

**ANNUAL REVIEW FOR 2015
OF THE CAPE MAY POINT, NJ MUNICIPAL BEACHES**



The Photo above taken on March 23, 2015 shows the existing offset conditions between the beaches at Lake Avenue in the foreground and Coral Avene on the updrift side of the rock groin. In 2009 the USACE transferred sand from the Coral Avenue beach cell to the Lake Drive beach to improve conditions in both cells temporarily alleviating the disruption in natural sand flow by the groin that results in the beach offset.

PREPARED FOR: THE BOROUGH OF CAPE MAY POINT
215 LIGHTHOUSE AVENUE
CAPE MAY POINT, NJ 08212

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MAY 29, 2015

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Introduction:

The annual survey of the nine cross section stations on the municipal beach was completed by the Stockton University Coastal Research Center (CRC) on March 23 and 24, 2015. These were compared to previous surveys that were conducted April 2013 and April 2014. The findings included in this report complete the annual review of the municipal beaches prior to the 2015 tourist season.

During 2013, local, state and federal efforts were focused on helping shore communities devastated by Hurricane Sandy recover and rebuild. In Cape May Point those efforts included a federal beach nourishment maintenance project to restore the engineered project beaches. The US Army Corps of Engineers (USACE) was able to use FY12 funds to complete the second renourishment cycle of the Lower Cape May Meadows - Cape May Point shore protection project. The renourishment project began in November 2012 and was completed in January 2013. Because the project commenced immediately after Hurricane Sandy, any erosion caused by the hurricane was repaired and no additional authorization was required. The USACE placed a reported 345,000 cubic yards of sand onto the Lower Cape May Meadows – Cape May Point project beaches with approximately 108,697 placed on the Borough’s beaches (Dwight Pakan, personal communication, USACE). The April 2013 surveys show the shape of the nourished beaches approximately two months following completion of the renourishment project. The April 2014 and March 2015 surveys allow for a one- and two-year assessment of the project’s readjustment. Data presented herein show volume trends and changes in shoreline position during relatively mild weather conditions that occurred between 2014 and 2015.

Beach Monitoring Program:

The CRC established the Borough’s beach monitoring program in 1991 to address the changes observed along the shoreline. Nine permanent monitoring survey lines are located at the following sites along the Borough’s ocean and bay shorelines. Each profile starts at a fixed reference position behind the dunes, crosses the dunes, beach and extends over 600 feet into the water, ending at a depth of 12-16 feet. Each cross section is located midway between the rock groins that define each of the beach cells. Below is a list of the monitoring site locations and the survey number and dates included in this report:

CMP-0: Lighthouse Avenue	Survey 41	April 22 & 23, 2013
CMP-1: Lehigh Ave	Survey 42	April 10, 2014
CMP-2: Whilldin Ave	Survey 43	March 23 & 24, 2015
CMP-3: Coral Ave		
CMP-4: Lake Drive		
CMP-5: Cape Avenue		
CMP-6: Pearl Avenue		
CMP-7: Stites Avenue		
CMP-8: Alexander Avenue		

Table 1.
Summary of Shoreline and Profile Sand Volume Changes
Between
April 2014 and March 2015 at the Cape May Point Beaches

Profile Number	Shoreline Change (feet)	Volume Change (yds ³ /ft)	Cell Distance (feet)	Net Volume Change (yds ³)
CMP-0	-8	-9.84	420	-4,133
CMP-1	13	19.36	445	8,617
CMP-2	-23	-15.54	460	-7,148
CMP-3	-9	-21.66	450	-9,748
CMP-4	-13	-16.76	675	-11,316
CMP-5	5	-3.92	690	-2,705
CMP-6	12	12.07	710	8,568
CMP-7	14	0.35	680	241
CMP-8	-10	-0.87	660	-571
Total Volume Change for Cape May Point =				-18,197

The summary table above compiles the annual shoreline and beach volume change information between 2014 and 2015. The changes are based on the advance (seaward) or the retreat (landward) of the zero elevation datum position on each cross section. This elevation represents the “shoreline” position; it approximates the proper change horizontally for any shoreline point selected on the beachface subject to daily wave run-up. The unit sand volume computed for the cross section in cubic yards of sand per foot of shoreline is multiplied by the distance between the groins in Cape May Point to arrive at the net volume in the right column for each cell. For the April 2014 to March 2015 time frame, the Borough’s beaches recorded a modest net loss of 18,197 cubic yards of sand focused on the Whilldin to Lake Avenue beaches.

Table 2.
Summary of Shoreline and Profile Sand Volume Changes
Between
April 2013 and March 2015 at the Cape May Point Beaches

Profile Number	Shoreline Change (feet)	Volume Change (yds ³ /ft)	Cell Distance (feet)	Net Volume Change (yds ³)
CMP-0	-14	-24.01	420	-10,084
CMP-1	-39	-24.99	445	-11,121
CMP-2	-51	-42.05	460	-19,343
CMP-3	-20	-33.16	450	-14,922
CMP-4	-42	-41.96	675	-28,323
CMP-5	6	3.29	690	2,270
CMP-6	19	21.80	710	15,478
CMP-7	36	33.05	680	22,474
CMP-8	8	5.53	660	3,650

Total Volume Change for Cape May Point = -39,921

The summary table above compiles the shoreline and beach volume change information from April 2013 following construction of the USACE maintenance project to beach conditions on March 23rd and 24th, 2015. The changes are based on the advance (seaward) or the retreat (landward) of the zero elevation datum position on each cross section. This elevation represents the “shoreline” position; it approximates the proper change horizontally for any shoreline point selected on the beachface subject to daily wave run-up. The unit sand volume computed for the cross section in cubic yards of sand per foot of shoreline is multiplied by the distance between the groins in Cape May Point to arrive at the net volume in the right column for each cell. From April 2013 to March 2015 time frame, the Borough’s beaches recorded a modest net loss of 39,921 cubic yards of sand. This represents a loss of approximately 36% of the 108,697 cubic yards of sand placed on the Borough’s beaches during the recent USACE project. Sand was shed from the eastern beaches between the State Park and Lake Drive while the western beaches accumulated sand reducing the net sand volume loss for the Borough.

Review of Each of the Beach Cells in Cape May Point:

This section describes the changes documented at each profile location to show general trends in sediment movement along the municipal beaches for 2014-2015. Beach volume and shoreline changes were calculated from April 2014 to March 2015. The individual site review includes photos taken during the surveys and annual comparison plots to document shoreline changes at each location. Individual site descriptions are included for each profile.

Lighthouse Avenue



This shot taken in April 2014 shows the view looking northeast from the dune crest. The bunker in the distance offers a good visual reference point for qualifying changes to the beach.

The photo taken on March 2015 shows the dune and beach remained remarkably stable this year. There were no visible changes to the beach or dune system other than plant growth.

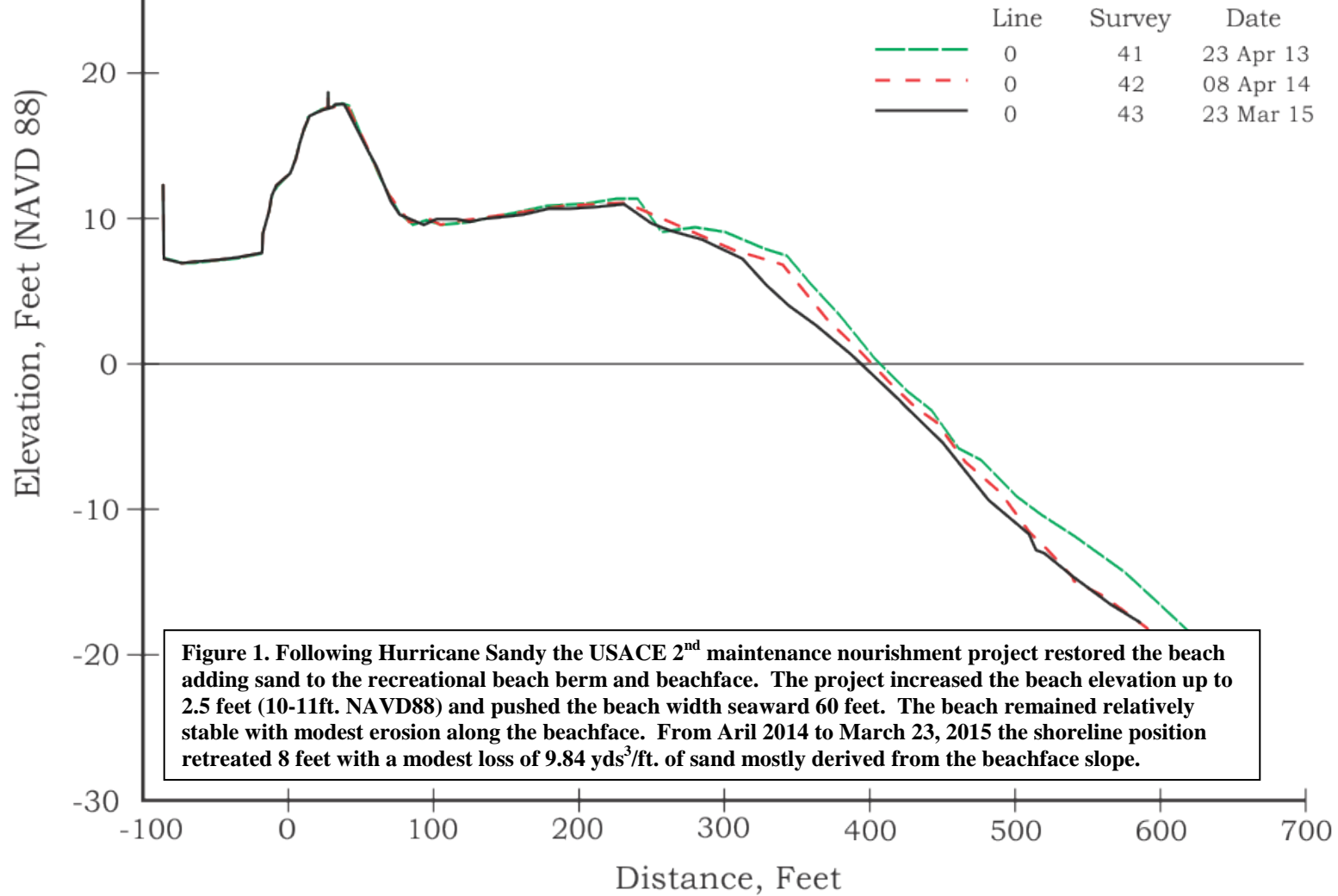
CMP-0 (Cell 0) is the northeastern-most cell that borders the State Park and is bounded to the west by a rock groin. This location has benefited tremendously from the USACE Lower Cape May Meadows – Cape May Point shore stabilization and ecosystem restoration project, initial construction was completed June 2007. The project added over 250 feet of recreational beach berm and established a stable dune system 100 feet wide at the toe with a crest elevation of 18 feet NAVD88. Prior to the initial project the beach was narrow that exposed the dune system to frequent severe erosion from the ocean wave climate forcing the installation of hard structures consisting of tensor mats to armor the seaward slope of the dune.

