MIAMI-DADE COUNTY, FLORIDA

BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT

SURFSIDE BEACH

2020 BEACH NOURISHMENT

POST-CONSTRUCTION MONITORING REPORT

NOVEMBER 2020

US Army Corps
of Engineers
Jacksonville District

U.S. ARMY CORPS OF ENGINEERS

JACKSONVILLE DISTRICT

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1) Introduction

This report presents the results of the Pre- to Post-Construction Monitoring of the 2020 nourishment of Surfside which is part of the Main Segment of the Miami-Dade County, Florida Beach Erosion Control and Hurricane Protection Project (BEC & HPP). This report analyzes the field data and investigates the performance of the 2020 nourishment. This report was prepared under the provisions of Florida Department of Environmental Protection (FDEP) Joint Coastal Permit (JCP) No. 0233882-010-JM, in Miami-Dade County, Florida.

1.1) Authority

The Miami-Dade County, Florida BEC & HPP consists of two project segments. Surfside is part of the Miami-Dade County, Florida BEC & HPP Main Segment. The original Beach Erosion Control and Hurricane Protection report for Miami-Dade County, Florida was authorized by the Rivers and Harbors Act on July 3, 1930. An extension of restudy to include all of the Miami-Dade County north of Government Cut was approved by the Chief of Engineers in January 1961 (USACE 1965).

The Beach Erosion Control and Hurricane Protection Project for Dade County, Florida was authorized by the Flood Control Act of 1968. In addition, Section 69 of the 1974 Water Resources Development Act (Public Law 93-251) included the authorization for initial construction by non-Federal interests of the 0.85-mile segment along Bal Harbour Village, immediately south of Bakers Haulover Inlet. The authorized project, as described in the 1968 Chief's Report for the project, provided for the construction of a protective and recreational beach and a protective dune for 9.3 miles of shoreline between Government Cut and Bakers Haulover Inlet (encompassing Miami Beach, Surfside, and Bal Harbour) and for the construction of a protective and recreational beach along 1.2 miles of shoreline at Haulover Beach Park.

The Sunny Isles Segment of the project was added in 1985. Specifically, under the authority of the Supplemental Appropriations Act of 1985 and the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662).

1.2) Purpose and Scope

The purpose of this monitoring report is to evaluate the performance of the most recent nourishment of Surfside. This report presents volumetric and shoreline position change analyses of this fill area based upon pre- and post-construction surveys. An analysis and survey of the borrow area is not required as part of the project monitoring because the sand was purchased and delivered from an upland sand mine.

1.3) Authorized Project Description

The authorized project for the Main Segment includes a protective beach berm and dune for 9.3 miles of shore between Bakers Haulover Inlet and Government Cut (encompassing Bal Harbour, Surfside, and Miami Beach) and a protective beach berm (without a dune) along 1.2 miles of shore at Haulover Beach Park. Between Bakers Haulover Inlet and Government Cut, the authorized project includes a 20-ft wide dune at 11.5 ft above Mean Low Water (MLW) and a level berm of 50-ft wide from the Erosion Control Line (ECL) at an elevation of 9 ft MLW with natural slopes shaped by wave action. At Haulover Beach Park, the project includes a level berm 50-ft wide at an elevation of 9 ft MLW and natural slopes.

As authorized, the Main Segment did not have a recommended nourishment interval but was intended to be nourished periodically, as needed, to compensate for erosion losses throughout the 50-yr period of

Federal participation. The average annual nourishment requirements were estimated at 191,000 cy/yr and 20,000 cy/yr for Bakers Haulover Inlet to Government Cut and Haulover Beach Park, respectively.

The authorized project for the Sunny Isles Segment includes a protective beach berm along 2.5 miles of Sunny Isles. The authorized project berm is a 20-ft wide berm from the ECL with front slopes of 1-ft Vertical on 10-ft Horizontal (V:H) from berm crest to MLW, then 1V: 25H slope to the existing bottom. The authorized nourishment volume was 715,000 cubic yards every 10 years. The 2016 Limited Re-evaluation Report (LRR) updated the erosion rate to 50,000 cy/yr of material lost for a total of 500,000 cubic yards every 10 years (USACE, 2016).

2) Project History

The Miami-Dade BEC & HPP Main Segment was authorized in 1974 and consists of 9.3 miles of shoreline extending from Bakers Haulover Inlet to Government Cut and 1.2 miles of shoreline located immediately north of Bakers Haulover Inlet (Haulover Beach Park). The Sunny Isles Segment of the project was separately authorized in 1985 and encompasses 2.5 miles of shoreline. A Limited Re-evaluation Report and Environmental Assessment (EA), which evaluated potential future sand sources for both project segments, was approved in March 2016.

The Main Segment consists of four portions; Haulover Beach Park (FDEP Range Monuments R-19.3 to R-26), Bal Harbour (R-27 to R-31), Surfside (R-31 to R-38), and Miami Beach (R-38 to R-74), as seen in **Figure 1**. The initial construction of the Main Segment was conducted in several phases from 1975 to 1982 and included the placement of approximately 12,247,100 cy of material from Haulover Beach Park to Government Cut for a cost of approximately $48 million. The Sunny Isles Segment (R-7 to R-19.3) was initially constructed in 1988 with a placement of about 1,320,000 cy for approximately $12 million.

In addition to sand placement, other project-related construction has occurred. Modifications include extending the south jetty at Bakers Haulover Inlet by 735 ft with a southerly curve at the end in 1975 and tightening the north jetty at Government Cut in 1983 and 1999 to prevent sand passing through the structure. A pair of detached breakwaters was constructed at Sunny Isles in 2002 to stabilize the shoreline behind the structures. Similarly, three attached breakwaters were constructed near 32nd Street in Miami Beach in 2002 to stabilize an erosional hot spot. A detailed history of construction events as part of the Miami-Dade County BEC & HPP can be found in **Appendix A**.

