Organised By: ***Co-Hosted By:***

COASTAL RESILIENCE: SAFEGUARDING OUR SHORES

Thursday, 27th July 2023

9am – 10.30am SGT

Thank you for your patience.
Session will begin soon.

Organised By: ***Co-Hosted By:***

SWA
SINGAPORE WATER ASSOCIATION

U.S. COMMERCIAL SERVICE
United States of America
Department of Commerce

COASTAL RESILIENCE: SAFEGUARDING OUR SHORES

Thursday, 27th July 2023

9am – 10.30am SGT

Organised By:

SWA
SINGAPORE WATER ASSOCIATION

Co-Hosted By:

U.S. COMMERCIAL SERVICE
United States of America Department of Commerce

HOUSEKEEPING

- ***To ensure better connectivity, please mute your microphone and turn off the camera. You may communicate with us after the event or during the Q&A.***
- ***Please share your questions in Q&A icon (right bottom) where we will try to provide answers whenever possible. Do identify yourself so we can respond to any unanswered questions.***
- ***If you need real time speech-to-text translation, please select your preferred language in the bottom left CC icon.***
- ***Please complete a one-minute poll survey at the end of the session.***

Organised By:

Co-Hosted By:

DISCLAIMER

- ***All information shared is for general information only and does not contain or convey any legal advice or administrative assistance.***
- ***Information shared today is true and accurate as of publication date.***
- ***The organiser and speakers reserve all rights in the provided materials.***
- ***This session will be recorded, shared, and kept for as long as it serves a business purpose for the Association. By attending this event, you are giving your consent to this recording.***

Organised By: ***Co-Hosted By:***

SWA
SINGAPORE WATER ASSOCIATION

U.S. COMMERCIAL SERVICE
United States of America
Department of Commerce

COASTAL RESILIENCE:
SAFEGUARDING OUR SHORES

WELCOME

Organised By:

Co-Hosted By:

SPEAKERS

Roderick D. Scott

Board Chairman

Flood Mitigation

Industry Association

INDUSTRY OVERVIEW

FMIA

Flood Mitigation Industry Association

The flood mitigation industry is rapidly growing to meet increasing needs to mitigate flood risk

STEPS CAN & SHOULD BE TAKEN NOW
to protect homes, businesses, & assets before disasters strike.

ABOUT THE FMIA

A 501C3 NON-PROFIT ORGANIZATION CREATED TO ADVOCATE FOR THE FLOOD PROTECTION INDUSTRY

1

Educate the public about flood hazard mitigation & the industry

2

Educate elected officials about the benefits of flood hazard mitigation

3

Help create more flood resilient neighborhoods and communities

Flood risk is a growing concern that affects the entire globe.

WHAT'S AT RISK?

INDUSTRIAL, COMMERCIAL, RESIDENTIAL, LOW and MODERATE INCOME, CRITICAL INFRASTRUCTURE

LMI RESIDENTIAL

CRITICAL INFRASTRUCTURE

RESIDENTIAL HOUSING

Solutions are available. The following are examples of how we *protect all assets and the movement of commerce.*


TIME TO REPLACE THE
OLD WITH THE NEW

WE PROVIDE A SUITE OF SERVICES

- Engineering Analyses
- Site Surveys
- Risk Assessment
- New Product Testing

THE MITIGATION INDUSTRY IS DRIVING KEY TRENDS

- Small Business Growth
- Manufacturing Jobs
- R&D – Technology & Product Innovation
- Global Export Potential

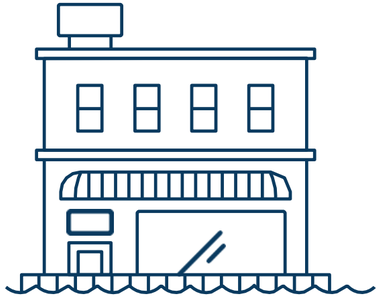
WE PROVIDE A VARIETY OF

TYPES OF FLOOD MITIGATION SOLUTIONS

Wet Floodproofing

Dry Floodproofing

Elevation

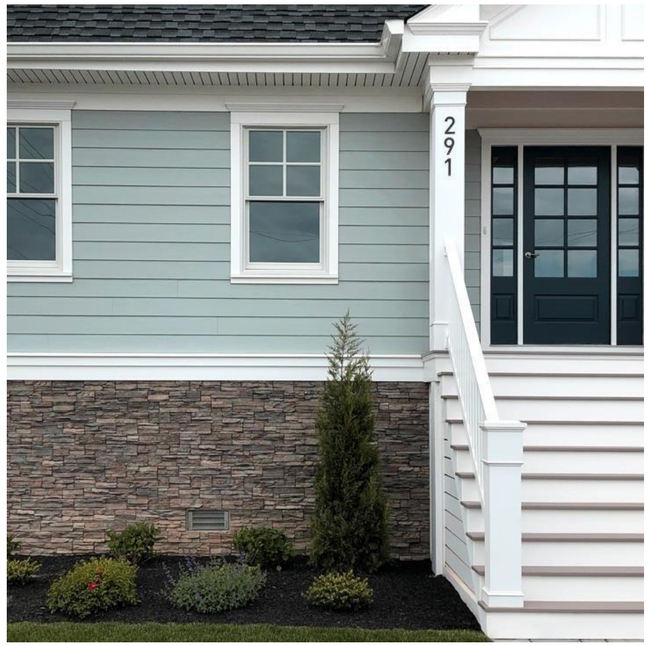


Deployable Barriers

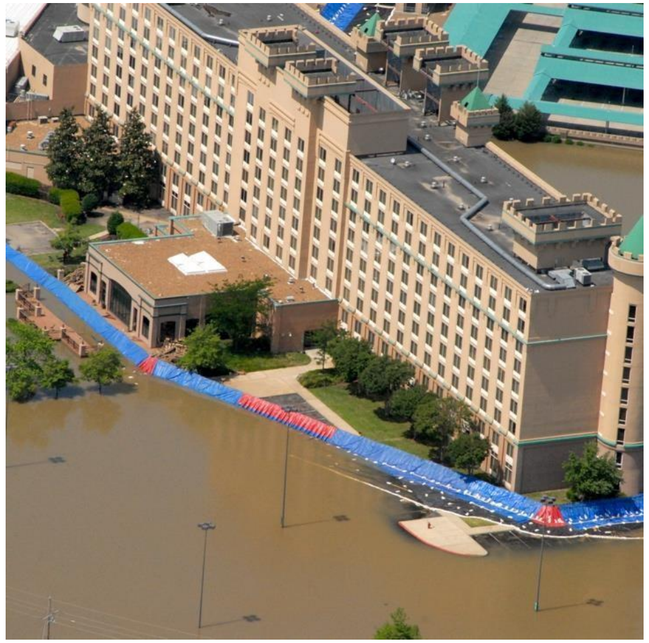
WET FLOODPROOFING

DRY FLOODPROOFING

ELEVATION



DEPLOYABLE BARRIERS




Mitigating now
will protect our
communities &
safeguard our
infrastructure.

FMIA

Flood Mitigation Industry Association

HELPING TO CREATE FLOOD RESILIENT COMMUNITIES

floodmitigationindustry.org | info@floodmitigationindustry.org

Organised By:

SWA
SINGAPORE WATER ASSOCIATION

Co-Hosted By:

