



# Wave Dissipation System

OCRM Staff  
Recommendation



## OBJECTIVE

Determine whether the  
Wave Dissipation System (WDS) :

- 1.) Was successful in addressing an erosional issue. (per S.C. Code Ann. § 48-39-320(C))
- 2.) Impacts the beach environment.  
(per S.C. Code Ann. § 48-39-130(D)(2))

The WDS is an experimental device proposed by The Citadel intended to:

1. Dissipate wave energy and its erosive effects on the beach.
2. Protect landward elements.



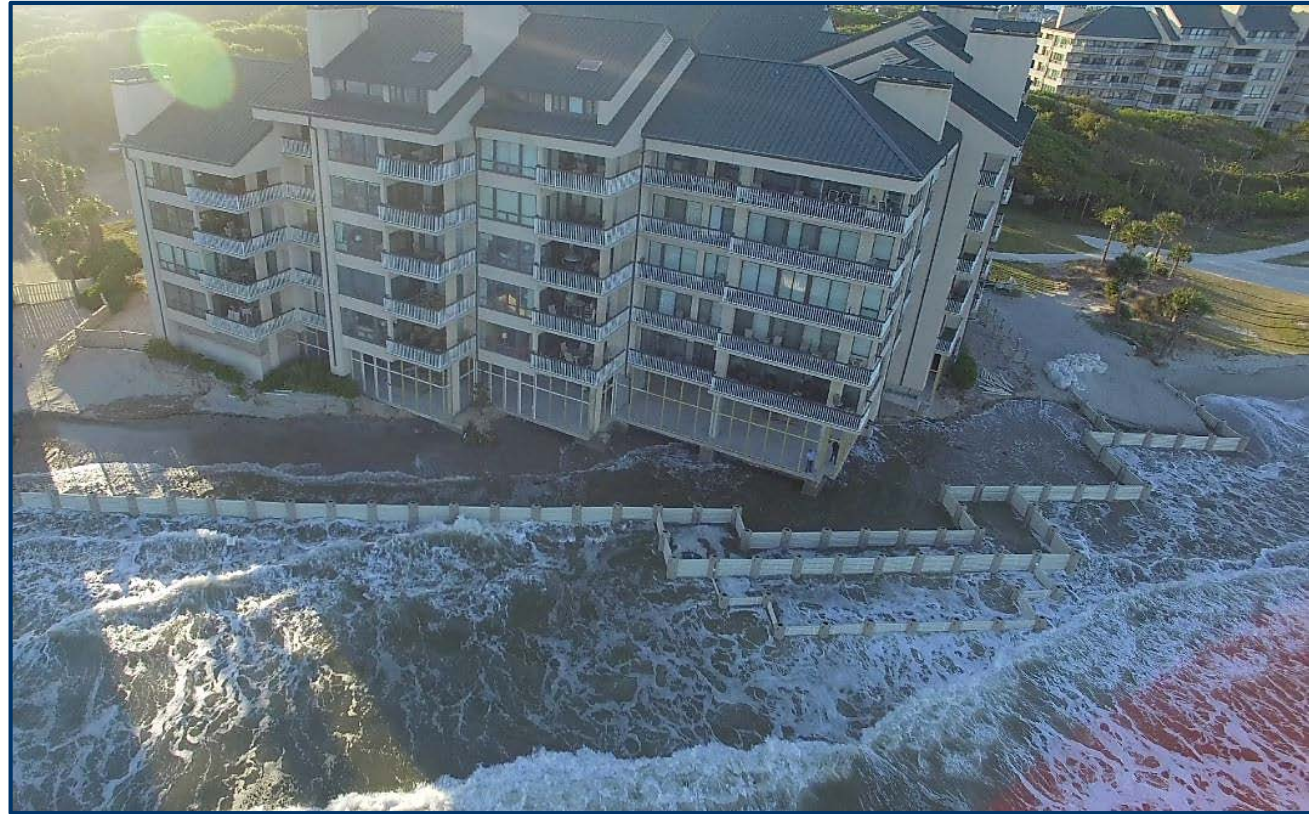
## WDS Structures

- Installed at 4 unique sites: Ocean Club, Seascape Villas, Beachwood East, Harbor Island.
- Vertical Piles & hard plastic casings
- Horizontal PVC
- Spacers



## Ocean Club

- Located in Wild Dunes on Isle of Palms.
- Triple-tier structure
- 256 ft long
- Wave conditions: Extreme loading



