

**FINAL REPORT FOR 2017
ON THE CONDITION OF THE MUNICIPAL BEACHES
IN
THE CITY OF BRIGANTINE BEACH, ATLANTIC COUNTY, NEW JERSEY**



View to the north from 14th Street North at the end of the promenade as the US Army Corps project maintenance for 2018 got underway January 26, 2018. The dredge in Brigantine Inlet can be seen on the horizon in the distance and the sand is being placed on the “feeder beach” for about 1,500 feet north of development to provide added material as the project proceeds south to approximately Roosevelt Blvd.

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Annual Report for 2017 to the City of Brigantine Beach on the Condition of Municipal Ocean Beaches

Introduction:

This report presents the status of the beaches within the City of Brigantine Beach from October 2016 to October 2017. During this period, the municipal beaches were subjected to a significant northeast storm (January 23, 2017) on the one-year anniversary of the January 2016 storm named Jonas. The January 2017 storm was less severe than the Jonas northeaster. A moderate storm occurred on March 14, 2017 and in May from a low-pressure system. In September (18-19), coastal flooding and high waves were associated with the offshore passage of Hurricane Jose. The fall season was relatively quiet with cold weather dominating late December into January 2018.

The US Army Corps of Engineers (USACE) returned in early 2018 to replace sand along the engineered segment of the Brigantine beach from the feeder zone north of development, to approximately Roosevelt Boulevard along the oceanfront. Erosion had left a wet sand strip along the promenade revetment along the northernmost part of the developed segment of Brigantine Island. Once again the sand source was the Brigantine Inlet ebb-tidal delta. The dredge pumped the sand slurry along a submerged pipeline from the inlet to the discharge locations along the project beach. The 2013 USACE post-Sandy restoration project was conducted in two phases (phase one 667,000 cubic yards [CY], January 2013 and phase two 250,000 CY, July 2013) and placed a reported 917,000 CY of sand on the project beaches. The 2018 effort is designed to add approximately 755,000 CY of material to the north end beach and be complete by mid-March (Erik Rourke, USACE-NAP project manager).

Beach Monitoring Program Methodology

The CRC established a coastal monitoring program for the City of Brigantine in June 1992, commencing research on the beaches between two major northeast events that affected the Jersey shore in October 1991 and December 1992. The program collects data from nine shoreline-perpendicular beach profile stations, initially monitored on a quarterly basis, to analyze beach changes. Starting in 2008 the program was resumed at a survey frequency of twice annually. Beginning at a fixed reference position, a profile includes the dune system, beach, berm, nearshore and offshore to a water depth of approximately -14.0 feet (NAVD88). Table 1 lists the Brigantine sites where cross sections, photographs and field notes are presented.

**Table 1:
Beach Profile Locations**

- **Brig 134** - North end Green Acres undeveloped area (NJBPN #134)
- **Brig 220** - At the north end of the feeder beach, 1200 feet from road end
- **Brig 12** - 12th Street North
- **Brig 4** - 4th Street North (NJBPN #133)
- **Brig 5** - 5th Street South
- **Brig 15** - 15th Street South (NJBPN #132)
- **Brig 27** - 27th Street South
- **Brig 43** - 43rd Street South (NJBPN #131)
- **Brig 1** - ‘South Beach’ 600 feet north of the Absecon Inlet Jetty

Surveys Completed

The CRC completed three surveys between October 2016 and October 2017.

- October 12, 2016 Survey 88
- March 3, & April 10 - 11, 2017 Survey 89
- October 4, 2017 Survey 90

Beach Performance

Brigantine’s last major beach fill project occurred in 2013 as post-Hurricane Sandy restoration placed 917,000 CY of sand on the engineered beach and restored the federal project beach template.

When combined with past beach fills, over 3.1 million CY of sand have been placed on the beaches along the northernmost part of the developed portion of Brigantine Island. Construction of the first Federal shore protection project in the City of Brigantine Beach commenced in 2006. Since placement, the USACE engineered beach sustained several significant storm events but maintained its storm protection value to the community during Hurricanes Irene (2011) and Sandy (2012) by preventing major flooding and property damage from storm waves. The current work in progress will add 755,000 CY to the total providing 3,855,000 CY of new sand to the Brigantine shoreline since 1996.

The Brigantine oceanfront shoreline is routinely subjected to wave conditions which act to transport sand in the zone of breaking waves toward the south where sand in transport arrives at the Absecon Inlet north jetty. This structure had two initial project goals, first to provide Absecon Inlet with channel position stability, and second to act as a wave barrier for northeast waves impacting the Atlantic City inlet developed shoreline. This second goal created a long jetty that extended hundreds of yards seaward of the existing Brigantine beach shoreline at the time it was built (1944). The effect was to provide a very successful catcher’s mitt for this sand in transit to the south along the Brigantine oceanfront. The net result today is a fillet of sand deposited against the north side of the jetty extending over 1,000 feet seaward of the original beach that tapers to minimal shoreline advance at 15th Street South. However, since beach nourishment commenced in 1996, this fillet has grown even larger and now extends north to 5th Street South where the federal project currently ends.

Annual & Seasonal Beach Changes:

Table 2 displays sand volume changes expressed in cubic yards per foot of beach (yds³/ft.), while shoreline changes are given in feet. Calculating the average volume change between adjacent profiles and multiplying by the distance separating the sites yields a net volume change expressed in cubic yards (yds³) for the distance between the two sites. Adding the cumulative volume changes provides a net volume for the entire City of Brigantine beach over the entire length of surveyed cross section. Shoreline position changes are measured as the horizontal movement (toward the ocean (+) or toward land (-)) in the zero elevation point on each profile.

This table presents the annual change in shoreline positions and the net sand volume change across the entire length of the profile survey. The northernmost survey line over a mile north of Brigantine’s development gained sand this year. However, the next four sites from the feeder beach just north of development (Site 220) lost sand volume in a decreasing volume to the south at 5th Street South. Substantial sand accumulation occurred at 15th, 27th, and a modest increase occurred at 43rd Street (South). The site directly adjacent to the Absecon Inlet jetty lost very little volume. Almost 100,000 cubic yards of new sand was added between 15th and 27th Streets South in 2017. All sites south of 12th Street North saw shoreline advances seaward. The cumulative sand volume increase was 104,962 cubic yards of sand added. However, losses from the feeder beach south to 5th Street South reached -109,306 cubic yards. The Brigantine oceanfront ended the year 2017 with more sand on the beach, but definitely skewed to the southern two thirds of the municipal coastline.

Table 2
Brigantine Shoreline and Sand Volume Changes
Fall 2016 to Fall 2017

Profile	Shoreline Change (feet)	Volume Change (yds³/ft.)	Avg. Volume Change (yds³/ft.)	Distance Between (feet)	Net Volume Change (yds³)
Brig-134	25	46.59			
			8.860	3,122	27,661
Brig-220	1	-28.87			
			-24.367	1,860	-45,322
Brig-12	-11	-19.86			
			-27.165	1,951	-52,998
Brig-4	14	-34.47			
			-21.411	1,805	-38,647
Brig-5	32	-8.36			
			11.318	2,729	30,887
Brig-15	63	30.99			
			32.115	3,042	97,692
Brig-27	67	33.24			
			18.474	4,132	76,335
Brig-43	58	3.71			
			1.642	5,855	9,611
Brig-1	8	-0.43			
			-0.428	601	-257
Absecon Jetty					
			Total Volume Change =		104,962

