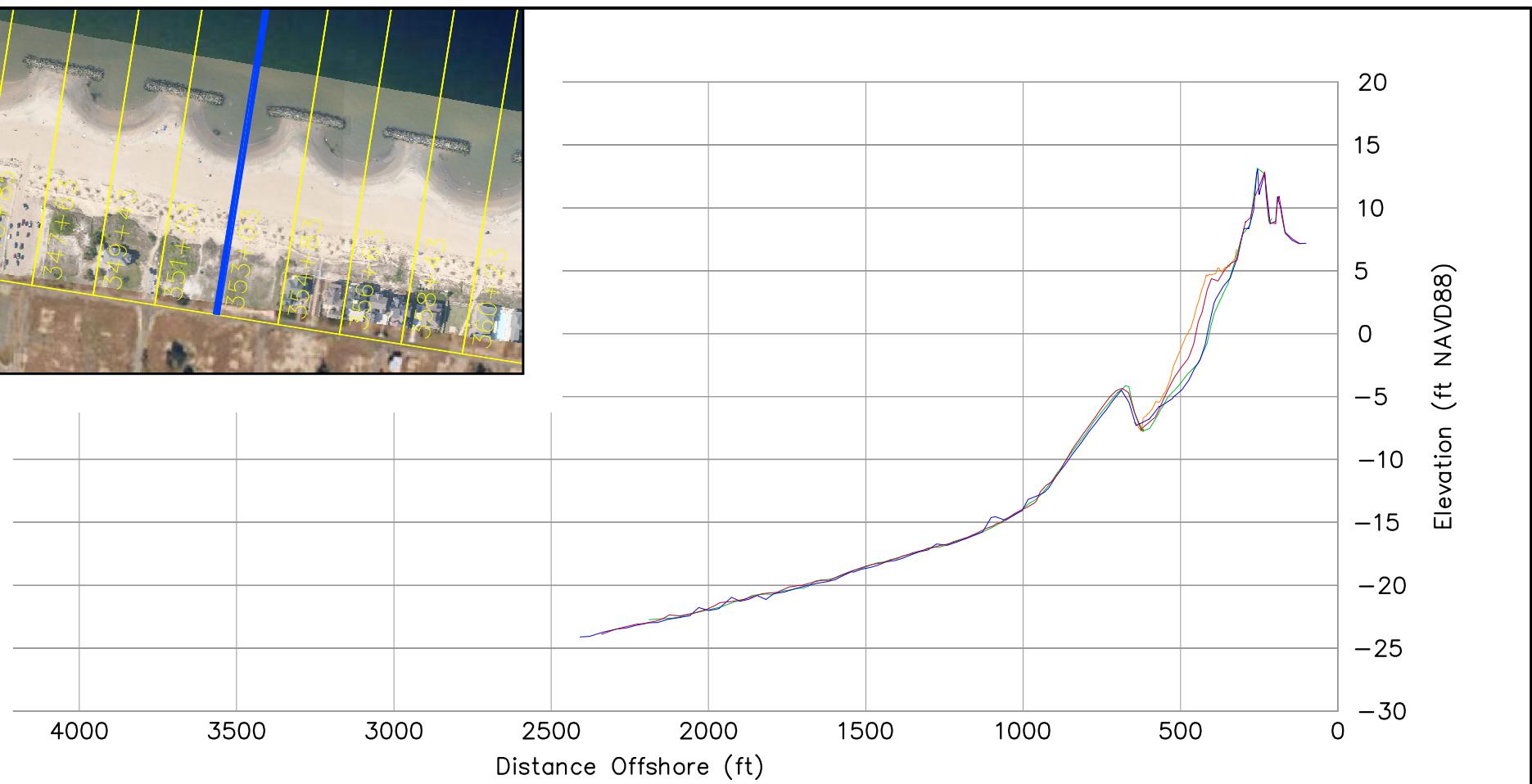


Survey Transect 351+23	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	37.62 ft/yr	33.84 ft
Volume Change Above -15 ft NAVD88	19.53 cy/ft/yr	21.24 cy/ft
Volume Change Above 0 ft NAVD88	7.38 cy/ft/yr	8.17 cy/ft

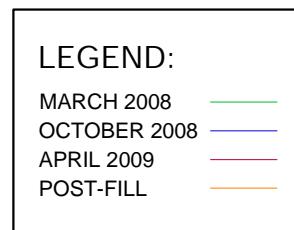


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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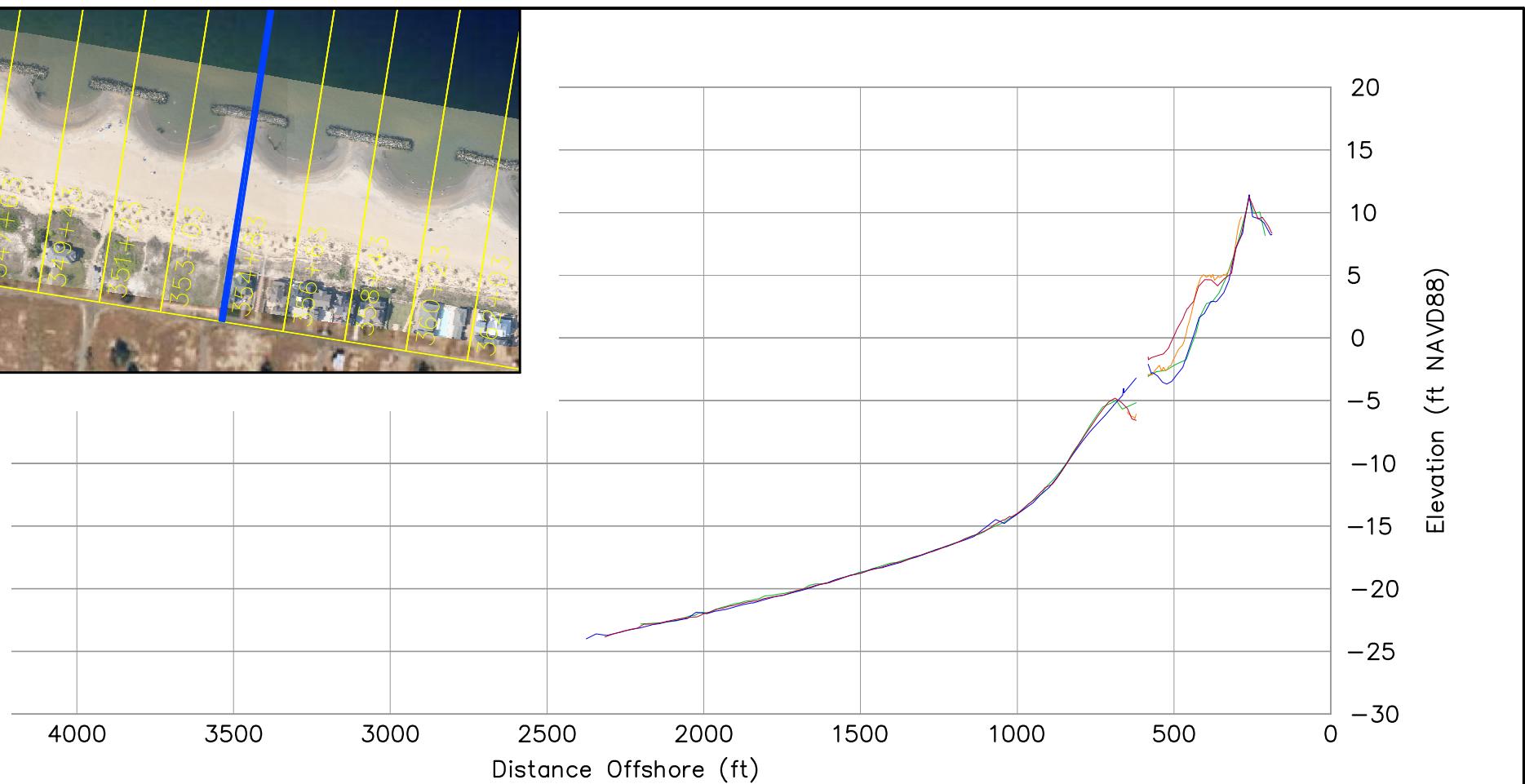


Survey Transect 353+03	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	40.76 ft/yr	36.40 ft
Volume Change Above -15 ft NAVD88	15.35 cy/ft/yr	19.27 cy/ft
Volume Change Above 0 ft NAVD88	4.45 cy/ft/yr	5.36 cy/ft

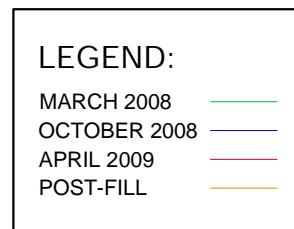


Notes:

1. Stationing From West To East At Varying Intervals.
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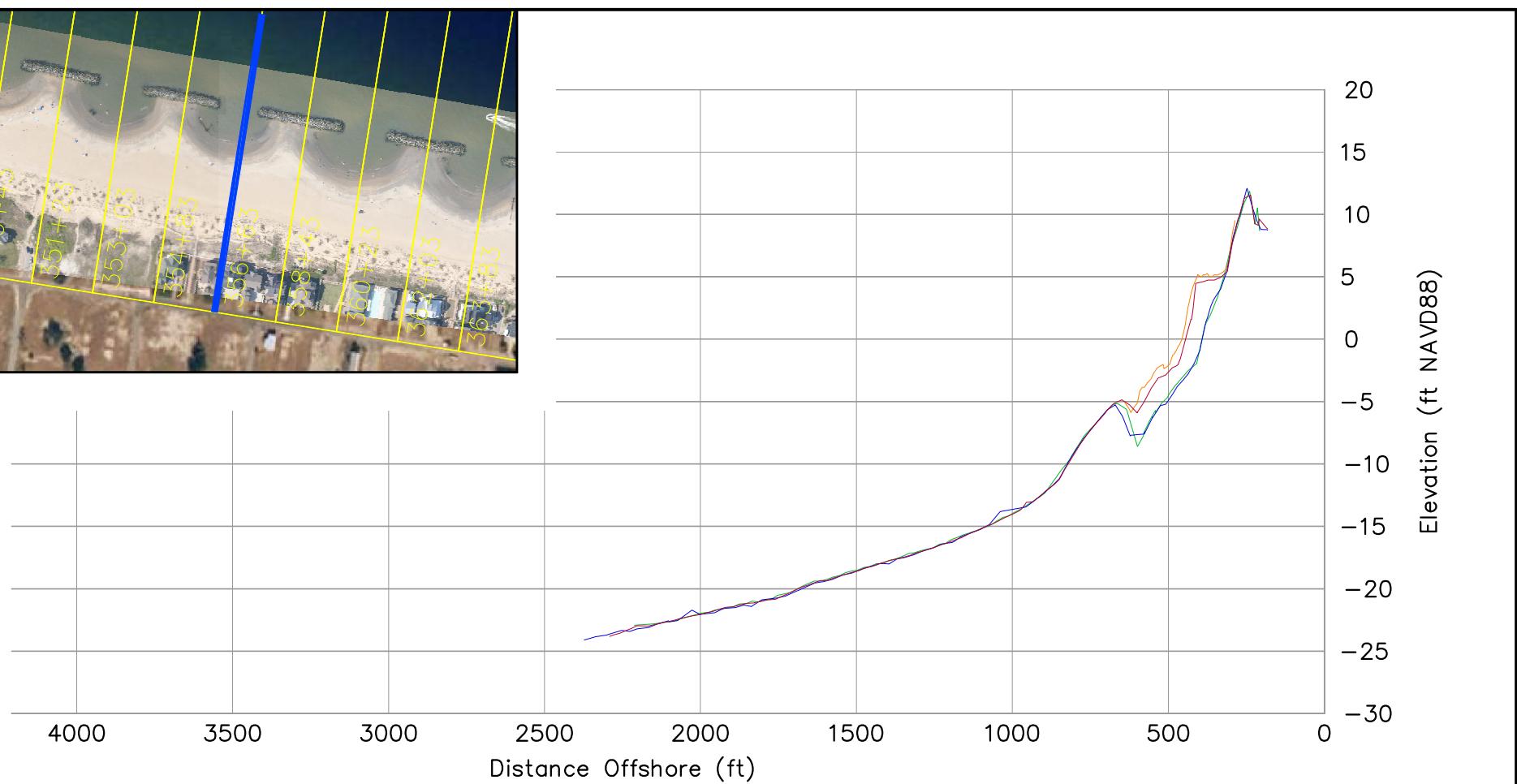
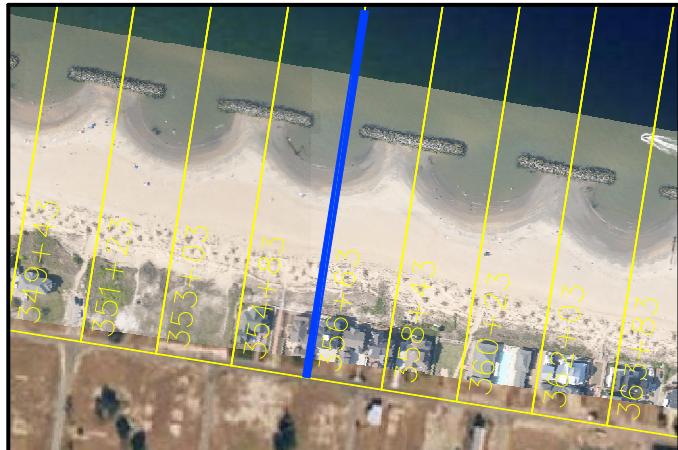


