

**ANNUAL REVIEW FOR 2017
OF THE CAPE MAY POINT, NJ MUNICIPAL BEACHES**



The photo above taken on September 1992 is presented to remind everyone what the Cape May Point Borough shoreline once looked like where storms routinely broke through at Lighthouse Avenue, rocks were the final line of defence between Lighthouse and Lehigh Avenues, and much of the remaining shoreline was wet to the dunes where a steep scarp meant that erosion was still at work reducing Cape May Point since the days of the Wanamakers as the earliest home builders in Sea Grove Village.

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Table of Contents

Introduction	1
Beach Monitoring Program	1
Table 1: Summary of Shoreline and Volume Changes March 2015 to April 2016	2
Table 2: Summary of Shoreline and Volume Changes April 2014 to April 2016	3
Review of Each of the Beach Cells in Cape May Point	3
Individual Oceanfront Site Reviews—CMP-0 to CMP-8 Photos	4-20
Figures 1 to 9 Annual Cross Sections - 9 Municipal Profile Sites	5-21
Summary of Avalon’s Oceanfront Beaches	22
Observations & Recommendations	22

CMP-1: Lehigh Ave	Survey 45	April 24, 2017
CMP-2: Whilldin Ave	Survey 45	April 26, 2017
CMP-3: Coral Ave	Survey 45	April 26, 2017
CMP-4: Lake Drive	Survey 45	April 24, 2017
CMP-5: Cape Avenue	Survey 45	April 26, 2017
CMP-6: Pearl Avenue	Survey 45	April 26, 2017
CMP-7: Stites Avenue	Survey 45	April 24, 2017
CMP-8: Alexander Avenue	Survey 45	April 24, 2017

The summary table below compiles the annual shoreline and beach volume change information between 2016 and 2017. The shoreline 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.

Table 1.
Profile Shoreline and Sand Volume Changes
April 2016 to April 2017

Profile Number	Shoreline Change (feet)	Volume Change (yds ³ /ft)	Cell Distance (feet)	Net Volume Change (yds ³)
CMP-0	31	34.14	420	14,339
CMP-1	70	44.47	445	19,789
CMP-2	24	22.16	460	10,194
CMP-3	5	6.92	450	3,144
CMP-4	45	23.51	675	15,869
CMP-5	8	7.87	690	5,430
CMP-6	0	-3.69	710	-2,620
CMP-7	20	11.65	680	7,922
CMP-8	-39	-22.33	660	-14,738

Total Volume Change for Cape May Point = 59,329

Last year from March 2015 to April 2016, the Borough’s beaches recorded a gain of 52,682 cubic yards of sand focused on the eastern and western ends of the Borough’s shoreline. This year the Army Corps work appears at Lighthouse and Lehigh plus Lake Avenue beaches with only two sites of nine losing

sand. The Alexander Avenue site, a big gainer last year, shed sand into Delaware Bay or Sunset Beach this past year yielding a Borough wide net gain of 59,329 cubic yards of sand. Neglecting the loss from Alexander Avenue, the net was 74,067 cubic yards which approaches the volume reported as placed on the beaches by the USACE project manager (110,484 cy).

The summary table below compiles the shoreline and beach volume change information from March 2015 to beach conditions in April, 2017. The shoreline changes are again based on the advance (seaward) or the retreat (landward) of the zero elevation datum position on each cross section. Sand volume changes are computed for individual cross section in cubic yards of sand per foot of shoreline multiplied by the distance between the groins in Cape May Point to arrive at the volume in the right column for each cell.

Table 2
Profile Shoreline and Sand Volume Changes
March 2015 to April 2017

Profile Number	Shoreline Change (feet)	Volume Change (yds ³ /ft)	Cell Distance (feet)	Net Volume Change (yds ³)
CMP-0	111	88.24	420	37,061
CMP-1	91	45.67	445	20,323
CMP-2	27	14.77	460	6,794
CMP-3	-10	-4.24	450	-1,908
CMP-4	33	11.86	675	8,006
CMP-5	11	16.43	690	11,337
CMP-6	-30	-12.08	710	-8,577
CMP-7	15	22.22	680	15,110
CMP-8	25	33.05	660	21,813
Total Volume Change for Cape May Point =				109,959

Between March of 2015 and April of 2017 the Borough beaches gained 109,959 cubic yards of new sand largely due to efforts by the US Army Corps of Engineers. The work completed in late 2016 is listed above with the Borough's share directly placed equal to 110,484 cubic yards. The near equality between the net change over two years and the ACOE total sand volume places is strictly a coincidence, but it is nice to know that two years later the Cape May Point beaches retain the entire recent placement of material relative to 24 months earlier.

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

This section describes the changes documented at each profile location. Beach volume and shoreline changes were calculated from April 2016 to April 2017 and from March 2015 to April 2017 as shown in the tables above. The individual site review includes photos taken during the surveys and annual comparison plots for the past three years to document changes to the beach at each location. Individual site descriptions are included for each profile.

Lighthouse Avenue



The photo taken in April 2016 shows the dune and beach remained remarkably stable. There were few visible changes to the beach or dune system other than continued plant growth.



The photo taken in April 24, 2017 shows the dune toe and wider beach looking toward the Nature Conservancy. This has been a substantially wider beach as a result of the USACE work.