Table 3
Brigantine Shoreline and Volume Changes
March 3, 2017 to October 4, 2017

Profile	Shoreline Change (feet)	Volume Change (yds³/ft.)	Avg. Volume Change (yds³/ft.)	Distance Between (feet)	Net Volume Change (yds³)
Brig-134	20	17.82			
			4.912	3,122	15,335
Brig-220	21	-8.00			
			-8.923	1,860	-16,596
Brig-12	10	-9.85			
			-6.858	1,951	-13,379
Brig-4	-19	-3.87			
			-4.922	1,805	-8,883
Brig-5	-51	-5.98			
			6.352	2,729	17,333
Brig-15	-6	18.68			
			16.961	3,042	51,595
Brig-27	-69	15.24			
			15.126	4,132	62,501
Brig-43	-22	15.01			
			14.222	5,855	83,267
Brig-1	-22	13.44			
			13.435	601	8,074
Absecon Jetty					
			Total Volume Change =		199,248

Table 3 shows the summer seasonal trend. The shoreline retreated at all sites from 4th Street North to the Absecon Inlet jetty. However, the larger shoreline displacements at 5th Street South and 27th Street South, the retreat is related to erosion of the modest berm accumulation in spring 2017 or the shifting of the berm upward and landward as summer waves pushed sand onto the beach. The sand volume was accretional with 5 of 9 locations showing positive accumulations yielding a 199,248 cubic yard net gain for the summer of 2017. This year was a near perfect repetition of summer accumulation last year with sand volume gains. In 2016, the northern three sites lost material, but more than the amount lost (-38,858 cubic yards) was gained along the southern two thirds of the island's beach (238,106 cubic yards) during 2016.

Individual Profile Descriptions

This section describes the changes documented at each of the beach profile locations from October 2016 to October 2017 and includes photographs and cross-sections that show the semi-annual and annual comparisons (Figures 1 – 27).

• **Profile Brig-134: Green Acres - North end** (Figures 1a, 1b & 1c)

The profile line is located 4,752 feet north of the promenade at the north end of Brigantine Avenue. Located within the State Park natural area no sand has been added to the site during any of the past nourishment projects. The closest sand placement activity occurred at the “feeder beach” almost 3,500 feet south of this location. This region typically is influenced by the inlet dynamics at Brigantine Inlet to the north. Periodic episodes of sand crossing the inlet from Little Beach and moving south adds to the beach in this region.

Hurricane Sandy in 2012 overwashed this natural area removing all the gains that were naturally achieved over the last 20 years since the December 1992 storm. Since then 5 years have passed allowing dunes to accumulate around surviving grass plants generating a new dune line which grew wider and taller over the past year. In 2017, the beach gained sand volume and the shoreline advanced seaward.

Profile Brig-134: Green Acres - North end



Figure 1a taken on October 12, 2016 looking north along a fairly wide dry beach. The dune toe shows substantial accumulation since Hurricane Sandy.

(Figures 1a & 1b)



Figure 1b taken October 4, 2017 demonstrates a similar condition of this beach. The dune grass propagated down slope onto the upper beach, while the berm developed a decent ridge at the water's edge.

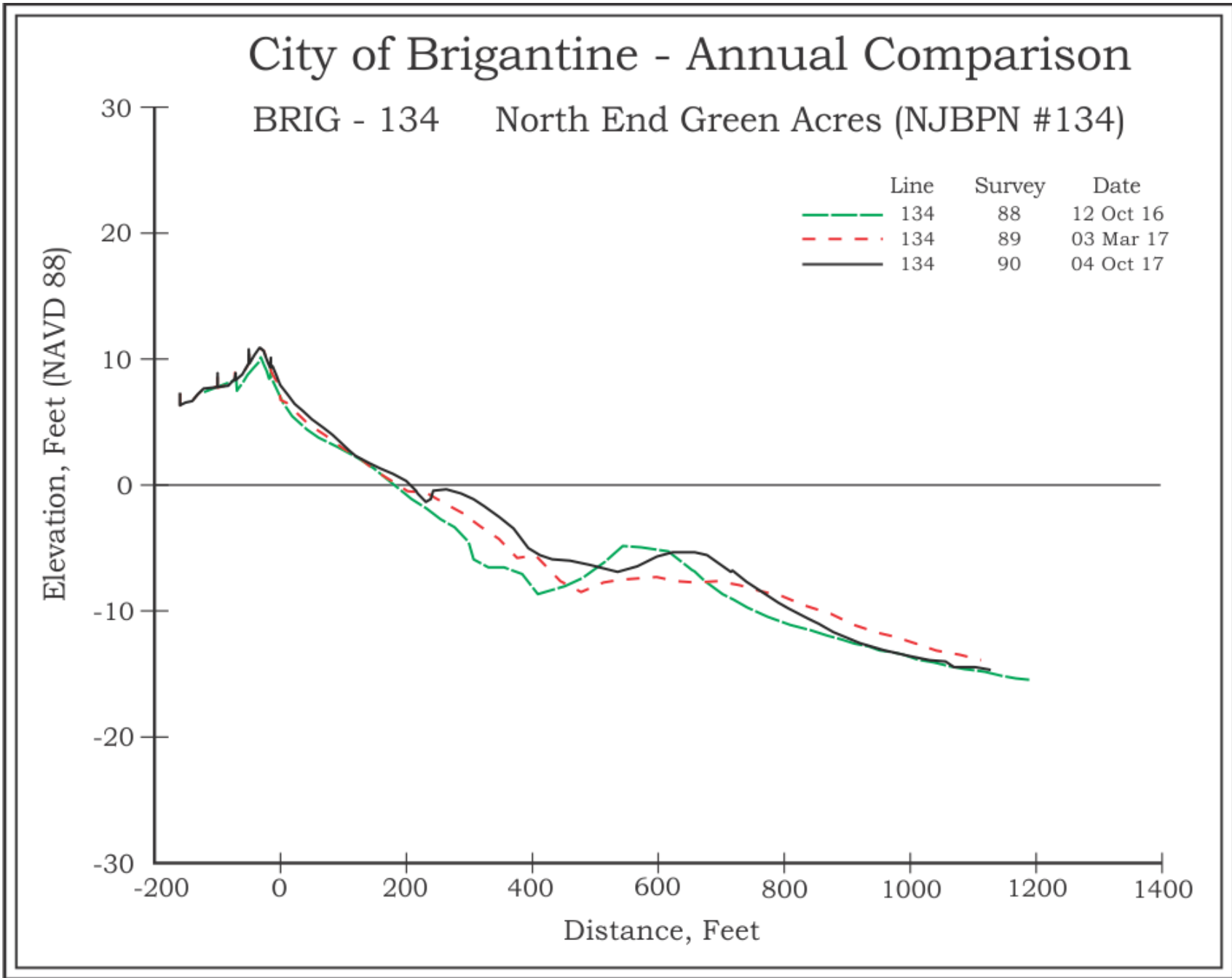


Figure 1c - Three cross sections show both the annual increase in sand volume (green to black), but the seasonal growth as well. The offshore bar appeared at its largest in the October surveys, while sand migration onto the beach was captured in progress on the October 2017 survey.

• **Profile Brig-220: Feeder Beach - Line 00+1200**

(Figures 2a, 2b & 2c)

The site is located on the “feeder beach” portion of Brigantine’s engineered beach 1200 feet north of the promenade in the natural area. Sand shed from this location provides advance nourishment to the downdrift erosional “hotspot” that is located to the south along the revetment/promenade. Established in 1996 during the very first municipal beach project between the NJDEP and the City of Brigantine, the goal for this section of beach was to provide an available sand source for recreational beaches to the south. This sand source was intended to erode and move south into the developed portion of the project area to slow erosion in front of the revetment to a more sustainable rate and extend project benefits for a longer period. This process has been documented and has performed better than expected since initial construction, provided sufficient sand volume remains in this segment of beach. Once the “feeder beach” erodes landward of the promenade the benefits diminish.

Over the course of the past year (2016-2017) sand did erode from this location, however the shoreline did not migrate toward the dunes meaning that sand was arriving in the area just slightly slower than it was leaving to move south.

