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NEW JERSEY'S DISTINCTIVE PUBLIC UNIVERSITY

**A DIGITAL ELEVATION MODEL to COMPARE the EXISTING DUNES at SEAPOINTE VILLAGE,
with the US ARMY CORPS of ENGINEERS HEREFORD INLET TO CAPE MAY INLET SHORE
PROTECTION PROJECT LOCATED in TOWNSHIP OF LOWER, CAPE MAY COUNTY, NJ**

Prepared for the Seapointe Village Owners Association

**Prepared by the Stockton University Coastal Research Center (CRC), 30 Wilson Ave, Port Republic, NJ
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Introduction:

Earlier in 2015 the Philadelphia District Corps of Engineers released its design plans for their Hereford Inlet to Cape May Inlet Shore Protection project. This final Feasibility Study contains the District's planning and justification for this segment of the NJ coastline for a long-term coastal shore protection program. This proposal examines the entire barrier segment between Hereford and Cape May Inlets with the knowledge that the sand supply is not in question, just its eventual distribution along the shoreline. The only erosional issue is present in the City of North Wildwood, which is located on Hereford Inlet with a 25-block oceanfront exposure to the Atlantic Ocean. Erosion became an issue beginning in the 1990's with a retreat of 1,050 feet in the high tide line at a CRC survey site at 15th Avenue. Sand moved from the beach in a nearly perfect 50:50 split between the sand volume moving into Hereford Inlet and the volume seen moving south along the remaining oceanfront toward Cape May Inlet (a 500-foot shoreline advance seaward at Cresse Avenue).

Since the oceanfront beach has expanded seaward in the remaining three municipal entities plus in the wildlife refuge at the southernmost portion, the plan calls for excavating sand from the beach itself and pumping the water slurry north to augment the North Wildwood erosion zone. In addition the design plan calls for a continuous dune system with a crest elevation of 16.00 feet (NAVD 1988), with a 25-foot wide crest surface at that elevation and slopes both landward and seaward of 5:1 from 16.0 feet down to the existing beach. The berm width would be reduced between Wildwood and Lower Township by the sand volume required at the time of construction should this design be adopted.

