DEMONSTRATION PROJECTS

DEMONSTRATION PROJECTS

Project Number	Project Proposals
DEMO-01	Sediment Capture Tide Pump
DEMO-02	Trap Bag
DEMO-03	Stabilized Shorelines for Shoreline Protection
DEMO-04	Shoreline Protection/Sea Rise & Recovery Strategy
DEMO-05	Armored Barrier Island & Coastal Restoration System
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DEMO-01

Sediment Capture Tide Pump

Demo-01

PPL 24 DEMONSTRATION PROJECT NOMINEE FACT SHEET
February 10, 2014

Demonstration Project Name:
Sediment Capture Tide Pump

Coast 2050 Strategies:
Coast-wide strategies: Produce energy while building and maintaining land.

Potential Demonstration Project Location:
Jean LaFitte/Lake Salvador and Bayou Dupont Sediment
Delivery - Marsh Creation #3 (BA-164) for inland. The TV-16 Cheniere au Tigre shoreline demonstration project for off shore. Any canal, river, bay or body of water where sediment is present and available in the wetlands and beyond.

Problem:
The Louisiana wetlands has lost the timely and adequate flow of waters that has built and maintained the land.

Goals:
Utilize tidal, wave and wind energy, simultaneously or separately, into a force that is useful to rebuild the wetlands.

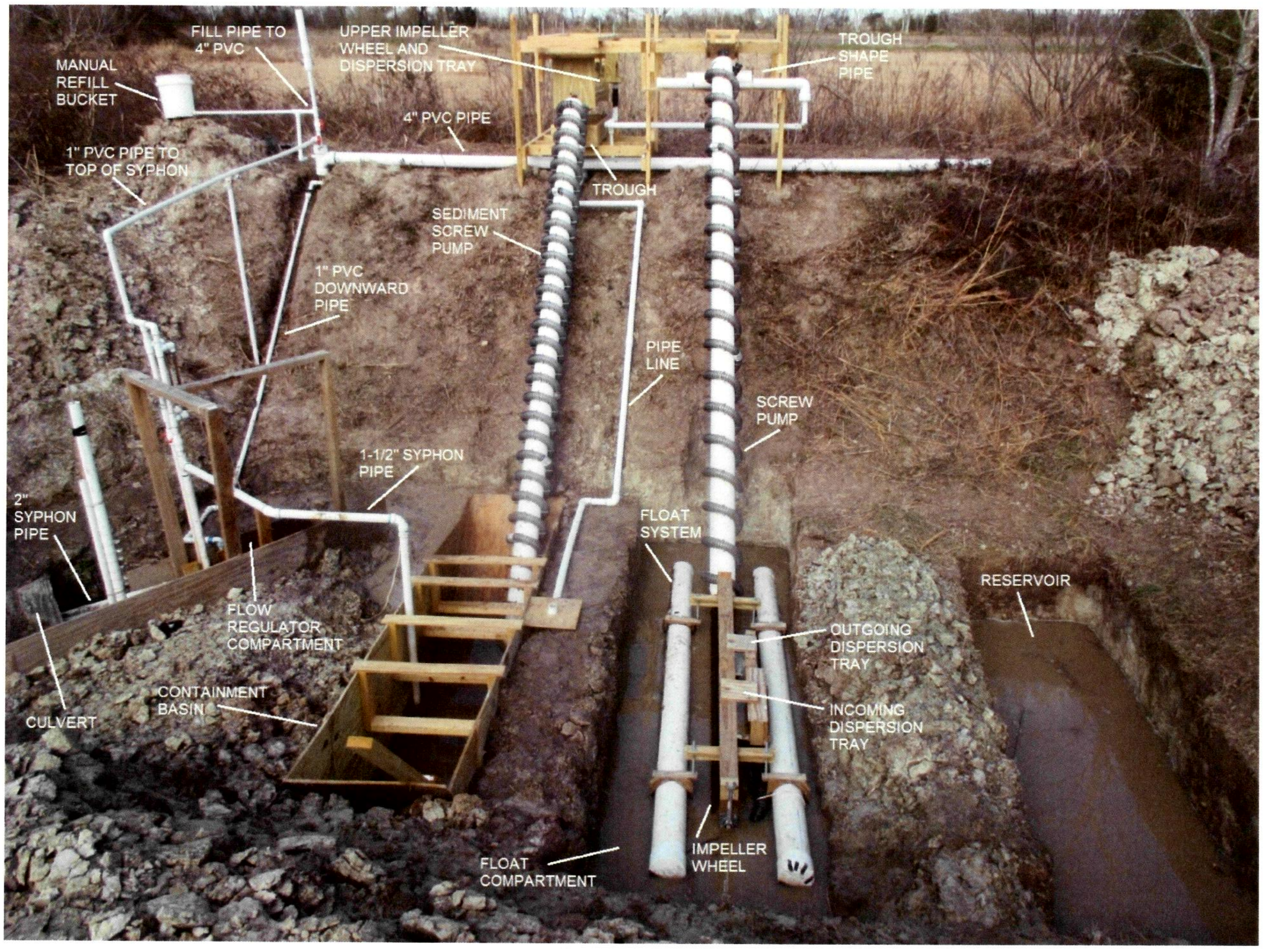
Proposed Solutions:
1. Reduces the need for fuel.
2. Shoreline waves are no longer the enemy, but an asset.
3. The captured sediment that is displaced by the pump will allow the rising waters of the ocean to flow into the displaced area, thus reducing the rise of the world's oceans.
4. Backfill the oilfield canals to the original land surface level or the best level with sediment captured from canals, rivers and bays.
5. Rebuild the shoreline beaches and barrier islands with sediment from the continental shelf.
6. Housed in a vertical box culvert type structure that protects the pump from the elements.
7. Can be manufactured and shipped to the location.

Project Benefits:
1. Reduces the carbon footprint.
2. Replace rock or structural embankments with energy producing structures.
3. Provides nutrient rich sediment.
4. Builds agriculture.

Project Costs:
Unknown, to be determined.

Preparer(s) of Fact Sheet:
Richard C. Russo, Vermilion Parish, 337-230-1963, myspacercer@yahoo.com

Sediment Capture Tide Pump



Culvert in the canal with syphon pipes.

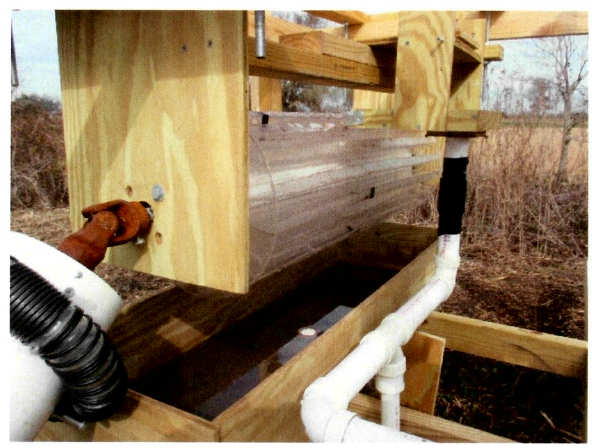
Flow Regulator Compartment

Sediment Capture Tide Pump

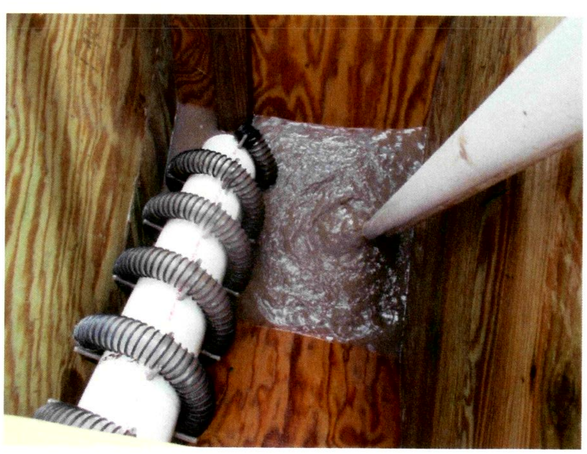
Incoming Dispersion Tray

Float Compartment Impeller Wheel

Trough Shape Pipe



Upper Impeller Wheel and Dispersion Tray



Containment Basin with syphon water flowing.

Trough with Basin water flowing.

Sediment Capture Tide Pump

Here is how it works:

The tidal water in the canal flows into the inlet end of a 2 inch PVC plastic pipe that travels through a culvert into the pond, and exits into a flow regulator compartment. As the water rises in the compartment, it begins to flow through a pipe in the compartment wall and into a dispersion tray, where it is dispersed into the side of an impeller wheel, causing the wheel to rotate. The water then falls into a float compartment where the impeller wheel is attached to a float system, which holds the horizontal shaft of the impeller wheel parallel at a set distance above the surface of the water that falls from the wheel. As the water rises in the float compartment it begins to flow through a one way flow pipe in the compartment wall and into a reservoir where it is stored. When the tide reverses, the water in the reservoir flows through another pipe in the float compartment wall, then into another dispersion tray, which repeats the flow process in reverse, before returning to the canal.

The impeller wheel is attached to an Archimedean screw pump by a universal joint set at 45 degrees. As the impeller wheel rotates, it causes the float compartment water to flow into the lower end of the screw pump and elevates the water to the upper end, where it is released into a trough shape pipe. The elevated water then flows into another dispersion tray, where it is dispersed into the side of another impeller wheel that is attached to the upper end of another Archimedean screw pump, thus rotating it as the water falls into an upper trough set beneath the upper impeller wheel. The lower end of this screw pump is set at the bottom of a containment basin, which is about 4 feet below the surface of the water in the canal. This screw pump lifts sediment at the bottom of the basin and releases it into the upper trough. When the rising elevation of the canal water is 5 inches above the float compartment, the impeller wheel will rotate until high tide, and continues to the height of a flood. It does the same in reverse.

