

*USING ORGANIC ENGINEERING  
PRINCIPLES TO ADDRESS  
ECOSYSTEM VALUES IN THE  
BOTTOM LINE*

David D. McGehee, P.E., M.Oc.E., D. CE

*Emerald Ocean Engineering LLC*

*Pensacola Beach, FL*

**Organic Engineering:**  
Integration of engineered features  
with natural processes to efficiently  
and sustainably provide economic,  
environmental and social benefits.

Nature as the Client, not a Problem  
Ecosystems as a Goal, not Collateral Damage  
Society (Regulators) as a Partner, not an Obstacle

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# FORM ORIENTED

## The Engineer's Shape Goggles

The Project = The Plans

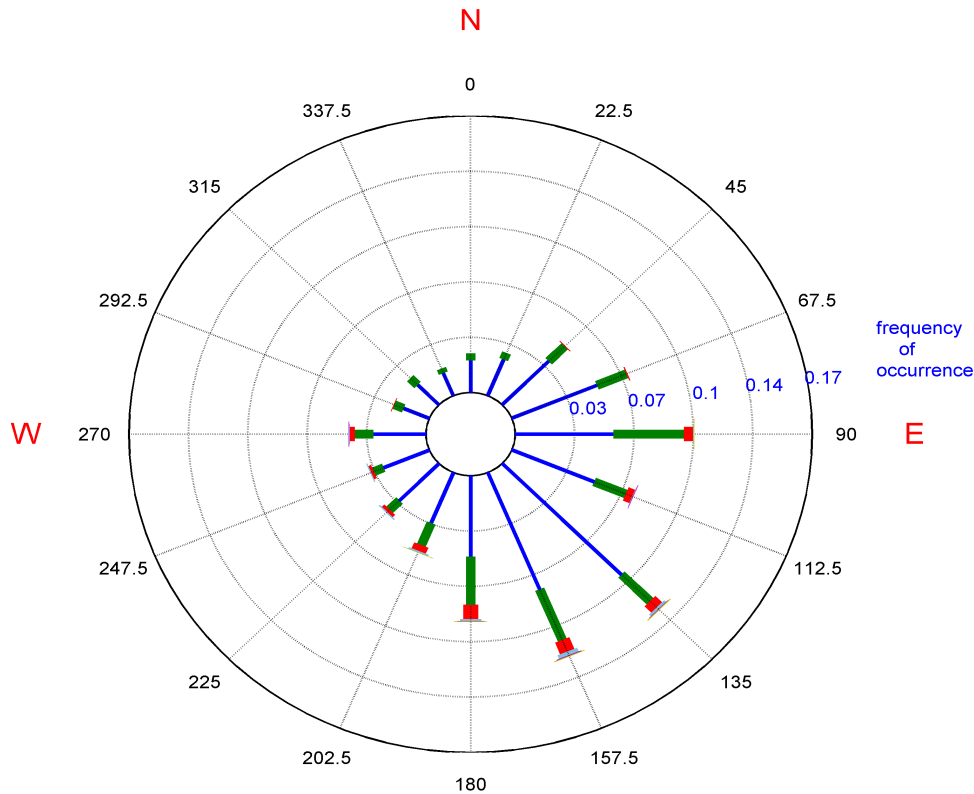
Success = Preserving the Form

# Dynamic Range, or The Hard Structure's Dilemma



Gulf of Mexico WIS Station 73170  
01-Jan-1980 thru 31-Dec-1999  
Long: -87.084° Lat: 30.166° Depth: 25 m  
Total Obs : 58438