## Seascape

- Located in Wild Dunes on Isle of Palms.
- Double tier structure.
- 120 ft long
- Wave conditions:  
Extreme loading



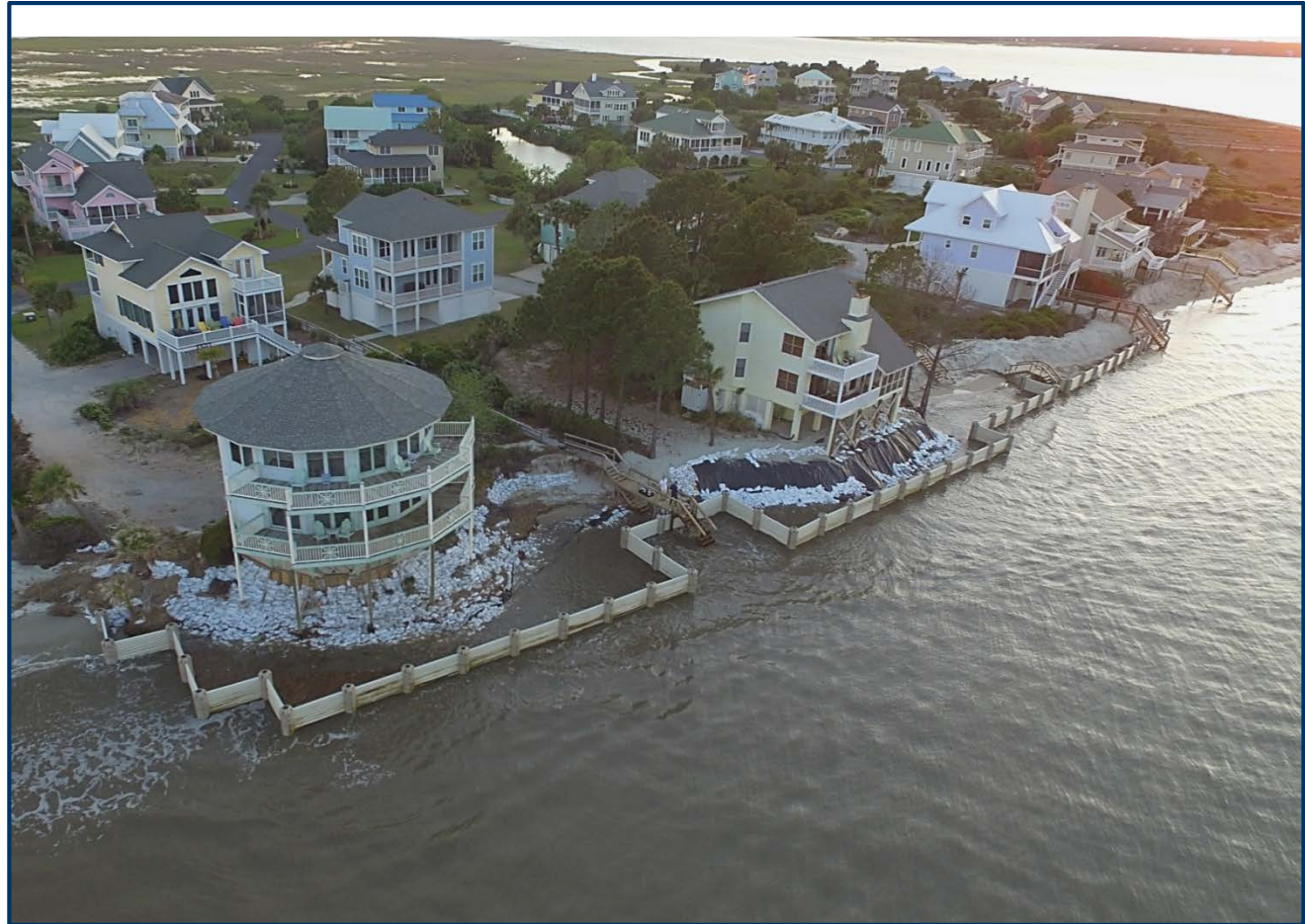
## Beachwood East

- Located in Wild Dunes on the Isle of Palms.
- Seaward of nine houses; 11 – 19 Beachwood East.
- Single tier structure
- Total length: 850 ft.
- Wave conditions: Less extreme than Ocean Club, but more than Harbor Island



## Harbor Island

- Located on North Harbor Drive; Lots 49, 52, 53, and 56.
- Single tier structure
- Total Length: 400 ft.
- Wave conditions: Less extreme







