



## CARTERET COUNTY BEACH COMMISSION

### Agenda Topic Cover Sheet

# Beachfill Template Alternatives & Final Design (Reach 5): East Emerald Isle, Phase III Post-Florence Renourishment Project.

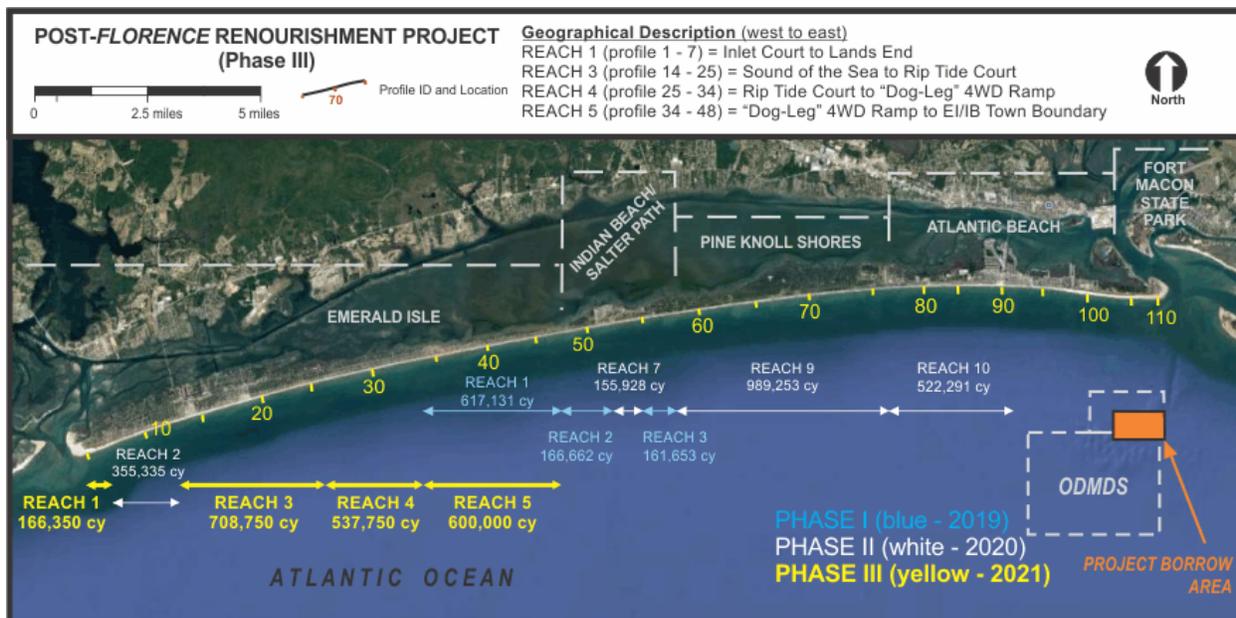
Meeting Date: **11/16/2020**

Topic No. **6**

Suggested Action: None – Informative Presentation.

Sam Morrison with the engineering firm of Moffatt & Nichol (M&N) will be providing a PowerPoint presentation to the Beach Commission at our November meeting summarizing the various beach nourishment templates considered and the analytical processes utilized for the East Emerald Isle Reach associated with our upcoming Phase III Post-Florence Renourishment Project. In general, Phase III has three components; **(A)** The large gap in Emerald Isle the Phase I and II projects did not address totaling 1,246,500 cubic yards (cy), **(B)** A small area towards the Point (between Inlet Court and Lands End) that we did not tackle in Phase II incorporating 166,350 cy, and **(C)** We are also returning to the numbered streets of Emerald Isle (the 2019 Phase I area) to provide additional sand to this reach as well (600,000 cy). Collectively, this equates to 2,012,850 cy over a linear distance of 49,455 feet (9.4 miles) – see Fig. 1 next page. Great Lakes Dredge & Dock has been awarded the nourishment contract and anticipates to start the project sometime in the mid-to-late January 2021 timeframe. Our environmental window sunsets on April 30<sup>th</sup> and all heavy equipment must be off the beach at this time.

A second nourishment in the numbered streets ("Reach 5" in Fig. 1) was predicated for two predominant reasons; **(1)** Our fill density in this area was actually below the volume of sand loss documented for hurricane Florence (+38.2 cy/ft added in 2019 vs. -43.8 cy/ft lost in 2018) – this was one of the collateral design issues we had back in late 2018 trying to get the most critical areas of Bogue Banks nourished with the financial resources we had in-hand at the time. Remember, this was months and months before FEMA fixed-cost funding to Pine Knoll Shores, Indian Beach, and Emerald Isle was approved; and was also months before the General Assembly even passed legislation enabling us to apply for State funding. And importantly and the subject of this memorandum, **(2)** As we have identified before, the numbered streets (particularly 10<sup>th</sup> through 20<sup>th</sup> streets) are a known erosion "hot spot" and thus require more frequent infusions of sand.



**Figure 1** – Plan map depicting the geographic ranges and volumes associated with the Post-Florence Renourishment Project for Phase I (2019), Phase II (2020), and Phase III (2020-21 as contracted).

Rather than employing a traditional "straight berm" approach for the East Emerald Isle Reach (i.e., generally an equal berm width throughout), we requested Moffatt & Nichol to evaluate several berm width/fill density templates of their choosing to ascertain if a longer-lasting design would percolate to the surface during the analysis. As mentioned above, a total of 600,000 cy is planned for the East Emerald Isle Reach and our goal was to constrain the best use of this volume in the Reach footprint. To these ends, a total five designs were evaluated as briefly described below and graphically depicted on Fig. 2 (next page);

#### #1 Straight Berm

- 60 feet berm width with a 36 cy/ft fill density throughout.