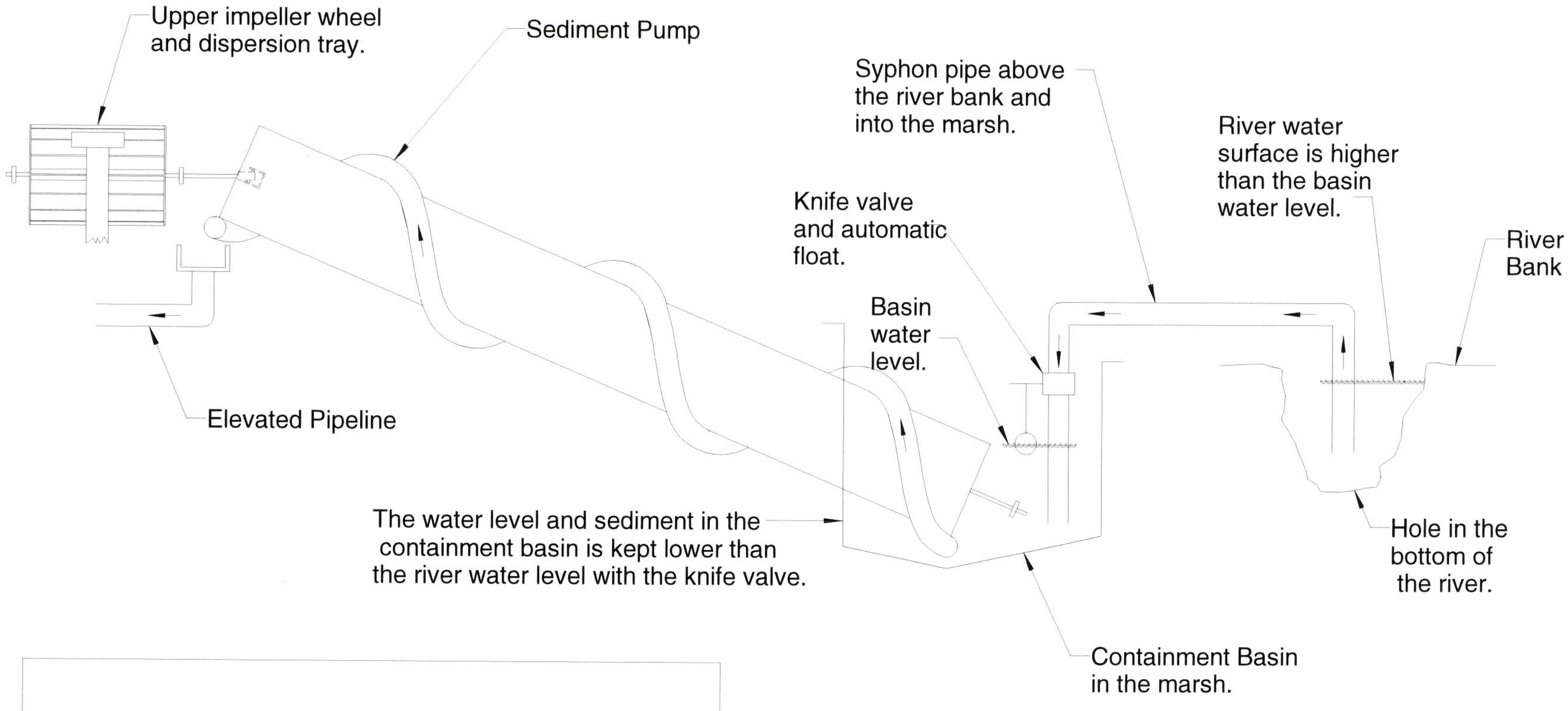
The sediment is captured by a syphon in a pipe, which is designed as follows. A shallow hole is dug in the bottom of the canal at the end of the culvert. An inch and a half PVC pipe is placed at the bottom of the canal hole to serve as an inlet for the syphon. As the syphon water travels through the culvert, it picks up the sediment at the bottom of the canal hole and releases it into the containment basin. The syphon is started and maintained by filling a horizontal 4 inch PVC pipe with water, above the syphon pipe, then releasing the water into a 1 inch pipe downward into the flow regulator compartment. This creates a vacuum in the 4 inch pipe. Attaching another 1 inch pipe from the top of the 4 inch pipe to the top of the syphon pipe, will vacuum the air out of the syphon. This will pull the water from the canal into the pipe and start the syphon. Installing a knife valve will stop the syphon. The water from the float compartment screw pump also flows into the inlet of the 4 inch pipe that keeps it filled.

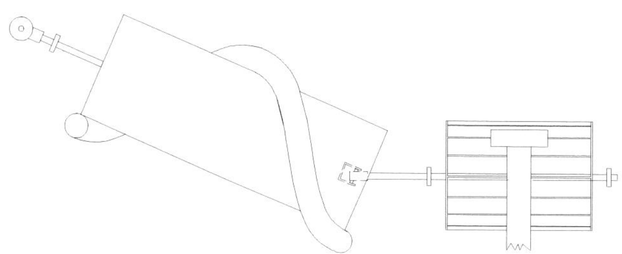
The water and sediment in the upper trough is released into a pipe line, then distributed by the gravitational force produce by the upper elevation. The tide pump is a work in progress. An automated system and a wind pump is in development.

Demo-01

Richard C. Russo
337-230-1963
February 10, 2014

Sediment capture





The combination of the impeller wheel and the Archimedean screw pump is the mechanism that creates the force necessary to move the sediment.

http://greenaccessibility.com/the_tide_pump_how_it_works_video

DEMO-02

Trap Bag

CWPPRA REGIONAL PLANNING MEETINGS
FEBRUARY 2014

Proposed Project Name

TrapBag® Coastal and Canal erosion control DuneCore® barriers

Project Overview

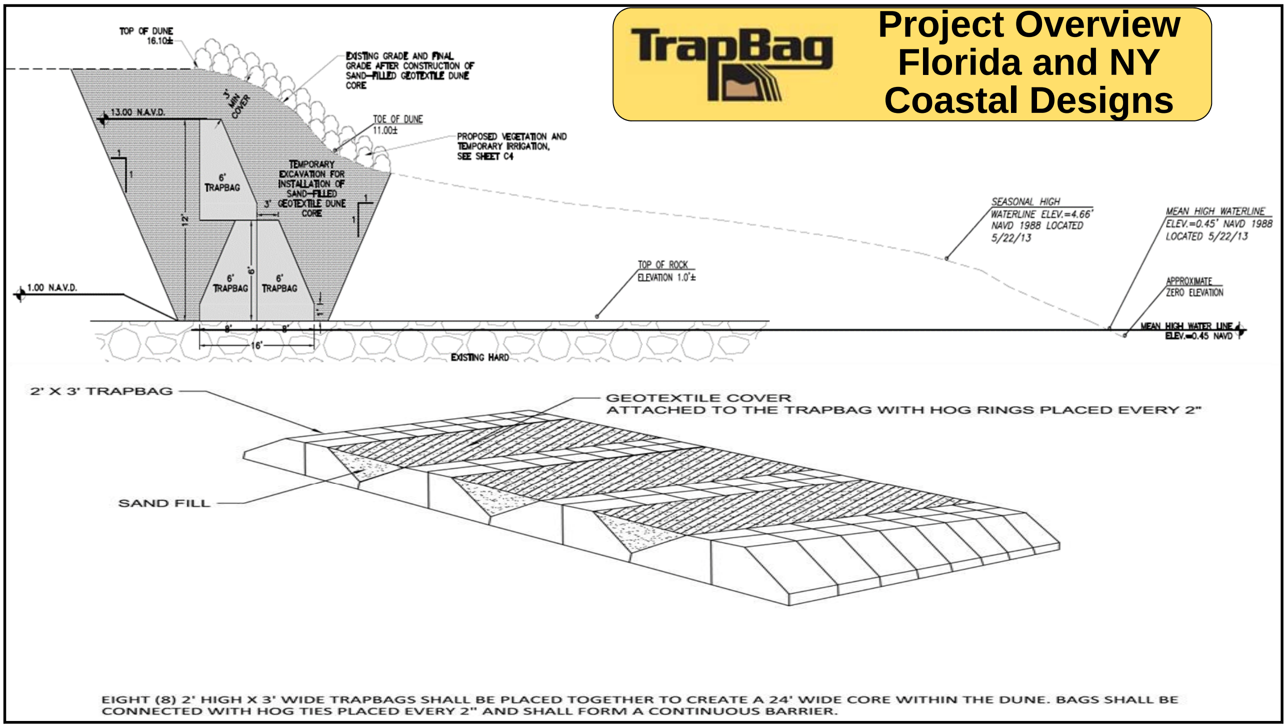
Coastal and inland Louisiana are losing miles of beaches and canal banks due to erosion. The erosion is caused by loss of protective barrier islands, rising global tides, tropical weather events and unstable soil conditions.

TrapBag® DuneCore® is an engineered solution to reinforce coastal dunes, inland levees and canal banks. After Super Storm Sandy, DuneCore® coastal designs were jointly developed by TrapBag®, the NYC Parks department and USACE New York offices to give coastal communities a first line of defense against future storms by stopping beach front erosion through construction of engineered dunes.

The key success of the DuneCore® is the containment of material, engineered shape, durability of construction and sheer filled mass. The DuneCore® can be filled with local materials, covered with geotextile grids and planted with natural vegetation to support wildlife habitat.


TrapBag
Project Overview
Protective Coastal
Barriers - NY


TrapBag
Project Overview
Staten Island, NY



Project Overview
Florida and NY
Coastal Designs
TOP OF DUNE
16.10±
EXISTING GRADE AND FINAL GRADE AFTER CONSTRUCTION OF SAND-FILLED GEOTEXTILE DUNE CORE
3' MIN COVER
13.00 N.A.V.D.
TOE OF DUNE
11.00±
PROPOSED VEGETATION AND TEMPORARY IRRIGATION, SEE SHEET C4
6' TRAPBAG
TEMPORARY EXCAVATION FOR INSTALLATION OF SAND-FILLED GEOTEXTILE DUNE CORE
3'
12'
6'
6' TRAPBAG
6' TRAPBAG
1.00 N.A.V.D.
8'
8'
16'
EXISTING HARD
TOP OF ROCK
ELEVATION 1.0'±
SEASONAL HIGH
WATERLINE ELEV.=4.66' NAVD 1988 LOCATED 5/22/13
MEAN HIGH WATERLINE
ELEV.=0.45' NAVD 1988 LOCATED 5/22/13
APPROXIMATE
ZERO ELEVATION
MEAN HIGH WATER LINE
ELEV.=0.45 NAVD
2' X 3' TRAPBAG
GEOTEXTILE COVER
ATTACHED TO THE TRAPBAG WITH HOG RINGS PLACED EVERY 2"
SAND FILL
EIGHT (8) 2' HIGH X 3' WIDE TRAPBAGS SHALL BE PLACED TOGETHER TO CREATE A 24' WIDE CORE WITHIN THE DUNE. BAGS SHALL BE CONNECTED WITH HOG TIES PLACED EVERY 2" AND SHALL FORM A CONTINUOUS BARRIER.

Project Overview
River Bank
Reinforcement-
Pontchartrain Levee

DEMO-03

Stabilized Shorelines for Shoreline Protection

PPL24 DEMONSTRATION PROJECT
February 12, 2014

Demonstration Project Name: Stabilized Shorelines by RECON

Coast 2050 Strategy(ies):
Maintain Gulf, bay and lake shorelines consistent with the State Master Plan.

Potential Demonstration Project Location(s):
Coastal wide.

Problem:
Excessive erosion of Gulf, bay and lake shorelines expose thousands of acres of interior marshes to increased erosion rates and severe ecological change. In addition, the loss of wetlands resulting from the direct effects of wave action is magnified over open bodies of water where distances are great. Highly organic interior marshes have limited options for restoration because of poor soil conditions.

Shoreline erosion rates have been measured in excess of 30 feet per year in areas across the Louisiana coast. A large portion of coastline will not support rip-rap and require non-rock shoreline protection. The need for stabilization in critical areas was noted in all four Coast 2050 regions.

Goals:
The proposed demonstration project would greatly minimize or prevent continued erosion of shorelines, enhance interior marsh creation or regeneration, and maintain exchange and interface with estuarine systems. Additionally, some accretion may likely occur and build emergent marsh.

Proposed Solution:
Stabilization may take place in-situ by blending in reagent amendments that create mineral growth that is not susceptible to rehydration, or if the shoreline soils consist mainly of organic matter such as root matter and peat, importing lightweight, non-rock pre-stabilized materials, such as dredge spoils, would be distributed along eroding shorelines. The stabilized materials will not rehydrate and change back to an unstable, low-strength state. If wave action, similar to that along the Gulf, is causing stabilization along the shoreline to be counter-productive, or if sloughing is a deterrent due to a steep grade, then it may be more beneficial to excavate a trench along the shoreline and fill the trench with a lightweight stabilized material. In the latter case, a small dimension of shoreline between the stabilized material filled trench and open water will eventually erode away, exposing the trench-filled stabilized material that would serve to protect the remaining coastline.