WAVE ROSE



## Dynamic Range of Wave Loads

$$T > 70\%, F_w \leq O (1)$$

$$T < 1\%, F_w \leq O (10)$$

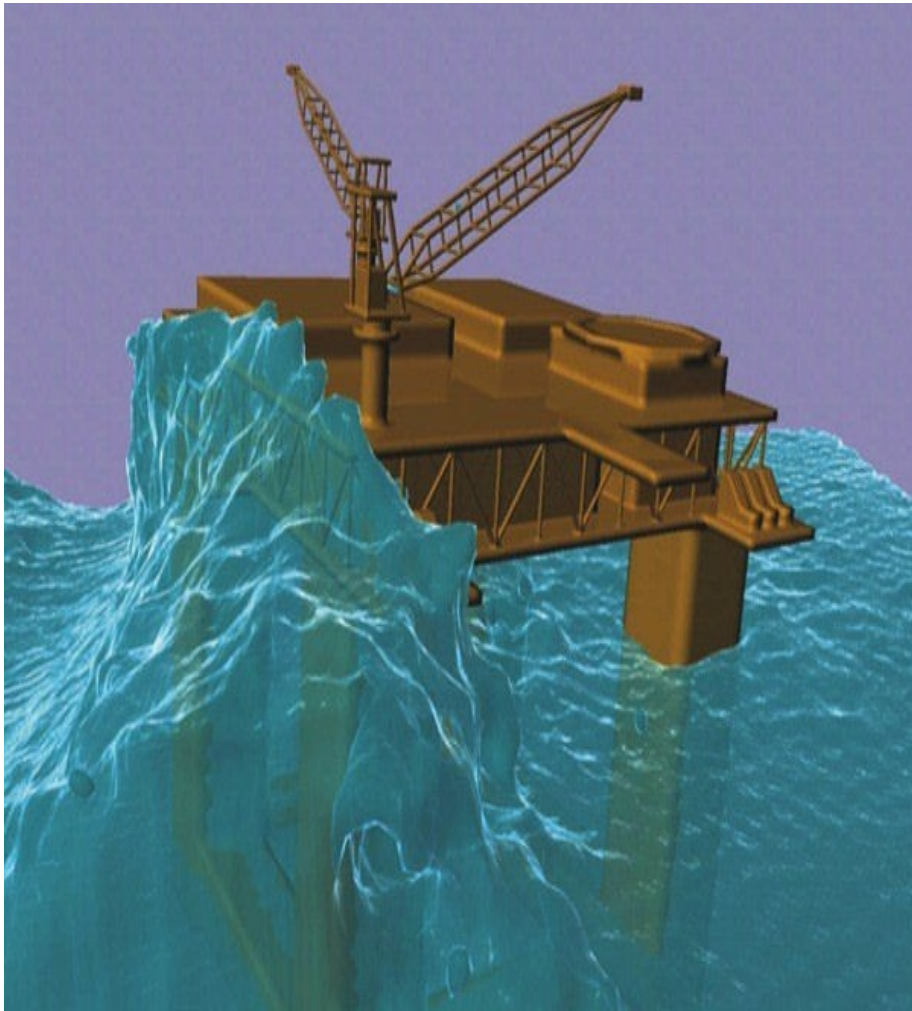
$$T < .02\%, F_w \sim O (50)$$

$$T < .0005\%, F_w \sim O (100+)$$

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# Design a Form to Endure the Loads



**SUCCESS!**



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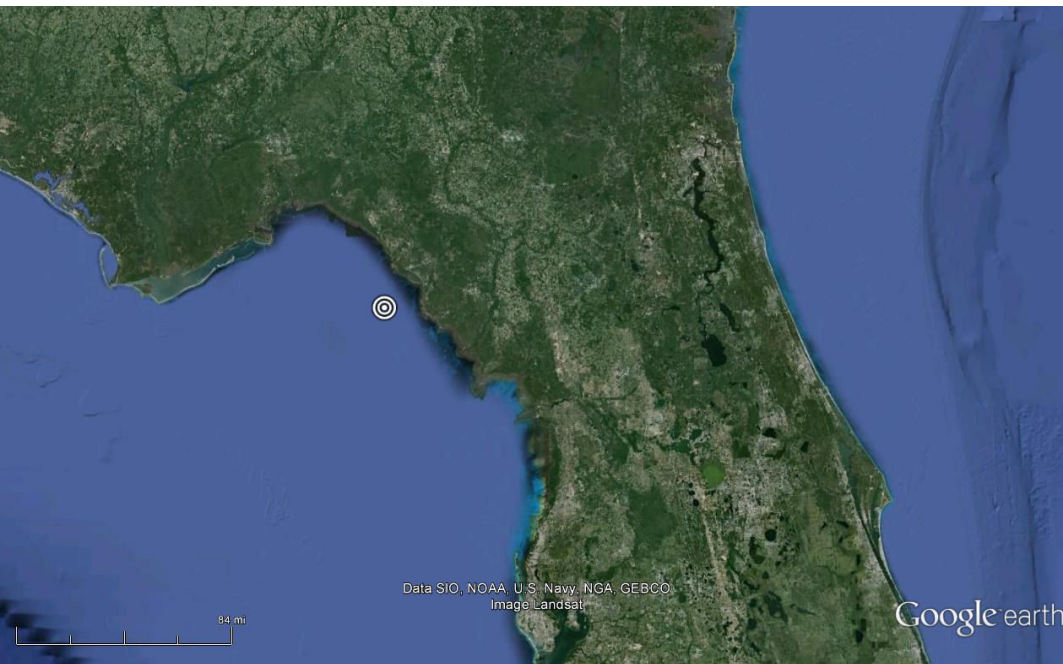
# Form Loss = Failure