U.S. COMMERCIAL SERVICE
United States of America
Department of Commerce

SPEAKERS

William A. Smallwood II

President

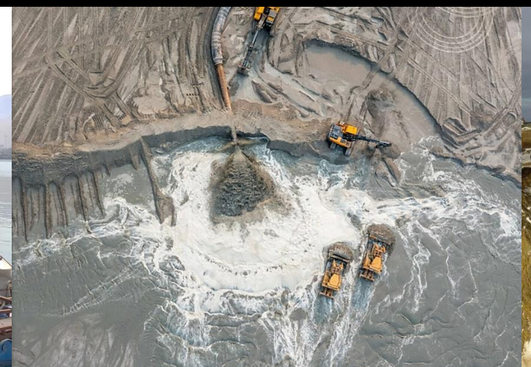
Flint Technical, Geosolutions



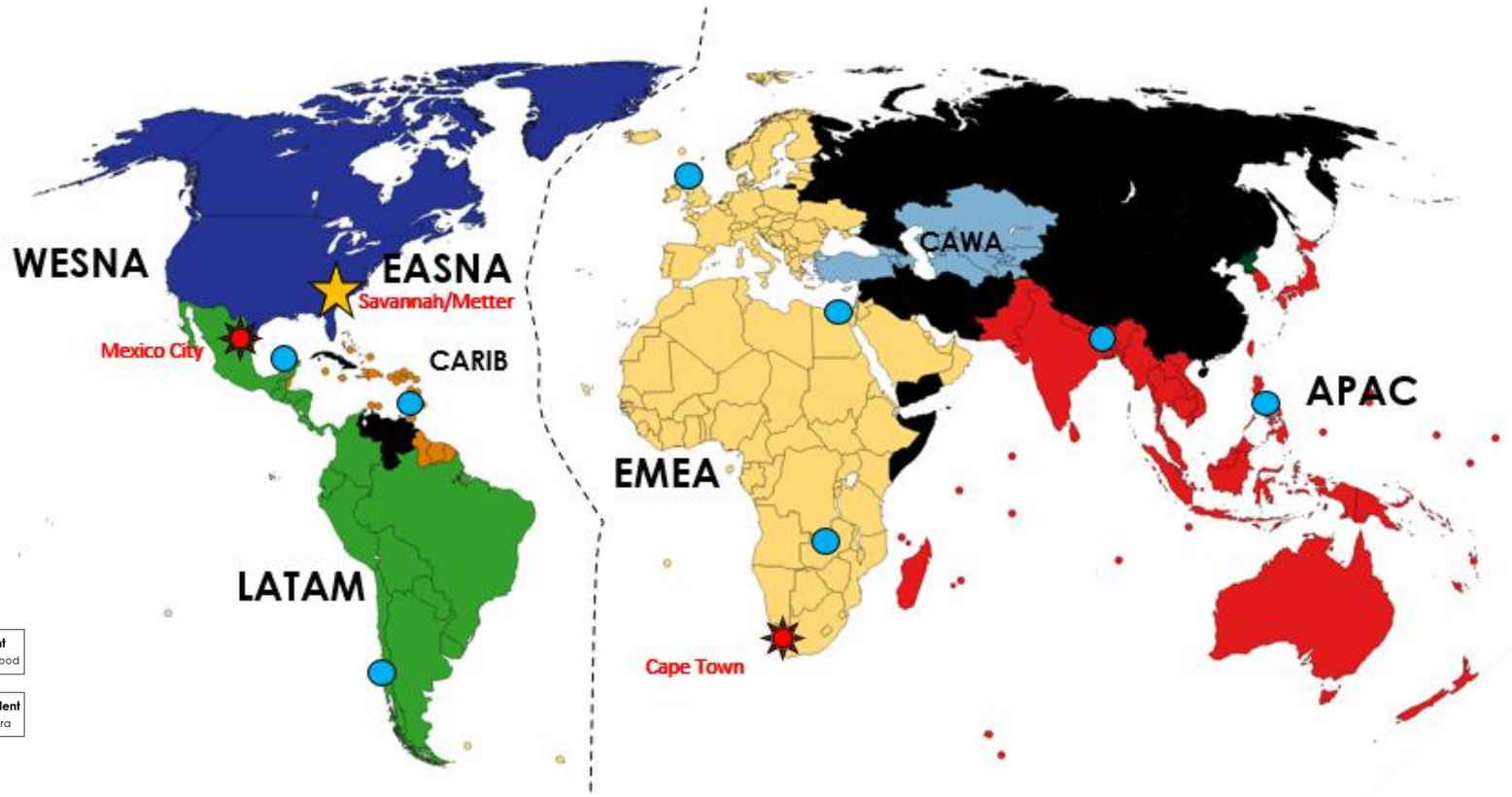
SWA – Tech Sharing Webinar

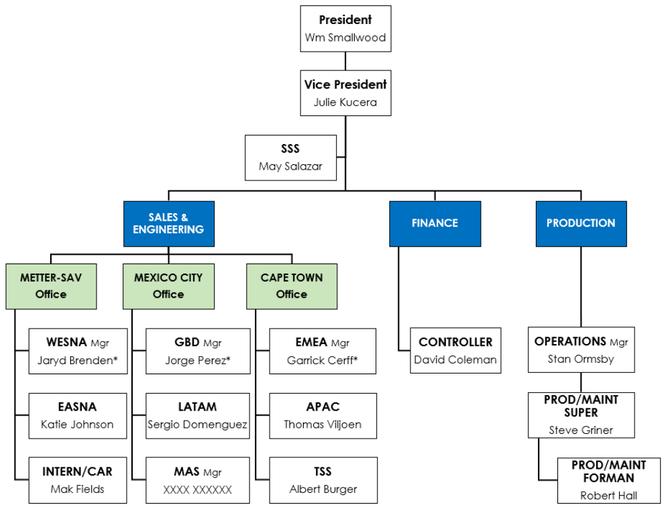
Coastal Protection Systems

William Smallwood, MSc Civ Eng, Cert Coastal Eng
President


Sales Regions

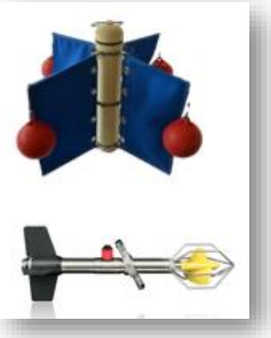




TEAM Titan

TITANTube Technology

Technical Support Services (TSS)



Coastal Data Collection

- Granulometry (Sand) Sampling & Analysis
- Determining a Beach's Profile
- Measurement of Marine Currents

Coastal Analysis, Design & Bid Assistance

- Technology Orientation
- Conceptual Design Services
- Pre-bid Organization Services

Coastal Training & Support

- Virtual & In-Person Start-up Training
- Field QA Inspection/Assistance
- Post Project As-Builts

NOTE: All FTG Sales & TSS personnel have been certified in dredging through either the WEDA Dredging 101 & 201 program or the TAMU Dredge Engineer program.

TEAM Titan

TITANTube Technology

Engineer Tech
Certification Program

Introductory Level
The Introductory Level has been developed to orient newcomers to the full scope of FTG's product offering and services. All training is offered through self-administered PPT modules.

Basic Level
The Basic Level moves on to provide more detailed information on our products and services to enable the parties to conduct semi-technical discussions on products and appropriate usage. Training is again offered by self-administrated PPT modules.

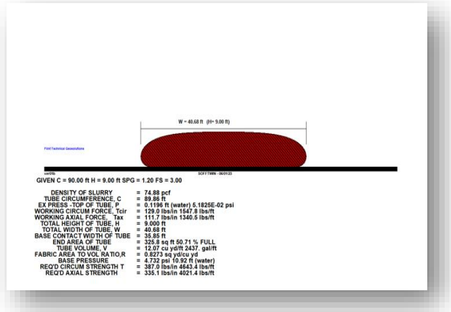
Advanced Level
The Advanced Level is geared towards detailed technical discussions on design and installation procedures. Training is again offered by self-administrated PPT modules but under the supervision of a mentor.

Master Level
The Master Level is designed for project and sales management personnel and is presented by on-line self-paced university BSc courses.

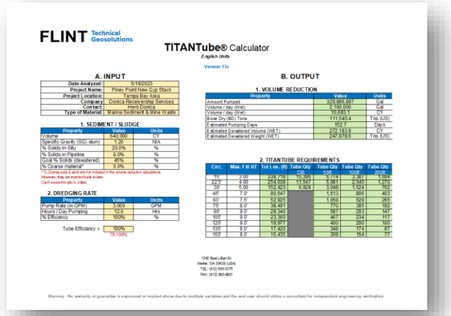
Professional Level
This level was developed for design team leaders and utilizes university certification programs.

TEAM Titan
TITANTube Technology

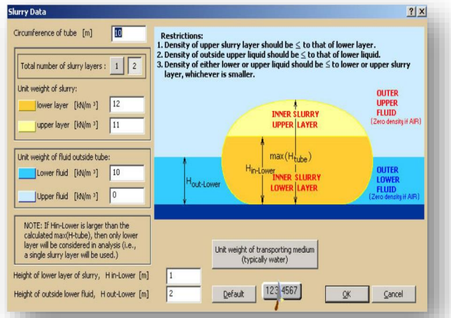
Software Utilized



Softtwin



Calculator



GeoCops

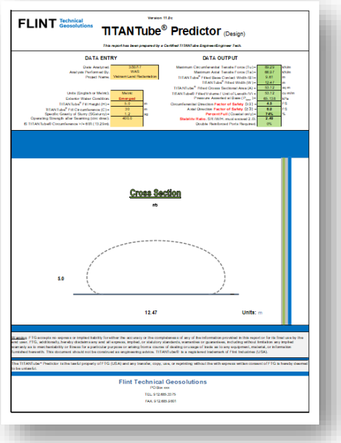
INPUT

These software programs are all interactive and are utilized for the design of geosynthetic tubes. For any given problem, the geometry of the tube, the circumferential and longitudinal required strength of the encapsulating geosynthetic as well as the quantity required and the volume dewatered are produced.

OUTPUT

The computations account for reduction factors related to seam strength, durability, creep and installation damage. Results are obtained by solving a differential equation subjected to design constraints. The user, however, is not directly involved with the calculations thus no knowledge of differential calculus is required.