Generally, placing stabilized dredge spoils along a bay or lake shoreline can take place from a deck barge equipped with bin walls. First, a dredge spoil disposal area or excessively wet clay soil must be amended using a reagent blend that promotes structural mineral growth. Once the stabilized product has fully cured, it will be excavated similar to a borrow pit and loaded into dump trucks. The dump trucks would travel to the dock, back onto the barge via a ramp, and then dump the material on the back end of the barge to the front. It is highly recommended that stabilized material remain in the largest size possible without breaking the material up any more than the excavator did loading it. Stabilized material would likely vary in particle size from 2 feet, down to fines. The fines would serve useful in filling the voids of the larger stabilized particle sizes. A low-draft tug boat is recommended to push the barge to the shoreline requiring protection, and a long-reach excavator positioned on the barge would be used to off-load material. This method is the least invasive to wetlands since most all of the protection is along the eroding face of the shoreline and the stabilized material weighs much less than rip-rap and has the appearance of native soils.

If deemed necessary due to extreme wave action or steep banks, trenches can be excavated on the bank of the shoreline adjacent and parallel to the open water using marsh excavators. Stabilized dredge spoils can be deposited in the trench and trench spoils can then be deposited back over the stabilized dredge spoils to fill any remaining voids and to allow re-establishment of vegetative growth. If shoreline soils are not too organic, rooted or peaty in nature, it is possible that reagents can be injected in-situ to structurally improve the native soils. In the event shorelines contain mainly organic, rooted matter caused by previous erosion, then a dry blend of reagents that consumes vast amounts of water can be injected in a salt/ brackish water-filled trench until the reagent forms a self-hardening solidified mass that is lightweight, yet reach compressive strengths of over 4.5 tons per square foot within a few days. This structural material would withstand the constant beating of wave action or periodic storm surge much like the stabilized dikes that surround and protect a multi-billion dollar LNG facility has proven so in Cameron Parish, Louisiana.

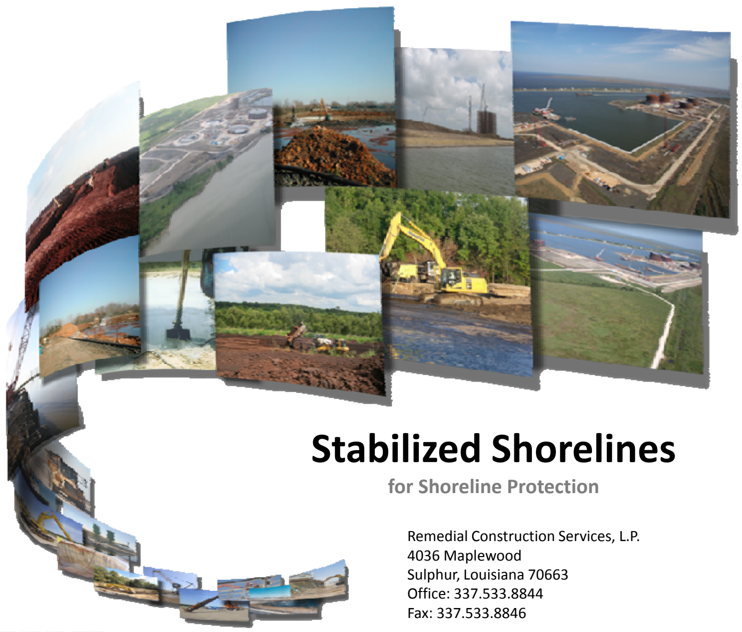
Various reagent blends that create sustainable mineral growth that are not susceptible to rehydration should be demonstrated in separate reaches in order to provide multiple solutions to shoreline protection.

Project Benefits:
The proposed project will:

1. Be environmentally safe;
2. Provide immediate shoreline protection;
3. Appear like natural existing shorelines;
4. Allow stable conditions for oysters to attach to along the shoreline;
5. Have a long term cost benefit and longevity over man-made non-rock solutions;
6. Absorb and deflect wave energy and storm surges;
7. Protect and enhance existing or planted shoreline vegetation;
8. Allow ingress and egress of aquatic species;
9. Trap sediment behind the shoreline to build up marsh, without eroding away; and
10. Reduce interior marsh loss.

Project Costs:
The approximate cost to perform at least four (4) reaches of shoreline protection using in-situ stabilization techniques, pre-stabilized materials and a minimum of two reagent blends is $1,000,000; approximately $250,000 per reach.

Preparer(s) of documents:
Karl H. Peckhaus, 337-533-8844 karl.peckhaus@reconservices.com



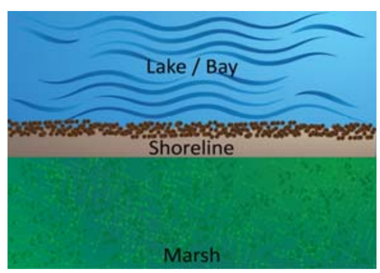
Stabilized Shorelines

for Shoreline Protection

Remedial Construction Services, L.P.
4036 Maplewood
Sulphur, Louisiana 70663
Office: 337.533.8844
Fax: 337.533.8846

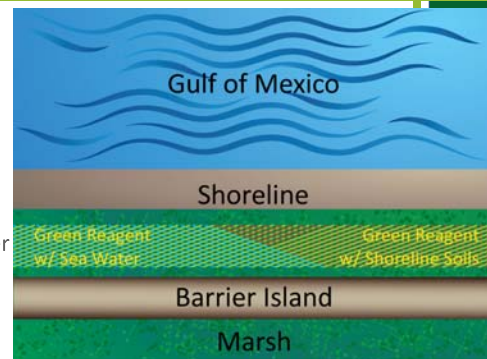
Solutions

- Non-rock protective solutions
- Soil amendments strengthen highly erodible shorelines
- Use of stabilized dredge spoil to protect shorelines with a high organic content
- It's environmentally safe
  - http://www.nolaenvironmental.gov/nola_public_data/projects/usace_levee/docs/original/IER33404b1signed.pdf
  - http://www.usace.army.mil/Portals/2/docs/civilworks/Project%20Planning/alton2gale.pdf
- It's a long-term solution
  - To minimize erosion
  - To regain our coast



Solutions

- Beneficial use of green reagents can:
  - Turn saltwater-filled trench into a soft rock, without the weight
  - Stabilization of existing shoreline creates non-dispersive, irreversible characteristics
  - Reinforce perimeters of our barrier islands to contain spoils
- How it works:
  - Stabilization process forms calcium silicate hydrate minerals or derivative thereof
  - Minerals formed by a chemical reaction are strong, irreversible and long-lasting



Benefits

- Stops erosion in its tracks
- Meets EPA Green Initiatives
- Long-term cost benefit over competing technologies
- Absorbs and deflects wave energy
- Protects and enhances existing or planted shoreline vegetation
- Allows ingress and egress of aquatic species
- Traps sediment and reduces wave energy
- Reduces interior marsh loss
- It's the best approach to regain our coast

Experience

- 8MM cubic yards of stabilization
- Shoreline restoration
- Dike construction
- Sediment and erosion control
- Beneficial use of dredge spoils
- Multi-billion dollar facility protected from hurricanes Ike and Rita storm surge

DEMO-04

Shoreline Protection/Sea Rise & Recovery Strategy

Shoreline Protection/ Sea Rise and Recovery Strategy

Gary Cook, Design/Logistics
Geismar, Louisiana 70734
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504-615-5034

John Wear, President, Chief Scientist
TRIDENT ENVIRONMENTAL SERVICES & TECHNOLOGIES, Inc.
504-520-0537
820 Poydras
New Orleans, Louisiana 70112
RootZone® Humus
Email: johnwear@yahoo.com
Barrier Islands, Marshlands, Berms Projects
Coastal Restoration Projects Specialists

Who we are and why we are here:

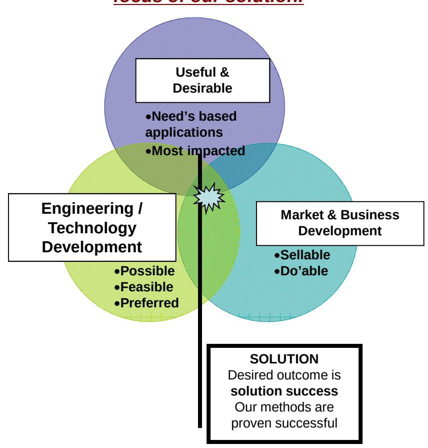
Our solution for restoration and recovery is a holistic offering. In this plan, we shoreline protection, will enhance building of habitat, and will assure land building and include berm stabilization.

Marshlands remediation and stabilizing are part of our plan, and we include a solution that includes "*dead zone*" control.

Our plan addresses needs of:
Fishing Industry – Ecological Systems – Marine Habitats - Political Tenure – and other stakeholders.

Our plan works sustainably because we cooperate with nature.

Our plan is a 'needs based' approach developed with and for those most impacted. Fact and sustainable remedies are the principle focus of our solution.



Sea Level Rise/Shoreline Protection/ Habitat for Coastal Regions

- We have designed and patented a system that will help control effects of sea rise. Our system will provide shoreline protection, will enhance building of habitat, and will assure land building.
- Designed to replace rock jetty, our new concept (Geo-TECH-Jetti) is installed above the water line, considering projected sea rise (as determined by official government determinations). Our Geo-TECH-Jetti units are filled with dredged material sourced from near the installation. Within a prepared area on top of the Geo-tech containers are RootZone Humus-filled, (RZHO), biodegradable containers. The RZHO-filled containers are planted with mature native marsh grasses and other select native plants. Our specialized method, proven in several previous deployments, ensures highly energetic and sustained plant growth, while providing shoreline force and sea-rise protection. Land building also results as these solutions continue to work efficiently, while cooperating with nature.
- Once set in place the Geo-TECH-Jetti units are stabilized with XX heavy duty PVC pipe, driven down 7 feet for firm hold, there are stainless steel rings on the bottom of units in three locations for PVC pass through. The PVC stabilization devices are designed so that they can be retrieved at a future time, when it may be determined that plant rooting and accretion has been achieved and our "hold" feature is no longer needed.
- Our proven methods allow for replacement of rock as stabilization means. Using our proven methods, we ensure rapid reestablishment of habitat. Shellfish, fin-fishes, invertebrates, and other vital coastal organisms are able to reestablish populations.
- Installing our Geo-TECH-Jetti units, we accomplish rapid rebuilding of the entire food-web, by providing the multiple benefits. **(1)** We provide protection from sea-rise. **(2)** We ensure rapid establishment of native plants along shorelines, making possible rapid habitat establishment. **(3)** Our methods assure accretion, as the long, well-set units of Geo-TECH-Jetti prevent erosion. **(4)** The Geo-TECH-Jetties also provide protection from surface and sub-surface oil encroachment on shorelines and into adjacent marshes. **(5)** Shoreline areas of land, (marshes or barrier island shores), behind the rows of Geo-TECH-Jetti units are filled with dredged material has our process continues, the filled RZH and RZHO are applied to ensure fertility.
- The Geo-TECH-Jetti is set in place, working from barges. Our Geo-TECH-Jetti Placement System makes it possible for us to position units efficiently, one in front of the other, and over lapping with space between them allowing existing habitat to continue functions as installation is accomplished.
- If it is decided that marsh or shoreline is not to be filled in some areas where Geo-TECH-Jetti are being installed, our units are set next to each other and can be used to serve as solid shoreline protection without back-filling.

- **GEO-TECH-Jetti Spec:**
- Material- PP Woven Fabric
- Product Code = CPP 6500 (Uncoated fabric)
- Fill Test Value:

TEST PARAMETER	TEST STANDARD		UNIT	FIL TEST VALUE
GRAB TENSILE	MD	D 4632	LBS	340
GRAB ELONGATION	MD		%	20
CD	%			20
TRAPEZODIAL TEAR	MD	D 4533	LBS	140
CD			LBS	140
PERMITIVITY		D 4491		0.03
FLOW RATE			Gal/sqft/min	2.4
GSM	D 5261	GRAMS		245

- Filled Weight: 7,800 pounds.
- 6- RZHO containers w/ native marsh grass set on top.
- Estimated Life Duration: 28-34 + years.