Figure 1: Map of Miami-Dade County Beaches showing the federal BECHPP segments of Sunny Isles, Haulover Beach Park, Bal Harbor, Surfside, and Miami Beach.

2.1) Previous Nourishments

The Surfside beach was initially constructed by the U.S. Army Corps of Engineers (USACE) as part of the first phase of the Main Segment's initial construction. Phase I included fill placement along two areas. The north area extended along 1.1 miles of Haulover Beach Park (R-19.3 to R-26) and the south area included a 1.5-mile section of beach including the Surfside and the northern tip of Miami Beach (R-31 to R-39). Construction of Phase I began in 1977 and concluded in 1978 and was conducted by Great Lakes Dredge and Dock Company (GLDD) for $5,731,400. Approximately 300,000 cy of material was placed along Haulover Beach Park and 2,640,000 cy was placed at the Surfside and Miami Beach. The source of the fill material was offshore borrow areas located directly offshore of each fill area (Offshore Borrow Areas A, B, and C). The locations of these borrow areas can be seen in Figure 2 of Appendix A. The construction template of the initial construction included a 130-ft wide berm from the ECL, at an elevation of +9 ft MLW, and a 1V:30H slope. Since its initial construction, Surfside has been nourished three additional times including the 2020 nourishment, as seen in **Table 1**.

The 1999 nourishment of Surfside included the placement of 590,000 cy of material along Surfside (R-32 to R-36), in addition to 132,000 cy placed along the southern end of Miami Beach. The borrow area for

both areas was an offshore borrow area located just south of Government Cut (South of Government Cut borrow area), approximately 3 miles offshore of Virginia Key. The project consisted of a 250-ft wide berm at an elevation of +9 ft MLW, with a 1V:20H slope. The project was constructed by GLDD.

Surfside Beach was used as a disposal area for approximately 12,800 cy of material from upland construction in 2014. The material was excavated from the construction site of The Surf Club Condominiums and placed on the beach berm.

Table 1: Nourishment History of Surfside

Date Complete	Project Type	Volume (cy)	Source	Project Location
June 1978	USACE	2,640,000	Offshore Borrow Areas A, B, and C	R-31 to R-38
June 1999	USACE	590,000	Offshore Borrow Area South of Government Cut	R-32 to R-36
April 2014	Local	12,800	Upland Construction	R-32 to R-36
February 2020	USACE	325,000	Upland Mine	R-31 to R-36.5

2.2) Summary of 2020 Nourishment

The 2020 nourishment of Surfside is the subject of this monitoring report. This nourishment was performed to restore the protective beach along the Surfside shoreline. This is the third nourishment of Surfside by the USACE (1978, 1999, and 2020). The project was awarded to Heavy Civil Corp for $17.9 million. The total payment volume placed during the project was 324,845 cy. The nourishment project was 100 percent federally funded via the Bipartisan Budget Act of 2018 (Public Law 115-123).The material was obtained from Vulcan Witherspoon Mine, an upland sand mine near Moore Haven, Florida, and approximately 97 miles from the project site.

Construction of the project began in August of 2019 at 87th Street (R-36.5) and work progressed from south to north until reaching the northernmost point of the project at approximately 96th Street (R-31), with completion of the project occurring in February 2020. The contractor used 88th Street and 96th Street as construction access and had staging areas at 89th Street and 92nd Street.

The project consisted of the construction of a flat, 240-ft wide berm from the ECL at an elevation of 6.1 ft NAVD88 (8.3 ft MLW) with a 0.5-ft tolerance, allowing payment for placement up to elevation 6.6 ft NAVD88 (8.8 ft MLW). A construction slope of 1V:10H tied the berm crest to the existing bottom. The project fill had 250-ft long tapers at the north and south ends of the fill to tie the project in with the existing shoreline and reduce end losses. The typical construction profile from the project plans and specifications can be seen in **Figure 2**.