The original “feeder beach” was initially created to be 2,400 feet in length extending 600 feet into the NJ open space of northern Brigantine. Park officials declined to permit future activities of beach nourishment within the park boundaries, so all subsequent work extends 1,600 feet north of all oceanfront development to the City boundary with the open space lands.

Profile Brig-220: Feeder Beach - Line 00+1200

(Figures 2a & 2b)



Figure 2a was taken October 12, 2016 looking south toward developed Brigantine. There is a substantial ridge between the dry beach and the water’s edge as a result of offshore bar migration toward the shoreline.

Figure 2b taken October 4, 2017 shows a more normal profile without a runnel trough between the ridge and dry beach. The process shown to the left had gone to completion.

City of Brigantine - Annual Comparison

BRIG - 220 Feeder Beach

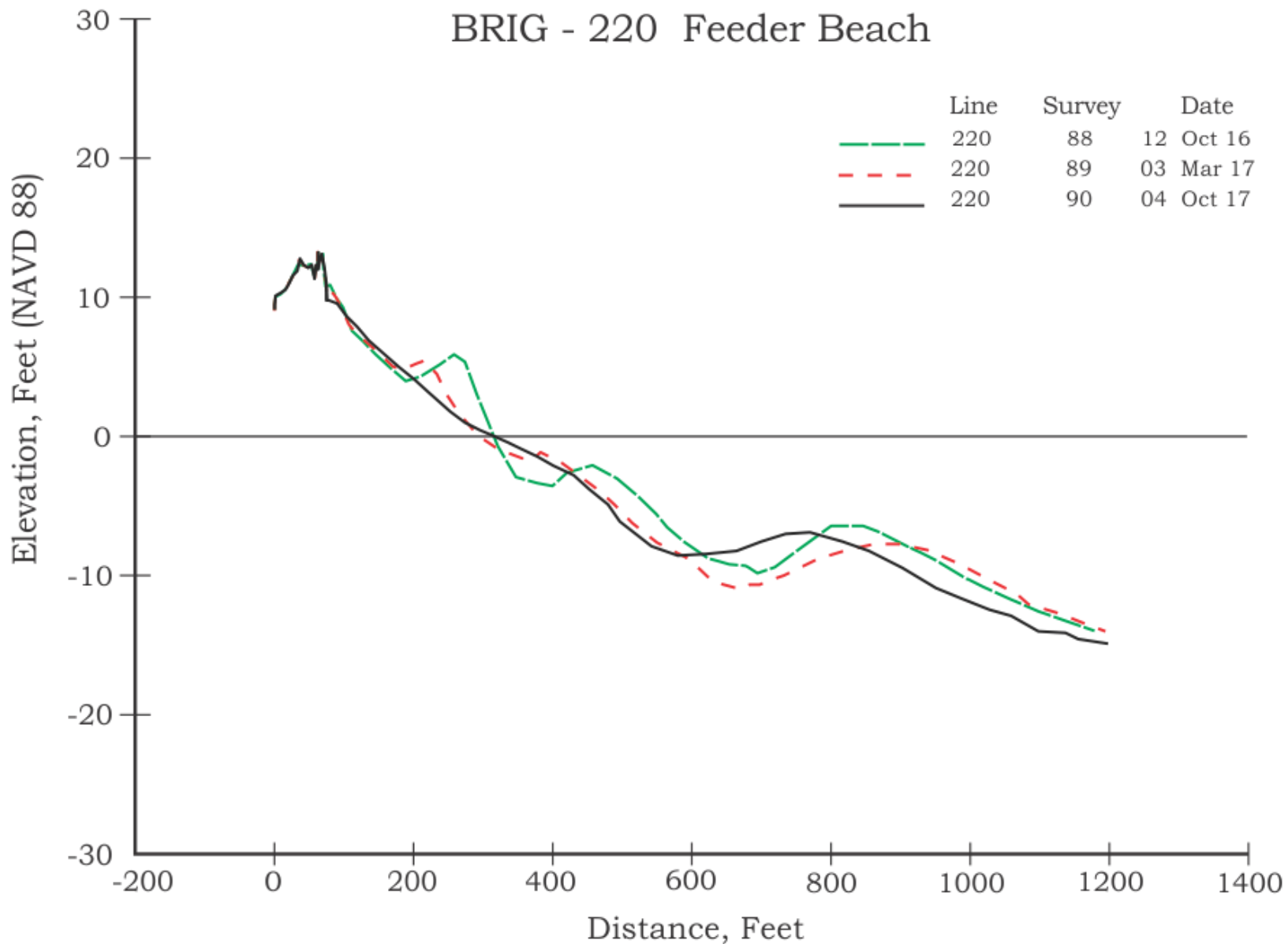


Figure 2c - The high berm from October 2016 decreased in size over the summer and was eroded flat by October 2017. Offshore bar position shifted landward by October 2017, but little change occurred in the shoreline position.

• **Profile Brig-12: 12th Street North**

(Figures 3a, 3b & 3c)

This profile site was established June 1992 along the north side of 12th Street North. The profile includes the road, promenade and bulkhead revetment structure that was completely reconstructed prior to the 1997 beach nourishment project. The Federal project placed sand here in February 2006, eventually adding 171.45 yds³/ft. of sand to the beach. This site is within a region of chronic erosion due to the orientation of the beach and revetment that protects the north end of Brigantine Blvd. As the beach retreats to the promenade the rock revetment protection is exposed. The hard structure revetment reflects wave energy, so return flow scours the beach elevation downward rapidly. Left unchecked the erosion spreads rapidly south along the revetment towards oceanfront development near 8th Street North. The “feeder beach” was designed to alleviate this from occurring by providing advanced sand nourishment to this region in order to maintain a minimal beach seaward of the revetment and prevent exposure of the hard structure.

Hurricane Sandy eroded the beach to the revetment. In 2013, the USACE restored the damaged shoreline to the full beach template design at this site. The Federal project placed 209.55 yds³/ft. of sand while the shoreline position advanced seaward 311 feet. Over 2014, this section of shoreline rapidly eroded losing nearly 77 yds³/ft. of sand, along with 113 feet of shoreline retreat. Combining the 2014 and 2015 losses accounted for 80% of the placed sand lost in just two years following sand placement in 2013.

The October 2017 survey preceded the start of the current Federal maintenance effort designed to add 755,000 cubic yards of Brigantine Inlet sand to this part of the shoreline. There was a narrow dry beach at the end of 2017 and sand placed as of this writing has started to accumulate along the revetment south to this profile.

Profile Brig-12: 12th Street North

(Figures 3a & 3b)



Figure 3a taken October 12, 2016 looking south along the revetment and bulkhead. The beach slopes seaward from the rocks allowing most high tide wave to reach the rocks.

Figure 3b taken October 2, 2017 following the summer beach accretion. A small berm had developed filling in around the rocks leaving a narrow dry beach in place.