Stainless Steel Rings not shown

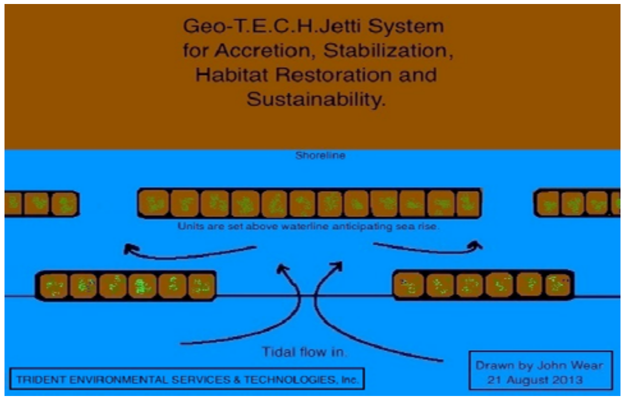

Geo-T.E.C.H.-Jetti design
Coastal Restoration Units held in place by PVC stakes. Units filled and stabilized. Fill material will protect and will enhance plant growth. Deep rooting assured and habitat sustainability.
Fill and planting behind the units.
Geo-TECH-Jettie Units held in place by PVC stakes.
John Wear 18 August 2013

5

6” Dredge

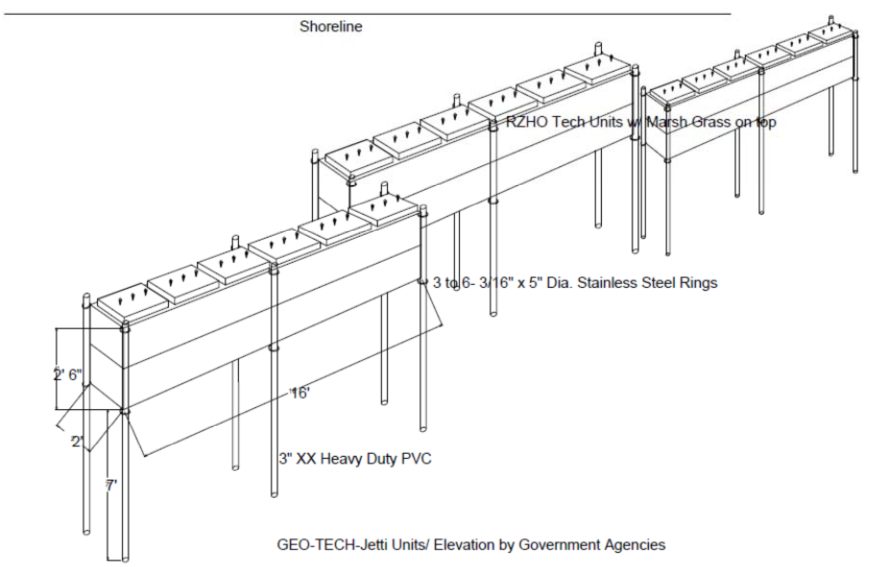
6

Water side of Jetti are spiked with XX heavy PVC pipe driven 7' into ground for stabilization.



Biodegradable container for planting on top of the Geo-TECH-Jetti units.

7



GEO-TECH-Jetti Units/ Elevation by Government Agencies

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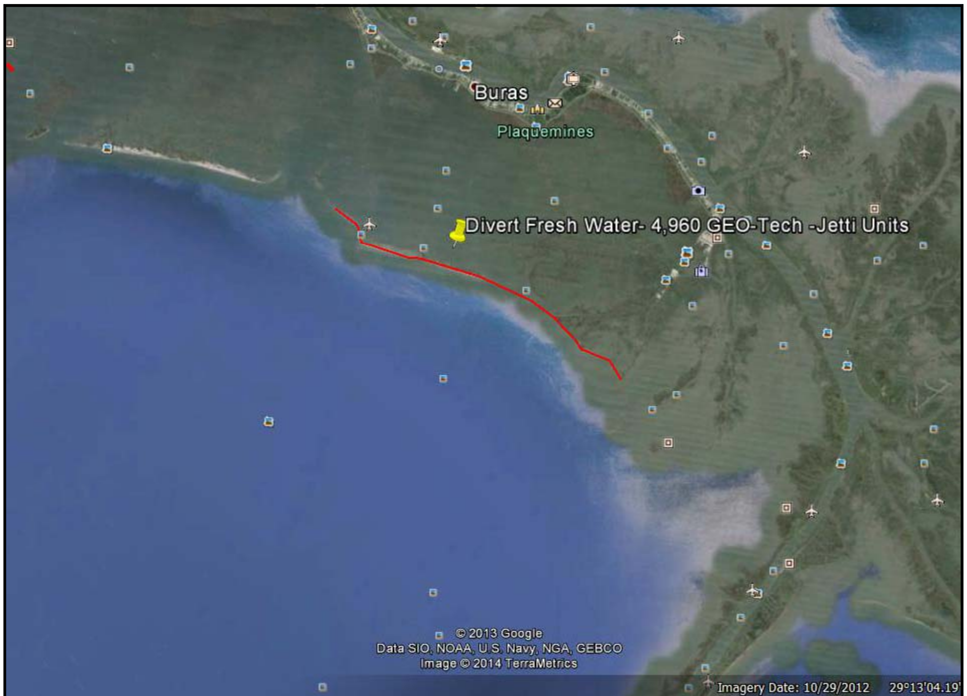
Buras
Plaquemines
Divert Fresh Water- 4,960 GEO-Tech -Jetti Units
© 2013 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2014 TerraMetrics
Imagery Date: 10/29/2012
29°13'04.19"


SHALLOW DRAFT
Shallow Draft

VALUE PROPOSITION:

- Our team realizes that many third parties will become involved in these projects. A variety of inter-related projects between third parties and our team will require expedited cooperation as appropriate in expediting agreements and in their subsequent performance.
- We will assist in operational issues and modernization requirements and their impacts on economic recovery by installing a safe, reliable, functional and efficient solution that will maximize the benefit of an integrated system and network.
- We will strive to ensure increased return on investment by providing solutions that exceed the needs and results sought by the concerned parties.

BUSINESS DRIVERS for PROPOSED SOLUTION:

- Regional economic development
- Local job creation and retraining
- 501C-3 and University Stipend support

Our team can act as the single point of responsibility for coordinating the design, managing the delivery and serve as an ongoing advisor for the process.

NEXT STEPS:

- Vetting & Due diligence
- Product(s) and concept approval
- Joint Planning, solution development and testing
- Contract process
- Implement, manage, expand and improve

Recalling who we are and why we are here:

We are here with SOLUTIONS

Our plan provides an integrated solution, which offers:

Land stabilization by soil building and planting.

- We provide the contracting, implementation and project management
- **TRIDENT ENVIRONMENTAL SERVICES** & **TECHNOLOGIES**, **Inc.** provides scientific expertise, with biodynamic product for fertility and remediation.
- Continued ecological improvement using specific grasses and trees, provided by **Trident Environmental Services & Technologies, Inc.**, and partners.

We add replenishment of invertebrates & fish into repaired marshlands and littoral areas.

(The aquaculture initiative.)

Trident Environmental Services & Technologies, Inc*. provides consultation, product, and solution application expertise.*

Continued ecological improvement through phyto-remediation

Natural growth stimulating and remediating biotechnology

Contact Information

Solution Team and Contact Information:

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John Wear, Chief Scientist, Engineering Consultant
TRIDENT ENVIRONMENTAL SERVICES & TECHNOLOGIES, Inc.820 Poydras
New Orleans, Louisiana 70112
Telephone: 504-520-0537 and 228-314-0400

RootZone Humus
johnwearusa@yahoo.com
Role: Technology Supplier, Solution Development and Planning

Information and websites links:

- **Innovative Uses of Organic Matter, Compost: Bioremediation and Pollution Prevention** United States, Environmental Protection Agency,
  - www.epa.gov/wastes/conserve/rrr/composting/pubs/bioremed.pdf
- **Trident Environmental Services & Technologies'**
- **www.tridentworld.org**

www.compostconcentrate.com

DEMO-05

Armored Barrier Island & Coastal Restoration System

PPL24 DEMONSTRATION PROJECT NOMINEE Draft FACT SHEET
February 19, 2014

Demonstration Project Name:
Armored Barrier Island and Coastal Restoration System

Coast 2050 Strategy(ies):

- Protect shorelines,
- Maintain land bridges,
- Maintain shoreline integrity.
- Reclaim/Restore lost wetland and barrier island land masses

Potential Demonstration Project Location(s):
Coastwide

Problem:
What problem will the demonstration project try to solve?
To minimize the effect of land loss on wetlands and barrier islands as a result of normal wave action and storm surge influences.

What evidence is there for the nature and scope of the problem in the project area?
Past efforts to protect the barrier islands and restoration of the wetlands have proved to be unsuccessful or having limited success too small to reverse the trend of net land loss to our coastal ecosystems.

Goals:
What does the demonstration project hope to accomplish?
Provide a maintainable footprint (armored dike area) on the barrier islands and wetlands to insure multiple lines of defense against flooding from storm surges while maintaining natural habitat for the ecosystem.

Proposed Solution:
Describe demonstration project features in as much detail as possible.
The proposed system uses autoclaved aerated concrete panels to construct a form to be used to pump native sands into to form the base of an armored dike around the defined perimeter of the barrier islands. Geotextile fabrics will be placed inside the forms to provide strength to the system and to prevent loss of the sand material. Against the flood side of the forms sand will be placed at 1 on 10 slopes to reduce wave energy and minimize the effects of erosion. Against the protected side of the forms sand will be placed at 1 on 3 slopes to minimize the effect of any overtopping. A concrete mat will be placed over the flood side and protected side sand slopes. A geotextile fabric will cover the sand to minimize material losses. A concrete mat will be placed over the geotextile fabric to armor the system against wave action. A 3 foot layer of sand will be placed over the concrete matting and planted with native vegetation to provide habitat for the ecosystem. The minimum estimated height of the barrier is 10 feet and the minimum length

of the system on the flood side is estimated to be 180 feet long. Actual heights and lengths will be site specific and determined by the actual wave heights to be encountered.

The AAC panels can also be used as building blocks for restoring lost wetlands. Panels can be placed in open water, lined with geotextile and pumped with native soils to provide a base for restoring wetlands. This system acts similar to a bulkhead. Land masses can be built in large quantities or in smaller quantities as dictated by budgetary constraints.

Project Benefits:
Describe demonstration project benefits in as much detail as possible.
The proposed project would: Reduce the land loss on barrier islands and wetlands as a result of wave actions associated with storm surges.

Potential Project Cost:
The estimated construction cost is $10,000,000.00 per mile.