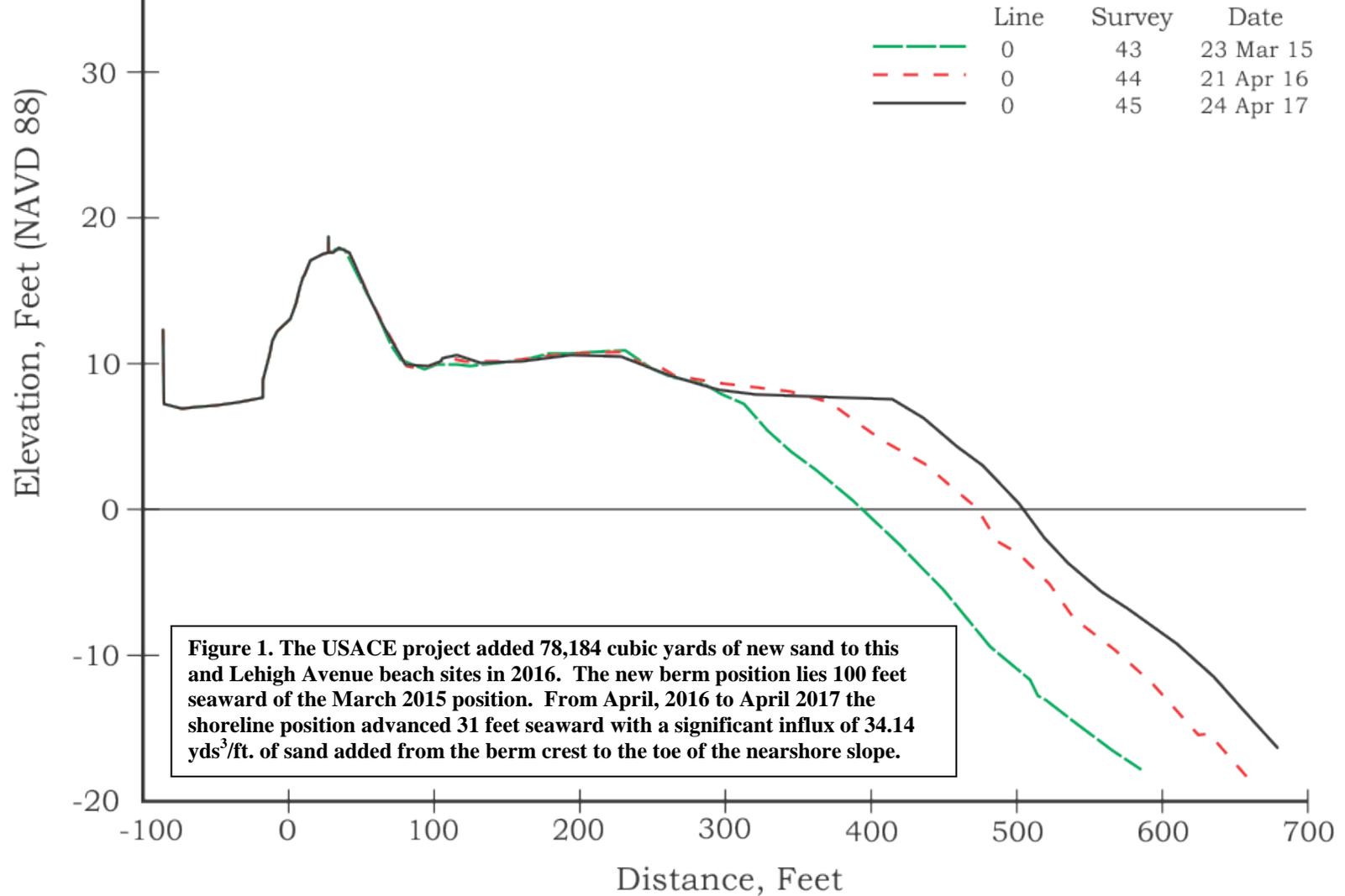
CMP-0 (Cell 0) is the northeastern-most cell that borders the State Park and is bounded to the west by a rock groin. This location has benefited tremendously from the USACE Lower Cape May Meadows – Cape May Point restoration project, initial construction was completed June 2007. The project added over 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; a small dune armored with tensor mats on the seaward slope protecting the exposed dune system from severe erosion.

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 per foot of shoreline seaward of the dune toe. Following the project the beach elevation ranged from 10-12 feet NAVD 88 and extended 275 feet seaward of the dune toe.

The recent USACE activity has added 78,184 cubic yards of new material to this site and Lehigh Avenue beach immediately to the southwest. The cross section shows that the beach grew wider in each of the past two years at this site.

Cape May Point - Annual Comparisons

CMP - Line 0 - Lighthouse Avenue



Lehigh Avenue



Taken on April 21, 2016, photo shows a stable to slightly accretive beach. The berm is noticeably wider and higher. Sand has accumulated along the beach berm and beachface slope, advancing the shoreline position.



Taken on April 26, 2017, the photo shows a stable to slightly accretive beach. The berm is wider and slightly higher a year later, sand has accumulated along the beach berm and beachface slope, advancing the shoreline position post-project.

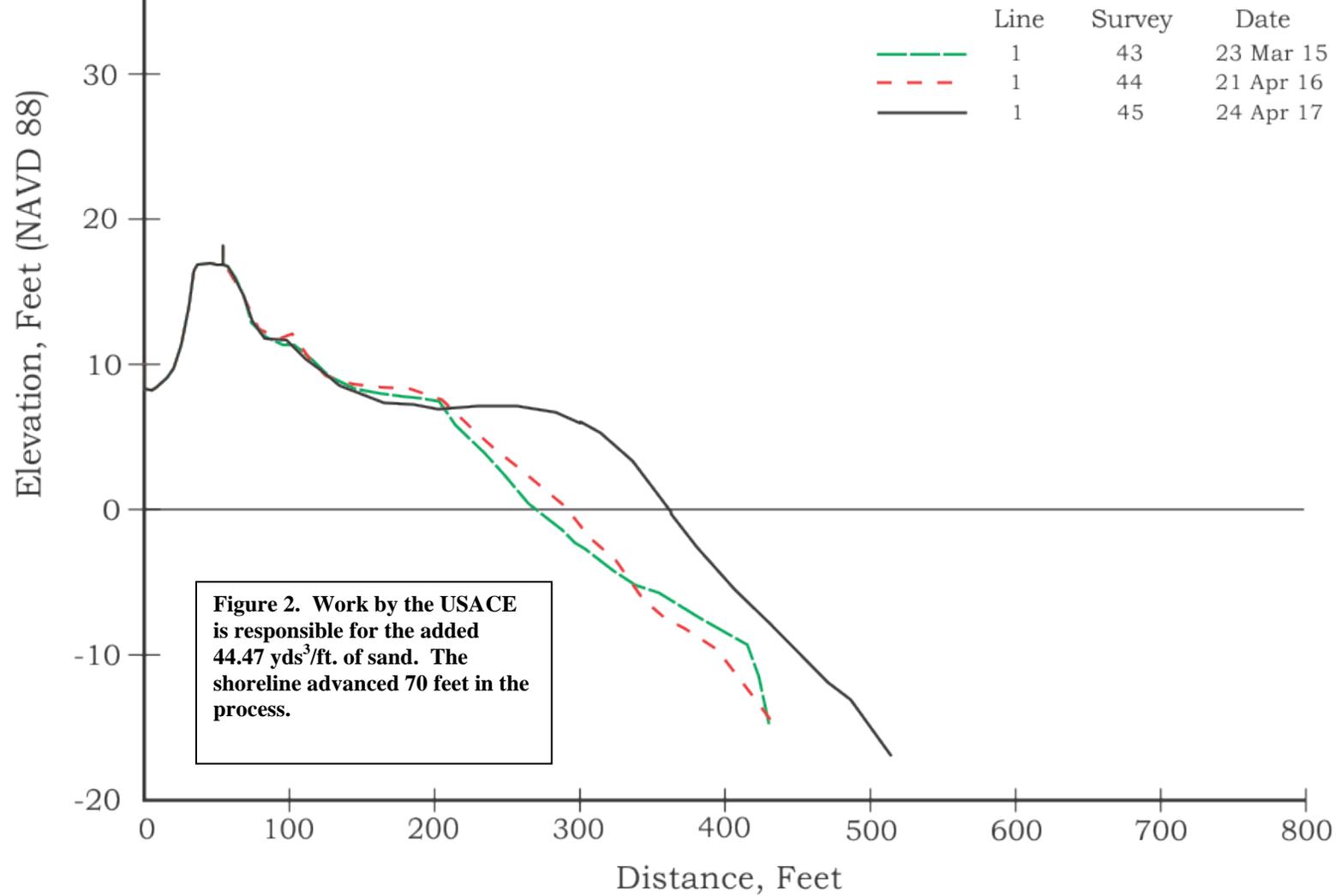
CMP-1 (Cell 1) stretches from the Lighthouse Avenue groin to Lehigh Avenue. Prior to the initial USACE project no dry beach was present between the rock groins. Shore protection was provided by a rock seawall that armored the seaward dune slope. Beyond the groins the seafloor steeply dropped into the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