In order for DHEC – OCRM staff to determine whether the Wave Dissipation System (WDS) was successful in addressing an erosional issue, and whether it has any impacts to the beach environment, we utilized the following:

- 1.) The Citadel's project and report
- 2.) GEL Engineering's data and report
- 3.) DHEC - OCRM staff's observations

# Does the WDS address an erosional issue as seen at Ocean Club, Seascape, Beachwood East, or Harbor Island?

The Department used **3 indices** to determine whether the WDS addressed an erosional issue:

- 1.) The ability of the WDS to **hold the scarp line position.**
- 2.) The ability of the WDS to **increase or retain sand volume** on the landward side of the structure.
- 3.) The ability to **minimize trenching and scouring.**

## Scarp Line Position

The Citadel collected:

- **Scarp line position**

OCRM contracted with an independent third party, GEL Engineering, to review the WDS system between March and July 2016.

GEL collected:

- **Scarp line position**



## Sand Volume Changes

The Citadel collected:

- **Transect data from the WDS to the low tide line.**

OCRM contracted with an independent third party, GEL Engineering, to review the WDS system between March and July 2016.

GEL collected:

- **Transect data from scarp line to the low tide line.**



## Trenching and Scour

The Citadel collected:

- **Photos and Videos**

OCRM contracted with an independent third party, GEL Engineering, to review the WDS system between March and July 2016.

GEL collected:

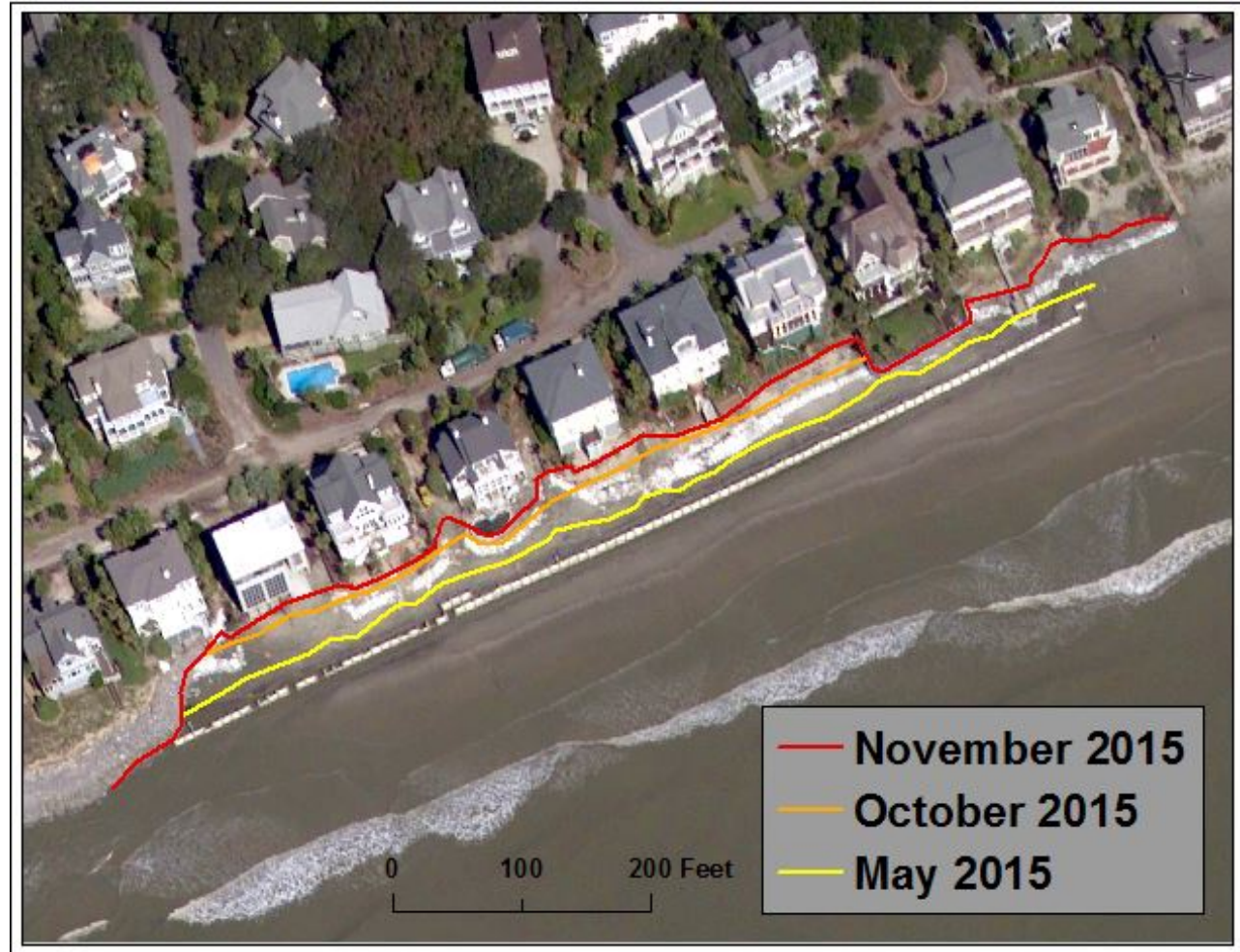
- **Photos and Videos**



# Analysis Results of the Three Erosional Indices

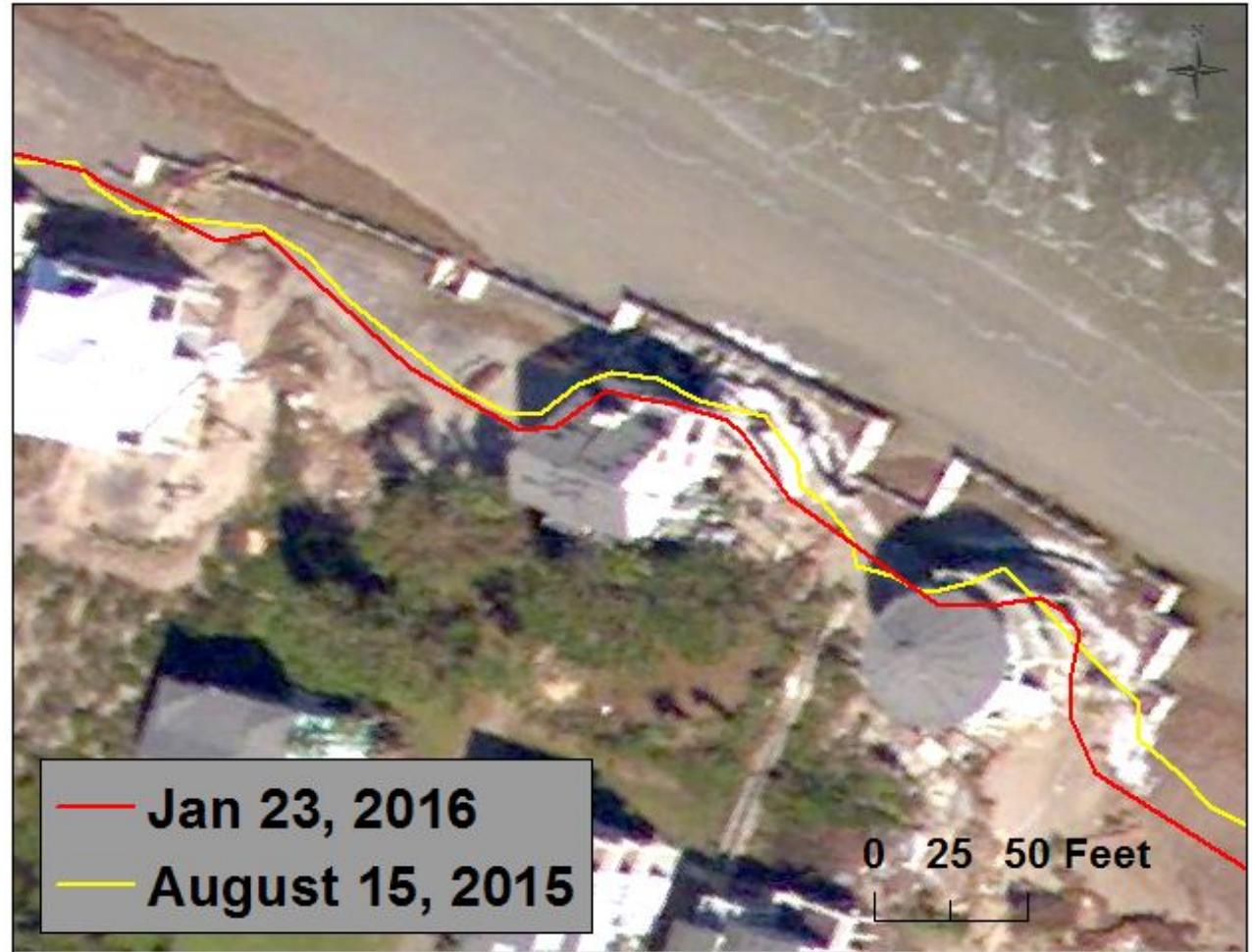
Source	Citadel Results	GEL Results	DHEC - OCRM Staff Observations
<b>Index 1: Scarp Line Position</b>	Data shows scarp line position retreating at all sites after WDS was installed.	Scarp was stable in areas with sandbags. In areas with no sandbags, scarp line position continued to erode.	Visual inspection indicated a landward movement of scarp line position at all sites without sandbags. Emergency order for sandbags were requested by home owners after WDS installation at Beachwood East, Harbor Island, and Ocean Club.
<b>Index 2: Elevation Changes Landward of WDS</b>	No Data Analysis	Sand volume decreased landward of WDS at all sites.	N/A
<b>Index 2: Elevation Changes Seaward of WDS</b>	No Data Analysis	Sand volume increased on the seaward side of the WDS	N/A
<b>Index 3: Trenching or Scour</b>	Documented local trenching at all sites. Removing panels restored beach profile.	Scour occurred at 3 sites between March and April, which subsequently accreted. Scour occurs at WDS when there is erosive wave action.	Temporary but persistent scour photo documented at all sites. HI: July, Aug, Sept, Oct 2015, March, April 2016 OC: April, May 2016 Beachwood East: Sept, Oct, Nov, Dec 2015; Feb, April, May, June 2016