#### #2 Trapezoid

- A "fat" straight middle section incorporating an 85 feet berm and a fill density of 51 cy/ft with long, abrupt parallel sides.

#### #3 Bell Curve Bubble

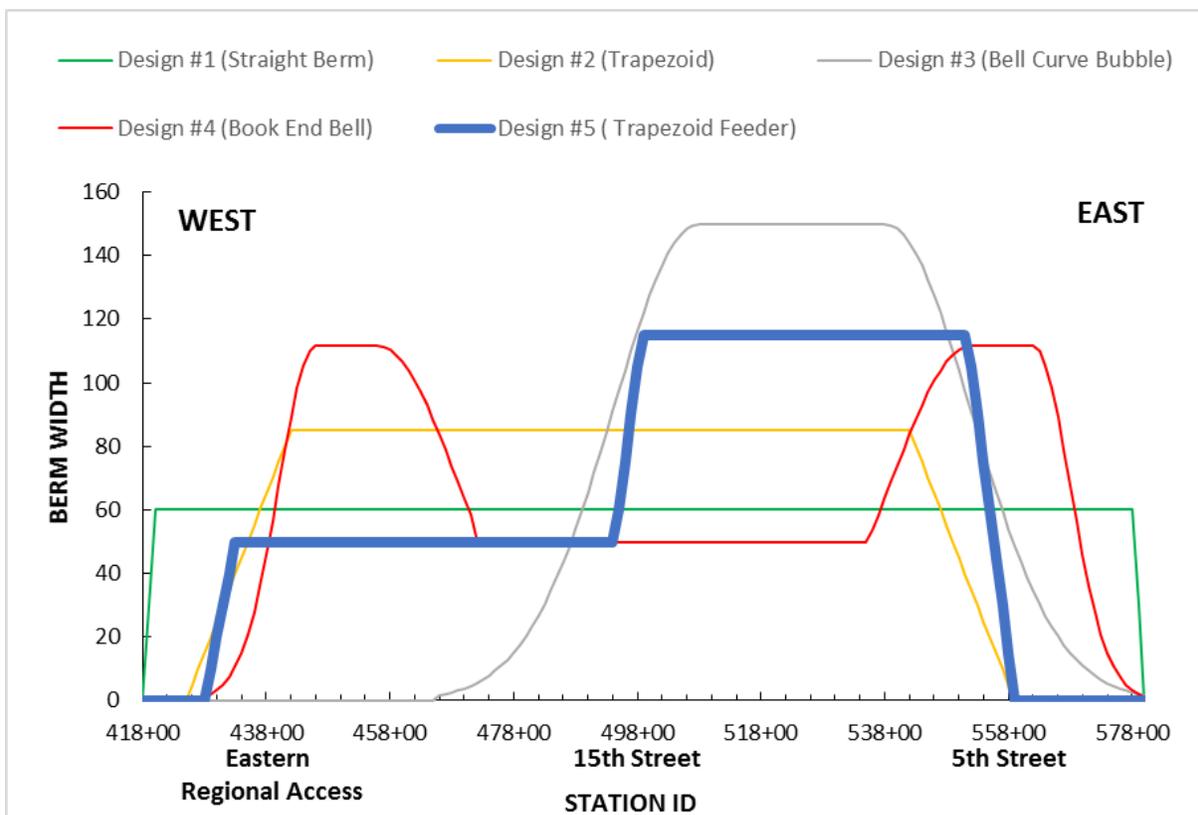
- The fill would be constrained to roughly 1<sup>st</sup> to 21<sup>st</sup> Streets with the peak of the bell curve situated near 10<sup>th</sup> Street and extending roughly 1,500 linear feet in either direction from the center (~3,000 linear feet total). The peak of the bell curve includes a 150 feet berm with a 90 cy/ft fill density.

#### #4 Book End Bell

- Two smaller bell curves positioned on either side of the Reach with a smaller, straight berm in the middle. Generally a 112 feet berm (67 cy/ft density) for the bells and a 50 feet berm, 30 cy/ft fill density for the straight middle section.

#### #5 Trapezoid Feeder (selected design)

- Two side-by-side trapezoids with the "bigger" trapezoid positioned between 5<sup>th</sup> and 15<sup>th</sup> Streets (115 feet berm; 69 cy/ft fill density), and the smaller adjacent trapezoid to the west extending from 15<sup>th</sup> Street to the Town's Eastern Regional Access (50 feet berm; 30 cy/ft fill density).



**Figure 2** – Schematic depicting the five beachfill templates in terms of berm width analyzed for the East Emerald Isle Reach (#5) associated with the upcoming Phase III Post-Florence Renourishment Project.

The proposed design alternatives basically fall into one of two broad categories notwithstanding the straight berm and trapezoid approaches; either place more sand directly within the peak “hot-spot” at ~10<sup>th</sup> to 13<sup>th</sup> Streets, OR place more sand outside the hot-spot area in hopes sand will migrate into the hot-spot. Again our major objective was to select the design that would provide the greatest durability (i.e., last the longest to reduce the nourishment frequency). While one design didn’t “jump off the page” based on the modeling analysis, the “Trapezoid Feeder” template did yield the best result and was incorporated into the plans and specifications for Phase III (see the thick blue line/Design #5 in Fig.2). Mr. Morrison will provide more details concerning the analysis at our November Beach Commission meeting, and we’re pleased that we are trying a different approach for the hot-spot using all of monitoring data and experience we have obtained over the course of the past several years.