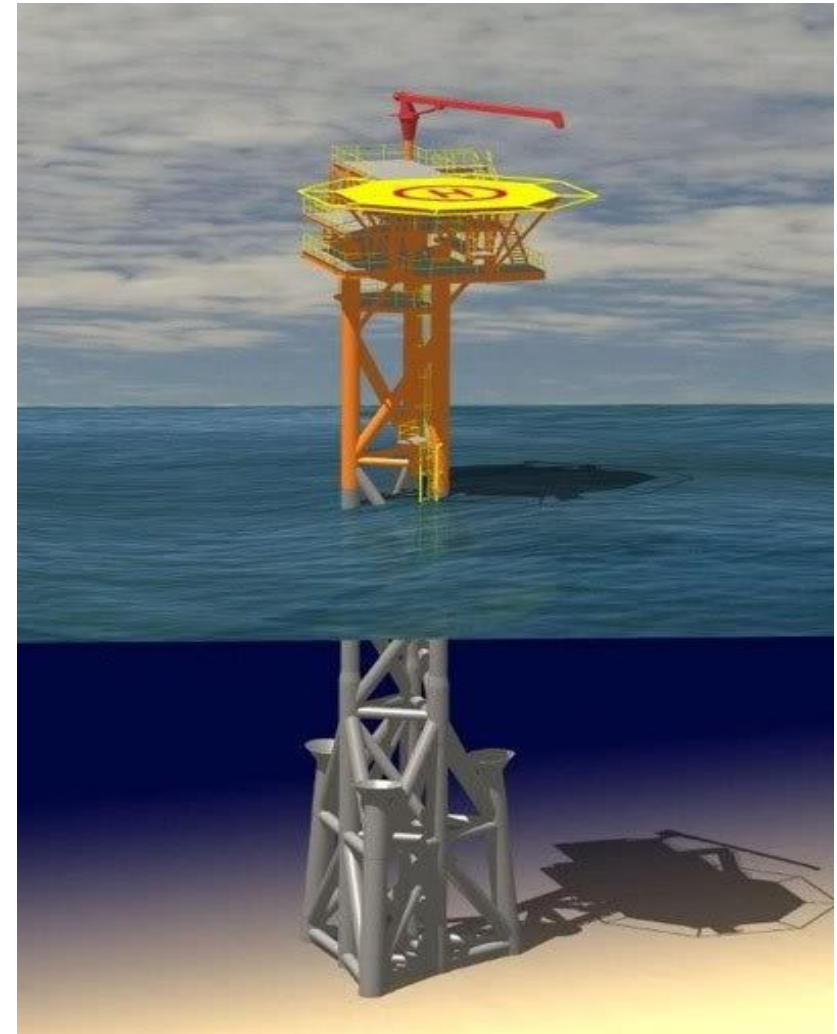
# Telemetry Platform

Mission: Measure/Trx Hurricane Waves

Hazards →  
Hurricanes, Vessels



Std. Form → O ~ \$ M



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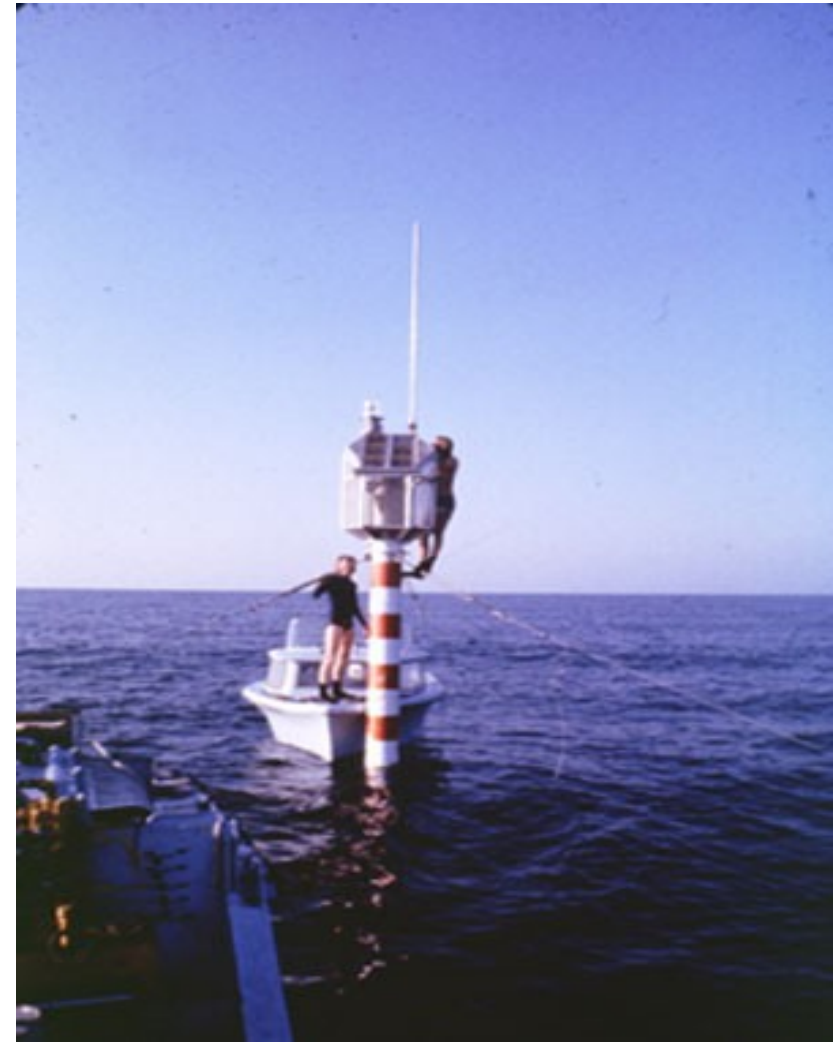
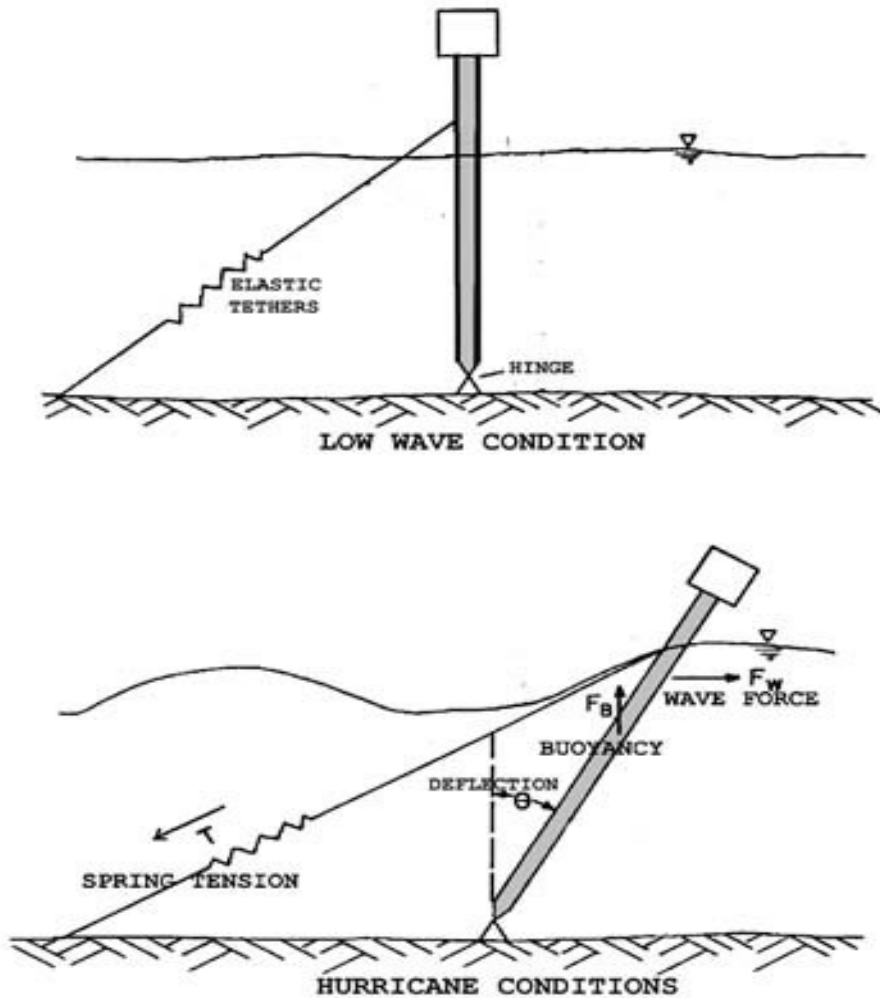
# FUNCTION Oriented