Although the dune system has remained remarkably stable to accretive since initial sand nourishment the beach has been exposed to multiple storms, waves generated during severe events resulted in moderate beach erosion. By April 2012 the beach elevation and width were reduced. The USACE authorized a second maintenance project with construction from November 2012 to January 2013. The project restored the design beach width and elevation. The beach width increased by 58 feet with 63.13yds³/ft. of sand added to each foot of shoreline seaward from the dune toe. Following the project the beach elevation ranged from 10-12 feet NAVD 88 and extended 275 feet seaward of the seaward dune toe.

The beach and dune system remained stable through March 2015. Modest beach erosion along the beachface slope removed some sand from the system. The shoreline retreated a modest 8 feet while -9.84yds³/ft. of sand eroded from the site. Almost all of the eroded sand (-13.35yds³/ft.) was from the berm and beachface. This beach still provides ample storm protection to prevent significant storm damage to the dune system and oceanfront properties while aeolian sand from the beach continues to feed sand to the seaward dune slope and foredune around installed dune fences. The beach configuration on March 23, 2015 closely mimicked the April 2014 profile. The beachface slope remains relatively steep at a rate of approximately 10 to 1 so that within 200 feet the seafloor goes from 0 to -20 feet NAVD 88. Proximity to the nearshore tidal channel cause stronger longshore currents along this shoreline moving sand in the down drift direction.

Cape May Point - Annual Comparisons

CMP - Line 0 - Lighthouse Avenue



Lehigh Avenue



04/06/2014

This photo taken on April 2014 shows beachface erosion has exposed more of the rock groin along the down drift shoreline.



03/23/2015

Taken on March 23, 2015, this photo shows that the beachface recovered some of the sand lost by the April 2014 survey. The berm is noticeably wider and higher.

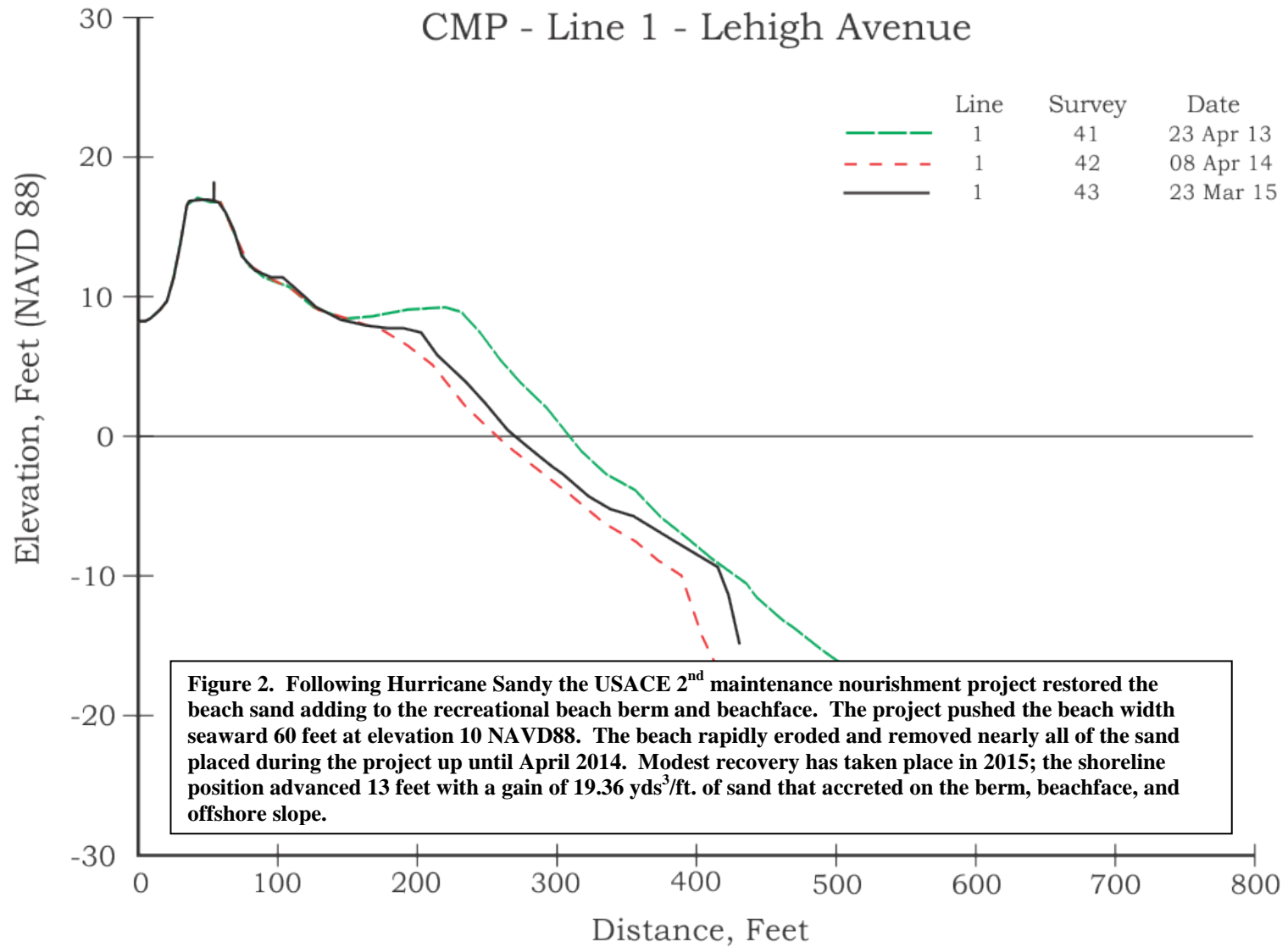
CMP-1 (Cell 1) stretches from the Lighthouse Avenue groin to Lehigh Avenue. Prior to the initial USACE project no dry beach was present between the rock groins. Shore protection was provided by a rock seawall that armored the seaward dune slope. Beyond the groins the seafloor steeply dropped into the adjacent tidal channel. The initial USACE project re-established a dry recreational berm and covered the seawall with sand to restore the dune.

Although the dune system has remained remarkably stable to accretional since construction the beach has been exposed to several recent severe storm events. Waves generated during the recent severe events that resulted in moderate beach erosion. By April 2012 the beach elevation and width were reduced. The USACE authorized a second maintenance project with construction from November 2012 to January 2013. The project restored the design beach width and elevation. The beach width increased by 60 feet with 56.39yds³/ft. of sand added to each foot of shoreline seaward from the dune toe. Following the project the beach elevation was 10 feet NAVD 88 and extended about 170 feet seaward of the seaward dune toe.

The project beach rapidly eroded through April 2014, however, by March 2015 the erosional trend had reversed and this site gained 13 feet of shoreline with a net increase of 19.36 yds³/ft. of sand. This beach still provides ample storm protection to prevent significant storm damage to the dune system and oceanfront properties while aeolian sand from the beach continues to feed sand to the seaward dune slope and foredune around installed dune fences. The beachface slope remains relatively steep within the initial 125 feet the slope then steepens to an angle of repose slope into the adjacent tidal channel. The proximity of this beach to the nearshore tidal channel with strong longshore currents near the end of the groins creates the potential for rapid retreat of the beachface slope as the channel cuts landward into the nearshore slope.

Cape May Point - Annual Comparisons

CMP - Line 1 - Lehigh Avenue



Lehigh to Whilldin Avenues



The photo was taken on April 8, 2014 from the toe of the dune. Plants are colonizing the seaward dune slope where aeolian deposition has expanded the feature seaward.

The photo taken on March 23, 2015 shows continued aeolian accumulation and colonization of plants seaward onto the open beach. The overall beach width has decreased while the elevation has remained stable.