These programs can also provide the approximate consolidated shape of the tube. This is often important for assessing storage capacity or for construction of structures such as levees or breakwaters. The current versions have been further fine tuned from their original versions



Predictor

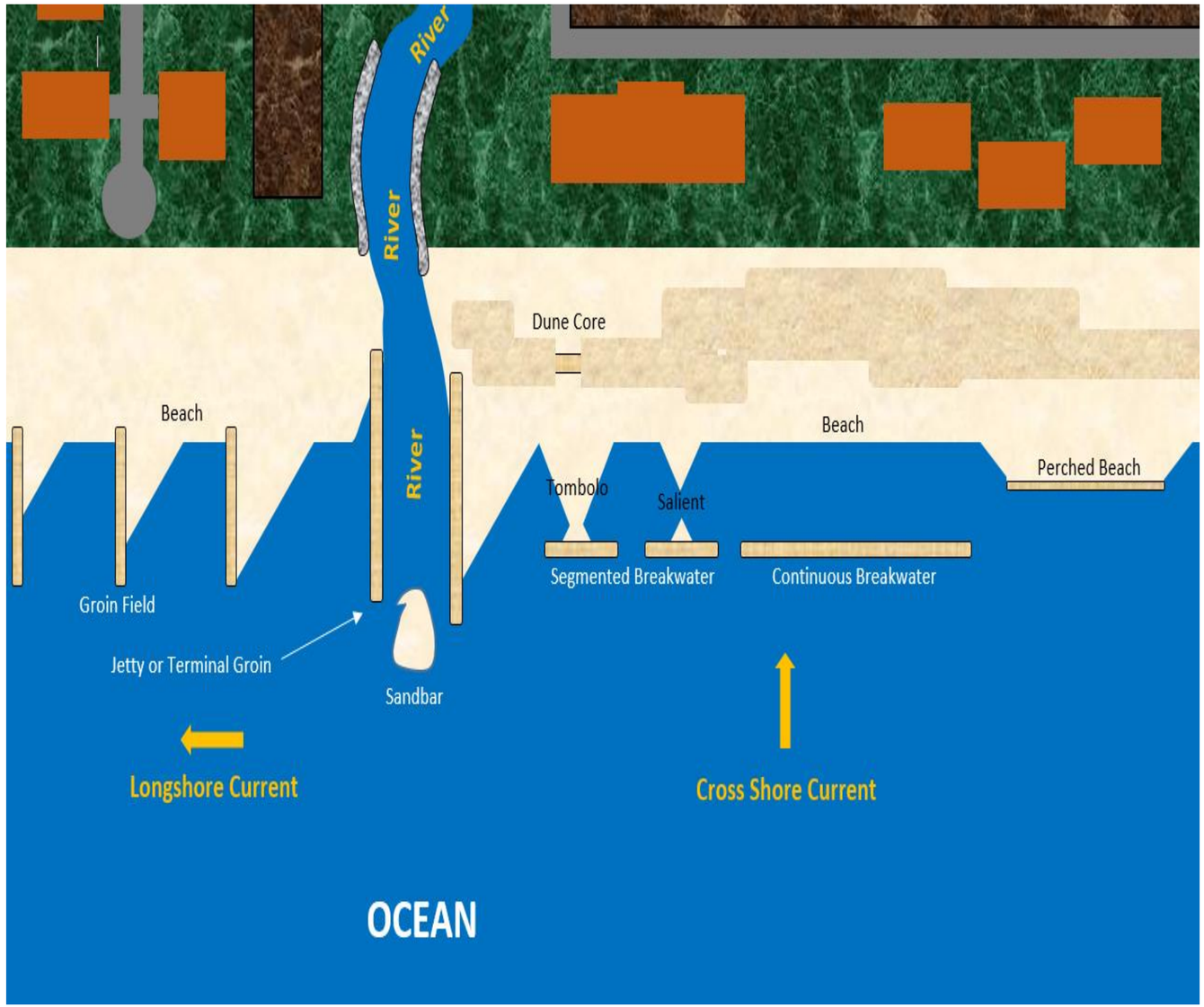
TEAM Titan
TITANTube Technology

DESIGN QUESTIONS:

Hard vs Soft Structures

- Proposed use of adjacent property
- Amount of area available
- Design life of project
- Prorated maintenance cost
- Ramifications downdrift (sand transfer)
- Affect on plant & fish life

TEAM Titan



Hard Structures

CURRENTS & STRUCTURES

LONGSHORE CURRENT (Shore Perpendicular Structures)

- Groins (Groynes)
- Jetties (Terminal Groin)

CROSS SHORE CURRENT (Shore Parallel Structures)

- Breakwaters (Segmented & Continuous)
- Artificial Harbors
- Revetments
- Seawalls
- Dune Cores
- Perched Beaches
- Land & Marsh Creation

Structural Design Criteria for Coastal Structures

The design of coastal structures, such as seawalls, breakwaters, and groins, requires careful consideration of the specific coastal environment, wave conditions, sediment transport, and other factors. Here are some of the common structural design criteria for coastal structures:

1. Design Wave Conditions: The design of coastal structures begins with an assessment of the wave conditions, including wave height, period, direction, and storm surge levels to determine the design wave loadings that the structure will need to withstand.

2. Design Water Levels: The design water levels account for the mean sea level, tidal variations, storm surge, and wave run-up that the structure will need to be designed to resist.

3. Structural Stability: Coastal structures must be designed to resist wave forces, wave-induced currents, and water pressure.

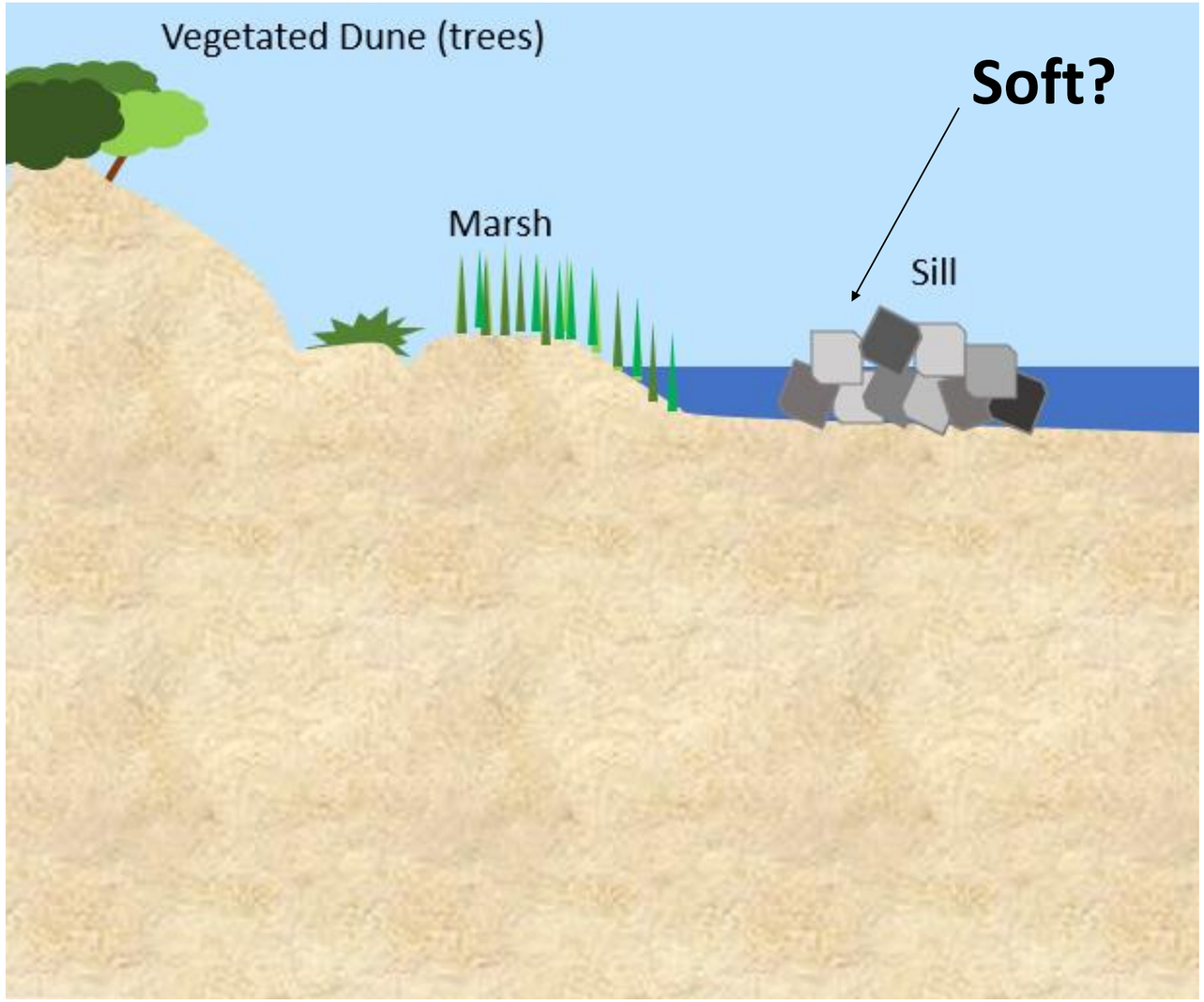
4. Structural Materials: The selection of appropriate materials for coastal structures is crucial. The materials must be resistant to corrosion from saltwater exposure and durable in the harsh coastal environment.

5. Foundation Design: The design of the foundation depends on the soil conditions at the site and ensures that the structure is adequately supported and stable.

6. Climate Change Considerations: Coastal structures are now designed with consideration for future sea-level rise, changes in storm patterns, and coastal erosion.

7. Sediment Transport:
Coastal structures can affect sediment transport patterns along the coastline and the design must consider the potential impacts on sediment movement and beach erosion or accretion.

8. Environmental Considerations:
Coastal structures should be designed to include preserving natural habitats, minimizing disruption to marine life, and incorporating features that enhance ecological functions.