This site also received sand during the USACE authorized second maintenance project conducted between November 2012 and 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 recent project counted both Lighthouse and Lehigh sites as one placement volume at 78,174 cubic yards. The visual impact is like that seen at Lighthouse Avenue with both sites gaining similar increases.

The shoreline advance has brought the zero elevation position 70 feet seaward compared to last year. This material will migrate slowly west along the shoreline benefitting the adjacent beach cells over time.

Cape May Point - Annual Comparisons

CMP - Line 1 - Lehigh Avenue



Lehigh to Whilldin Avenues



The photo above was taken on April 21, 2016. Seaward dune slope has accumulated sand and the beach is considerably wider in 2017.



This view from the berm shot April 24, 2017 is out on the new, wider beach showing two distant figures near the groin.

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 are functioning and 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 a rock seawall that served as property protection prior to the project. No additional sand was placed here during the 2013 2nd maintenance cycle.

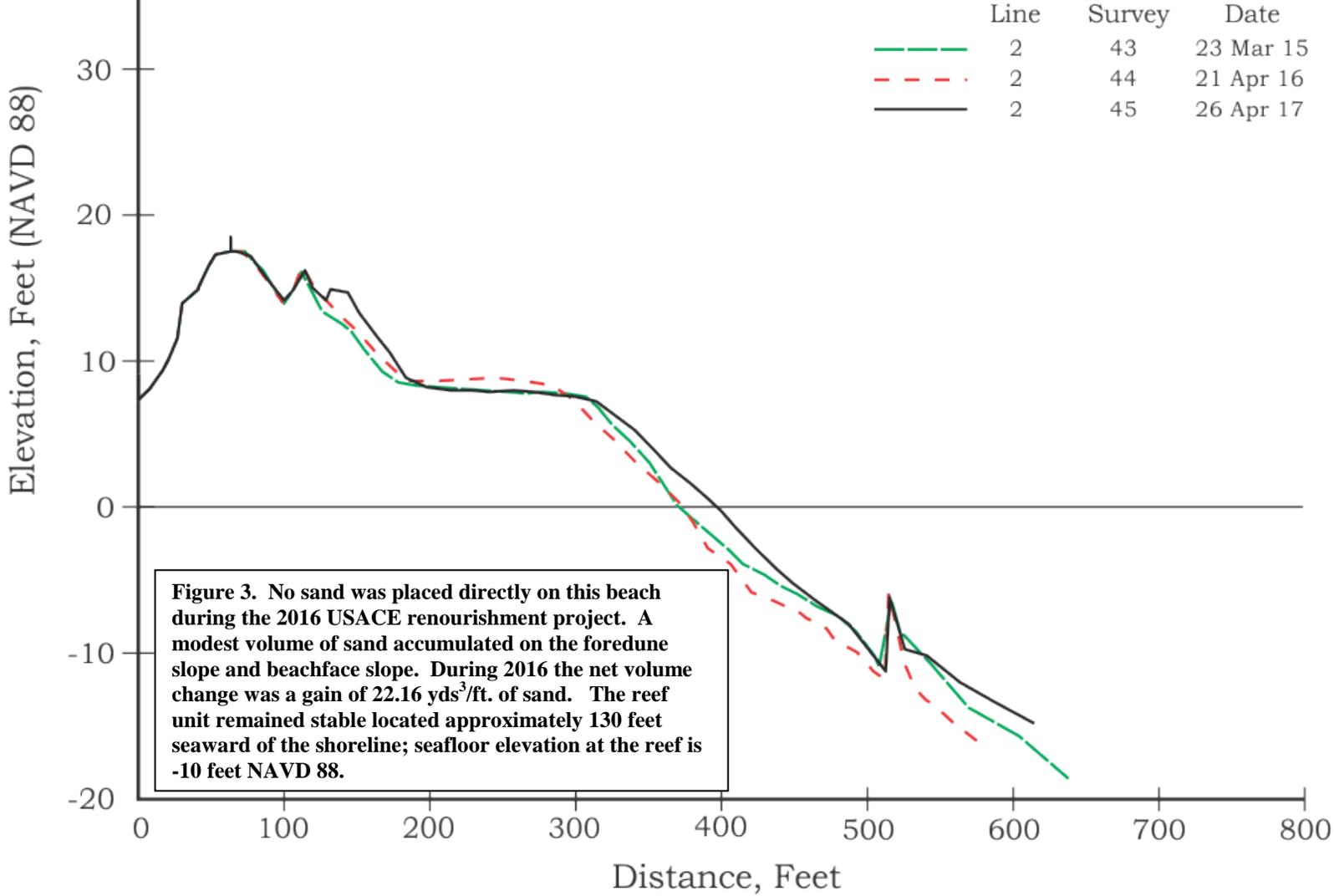
The recent cycle of USACE sand placement also did not directly put sand into this cell. However, the natural transfer of material has created a 24-foot shoreline advance and an net gain of 22.16 yds³/ft. in sand volume.

The “Beachsaver” unit crest remains about six feet above the nearshore seabed slope. Landward of the units, a trough also remains at shallower depths than last year, but in a similar range. The top elevation has remained constant for many years, so the structure appears stable.

As of April 2017, the reef crest was 110 feet seaward of the zero elevation shoreline position (about mid-tide position) with the concrete units residing in -11 to -12 feet of water below the NAVD88 zero elevation. The reef crest protrudes up to elevation -6 feet NAVD88. In this position the units are unlikely to be encountered by swimmers this season within the middle of the groin cell. 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 April 21, 2016 photo shows the beach offset along the Coral Avenue groin continues to widen. By far this offset is the most pronounced in Cape May Point.