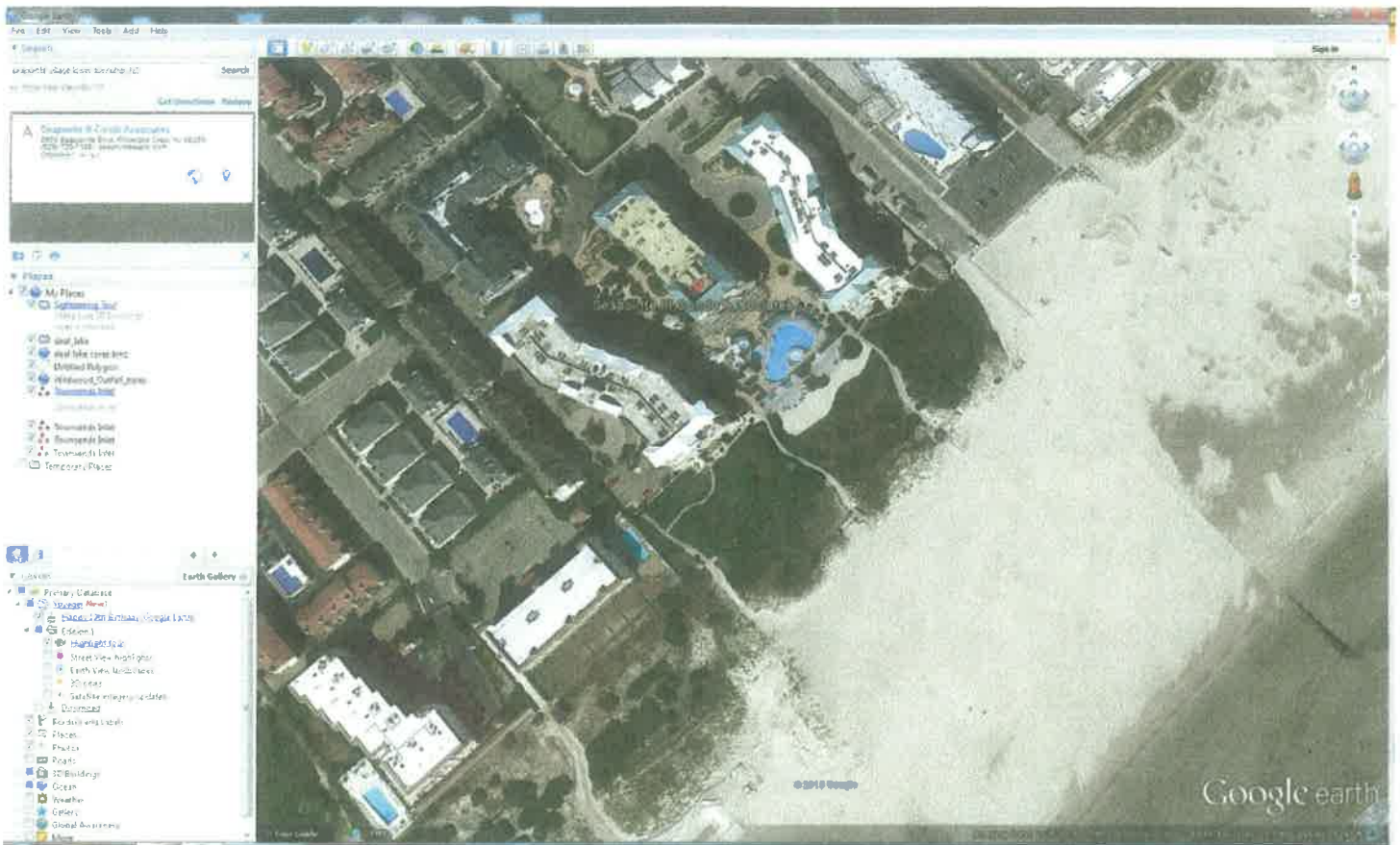


Figure 1. Google Earth View of Seapointe Village and surrounding properties as of October 5, 2014. The huge contrast between the dune at Seapointe Village and the Icona property just north of Memphis Avenue is abundantly clear. Seapointe Village has the best vegetated dune with a very well defined crest among the five privately held oceanfront properties in Lower Township.

The Impact on Seapointe Village Property:

Seapointe Village is located between Memphis and Station Avenues in the Township of Lower, Cape May County, NJ. The ownership extends from the mean high tide line landward for 1,750 feet to Seaview Avenue parallel to the shoreline. The figure below was extracted from the Army Corps Feasibility Study and shows two things:

- A. The zone of sand excavation for the project ends at Memphis Avenue just north of Seapointe Village. Therefore, no existing sand is destined for removal from the Seapointe beachfront. In fact, recent changes to the erosional behavior in North Wildwood may mean the end point for project sand excavation occurs in Wildwood Crest.
- B. The proposed plan for the Lower Township portion is basically to create a consistent elevation and width dune along the beachfront as wave damage protection should a serious northeast storm or hurricane occur during the project timeframe of 50 years.