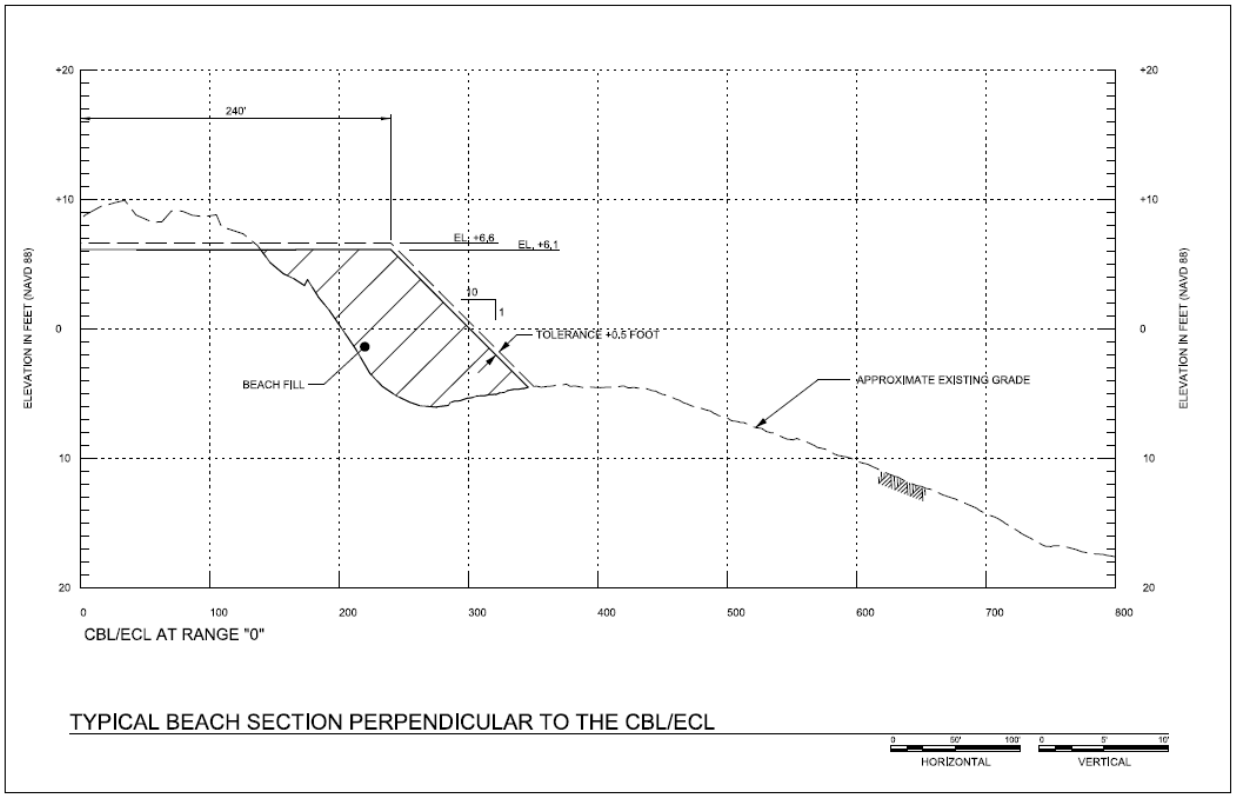

Figure 2: Typical Profile and Beach Fill Template for the 2019 to 2020 Project

3) Project Monitoring Requirements

The 2020 construction of Surfside was conducted under JCP No. 0233882-010-JM. A county-wide Physical Monitoring Plan (PMP) was created in 2016 and governs the monitoring requirements associated with this construction event. The PMP components include beach and offshore surveys, offshore borrow area surveys, data analysis, and report preparation.

3.1) Beach Profile Surveys

Topographic and bathymetric profile surveys of the beach and offshore are required to be conducted within 90 days prior to commencement of construction of a beach nourishment event, within 60 days following the completion of construction, and biennially thereafter beginning with the next regularly scheduled county-wide biennial monitoring survey. The pre- and post-construction surveys must include profile surveys at each FDEP DNR reference monument within the bounds of the beach fill area and must also include the next profile locations on each adjacent side of the fill area. Note that the profiles are designated as "DNR" monuments since they were originally placed by Florida's Department of Natural Resources, which preceded the FDEP. The range monuments (abbreviated to "R-" for convenience) are located approximately every 1,000 ft along the project area, as seen in **Figure 3**, in addition to the entire length of Miami-Dade County. The FDEP monument control information for the R-monuments used for analysis within this report (which includes the Bal Harbour segment (R-27 to R-31) as well as the Surfside fill area) can be found in **Table 2**. The Bal Harbour segment is not required to be monitored as part of the FDEP permit but it is included to show the changes to the beach south of Bakers Haulover Inlet following the nourishment of Surfside.

Figure 3: Aerial Image of Surfside with FDEP R-Monuments and Survey Azimuth Lines

Table 2: FDEP Monument Controls

FDEP MONUMENT CONTROL (Feet NAD83 / NAVD88)					
MON ID	M. DATE	NORTHING	EASTING	AZ	M. ELEV.
R-27	OCT1974	570113.46	944645.04	120.0	8.10
R-28	OCT1974	569090.69	944590.33	95.0	7.37
R-29	DEC1991	568077.37	944715.01	95.0	7.54
R-30	JUL1997	567131.98	944900.26	90.0	7.74
R-31	JUL1997	565987.64	945017.96	90.0	7.64
R-32	OCT1974	564959.02	944935.60	90.0	10.38
R-33	OCT1974	563990.14	944999.83	90.0	9.44
R-34	OCT1974	562980.50	945073.59	90.0	10.08
R-35	OCT1974	561751.32	945175.46	90.0	10.06
R-36	OCT1974	560619.93	945338.60	90.0	9.64
R-36.5	N/A	560109.41	945552.57	90.0	N/A
T-37	AUG1978	559570.45	945480.06	90.0	9.33

3.2) Borrow Area Surveys

Borrow area surveys are not required as part of this monitoring effort because the material was purchased from an upland sand mine (Vulcan Witherspoon Mine) rather than obtained from an offshore source.

3.3) Data and Report Submission

The engineering analysis and monitoring report of the post-construction conditions off the project are to be digitally submitted to the FDEP within 120 days following completion of construction and each biennial monitoring survey. The report shall summarize and discuss the data, the performance of the beach fill project, and identify erosion and accretion patterns within the monitored area. Results shall be analyzed for patterns, trends, or changes between annual surveys and cumulatively since project construction. In addition, the report shall include a comparative review of project performance to performance expectations and identification of adverse effects attributable to the project. The report shall specifically include:

1. A record of the volume and location of all beach fill or inlet sand bypassing material placed within the project area;

2. The volume and percentage of advance nourishment lost since the last beach nourishment project as measured landward of the Mean High Water (MHW) line of the most recent survey;

3. The most recent MHW shoreline positions (ft) in comparison with the design profile at each individual monument location;

4. The MHW shoreline position changes (ft) relative to the pre-construction survey at each individual monument location for all the monitoring periods;

5. The total measured remaining volume (cy) in comparison with the total predicted remaining volume (cy) above the MHW line and above the Depth of Closure for the entire project area over the successive monitoring periods; and,

6. Other shoreline position and volumetric analysis the Permittee or engineer deem useful in assessing, with quantitative measurements, the performance of the project.

The report shall include computations, tables and graphic illustrations of volumetric and shoreline position changes for the monitoring area. An appendix shall include superimposed plots of the two most recent beach profile surveys, the design profile, and pre- and post-construction beach profile at each individual monument location (Miami-Dade County, 2016).