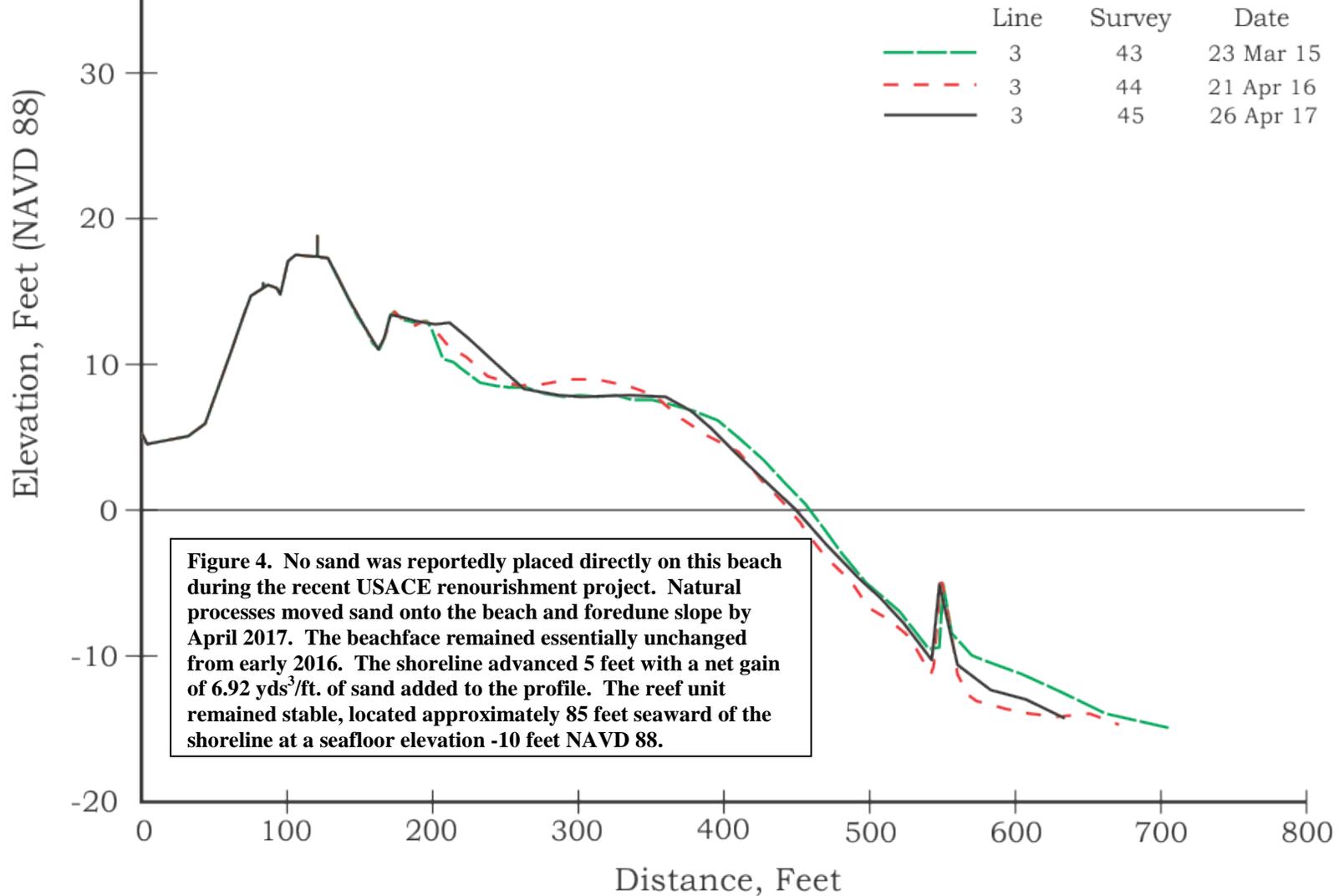
By April 26, 2017, the offset in beach width has decreased as more sand was added to the western half. The dune increased, while the beach remained constant at the cross section location.

CMP-3 is bounded by rock groins at Whilldin Avenue and Coral Avenue. This beach cell was the other original 1993 “Beachsaver” unit installation in Cape May Point. Sand added to the system during the initial USACE project had resulted in the near burial of the entire beach unit structure. No additional sand was placed here during the 2nd maintenance cycle (2012-2013). No new sand was added here during the recent USACE project either. Sand accumulated on the dunes, and minimally on the beach.

The minimal change to the beach width keeps the “Beachsaver” units within relative close proximity to the shoreline, approximately 85 feet. The concrete crest protrudes to elevation -5.0 feet (NAVD88 zero datum) while the base is at -11 to -12 feet NAVD88. This location has been restricted for several years as the beach width brings the zero elevation position within 100 feet of the reef structure. There is a deep trough at the landward side of the reef structure and the swimming space has decreased marginally. Again this year the recommendation is to allow swimmers to wade nearshore in shallow water less than 3-4 feet deep regardless of the tide level. Water access could be allowed here in mid-beach but water access near the groins where the units are closer to shore should be prohibited. Another hazard is the wave surge turbulence as larger waves pass over the submerged reef units. Someone of limited swimming ability might panic if buffeted about by this repetitive water turbulence within 40 feet of the reef units. This is only a concern when larger waves are reaching the shoreline.

Cape May Point - Annual Comparisons

CMP - Line 3 - Coral Avenue



Coral Avenue to Lake Drive



Photo above was taken on April 20, 2016 looking west at Lake Drive. There was a modest shift in sand from the beachface slope to the upper beach.