Preparer(s) of Fact Sheet:
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(see attached picture and drawings)

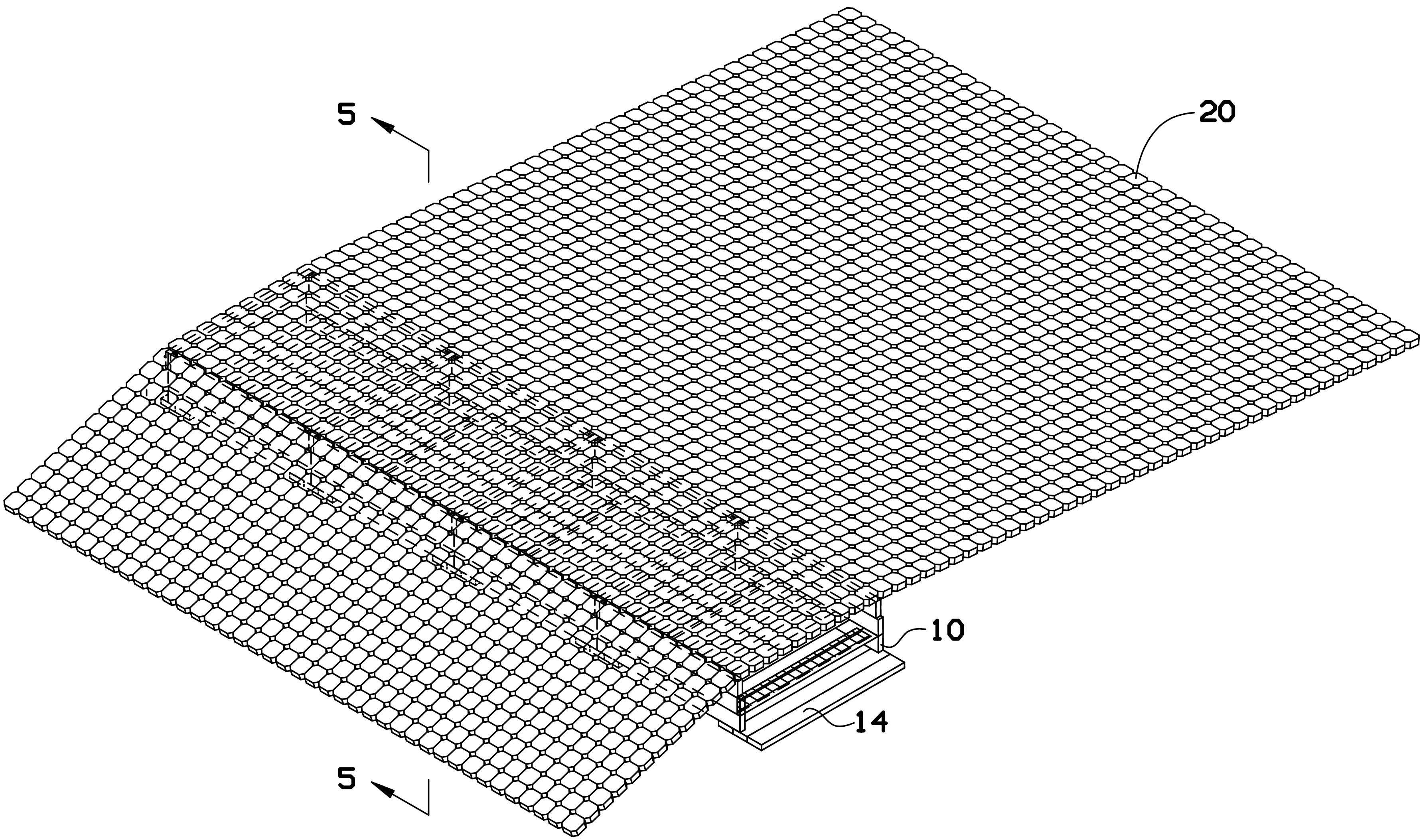

FIG.1

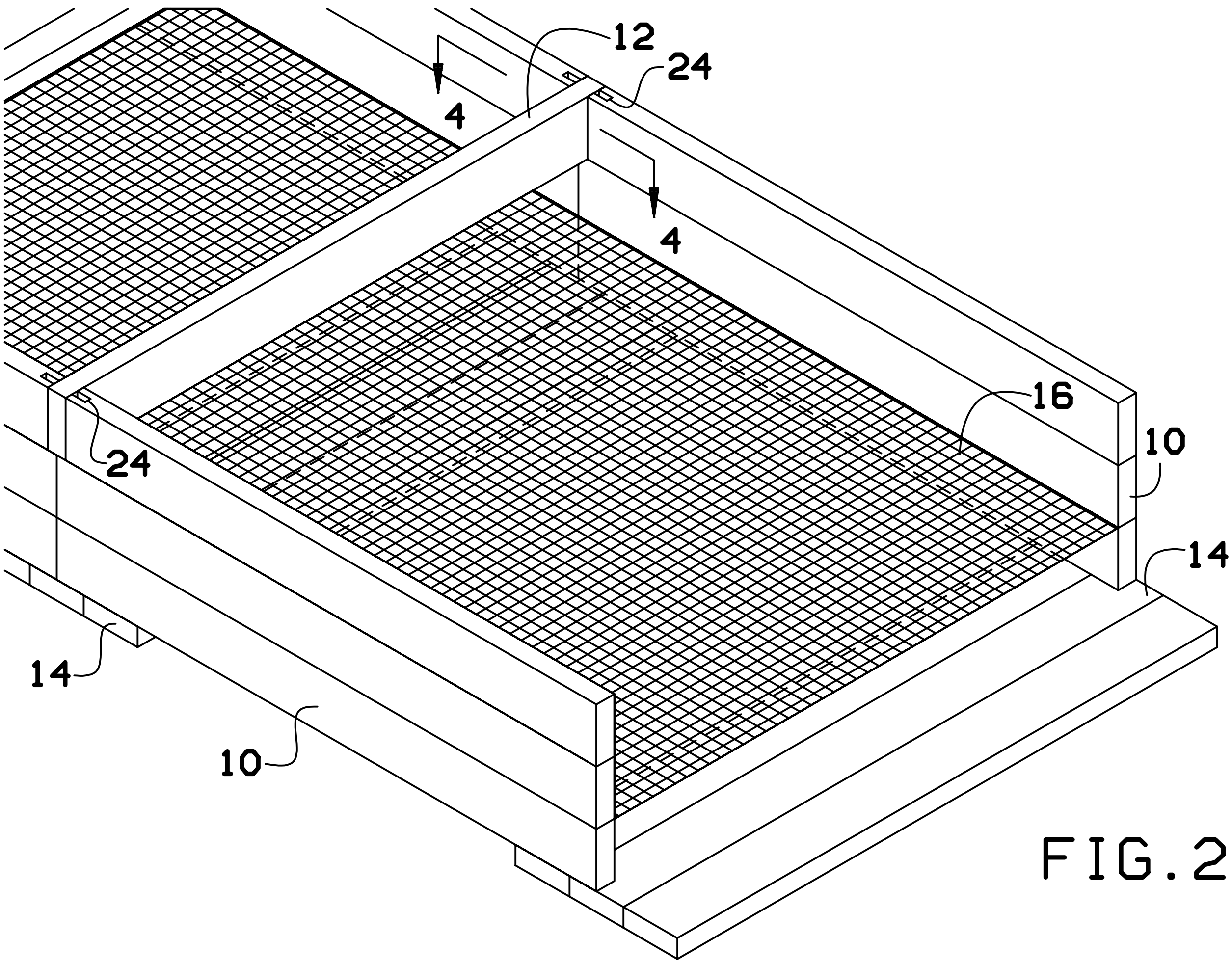

FIG.2

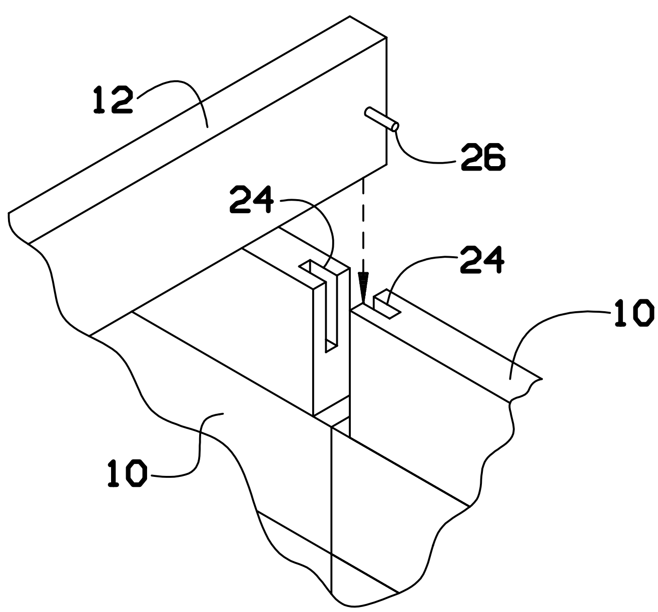

FIG.3

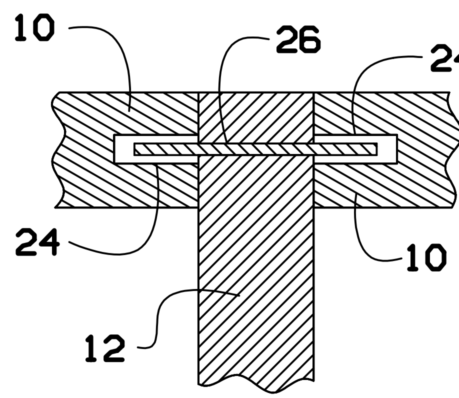

FIG.4

Cross Section of Levee

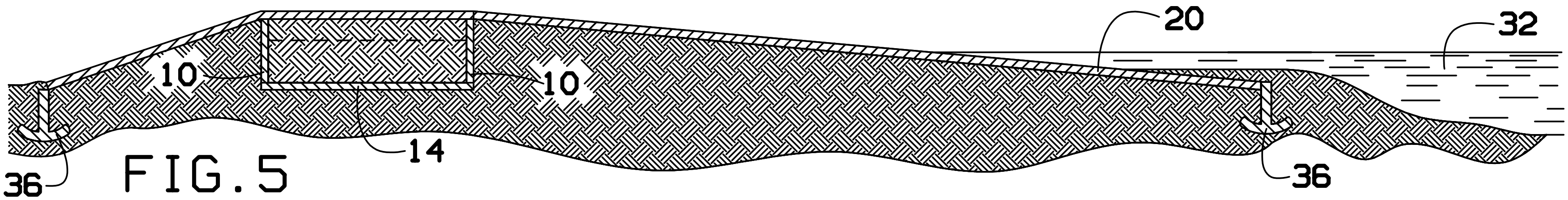

