ANNUAL REVIEW FOR 2020 OF THE CAPE MAY POINT, NJ MUNICIPAL BEACHES



The photo above taken on April 4, 2020 from the landward side of the dune fencing on Lighthouse Avenue looking out across the foredune vegetation into the State Park. The WW II concrete fire control bunker, now residing within the dry sand beach was entirely beyond the water line proir to the beach restoration. Where the photographer is standing would have been at or perhaps slightly in the ocean in 1990. The pine trees are naturally seeded into the dune along with the yucca plant in the left-center foreground.

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

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May 8, 2020

Table of Contents

| Introduction | 1 |
|---|------|
| Beach Monitoring Program | 1 |
| Table 1: Summary of Shoreline and Volume Changes May 2019 to April 2020 | 2 |
| Table 2: Summary of Shoreline and Volume Changes April 2018 to April 2020 | 3 |
| Review of Each of the Beach Cells in Cape May Point | 3 |
| Individual Oceanfront Site Reviews—CMP-0 to CMP-8 Photos | 3-21 |
| Figures 1 to 9 Annual Cross Sections - 9 Municipal Profile Sites | 6-22 |
| Summary of Cape May Point's Oceanfront Beaches | 23 |
| Observations & Recommendations | 23 |

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 April 3 and 7, 2020. These were compared to previous surveys that were conducted April 2018 and May 2019. The findings included in this report complete the annual review of the municipal beaches prior to the 2020 beach bathing season. This year beach use will be subject to a serious decline in corona virus cases currently forcing the Borough to close the beaches to public use.

No subsequent US Army Corps of Engineers (USACE) work has been done since early 2017. Work will follow the planned maintenance cycle for both Cape May Point and the Nature Conservancy.

The 2019 hurricane season was fortuitously limited along the mid-Atlantic shoreline. Two storms entered the western north Atlantic during the season but stayed well out to sea as they moved to the New Jersey latitude. The winter season saw a number of very mild northeasters with the worst occurring April 13, 2020 accompanied by 70 MPH wind gusts from the southwest. Most storms tracked to the northwest of the Jersey shore this year making it one with very low sand volumes eroded from NJ beaches.

Since all beach access paths were closed during this survey, the assessment is one where some windblown sand clearing will likely be needed if and when they are opened.

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 were established 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 | Surveys 46, 47 & 48 ending April 4, 2020 |
|--------------------------|--|
| CMP-1: Lehigh Ave | Surveys 46, 47 & 48 ending April 4, 2020 |
| CMP-2: Whilden Ave | Surveys 46, 47 & 48 ending April 4, 2020 |
| CMP-3: Coral Ave | Surveys 46, 47 & 48 ending April 4, 2020 |
| CMP-4: Lake Drive | Surveys 46, 47 & 48 ending April 7, 2020 |
| CMP-5: Cape Avenue | Surveys 46, 47 & 48 ending April 7, 2020 |
| CMP-6: Pearl Avenue | Surveys 46, 47 & 48 ending April 7, 2020 |
| CMP-7: Stites Avenue | Surveys 46, 47 & 48 ending April 7, 2020 |
| CMP-8: Alexander Avenue | Surveys 46, 47 & 48 ending April 7, 2020 |

The summary table below compiles the annual shoreline and beach volume change information between 2019 and 2020. 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.

| | | May 2019 to Apr | | |
|---------|-----------|------------------------|----------------------|---------------------|
| Profile | Shoreline | Volume | Cell | Net Volume |
| Number | Change | Change | Distance | Change |
| | (feet) | (yds ³ /ft) | (feet) | (yds ³) |
| CMP-0 | -7.4 | -9.81 | 420 | -4,119 |
| CMP-1 | 10.3 | 9.89 | 445 | 4,401 |
| CMP-2 | -17.6 | 1.63 | 460 | 749 |
| CMP-3 | -8.9 | 3.60 | 450 | 1,619 |
| CMP-4 | -9.0 | -2.57 | 675 | -1,733 |
| CMP-5 | 10.7 | 13.88 | 690 | 9,574 |
| CMP-6 | -3.6 | -0.03 | 710 | -20 |
| CMP-7 | 5.5 | 1.41 | 680 | 957 |
| CMP-8 | 23.9 | 9.69 | 660 | 6,397 |
| | T T | otal Volume Change | for Cape May Point = | 17,825 |