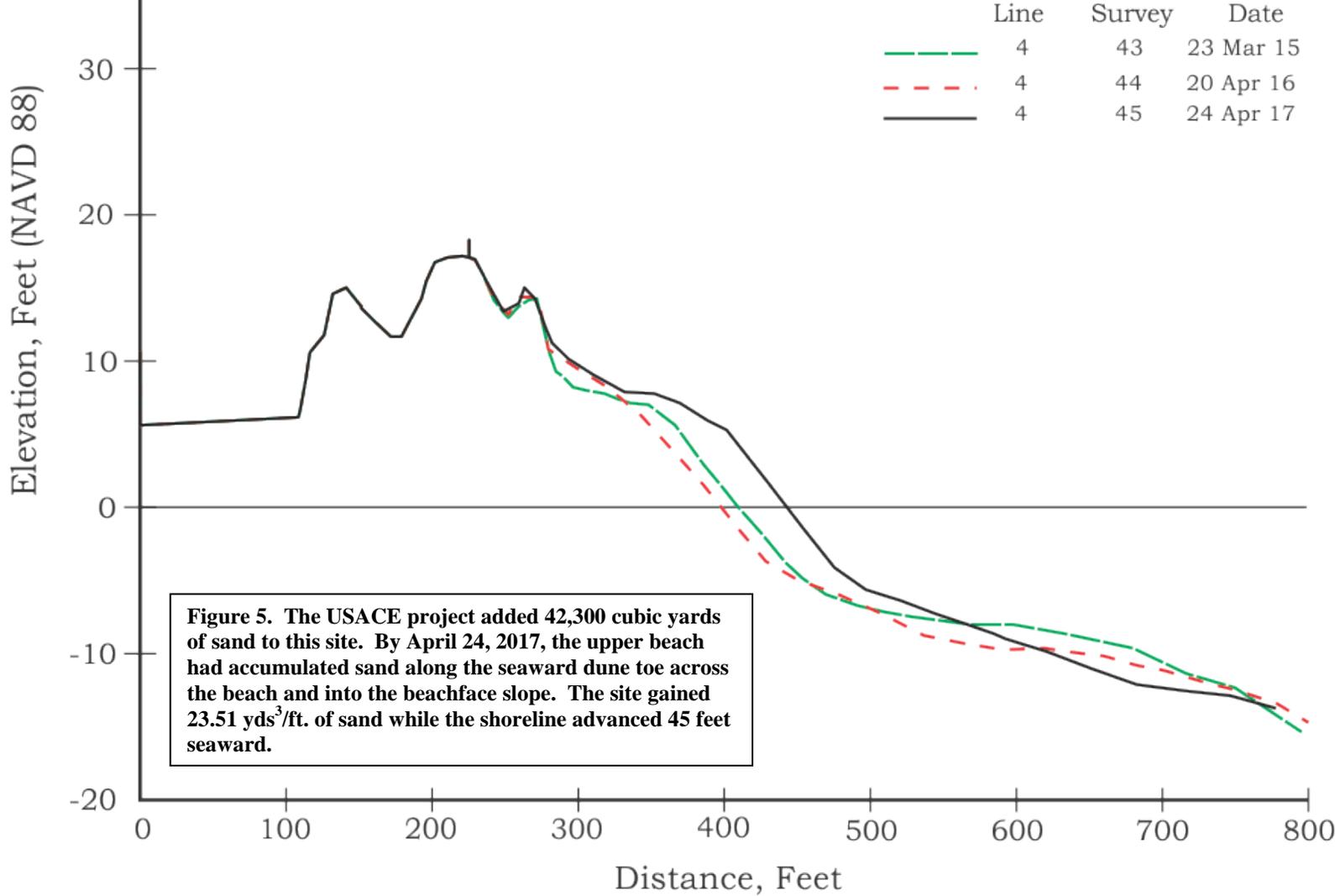
A similar view on April 24, 2017 shows a higher beach elevation with a well-defined wave limit on the sand.

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). This cell does not contain any nearshore “Beachsaver” structures but it has received sand both during the initial project and in 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). This site also received modest sand placement in 2016 (42,300 cubic yards, Dwight Pakam, personal communication).

The dune has remained relatively stable to slightly accretive through the recent monitoring time interval. The new sand shows as a wider berm accompanied by a 45-foot shoreline advance seaward. This added width will be welcome this summer since this is one of the most popular beach sites in the Borough.

Cape May Point - Annual Comparisons

CMP - Line 4 - Lake Avenue



Surf to Cape Avenues



The Photo above, taken on April 20, 2016 shows sand accumulation on the seaward dune slope and upper beach berm that partially buried early colonizing plants but enhanced storm resiliency.



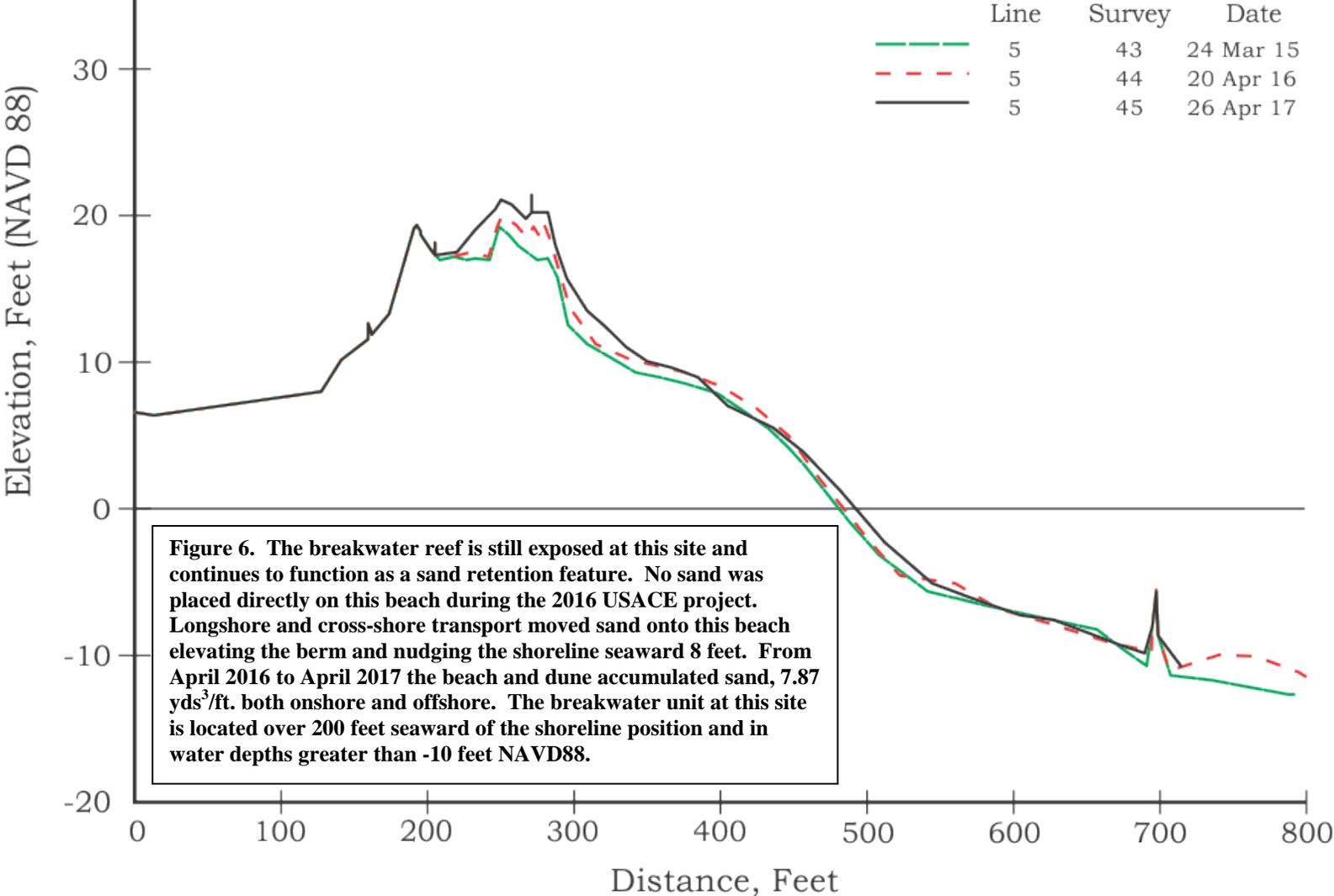
The view above was taken April 24, 2017 and includes the same pole on the beach as shown to the left. Dune enhancement occurred along with more sand at the dune toe.

