



George B. Burkley

**Understanding the
Advantages of K-Sim
Navigation Versus
Physical Model
Simulation**

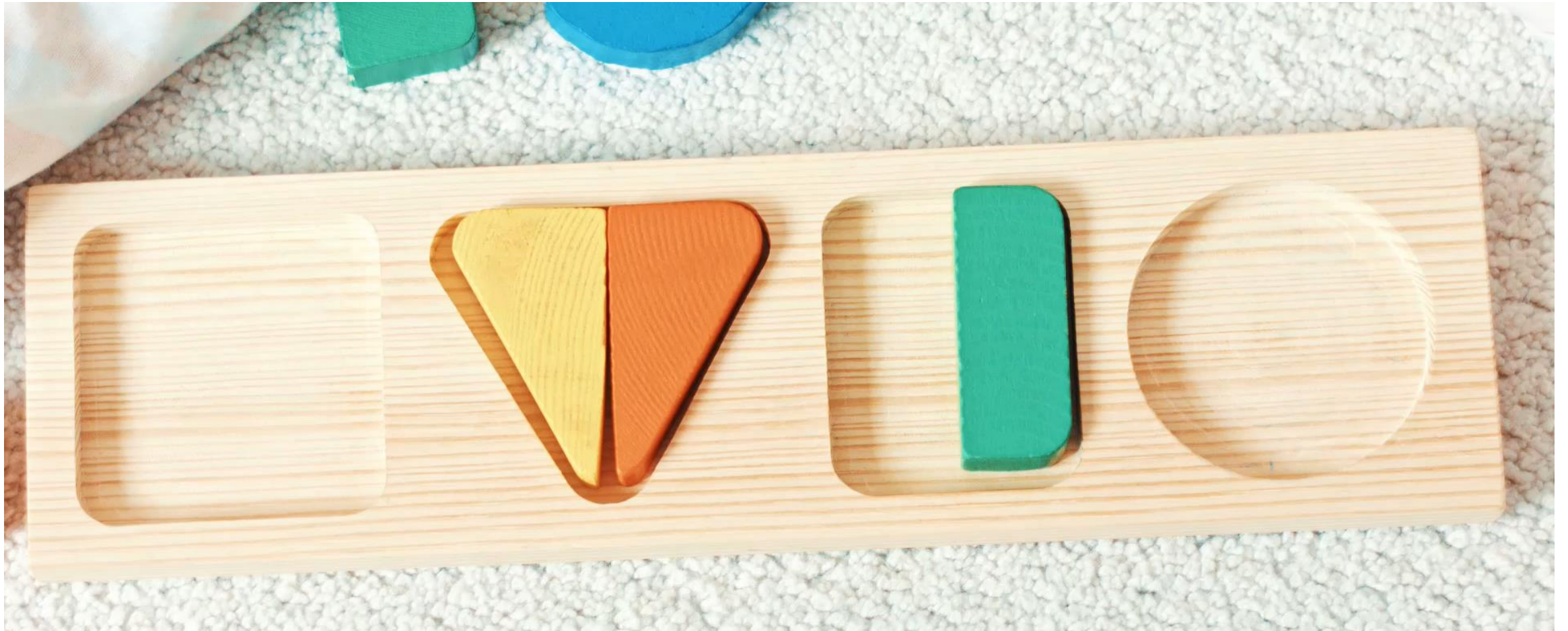
*Case Study:
Galveston Ike Dike*



Simulator v. Manned Model

Evaluating Ultra-Large Containership Operations

Scale Modeling



Customer: Santos Pilots, Brazil
Layout BTP Container Berth
ULCV Research and Training





Bayport Ultra Large Containership Research



Capt. Jonathan Samuel
Houston Pilots



Capt. Philippe Kaufmann, Mid-St. Lawrence Pilots Setting Up Valero Ultramar Scale Model Testing



Ultra Large Containership Research Manned
Models: Barbours Cut, LaPorte, Texas
Report Video

The K-Sim Navigation Simulator



**MARITIME TECHNOLOGY
& TRAINING CENTER**
SAN JACINTO COLLEGE

SJCC Houston Pilots K-Sim Navigation Main Bridge





Tug Bridge

Capt. Mike Curtis, Houston Pilots Suezmax v. Suezmax in the HSC





What do we want to learn?