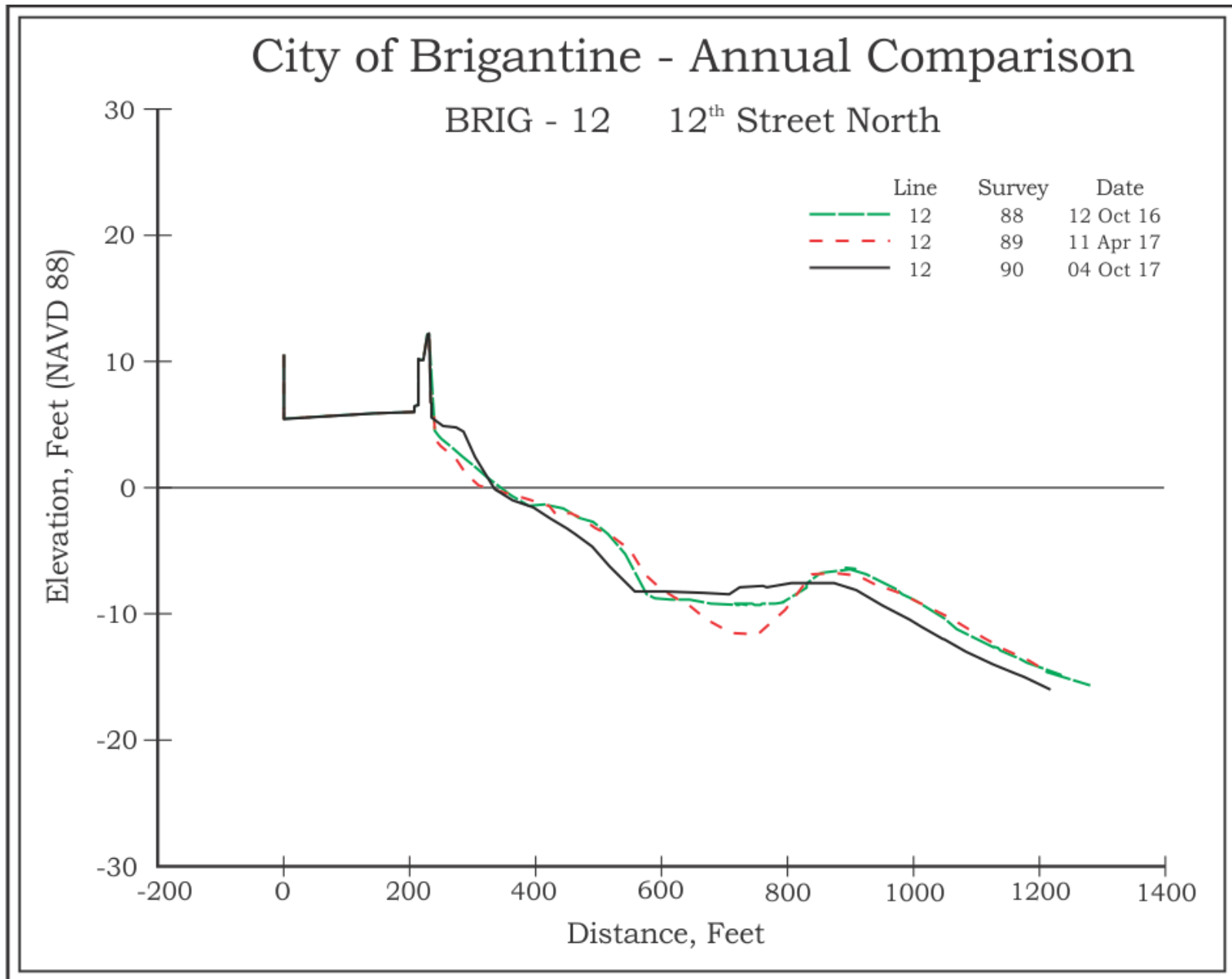


Figure 3c - This profile site is at a minimal state and will greatly benefit from the Federal beach maintenance currently in progress. The small berm appeared by summer's end in 2017 adding to the recreational beach width. Sand from the feeder beach and from offshore provided this temporary improvement.

- **Profile Brig-4: 4th Street North**

(Figures 4a & 4b)

Brig-4 was established as part of the New Jersey Beach Profile Network in 1986, and included in the City's monitoring project in June 1992. The location is at the southern end of the original city engineered beach nourishment project area approximately 100 feet south of station 2800-00. The initial Federal project extended further south and placed 80.57 yds³/ft. of sand at this site.

During 2013, the USACE maintenance project added nearly 75 yds³/ft. of sand to restore the Federal beach template in this region. During the second half of the year the project berm and nearshore experienced modest erosion that swept sand away from the site. The net loss was about 30 yds³/ft. or approximately 40% of the sand placed. Changes observed over 2014 were minimal, with modest accumulations at the dune toe and seaward beach berm. This resulted in a net sand volume gain of 13.28 yds³/foot. This site experienced modest shoreline retreat and erosion in 2015 and 2016. Between 2016 and 2017, berm sand was relocated seaward to the sandbar and there was a modest shoreline advance during the year.

Dune erosion has been relatively rare here since beach nourishment began in 1997. The beach slope remains gentle and allows waves to dissipate over a fairly wide distance so the dunes are not frequently affected.

Profile Brig-4: 4th Street North

(Figures 4a, 4b & 4c)



Figure 4a taken October 12, 2016 looking north at the water's edge. The beach slope is uniform, flat and toward the ocean. There is a berm present with a pronounced ridge.

Figure 4b taken October 4, 2017 showing the wet/dry line about a hundred feet seaward of the dune toe. There is little berm deposition present at this time.

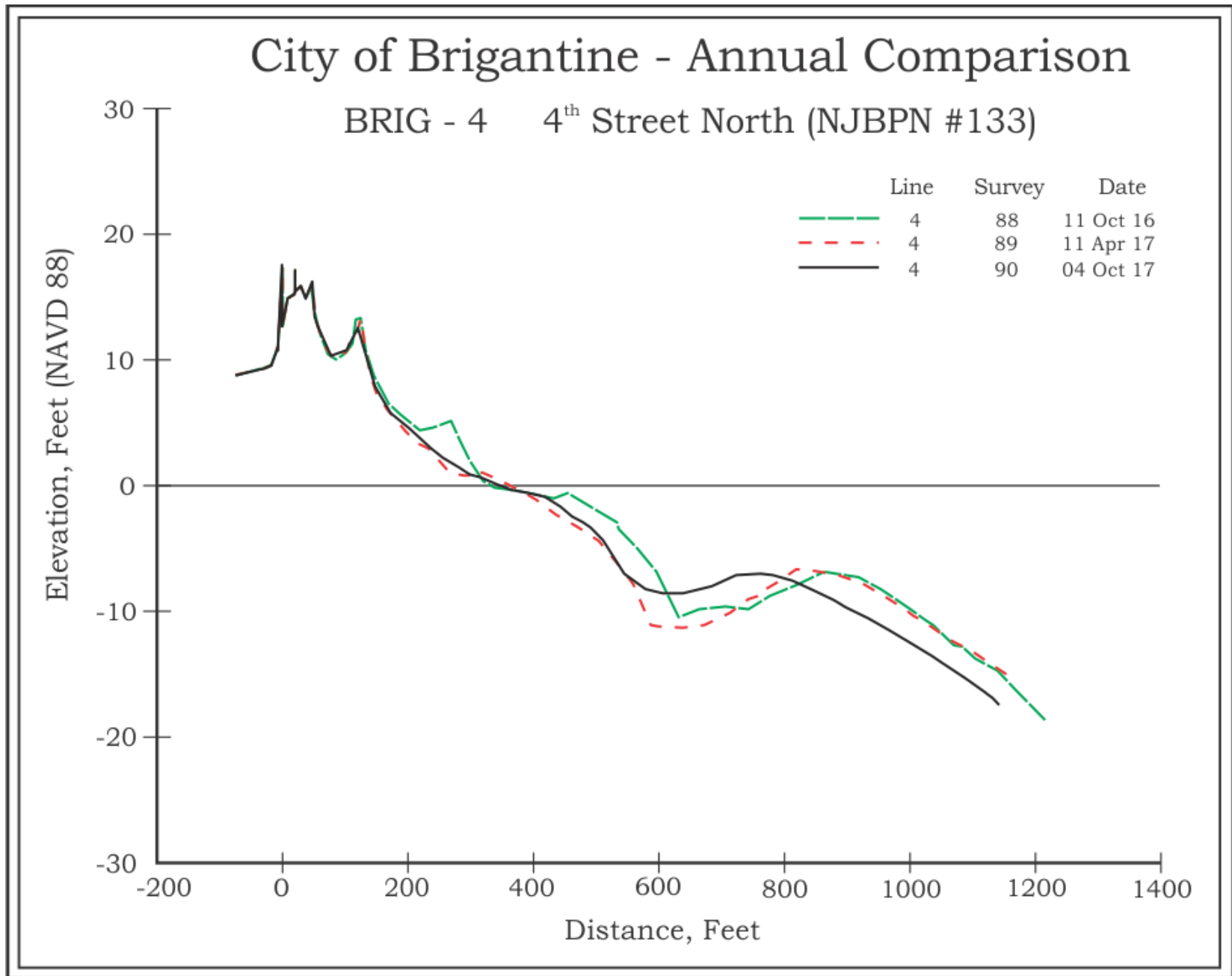


Figure 4c - Located south of the promenade, this site behaves as a stable shoreline without dramatic shifts landward or seaward. Sand built a berm in 2016 that did not remain over the two later surveys. Offshore the bar moved landward without reaching the shoreline.