In the case of this monitoring report, these datasets include the pre- and post-construction beach profile surveys for Surfside and Bal Harbour (R-27 to T-37).

4) Project Monitoring Data

The project monitoring data for the 2020 nourishment of Surfside consists of topographic and bathymetric profile surveys of the beach.

4.1) Tidal Datums

To evaluate the monitoring surveys with reference to a tidal datum such as MHW, the geodetic datum North American Vertical Datum (NAVD88) must be related to the tidal datum in the project area. The nearest tidal datum in the project area is Haulover Pier, North Miami Beach, FL, Station No. 8723080 available from NOAA. This gauge is located at the Haulover pier, which is approximately 1.4 miles north of the project area. The tidal datums at this station can be found in **Table 3**. These tidal datums are referenced to Mean Lower Low Water (MLLW).

Table 3: Tidal Datums at NOAA Tide Station No. 8723080, Haulover Pier, North Miami Beach, FL

Datum	Value(ft-MLLW)
Mean Higher High Water (MHHW)	2.68
Mean High Water (MHW)	2.61
North American Vertical Datum of 1988(NAVD88)	2.25
Mean Sea Level (MSL)	1.39
Mean Low Water (MLW)	0.14
Mean Lower Low Water (MLLW)	0.00

4.2) Monitoring Surveys

The pre-construction survey consists of beach profile transects surveyed along the Bal Harbour and Surfside shorelines. The pre-construction survey (19-160) was performed by Degrove Surveyors, Inc. between 15 July 2019 and 06 August 2019 from R-monument R-27 to T-37. This survey includes the area starting just south of the south jetty of the Bakers Haulover Inlet to past the end of the Surfside project fill limits (R-36.5). This area includes all of Bal Harbour (R-27 to R-31) and the majority of Surfside (R-31 to T-37). The beach profile surveys were taken approximately every 1,000 ft at R-monuments and the profiles extend at least 3,000 ft seaward from each monument or to a depth of -30 ft NAVD88.

The post-construction survey consists of beach profile transects surveyed along the Bal Harbour, Surfside, and Miami Beach shorelines. The post-construction survey (20-158) was performed by Park Coastal Surveying, LLC between 29 June 2020 and 08 July 2020 from R-monument R-26 to R-41. This survey includes one profile at Haulover Beach Park (R-26), all of Bal Harbour (R-27 to R-31), all of Surfside (R-31 to R-38), and the northern tip of Miami Beach (R-38 to R-41). The beach profile surveys were taken

approximately every 1,000 ft at R-monuments and the profiles extend at least 3,000 ft seaward from each monument or to a depth of -30 ft NAVD88.

A summary of the surveys used for the MHW position change and volume change analyses can be found in **Table 4**.

Table 4: Summary of Surfside Surveys

Survey	Survey Start Date	Survey End Date	Location	Borrow Area
Pre-Construction Survey (19-160)	07/15/2019	08/06/2019	R-27 to T-37	N/A
Post-Construction Survey (20-158)	06/29/2020	07/08/2020	R-26 to R-41	N/A

5) Survey Analysis

The subject of the analysis found in this monitoring report is the differences in volume and MHW position between the pre-construction (19-160) and post-construction surveys (20-158) between R-27 and T-37. Individual beach profile surveys showing the pre-construction and post-construction surveys along with the authorized project template and construction template at each R-monument can be found in **Appendix B**.

The first component of the survey analysis is the MHW position change over time. The MHW elevation is 0.36 ft NAVD88 based on the tidal datums at NOAA Tide Station No. 8723080 at Haulover Pier, North Miami Beach, FL. The MHW positions were measured from each plotted cross-sectional profile at each R-monument using Computer Aided Design and Drafting (CADD) software Microstation by Bentley.

The second component is the volumetric change between the pre-construction and post-construction surveys. This change was calculated using Microstation Inroads software by Bentley. Inroads used Digital Terrain Model (DTM) files created from the topographic and hydrographic surveys to calculate the triangulated volumes from each survey. The volume difference between both surveys was calculated between each pair of R-monuments in the surveyed area. The unit volume change between each set of R-monuments was calculated by taking the volume difference and dividing it by the shoreline length between R-monuments. Volumetric change computations include the area in the cross-shore direction from the extents of survey 20-158 to the local depth of closure (DOC) of -19.3 ft NAVD88. The -19.3 ft DOC is typically the outer limit of the zone of most active sediment transport. The DOC was determined using the Hallermeier Inner Simplified DOC equation and through observation of field surveys.

5.1) Overview of Littoral Processes

The main forcing mechanism for sediment transport along the Miami-Dade County beaches is alongshore currents that result from waves impacting the coast at an angle other than shore-normal. The alongshore currents contribute to a net southerly directed sediment transport. The net rates of transport vary with location but generally range between 45,000 and 55,000 cy/yr. The gross transport rates can be substantially higher due to the periodic northward flow of sediment caused by winds and waves from southerly directions during the summer months. There is considerable sediment transport in the vicinity of Bakers Haulover Inlet and Government Cut. Areas of higher and lower net transport are observed as well; the lowest net transport is observed at Bakers Haulover Inlet and is due primarily to the obstruction created by the inlet. Localized changes in the longshore sediment transport are present at multiple “hot

spots" along the Miami-Dade shoreline. The highest net transport is observed at 32nd Street in Miami Beach and is due to waves breaking at a steeper angle along the curved shoreline (USACE, 2016).

Erosion rates through Miami-Dade County are detailed in Sub-Appendix A of the 2016 LRR Engineering Appendix. Those calculated erosion rates vary between 15,000 cy/yr at Haulover Park to 55,000 cy/yr Bal Harbour. The erosion rates calculated for Surfside in the 2016 LRR are 45,000 cy/yr, while the countywide average erosion rate is 240,000 cy/yr.