Maintain function over time

Allow form to respond to environment



# *Resilient* Offshore Platform



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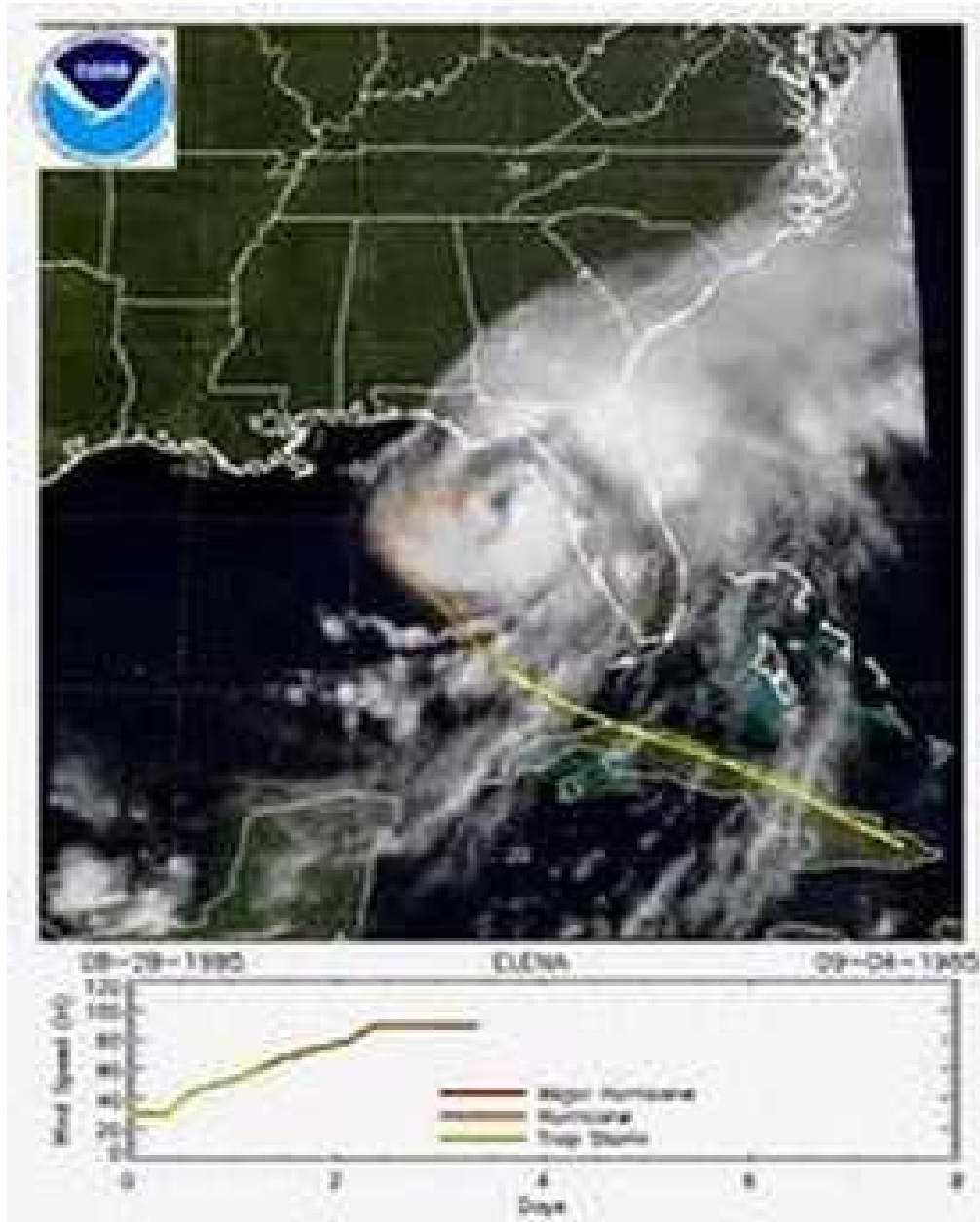
# Performance



- 100 + mph winds
- 15 +ft breaking waves
- 0 function @ storm
- 0 damage
- 100 % function immediately after

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# What is a Living Shoreline?



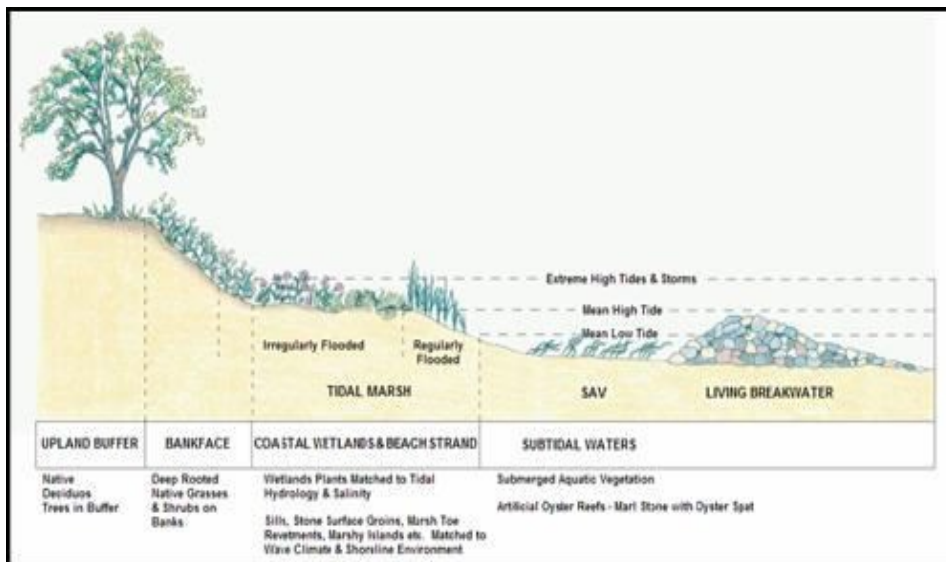
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# What is a Living Shoreline?