Soft Structures

Living Shorelines

ARTIFICIAL

- Beach Nourishment (dredging)
- Reef Enhancement
- Dune Creation (sand)

VEGETATED

- Mangrove Planting
- Afforestation of Dunes (tree planting)
- Dune Planting (grasses)

OTHER

- Managed Retreat

Advantages and Disadvantages of Soft Shoreline Stabilization

Alternative soft stabilization approaches referred to as living shorelines, because they offer added ecological benefits. Some of the non-exclusive benefits of soft stabilization approaches include:

- Maintaining natural shoreline dynamics and healthy sand movement across a coastal cell
- Trapping sand to rebuild eroded shorelines or maintain current shoreline form
- Providing or enhancing important shoreline habitat
- Reducing wave energy impacts at or seaward of the shoreline
- Absorbing storm surge and flood waters
- Filtering nutrients and other pollutants from the water
- Reducing the initial costs of stabilization from bulkheads, rip rap, and other hard structural approaches

While there are many benefits associated with living shorelines, they are not appropriate for all geomorphic environments. Drawbacks for living shorelines include:

- Not being appropriate for high energy environments
- Not being as effective where much of the shoreline is already hardened
- Being more difficult to design and install than more traditional hard structural approaches
- Usually requires more area to function properly
- Having limited information available on the effectiveness of living shorelines for different types of shorelines, energy regimes, and storm conditions

Deciding: Hard vs Soft Structures

Cost versus Effectiveness

Living shorelines include salt marshes, mangroves, oyster reefs, and seagrasses that prevents erosion and stabilizes the shoreline. One way to assess the ecosystem service value from shoreline stabilization that a living shoreline offers is to calculate what it would cost to get that stabilization from constructing a hardened structure like a bulkhead, sill, or seawall. Depending on specific design and local costs, living shorelines (soft structures) can be less or more expensive to install than hardened structures.

Shoreline Structure	Cost (per linear meter)
Bulkhead	$462–$6,002
Groin or Jetties	$1,300–$49,639
Living Shorelines	$228–$6,205

Comparison: Soft vs Hard Structures

BENEFITS	SOFT STRUCTURES	HARD STRUCTURES
Reduce shoreline erosion	10	10
Deflect or absorb wave energy	6	9
Minimal maintenance	NA	NA
Reduce Storm Surge	7	9
Adapt to Sea Level Rise	7	6
Increase Recreational Opportunities	4	8
Potential for beach creation	7	10
Improve water quality	8	5
Create habitat	8	8
Enhance property aesthetics	6	9
TOTAL SCORE	**63**	**74**

TEAM Titan

FLINT Technical Geosolutions

Version 11.0c

TITANTube® Predictor (Design)

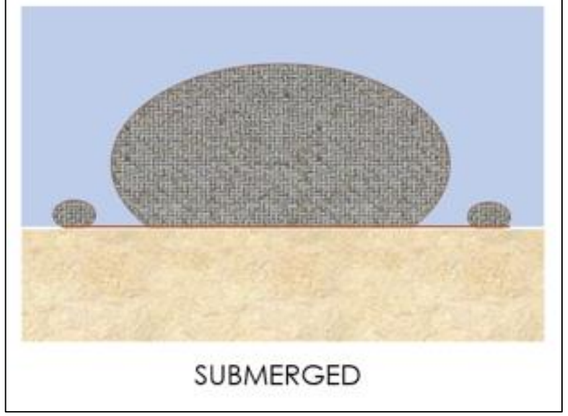
This report has been prepared by a TITANTube Certified Engineer Tech.

DATA ENTRY

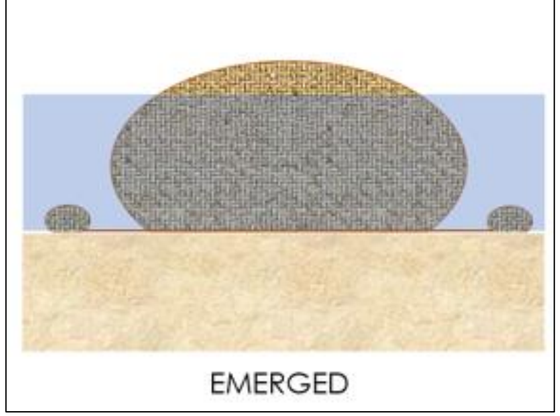
Date Analyzed:		
Analysis Performed By:	WAS	
Project Name:		
Units (English or Metric):	English	
Exterior Water Condition:	**Emerged**	
TITANTube® Fill Height (H) =	9.0	ft
TITANTube® Fill Circumference (C) =	90	ft
Specific Gravity of Slurry (SGslurry) =	1.2	sg
Operating Strength after Seaming (circ direc):	435.0	
IS TITANTube® Circumference >/= 60ft (13.29m):	Yes	

DATA OUTPUT

Maximum Circumferential Tensile Force (Tu) =	128.38	lb/in.
Maximum Axial Tensile Force (Ta) =	96.29	lb/in.
TITANTube® Filled Base Contact Width (B) =	36.11	ft
TITANTube® Filled Width (W) =	40.74	ft
TITANTube® Filled Crosss Sectional Area (A) =	326.28	sq ft
TITANTube® Filled Volume / Unit of Length (V) =	12.08	cu yd/ft
Pressure Asserted at Base (P_{base}) =	4.717	psi
Circumferential Direction **Factor of Safety** (≥ 3) =	**3.4**	FS
Axial Direction **Factor of Safety** (≥ 3) =	**4.5**	FS
Percent Full (Coastal only) =	**51%**	%
Stability Ratio, SR (W/H, must exceed 2.0):	**4.53**	
Double Reinforced Ports Required:	Yes	



SUBMERGED



EMERGED

Designing to work with Nature!