• **Profile Brig-5: 5th Street South**

(Figures 5a, 5b & 5c)

This profile station was selected and established at 5th Street South in December 1998. The location is approximately midway between the end of the initial (1997) project beach at 4th Street North and the established site at 15th Street South. This site has a well-developed dune system composed of three significant ridges. The dune system is more expansive than along the northern engineered beach at approximately 225 feet in width. Seaward growth through aeolian processes had added volume and width to the dunes annually until Sandy cut into the developed foredune ridge. Monitoring trends at this site over the years indicate a transitional zone exist in this region between chronic erosion to the north and accumulation on the southern beaches as sand moves south through this region on littoral currents. The initial Federal project placed a small volume of sand on this beach in 2006 and no sand was placed this far south during the 2011 USACE maintenance project.

No sand was placed directly on this section of shoreline during the 2013 USACE post-Sandy maintenance fill project. The project tapered into the existing beach conditions just north of this location at 3rd Street South. The current (2018) Federal project will stop at Roosevelt Avenue five blocks to the north. The site has experienced swings in volume gains and losses since 2014, but overall remains stable.

Profile Brig-5: 5th Street South

(Figures 5a & 5b)



Figure 5a photo on October 11, 2016. The beach was flat due to the late September northeast storm. Beach width protects the dune from erosion by all but serious storm events.



Figure 5b photo taken October 4, 2017 looking north closer to the dune toe. The beach was uniformly sloped from the dune toe to the water's edge at this point in time.

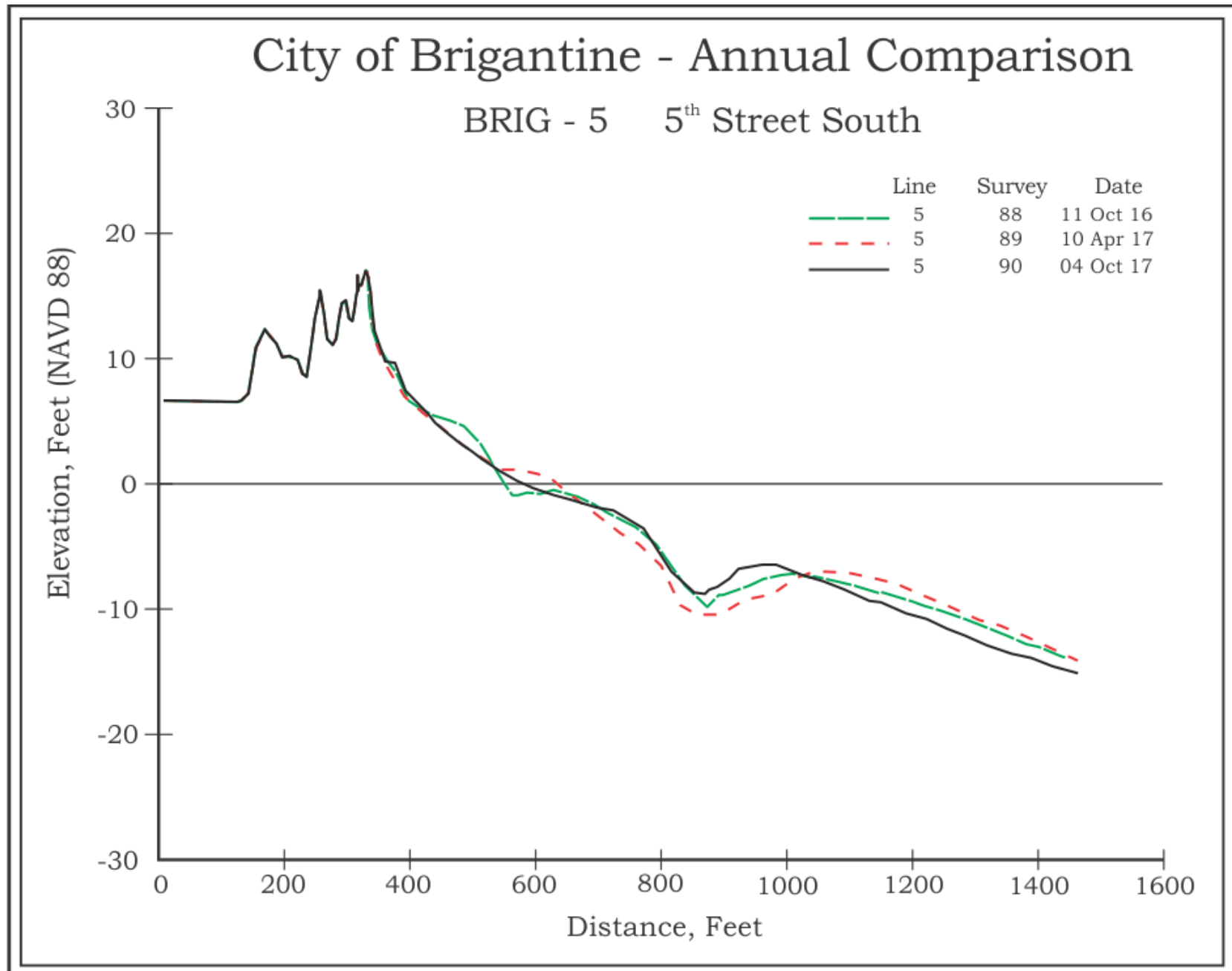


Figure 5c - The 5th Street South site maintained a stable beach with little change observed offshore either. The bar shifted slightly landward with minor elevation differences. Annual volume losses were minimal (8.36 yd³/ft.) and the shoreline moved 32 ft. seaward.

• **Profile Brig-15: 15th Street South**

(Figures 6a, 6b & 6c)

At 15th Street South, the dune is interrupted by the Legacy Vacation Resort (old Brigantine Hotel, built in 1929). Instead, shore protection for the seaward properties is limited in this two block section between 14th and 15th Street South to the aging exposed wooden bulkhead. North of 14th Street South and south of 15th Street South the bulkhead is buried below a well-developed dune system that provides significant storm protection for seaward properties. This site was located at the nodule point for the City beaches both from a geographical location and sand deposition and erosion perspective. No sand has been placed here directly during previous beach nourishment efforts as natural sand accumulation due to southerly littoral transport has been sufficient to produce an increasingly wider beach since 1997. Beach nourishment has shifted the node between erosion and deposition further north to approximately 5th Street South.

Post Sandy recovery has been limited here to natural processes as no sand was placed in this region during the 2013 federal maintenance project. By the end of 2013, the site remained about 13 yds³/ft. of sand below the pre-Sandy volume although the shoreline position remained relatively stable despite the reduction in elevation and width of the beach berm. Through 2014, natural recovery continued with 76 feet of shoreline advance and a net sand volume gain of 25.24 yds³/ft. concentrated in the both the seaward berm and beachface slope. In 2015 and 2016, the site experienced volume losses. Between October 2016 and October 2017, the

While no current Federal effort will be expended adding sand to this site directly, the influence of an additional 755,000 cubic yards introduced to the north will make its presence felt here by fall 2018.