Survey Transect 354+83	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	56.47 ft/yr	56.76 ft
Volume Change Above -15 ft NAVD88	16.93 cy/ft/yr	22.26 cy/ft
Volume Change Above 0 ft NAVD88	4.71 cy/ft/yr	7.18 cy/ft

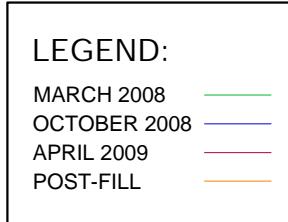


Notes:

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2. Sections Are Viewed Toward Increasing Stationing.
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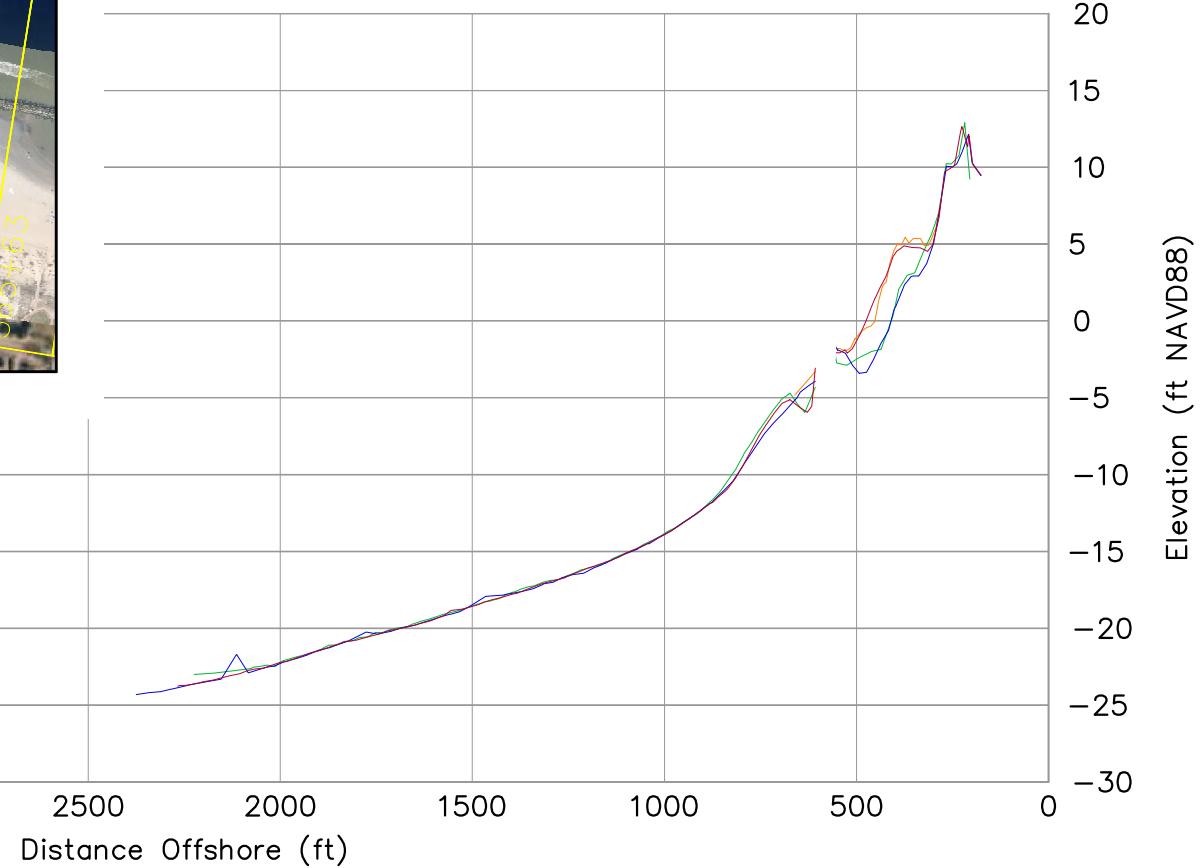


Survey Transect 356+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	47.35 ft/yr	51.53 ft
Volume Change Above -15 ft NAVD88	26.84 cy/ft/yr	30.05 cy/ft
Volume Change Above 0 ft NAVD88	5.54 cy/ft/yr	5.11 cy/ft

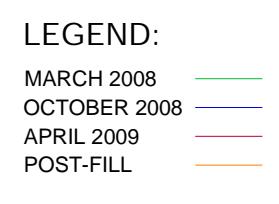


Notes:

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2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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Survey Transect 358+43	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at MHW (0.98 ft NAVD88)	56.66 ft/yr	62.19 ft
Volume Change Above -15 ft NAVD88	16.12 cy/ft/yr	22.37 cy/ft
Volume Change Above 0 ft NAVD88	5.24 cy/ft/yr	9.19 cy/ft

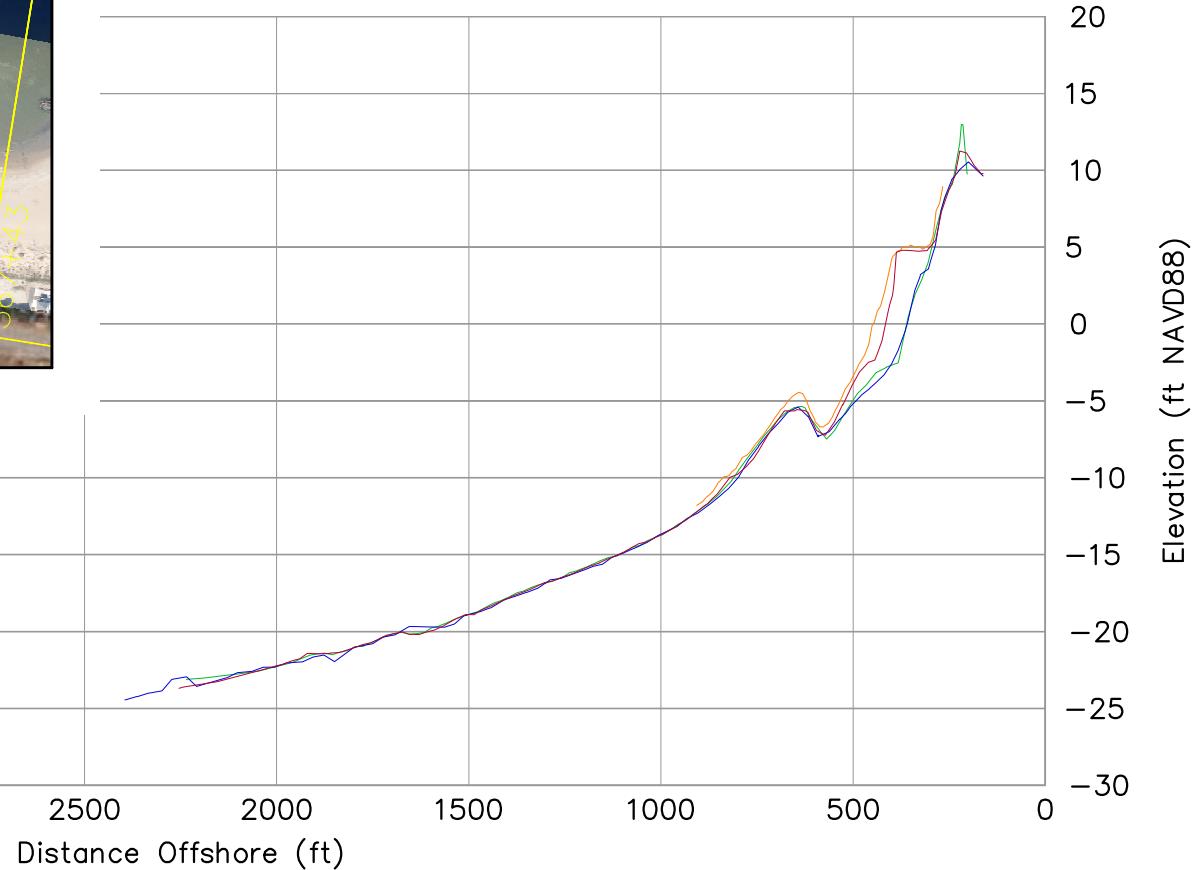
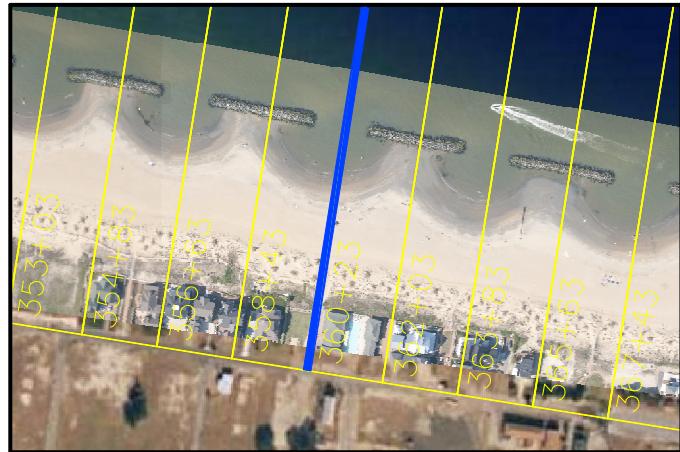


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
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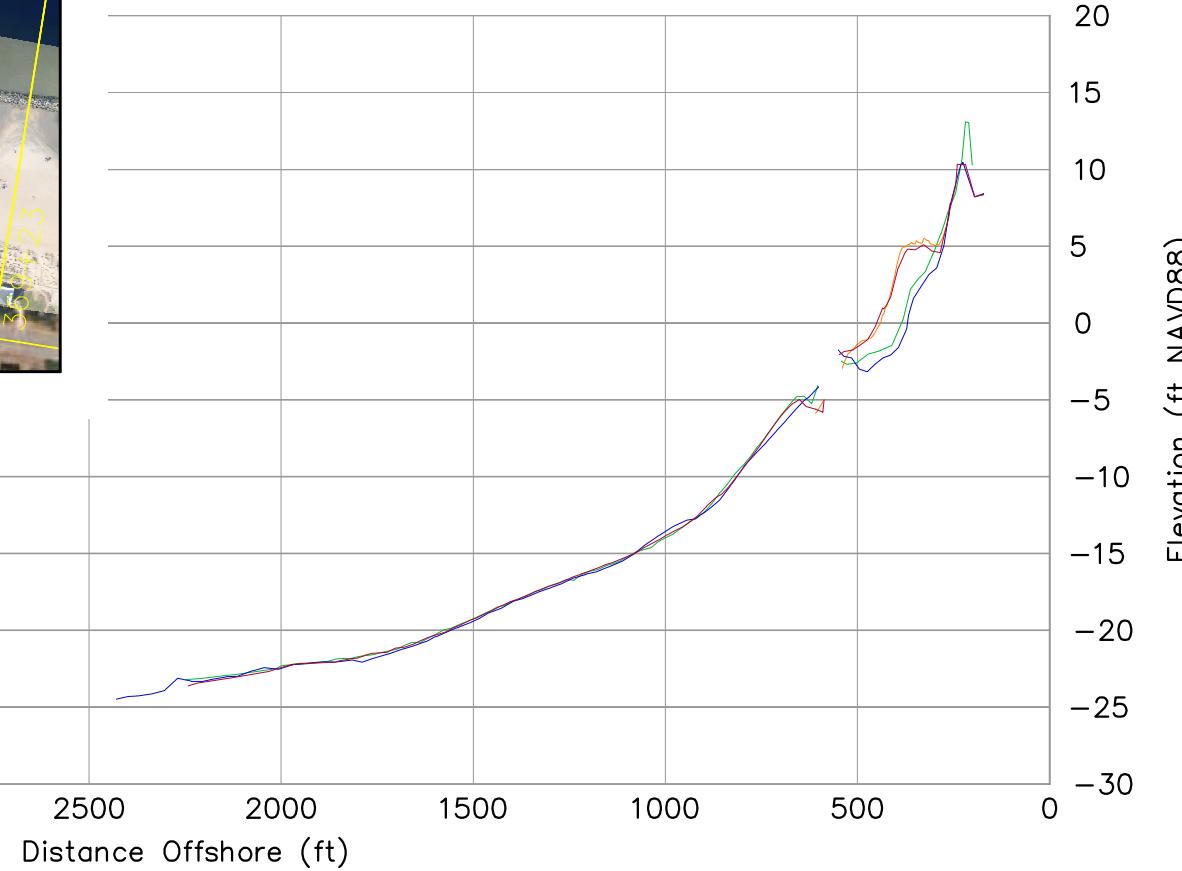
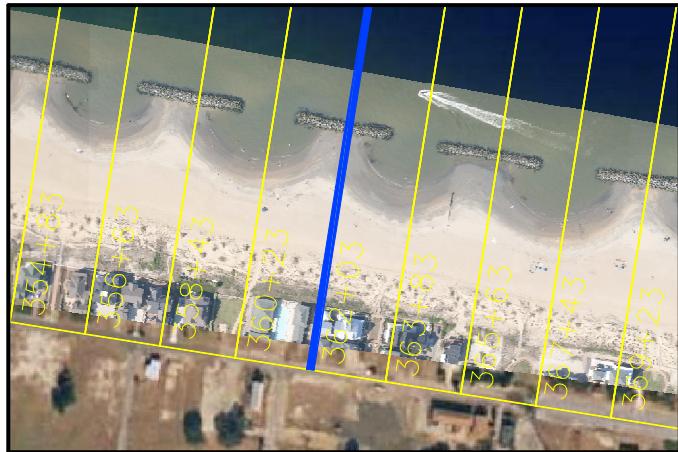
Survey Transect 360+23	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	53.68 ft/yr	56.72 ft
Volume Change Above -15 ft NAVD88	19.71 cy/ft/yr	25.88 cy/ft
Volume Change Above 0 ft NAVD88	4.81 cy/ft/yr	6.39 cy/ft