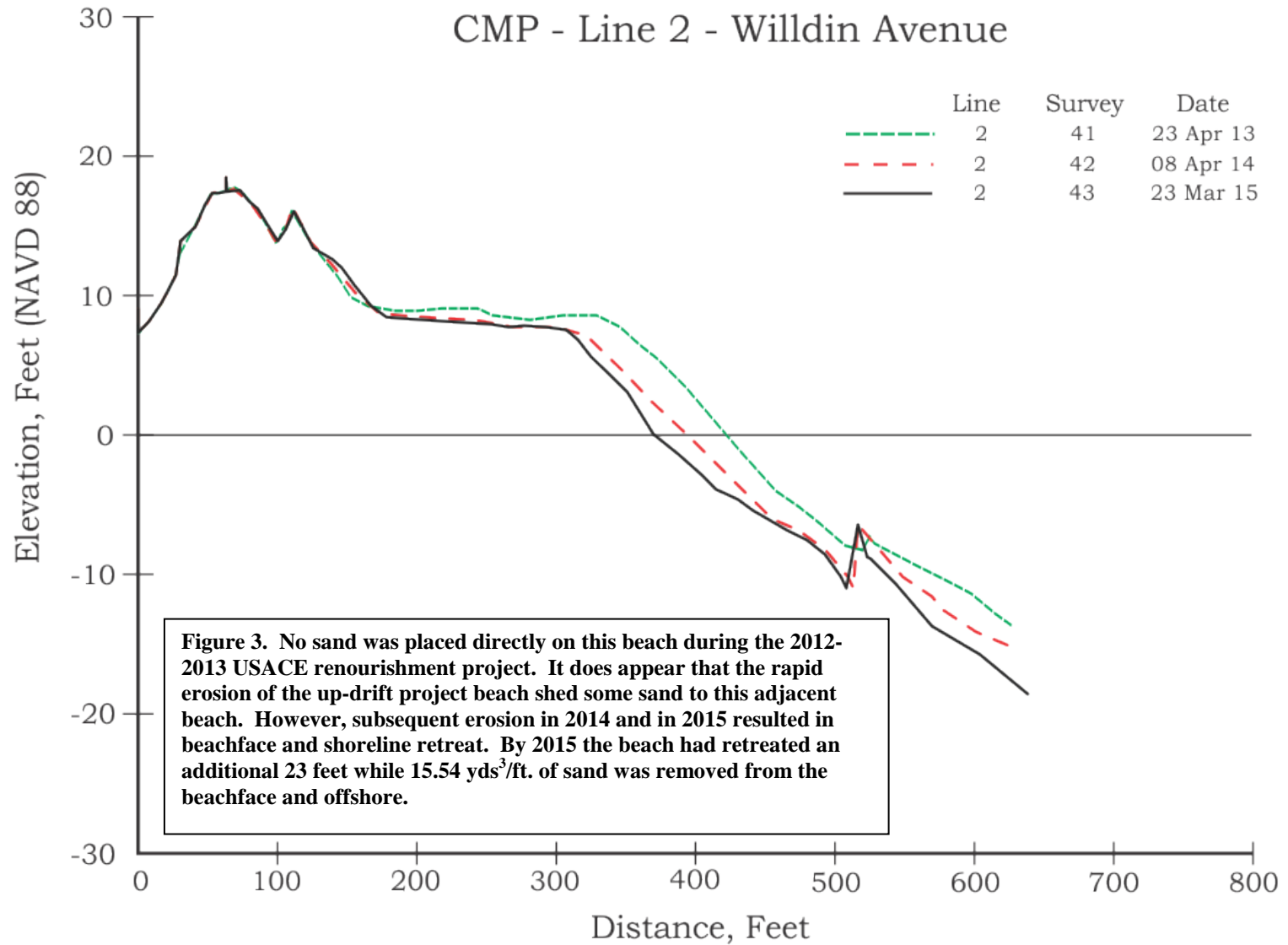
The CMP-2 (Cell 2) beach is the northeastern-most of the groin cells with an early installation of the “Beachsaver” units from 1993, which still show on the profile cross-section at the 520-foot distance from the reference point and remain relatively stable. Sand added to the system during the initial USACE project has resulted in the near burial of the entire beach reef structure and a rock seawall that served as property protection prior to the project. No additional sand was placed here during the recent 2nd maintenance cycle.

Sand shed from the recent project beaches accumulated rapidly in this cell during 2013. The site gained 32.58 yds³/ft. of sand and the shoreline advanced seaward 32 feet. Accumulation of sand continued from the foredune seaward to the profile limits. However, by April 2014 over half of this gain eroded primarily shed from the beachface and berm. The shoreline position retreated 28 feet with a loss of 26.64 yds³/ft. of sand eroded from the beachface. By March 2015 the erosional trend has continued with an additional 15.540 yds³/ft. of sand lost with a shoreline retreat of 23 feet. The deeper trough (-11 feet NAVD88) that was scoured in 2014 landward of the “Beachsaver” units has remained, while beyond the units offshore sand has also been lost for 2 consecutive years.

The “Beachsaver” unit crest protrudes about two feet above the nearshore slope. Landward of the units a deep trough was scoured that exposed 5 feet of the vertical landward face of the unit. The crest is 125 feet seaward of the zero elevation shoreline position (about mid-tide position) with the concrete units residing in -11 feet (landward) and -8.0 feet (seaward) of water below the NAVD88 zero elevation. The crest protrudes up to elevation – 6 feet NAVD88. In this instance the units are unlikely to be encountered by swimmers this season within the middle of the groin cell. As always caution and restrictions should be in placed closer to the groins where the shoreline sand extends outward toward the concrete reef along each groin.

Cape May Point - Annual Comparisons

CMP - Line 2 - Willdin Avenue



Whilldin to Coral Avenues;



The 2014 photo taken on April 8 shows the dune and beach have remained relatively stable. The adjacent groin represents a good visual reference point for qualitative comparison.

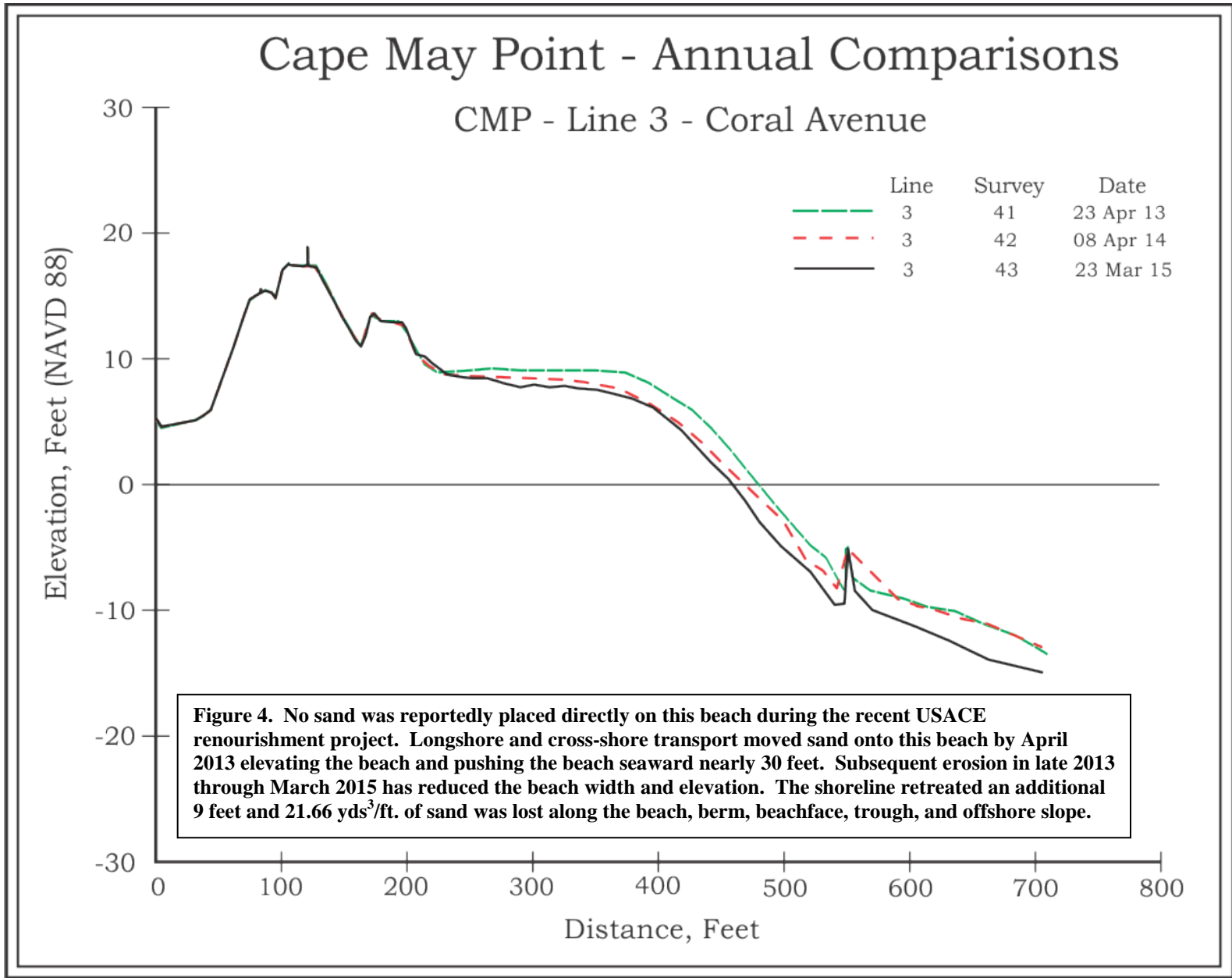


The 2015 photo taken on March 23 shows that the berm appears to have lost a modest amount of width and height. The adjacent groin appears to have less beach around it in 2015.