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# Form Oriented Living Shorelines



# Living Functional Characteristics

- Resilient: Survives extremes
- Adaptable: Responds to change
- Grows if fed
- Contributes to Ecosystem
- Protects Itself

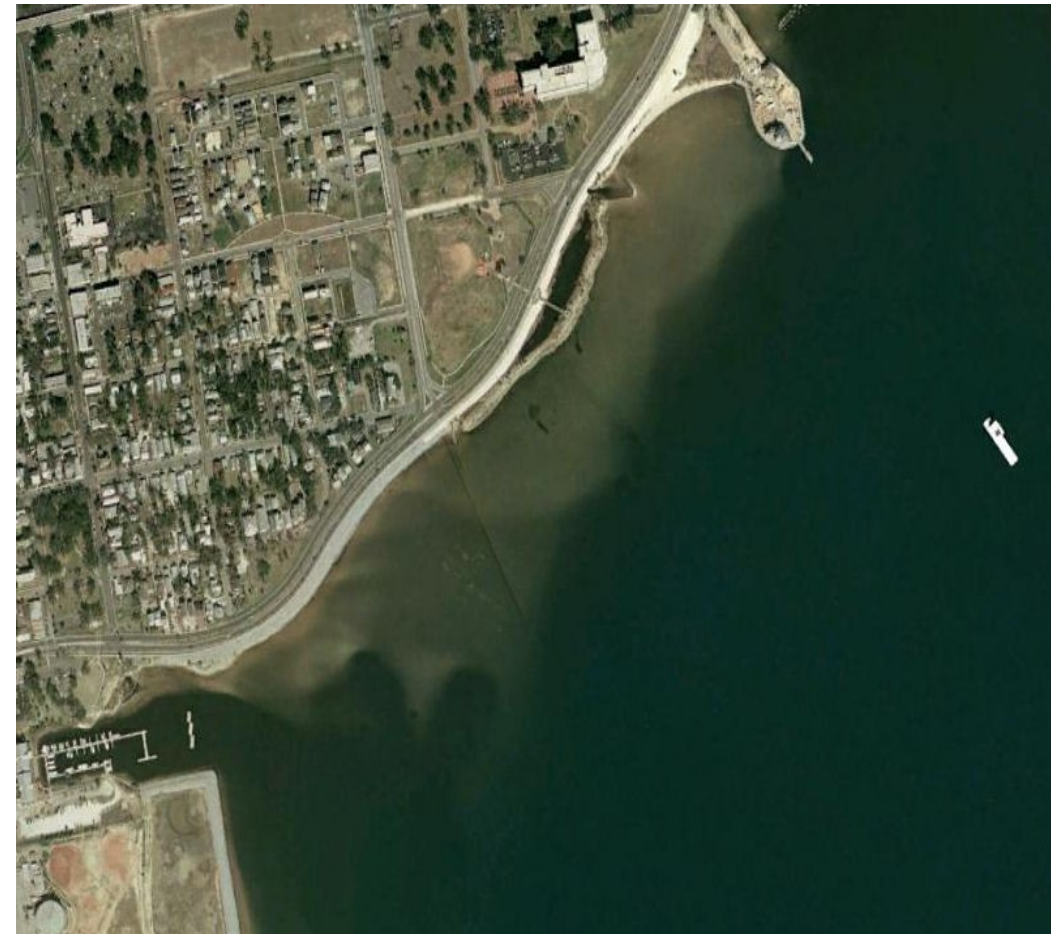
# Project Greenshores Phase II, Plan (marsh adapts to environment)



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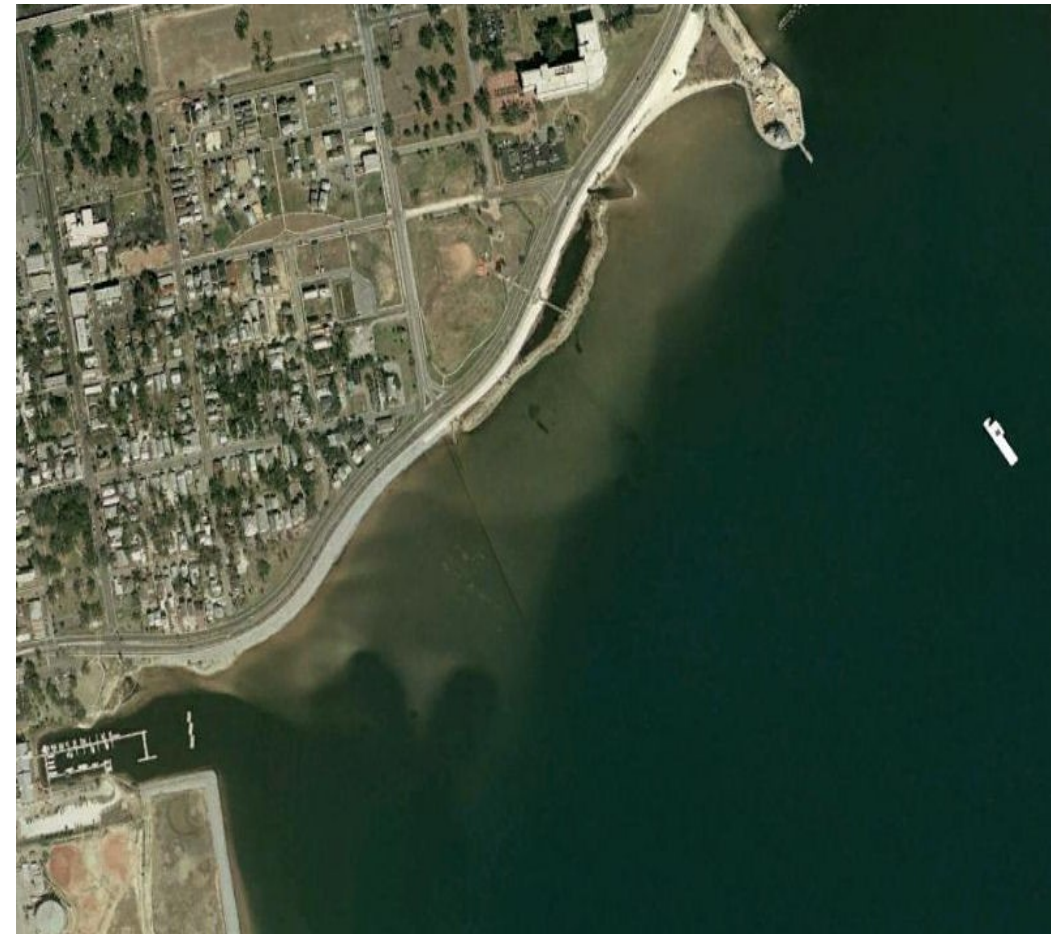