5.2) Mean High Water Position Change Analysis

The changes in MHW position between the pre- and post-construction surveys (19-160 and 20-158) are summarized in **Table 5** and **Figure 4**. From the NOAA Haulover Pier, North Miami Beach, FL, Station (No. 8723080), the MHW elevation is 0.36 ft NAVD88. During construction, the greatest changes in MHW were typically found in the project fill area. From R-32 to R-36, the MHW position advanced between 84 and 104 ft. The MHW position at R-31, at the end of the northern taper, only showed an advance of 16 ft. The MHW positions at T-37, which is the first profile south of the fill area, showed an advance of 80 ft. This shows that the fill has been begun to disperse along the shoreline and that the dispersion effect is greater to the south rather than the north. The Bal Harbour area to the north experienced a MHW retreat during this time period ranging from -11 to -22 ft. The average shoreline change within the Surfside constructed area is an advance of 80 ft, while Bal Harbour had an average shoreline change of -16 ft. **Figure 5** and **Figure 6** show the MHW position at Bal Harbour and Surfside before and after the nourishment.

Table 5: Mean High Water Position Relative to Design Template, Construction Template, and 2019 and 2020 Monitoring Surveys with Shoreline Position Change

	Distance from R-Monument (ft)				MHW Position Change (ft)
FDEP R-Monument	Authorized Design Template	2020 Construction Template	August 2019 (Pre-Construction)	July 2020 (Post-Construction)	July 2020 to August 2019
R-27	225	N/A	381	359	-22
R-28	241	N/A	278	267	-11
R-29	210	N/A	243	225	-18
R-30	110	N/A	178	164	-14
R-31	98	49 (Taper)	132	148	16
R-32	273	411	289	373	84
R-33	303	441	321	417	96
R-34	328	465	351	444	93
R-35	345	483	311	415	104
R-36	292	430	267	353	86
R-36.5	130	57 (Taper)	134	203	69
T-37	271	N/A	243	323	80
AVG Surfside Constructed Area (R-31 to R-36.5)			**258**	**336**	**78**
AVG Bal Harbour Area (R-27 to R-30)			**270**	**254**	**-16**
AVG Total Surveyed Area (R-27 to R-37)			**261**	**308**	**47**

*Highlighted area denotes fill placement area (R-31 to R-36.5)