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, located just under 200-feet seaward of the zero elevation shoreline position. These units are furthest from the shoreline and 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.

No sand was placed west of Lake Drive during the 2012-2013 USACE renourishment project or during the recent 2016 effort, but natural processes have moved sand from east to west along the Borough's shoreline over time. The wider beaches have provided a source of sand for the wind to move sand onto the seaward slope and crest of the dune. This process added 7.87 yds³/ft. in sand volume combined with an 8-foot shoreline advance seaward.

Cape May Point - Annual Comparisons

CMP - Line 5 - Cape Avenue



Cape to Pearl Avenues



This photo taken on April 20, 2016 shows accumulation of sand along the seaward dune slope and upper beach. Beach cusp formation in the beachface on the downdrift side of the groin resulted in modest shoreline retreat.



This view was taken April 26, 2017 at the toe of the dunes looking east. The beach is a little wider, but the majority of the added sand has accumulated on the dunes and at the dune toe.

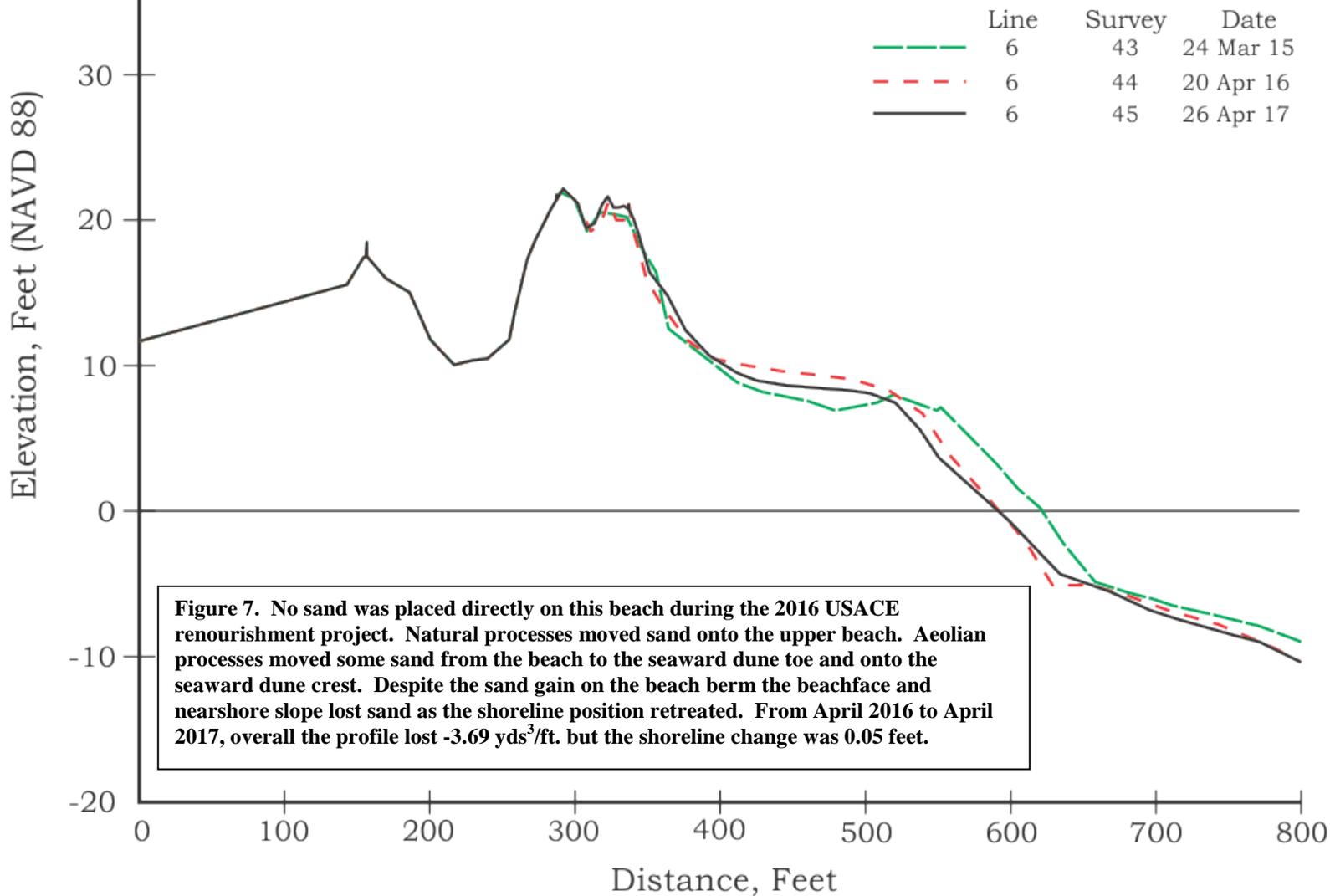
CMP-6 (Cell 6) is bounded by the rock groins at Cape Avenue and Pearl Avenue. The nearshore bay floor contains the “Double Tee” structures that were installed as part of the USACE CMP-227 experimental project. These units were quickly buried and have remained buried by sand in the past eight annual surveys. Consequently, they have limited ability to influence additional sand retention.

Sand shed from the initial up drift federal project beaches moves into this site seasonally by predominant longshore drift. As a result 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. 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 is already prohibited.

No sand was placed this far west during the USACE nourishment project, so beach building has been a result of natural processes. By April 2017, sand had accumulated on the dry recreational beach berm and seaward dune slope and crest through aeolian processes and wave run-up. The beach width remains at its 2016 position with a similar offshore slope. The sand volume decreased by 3.69 yds³/ft. while the shoreline change was just 0.05 feet since last year.

Cape May Point - Annual Comparisons

CMP - Line 6 - Pearl Avenue



Pearl to Stites Avenues



The photo above was taken on June 1, 2016 from a mid-beach perspective. Dune grass has colonized the seaward slope to the toe. The wider beach berm provides sufficient storm protection for continued dune growth.



By April 24, 2017, the berm was a bit wider, the dune grew above 30.0 feet NAVD 88 in elevation and sand accumulated at the seaward dune slope.