- All sites saw the scarp line retreat landward following the installation of the WDS.
- Emergency orders for sand bags issued for Beachwood East properties on Sept 28<sup>th</sup>, Oct 7<sup>th</sup>, Nov 24<sup>th</sup>, and Dec 17<sup>th</sup> 2015.



Changes to Scarp Line at Beachwood East.  
WDS installation completed September 10, 2015.

- All sites saw the scarp line retreat landward following the installation of the WDS.
- Emergency orders for sand bags issued for Harbor Island properties on Sept 30<sup>th</sup> and Oct 7<sup>th</sup> 2015.



Changes to Scarp Line at Harbor Island.  
WDS installation completed June 3, 2015.



- All sites saw the scarp line retreat landward following the installation of the WDS.
- Emergency orders for sand bags issued for Ocean Club on Sept 28<sup>th</sup> and Dec 18<sup>th</sup>, 2015 and Feb 19<sup>th</sup>, 2016



**Changes to Scarp Line at Ocean Club and Seascape.**  
OC installation completed June 5, 2015. Seascape installation 1<sup>st</sup> tier completed Dec 2015; 2<sup>nd</sup> tier completed Feb 2016.

- All four sites saw sand volume decrease landward of the WDS between March and July, while the beach seaward of the WDS accreted sand.
- This indicates that the WDS blocked the natural movement of sand up the beach.

Changes in Sand Volume (cy/ft)	Ocean Club	Seascape Villas	Beachwood East	Harbor Island
Landward of low tide line	1.3	3.1	1.4	1.1
Landward of WDS	-0.9	-0.7	-0.6	-0.2



Horizontal panel removal at Ocean Club; January 2016

## Trenching and Scour at Ocean Club



06/30/2016 11:06



## Does the WDS have impacts to the beach environment?

In order to determine this, the Department reviewed impacts to the following pursuant to S.C. Code Ann . § 48-39-130(D)(2) and Budget Proviso:

- 1) Physical or Aesthetic Resources
- 2) Beach Access
- 3) Adjacent Properties
- 4) Flora and Fauna