LEGEND:

MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
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3. All Survey Elevations In Feet Referenced to NAVD88.
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5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	52.76 ft/yr	67.81 ft
Volume Change Above -15 ft NAVD88	12.72 cy/ft/yr	21.25 cy/ft
Volume Change Above 0 ft NAVD88	5.86 cy/ft/yr	7.76 cy/ft

LEGEND:

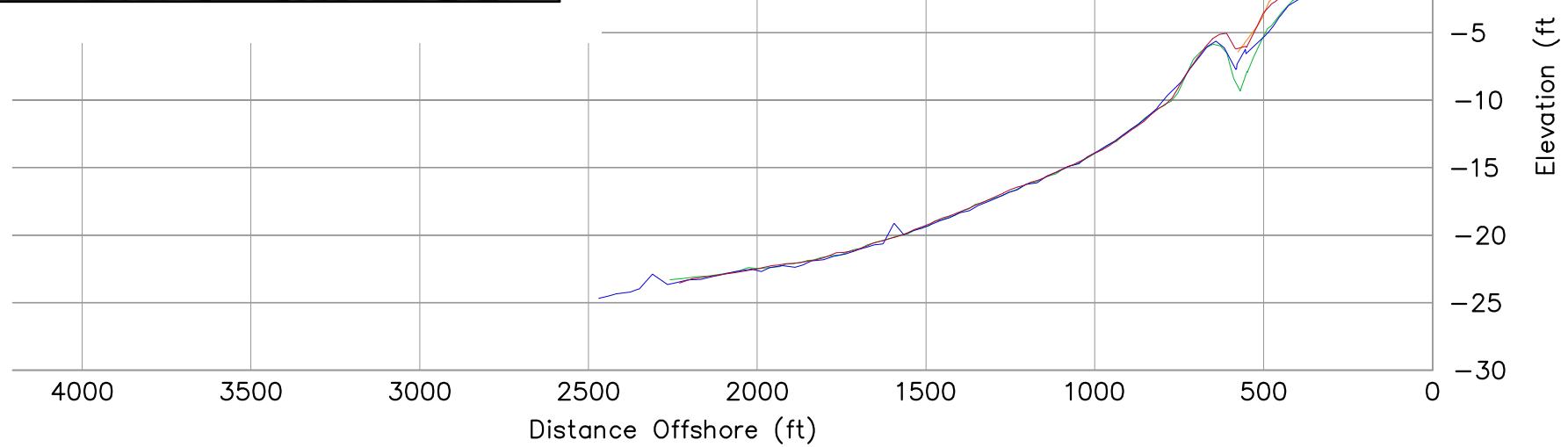
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

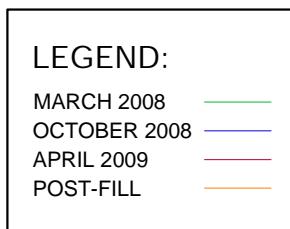
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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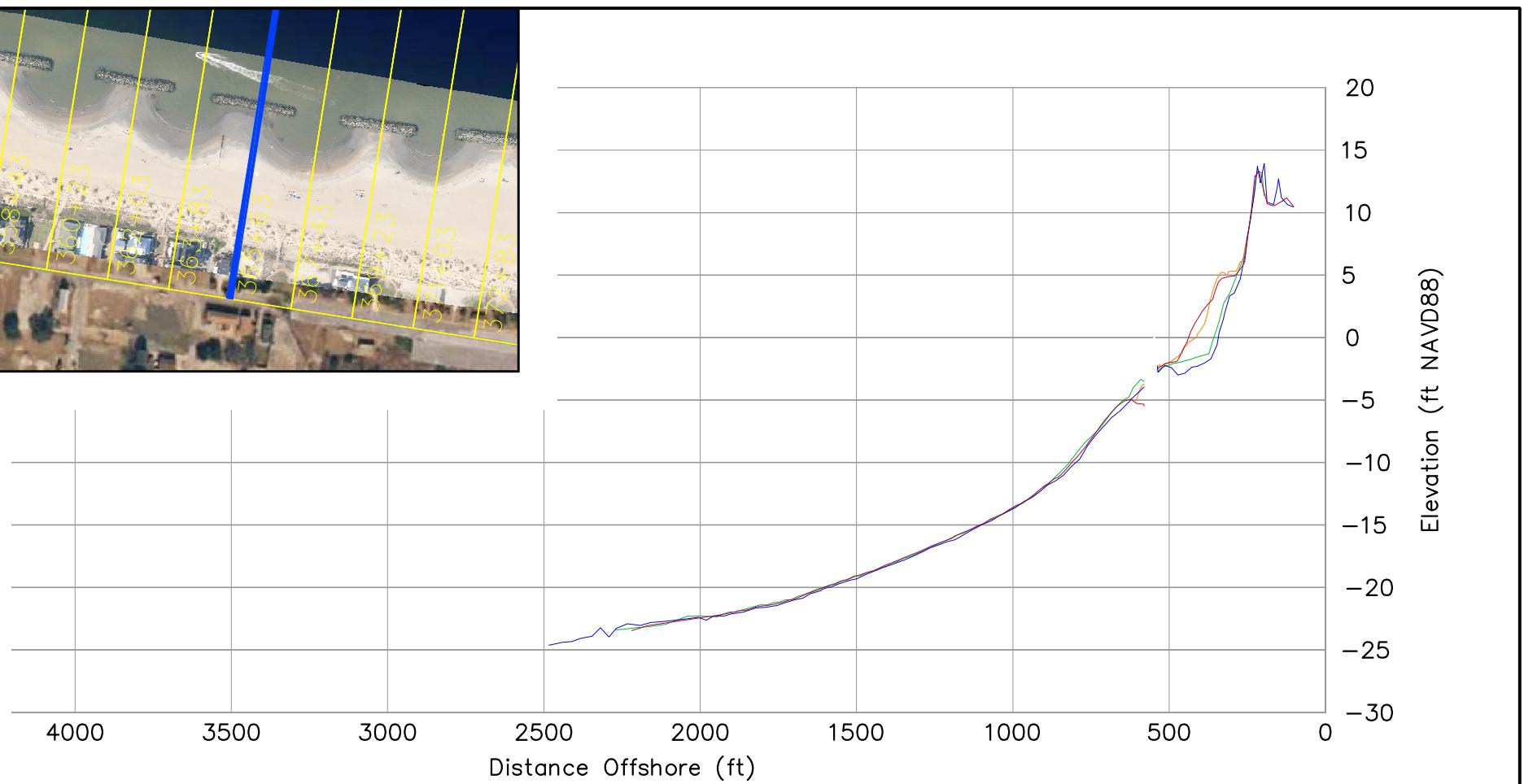


Survey Transect 363+83	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	43.18 ft/yr	51.67 ft
Volume Change Above -15 ft NAVD88	24.43 cy/ft/yr	26.66 cy/ft
Volume Change Above 0 ft NAVD88	4.32 cy/ft/yr	7.76 cy/ft

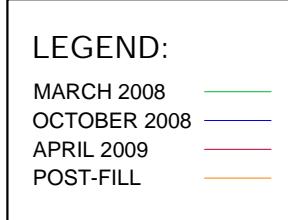


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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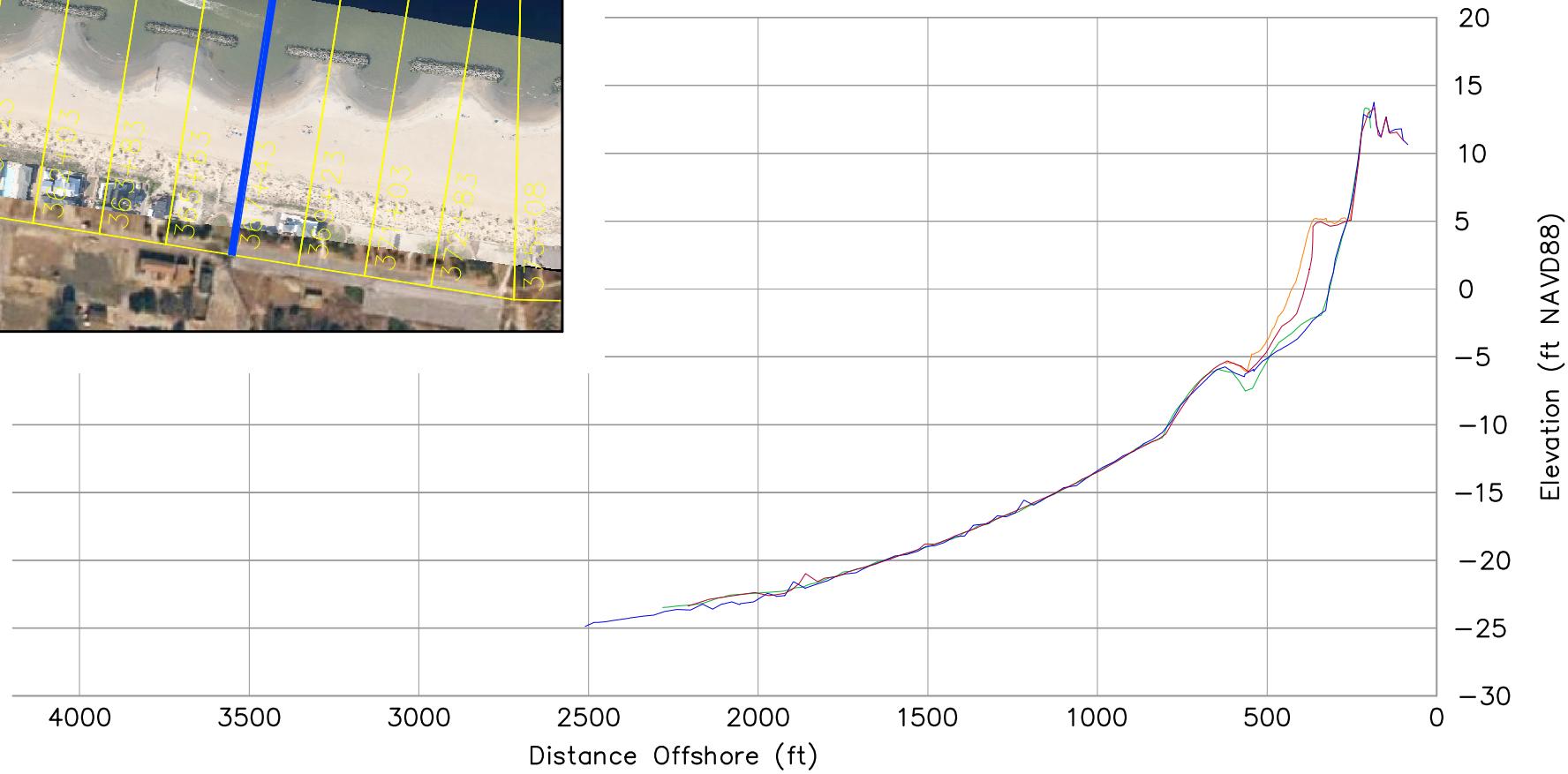
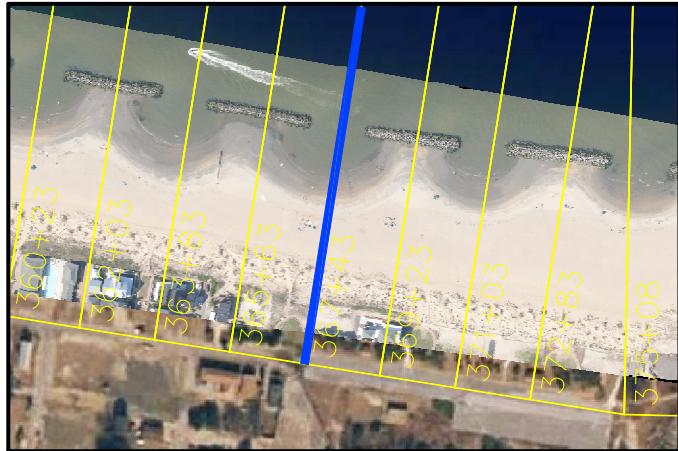


Survey Transect 365+63	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	72.22 ft/yr	88.16 ft
Volume Change Above -15 ft NAVD88	11.24 cy/ft/yr	19.69 cy/ft
Volume Change Above 0 ft NAVD88	4.98 cy/ft/yr	4.39 cy/ft

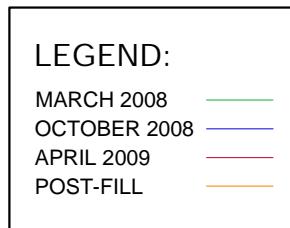


Notes:

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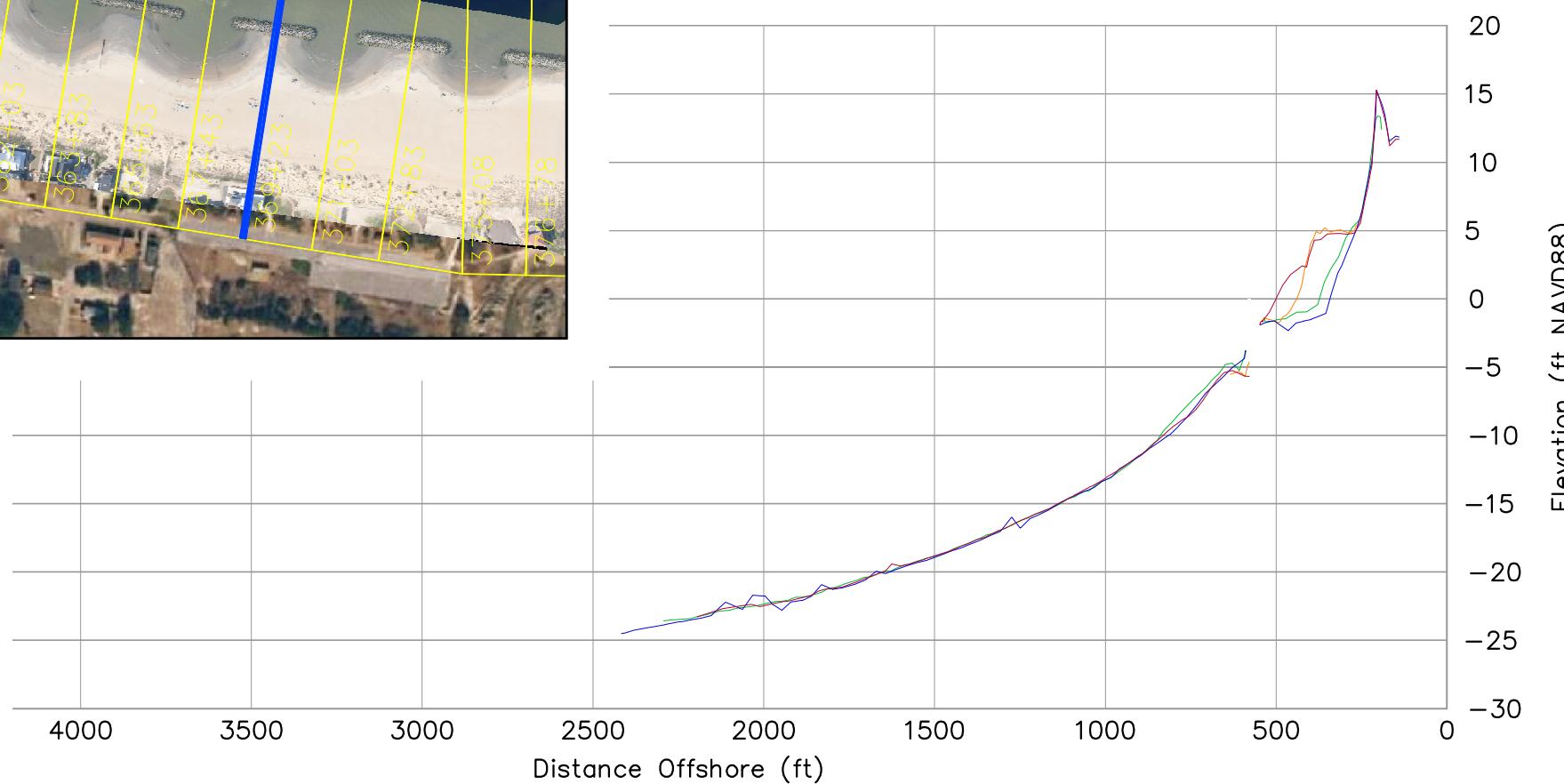


Survey Transect 367+43	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	67.78 ft/yr	71.43 ft
Volume Change Above -15 ft NAVD88	24.98 cy/ft/yr	25.87 cy/ft
Volume Change Above 0 ft NAVD88	2.74 cy/ft/yr	2.57 cy/ft

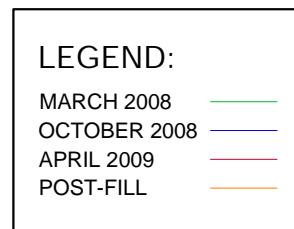


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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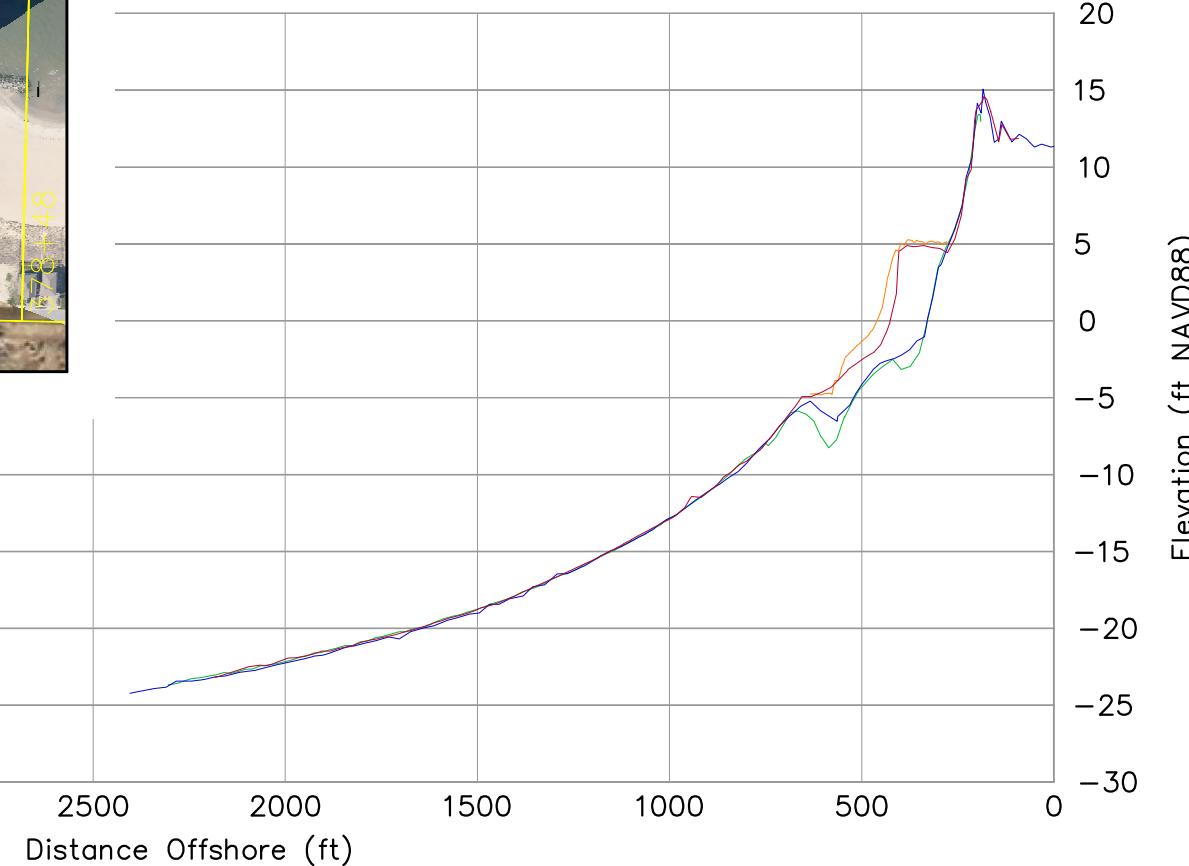
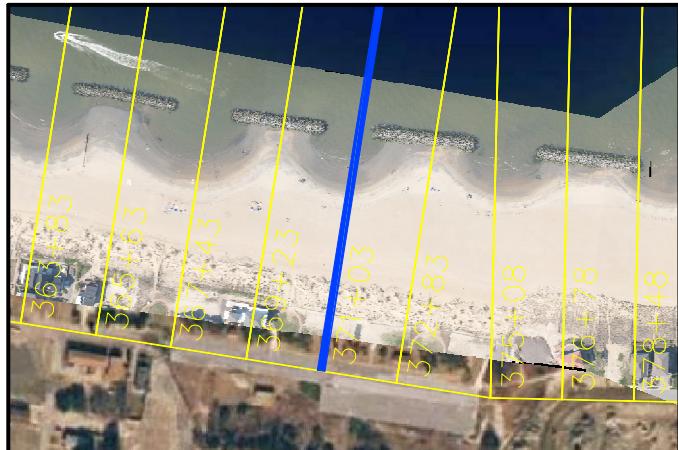


Survey Transect 369+23	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	112.06 ft/yr	150.00 ft
Volume Change Above -15 ft NAVD88	13.41 cy/ft/yr	23.92 cy/ft
Volume Change Above 0 ft NAVD88	5.22 cy/ft/yr	5.16 cy/ft

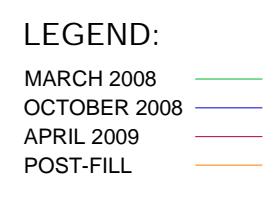


Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.

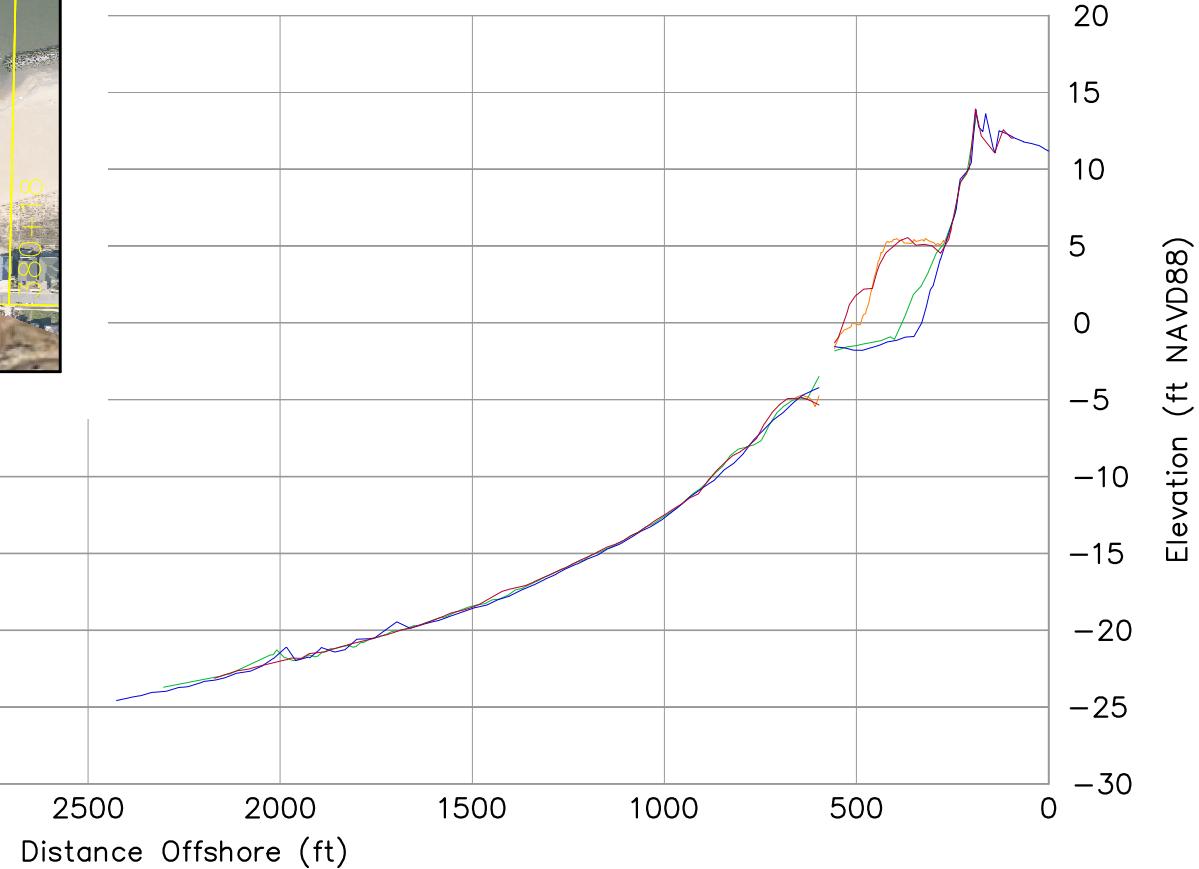
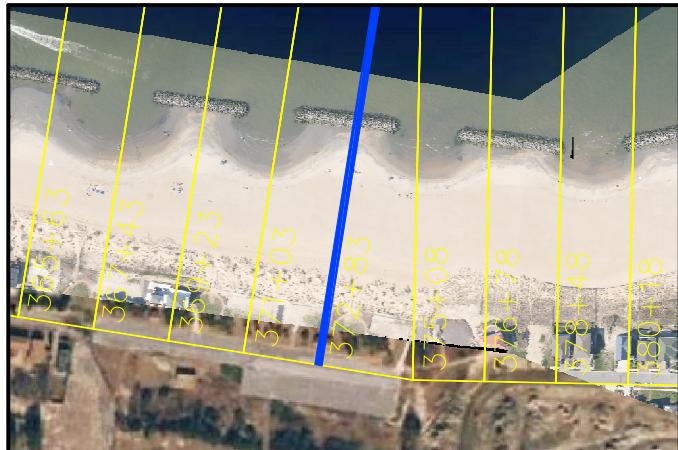