Table 1.Profile Shoreline & Sand Volume ChangesMay 2019 to April 2020

This is the second year in a row where natural processes have provided moderate sand volume gains in Cape May Point. Last year, the Borough's beaches recorded a gain of 29,848 cubic yards of sand focused largely on the eastern ends of the Borough's shoreline. This year the gain was less at 17,825 cubic yards, but there were only three cells were sand was lost (CMP-0, CMP-4 and CMP-6). None of the loss compartments saw serious declines in sand volume or major shoreline position retreats landward. There were five cells were the shoreline (zero-elevation) position did retreat with the maximum value at -17.6 feet in Cell 2.

The summary table below compiles the shoreline and beach volume change information from April 2018 to beach conditions in April 2020 covering the last two years of surveying. Four of nine survey locations saw shoreline retreats landward over the past two years. The sand volume was positive at all but Lighthouse Avenue and at Brainard Avenue with single digit losses recorded at Lighthouse and a subsingle digit loss seen at Brainard.

| | April 2018 to April 2020 | | | | | | |
|---------|--------------------------|------------------------|----------------------|---------------------|--|--|--|
| Profile | Shoreline | Volume | Cell | Net Volume | | | |
| Number | Change | Change | Distance | Change | | | |
| | (feet) | (yds ³ /ft) | (feet) | (yds ³) | | | |
| CMP-0 | -2.9 | -5.71 | 420 | -2,397 | | | |
| CMP-1 | 33.5 | 25.13 | 445 | 11,183 | | | |
| CMP-2 | 6.7 | 19.22 | 460 | 8,843 | | | |
| CMP-3 | 2.8 | 11.54 | 450 | 5,195 | | | |
| CMP-4 | -18.9 | 2.64 | 675 | 1,779 | | | |
| CMP-5 | -3.1 | 16.18 | 690 | 11,161 | | | |
| CMP-6 | 18.8 | 12.42 | 710 | 8,820 | | | |
| CMP-7 | -7.4 | -0.90 | 680 | -609 | | | |
| CMP-8 | 17.6 | 11.79 | 660 | 7,780 | | | |
| | Το | otal Volume Change f | for Cape May Point = | = 51,756 | | | |

Table 2Profile Shoreline & Sand Volume ChangesApril 2018 to April 2020

In the two-year interval between April of 2018 and April of 2020, the Borough beaches gained 51,756 cubic yards of new sand as material directly placed both in Cape May City and along the Nature Conservancy migrated south into Cape May Point carried by littoral transport. The work completed in late 2016 within the Borough directly placed 110,484 cubic yards of new sand on some Borough beaches. The Lighthouse Avenue site appears to be indicating that the abundance of new material arriving is declining, but not severely so.

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

This section describes the changes documented at each profile location. Individual site descriptions are included for each profile. The spring 2020 photographs provide an update on each site's environmental conditions and the cross sections show where change has occurred and the approximate magnitude of the changes in sand volume and shoreline position.

Lighthouse Avenue:

CMP-0 is the northeastern-most cell that borders the State Park and is bounded to the southwest by a rock groin. This location has benefited tremendously from the USACE Lower Cape May Meadows – Cape May Point restoration project, where 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 to protect the exposed dune system from severe erosion. There is no public access from Lighthouse Avenue to the beach.



Figure 1. The view was taken April 3, 2020 showing the transition into the NJ State Park and with Cape May City in the far distance. This expanse of beach remains a direct result of federal beach restoration at this location.