Which is the best tool?

They both are!

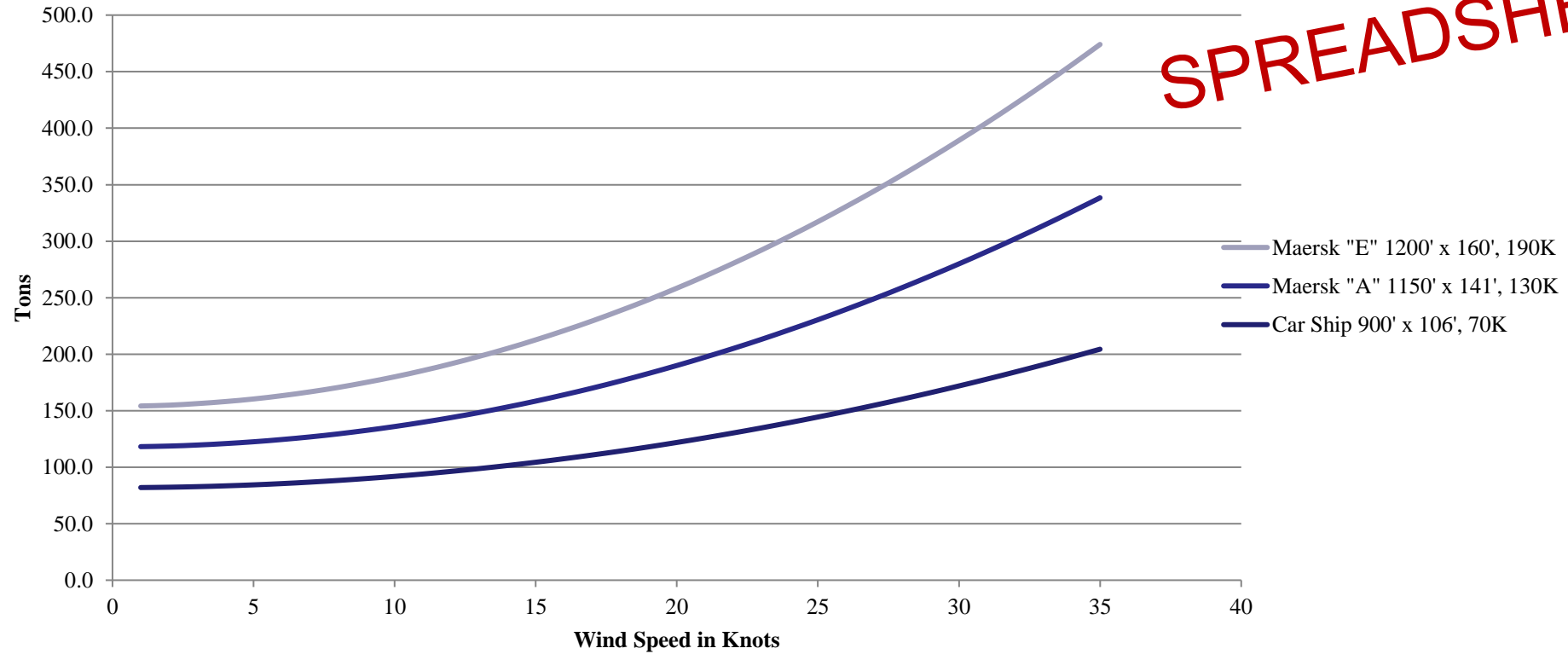
Different tools for different answers



Comparison of Tons of Tug Bollard Force Required Considering Both Bollard Pull Required for Tonnage and for Wind Force