CMP-3 (Cell 3 bounded by rock groins at Whilldin Avenue and Coral Avenue) is the other beach cell with an original 1993 “Beachsaver” unit installation. Sand added to the system during the initial USACE project has resulted in the near burial of the entire beach unit structure. No additional sand was placed here during the 2nd maintenance cycle (2012-2013).

Following episodes of erosion through 2012 sand accumulated in this cell naturally in 2013. Wind-blown sand enhanced the foredune from its 2012 configuration and sand accumulated seaward across the beach offshore to the “Beachsaver” reef. The shoreline advanced 29 feet with an addition of 28.90 yds³/ft. of sand to this site. As of April 2013 the shoreline advance brought the reef units to within 70 feet from the zero elevation shoreline position location on the beach itself. In 2014, the berm had lowered nearly two feet from its 2013 elevation.

By March 2015 the beach had modestly eroded along with the beachface slope. The shoreline position retreated landward 9 feet with a loss of 21.663 yds³/ft. of sand. This modest loss of beach width kept the units in relative close proximity to the shoreline approximately 90 feet. The concrete crest lies in 5.0 feet of water at mid-tide (NAVD88 zero datum). This location remains the most problematic in terms of swimmers encountering the structure while using the beach. There is no deep trough at the landward side of the reef structure. The swimming space has increased by 30 feet and if the guards are diligent in keeping swimmers close to shore in shallow water less than 3-4 feet deep regardless of the tide level, water access could be allowed here. Water access near the groins where the units are closer to shore should be prohibited.



Coral Avenue to Lake Drive



By April 2014 the beachface had eroded nearly 40 feet, while the dune system remained stable.



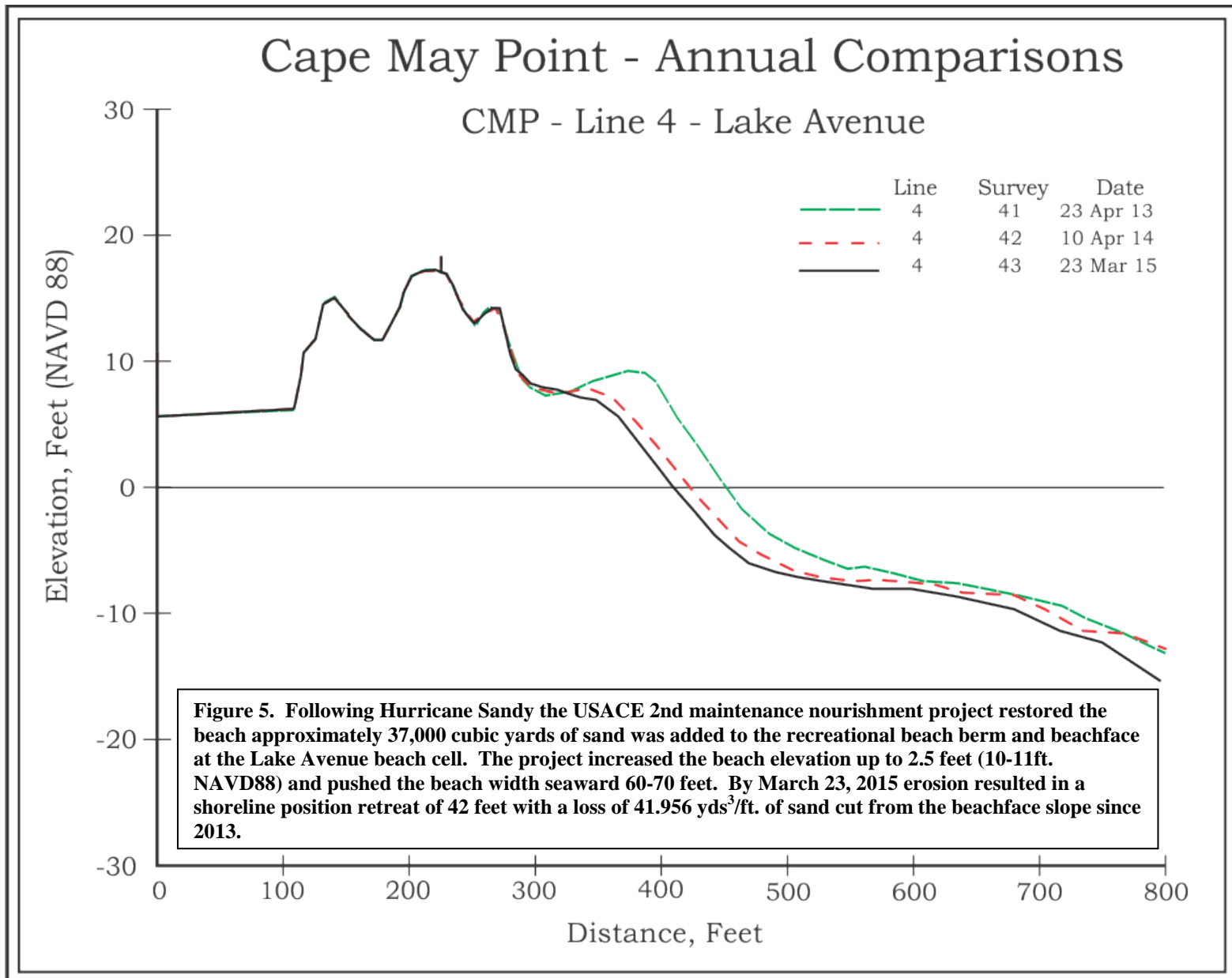
Photo above was taken from the swash on March 23, 2015. The erosion of the beachface has continued in 2015 as an additional 13 feet of shoreline was lost.

The Lake Drive (CMP-4, Cell 4) beach cell is bounded by the rock groins at Coral Avenue and south of Lake Drive (closer to Surf Avenue). Following a period of erosion the recreational beach berm had retreated, and by April 2012 it extended just 50 feet seaward of the dune toe. This cell does not contain any nearshore structures but received sand during the recent 2nd maintenance cycle nourishment project.

Over the 2012/2013 winter the USACE reported sand placement of 37,000 cubic yards in the Lake Drive beach cell (Dwight Pakan, USACE). The beach berm width advanced to approximately 125 feet seaward of the dune toe at elevation 10 feet NAVD 88 with 43.63 yds³/ft. of sand added, the shoreline position advanced seaward 60 feet. Aeolian sand accumulated along the foredune crest.

By April 2014 approximately half the beach width added during the recent project was eroded. The shoreline retreated 29 feet with a loss of 24.79 yds³/ft. of sand scoured from the beachface slope and swept by longshore currents from the beach cell. The dune and offshore seafloor were relatively stable.

By March 2015 the erosional pattern continued, and the shoreline retreated an additional 13 feet while 16.764 yds³/ft. of sand volume was lost. Since 2013 this site has lost 41.956 yds³/ft. of sand and the shoreline has retreated 42 feet. Despite the recent losses this beach should still support recreational activity this summer. This location remains one of the more desirable bathing beaches in the Borough with approximately 70 feet of dry recreational beach, a gradual descent into deeper water and a relatively large, shallow offshore platform area for recreational swimming.



Surf to Cape Avenues



The photo taken on April 10, 2014 shows a significant accumulation of aeolian sand on the seaward slope. Sand deposition buried the dune grass on the seaward slope. The beach berm remained stable this year.



The photo taken on March 24, 2015 shows berm and dune conditions similar to the April 2014 survey. Modest volume gains occurred above the 0.0 ft NAVD88 datum.

