Recycling of Surplus Sand to Extend the Time Between Beach Fill Episodes

Cape May County, New Jersey

Dr. Stewart Farrell

Coastal Research Center

1795 Franklin Map Shows Inlets

Inlet Morphology has Remained Fairly Constant

The Wildwoods – An Island with Surplus Sand

ACOE Map of the Wildwoods Showing Zones of Sand Loss vs. Gain

March 26, 2008

Sediment imbalance between northern and southern portions of project area

Ocean City, NJ has a Vast Deposit Centrally Located on the Island

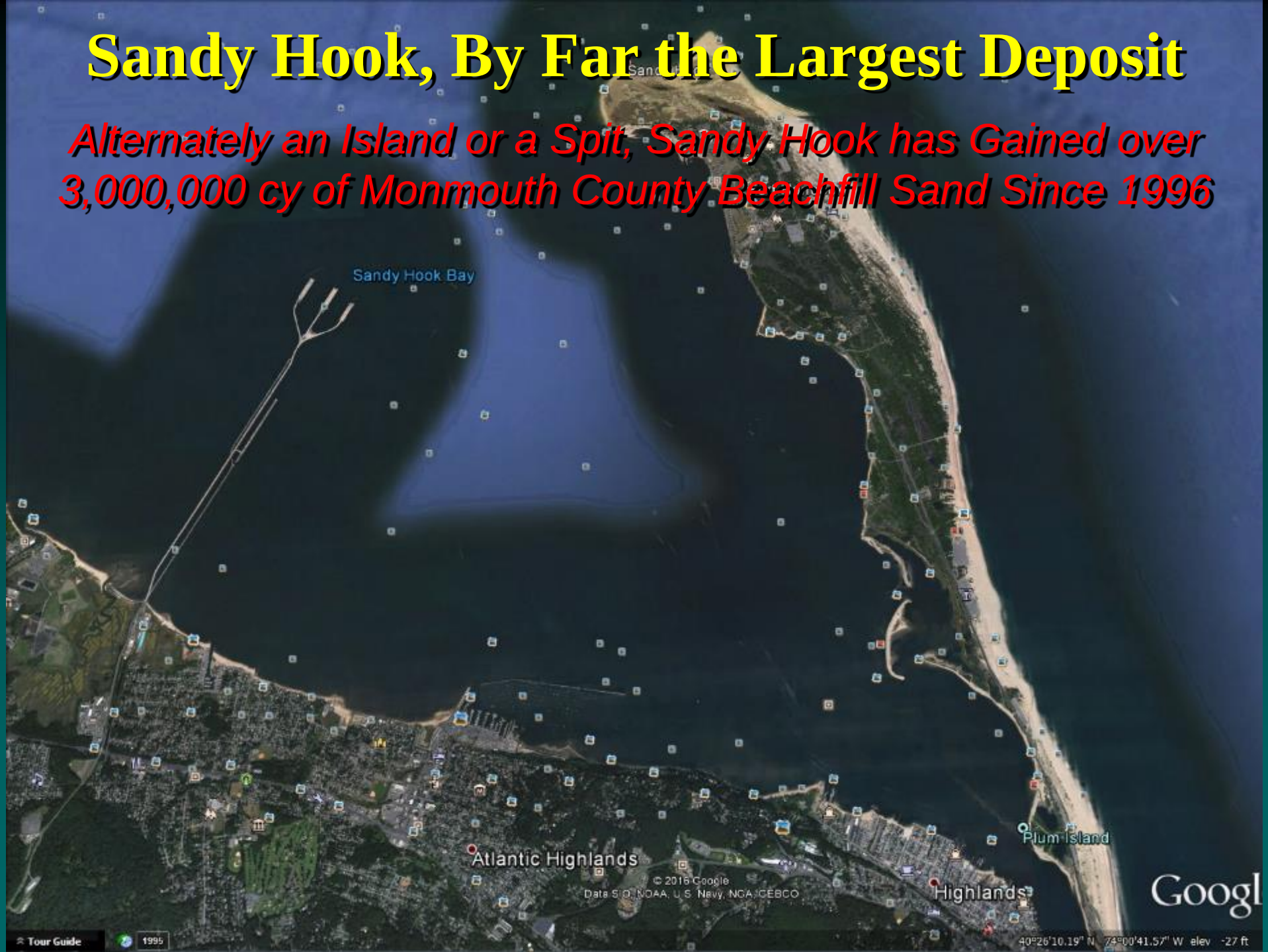
Brigantine, NJ has a Sand Repository

"Absecon Inlet's North Jetty has built up a 6 million cy reserve"