Survey Transect 371+03	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	90.51 ft/yr	96.03 ft
Volume Change Above -15 ft NAVD88	43.97 cy/ft/yr	39.20 cy/ft
Volume Change Above 0 ft NAVD88	2.47 cy/ft/yr	3.61 cy/ft



Notes:

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4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	146.50 ft/yr	202.10 ft
Volume Change Above -15 ft NAVD88	34.98 cy/ft/yr	44.75 cy/ft
Volume Change Above 0 ft NAVD88	8.76 cy/ft/yr	4.06 cy/ft

LEGEND:

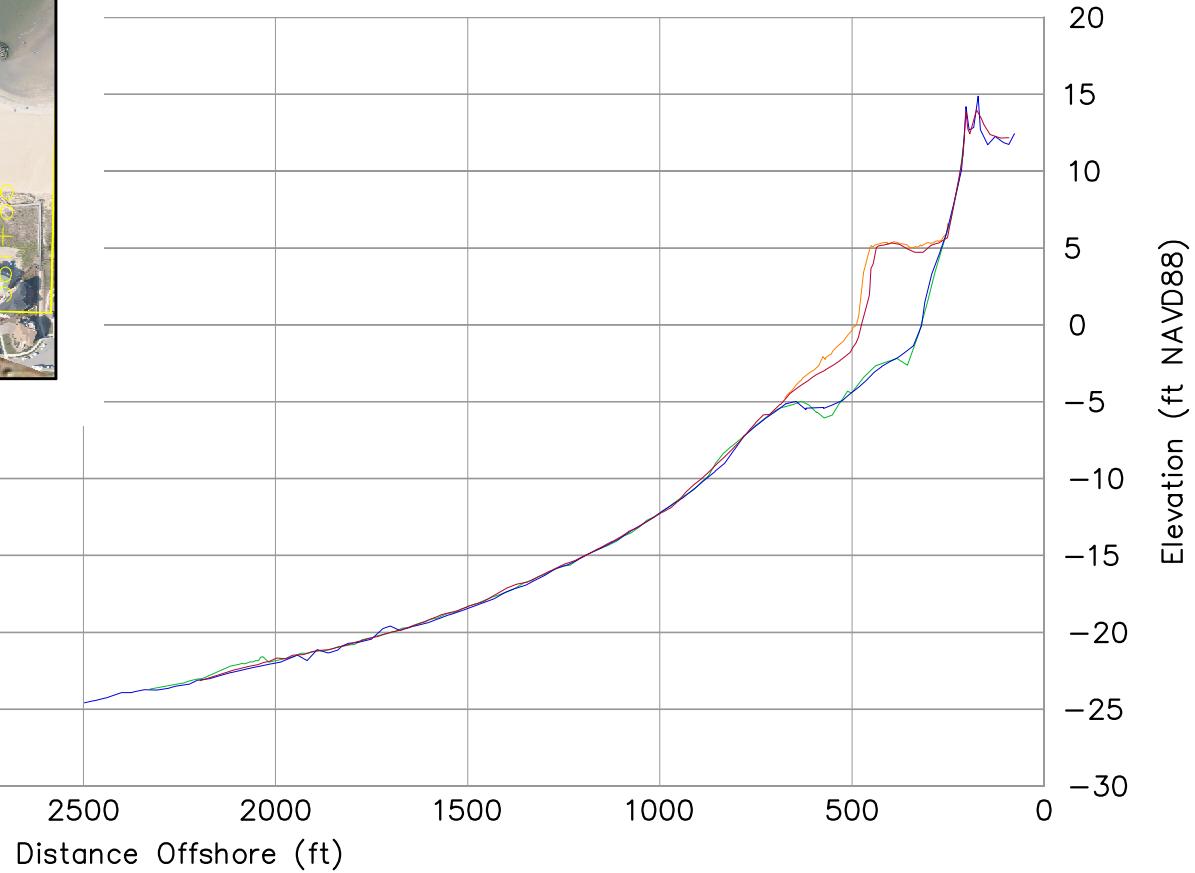
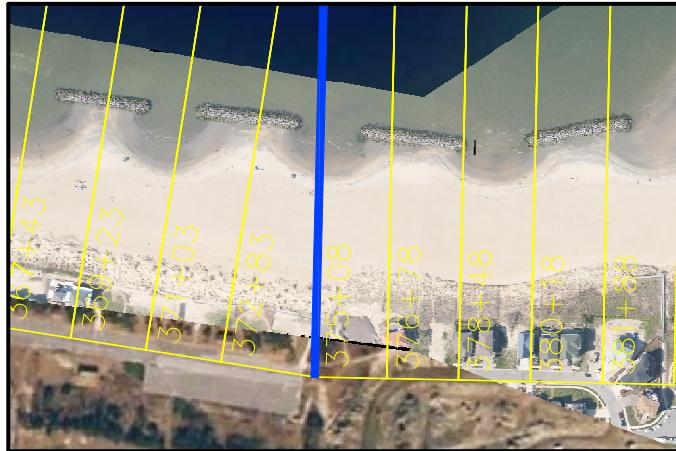
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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Survey Transect 375+08	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	146.06 ft/yr	151.86 ft
Volume Change Above -15 ft NAVD88	57.17 cy/ft/yr	61.33 cy/ft
Volume Change Above 0 ft NAVD88	4.82 cy/ft/yr	4.75 cy/ft

LEGEND:

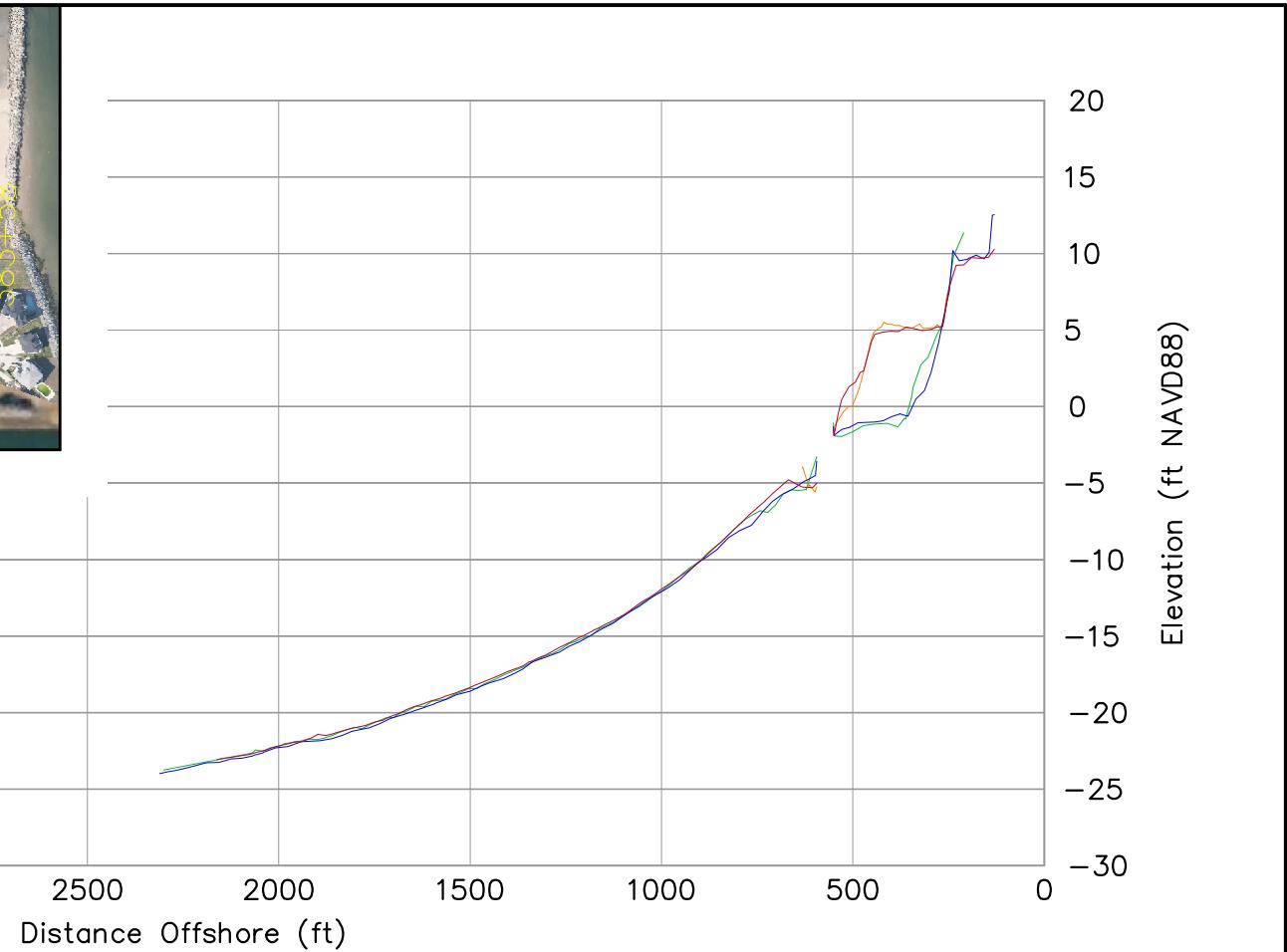
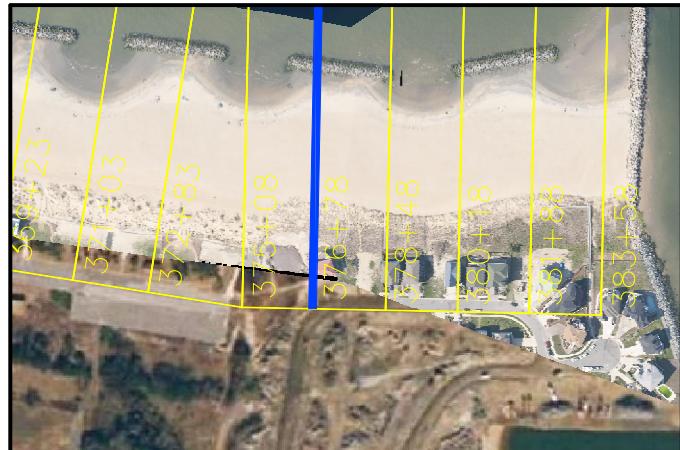
MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

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2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
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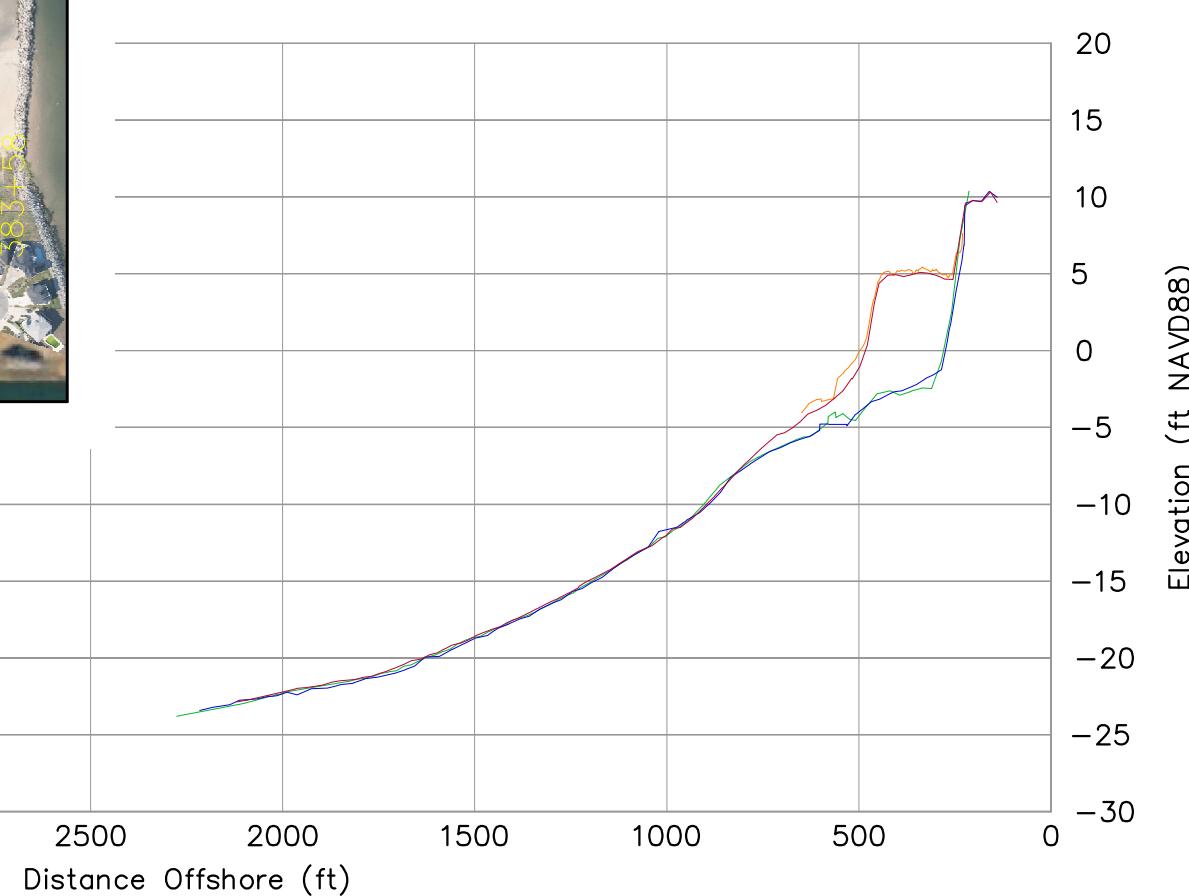
Survey Transect 376+78	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	162.41 ft/yr	202.19 ft
Volume Change Above -15 ft NAVD88	38.78 cy/ft/yr	41.86 cy/ft
Volume Change Above 0 ft NAVD88	5.91 cy/ft/yr	6.83 cy/ft