# Greenshores, As Built



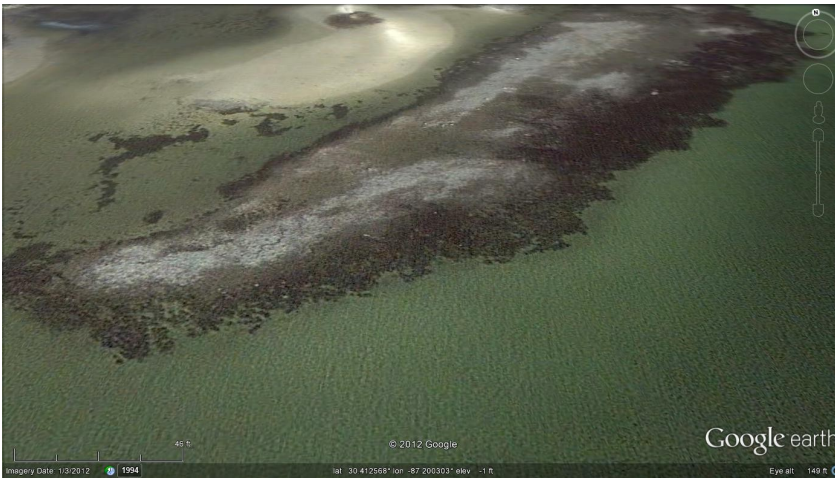
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# Greenhores, As Built (adapting to reality)



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# Greenhores, Being Built



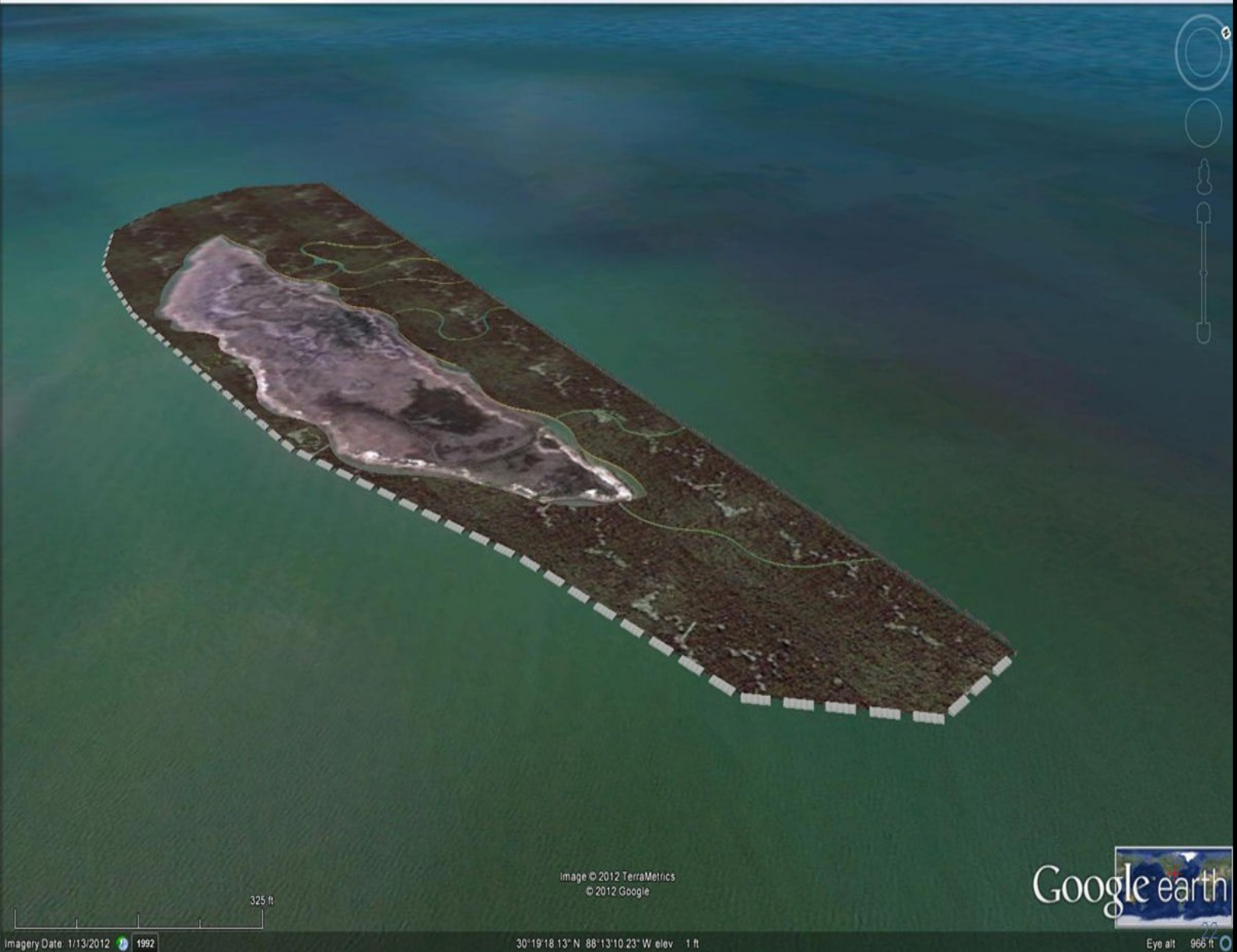
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# Living Revetment (it grew some)