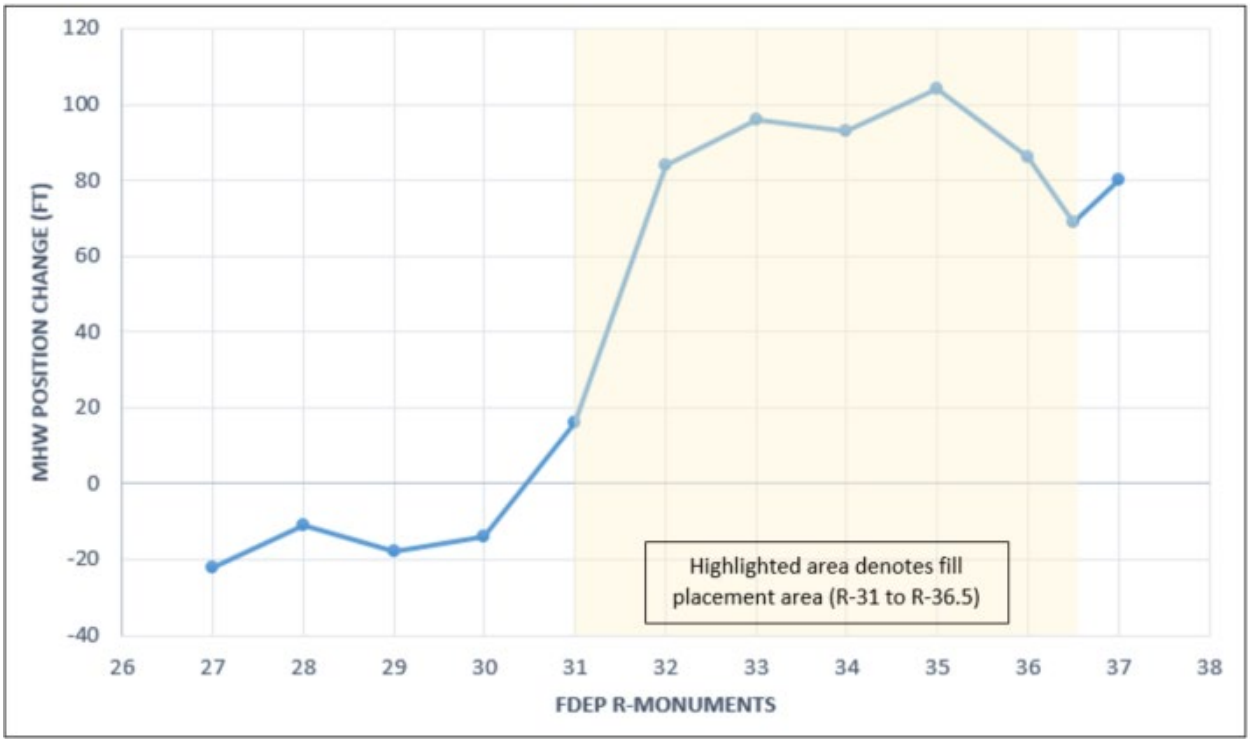

Figure 4: MHW Position Change for Surveyed Area, Pre to Post-Construction

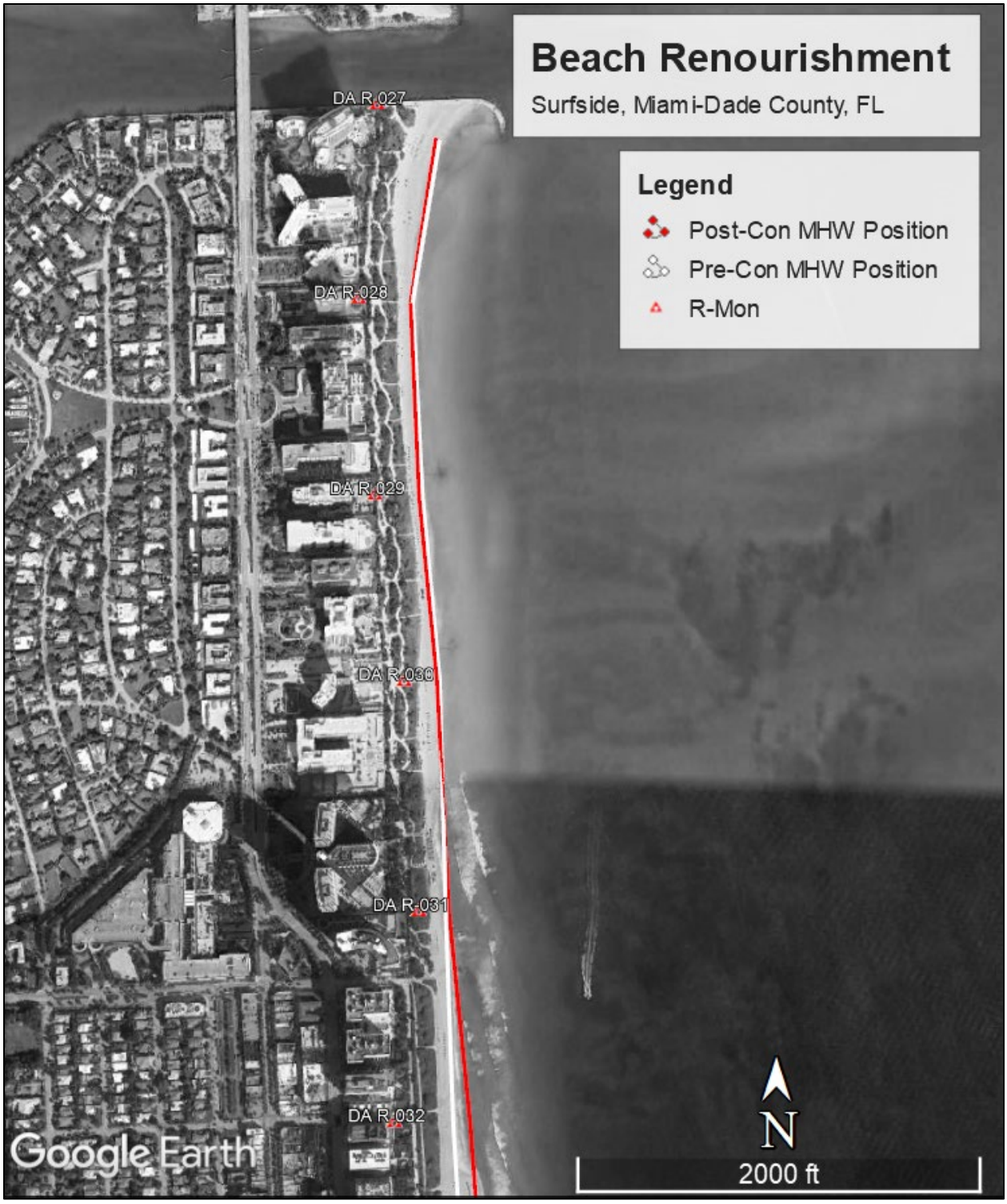

Figure 5: MHW Position August 2019 to July 2020 from R-27 to R-32 (Aerial dated 01 Feb 2020)

Figure 6: MHW Position August 2019 to July 2020 from R-32 to T-37 (Aerial dated 01 Feb 2020)

5.3) Volume Change Analysis

As part of the monitoring requirements, the USACE measured volumetric changes within the surveyed area. Volume changes were calculated by creating a DTM for each survey and then using Bentley's Microstation Inroads software to calculate the volume change between the two survey surfaces between every pair of R-monuments. Volumetric calculations extend from the landward extent of the post-construction survey (20-158) to the -19.3 ft NAVD88 contour which is the depth of closure. This corresponds to the zone of the most active sediment transport as significant material movement is not expected, nor observed, outside of the DOC. Volume changes between each R-monument can be seen in **Table 6** and **Figure 7**.

Consistent with the MHW analysis, the comparison between the pre-construction (August 2019) and post-construction (July 2020) survey resulted in volumetric gains, a direct result of the 2020 nourishment project. Individual unit volume changes varied within the fill area from a minimum gain of 41.3 cubic yards per linear foot (cy/lf) between R-31 and R-32 to a maximum gain of 66.3 cy/lf between R-33 and R-34. This area had an average unit volume gain of 56.6 cy/lf.

The Bal Harbour area, which did not receive any fill, had a maximum unit volume loss of -9.5 cy/lf between R-27 and R-28, which is just south of the Baker's Haulover Inlet south jetty. Bal Harbour had a maximum unit volume gain of 7.6 cy/lf between R-30 and R-31, which is just north of the fill area and is likely the result of the natural dispersion of the beach fill as the beach equilibrates. This area had an average loss of 1.1 cy/lf.