"Absecon Inlet"

Sandy Hook, By Far the Largest Deposit

Alternately an Island or a Spit, Sandy Hook has Gained over 3,000,000 cy of Monmouth County Beachfill Sand Since 1996



Sand Backpassing The Recycling Concept

- **A chronic pattern of sand movement is required**
- **The supply beach must be accessible from the depositional beach area.**
- **Probably not the primary means of providing shoreline stability**
- **THE COST is very low in comparison to finding new sand**
- **Tried four times in Avalon 2006, 2012, 2014 & 2016 (229,063 cy)**
- **Mobilization cost about 8% of that for a dredge in the inlet**
- **Sand moving cost about $6 - $7.00 per cubic yard up to 3 miles**
- **Excellent means to maintain a large Federal project to extend the time between major maintenance efforts**
- **The sand has been shown repeatedly over two decades to be arriving between 32nd and 70th Streets faster than it could be hauled back to the north AND it is guaranteed to return.**

Sand Backpassing The Recycling Concept

North Wildwood Used Sand Backpassing Following Hurricane Irene in 2012 using Wildwood Crest Beach as Source (93,000 cy)

Thirteen High Capacity Trucks Made 1,700 Trips Between March and May 2012

North Wildwood Employed Sand Backpassing in 2016 to move 171,000 cy from the City of Wildwood following an Early 2016 Northeast Storm

The Army Corps of Engineers has this Concept as the Design Option for the Hereford Inlet to Cold Springs Inlet Shore Protection Project now in final Feasibility Review

Brigantine has Considered Moving Sand from Absecon Inlet back to the Northern Erosion Zone Between Corps Dredge Projects

2006 Back Pass

Loading 25 cy Trucks

53,000 cu yds. placed

The 2012 Avalon Mid-Beach Sand Back-Passing Operation

a. Southern & northern borrow areas

b. An exclusion zone between the borrow sites

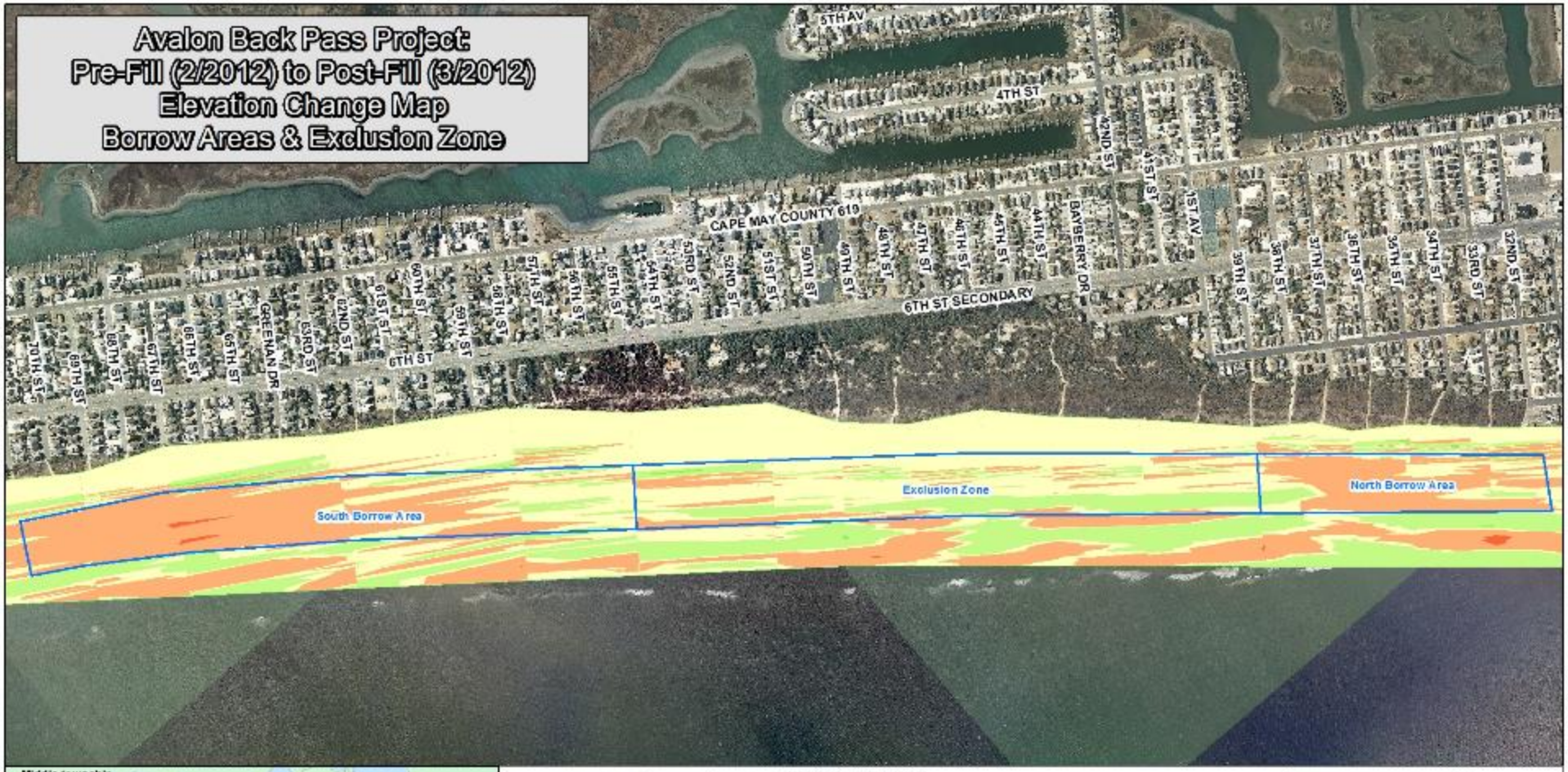
c. Limit was between the mid-tide line and the toe of the dunes