## Findings:

- **Impacts to physical resource**
  - **Scouring or trenching**
  - Periodic excavations to adjust the system.
  - Continued erosion of scarp line
  - Loss of sand volume landward of the WDS and restriction on sand naturally migrating up the beach
- Impacts to Beach Access
- Impacts to Adjacent Properties
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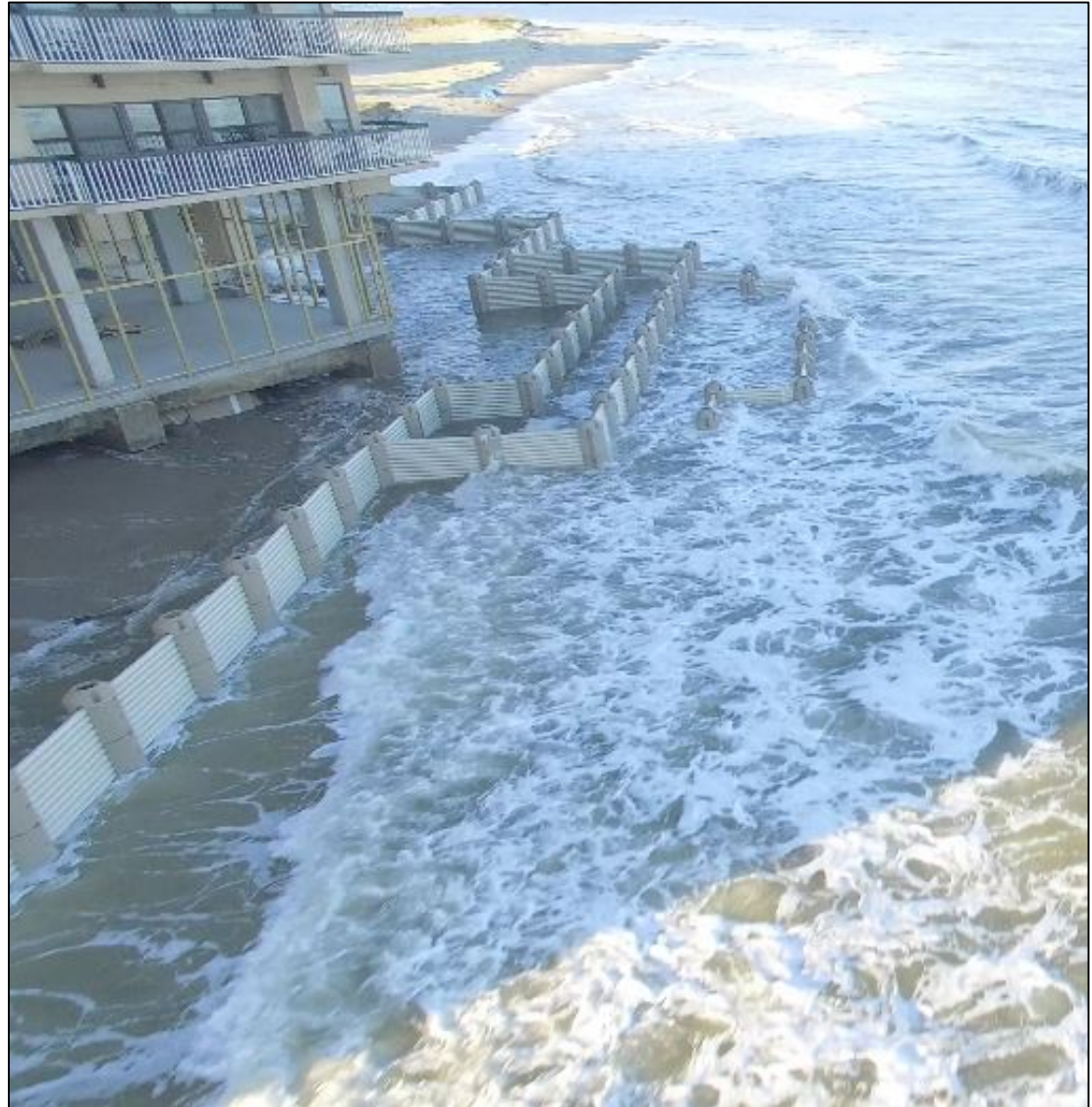
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South Carolina Department of Health and Environmental Control  
Healthy People. **Healthy Communities.**



## Final Conclusions

- The WDS does not address an erosional issue.
- The WDS does not act as a qualified device according to Statute and Regulation because there are negative impacts to fauna, flora, physical or aesthetic resources, beach access and adjacent properties.
- The WDS does not satisfy all the criteria of the Budget Proviso.
- The Department's recommendation to the Board is to not approve the WDS for future use and to require the existing structures to be removed from the beach following the final agency decision.



## Contact Us



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*Dewees Inlet*

OC & SV WDS

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Breaking Waves

*Atlantic Ocean*

BE WDS

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Seagrass Ln

Hidden Green Ln

Fairway Ln

Pelican Reach

Back Bay Dr

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Beachwood W

Beachwood E

Grand Pavilion

57th Ave

Marsh Island Ln

etto Dr

Ocean Point Dr

Linkside Ct

Ocean Point

*St. Helena Sound*

HI WDS

Sediment  
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Vertical Porous Panels