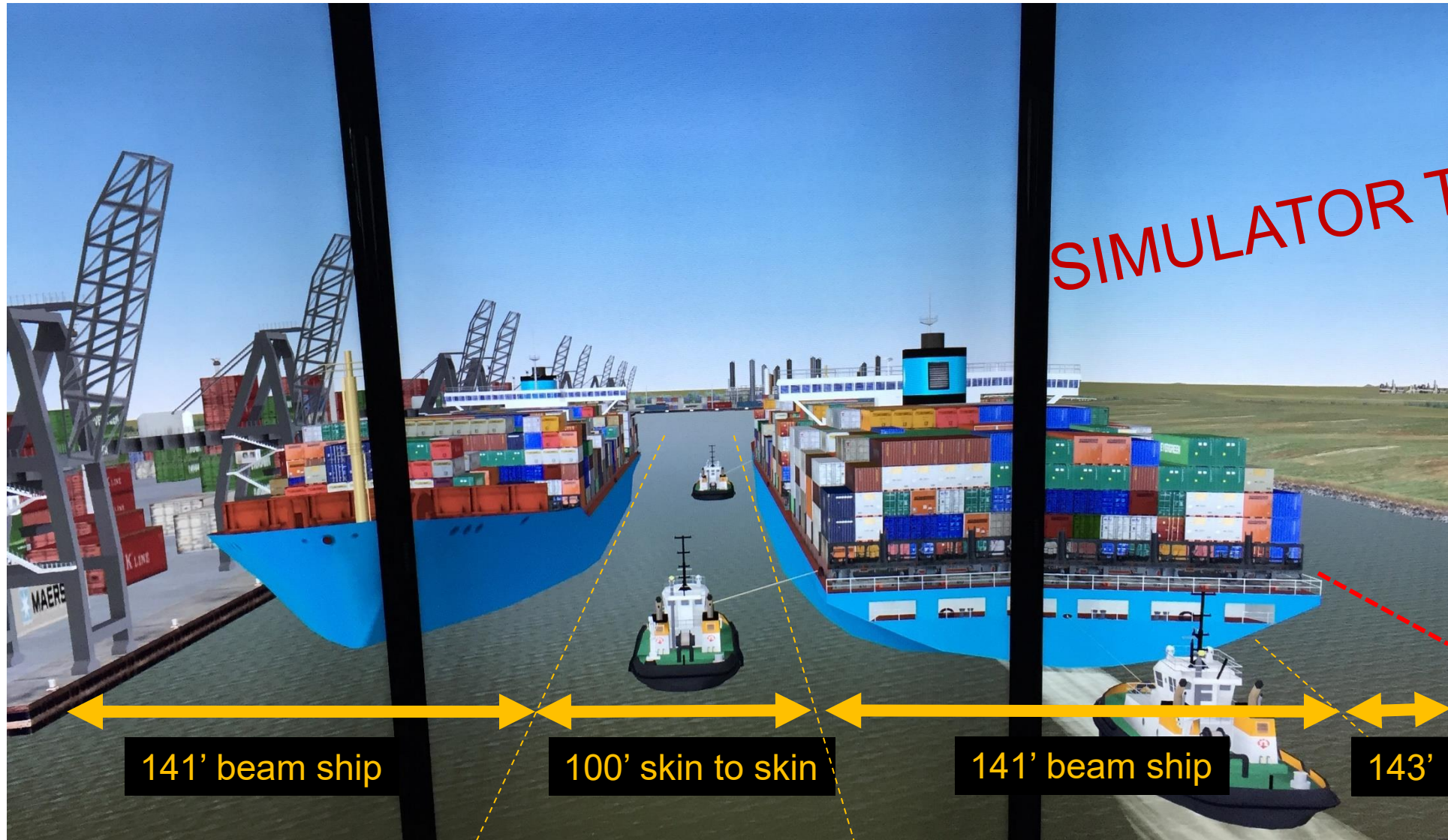


OCIMF Formula $F_w = 0.08 V^2 AL$ kgf and $BF = [(Disp \times 60) / 100,000] + 40$