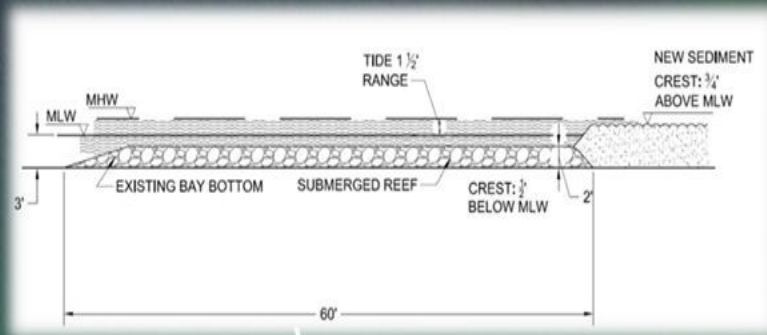


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# Potential Design Element Alternatives



# Alternate Concept



Google earth

Imagery Date: 1/13/2012 1992

30°19'16.20" N 88°13'21.57" W elev 1 ft

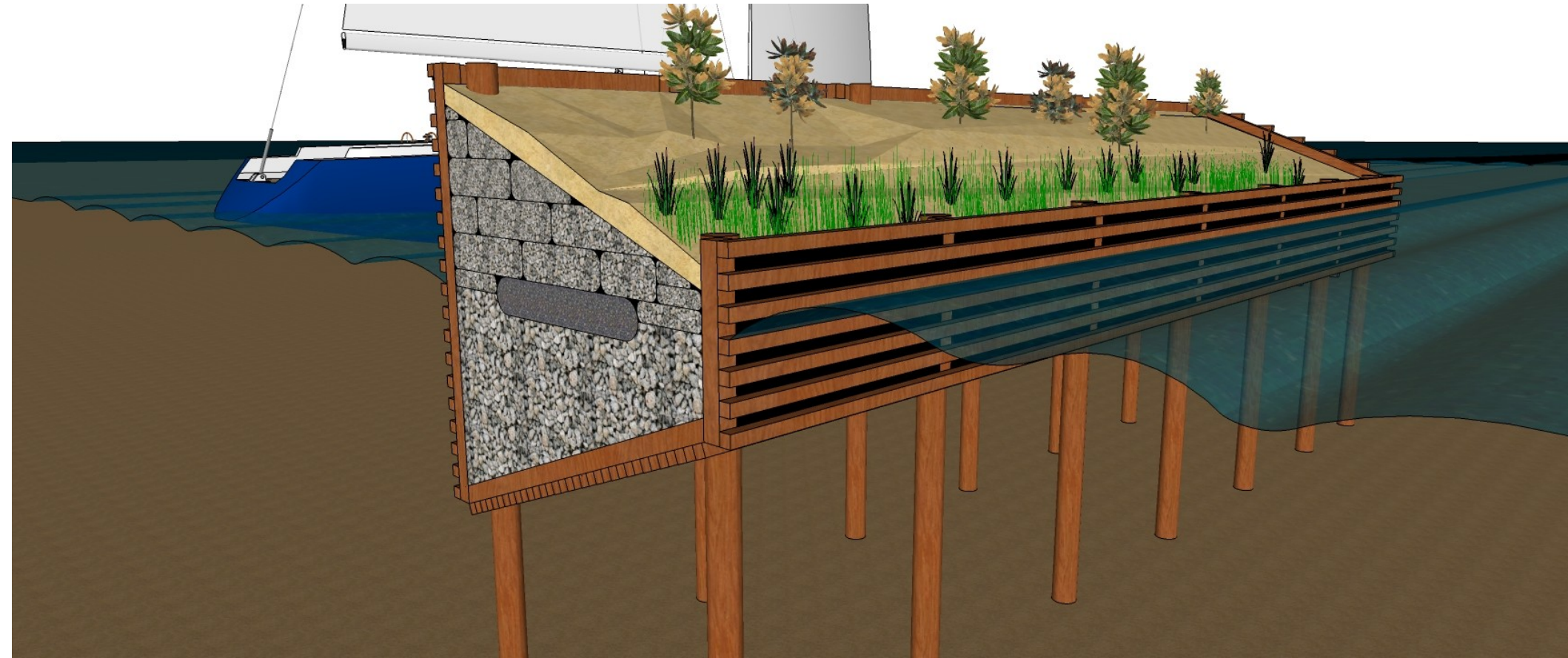
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# Living Marina Concept