Woven Fabric

Woven

Composite

Polyurea

Light Armor w/Shroud

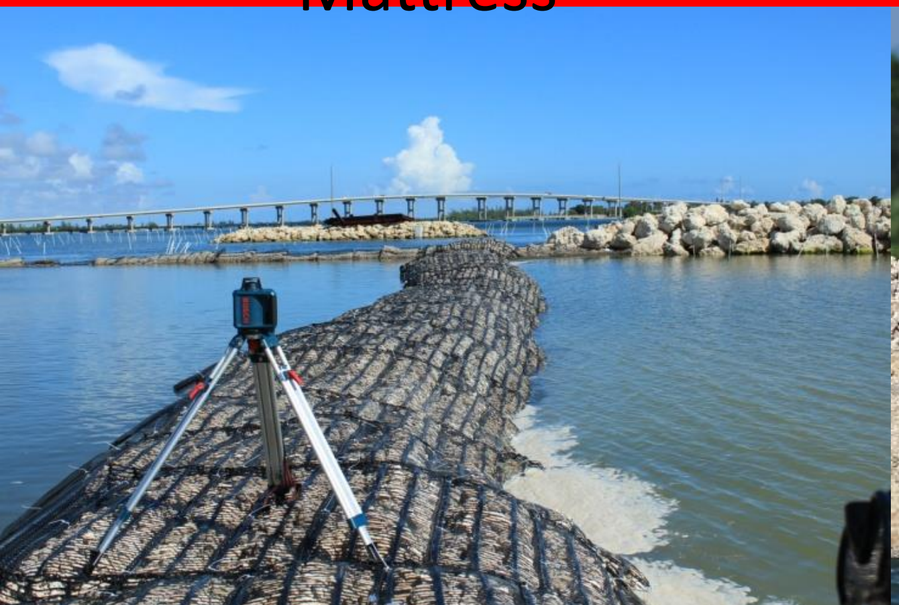
Medium Armor

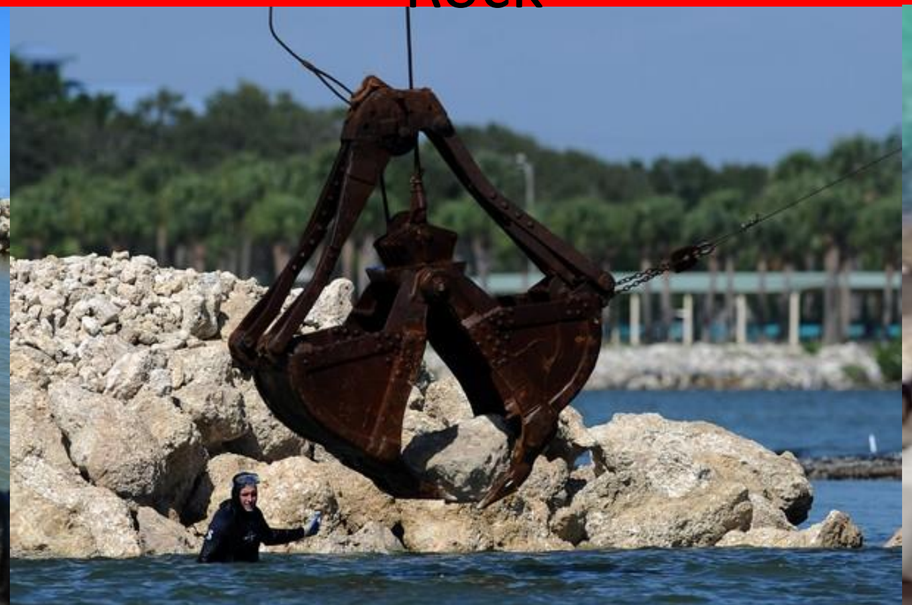
Heavy Armor

Mattress

Rock

Tetrapod





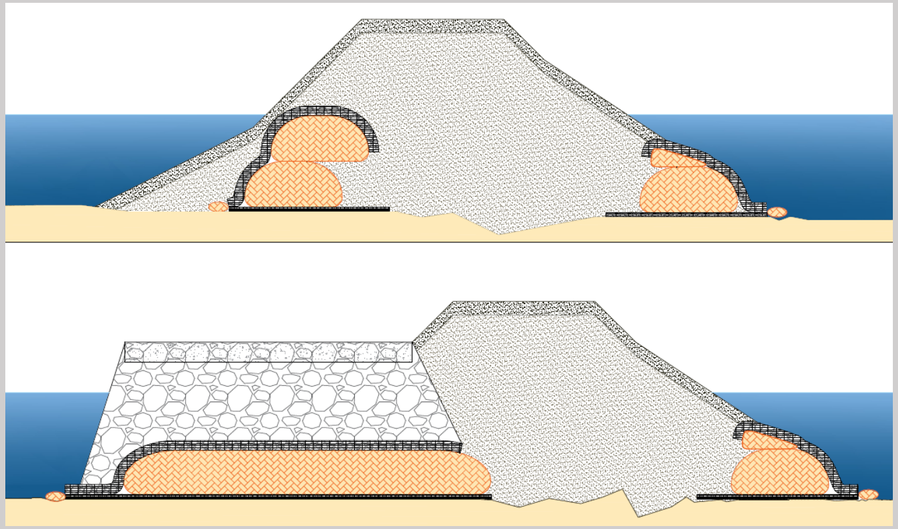
Flint Technical Geosolutions

International Awards

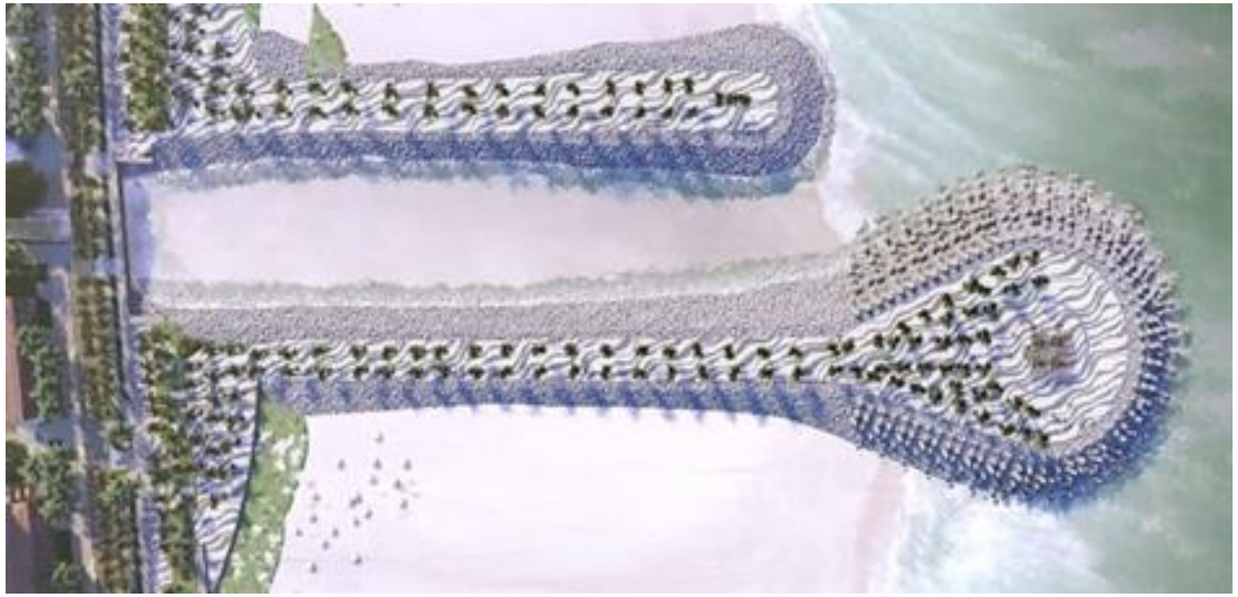
The International Achievement Awards (IAA) are an annual competition with a goal to promote awareness of the specialty fabrics used in thousands of products and applications ranging in size and shape. For more than 70 years, the awards have recognized innovation, technical skill and design excellence. Entries are judged by industry experts, editors, architects, educators and design professionals who were selected for their knowledge in particular field of study or product area.

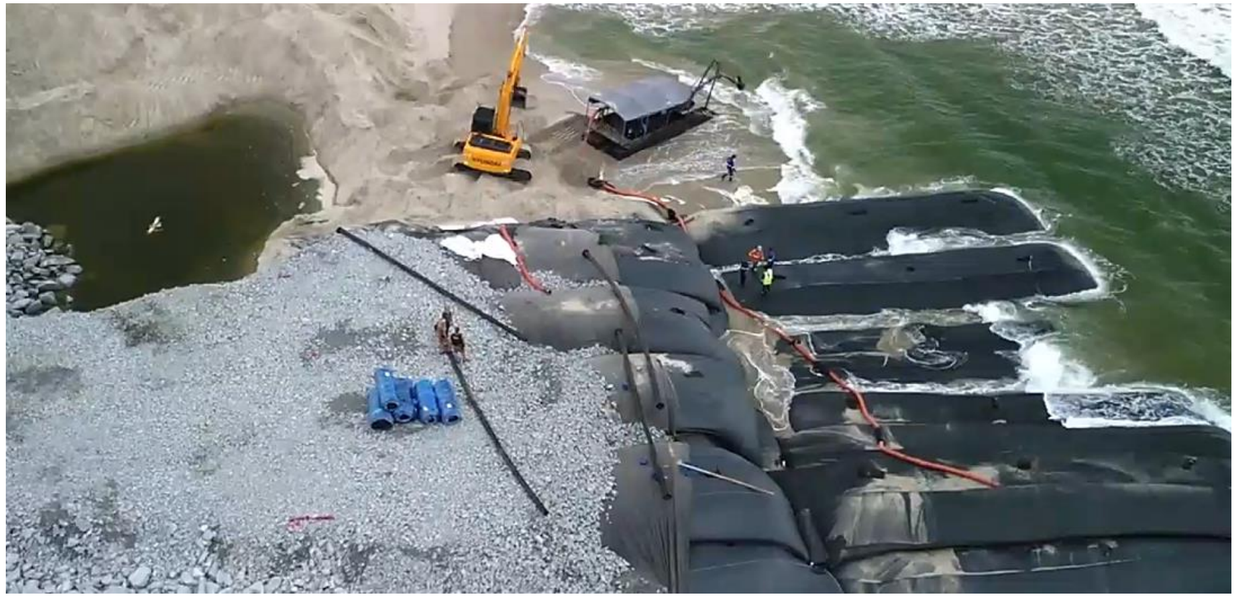
2017 – **IFAI Award of Excellence** (Ocean Isle Revetment - Coastal)
2017 – **IFAI Achievement Award** (Washington DC – Dewatering)
2016 – COPRI Project Excellence Award (Ft Pierce – Coastal)
2015 – Best Project – Water/Environment (Morrow Lake – Dewatering)
2015 – Safety Award/Dredging (Morrow Lake – Dewatering)
2014 – Certificate of Recognition (Deer Island – Coastal)
2014 – Safety Award/Dredging (Enbridge – Dewatering)
2014 – **IFAI Award of Excellence** (Ft Pierce – Coastal)
2013 – Environmental Excellence Award (Deer Island – Coastal)
2012 – **IFAI Award of Excellence** (West Ship Island – Coastal)
2012 - Award Of Excellence & Keystone Award for Overall Best Project (Assiniboine River – Civil)
2011 – COPRI (Small) Project Excellence Award (Eustatia Island – Coastal)
2007 – **IFAI Achievement Award** (Coronet Sludge Cap – Environmental)