Profile Brig-15: 15th Street South

(Figures 6a & 6b)



Figure 6a taken October 11, 2016 also following a late September 3-day northeast event. Waves did not reach the dune toe and the beach remains wide and well developed.



Figure 6b taken October 5, 2017 at approximately the same perspective as in 2016. The wide beach remains in excellent condition.

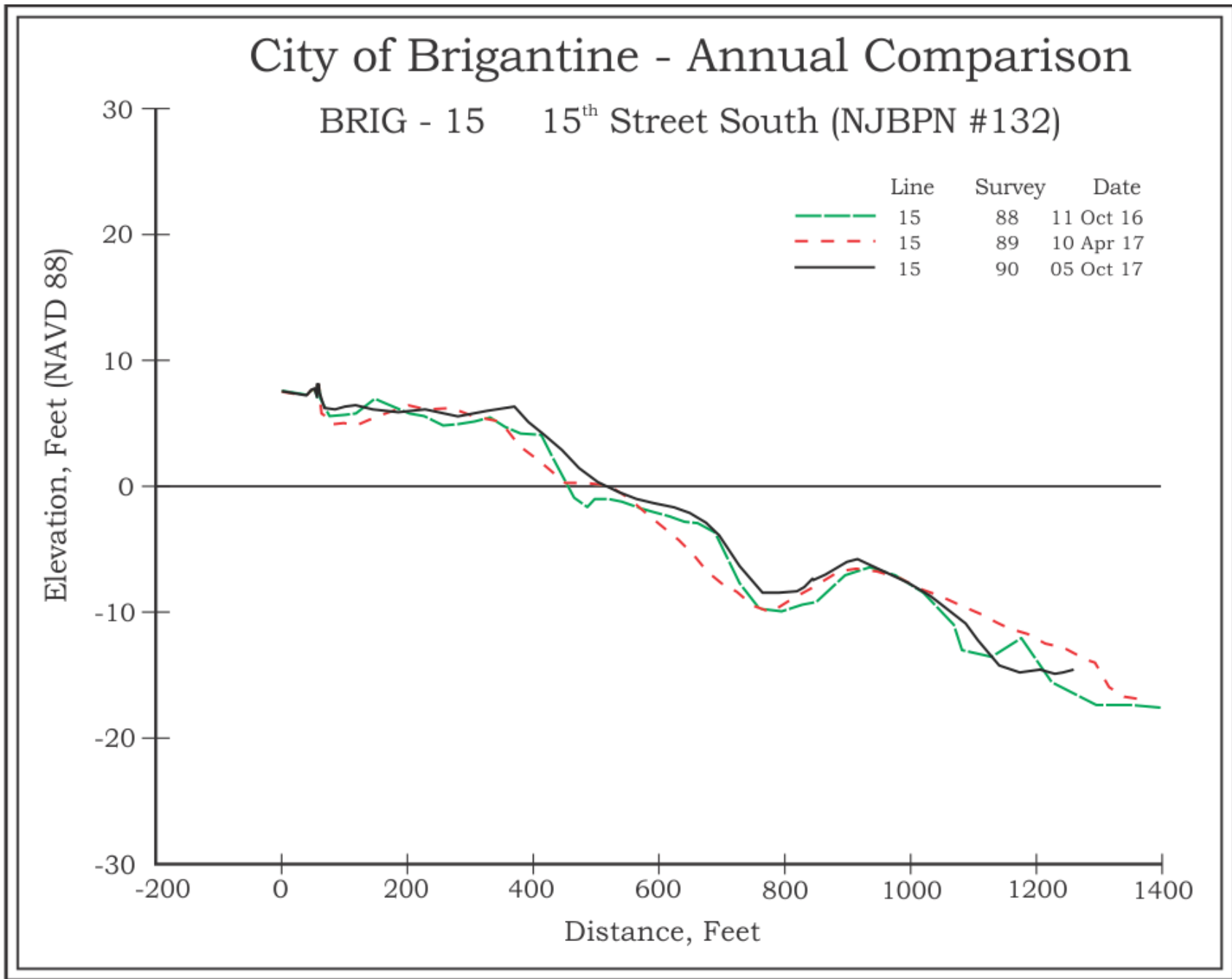


Figure 6c - At 15th Street South the post beach nourishment era that began in 1997 has produced a 375-foot wider dry beach which serves as wave attenuation during storms, but no dune means the development is at risk to wave overtopping the bulkhead and flooding during storms. Offshore large bar systems develop and migrate landward.

• **Profile Brig-27: 27th Street South**

(Figures 7a, 7b & 7c)

This site was established in 1992 for the city’s beach monitoring program. The location was selected to fill a void between two pre-existing NJBPN sites, located at 15th Street South and 43rd Street south. In contrast to 15th Street South, Brig-27 has a well-established dune system nearly 375 feet wide supported with a 300-foot wide beach. Multiple dune ridges provide significant storm protection against storm wave damage to the oceanfront properties. The Absecon Inlet jetty has created a region of backfill that continues to extend north past this site. The jetty will continue to trap sand moving south transported by longshore currents towards the inlet providing a source of sand to feed this dune system and continue seaward growth of the beach for the foreseeable future.

In contrast to 15th Street South the wide beaches and well developed dune system provided significant protection for oceanfront property and infrastructure during Hurricane Sandy. The wide beach absorbed the storm surge and wave energy reducing and flattening the feature but preventing over wash of the dune system with little scarp cut into the seaward slope in this region. This site demonstrated the value of a wide, high beach berm and well developed dune system for providing storm protection for oceanfront property and infrastructure.

Following Hurricane Sandy, beach widths remained relatively static, but incremental shoreline advances added to the overall excellent conditions seen here. During 2017 a very large berm developed making the segment between 15th Street South and this site the most accretional along the City oceanfront.

Profile Brig-27: 27th Street South

(Figures 7a & 7b)



Figure 7b Photo taken October 11, 2016, looking south shows the extent of the dry beach and the dramatic seaward dune slope.



Figure 7b. Photo taken October 5, 2017 from a nearly identical perspective shows dune grass growth and extensions seaward down the slope. The beach is wide, high and dry due to the sand impounding by the Absecon Inlet jetty located far in the distance.