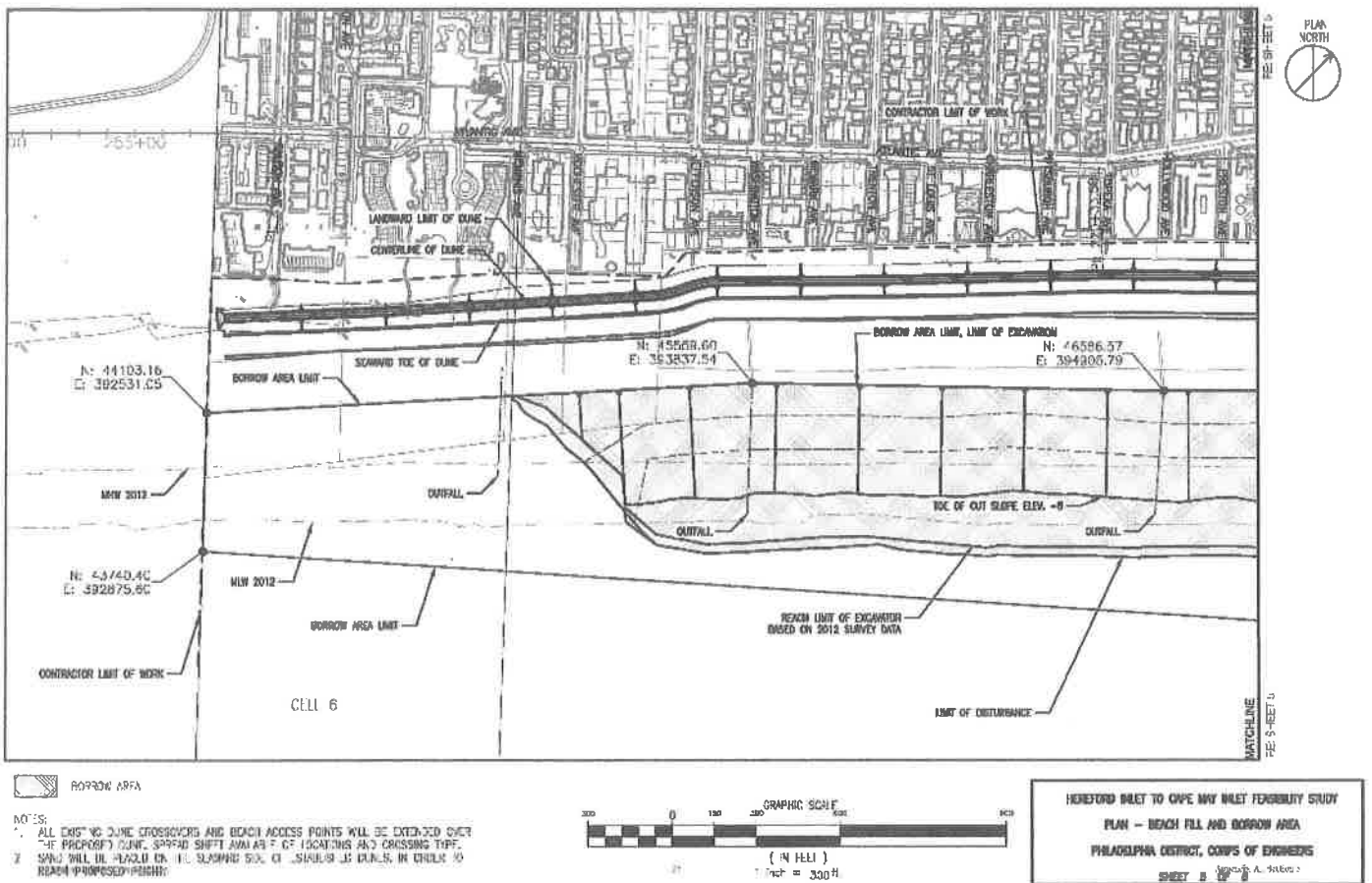


Figure 2. Page 159 extracted from the Hereford Inlet to Cape May Inlet Final Feasibility Study for the Wildwoods. The gray area represents the zone proposed for excavation to supply sand for North Wildwood’s erosional zone. The excavation ends at Memphis Avenue at the northern boundary of Seapointe Village. This plan view also shows the design dune extending across the area to the southern limit of work (end of human development on the island).

The feasibility study also includes design cross sections of the beach/dune system showing a series of design parameters depending on the beach conditions at specific “type” sites. The page below shows the design plan for a beach with no sand added or removed from the berm, but with the proposed dune continuing along the shoreline and integrated into the existing dune. The image below is “typical” of the project south of Rochester Avenue in Lower Township where there are no plans to alter the beach width or sand volume, but maintain a consistent elevation and width dune across as wave protection for developed parts of the island.

The feasibility study’s text describes the proposed dune enhancement work as occurring seaward of the existing crest elevation to either (a), raise the existing elevation to 16.0 feet NAVD 1988, or (b), widen the crest so that 25 feet of surface width is at least at a 16.0 foot elevation. Should the existing dune cross section actually MEET the design criteria of elevation and crest width, then no further work would be undertaken. Why re-do what nature or the property owner has already created?

The existing dune system at Seapointe Village is robust, well vegetated, and has a substantially wider base than the proposed project dune. The digital scan is designed to show every detail in the match, deficit or excess beyond the design for the association’s property. The variation of dunes in Lower Township is huge with the largest difference between those present at Seapointe Village and the total absence of any dune at all on the Iona property immediately north across Memphis Avenue.