LEGEND:

MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

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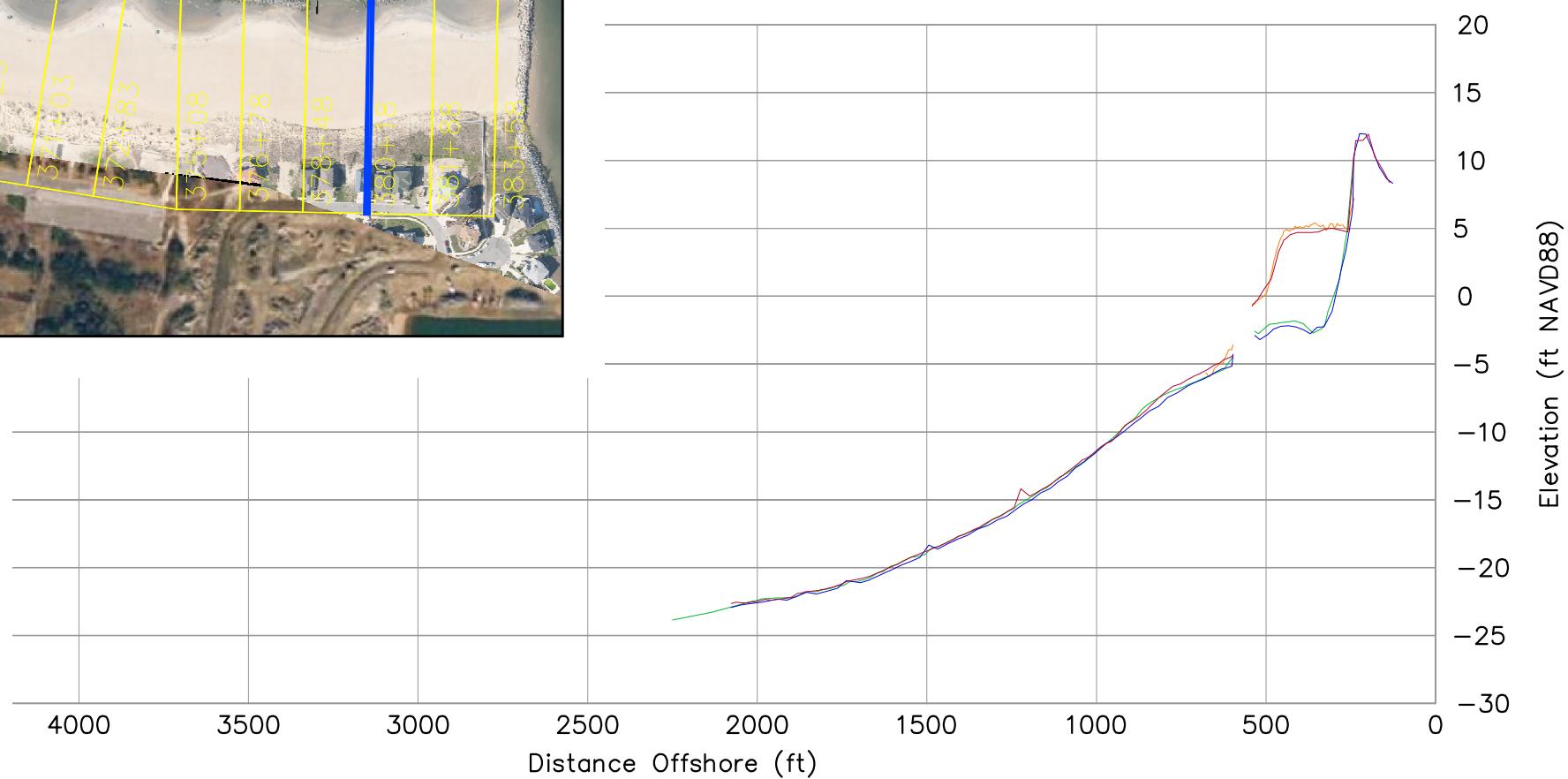
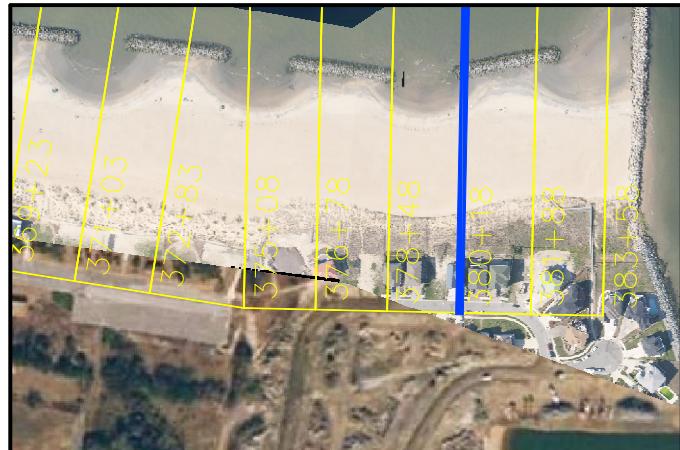
Survey Transect 378+48	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	189.56 ft/yr	206.44 ft
Volume Change Above -15 ft NAVD88	65.64 cy/ft/yr	73.14 cy/ft
Volume Change Above 0 ft NAVD88	3.34 cy/ft/yr	4.76 cy/ft

LEGEND:

MARCH 2008	—
OCTOBER 2008	—
APRIL 2009	—
POST-FILL	—

Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	192.64 ft/yr	206.43 ft
Volume Change Above -15 ft NAVD88	57.13 cy/ft/yr	64.92 cy/ft
Volume Change Above 0 ft NAVD88	3.68 cy/ft/yr	4.84 cy/ft

LEGEND:

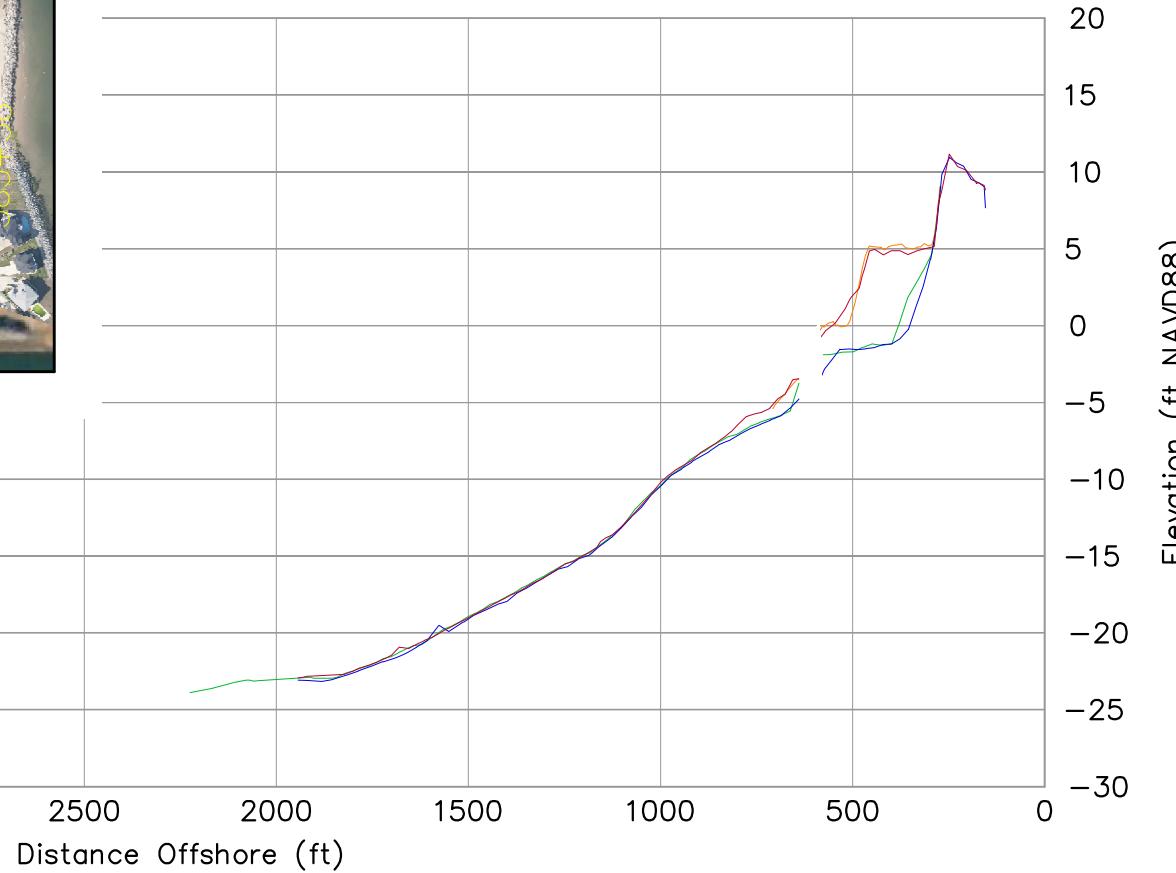
MARCH 2008	—
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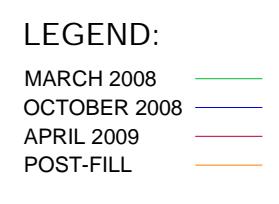
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward And Seaward Of The Breakwater.



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Survey Transect 381+88	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	145.08 ft/yr	183.86 ft
Volume Change Above -15 ft NAVD88	42.30 cy/ft/yr	53.43 cy/ft
Volume Change Above 0 ft NAVD88	6.73 cy/ft/yr	5.54 cy/ft

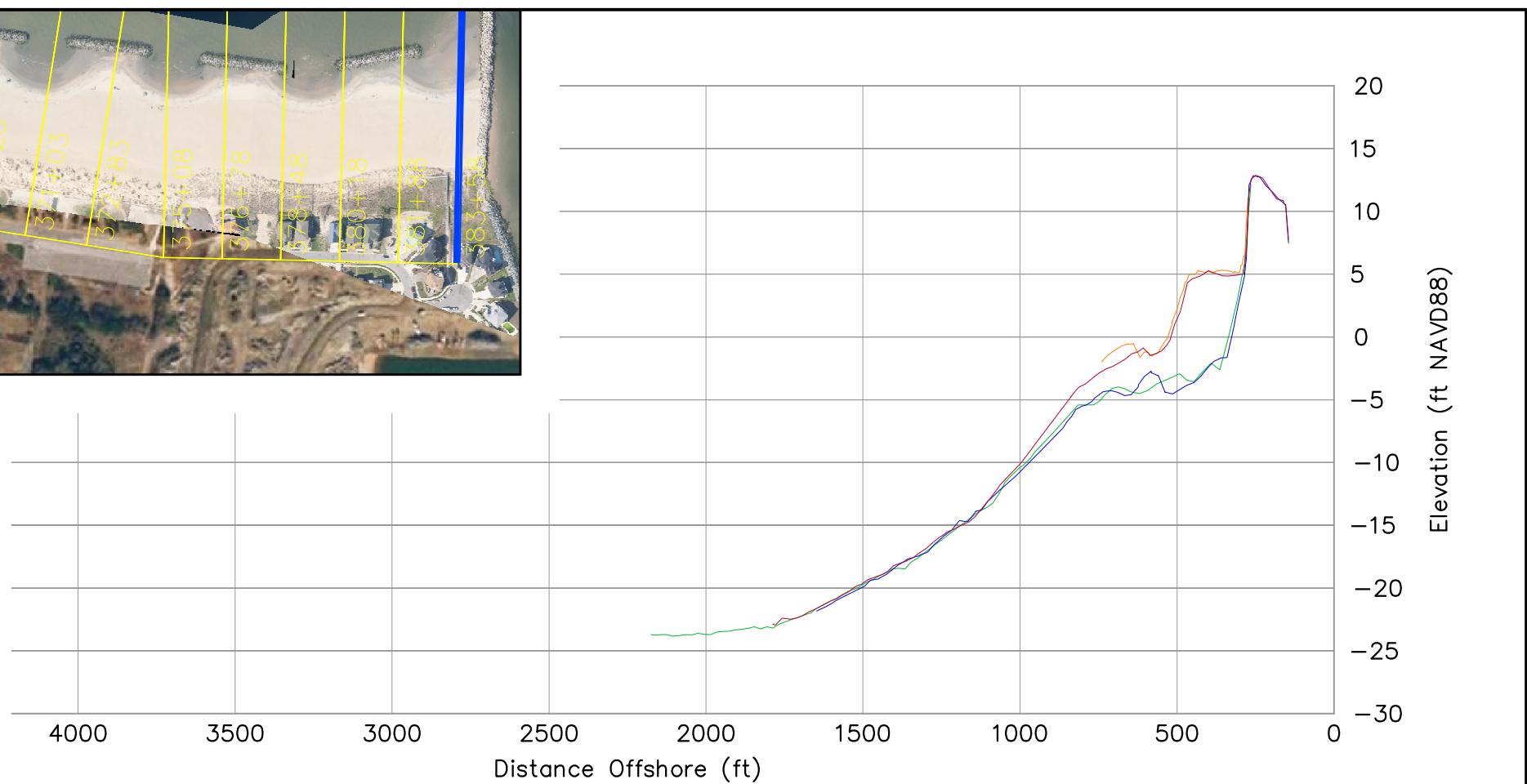


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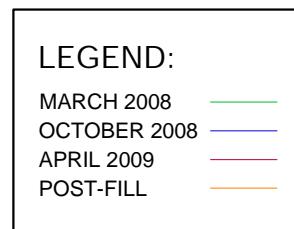
1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
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Survey Transect 383+58	March 2008 - April 2009	October 2008 - April 2009
Shoreline Change at M HW (0.98 ft NAVD88)	170.41 ft/yr	190.66 ft
Volume Change Above -15 ft NAVD88	73.42 cy/ft/yr	82.37 cy/ft
Volume Change Above 0 ft NAVD88	3.84 cy/ft/yr	4.02 cy/ft



Notes:

1. Stationing From West To East At Varying Intervals.
2. Sections Are Viewed Toward Increasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. Survey Comparison Made To March 2008 and October 2008.
5. 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 (March 2008 to April 2009)

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 March 22, 2008 to April 15, 2009.