FIG.5

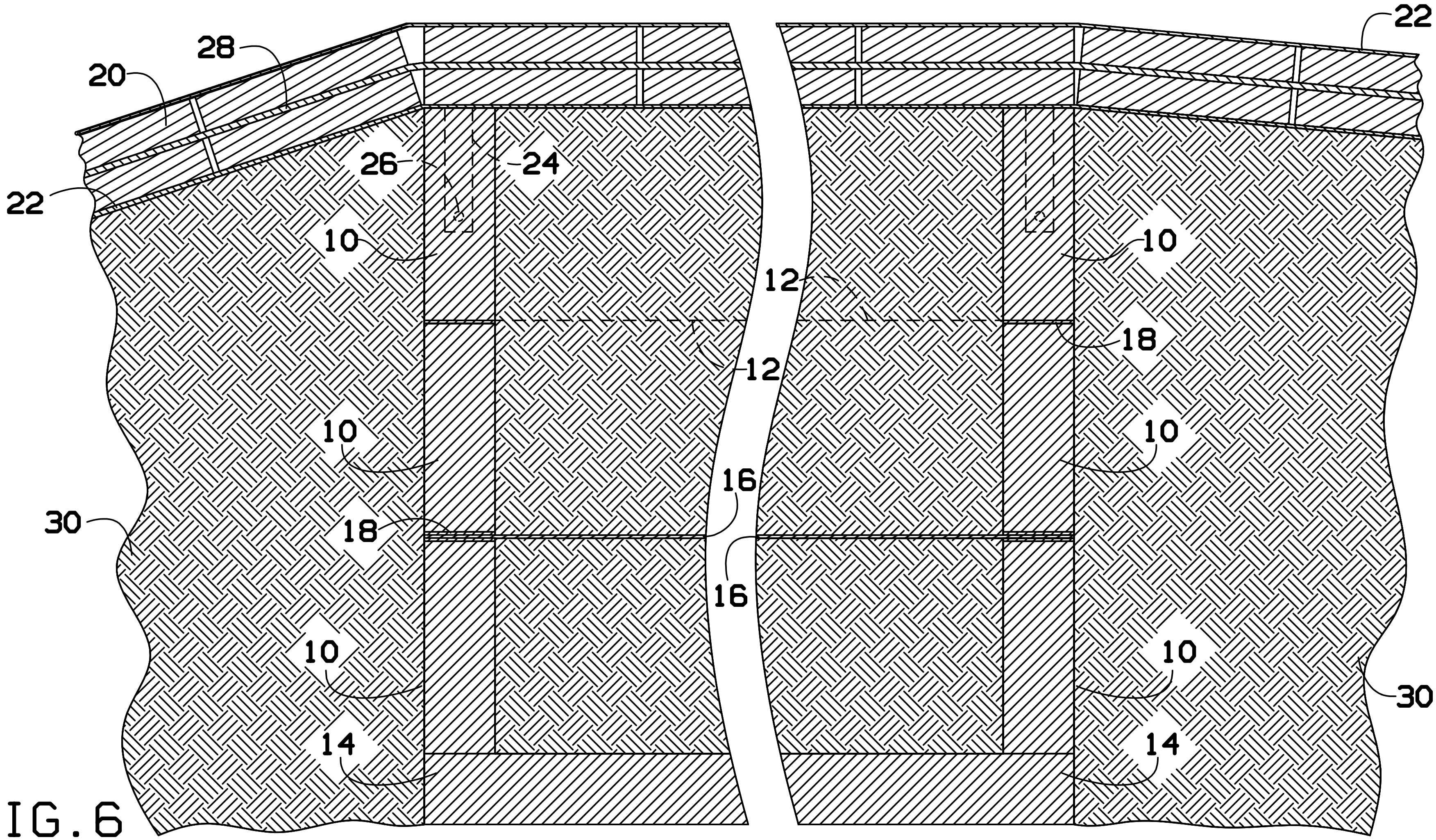

FIG.6

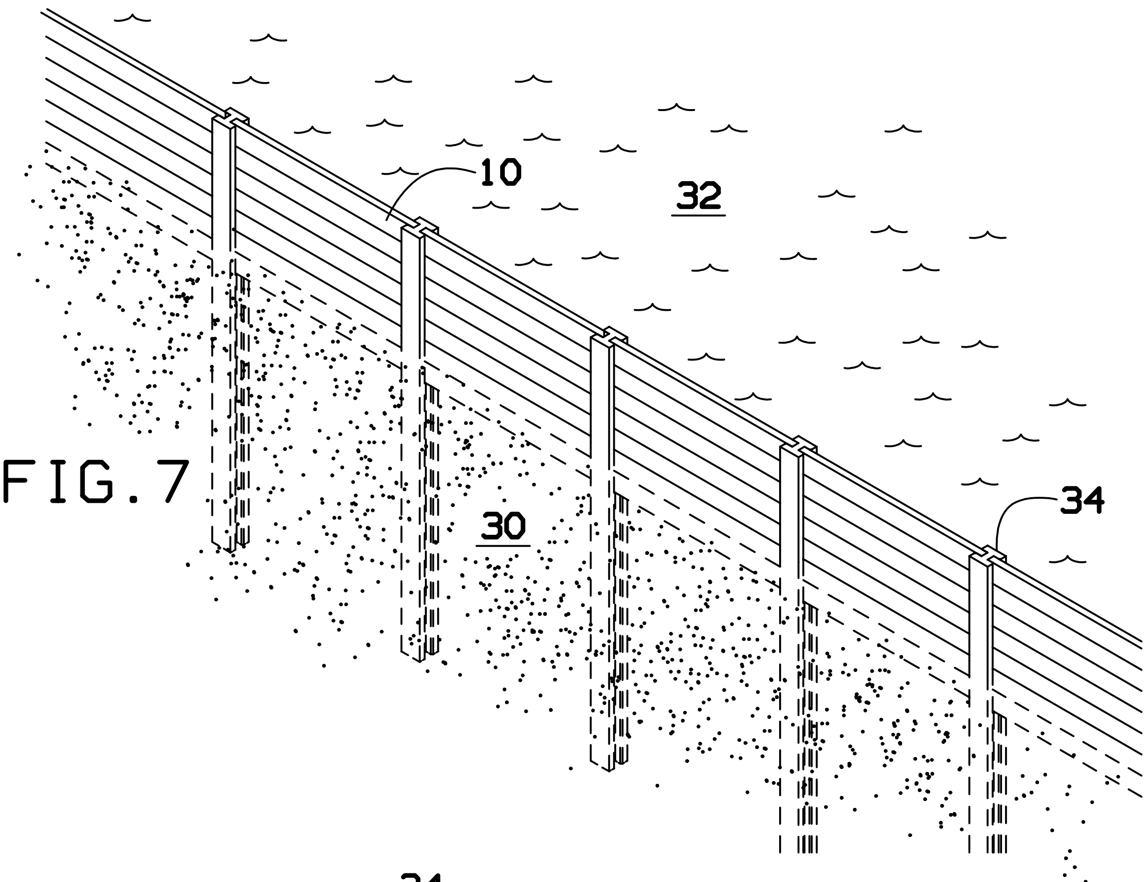

FIG.7

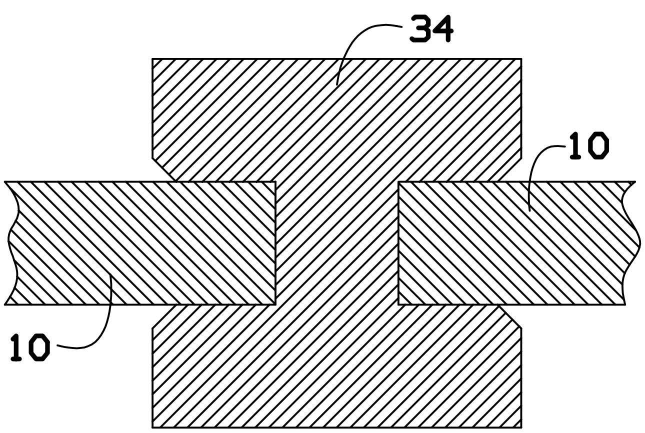

FIG.8

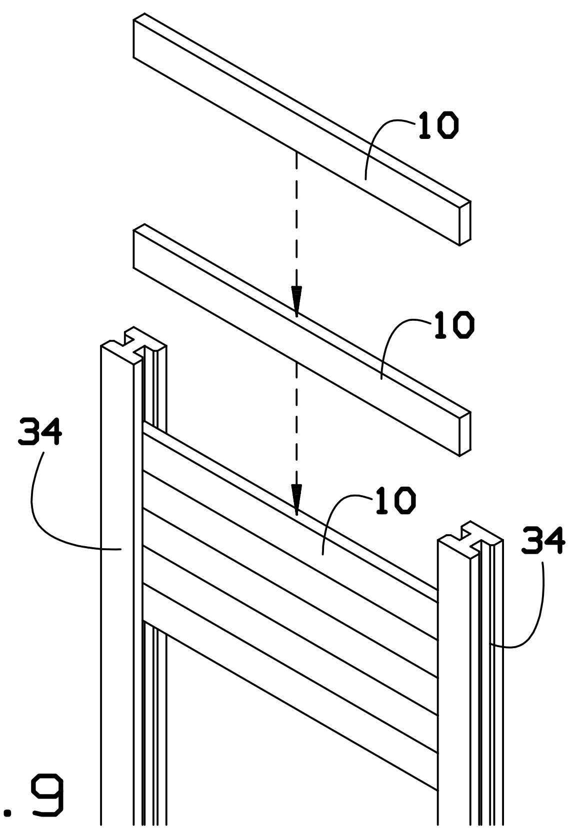

FIG.9

Goin Installed on Beach

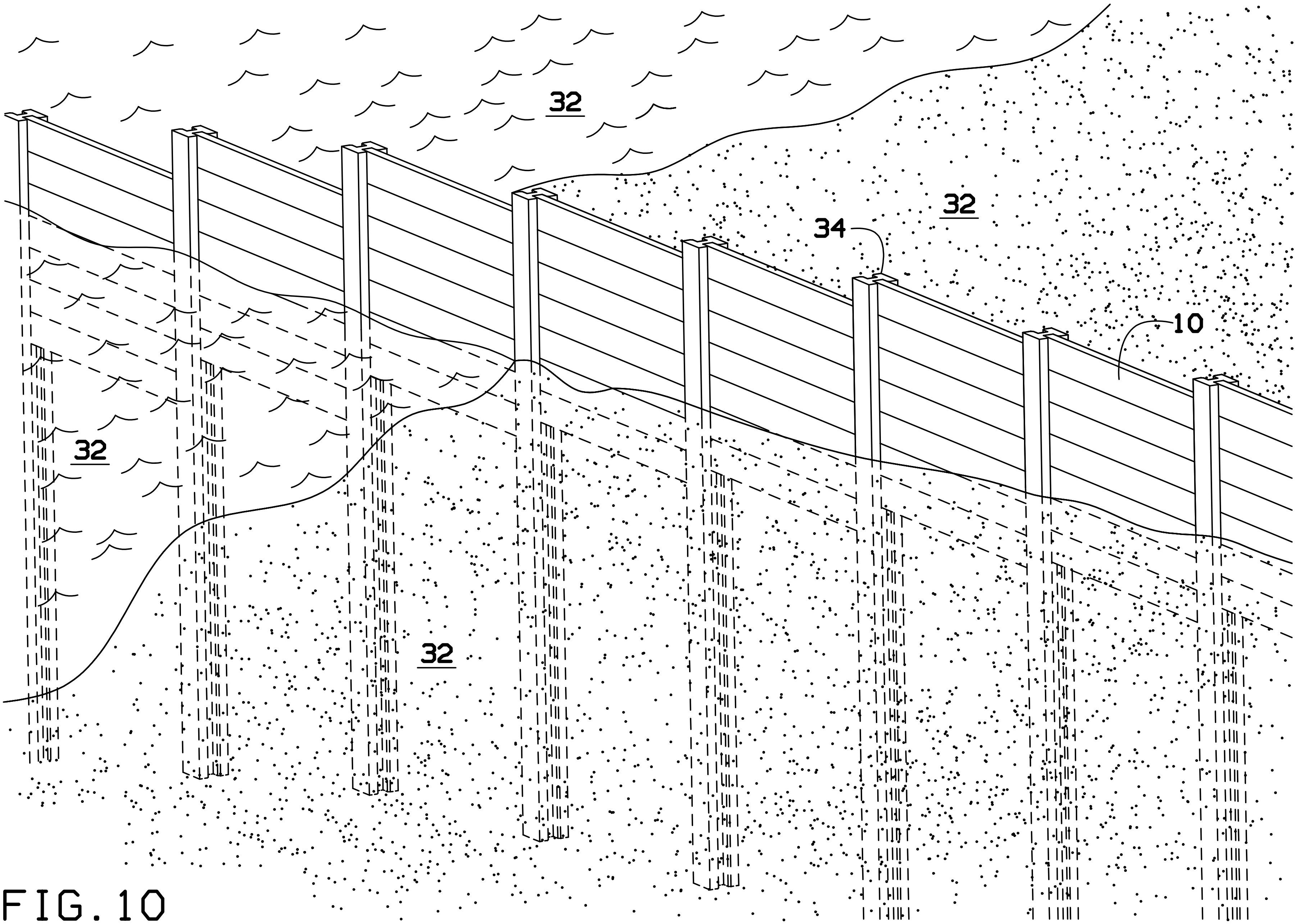

FIG. 10

<u>Louisiana's Coastal Land Loss Problem</u>

How much land has been lost?