Ft Pierce, FL (USA) – Artificial Island Breakwater

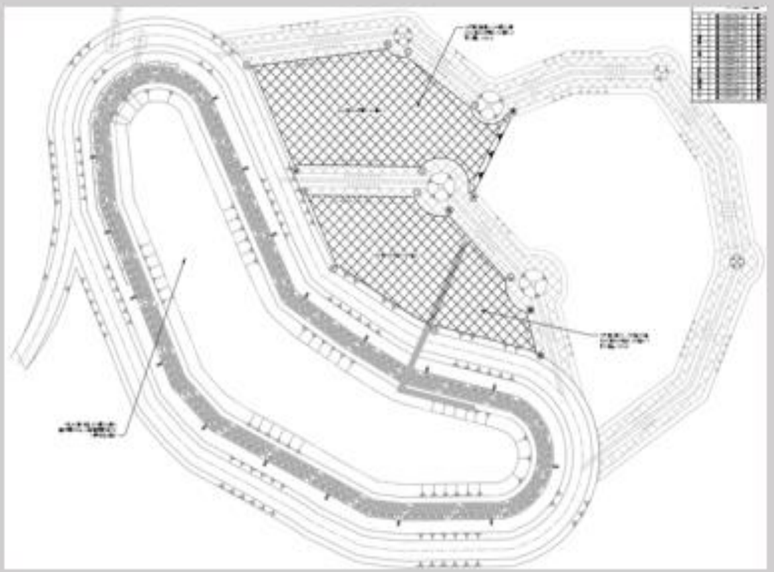


Matinhos, Parana (Brasil) – Groins & Jetties

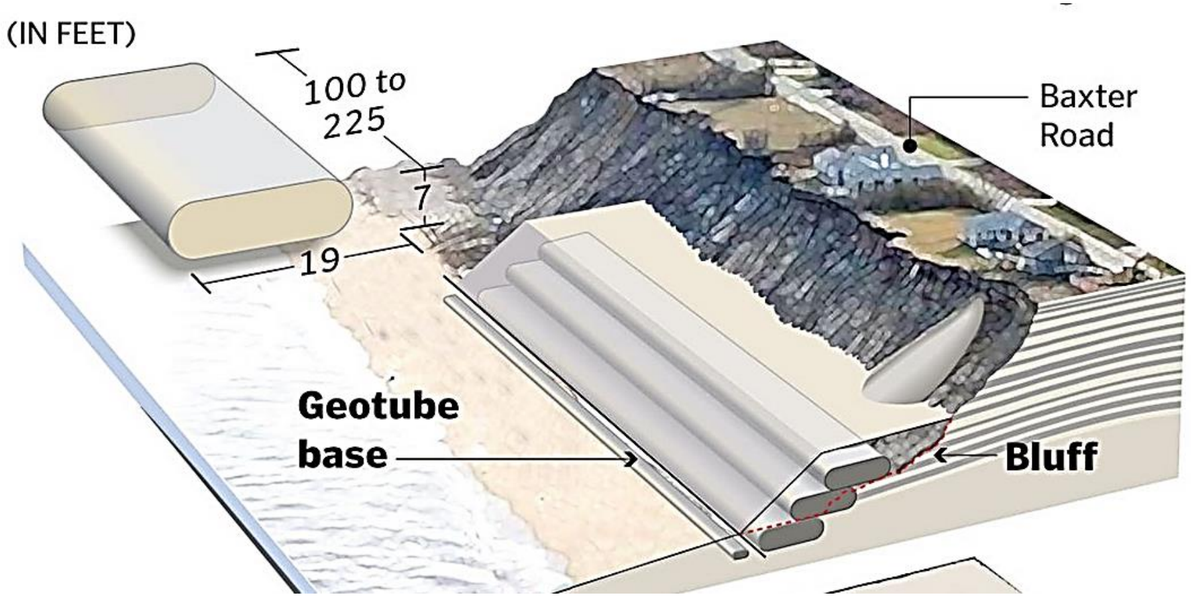




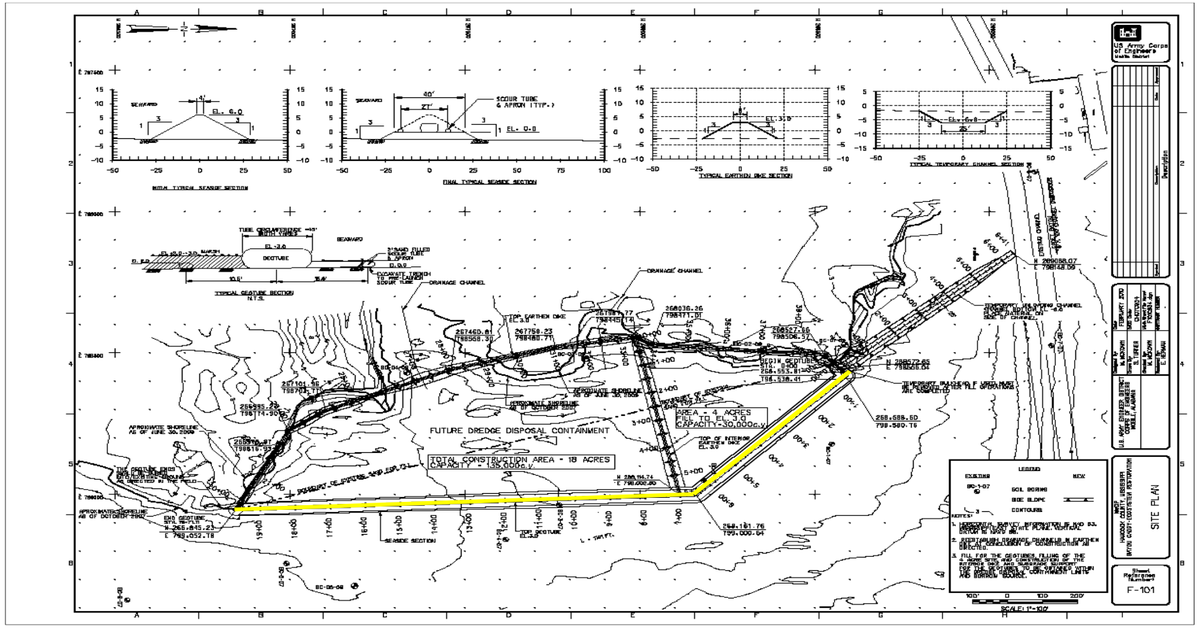
Nantucket, MA (USA) – Revetment/Toe Protection



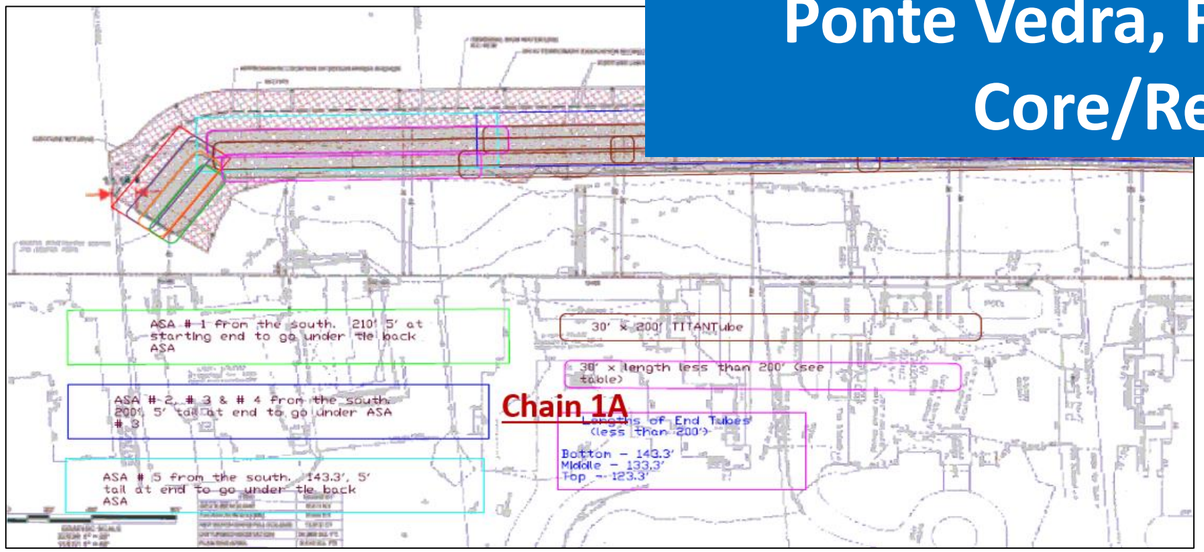
Nantucket, MA (USA) – Revetment/Toe Protection