At the initial meeting, the team observed that likely the only deficit in the Seapointe Village dune system would be the two beach access pathways extending from the landscaped pool area onto the beach bracketing the luncheon facility immediately seaward of the dune toe. Likewise the Memphis Avenue street end at the beach lacks any dune, so this would also need to be constructed to the design parameters. The project plans include

installing pedestrian cross over walkways and dune grass with fencing to trap additional wind transported sand on the seaward dune slope.

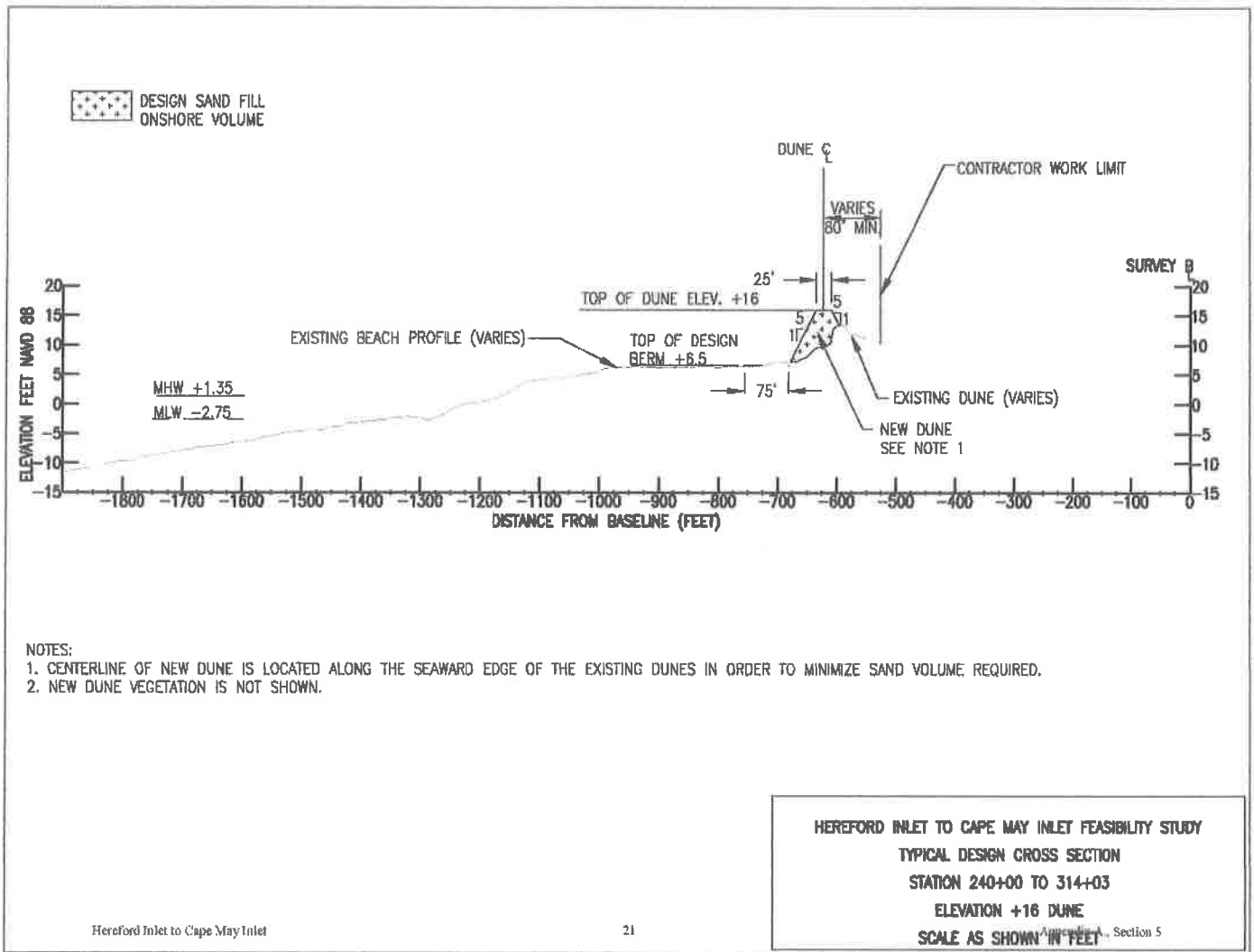


Figure 3. The proposed design cross section for the southernmost portion of the project (240+00 to 314+03 stations along the oceanfront). The plan shows that the design dune would be integrated seaward of the existing dune’s crest to create the 25-foot wide summit elevation at 16.0 feet with the 5:1 slopes landward and seaward.