- 1880 sq. miles since 1930, CPRA Master Plan
- 1900 sq. miles, since 1932, US Geological Survey
- 2000 Sq. miles, various media reports

How to fund the restoration?

- $50 million, CPRA estimate 2010 dollars, will cost $100 million to execute as planned
- $8.7 billion 2013 annual oil and gas revenue
- $?$? Lawsuits vs. big oil, US Corps of Engineers

TIDAL SOLUTIONS, LLC

Before we can restore the land, we need to know why.

- Habitat
- Shipping Industry
- Oil and Gas Industry
- Recreation/Culture

Where is the line in the sand drawn for the battle to save the coast?

- The storm surge modeling was used to develop the flood protection systems to protect citizens from the 100 year event.
- Where was the coast line for the modeling? Is it now further inland? Is the flood threat now greater than what the system is designed for?
- How do the proposed restoration projects affect the storm surge modeling?
- How do the proposed restoration projects fit into the multiple lines of defense strategy? (Specifically barrier islands and wetlands)

TIDAL SOLUTIONS, LLC

TIDAL SOLUTIONS, LLC

Tidal Solutions LLC, Our alternatives for the restoration of the barrier islands and wetlands in Louisiana.

TIDAL SOLUTIONS, LLC

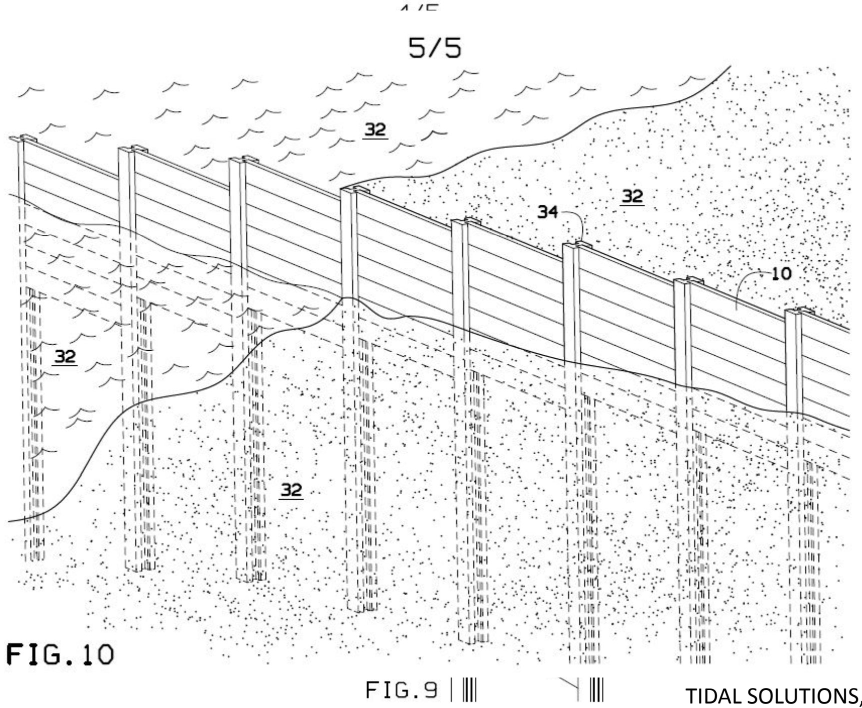

FIG. 10

TIDAL SOLUTIONS, LLC

DEMO-06

Innovative Bedload Sediment Collector

PPL24 PROJECT NOMINEE FACT SHEET
PROPOSED DEMONSTRATION PROJECT
February 13, 2014

Innovative Sediment Collector Technology (Region II RPT Meeting – Coastwide Demonstration Project)

State Master Plan Consistency
The Sediment Collector Technology is consistent with the Louisiana's Comprehensive Master Plan for a Sustainable Coast (2012), which states "…explore new project strategies, including cost effective delivery of sediment using innovative dredging techniques, …"

Project Location
Location to be identified following assignment of a Federal sponsor and consultation with the assigned Federal sponsor.

Problem – Sediments for coastal restoration features are typically excavated from static borrow sources by disruptive and costly dredge platforms and dredging operations. These sediment borrow sources have limited capacity, with nominal natural repliniishment rates following sediment excavation. The Sediment Collector Technology is a complimentary technology that allows for optimally collecting bedload sediments in a non-distruptive, non-intrusive, and sustainable manner from within streams, rivers, and other dynamic aquatic environments, which can subsequently be conveyed and beneficially used for coastal restoration projects.

Goals:

1) Evaluate the technical and cost viability of a passive sediment collector and delivery system to support protection and restoration projects within the Louisiana coastal zone in conjunction with and in lieu of traditional dredging.

2) Build upon earlier research and analyses of the Sediment Collector Technology as reported in Colorado State University's *Removal Efficiency Testing of Streamside Systems' Bedload Monioring Collector*, dated Mar 2005; in the US Army Engineer Research and Development Center's (ERDC) final *Application of Long Distance Conveyance (LDC) of Dredged Sediments to Louisiana Coastal Restoration*, TR-11-2, dated Jan 2011; and, in ERDC's draft *Sediment Management Methods to Reduce Dredging: Part 2, Sediment Collector Technology*, CHL CHETN-IV-x, dated Aug 2012.

Proposed Project Features
A Streamside Systems™ Sediment Collector System will be installed at the bottom of a river to hydraulically pump bedload sediments that fall in the Collector's hopper through pre-determined grate size. The sediment is pumped via pipeline to an upland dewatering site or other discharge means for beneficial reuse of the river sediment. Potential reuse of pumped sediment material could include marsh and wetland restoration.
Proposed equipment is as follows:

1- 30' Bedload Sediment Collector System with SS grates and urethane hoppers
2- 75 HP Dredge Pump (multiple pumps needed for longer distance conveyance)
3- Streamside Dewatering Station with Screw Auger Separator, Controls, Conveyor, Return water pump, Cavitation Tank

4- Piping
5- Flow gauging station for automated operation and control
* Site specific equipment may or may not be needed based on project

Preliminary Project Benefits – Implemention of an alternative sediment management system that passively collects and delivers sediments in a sustainable and cost-competive manner for the purpose of beneficially applying these sediments to protect and restore coastal ecosystem features throughout the Louisiana coastal zone.

Identification of Potential Issues - No significant issues have been identified at this time.

Preliminary Construction Costs - The estimated cost for engineering, permitting, installation (construction), and operation/monitoring costs are as follows:

Engineering/Design/Permitting	$ 165,000.00
Equipment	$ 635,000.00
Installation (Construction)	$ 150,000.00
Operation	$ 325,000.00
Monitoring	$ 300,000.00
Sub Total	$ 1,575,00.00
Contingencies 10%	$ 157,500.00
TOTAL COST	**$ 1,732,500.00**

Preparers of Fact Sheet

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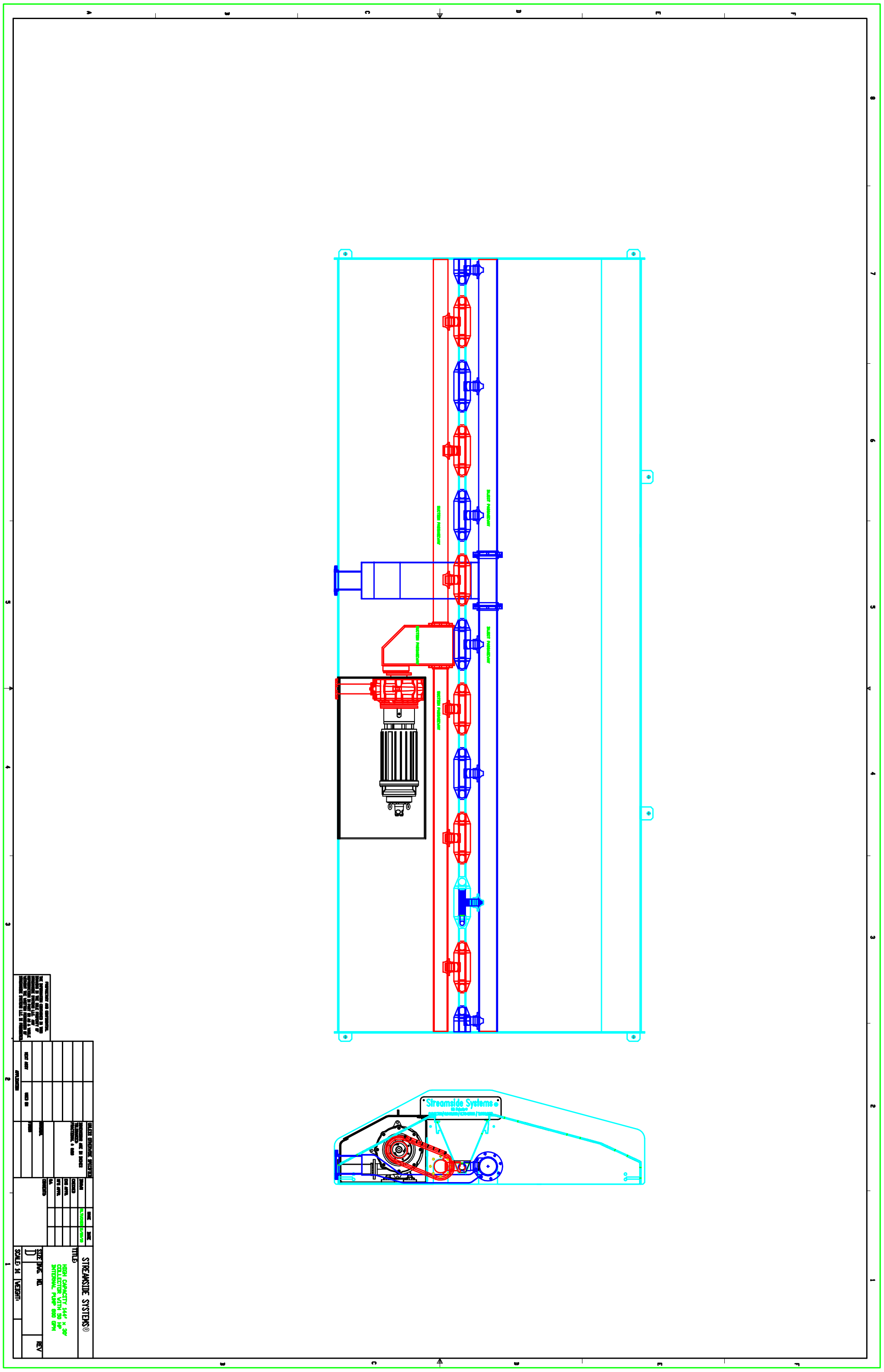
STREAMSIDE TECHNOLOGY

simplified thinking.



SEDIMENT Collector Technologies

About OUR Company

- Streamside Technology, LLC. was started in 2002 to test and market the previously patented sediment collector technology. Since then we have developed, tested and patented multiple technologies for the in-stream separation and removal of sediment.