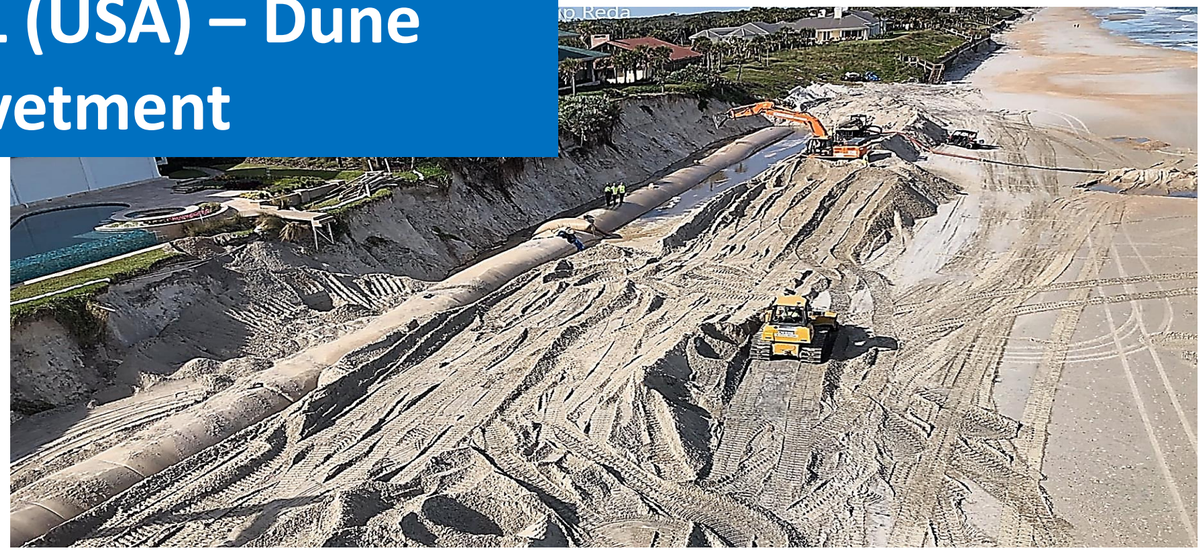


Bayou Caddy, MS (USA) – Marsh Recreation



Ponte Vedra, FL (USA) – Dune Core/Revetment



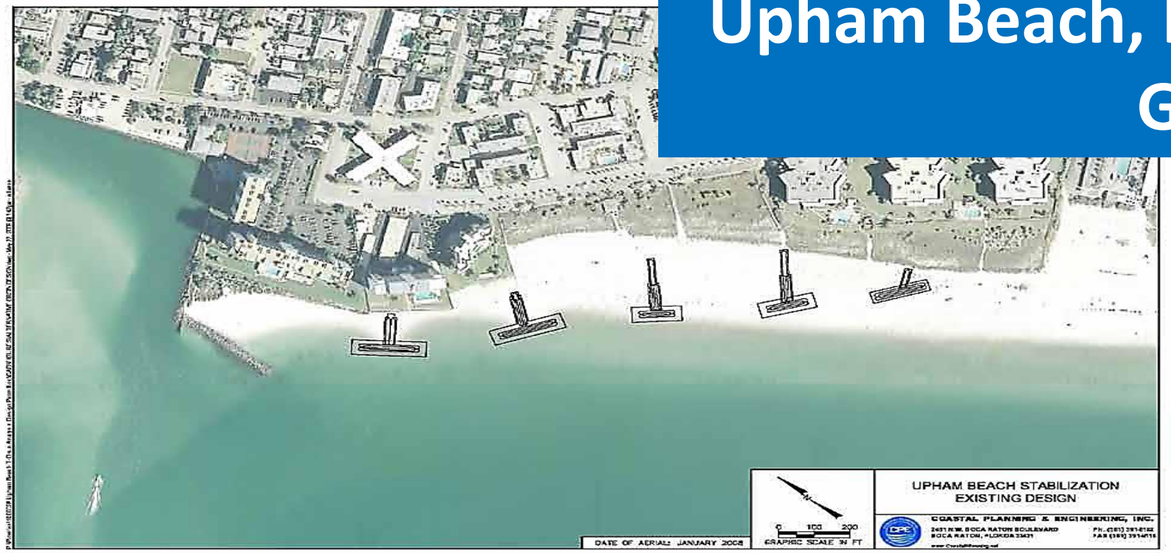


Mackey Island, FL (USA) – Marsh Creation

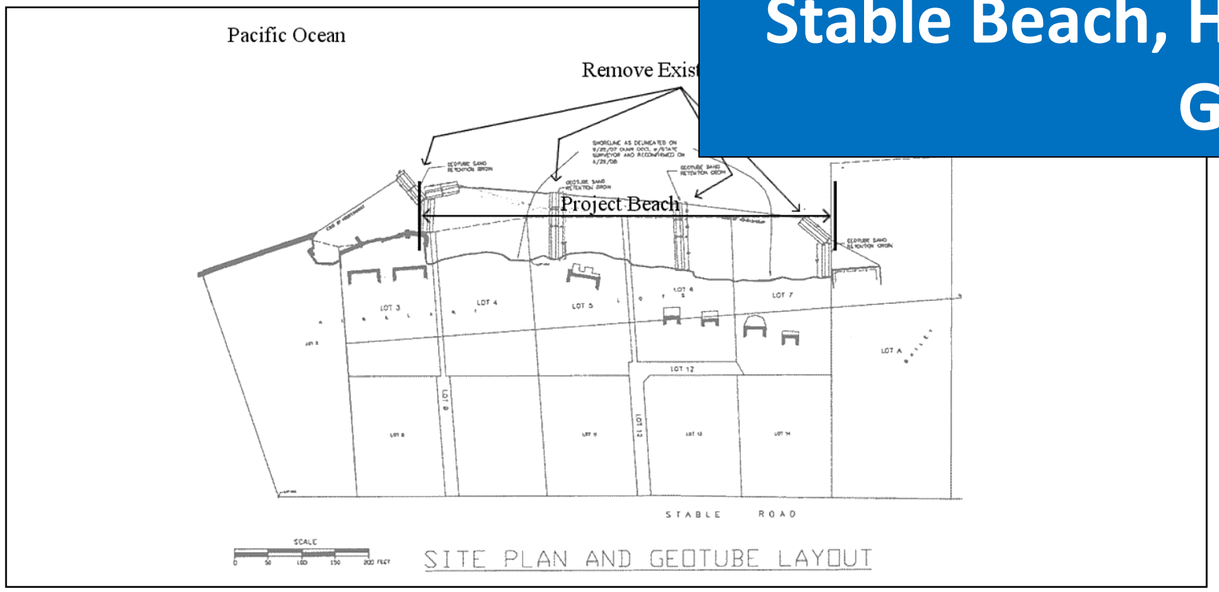
Cedar Cay, FL (USA) – Jetty & Marsh Creation

Lake Manitoba, MB (CAN) – Emergency Dikes

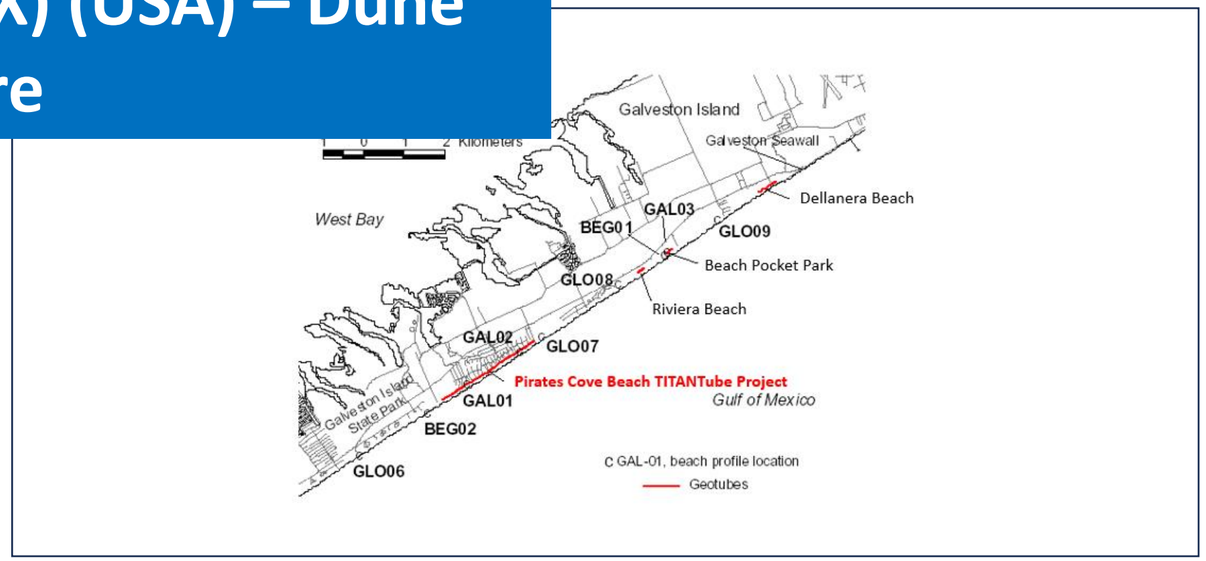
Upham Beach, FL (USA) – “T-Head” Groins



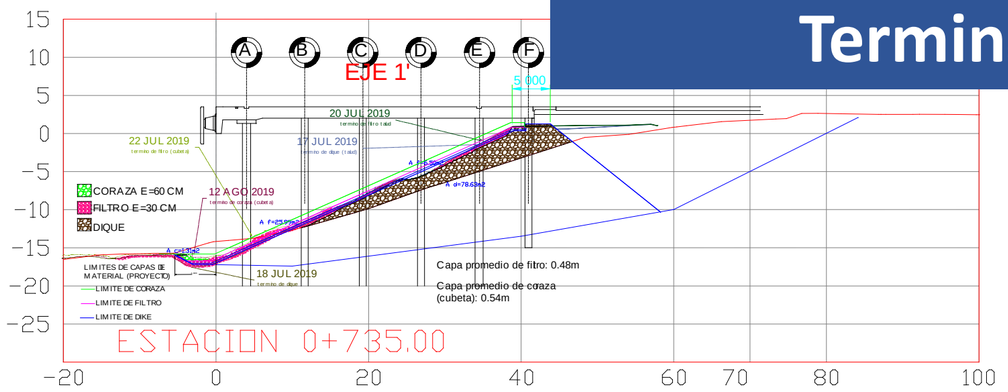
Stable Beach, HI (USA) – “T-Head” Groins