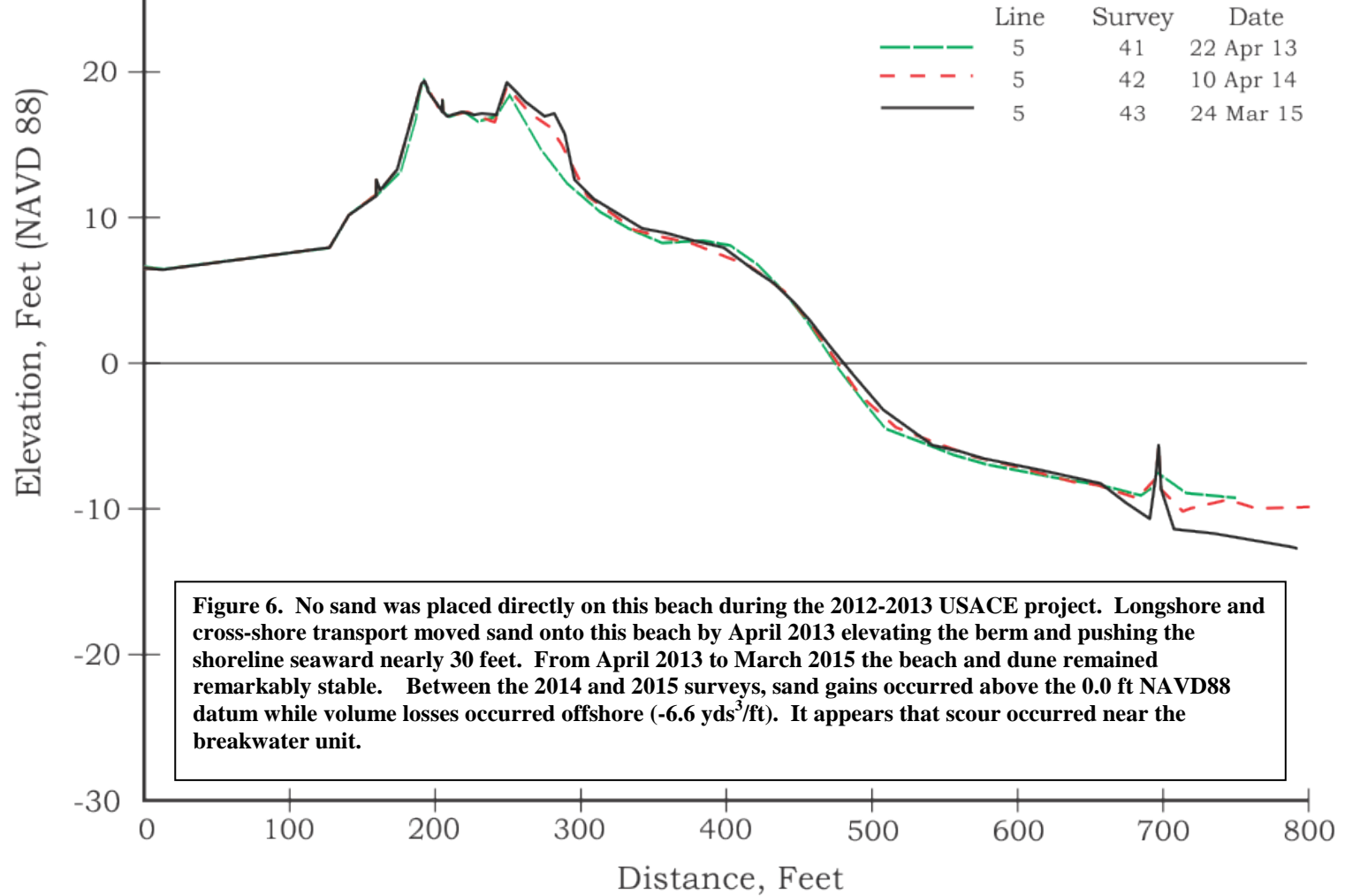
CMP-5 (Cell 5) contains the nearshore breakwater unit installed in 2002 during the USACE CMP-227 experimental project. The breakwater units are still present, but nearly buried in sand approximately 200-feet seaward of the zero elevation position. These units are lowest in elevation in the cell's mid-section where swimming is allowed that prevents individuals from encountering the units. In this cell the units pose little threat to recreational swimming but swimming along the rock groins should be restricted where the units are closer to shore due to sand accumulation at the rocks.

In 2012 the beach declined in width and elevation. No sand was placed west of Lake Drive during the 2012-2013 USACE renourishment project, but natural recovery added 20.63 yds³/ft. of sand to the system and pushed the shoreline position seaward 25 feet and restored most of the eroded beach width and elevation. Aeolian sand accumulated on the seaward slope and crest of the dune. Through April 2014 the beach width remained relatively stable with aeolian sand added to the dune system across the seaward crest to the toe. The sand added to the dune produced a modest volume gain with 3.49 yds³/ft. of sand added. By April 10th the dune system had expanded to 200 feet in width with a landward and seaward ridge crest elevation of 19 feet NAVD88. This additional volume, width and height added to the dune enhanced the system's storm protection for oceanfront properties and infrastructure.

Dune and berm conditions remained between the April 2014 and March 2015 surveys. Most of the volume losses occurred below the 0.0 ft NAVD88 datum (-6.6 yds³/ft) where the profile was lowered in elevation about 2 feet. The shoreline moved seaward a modest 4.5 ft.

Cape May Point - Annual Comparisons

CMP - Line 5 - Cape Avenue



Cape to Pearl Avenues



Aeolian sand continued to accumulate and has buried the dune grass on the seaward slope by April 10, 2014. The recreational beach berm remained stable and provides ample recreational space for beach patrons.



This photo taken on March 24, 2015 shows some of the seaward growth of the dune and vegetation that occurred during 2014-2015. (View to the east).

CMP-6 (Cell 6) is bounded by the rock groins at Cape Avenue and Pearl Avenue (approximately 350 feet to the northwest from the Cape Avenue groin). The nearshore bay floor contains the “Double Tee” structures that were installed as part of the USACE CMP-227 experimental project and have remained buried by sand in the past six annual surveys and continue to have limited ability in influencing sand retention. With sand shed from the initial federal project beaches into this site seasonally by predominant longshore drift, it is unlikely erosion will expose these units in the near future provided the USACE continues to remain committed to regular project maintenance by adding sand to the system. As a result of the units being buried beneath several feet of sand there is no probability of swimmers reaching the submerged Double Tee structures. These units are located on the seafloor 11 feet below the 0.0 ft. NAVD88 datum and buried by 4 feet of sand nearly 100 feet offshore. The units however might be accessible adjacent to the rock groins, and any recreational activity in the water close to the rock groins should already be prohibited.

Recent changes here were similar to those seen at Cape Avenue. No sand was placed this far west during the USACE renourishment project, so the recovery of the shoreline by April 2013 was natural as sand shed from the eastern project area was transferred to the western beaches by predominate longshore drift. By April 2014 more sand had entered the system from the up-drift beaches. Sand accumulated offshore and on the beachface slope, aeolian sand was deposited on the foredune slope and crest.

The dunes continued their seaward migration into 2015, and the entire profile gained 12.1 yds³/ft (similar to the amount that was found in 2014) and the dry beach moved seaward by 12.2 ft. These beach and nearshore changes make this beach an excellent option for most recreational activities. The relatively long public access pathway from Pearl Avenue to the beach has become further elevated by the deposition of at least four feet of new sand at the crest of the pathway to the beach. Since this change will likely bring pedestrian complaints about the difficulty of the “trek” to the beach this summer, we suggest the installation of “rolled boardwalk” sections to assist in the journey over the dune.

This could be accomplished by public works by obtaining retired fire company hose, make up 3.0 foot long decking, and buy neoprene capped roofing paper nails. Lay out the deck boards with the spacing in the sand, put the firehose along each edge about 6 inches in, nail to each deck board leaving about 8 inches of hose left over at one end of the section created. Then nail the sections together when finished and flip the walk over to use it. This particular ascent would require about 100 feet of walkway. Alternatively, Mr.Boardwalk.com will supply the material in sections at a much higher price. Perhaps contact the public works director in Avalon Borough because I know they use it and in far longer sections than Mr. Boardwalk supplies.

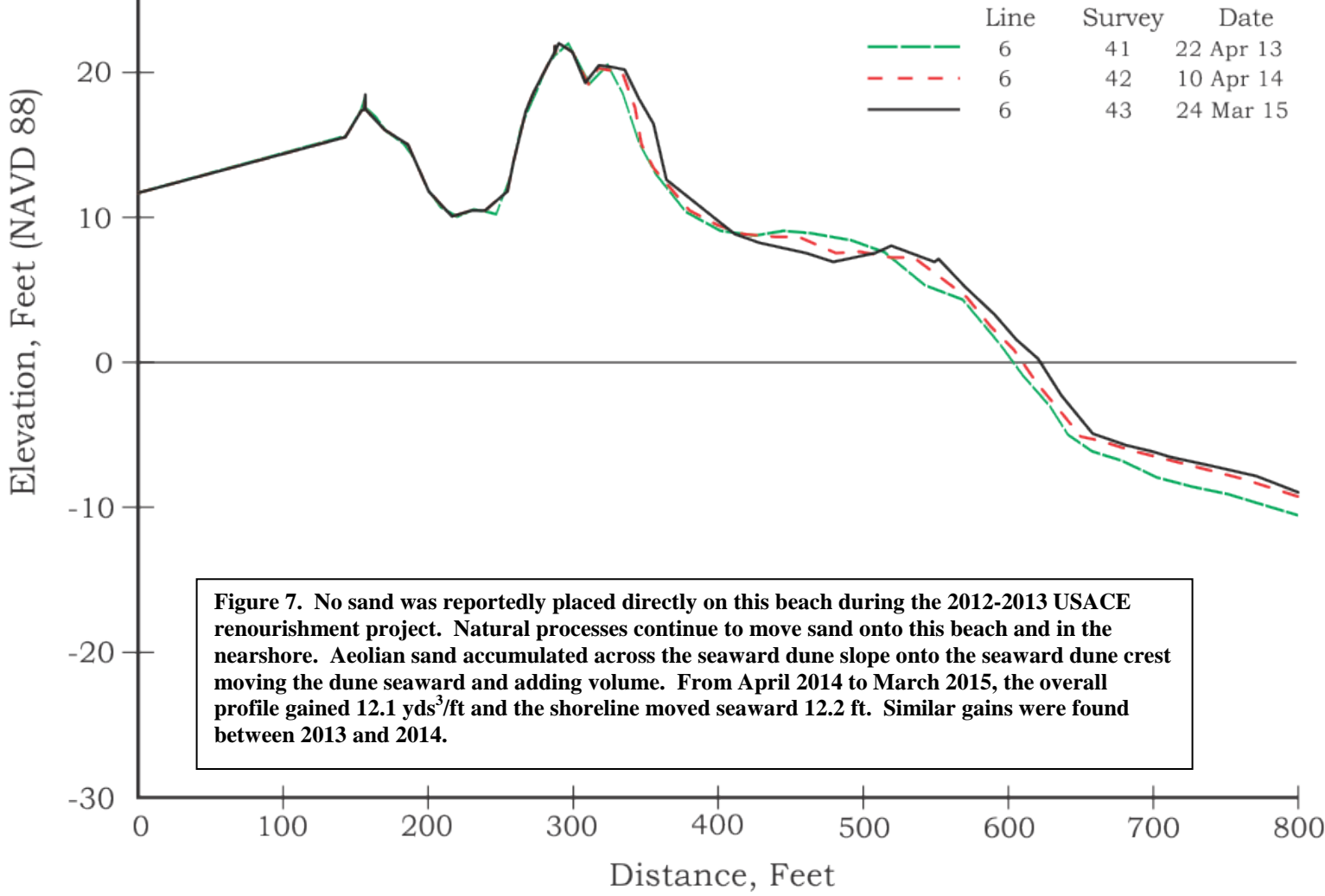
<http://www.finehomebuilding.com/how-to/tips/roll-up-boardwalk.aspx>

Above is the link to the do-it-yourself method of making rolled up boardwalks. Another source would be the Mobi-mat company below.