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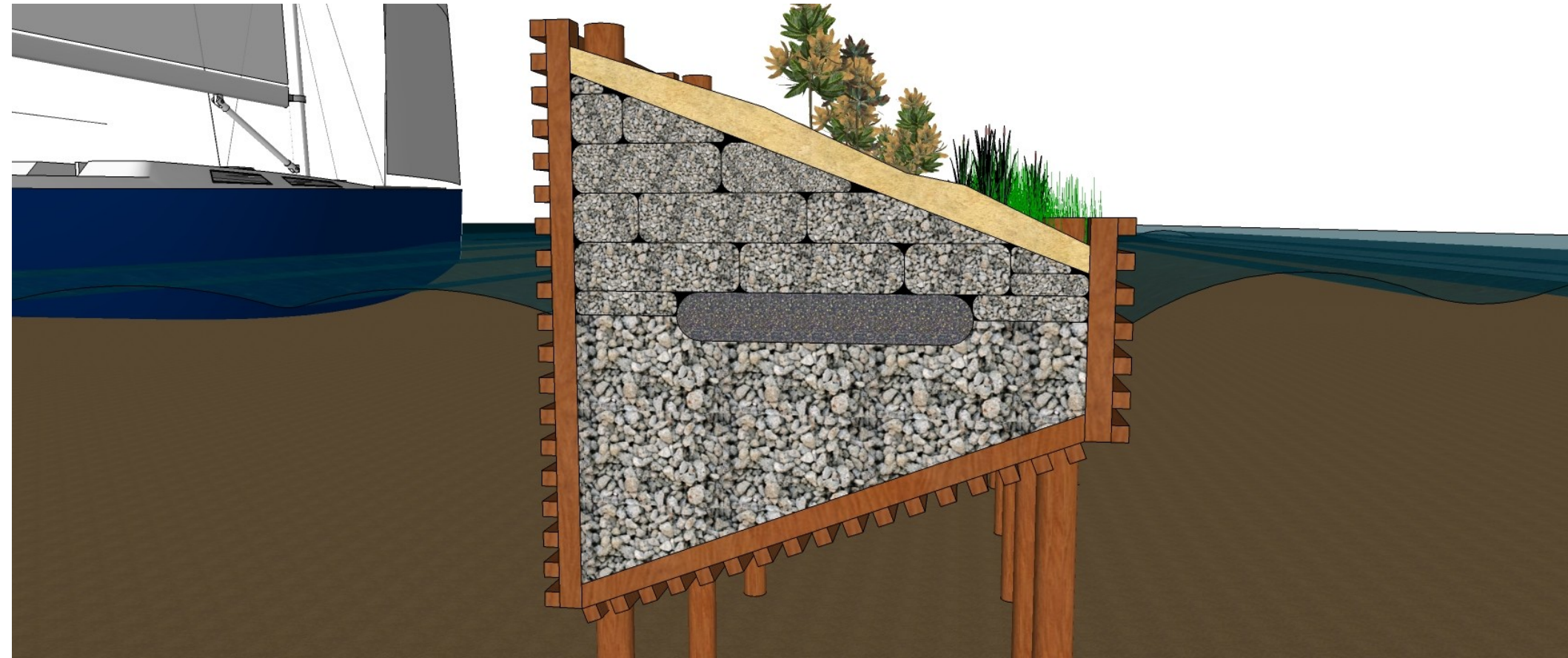
# Living Breakwater



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# Breakwater w/ Kidneys

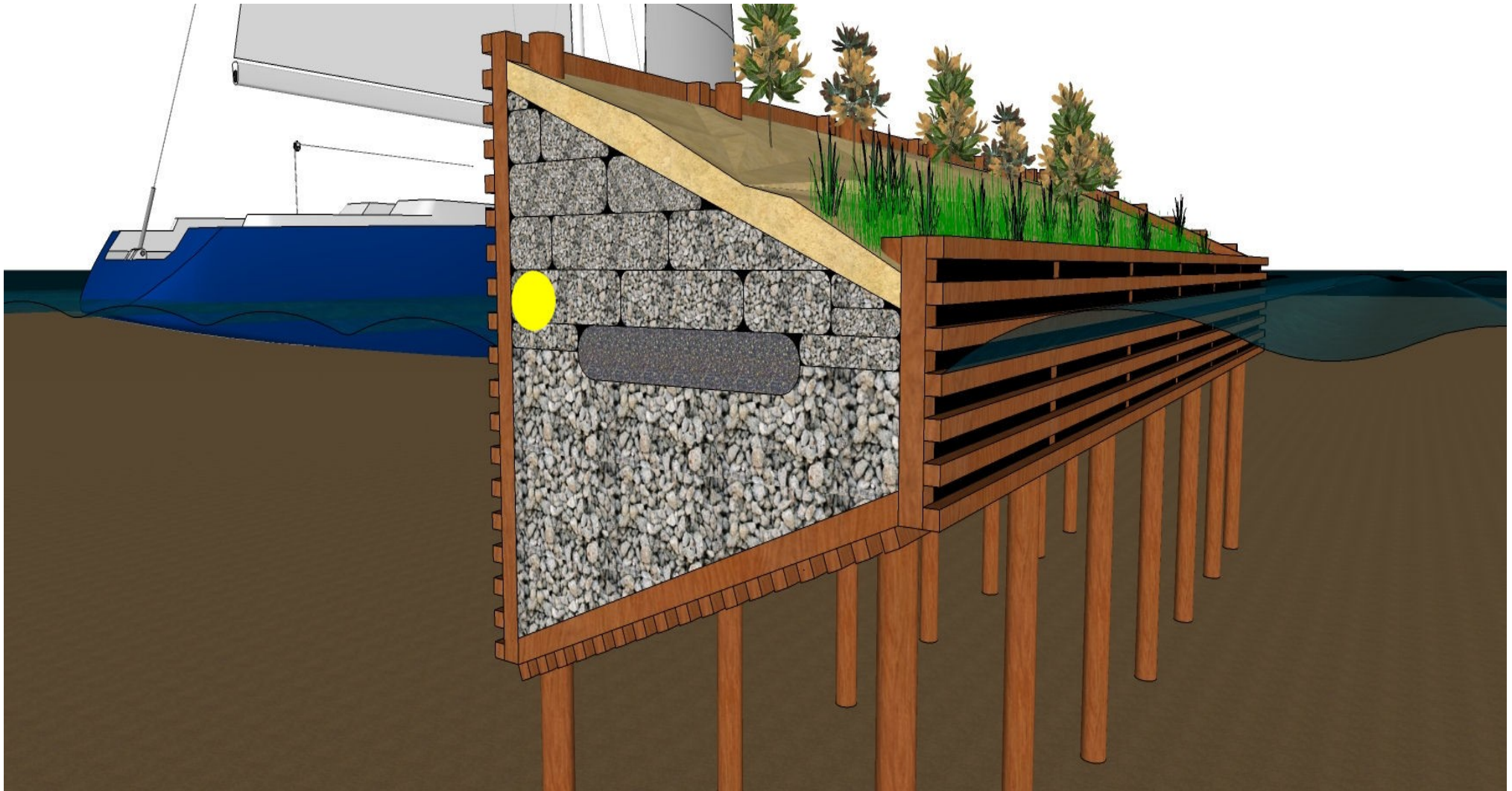


# Spill Response



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# Oil Boom Storage



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# QUESTIONS



wtf????