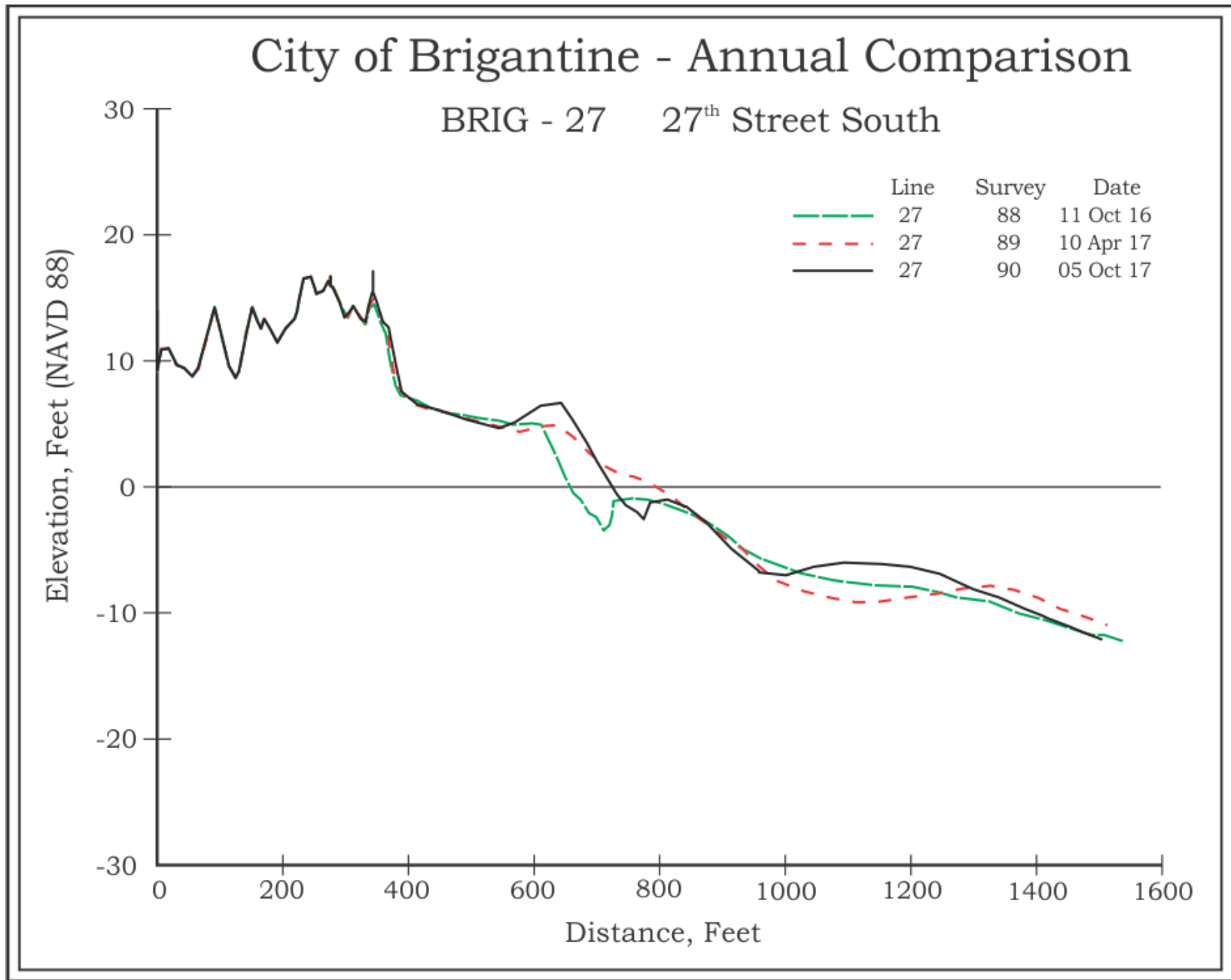


Figure 7c - The berm as of October 2017 was dramatically higher and produced an annual shoreline advance. The April shoreline position was on a more gentle beachface slope, so reached zero 34 feet further seaward than the steep beachface seen in October. The dune's seaward slope gained sand with each survey. Offshore a broad, low elevation bar emerged by October 2017.

• **Profile Brig-43: 43rd Street South**

(Figures 8a, 8b & 8c)

This site was established in 1986 as part of the New Jersey Beach Profile Network and was incorporated in the City's monitoring project in June 1992. The profile is located in an area dominated by the sand retention characteristics of the Absecon Inlet jetty. Sand retention benefits extend from the Absecon Inlet jetty to about 5th Street South. In 1986 the end of the street was the start of the beach with little dune growth. The present shoreline here is almost a half mile seaward of the shoreline position before the inlet jetty was built in 1944. The dune system occupies over 800 feet of width between the development and the seaward toe of the dune. The current recreation beach berm extends over 600 feet seaward of the dune toe.

In this region Hurricane Sandy's storm surge and wave energy were absorbed over the wide recreational beach that protected the primary dune system from erosion. The small foredune was flattened and swept away but protected the primary dune from direct wave impact. In 2014, 2015, and 2016, this beach resumed growth, but the width increases have been moderated because the shoreline is approximately at the sand retention limit of the inlet jetty. The berm will grow higher, but not much wider, while the dunes continue to acquire sand transported across 450 to 600 feet of dry sand back beach. Most of the volume gains between 2016 and 2017 were above the 0.0 ft. NAVD88 datum (11.14 yd³/ft.) with seaward expansion of the berm.

Profile Brig-43: 43rd Street South

(Figures 8a & 8b)



Figure 8a. Photo taken October 10, 2016 10 days after a 3-day northeast storm. Water flooded about half the beach width, but did no damage.



Figure 8b. Photo taken October 5, 2017 looking north along the extensive dry beach extending to the Legacy Resort in the far distance at 15th Street South.

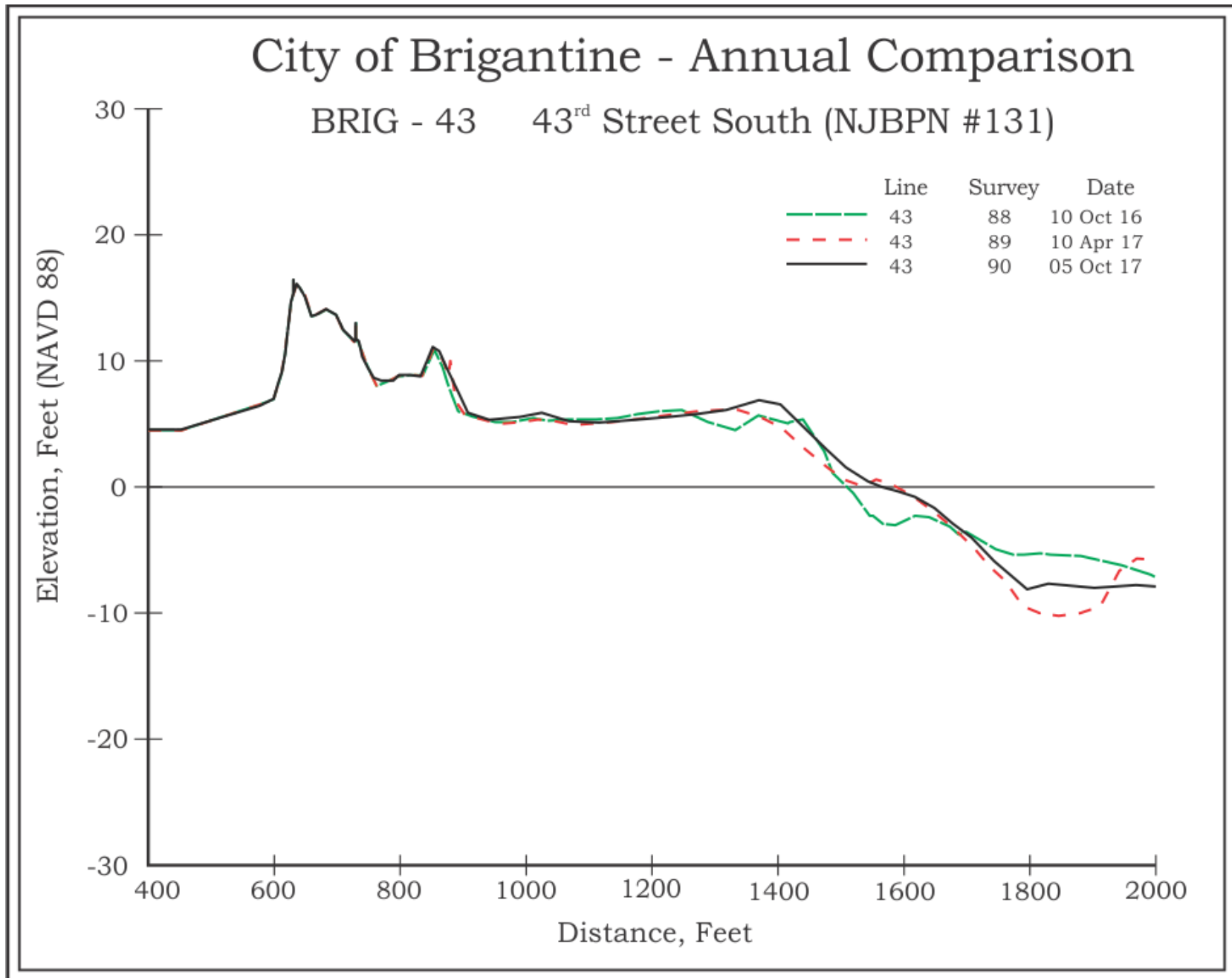


Figure 8c – This site has tripled its width over the 31-year monitoring history adding a classically configured berm in cross section by October 2017. The offshore slope was absent any bar system as of October 2017 in spite of a significant feature surveyed in April. Sand accumulated on the newest fore-dune’s seaward slope creating a feature approximately average for the entire dune system found elsewhere across much of the Jersey shore.