d. Excavation to 1.5 feet below existing surface

e. Work complete by March 15, 2012

f. Deposition area between 14th & 25th Streets

2012 pre- to post fill Borrow Sites



Pre to Post fill (2/2012 - 3/2012) Volume Change

Area	Volume Change Yds^3
South Borrow Site	-41,818
Exclusion Zone	5,001
North Borrow site	-13,139
Depostion Area	42,161
Total of Borrow Areas	-54,957
Entire Project Area	-7,794

Elevation Change

In Feet

- 4 - 6
- 2 - 4
- 0 - 2
- No Change
- 0 - (-2)
- (-2) - (-4)
- (-4) - (-5)

2/2012 and 3/2012 survey data collected by the Coastal Research Center were compared to obtain elevation differences.

Elevation changes are in feet.

No change is defined as 0.2ft to -0.2ft

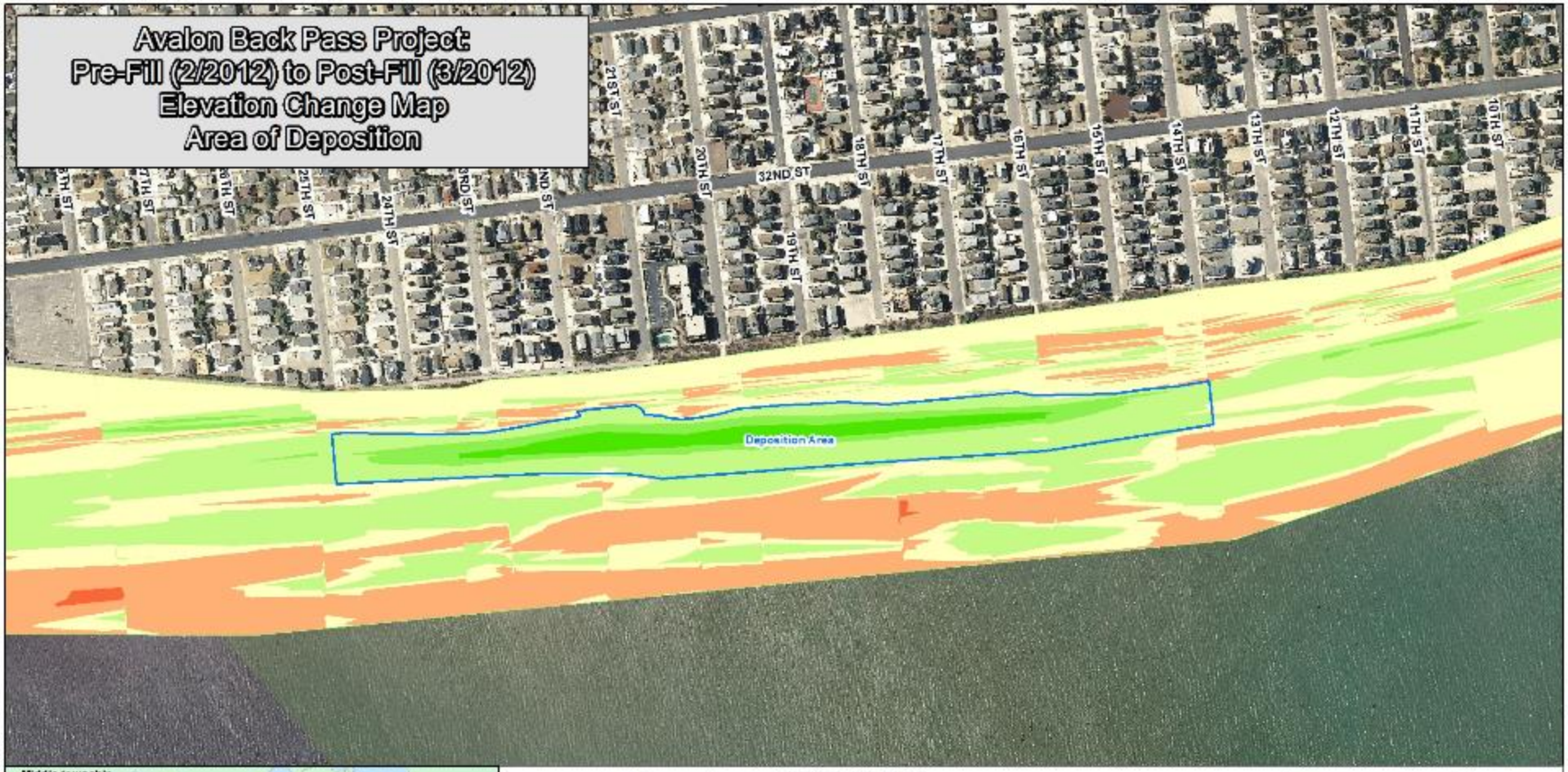
Base aerial photography:2007

The Richard Stockton College of New Jersey
CRC
Coastal Research Center

N

0 250 500 1,000 1,500 2,000 Feet

2012 Depositional Beach Site



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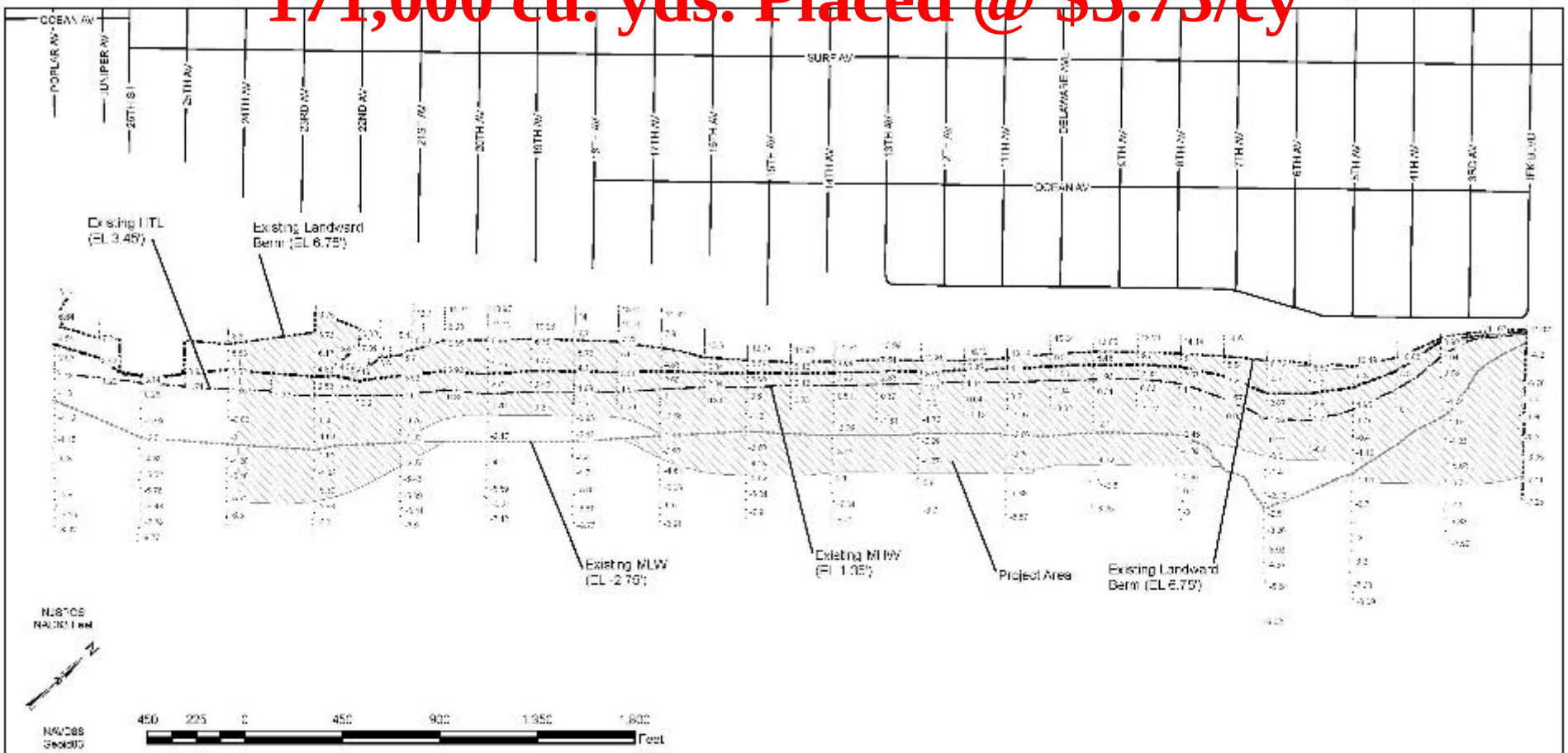
N