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 NAVD 88 (cy/ft/yr)
0+00	3/22/2008	4/15/2009	43.01	-2.62	25.21
2+50	3/22/2008	4/15/2009	-36.46	0.74	23.00
5+00	3/22/2008	4/15/2009	-5.89	1.76	33.77
7+50	3/22/2008	4/15/2009	-8.01	0.57	25.71
10+00	3/22/2008	4/15/2009	2.50	2.18	5.69
12+50	3/22/2008	4/15/2009	14.89	4.38	21.28
15+00	3/22/2008	4/15/2009	-4.10	3.56	7.51
17+50	3/22/2008	4/15/2009	1.08	3.50	7.94
20+00	3/22/2008	4/15/2009	-2.64	1.89	13.55
22+50	3/22/2008	4/15/2009	-29.38	-1.03	0.63
25+00	3/22/2008	4/15/2009	-17.78	-1.45	5.95
27+50	3/22/2008	4/15/2009	-22.73	0.64	2.50
30+00	3/22/2008	4/15/2009	-2.50	-0.79	13.30
32+50	3/22/2008	4/15/2009	-9.76	-2.76	-7.43
35+00	3/22/2008	4/15/2009	22.28	0.73	13.47
37+50	3/22/2008	4/15/2009	9.45	1.22	9.71
40+00	3/22/2008	4/15/2009	4.95	0.07	3.77
42+50	3/22/2008	4/15/2009	-19.60	-2.78	3.22
45+00	3/22/2008	4/15/2009	-1.09	0.18	0.67
45+25	3/22/2008	4/15/2009	-2.61	0.33	3.35
47+30	3/22/2008	4/15/2009	0.51	-0.20	3.91
49+35	3/22/2008	4/15/2009	2.01	-0.11	2.95
51+41	3/22/2008	4/15/2009	-19.58	-3.78	-3.36
53+46	3/22/2008	4/15/2009	32.37	1.28	6.64
55+51	3/22/2008	4/15/2009	-9.81	0.11	4.69
57+57	3/22/2008	4/15/2009	3.11	0.62	-2.19
59+62	3/22/2008	4/15/2009	-6.21	-0.81	0.92
61+62	3/22/2008	4/15/2009	-6.15	-0.70	-0.47
63+62	3/22/2008	4/15/2009	-8.61	1.73	1.35
65+62	3/22/2008	4/15/2009	-3.29	1.44	4.81
67+62	3/22/2008	4/15/2009	-5.59	-0.13	-4.74
69+62	3/22/2008	4/15/2009	-0.13	-0.12	-3.03
71+62	3/22/2008	4/15/2009	-7.83	-2.40	-9.25
73+62	3/22/2008	4/15/2009	-13.73	-0.57	-2.12
75+62	3/22/2008	4/15/2009	-2.71	0.91	0.06
77+62	3/22/2008	4/15/2009	-2.29	0.71	-0.85
79+62	3/22/2008	4/15/2009	7.66	2.46	2.34
81+62	3/22/2008	4/15/2009	5.20	1.85	7.55
83+62	3/22/2008	4/15/2009	8.44	2.89	6.64
85+62	3/22/2008	4/15/2009	3.35	-0.12	-1.63
87+62	3/22/2008	4/15/2009	-5.26	1.22	2.75

Table C-1. Summary of Shoreline Change and Volume Change (March 2008 to April 2009) 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 March 22, 2008 to April 15, 2009.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change Rate at MHW (ft/yr)	Volume Change Rate Above 0 ft NAVD 88 (cy/ft/yr)	Volume Change Rate Above -15 ft NAVD88 (cy/ft/yr)
93+41	3/22/2008	4/15/2009	-6.24	-0.48	-3.94
103+08	3/22/2008	4/15/2009	8.24	1.11	1.77
120+93	3/22/2008	4/15/2009	4.80	-0.74	0.01
129+17	3/22/2008	4/15/2009	-6.69	-3.28	-8.11
141+98	3/22/2008	4/15/2009	-9.10	-2.14	-0.76
152+01	3/22/2008	4/15/2009	-7.74	-1.99	-6.15
163+49	3/22/2008	4/15/2009	8.10	-1.07	3.81
169+63	3/22/2008	4/15/2009	15.32	2.64	3.62
171+63	3/22/2008	4/15/2009	14.47	1.09	3.18
173+63	3/22/2008	4/15/2009	-1.12	0.40	2.36
175+63	3/22/2008	4/15/2009	0.23	0.41	-2.39
177+63	3/22/2008	4/15/2009	-3.09	1.09	-6.66
179+63	3/22/2008	4/15/2009	-6.75	-0.15	-2.84
181+63	3/22/2008	4/15/2009	-0.92	-0.90	-2.15
183+63	3/22/2008	4/15/2009	-4.82	0.25	3.46
185+63	3/22/2008	4/15/2009	1.08	0.08	3.42
187+63	3/22/2008	4/15/2009	-6.67	0.53	0.60
189+63	3/22/2008	4/15/2009	2.01	1.16	-2.90
191+63	3/22/2008	4/15/2009	13.07	2.14	6.49
193+63	3/22/2008	4/15/2009	6.94	1.21	4.81
195+63	3/22/2008	4/15/2009	8.62	1.17	2.66
206+86	3/22/2008	4/15/2009	-4.76	0.87	-0.03
218+66	3/22/2008	4/15/2009	11.22	3.10	12.86
229+85	3/22/2008	4/15/2009	-3.03	0.56	-8.10
242+03	3/22/2008	4/15/2009	-5.25	0.46	-0.60
252+62	3/22/2008	4/15/2009	19.33	4.78	12.79
263+22	3/22/2008	4/15/2009	2.21	0.75	0.75
274+53	3/22/2008	4/15/2009	-8.44	0.89	2.26
281+40	3/22/2008	4/15/2009	-15.49	2.03	2.45
288+39	3/22/2008	4/15/2009	1.63	-1.30	-0.38
295+27	3/22/2008	4/15/2009	16.18	3.05	-0.76
302+24	3/22/2008	4/15/2009	4.67	6.29	9.85
315+96	3/22/2008	4/15/2009	14.90	3.61	11.39
323+09	3/22/2008	4/15/2009	17.01	0.26	-0.55
329+63	3/22/2008	4/15/2009	60.25	6.19	21.04
331+43	3/22/2008	4/15/2009	68.71	7.97	26.39
333+23	3/22/2008	4/15/2009	70.87	6.85	34.25
335+03	3/22/2008	4/15/2009	74.09	5.81	29.25
336+83	3/22/2008	4/15/2009	91.57	4.19	31.93
338+63	3/22/2008	4/15/2009	82.98	4.47	38.06
340+43	3/22/2008	4/15/2009	83.47	7.07	35.54
342+23	3/22/2008	4/15/2009	98.40	1.92	31.85
344+05	3/22/2008	4/15/2009	76.04	4.31	28.67

Table C-1. Summary of Shoreline Change and Volume Change (March 2008 to April 2009) 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 March 22, 2008 to April 15, 2009.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change Rate at MHW (ft/yr)	Volume Change Rate Above 0 ft NAVD 88 (cy/ft/yr)	Volume Change Rate Above -15 ft NAVD88 (cy/ft/yr)
347+63	3/22/2008	4/15/2009	44.22	6.84	14.59
349+43	3/22/2008	4/15/2009	43.68	6.23	23.78
351+23	3/22/2008	4/15/2009	37.62	7.38	19.53
353+03	3/22/2008	4/15/2009	40.76	4.45	15.35
354+83	3/22/2008	4/15/2009	56.47	4.71	16.93
356+63	3/22/2008	4/15/2009	47.35	5.54	26.84
358+43	3/22/2008	4/15/2009	56.66	5.24	16.12
360+23	3/22/2008	4/15/2009	53.68	4.81	19.71
362+03	3/22/2008	4/15/2009	52.76	5.86	12.72
363+83	3/22/2008	4/15/2009	43.18	4.32	24.43
365+63	3/22/2008	4/15/2009	72.22	4.98	11.24
367+43	3/22/2008	4/15/2009	67.78	2.74	24.98
369+23	3/22/2008	4/15/2009	112.06	5.22	13.41
371+03	3/22/2008	4/15/2009	90.51	2.47	43.97
372+83	3/22/2008	4/15/2009	146.50	8.76	34.98
375+08	3/22/2008	4/15/2009	146.06	4.82	57.17
376+78	3/22/2008	4/15/2009	162.41	5.91	38.78
378+48	3/22/2008	4/15/2009	189.56	3.34	65.64
380+18	3/22/2008	4/15/2009	192.64	3.68	57.13
381+88	3/22/2008	4/15/2009	145.08	6.73	42.30
383+58	3/22/2008	4/15/2009	170.41	3.84	73.42

Table C-2. Summary of Shoreline Change and Volume Change (October 2008 to April 2009)

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 October 15, 2008 to April 15, 2009.

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	10/15/2008	4/15/2009	52.80	-1.13	13.46
2+50	10/15/2008	4/15/2009	-7.97	0.34	14.56
5+00	10/15/2008	4/15/2009	-12.87	1.80	-8.47
7+50	10/15/2008	4/15/2009	-4.29	0.36	-5.46
10+00	10/15/2008	4/15/2009	-5.02	-0.10	-13.12
12+50	10/15/2008	4/15/2009	26.84	2.18	8.79
15+00	10/15/2008	4/15/2009	9.48	0.59	1.23
17+50	10/15/2008	4/15/2009	0.53	1.74	2.78
20+00	10/15/2008	4/15/2009	0.90	1.39	-3.00
22+50	10/15/2008	4/15/2009	-6.95	-0.41	0.48
25+00	10/15/2008	4/15/2009	-10.69	-1.83	-6.72
27+50	10/15/2008	4/15/2009	29.24	4.46	1.81
30+00	10/15/2008	4/15/2009	-4.23	-0.39	5.42
32+50	10/15/2008	4/15/2009	-3.91	3.03	-11.85
35+00	10/15/2008	4/15/2009	-34.69	0.28	-5.51
37+50	10/15/2008	4/15/2009	13.16	1.72	1.28
40+00	10/15/2008	4/15/2009	-26.82	-2.73	-6.51
42+50	10/15/2008	4/15/2009	6.45	1.66	2.99
45+00	10/15/2008	4/15/2009	-37.41	0.69	-6.02
45+25	10/15/2008	4/15/2009	-9.16	2.26	-2.51
47+30	10/15/2008	4/15/2009	-12.57	-1.59	-4.37
49+35	10/15/2008	4/15/2009	14.51	1.85	2.40
51+41	10/15/2008	4/15/2009	-4.10	1.63	-3.55
53+46	10/15/2008	4/15/2009	-16.55	-1.34	-3.43
55+51	10/15/2008	4/15/2009	-23.32	-1.73	-7.54
57+57	10/15/2008	4/15/2009	20.39	2.99	-8.17
59+62	10/15/2008	4/15/2009	-17.87	-1.25	-10.21
61+62	10/15/2008	4/15/2009	-8.61	-0.37	-12.81
63+62	10/15/2008	4/15/2009	-23.39	-0.38	-11.36
65+62	10/15/2008	4/15/2009	5.13	3.45	1.72
67+62	10/15/2008	4/15/2009	-25.25	-1.65	-9.72
69+62	10/15/2008	4/15/2009	27.30	4.59	7.16
71+62	10/15/2008	4/15/2009	0.24	2.04	-5.90
73+62	10/15/2008	4/15/2009	-47.61	-2.42	-7.97
75+62	10/15/2008	4/15/2009	-13.45	-2.63	-11.50
77+62	10/15/2008	4/15/2009	7.84	-0.27	-5.42
79+62	10/15/2008	4/15/2009	-14.74	-3.69	-11.64
81+62	10/15/2008	4/15/2009	1.05	-1.70	-5.87
83+62	10/15/2008	4/15/2009	7.08	2.65	0.02
85+62	10/15/2008	4/15/2009	0.06	-1.98	-7.55
87+62	10/15/2008	4/15/2009	2.16	1.06	-4.34

Table C-2. Summary of Shoreline Change and Volume Change (October 2008 to April 2009) 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 October 15, 2008 to April 15, 2009.