<http://www.mobi-mat.com/>

Cape May Point - Annual Comparisons

CMP - Line 6 - Pearl Avenue



Pearl to Stites Avenues



The April 10, 2014 photo shows continued sand accumulation on the seaward dune slope. The recreational beach berm width has expanded seaward approximately 20 feet during the year.



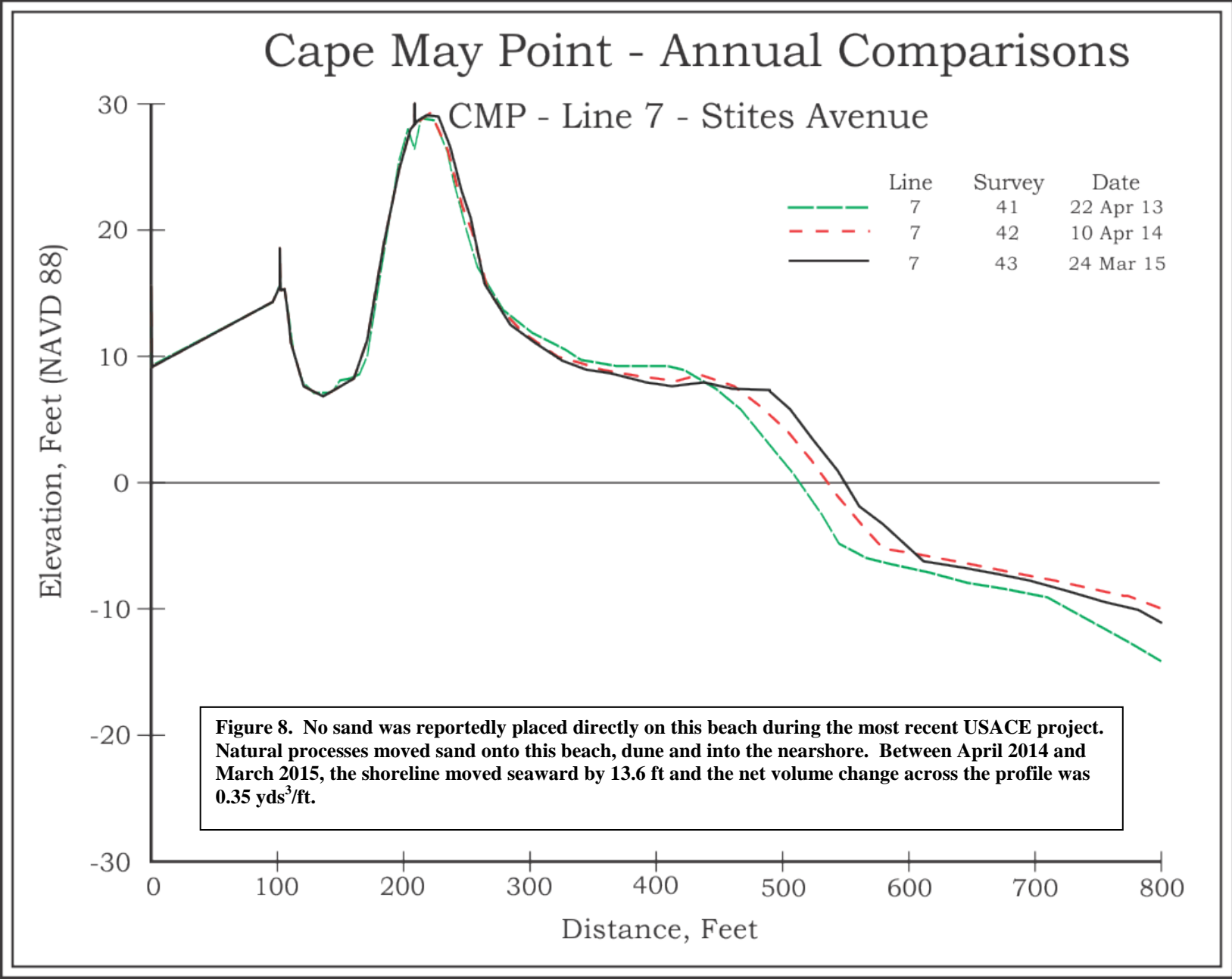
This photo taken on March 24, 2015 shows the stable dune that occurs from natural aeolian conditions. The berm and nearshore remained at nearly the same elevation as the 2014 survey (View to the west).

Profile CMP-7, located southeast of Brainard Avenue, (Cell 7) is bounded by the rock groins near Pearl Avenue and Stites Avenue. The cell has not received any sand directly from the past USACE beach restoration or maintenance projects. The beach and nearshore here are influenced by the tidal processes of the Delaware Estuary which continue to bring sand to the western beach cells. Sand has accumulated across the entire profile length from the dune crest to the offshore seafloor limits this process continued through April 2014.

In 2013 the annual net gain was 44.21 yds³/ft. and 34 feet of seaward shoreline position advance and nearly 40 feet of recreational berm width. Sand accumulation was nearly continuous across the entire profile length seaward from the dune crest to the offshore profile limits. The wind transport effect was most evident in the complete in-filling of the Stites Avenue beach access pathway where 4 feet of sand was deposited completely burying the pathway and seating area at the dune crest with new material.

By April 2014 another lobe of sand had moved landward from offshore onto the nearshore and beachface slope up to the berm crest and the net annual gain was 33.51 yds³/ft of sand. The accreting trend continued into 2015 moving the shoreline seaward (13.6 ft) from the 2014 position. Though there was a negligible amount of volume gain across the profile (0.35 yds³/ft) during that time period.

With no structures present at this location the wide dry beach should provide beach patrons with abundant recreational area and good nearshore swimming conditions for the summer season. As always caution should be used when determining if swimming should be allowed in deeper water near the end of the groins or along the rocks.



Stites to Alexander Avenues



Sand continued to accumulate both on the beachface and across the recreational beach berm. By April 10, 2014 aeolian sand had buried much of the dune grass that had colonized the lower slope and dune toe in 2013.



This photo taken on March 24, 2015 shows the dune and berm conditions similar to the 2014 survey. This site experienced negligible changes between 2014 and 2015.

The Alexander Avenue location, CMP-8 the westernmost cell (Cell 8), is positioned between the last two groins in Cape May Point. Again sand was never placed on the shoreline here during the USACE projects. Despite the lack of sand placement this cell is nearly full to the tip of the western groin so sediment loss to the western Delaware Bay shoreline is considerable. The offset in the beach west of the Alexander Avenue groin means that most of the sand is transported to the nearby bay floor and does not appear on the Sunset Beach shoreline.