Width, Height, and the Comparison of the Seapointe Village Dunes to the ACOE design:

On July 16, 2015 the Stockton University CRC team came to Seapointe Village, met with Mr. James Yost, manager and commenced to develop a comprehensive survey of the existing dunes with the goal of comparing the existing conditions to the Army Corps design dune to determine what additions may be necessary to achieve the ACOE design at Seapointe Village. The CRC team brought a Leica Geosystems Nova static digital scanner and Leica Viva RTK GPS equipment to establish a set of bench marks and using the scanner, make a digital map of the entire dune system and nearby ocean beach as the basis for the comparison with the ACOE plans for their 16.0-foot elevation dune. Mr. Yost had secured permission from two owners on the 5th floor oceanfront condominium units to allow the CRC team to set up the scanner on each balcony of the north and south buildings that look directly down over the entire dune.

The RTK GPS unit was employed to establish bench marks on the beach in an array to allow the scanner to develop an enormous number of digital elevations on the dune/beach system. After scanning was complete the existing dune crest was walked taking points among the vegetation to provide “bare-earth” information to allow later removal of the data points reflected from the bush vegetation. The team returned on August 13th to fill in

the blank areas with more data after examining the initial results. The scanner was set up in several ground places to better define areas not adequately scanned earlier.

Results;

There were 235 elevation points taken with the Viva RTK GPS and 3,300,000 points on the beach and dune taken by the Nova scanner. They comprise a complete digital elevation file on the existing dune conditions.

The project manager for the Hereford Inlet Shore Protection project was contacted to obtain the Army Corp's digital design mapping products to include in the CRC study so that the most precise comparison could be made between the design and the existing dune system. Both data sets were introduced into ESRI Arc GIS software and a three dimensional map was created as a combination of the design dune with a crest elevation of 16.0 feet NAVD 1988 datum, and the CRC digital map information obtained in July/August.

The map shown below is the compilation of the proposed dune with its crest, landward and seaward toe bases shown as dashed black lines (elevation to the left) and the existing Seapointe Village dune system. Areas where the existing dune exceeds the US Army design simply show as the air photograph view of the ground surface. The colors represent regions where the existing dune is deficient in elevation compared to the design plan. The yellow and orange colors represent the spots with the highest deficiency and are located on the "beach grade" public pathways to the beach through the dunes. Each of the two private Seapointe paths are low as is the Memphis Avenue public access path at the street end.

Memphis Avenue would require the most sand added (1,783 cubic yards on just the Seapointe portion) to achieve the design dune cross section, while the south path is far less at 486 cubic yards, and the north path is the least deficient at 315 cubic yards. A minor sand volume (636 cubic yards) would need to be added to the seaward dune slope along much of the property, but at 1- to 3-foot thicknesses at the most. Currently this zone has very sparse vegetation, so the added sand would have little environmental impact. The total deficiency amounts to 3,220 cubic yards of added sand, nearly all on the pathways or seaward dune slope. This represents 22.1% of the entire federal dune design for this property (14,540 cubic yards) above the 6.5-foot elevation of the existing beach had there been no existing dune at all.