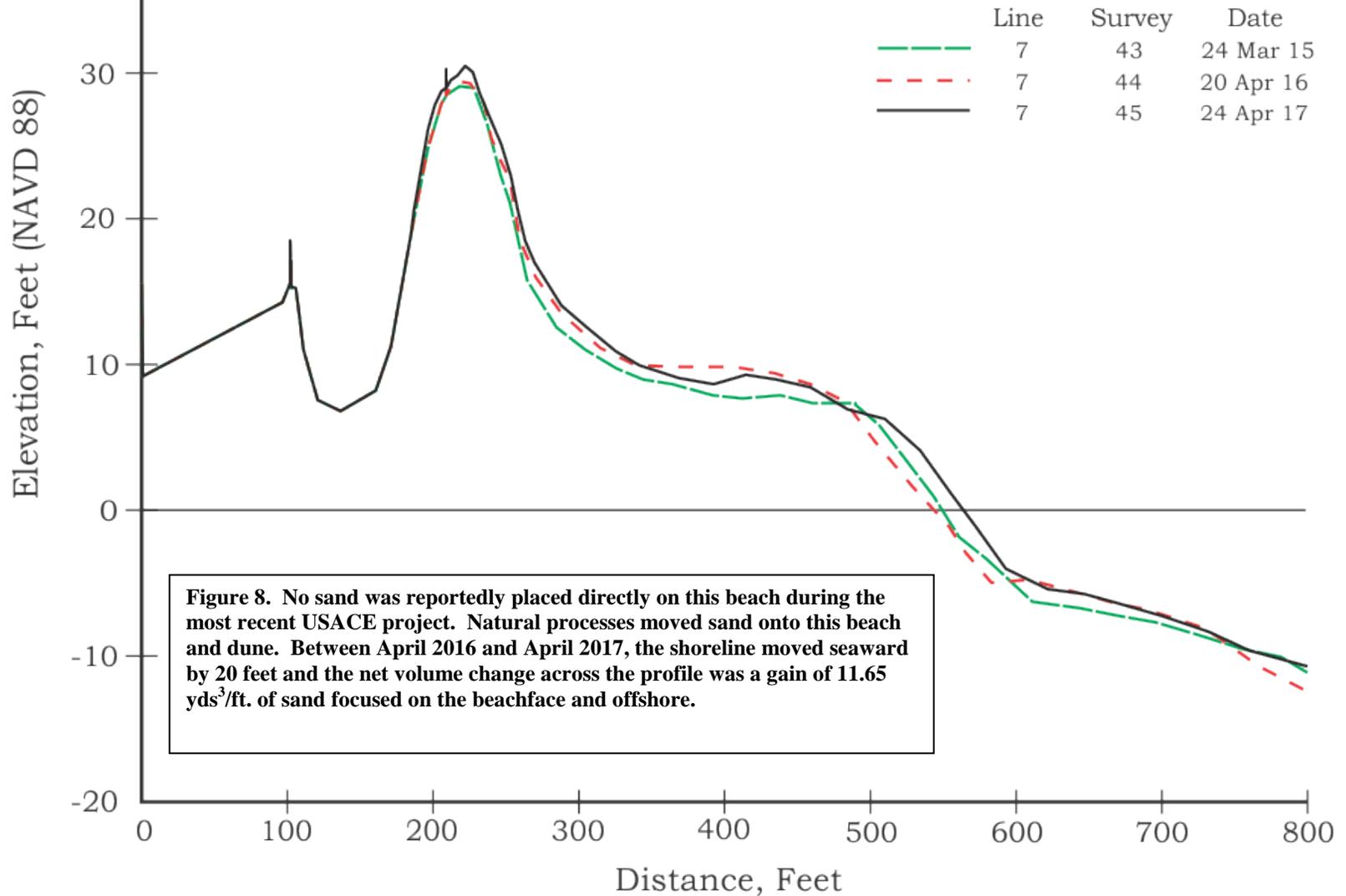
Profile CMP-7, located southeast of Brainard Avenue, (Cell 7) is bounded by the rock groins near Pearl Avenue and Stites Avenue. The cell has not received any sand directly from the past USACE beach restoration or maintenance projects. Natural processes dominated by longshore drift continue to transfer sand from east to west along the Borough's shoreline. This process has benefited the western beaches as sand has accumulated across the entire profile length from the dune crest to the offshore seafloor limits this process continued through April 2017. 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.

In 2017, the annual net volume gain was 11.65 yds³/ft. of sand with 20 feet of seaward shoreline position advance. The elevation of the recreational beach berm remained constant compared to last year and sand accumulated offshore. Aeolian transport moved sand to the seaward dune slope and up to the crest. Stites Avenue is the first Cape May Point dune to grow higher than 30 feet in elevation. The wind transport effect has been evident on the Stites Avenue beach access pathway where sand deposition has repeatedly buried the pathway and seating area at the dune crest.

Two solutions were suggested last year; 1) place 40-50 feet of snow fencing more or less parallel with the cut at the crest, but 30 feet toward the west from the cut; or 2) abundantly plant the 30 feet of dune crest toward the west with beach roses or dune grass between the existing dense vegetation and partly down the upper seaward dune slope. Either solution will reduce the deposition of sand in the Stites Avenue dune walk over. Each winter add another row of fencing at the toe of material trapped by the initial fence row or add more plants at the sand toe.

Cape May Point - Annual Comparisons

CMP - Line 7 - Stites Avenue



Stites to Alexander Avenues



This photo taken on April 19, 2016 shows continued dune growth and seaward expansion of the beach berm and shoreline position.



Sand left the Alexander Avenue beach as littoral processes moved it further west into the bay from the final groin or onto the Sunset Beach to the west.