- These environmentally friendly technologies provide for improved water quality and, in most cases, the production of a separated, clean, marketable product. The future of this technology for the treatment of contaminated sediment is paramount and is driving our current development efforts. Our goal is the on-site capture and treatment with beneficial re-use or release of treated sediment. For success, this must be done economically in both large rivers and in the smallest of streams.

Intellectual property

- Streamside Technology has 4 issued patents for varied Collector models in the United States.
  - Patent No. 6,042,733 / 6,346,199 / 6,764,596 / 7,850,857
- Three additional Collector Patents Pending
- Streamside Systems® is a Registered Trademark of Streamside Technology, LLC.

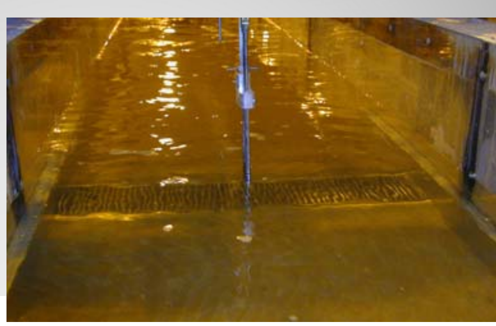
CONFIDENTIAL // COMPETITIVE COMMERICAL INFORMATION

THIRD PARTY VALIDATION

Hydraulics Laboratory, Engineering
Research Center, Colorado State University
Ft Collins, CO
Summer/Fall 2004

Twenty-four tests were performed by Colorado State University under a variety of substrates and velocities to assess the efficiency of total bedload capture.

RESULT: up to 99% efficient in selective removal of fine sediments



COLLECTOR TECHNOLOGY

- Sediment Collectors represent a new, innovative technology, using simple physical principles to capture targeted sizes of bedload sediments.
- Passive Collectors allow the energy of the stream to move bedload sediment up the Collector's ramp and into a hopper. As the sediment fills the hopper, it is pumped to a dewatering or disposal site.

STREAMSIDE TECHNOLOGY
simplified thinking

NEW APPROACH TO DREDGING

- The installation of Sediment Collector Systems on major river systems to reclaim sand as a usable bi-product and can generate revenue.
- Reduce the environmental impact of dredging in different areas and provide a reduction in cost.
- This approach would have a dramatic improvement on the environment, fish habitat, along with improving shipping and transportation within the harbors and bays.

What's New About This?

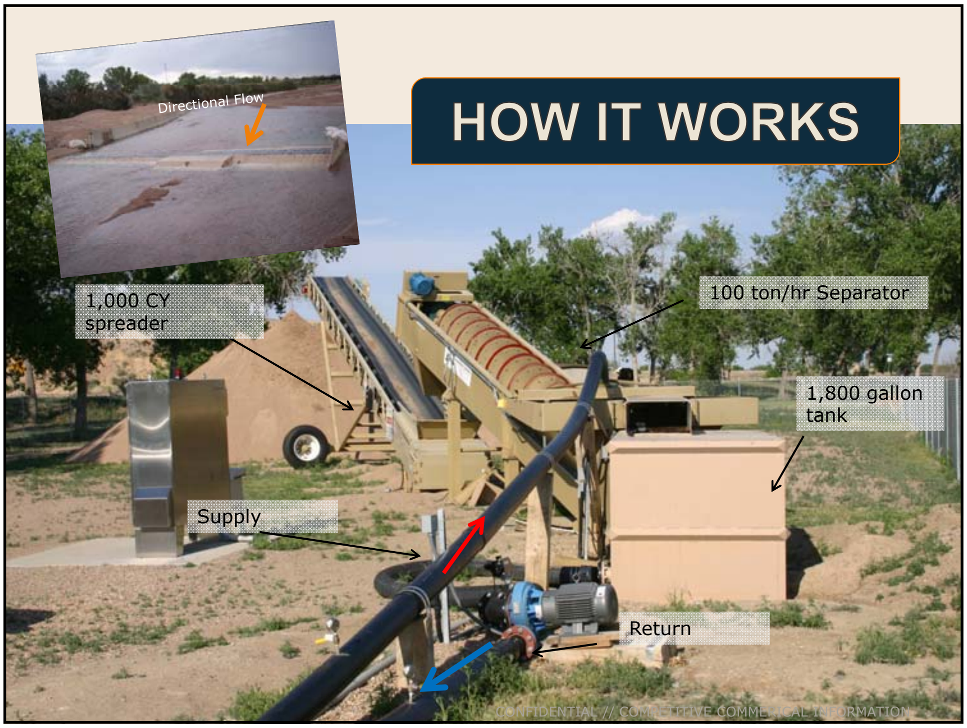
- Selective Capture
  - Low possibility of accidental entrainment
  - Bedload (coarse) sediments, minimizing sand bars
  - Control top size with grate opening
- **Removal at the Natural Transport Rate**
  - **Maximum production cant exceed natural transport rates**

TYPES OF SEDIMENT COLLECTORS

- Bedload Monitoring Collector
  - Can be used to develop watershed sediment budgets for fine bedload sediments, to develop Total Maximum Daily Loads (TMDL) specially for bedload fines and to monitor bedload transport rates through the watershed
- Contractor Collector System
  - Designed to eliminate downstream sediment impacts from bedload transport during in-stream construction projects. It can be used to control bedload sediment transport and prevent impacts to downstream aquatic habitats or biota.
- Forebay Collector
  - The purpose of a Forebay Collector is to capture transporting sediment during storm events, thus reducing maintenance on sediment retention ponds and waterways.
- Large Scale Collector System
  - Similar to the previous variations, large scale systems are fully scalable for most applications. The fluidized sediment is pumped to a dewatering site for beneficial reclamation of harvested sediments and the water is returned to the Collector in a semi closed-loop scenario.

SEDIMENT COLLECTOR INSTALLATIONS

HOW IT WORKS



Construction and Maintenance Cost

Collector (pumps, controllers, pipe, etc.)	$319,000.00
Sediment Spreader	$39,000.00
Installation	$110,000.00
Approx. Cost of Contract Documents	$50,000.00
Upgrades/Repairs	$10,000.00
Total	**$528,000.00**

**Costs are approximate*

- Operations
  - Uses 1kwh/min
  - <$53,000 per year if operated continuously

The results

- ERDC (Navigation Systems Research Program) study and released paper at International Sediment conference regarding Sediment Collector technology.
- The system, as designed on Fountain Creek, has the capability to remove **874,000 Cubic/Yard/Year**, if operated continuously and the river is able to produce that amount of material.
- This validation was accomplished at Fountain Creek over a three day storm event, which the system **removed approximately 2.75 cubic yards per minute**.

Large-scale Projects for 2014-15

- Lake Lure North Carolina, City of Lake Lure
  - 30’ high Capacity with Screw Separator and Stacker. Designed to handle 1,200,000 Cu/Yd/YR, 1800 GPM
- Cleveland, Ohio, Cuyahoga River, Port Authority
  - 50’ high Capacity with Screw Separator and Stacker. Designed to handle 874,000 Cu/Yd/YR, 1200 GPM
- Army Corps of Engineers, Rock Island District, Mackinaw River, Illinois
  - Corps testing and evaluation
- Confidential contaminated superfund site; 2014-15
  - 2-30’ High Capacity with Screw Separator and Contamination Processing/Washing
  - 1200 GPM

Ecosystem Restoration Applications

Direct Sediment Placement for Beneficial Use at Marshes/Wetlands

Connect to Existing/Permanent Sediment Conveyance Pipelines

Sediment Stockpiling for Rehandling on Future Ecosystem Restoration Projects

DEMO-07

Ecosystems by Walter Marine

Demo-07

Unique Anchoring System

Ecosystems patented Living Wave Barrier and Snorkeling Reefs are Limestone rocks embedded in discs of concrete.

Mounted on fiberglass piling to withstand storm events, it solves the subsiding and moving problems other units have in soft soils and high energy surf conditions. It is so stable, it is approved by the Corps of Engineers for installation in the Gulf of Mexico.

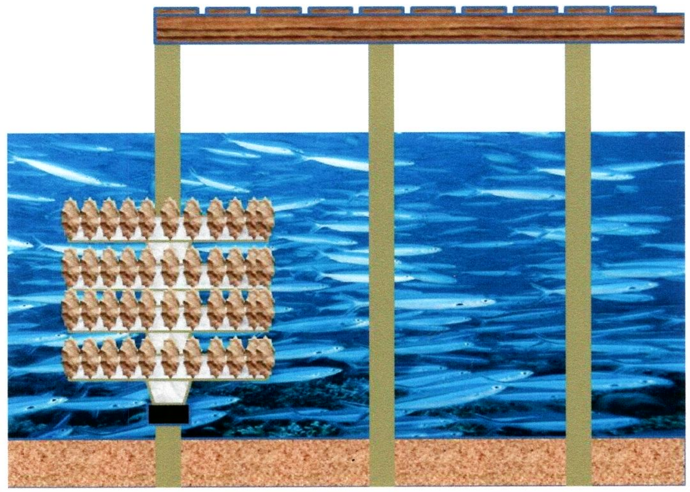
Natural Florida Limestone Rock provides perfect PH for marine organisms to live.

Can be designed to any shape and height.

Distance above ground, from surface and between discs can be easily adjusted to suit any requirement.

Dock Reef

Mitigate dock shading, Estuary, Grow Filter Feeding Animals or Fishing Reef At Your Own Dock



REEFMAKER
WALTER MARINE
ARTIFICIAL REEFS
www.reefmaker.net
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EcoSystems

Snorkeling
Estuary
Wave Attenuation
Oyster Growth
Artificial Reef

EcoSystems
PO Box 998
Orange Beach, AL 36561
251-979-2200
www.reefmaker-ecosystems.com

Configure EcoSystems to Suite Any Need

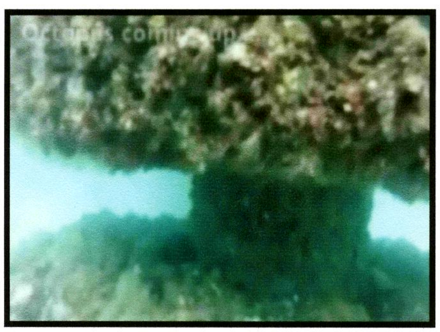
Snorkeling Reef

Installation of **EcoSystems Snorkeling Reef** in Pensacola Beach, FL.

Make your area the #1 for tourist destination, by adding a family orientated attraction to your community.

Corps of Engineer approved snorkeling reef for use in the surf.

Tourists, fishermen, snorkelers and divers will enjoy this asset. Bring tourists to



parks and hotels, rent snorkeling gear, Scuba training, fishing, etc. Best value for the dollar to provide additional family activities.

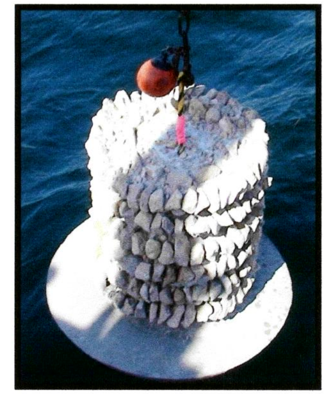
Living Wave Barrier

Chosen as shoreline protection for historic Deadman's Island located in Gulf Breeze, FL. **EcoSystems Living Wave Barrier** is working to remove destructive wave energy from the shoreline and providing estuary for marine animals.

EcoSystems reef units have removalable sections to soak in Oyster spat and reinstall

to jump start oyster growth.

Artificial Reef



Eco-

Superior to concrete alone.

Complex artificial reef with natural Florida Limestone rock provides habitat for all life found on natural reefs.

The complex design provides spaces for juvenile fish to find protection.

Installed near estuaries or outlets as habitat for juvenile fish until they are large enough to fend for themselves.