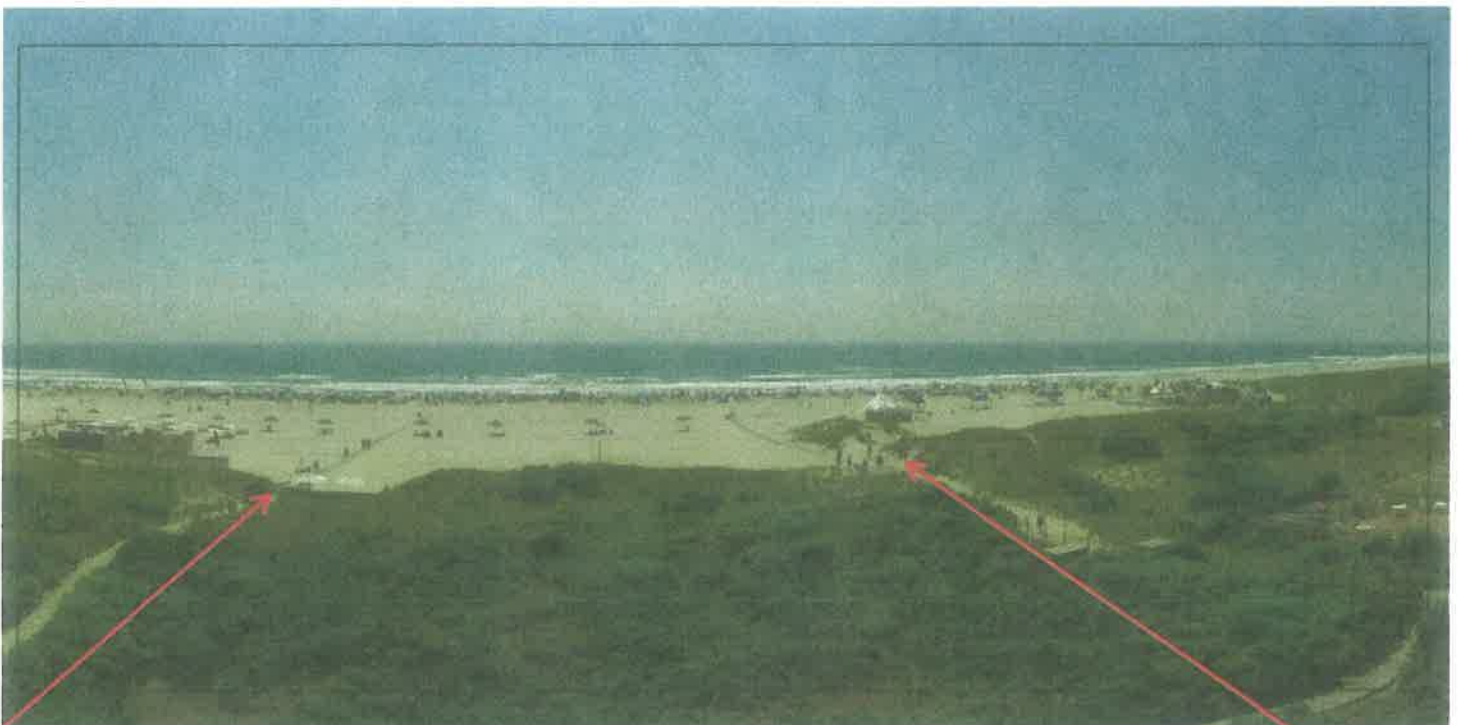


Figure 4. View from the south building's fifth floor balcony from the Nova digital scanner showing the existing dune footprint as it made the scans of the property. The individual images are stitched together producing this panoramic view of the beach July 16, 2015. Any dune modifications would all be located at the seaward-most 125 feet of this extensive vegetated area.