- **Profile Brig-1: South Beach**

(Figure 9a, 9b & 9c)

This site is located just 600 feet from the jetty, established to determine if sand is retained, eroded and or bypasses the structure. After years of observation around this structure including the inlet shoreline, sand moves around the Absecon jetty in cycles of retention, erosion then bypassing of the jetty. The current jetty configuration and length has essentially reached its capacity to retain new sand moving into the system. Once the beach width has expanded seaward to near the seaward end of the jetty and is exposed to storm erosion the sand moves offshore to the ebb shoal system or onto the inlet shoreline inside the jetty. Current dune configuration at this site extends over 1000 feet seaward of the development with approximately 300 feet of additional dry beach width.

The post-Sandy history of the site showed modest continued sand volume gains with small advances in the shoreline. The past year (2016-2017) had minor changes with $-0.43 \text{ yds}^3/\text{ft.}$ in sand volume loss combined with an 8-foot shoreline advance. A very minimal change given past performances where growth was extremely rapid. The change is likely due to the beach extending practically to the end of the jetty structure allowing sand to more readily by-pass into Absecon Inlet from the oceanfront. The jetty guarantees stability of the existing beach/dune system, but not continued seaward expansion.

Profile Brig-1: South Beach

(Figure 9a, 9b & 9c)



Figure 9a photo taken May 25, 2016 near the water's edge shows the beach width adjacent to the Absecon Inlet jetty.



Figure 9b Photo taken October 5, 2017 looking south along the berm crest toward Atlantic City. This beach is extremely popular for Recreational Vehicle associated beach uses, both here and along the Absecon Inlet beach on the Brigantine side.

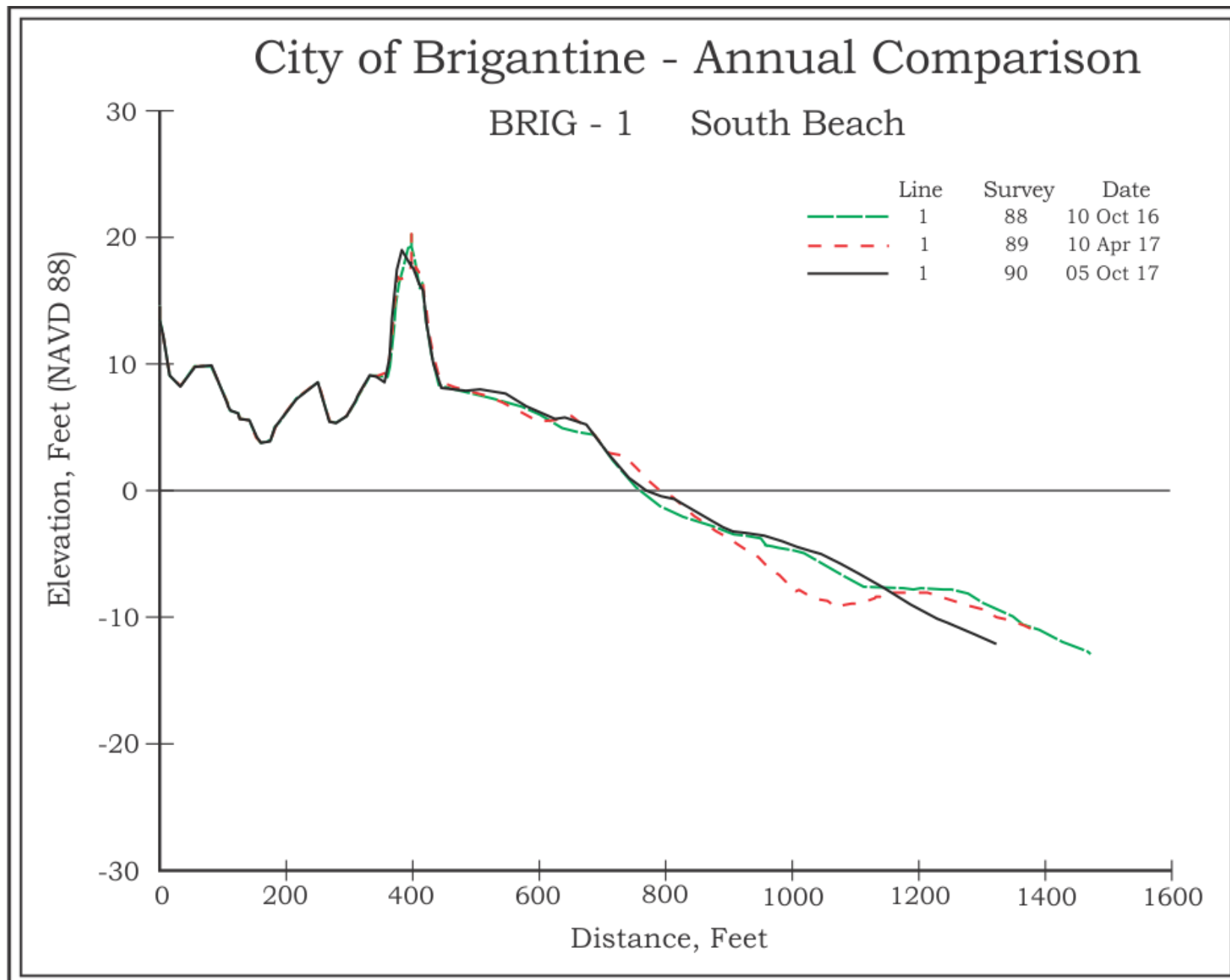


Figure 9c – Minor elevation changes occurred on the dry beach, while stability was maintained offshore. The offshore bar, present in April, moved landward by early October 2017.

Summary:

In 2016, the net gain was 77,252 cubic yards, with a dramatic loss between Brigantine Inlet and 27th Street South of 108,080 cubic yards while the beach south of 27th Street South gained 185,332 cubic yards to offset the sand volume loss to the north. However, between October 2016 and October 2017, the net gain of the entire oceanfront was 104,962 cubic yards, helped by the volumetric and shoreline gain in the northernmost profile (Brig-134) that did not occur in 2016. The current USACE beach maintenance project will mean a substantial net gain during 2018. How much remains on the southern 2/3's of the island is an open question since the inlet jetty is currently at capacity to retain material.

Sand back-passing remains an attractive option to reduce the frequency of required expensive beach nourishment projects on the north end beaches. It is evident from decades of monitoring that sand harvesting from the southern beaches is a sustainable option. The southern beaches have steadily accumulated sand over the 30 years of monitoring at a rate that exceeds the sand harvesting volume requirements needed to extend the interval between cost restrictive hydraulic dredge sand nourishment projects on the engineered beach. Over the past decade sand back-passing projects have been implemented as sustainable programs in several Cape May County communities. The Borough of Avalon has successfully completed four projects while North Wildwood has completed three projects.

Absecon Inlet Jetty Study:

The City opted not to authorize the continuation of this study in 2015, 2016, and 2017.