The total volume gain across the project fill area (R-31 to R-36.5) was approximately 342,000 cy. This is slightly higher (5%) than the pay volume for the project which was approximately 325,000 cy. This difference in volume is possibly due to minor accretion offshore of the construction area or potentially due to minor survey errors between high spatial density payment surveys versus monitoring surveys. The Bal Harbour area experienced a total volume change of about -3,200 cy. This area may have experienced higher erosional losses but the dispersion of the Surfside fill offset any erosion between R-30 and R-31 (accretion of 8,700 cy). The fill can also be seen dispersing to the south, as the area between R-36.5 and T-37 experienced almost 25,000 cy of accretion between the pre- and post-construction surveys. Pattern of fill dispersion to the north, south, and offshore can be seen in areas of higher elevation in **Figure 8**.

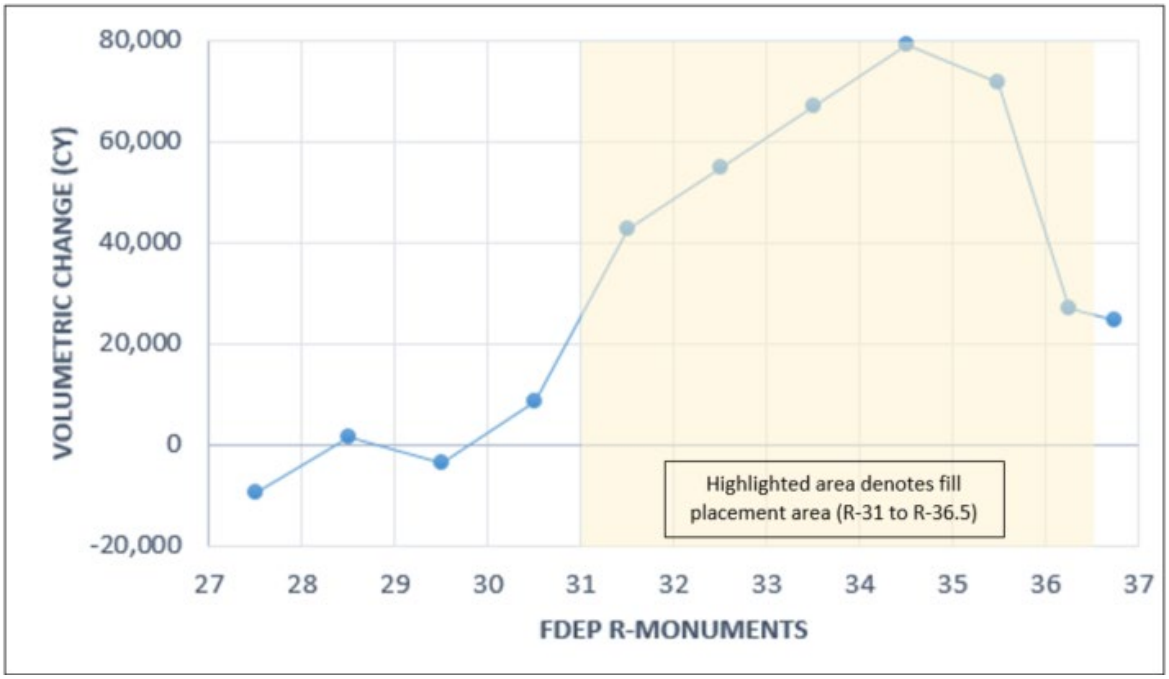

Figure 7: Volume Changes

Table 6: Volume Change

August 2019 - July 2020 (Survey 19-160 Pre-Con to 20-158 Post-Con)			Volume Change (cy)			Unit Volume Change (cy/lf)		
Construction Segment	FDEP R-Monument	Distance between R-Mon (ft)	Above MHW 0.36 ft NAVD88	Between MHW and DOC	Above DOC -19.3 ft NAVD88	Above MHW 0.36 ft NAVD88	Between MHW and DOC	Above DOC -19.3 ft NAVD88
Bal Harbour	R-27							
		1,025	-3,434	-6,295	-9,729	-3.4	-6.1	-9.5
	R-28							
		1,020	-1,219	2,589	1,370	-1.2	2.5	1.3
	R-29							
		963	-968	-2,565	-3,533	-1.0	-2.7	-3.7
	R-30							
		1,150	3,798	4,908	8,706	3.3	4.3	7.6
Surfside	R-31							
		1,032	14,190	28,405	42,595	13.8	27.5	41.3
	R-32							
		971	22,632	32,219	54,851	23.3	33.2	56.5
	R-33							
		1,012	22,658	44,468	67,126	22.4	43.9	66.3
	R-34							
		1,233	28,705	50,402	79,107	23.3	40.9	64.2
	R-35							
		1,143	25,879	45,695	71,574	22.6	40.0	62.6
	R-36							
		554	11,199	15,720	26,919	20.2	28.4	48.6
	R-36.5							
Surfside		544	8,240	16,405	24,645	15.1	30.2	45.3
	T-37							
Average Constructed Area		**991**	**20,877**	**36,152**	**57,029**	**20.9**	**35.6**	**56.6**
Average Bal Harbour Area		**1,040**	**-456**	**-341**	**-797**	**-0.6**	**-0.5**	**-1.1**
Average of Surveyed Area		**968**	**11,971**	**21,086**	**33,057**	**12.6**	**22.0**	**34.6**
Total Constructed Volume Area		**5,945**	**125,263**	**216,909**	**342,172**			
Total Bal Harbour Volume Area		**4,158**	**-1,823**	**-1,363**	**-3,186**			
Total Volume of Surveyed Area		**10,647**	**131,680**	**231,951**	**363,631**			

*Highlighted area denotes fill placement area (R-31 to R-36.5)