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.

In 2016, USACE activity added 78,184 cubic yards of new material to this site and the Lehigh Avenue beach immediately to the southwest. The cross sections show that the beach grew wider following the 2016 survey and remained stable since adding sand volumes in 2018 and 2019, totaling 43,232 cubic yards.

The Lighthouse Avenue beach is currently 400 feet wide from the dune toe to the water's edge. There has been minimal change in the profile configuration. Sand has added to the dune, shifted nominally on the dry beach, and moved upslope onto the berm at the beachface. Offshore, the slope has remained constant, if rather steep.



Lehigh Avenue:

CMP-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.



Figure 2. This view is to the northeast showing the beach width present as of April 3, 2020. The dune to the left side sits on top of the stone revetment and the beach is many times the pre-beach nourishment width creating an excellent storm barrier as well as a recreational resource to the Borough citizens.

This site also received sand during the USACE authorized second maintenance project conducted between November 2012 and January 2013. The most 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 seeing similar shoreline advances. Sand continued to move into this groin cell between 2018 and 2020. Both the shoreline advance (+33.5 feet) and the sand volume increase (25.13 yds³/ft.) were the largest seen across the Borough shoreline in the two-year interval.



Lehigh to Whilden Avenues:

The CMP-2 beach is southeastern-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 stable. Sand added to the system during the initial USACE project 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 "Beachsaver" unit has been incrementally buried by sand reducing its crest exposure above the seabed from 6 to barely 2.0 feet above the sea floor at its location. Landward of the units, a very minor trough remains with even shallower sand slopes further seaward as material was added offshore. There is a 90-foot area between the zero-elevation position on the beach and the barriers. The top elevation has remained constant for many years, so the structure appears stable. At low tide the distance would be less than 90 feet and at high tide a bit more. The depth at the base of the beachsaver is 7.05 feet NAVD 1988.



Figure 3. The April 3, 2020 view to the west shows an expanding foredune zone with large mounds of wind deposition around clumps of few grass plants indicating continued dune growth. The beach width is recreationally sufficient and serves as an effective wave barrier too.

The recent cycle of USACE sand placement also did not directly put sand into this cell. However, sand added to this cell by natural processes with a wider berm and continued extensive burial of the 1993 "Beachsaver" reef system.

However, the concrete barriers are still exposed on the seabed and have become more of a tripping hazard and risk of cut feet on the marine growth on the structure than previous potential for wave rush or back wash of swimmers into the structures.

This beach gained 1.63 yds^3/ft . in sand volume while seeing a 17.6-foot shoreline retreat between 2019 and 2020. Over the past two years the site gained 19.22 yds^3/ft . in sand volume while enjoying a 6.7-foot shoreline advance.



Whilden to Coral Avenues;

CMP-3 is bounded by rock groins at Whilden Avenue and Coral Avenue. This beach cell was the second 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 2016 USACE project either. Sand accumulated on the dunes, and minimally on the beach.



Figure 4. The view to the east along the foredune toe shows the grass mounding of the added sand where root extensions have generated tufts of new growth expanding the dune's width. The beach view is back toward CMP-2 showing the same two posts on the beach.

This site has seen near burial of the "beachsaver" reefs where the elevation relief on the concrete structures has been reduced from 5.0 feet showing above the seabed in 2016 to 2.25 to 2.5 feet showing May 1, 2019. This year, the reef system remains nearly buried with sand with more trapped between the shoreline and the reef structure.



Coral Avenue to Lake Drive

The Lake Drive (CMP-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 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).



Figure 5. This April 3, 2020 view to the east shows the extensive foredune, but a narrow beach curving toward the dune from the rock groin.

Lake Drive continues a multi-survey beachface retreat this year with approximately 9 feet of shoreline retreat in both 2019 and 2020. The sand volume increased by 17.55 yds³/ft. in 2019 and then remained constant with a minor gain of 1.63 yds³/ft. in 2020. The total of 19.22 yds³/ft. was added over two years.