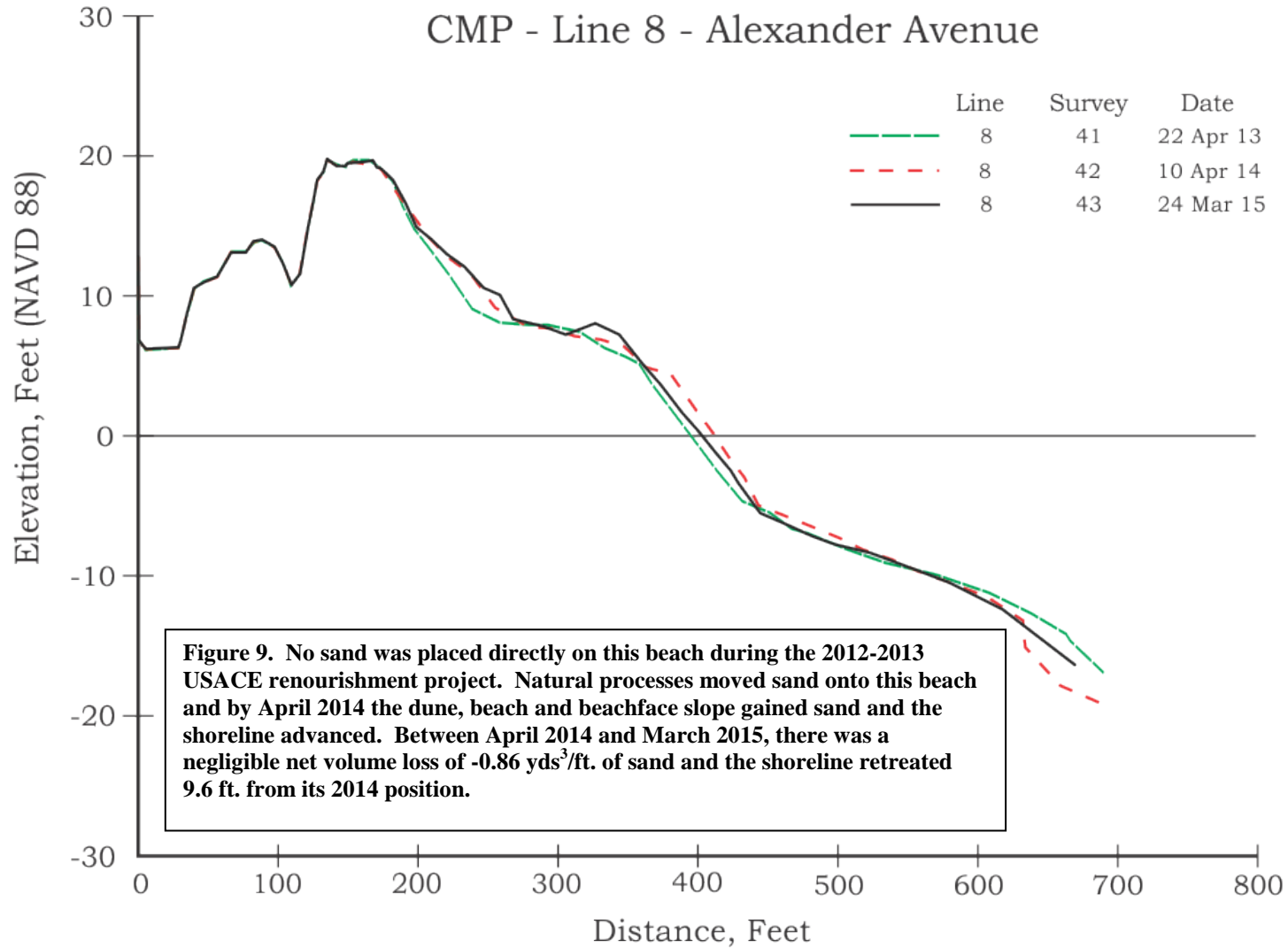
The Borough took advantage of an offer by the NJDEP to fund the addition of sand here as a post-Sandy betterment to increase storm resilience for the Delaware Bay shoreline of the community. Approximately 800 cubic yards of new sand was added to extend the dune near Alexander Avenue. This action closed a beach-surface elevation storm wave pathway into the western part of Cape May Point by raising the dune barrier about 6-7 feet in elevation. Pedestrian cross over paths and vegetation were later added.

After several years of accumulation, the beach continued the trend in 2013 and in 2014 the dune continued to accumulate sand from the seaward crest to the seaward toe. Sand moved onshore added to the beachface slope that advanced the shoreline position seaward 17 feet. The net annual volume change was a modest gain of 4.45 yds³/ft. of sand with onshore gains partially offset by a loss in the seafloor elevation near the profile limits.

Between 2014 and 2015, the profile experienced negligible volume losses (-0.86 yds³/ft) though the shoreline moved landward (-9.6 ft.). During this time, sand was added to the top of the berm from the 2014 position. The dry beach remains wide enough to support summer recreational activity onshore while the nearshore slope is steeper in this cell with water depths of -10 feet NAVD88 within 100 feet of the shoreline. The steeper slope and drop off near the end of the groins along with strong tidal currents in this region should probably limit swimming activity by most to the shallow nearshore region.

Cape May Point - Annual Comparisons

CMP - Line 8 - Alexander Avenue



Sand Transfer Potential

In the winter of 2008/2009 the USACE modified the original 2005 project template to reduce the sand volume at the two older breakwater cells (CMP-2 & CMP-3) and place additional sand on ocean-facing beaches and at Lake Avenue Beach (CMP-4). At CMP-3 (Coral Ave.) 49.02 yds³/ft. of sand was excavated from the beach. Sand was subsequently transferred into the adjacent cell at CMP-4 (/Lake Dr.) totaling 29.96 yds³/ft. of sand. The program was designed to improve recreational use of the beaches at Whilldin (CMP-2) and Coral Avenue (CMP-3) where concerns of swimmers in close proximity to the submerged concrete reefs could result in accidents. Removing sand and drawing the shoreline landward allowed safer water access by increasing the distance of swimmers to the structure while sand placement enhanced the recreational beach width at Lake Avenue.

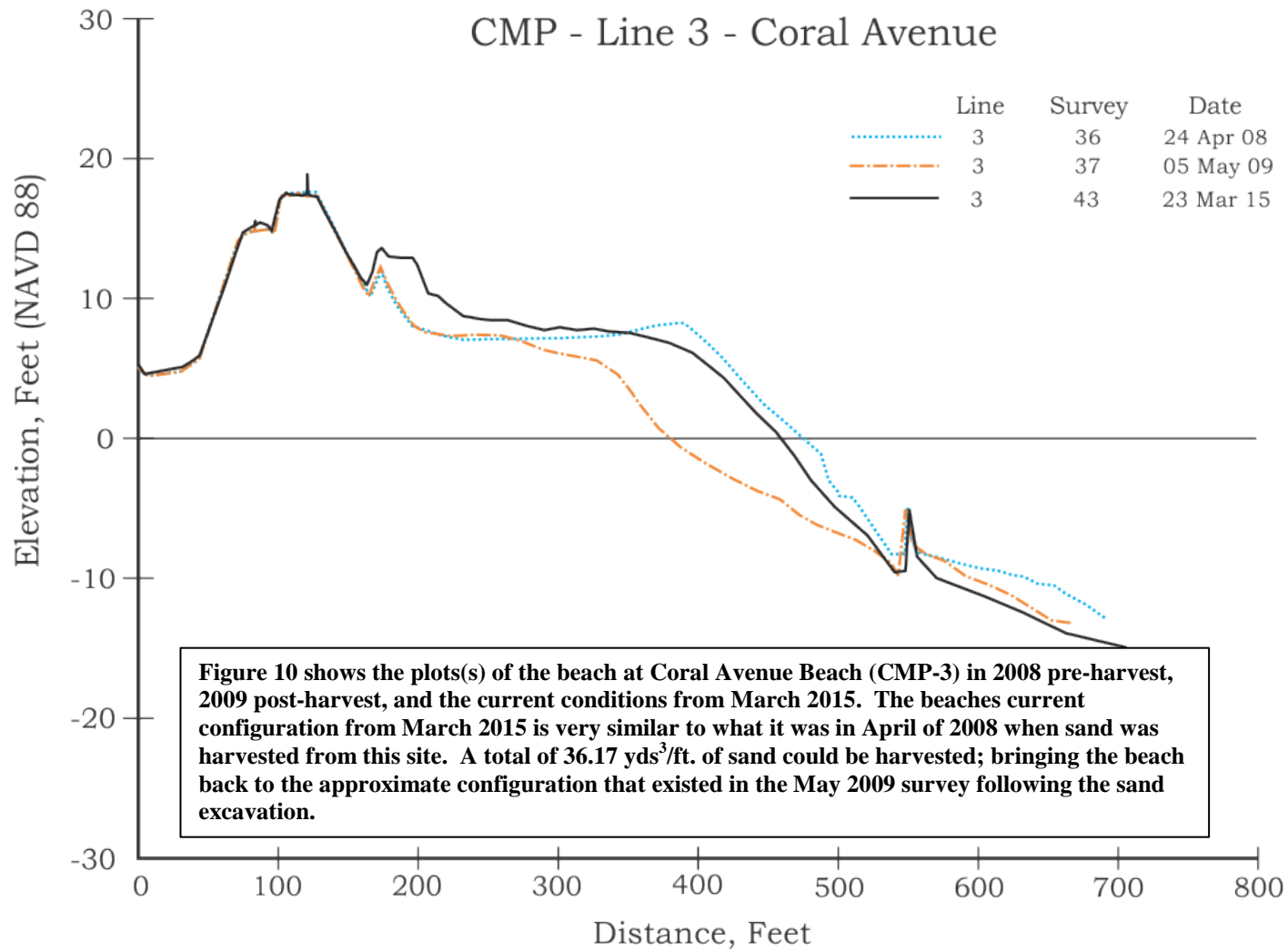
The 2015 configuration of both beaches in Cell 3 and 4 are again very similar to the conditions that prompted these USACE modifications to improve beach conditions in the winter of 2008/2009. For CMP-3 at Coral Avenue a volume comparison was done to determine how much sand is currently available for harvest. The calculation compared the 2009 post-USACE project condition to the current 2015 conditions. That analyst showed 36.14 yds³/ft. of sand could be harvested from the beach, restoring the 2009 USACE post-harvest beach conditions at Coral Avenue. In addition to supplying sand this would also again reduce concerns of swimmers in close proximity to the submerged concrete breakwater reef.