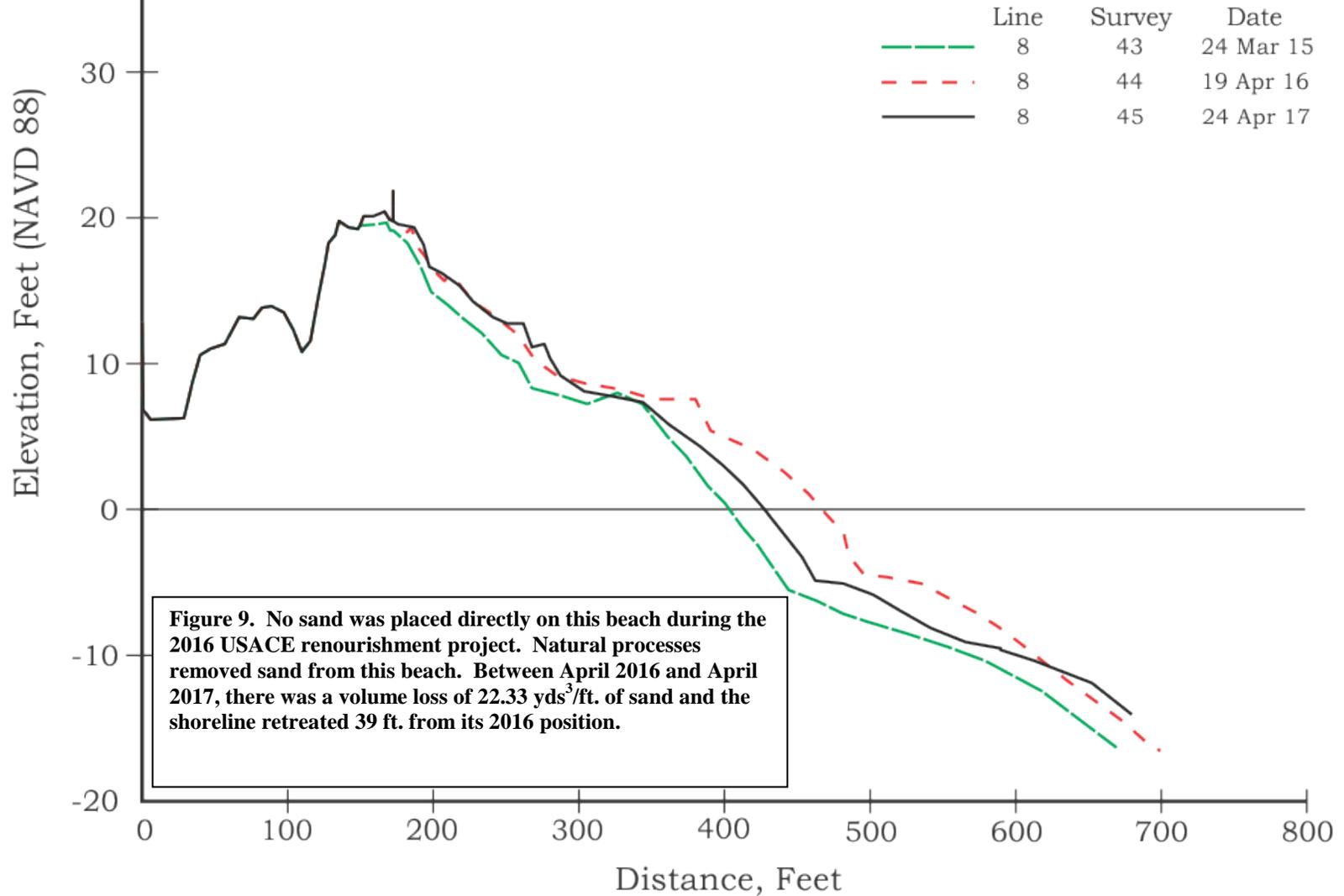
The Alexander Avenue location, CMP-8 is the western most beach cell in the Borough. Sand placement was never included for this location during the USACE projects. Natural processes have moved sand from the project beaches to this location. The beach extends seaward nearly to the tip of the western groin. Sediment loss from this cell is to the western Delaware Bay shoreline and shoals locally known as the “Cape May Rips”. 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.

Following completion of the initial USACE project sand began to accumulate in increasing amounts, 2015 was the first year in which this accretive trend stopped. In 2016, the accretive trend continued with a large wedge of sand accumulating from the seaward dune crest seaward to the profile limits. The dune advanced seaward 20 feet as a result of sand accumulation on the seaward slope. However, by April 2017, the shoreline retreat was 39 feet as 22.33 yds³/ft. in sand volume left the cell.

The dry beach provides ample area 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. Swimming has not been permitted at Alexander Avenue for many years with the final groin a long-time favorite for fishing activities.

Cape May Point - Annual Comparisons

CMP - Line 8 - Alexander Avenue



Summary

The USACE projects starting in 1989 have significantly increased the available sand budget from Cape May City through Cape May Point. In Cape May City the USACE has completed 11 nourishment cycles including the post-Sandy effort completed January 2014. In January 2013, the USACE completed its second nourishment cycle of the Lower Cape May Meadows – Cape May Point project with placement of 345,000 cubic yards of sand. In 2016, an additional 951,893 cubic yards were placed along the entire regions shoreline. All of this sand has resulted in a vast influx of sand for all the Cape May Point beaches even those western beaches not directly filled. Approximately 108,697 cubic yards (cy) of sand was placed directly on the Borough's beaches during the 2013 project limited to CMP 0, CMP 1 (71,697cy) and CMP 4 (37,000cy) cells. Sand has accumulated in the western cells and especially along the eastern shoreline. In 2016, 110,484 cubic yards were added to Cape May Point beaches at Lighthouse, Lehigh and Lake Avenues. Sand is also derived from sand shed from the USACE project beaches and transferred longshore from the State Park 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 April 2017.

The net sand volume change for 2017 was a gain of 59,329 cubic yards of sand. At all sites aeolian processes have moved sand from the wider beaches to the seaward dune toe and slope. Each site also showed an accumulation of sand on the recreational beach berm adding from a thin layer of sand up to two-feet thick of additional elevation. Sand was added from the dune seaward to the profile limits raising the elevations and expanded the overall width of the system. The individual cross sections that showed uniform deposition of sand from the dune crest through offshore do require large volumes of new sand being introduced to the system from adjacent beaches and outside the Borough.

Observations & Recommendations

There has been only minimal changes seen in the beach slope, offshore depths, and proximity of the beach to the offshore submerged breakwater units installed at three locations. CMP-2 remains at just over 100 feet from the zero elevation line to the breakwater crest, while CMP-3 is steeper and closer by 20 feet or so. The newer units at Cell CMP-5 at Cape Avenue are relatively distant at 200 feet and much safer for swimming. The Double Tee units at CMP-6 are buried where swimmers might be allowed and not an issue for swimming safety.

1. Cells 0 and 1 do not have structures; the beaches at Lighthouse and Lehigh Avenue gained substantial new sand and remain stable to accretive. Both beaches have steep slopes into deep water with strong tidal currents into and out of Delaware Bay.
2. Cell 2 at Whilldin Avenues, the shoreline position (zero datum) is approximately 110 feet distance from the breakwater structure. Depth of the scour trough landward of the units has decreased to -10 feet NAVD88. The swimming area remains limited, especially closer to the groins but should be manageable in the mid- beach cell 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. This is due to wave surge turbulence during larger wave size events.
3. Cell 3 at Coral Avenue, the shoreline position remained constant; the breakwater units in April 2017 were approximately 100 feet from the shoreline position (zero datum). The beachface slope remains fairly steep with continued existence of a scour trough landward of the units (-10 feet NAVD88). 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 (defined by a line of floats) 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 and the recreational berm is wider this year. The relatively shallow slope platform in the water between groins make wading and swimmer relatively safer for beach patrons.
5. Cells 5 and 6 contain the newer units but pose minimal risk for swimming in 2017. Both reef structures lie in greater than - 8 feet of water approximately 200 hundred feet from the shoreline 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 benefited from a wider berm area enhancing the recreational value of the beach, this paired with the shallow offshore platform will offer a relatively safe option for swimming.
7. Cell 8 at Alexander Avenue, sand loss this year has reduced the blanket space, but the available recreational area has been substantially improved at this beach since 2005. The sand lost from Alexander Avenue does not accumulate on the Sunset Beach segment, but adds to the sediment layers on the nearshore Delaware Bay floor instead.

The Coastal Research Center (CRC) will continue to monitor the conditions on the Cape May Point beaches at the Borough’s request and assist officials with addressing any coastal zone management zone issues. Please contact the CRC with any questions or concerns.