Surf to Cape Avenues:

CMP-5 contains the nearshore "beachsaver" units installed in 2002 during the USACE CMP-227 experimental project. The breakwater units are still present, located just over 240-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.



Figure 6. This beach also saw continued wind deposition within the foredune zone adding to the combination of grass growth and seaward expansion of the dune's seaward toe. The beach width is sufficient for the current conditions.

The wider beaches have provided a source of sand for the wind to move sand onto the seaward slope and crest of the dune. The beach from the dune crest to the waterline continued to gain sand volume between 2017 and 2020. The 2020 increase was 13.88 yds³/ft. overall and 10.73 yds³/ft. above the zero elevation. The "Beachsaver" reef system was detected, but with even less relief than documented last year.



Cape to Pearl Avenues;

CMP-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 ten annual surveys. Consequently, they have limited ability to influence additional sand retention.



Figure 7. This view was taken April 7, 2020 at the berm crest on the beach looking east toward the rock groin. The dune toe defines the extent of dune growth leaving a modest dry beach widening toward the groin.

Sand shed from the initial up drift federal project beaches moves into this site seasonally by predominant longshore drift. The barrier 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. This past year has seen added material to the berm, the foredune slope with very little loss offshore.



Pearl to Stites Avenues;

Profile CMP-7, located southeast of Brainard Avenue, 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. With no submerged offshore 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.



Figure 8. The April 7, 2020 view to the west on CMP-7 shows the expanse of foredune slope and its vegetation. The mass of accumulated dune sand remains the largest among the Cape May beach segments in both total elevation and width of the dunes. The beach provides excellent protection as well.

Dune crest elevations in excess of 30 feet NAVD 1988 provide excellent storm protection, especially since the beach faces southwest where major events do not directly impact the shoreline. The beach, the dunes and the nearshore regions all gained sand since 2019. The volume totals were not high (1.41 yds³/ft.) added by 2020 and a small net loss (-0.9 yds³/ft.) seen between 2018 and 2020. The shoreline retreated 7.4 feet since 2018.



Stites to Alexander Avenues;

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 moves onto the western Delaware Bay shoreline and shoals locally known as the "Cape May Rips". The offset landward 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 dominance of the tidal currents over the minimal wave transport landward for sand allows the currents to distribute sand on the shallow bay floor in the vicinity, instead of large quantities making it to the Sunset Beach shoreline.



Figure 9. This westernmost cell ends at the groin in the distance. Lower Township is immediately adjacent to the structure. The wave swash has recently reached the expanding dune toe slope without causing erosion to date. The ancient concrete ship is visible in the far distance off Sunset Boulevard beach in the Township.

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, sand accumulation resumed with a large wedge of sand appearing from the seaward dune crest seaward to the profile limits. The dune has

provided the most dramatic volume gain of any along the Cape May coastline. It accounts for about 40% of the entire site's sand accumulation since 2017. The beachface added the remaining 60% as the berm advanced seaward. The shoreline advanced 17.6 feet between 2018 and 2020 with 23.9 feet of advance in 2020 responsible for the net positive change.

Swimming is not permitted at this beach, reserving it for fishing and beach sitting only.



Summary:

The USACE commenced sand placement in Cape May City in 1989 and have conducted maintenance or storm restoration efforts 11 times including restoring beaches following Hurricane Sandy in 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 region's shoreline. Altogether, the beach restoration south of Cold Springs Inlet jetties has added 7,723,385 cubic yards of new material never previously within the local regional sand supply. The local wave approach to the regional shoreline guarantees that most of that sand will eventually pass into Cape May Point minus the volume which moves out to sea or onto the Delaware Bay bottom directly or remains in place as part of the beaches and dunes.