Feet
0 120 240 480 720 960

North Wildwood Sand Piles Hauled in from Wildwood City

2016 Design Plan for North Wildwood

171,000 cu. yds. Placed @ $5.75/cy



STOCKTON UNIVERSITY COASTAL RESEARCH CENTER 30 WILSON AVE., PORT REPUBLIC, NJ 08241	
North Wildwood, New Jersey Overview of Beach Nourishment - Proposed	
DRAWN BY: A.J. Ferencz	SHEET 1 of 1
CHECKED BY:	
SCALE: 1" = 450'	
DATE: 04/28/2016	

"This plan is not intended for Construction use"

Delineations and elevations of recommended fill were provided by Professional Geologist, Stewart Ferrell, PhD of the Stockton College Coastal Research Center.

This map was created using January, 2016 survey data (post winter storm Jones) by the Stockton University's Coastal Research Center. This data was used to derive the existing Mean Low Water (MLW) and Mean High Water (MHW).

All Vertical Units are in NAVD88

Total Project Area: 71.20 acres

Area within Project	[Acres] Max Disturbance
Above HTL	12.52
Between HTL and MHW	10.41
Total Area Above MHW	*22.92*
Between MHW and MLW	28.11
Below MLW	20.17
Total Area Below MHW	*48.28*
Total Project Area	71.20

North Wildwood, NJ
Elevation Change Between
March 2016 to June 2016
Surf
24th
23rd
22nd
21st
20th
19th
17th
16th
15th
14th
11th
10th
9th
7th
6th
5th
4th
3rd
2nd
1st
Chestnut
Ocean
John F Kennedy
The North Wildwood Elevation Change Map was created by comparing March 2016 post winter storm Nacio survey data and June 2016 post back passing survey data collected by the Stockton University Coastal Research Center.
Volume changes were calculated below 12 foot NAVD88.
Estimated gains in volume = 151,400 cubic yards
Elevation units are in NAVD88ft.
N
0
500
1,000
2,000
Feet
Elevation Change
in feet
6 - 8
4 - 6
2 - 4
0 - 2
No Change
(-2) - 0
(-4) - (-2)
(-6) - (-4)
Region | Volume (Yd³)
Areas of Gain | 151,400
Areas of Loss | -15,900
Net Volume Change | 135,500
STOCKTON UNIVERSITY
COASTAL RESEARCH CENTER
AJF 7/16

No. Wildwood During Project 2nd & Kennedy Blvd.

Critical Elements for Large Scale Backpass Projects

- **Must have a substantial accretional zone that adds 100,000 cy/year**
- **Permit requirements limit excavation depths & add exclusion zones**
- **Recovery to pre-project sand volumes required prior to next project start**
- **Wildlife issues can include biological surveys of sand foraging responses**
- **Trucking on the beach much preferred to hauling over roads**
- **Sand placement can involve stockpiling if seasonal restrictions are in place**
- **Equipment and crew experience in New Jersey is growing**
- **Project expenses eligible for NJDEP 75% - 25% cost sharing**
- **The ACOE *<u>might be amenable to project credit</u>* within their Shore Protection efforts if recycling can extend time between hydraulic maintenance efforts.**

Thank You