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	10/15/2008	4/15/2009	-0.58	3.22	1.88
103+08	10/15/2008	4/15/2009	9.92	1.51	3.17
120+93	10/15/2008	4/15/2009	2.57	-0.45	-3.56
129+17	10/15/2008	4/15/2009	-1.55	-3.30	-10.18
141+98	10/15/2008	4/15/2009	-2.79	-0.37	-3.21
152+01	10/15/2008	4/15/2009	-25.00	-3.19	-10.35
163+49	10/15/2008	4/15/2009	13.54	0.07	6.40
169+63	10/15/2008	4/15/2009	5.68	1.22	0.81
171+63	10/15/2008	4/15/2009	9.93	0.35	-2.04
173+63	10/15/2008	4/15/2009	6.50	1.03	7.55
175+63	10/15/2008	4/15/2009	11.60	2.91	3.16
177+63	10/15/2008	4/15/2009	27.53	2.14	3.59
179+63	10/15/2008	4/15/2009	6.29	2.23	14.76
181+63	10/15/2008	4/15/2009	-9.97	-1.04	-4.50
183+63	10/15/2008	4/15/2009	19.27	3.24	7.21
185+63	10/15/2008	4/15/2009	-1.72	-0.94	-1.06
187+63	10/15/2008	4/15/2009	16.77	3.26	7.24
189+63	10/15/2008	4/15/2009	-4.43	-0.19	-1.32
191+63	10/15/2008	4/15/2009	14.14	-0.71	5.28
193+63	10/15/2008	4/15/2009	2.77	-0.81	-1.50
195+63	10/15/2008	4/15/2009	-5.86	-1.56	-6.01
206+86	10/15/2008	4/15/2009	3.33	2.61	1.78
218+66	10/15/2008	4/15/2009	8.81	3.46	13.39
229+85	10/15/2008	4/15/2009	1.68	3.36	-3.50
242+03	10/15/2008	4/15/2009	0.79	3.08	2.09
252+62	10/15/2008	4/15/2009	19.86	2.87	10.66
263+22	10/15/2008	4/15/2009	-1.53	0.69	2.69
274+53	10/15/2008	4/15/2009	-8.16	5.50	5.25
281+40	10/15/2008	4/15/2009	-1.60	4.08	2.40
288+39	10/15/2008	4/15/2009	-9.96	4.42	-0.63
295+27	10/15/2008	4/15/2009	0.06	1.62	-3.57
302+24	10/15/2008	4/15/2009	-12.21	8.59	3.03
315+96	10/15/2008	4/15/2009	5.01	7.54	9.99
323+09	10/15/2008	4/15/2009	-1.06	1.56	-1.92
329+63	10/15/2008	4/15/2009	61.11	2.93	26.17
331+43	10/15/2008	4/15/2009	74.55	8.29	30.10
333+23	10/15/2008	4/15/2009	78.94	8.33	43.01
335+03	10/15/2008	4/15/2009	81.01	6.70	36.87
336+83	10/15/2008	4/15/2009	100.82	5.08	41.85
338+63	10/15/2008	4/15/2009	108.31	3.11	44.78
340+43	10/15/2008	4/15/2009	130.98	7.63	47.30
342+23	10/15/2008	4/15/2009	124.23	8.35	47.21
344+05	10/15/2008	4/15/2009	99.45	4.10	42.56
345+85	10/15/2008	4/15/2009	69.73	5.03	24.72

Table C-2. Summary of Shoreline Change and Volume Change (October 2008 to April 2009) 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 October 15, 2008 to April 15, 2009.

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 NAVD 88 (cy/ft)
347+63	10/15/2008	4/15/2009	69.95	8.56	22.34
349+43	10/15/2008	4/15/2009	36.87	8.22	23.50
351+23	10/15/2008	4/15/2009	33.84	8.17	21.24
353+03	10/15/2008	4/15/2009	36.40	5.36	19.27
354+83	10/15/2008	4/15/2009	56.76	7.18	22.26
356+63	10/15/2008	4/15/2009	51.53	5.11	30.05
358+43	10/15/2008	4/15/2009	62.19	9.19	22.37
360+23	10/15/2008	4/15/2009	56.72	6.39	25.88
362+03	10/15/2008	4/15/2009	67.81	7.76	21.25
363+83	10/15/2008	4/15/2009	51.67	7.76	26.66
365+63	10/15/2008	4/15/2009	88.16	4.39	19.69
367+43	10/15/2008	4/15/2009	71.43	2.57	25.87
369+23	10/15/2008	4/15/2009	150.00	5.16	23.92
371+03	10/15/2008	4/15/2009	96.03	3.61	39.20
372+83	10/15/2008	4/15/2009	202.10	4.06	44.75
375+08	10/15/2008	4/15/2009	151.86	4.75	61.33
376+78	10/15/2008	4/15/2009	202.19	6.83	41.86
378+48	10/15/2008	4/15/2009	206.44	4.76	73.14
380+18	10/15/2008	4/15/2009	206.43	4.84	64.92
381+88	10/15/2008	4/15/2009	183.86	5.54	53.43
383+58	10/15/2008	4/15/2009	190.66	4.02	82.37

Table C-3. Summary of Shoreline Change and Volume Change from East Ocean View Nourishment (March 2009-April 2009)

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 March 20, 2009 to April 15, 2009.

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 NAVD 88 (cy/ft/yr)
329+63	3/20/2009	4/15/2009	-	-	-
331+43	3/20/2009	4/15/2009	-175.90	-52.84	-89.43
333+23	3/20/2009	4/15/2009	-117.36	-45.99	-89.01
335+03	3/20/2009	4/15/2009	-203.00	-63.70	-106.88
336+83	3/20/2009	4/15/2009	-155.83	-72.97	-103.07
338+63	3/20/2009	4/15/2009	-84.37	-65.79	-89.18
340+43	3/20/2009	4/15/2009	-161.58	-71.23	-55.68
342+23	3/20/2009	4/15/2009	-145.86	-75.60	-62.82
344+05	3/20/2009	4/15/2009	-351.94	-94.30	-69.17
345+85	3/20/2009	4/15/2009	-78.05	-24.13	-75.53
347+63	3/20/2009	4/15/2009	518.16	-9.05	20.18
349+43	3/20/2009	4/15/2009	-240.90	-48.67	-96.42
351+23	3/20/2009	4/15/2009	255.36	-9.38	10.87
353+03	3/20/2009	4/15/2009	-253.68	-49.08	-140.46
354+83	3/20/2009	4/15/2009	404.59	-21.87	-36.71
356+63	3/20/2009	4/15/2009	-176.04	-56.46	-134.96
358+43	3/20/2009	4/15/2009	208.19	-18.29	-11.18
360+23	3/20/2009	4/15/2009	-366.83	-56.82	-244.68
362+03	3/20/2009	4/15/2009	46.47	-29.34	-28.33
363+83	3/20/2009	4/15/2009	-109.50	-52.98	-93.37
365+63	3/20/2009	4/15/2009	442.63	-3.80	4.24
367+43	3/20/2009	4/15/2009	-440.81	-53.05	-169.99
369+23	3/20/2009	4/15/2009	780.40	-9.88	77.14
371+03	3/20/2009	4/15/2009	-410.20	-65.84	-165.62
372+83	3/20/2009	4/15/2009	686.48	-8.61	-29.34
375+08	3/20/2009	4/15/2009	-226.44	-61.36	-137.24
376+78	3/20/2009	4/15/2009	434.63	-24.21	2.32
378+48	3/20/2009	4/15/2009	-78.62	-32.39	-93.68
380+18	3/20/2009	4/15/2009	31.87	-31.88	-20.28
381+88	3/20/2009	4/15/2009	320.64	-21.58	-7.17
383+58	3/20/2009	4/15/2009	-125.08	-61.95	-124.31

Table C-4. Summary of Shoreline Change and Volume Change from Central Ocean View Nourishment (March 2005-April 2009)

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 March 15, 2005 to April 15, 2009.

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 NAVD 88 (cy/ft/yr)
15+00	3/15/2005	4/15/2009	11.20	1.58	4.87
17+50	3/15/2005	4/15/2009	13.46	0.87	1.91
20+00	3/15/2005	4/15/2009	4.63	-0.09	1.28
22+50	3/15/2005	4/15/2009	-8.12	-2.77	-3.39
25+00	3/15/2005	4/15/2009	-3.83	-2.02	-1.21
27+50	3/15/2005	4/15/2009	-6.82	-1.66	2.44
30+00	3/15/2005	4/15/2009	-5.17	-1.45	-1.60
32+50	3/15/2005	4/15/2009	-12.44	-4.38	-6.23
35+00	3/15/2005	4/15/2009	-7.52	-1.87	-3.26
37+50	3/15/2005	4/15/2009	-1.20	-2.66	-3.67
40+00	3/15/2005	4/15/2009	-11.90	-1.89	-4.43
42+50	3/15/2005	4/15/2009	-15.89	-4.53	-7.51
45+00	3/15/2005	4/15/2009	-14.61	-2.90	-5.60
45+25	3/15/2005	4/15/2009	-10.40	-2.69	-6.04
47+30	3/15/2005	4/15/2009	-17.59	-3.71	-8.12
49+35	3/15/2005	4/15/2009	-6.85	-3.76	-4.85
51+41	3/15/2005	4/15/2009	-14.26	-2.30	-3.78
53+46	3/15/2005	4/15/2009	8.52	-0.70	0.21
55+51	3/15/2005	4/15/2009	-8.98	-1.99	-1.66
57+57	3/15/2005	4/15/2009	11.23	-0.22	1.44
59+62	3/15/2005	4/15/2009	-11.65	-2.06	-4.36
61+62	3/15/2005	4/15/2009	12.86	0.68	1.19
63+62	3/15/2005	4/15/2009	-6.89	0.29	-1.75
65+62	3/15/2005	4/15/2009	2.88	0.95	2.31
67+62	3/15/2005	4/15/2009	-30.40	0.09	-8.85
69+62	3/15/2005	4/15/2009	-14.21	-0.58	-2.32
71+62	3/15/2005	4/15/2009	-37.10	-0.37	-10.89
73+62	3/15/2005	4/15/2009	-4.19	-0.63	-0.31
75+62	3/15/2005	4/15/2009	0.08	0.98	-0.92
77+62	3/15/2005	4/15/2009	13.30	2.57	3.66
79+62	3/15/2005	4/15/2009	0.67	0.32	2.66
81+62	3/15/2005	4/15/2009	-1.08	-0.97	1.18
83+62	3/15/2005	4/15/2009	-7.20	-1.50	-2.45
85+62	3/15/2005	4/15/2009	-2.40	-1.83	-2.02
87+62	3/15/2005	4/15/2009	-2.63	0.23	-0.60

Table C-4. Summary of Shoreline Change and Volume Change from Central Ocean View Nourishment (March 2005-April 2009) 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 March 15, 2005 to April 15, 2009.

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 NAVD 88 (cy/ft/yr)
93+41	3/15/2005	4/15/2009	-1.49	-0.46	-1.32
103+08	3/15/2005	4/15/2009	-6.62	-2.45	-3.43
120+93	3/15/2005	4/15/2009	-9.49	-3.77	-0.82
129+17	3/15/2005	4/15/2009	-10.07	-4.32	-1.72
141+98	3/15/2005	4/15/2009	-4.79	-1.24	3.41
152+01	3/15/2005	4/15/2009	-8.12	-2.47	-0.95
163+49	3/15/2005	4/15/2009	-4.88	-1.93	0.60
169+63	3/15/2005	4/15/2009	-3.35	-0.98	0.06
171+63	3/15/2005	4/15/2009	-7.02	-1.34	-0.48
173+63	3/15/2005	4/15/2009	-6.28	-1.97	0.85
175+63	3/15/2005	4/15/2009	-9.50	-2.19	-2.12
177+63	3/15/2005	4/15/2009	-5.63	-1.26	-0.78
179+63	3/15/2005	4/15/2009	-8.37	-1.43	2.38
181+63	3/15/2005	4/15/2009	-7.66	-1.98	-1.22
183+63	3/15/2005	4/15/2009	3.30	0.63	3.26
185+63	3/15/2005	4/15/2009	-4.30	-0.77	1.90
187+63	3/15/2005	4/15/2009	10.32	1.56	5.91
189+63	3/15/2005	4/15/2009	-2.46	0.69	2.65
191+63	3/15/2005	4/15/2009	15.18	2.02	8.54
193+63	3/15/2005	4/15/2009	-0.08	0.98	3.96
195+63	3/15/2005	4/15/2009	-2.80	-0.31	1.63