This sand supply has resulted in an influx of material for all the Cape May Point beaches even those western beaches not directly filled. Approximately 108,697 cubic yards (cy) of sand were placed directly on the Borough's beaches during the 2013 project limited to CMP 0, CMP 1 (71,697 cy) and CMP 4 (37,000 cy) 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 (CMP 0, 1 and 4). In addition, sand continues to be 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 2020. In 2019 and 2020, large additions appeared along the eastern Borough beaches offshore, to the point of near burial of the 1993 "beachsaver" reef system installed at sites CMP-2 and CMP-3. The 2019 and 2020 cross sections at these two sites do show the most sand ever seen at the reef system. This sand accumulation continued with deposition further seaward from the reef systems creating a gentler slope into the bay. Strong northwest winds have produced dramatic additions to the western site dunes enhancing both the crest elevations and generating a wider foredune slope that now occupies the entire pre-existing width of the beaches originally in each cell.

The net sand volume change for 2020 was a decent gain of 17,514 cubic yards of sand. At most sites aeolian processes have moved sand from the wider beaches to the seaward dune toe and slope. The most dramatic addition in 2020 appears to have occurred at Alexander Avenue at CMP-8.

Observations & Recommendations

- 1. Cells 0 (Lighthouse Ave.) and 1 (Lehigh Ave.) do not have reef structures; the beaches at Lighthouse and Lehigh Avenue gained substantial new sand and currently have the widest dry sand recreational area of any in the Borough. Both beaches have steep slopes into deep water with strong tidal currents into and out of Delaware Bay.
- 2. Cell 2 at Whilden Avenues, the shoreline position (zero datum) is approximately 120 feet distance from the breakwater structure. Depth of the scour trough landward of the units has increased a bit from 2019, but with 2.5 feet of the reef structure now exposed above the sea floor around the units. The swimming area width has increased by 30 feet, but there is a risk of injury to unwary visitors if they step on the reef structure by accident. Wave surge should be far less than when 6-7 feet of height existed between the reef crest and the landward seafloor. The CRC again recommends installing a line of floats indicating the maximum distance for swimming that should be about 20 feet from the breakwater reef.

- 3. Cell 3 at Coral Avenue, the shoreline position remained relatively constant; the breakwater units in April 2020 were approximately 110 feet from the shoreline position (zero datum). The space between the water's edge and the reefs filled in dramatically to allow bathers to walk into the water to the reef itself. Wave turbulence over the structures should be minimal this season because about 2 feet of reef structure is exposed above the seafloor. The reduction in exposed reef structure above the sand surface reduces the wave turbulence over the reef and makes for safer swimming. Markers or floats should be used if swimming is allowed. Perhaps both CMP 2 & 3 could be used this season as a means to space out summer visitors as part of social distancing and allow chest deep water access in both of these beach cells.
- 4. Cell 4 (Lake Ave.) 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 about the same this year. The relatively shallow slope platform in the water between groins make wading and swimmer relatively safer for beach patrons.
- 5. Cells 5 (Cape Ave.) and 6 (Pearl Ave.) contain the newer submerged breakwater units but they pose minimal risk for swimming in 2020. Both reef structures lie in greater than -8 feet of water approximately 200 hundred feet from the shoreline at low tide. The landward trough filled in at Cell 5 as well, generating a flat area between the reef and the shoreline. The "Double Tee" structure in Cell 6 is 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. Cell 7 at Stites Avenue benefited from a stable berm area enhancing the recreational value of the beach, this paired with the shallow offshore platform will offer a relatively safe option for swimming. The beach is wider in 2020, but only by 6 feet.
- 7. Cell 8 at Alexander Avenue has seen a large gain in dune width as the foredune dramatically accumulated sand. The berm also grew wider increasing the recreational use area too. This beach has traditionally been closed to swimming. Allowing water access would entail additional life guards be hired to protect it.

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 issues. Please contact the CRC with any questions or concerns.