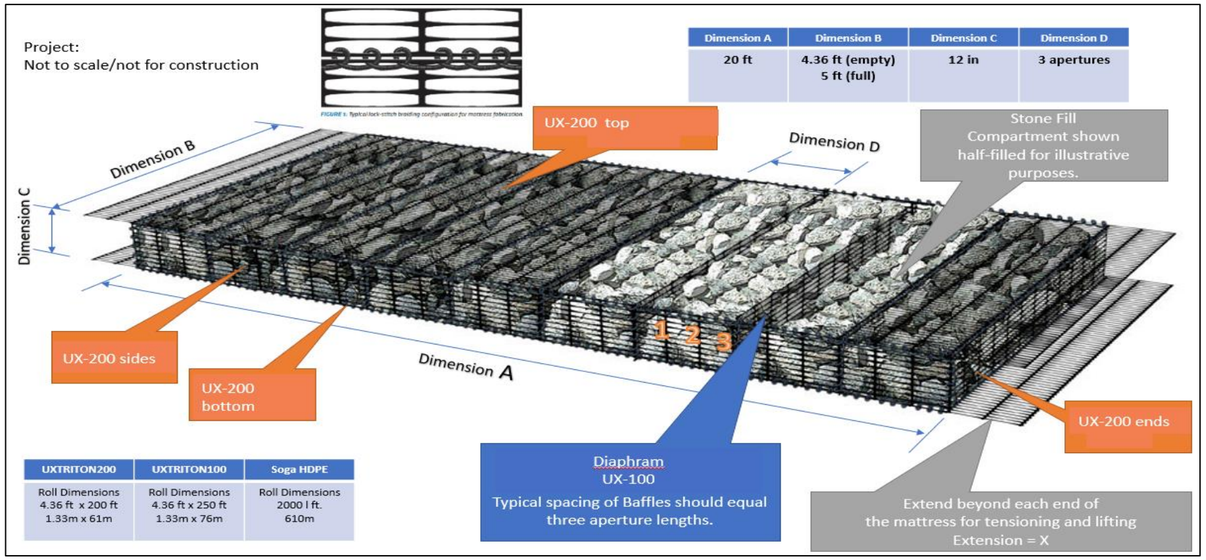


Bermuda HOA (TX) (USA) – Dune Core

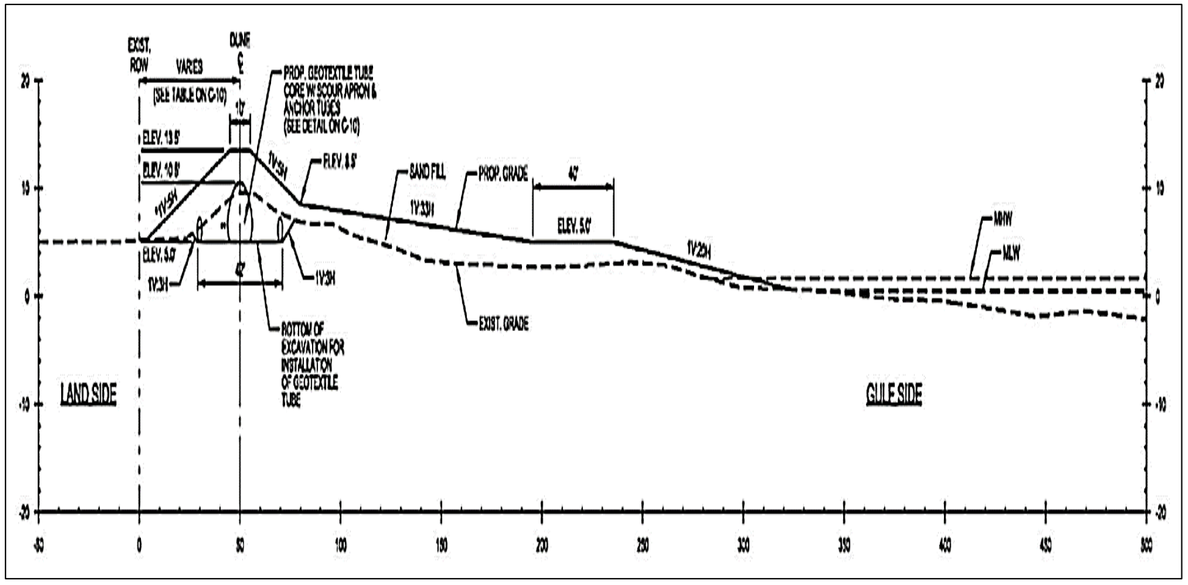


Manzanilla, Colima (MEX) – Port Terminal Scour Repair





Grand Isle, LA (USA) – Dune Core



FLINT
Technical Geosolutions

TEAM Titan

TITANTube Technology!

Thank You / Dankie / Gracias

Wm Smallwood, MSc Civil Eng, Cert. Coastal Eng
President – FTG

1040 East Lillian Street
Metter, Georgia 30439
Tel: 912-685-3375 (office)
Email: Jkucera@flintusa.net

Organised By: ***Co-Hosted By:***

COASTAL RESILIENCE: SAFEGUARDING OUR SHORES

Q&A

Organised By:

Co-Hosted By:

UPCOMING EVENTS

2nd Nov	*49th Singapore Water Industry Nite (SWIN)*
9th – 11th Aug	*Nanjing Tech Study Mission 2023 (Business Mission)*
20th – 23rd Sep	*Taiwan International Water Week 2023 - Taipei (SG Pavilion)*
13th – 16th Sep	*Water Indonesia 2023 - Jakarta (SG Pavilion)*
14th – 16th Sep	*CamWater 2023 - Phnom Penh (SG Pavilion)*
11th – 13th Oct	*Vietwater 2023 - Ho Chi Minh City (SG Pavilion)*
6th – 9th Nov	*AquaTech Dutch Mission 2023 - Amsterdam (Business Mission)*
22nd – 24th Nov	*Sustainability Environmental Asia 2023 - KLCC Malaysia (SG Pavilion)*

13 CLIMATE ACTION

Take urgent action to combat climate change and its impacts

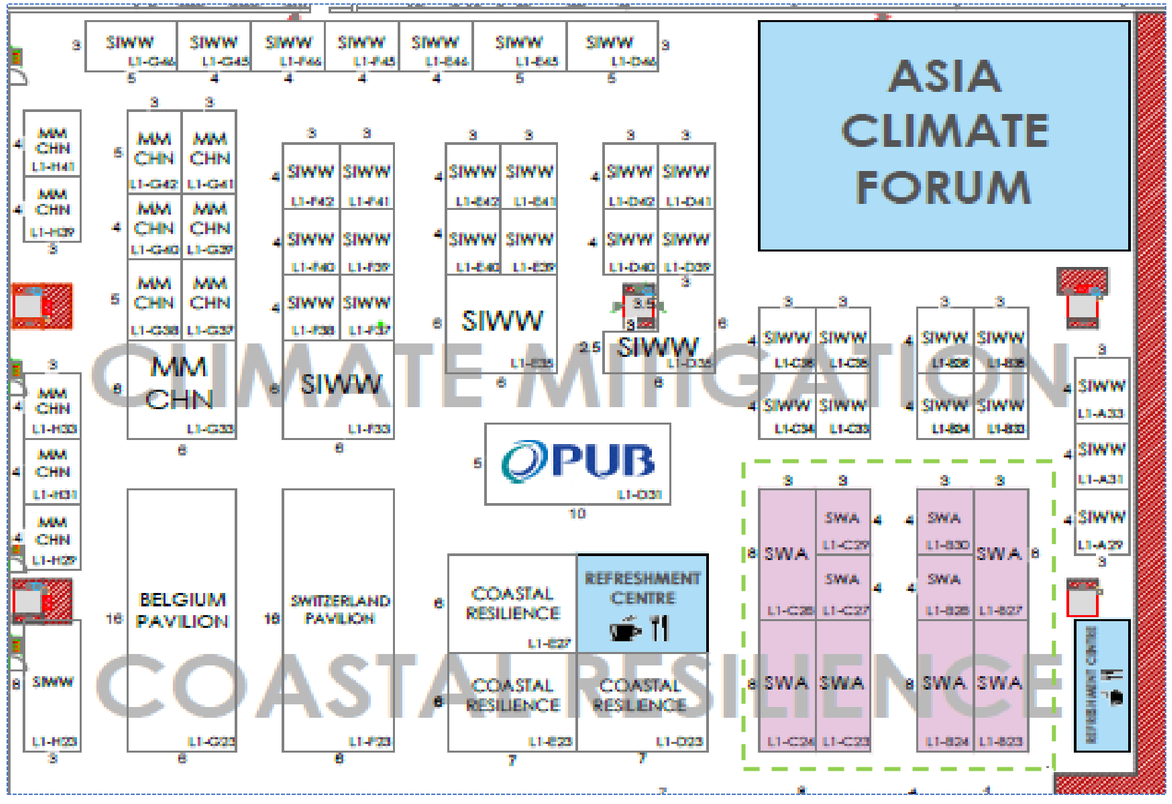
Climate Resilience

Coastal Protection

*The 10th edition of **SIWW2024** will take place @ Sands Expo and Convention Centre, MBS from the 19th to 21st June 2024 (https://www.siww.com.sg/home).*

*Critical to shaping the future of water, **SIWW 2024** will cover all aspects of the urban water cycle reflective of current trends and issues in and around the water sector.*

For more details, contact jasvinder@swa.org.sg



CONTACT US

SCAN ME

+65 6515 0812

enquiry@swa.org.sg

www.swa.org.sg

Singapore Water Association

Organised By: ***Co-Hosted By:***

SWA
SINGAPORE WATER ASSOCIATION

U.S. COMMERCIAL SERVICE
United States of America
Department of Commerce

COASTAL RESILIENCE:
SAFEGUARDING OUR SHORES

THANK YOU