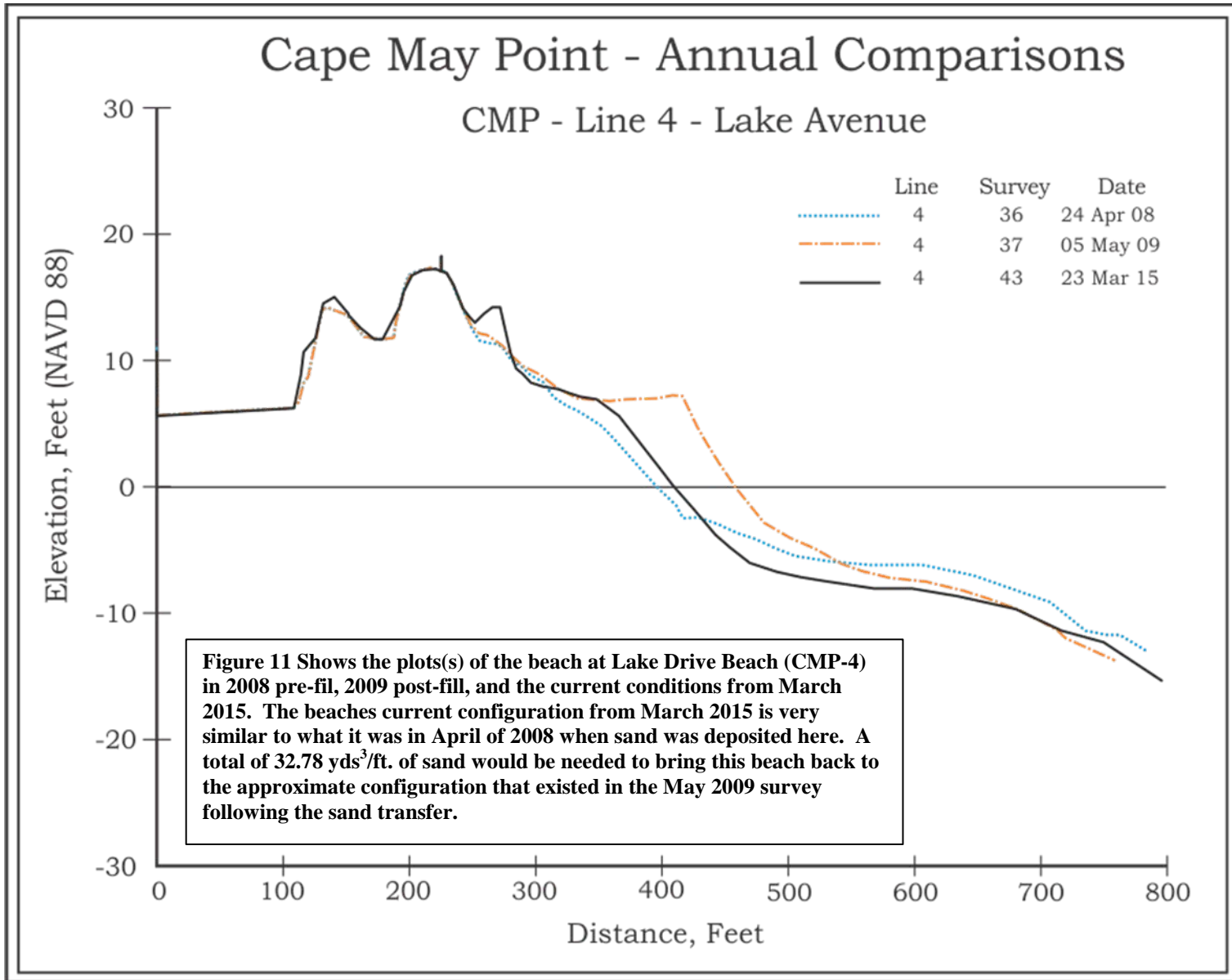
A separate volume comparison was done at CMP-4, Lake Drive to determine how much sand it would take to reach the USACE 2009 post-sand transfer beach configuration. The calculation compared the 2009 post-fill condition to the current 2015 conditions. It was determined that 32.78 yds³/ft. of sand is required to meet the USACE 2009 post-construction beach conditions and restore a wider recreational beach width to enhance both shoreline stabilization and storm protection.

The plots below showing the pre & post project conditions compared with current beach conditions demonstrate the feasibility and benefits of conducting another sand transfer project for cells CMP 3 & CMP 4.

Cape May Point - Annual Comparisons

CMP - Line 3 - Coral Avenue





Summary

The 345,000 cubic yards of sand added to the Lower Cape May Meadows – Cape May Point project beaches by the USACE in November 2012 to January 2013 has provided a vast influx of sand for all the Cape May Point beaches. Approximately 108,697 cubic yards (cy) of sand was placed directly on the Borough's beaches during the project limited to CMP 0, CMP 1 (71,697cy) and CMP 4 (37,000cy) cells. Sand accumulation in the remaining cells and especially along the western shoreline is largely derived from sand shed from the USACE project beaches and transferred longshore from the natural area into Cape May Point where the westerly curve of the shoreline into Delaware Bay allowed deposition on the beach. This process has continued through March 2015.

Through 2014 the project beach at Lighthouse Avenue remained stable as minor losses to the beachface was mitigated by a sand supply that readily feeds into this location unimpeded by structures from the Lower Meadows natural area and Cape May City. Lehigh Avenue at CMP 1 saw a modest recovery of the beachface and shoreline position. From CMP 2 to CMP 4 the beaches all lost sand with modest to moderate erosion along the beachface. Shoreline and beach width retreat at these sites ranged from -9 to -23 feet with corresponding volume losses of $-15.54 \text{ yds}^3/\text{ft.}$ to $-21.66 \text{ yds}^3/\text{ft.}$ of sand eroded from these beaches.

This erosional trend transitioned moving west along the Cape May Point shoreline with CMP 5 experiencing a negligible loss in sand volume paired with a small shoreline advanced, to a region of accretion and expansion both on the recreational beach and dune system at CMP 6 & 7. In the past three years the beach width at Stites Avenue has expanded seaward 70+ feet all from natural processes that has redistributed sand placed on the project beaches to the western shoreline. Similar trends have occurred at each beach from Cape Avenue to Alexander Avenue during the same time frame.

At all sites the wider beaches have provided a source of sand for aeolian processes to move sand to the dune system. Sand added to the crest and seaward slope has raised the crest elevation and expanded the overall width of the system. The individual cross sections show a uniform deposition of sand from nearly each dune crest, down to the beach and across the berm into the water this could only be true if large volumes of new sand were being introduced.

Observations & Recommendations

The impact of these changes to the degree of safety from collisions by bathers on the submerged breakwater units improved the situation from last year.

1. Cells 0 and 1 do not have structures; the beach at Lighthouse remained relatively stable with a slightly steeper slope further offshore, while at Lehigh Avenue modest recovery of its beachface advanced the shoreline seaward. These two beaches still have steep slopes into deep water with strong tidal currents into and out of Delaware Bay.
2. The zero elevation position (NAVD 88 zero, which equals about 1.5 feet above the average low tide) in Cell 2 at Whilldin Avenues is now about 150-foot distance from the breakwater structure. In 2013 the shoreline position was less than 100 feet from the submerged units. A deeper trough has developed between the water's edge and the breakwater units nearly -11 feet immediately landward of the units. While about 50 feet landward of the units the depth is approximately -7 feet. The swimming area is limited, but may again be manageable this year. The CRC again recommends installing a line of floats indicating the maximum distance for swimming that should be about 30 feet from the breakwater reef. Swimming near the groins has been avoided in all

cells, but here additional caution should be used as the units are slightly closer to the beach adjacent to the rocks.

3. Cell 3 at Coral Avenue the shoreline position has retreated slightly the breakwater units in March 2015 were approximately 90 – 100 feet from the shoreline position (zero datum). In 2013 the units were approximately 50 feet seaward of the shoreline position. The beachface slope remains fairly steep with development of a small trough landward of the units -9 feet. In the current beach configuration this location would only allow approximately half the distance between the reef and the mid-tide beach's water edge as safe for water activity. It is the CRC recommendation that entry into the water be limited to no more than 3- to 4-foot depths until such time that excavation removes sufficient sand from this region to draw the shoreline landward and increase the distance between the shoreline and the concrete units.
4. Cell 4 has no structures offshore and a relatively flatter nearshore slope. This site remains overall a good option for a swimming beach in Cape May Point this season. The shallow slope in the water will be very welcome at low tide for children and their parents/grandparents.
5. Cells 5 and 6 contain the newer units but pose minimal risk for swimming in 2015. Both reef structures lie in greater than - 8 feet of water several hundred feet from the water line at low tide. The "Double Tee" structure in Cell 6 is once again buried with additional sand. Swimming near the groins should always be avoided since the units are slightly closer to the beach adjacent to the rocks.
6. Cells 7 at Stites Avenue is enhanced with a wider berm area, this paired with the shallow offshore platform will offer a desirable option for swimming.
7. Cell 8 at Alexander Avenue remains in a very similar configuration to what it was in 2014 with negligible changes to the overall volume and shoreline position. Available recreational area and swimming has been substantially improved at these beaches since 2005. Other issues have guided the Borough's decision to close the Alexander Avenue beach to swimming due to its heavy use by fishermen plus very strong tidal currents moving into Delaware Bay past this beach with a major offset landward in the beach west of the Alexander Avenue groin making for a serious rescue situation should a swimmer be swept past this groin on a flood tide interval. This condition has not changed.

The Coastal Research Center (CRC) will continue to monitor the conditions on the Cape May Point beaches at the Borough's request. Please contact the CRC with any questions or concerns.