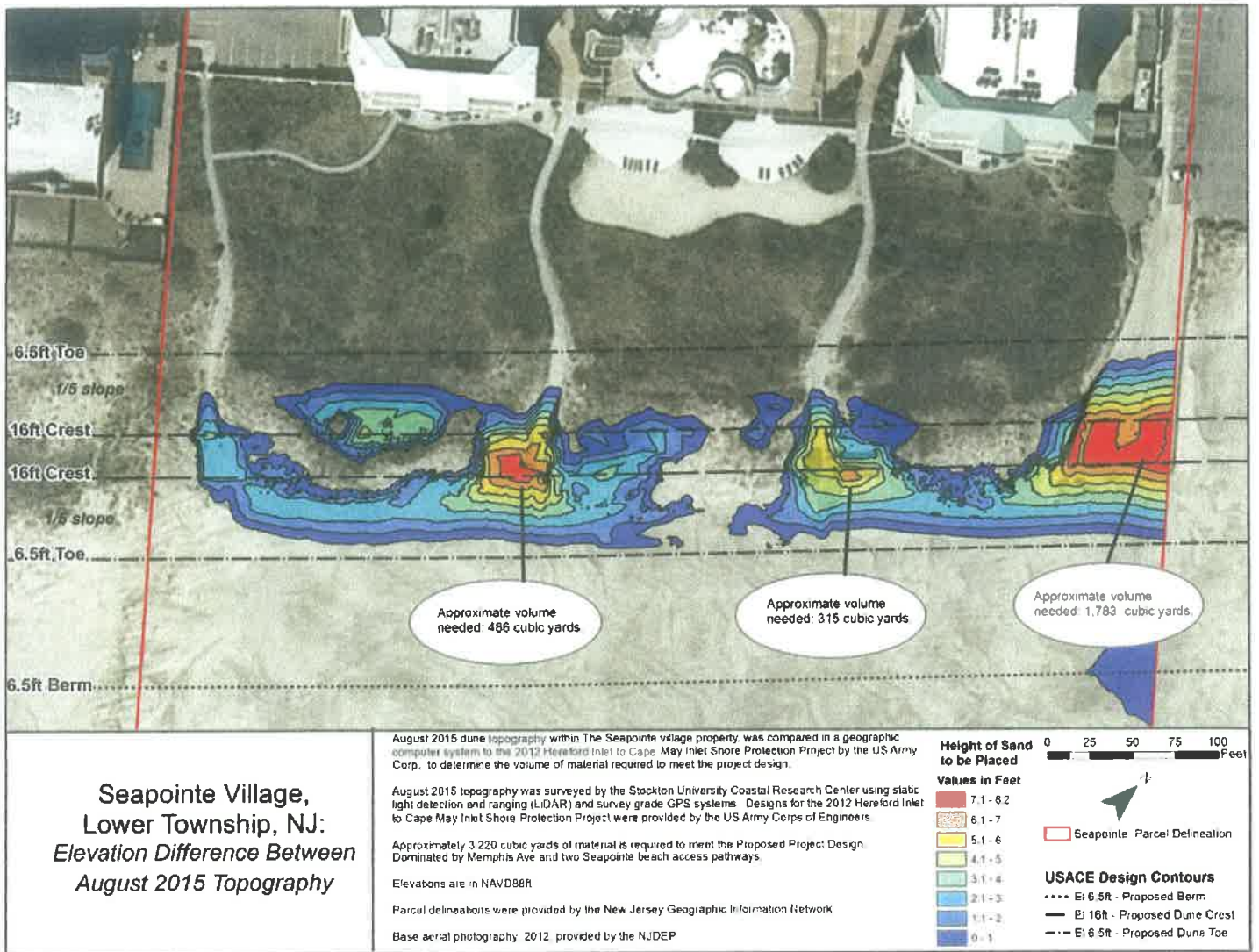


Figure 5. Digital comparison of the US Army proposed 16.0-foot crest elevation dune with the existing dune on the Seapointe Village property. The worst deficiency is found at the Memphis Avenue public access pathway shared with the Icona property to the north. The two private association pathways have much smaller deficiencies with the remainder found along the seaward dune slope out to the beach at elevation 6.5 feet. The colors are coded with the vertical difference between the existing dune and the design template dune proposed for this federal project. No calculation of existing dune surplus elevation sand volumes was done since no effort is expected to alter those regions.

This entire project is 65% federally funded, 26.25% NJ State funded, and 8.75% locally funded. The Township of Lower would be the normal local funding in this type of project, but the Township does not own any of the beaches. In any event, placing the necessary dune sand, the fencing, the pedestrian walkover paths, and the dune grass are all part of the project expenses as is a 50-year commitment by the US Army Corps of Engineers to maintain this project at the same funding ratios, at the design specifications on a 3-5 year interval (with congressional appropriation for the work).

Conclusions:

The Seapointe Village segment of this project will see no sand excavated from the association's beach, no beach construction or modifications to the existing beach, with the only modification at this site to be the creation of a consistent elevation (16.0 feet) primary dune at the present seaward location of the dune. The association's choices as to pathway slopes up from inland and back to the beach elevation would be incorporated into the project design at this location as would the design surface of the pathway. The seaward slope would be vegetated with American dune grass following dune modification. Pathway slopes more gentle than 5:1 might be the responsibility of Seapointe Village to create either as the project is built or at a later time.