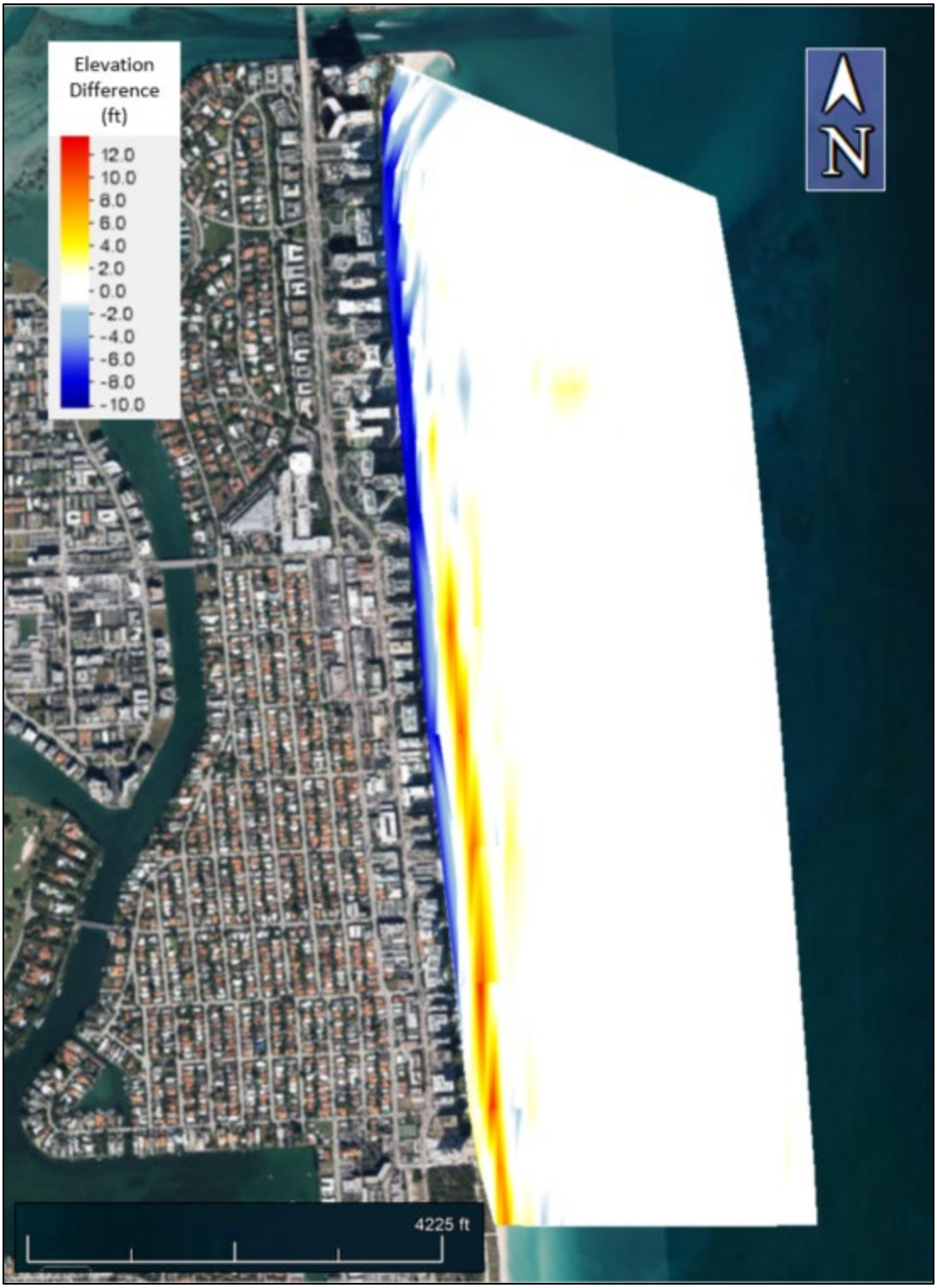

Figure 8: Elevation Change in Bal Harbour and Surfside between August 2019 and July 2020

6) Summary

This report describes the history of the Surfside portion of the Miami-Dade County, FL Beach Erosion Control and Hurricane Protection Project and provides details of the 2020 nourishment. The USACE evaluated the MHW position changes and volume changes between the pre-construction survey in August 2019 and the post-construction survey in July 2020. This is the first nourishment by the USACE of Surfside since 1999 because the shoreline has benefit from the southern drift of the material more frequently placed in Bal Harbour.

The average MHW position within the fill area (R-31 to R-36.5) saw an average advance of 78 ft between pre- and post-construction surveys. In contrast, Bal Harbour (R-27 to R-31), to the north of the project fill area, saw an average shoreline retreat of 16 ft.

The volume change within the fill area between August 2019 and July 2020 was an increase of 342,000 cy (57 cy/lf). This is slightly higher than the payment volume for the project of 325,000 cy (55 cy/lf). This difference in volume is possibly due to minor accretion offshore of the construction area or the offshore dispersion of sand between fill placement and payment surveys.

As expected, the Bal Harbour shoreline was erosional during this time period. The net volume change for Bal Harbour is -3,200 cy (-0.8 cy/lf) but this value is buoyed by dispersion from the Surfside fill. From R-30 to R-31, there was a volume gain of 8,700 cy (8 cy/lf) of material due to the dispersion of the fill but from R-27 to R-30, Bal Harbour experienced 11,900 cy (-4 cy/lf) of erosion.

In general, the project performed as expected between the pre-construction and post-construction surveys. The future monitoring of this project will be joined with the biennial county-wide monitoring program. This monitoring program includes a county-wide survey of the entirety of Miami-Dade County every two years, as well as an analysis of the MHW position and volume changes. The next expected occurrence of this monitoring will occur in 2022. During the time period between this report and the next one, it is expected that the Surfside fill area continues to disperse as the beach equilibrates based on the wave conditions. As discussed in the 2016 LRR, the expected erosion rate of this area is 45,000 cy/yr and it should be expected that the total erosion should be near 90,000 cy during the next monitoring cycle. This magnitude will be affected by any additional sand placements in the area or the adjacent ones or if severe storms cause larger than typical erosion during this time period.

7) References

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