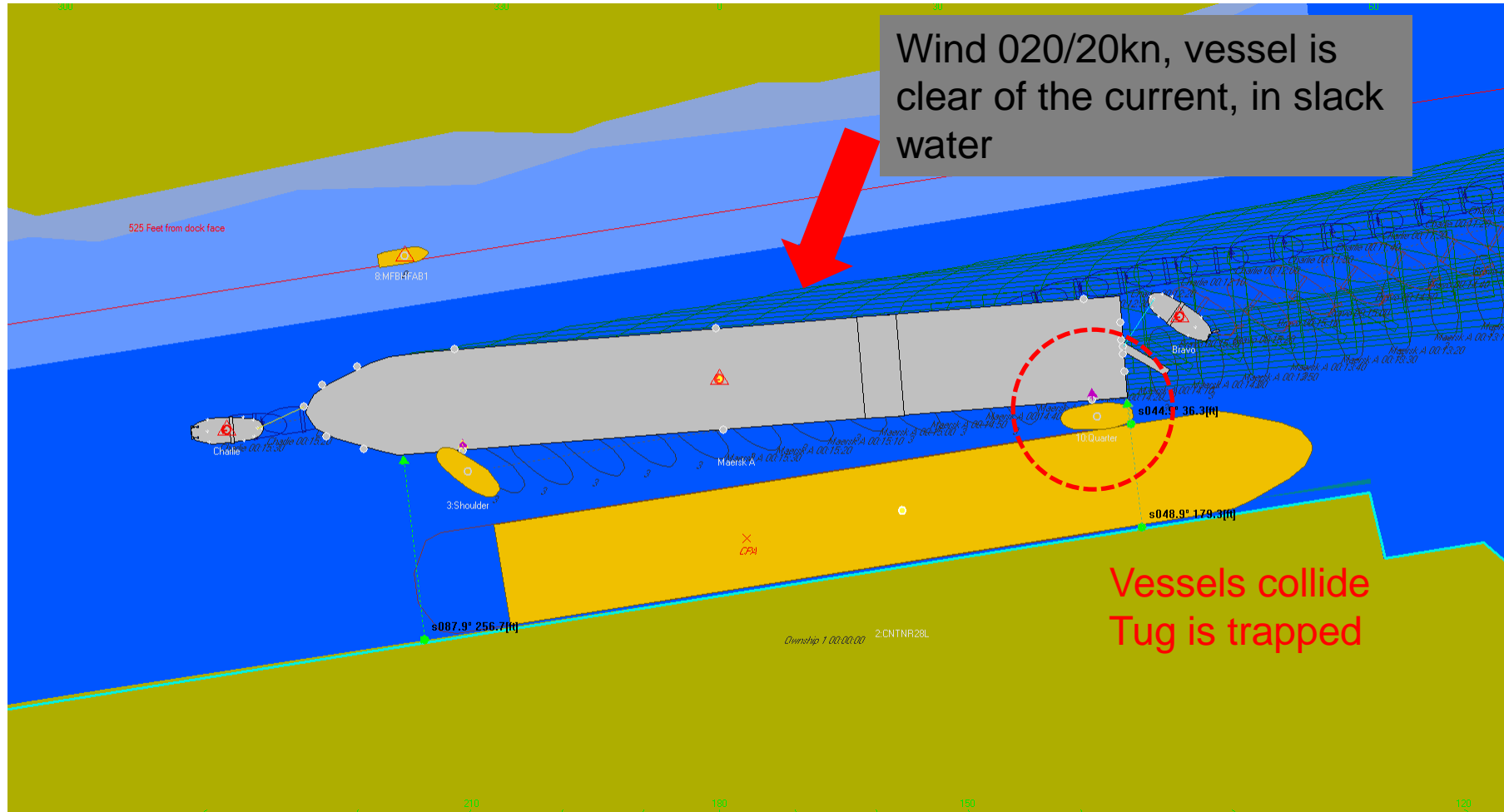


SPREADSHEET TOOL

Evaluating Clearances



Class "A" Passing Class "A" at BC #1: 20KN North Wind, .5 Ebb Current

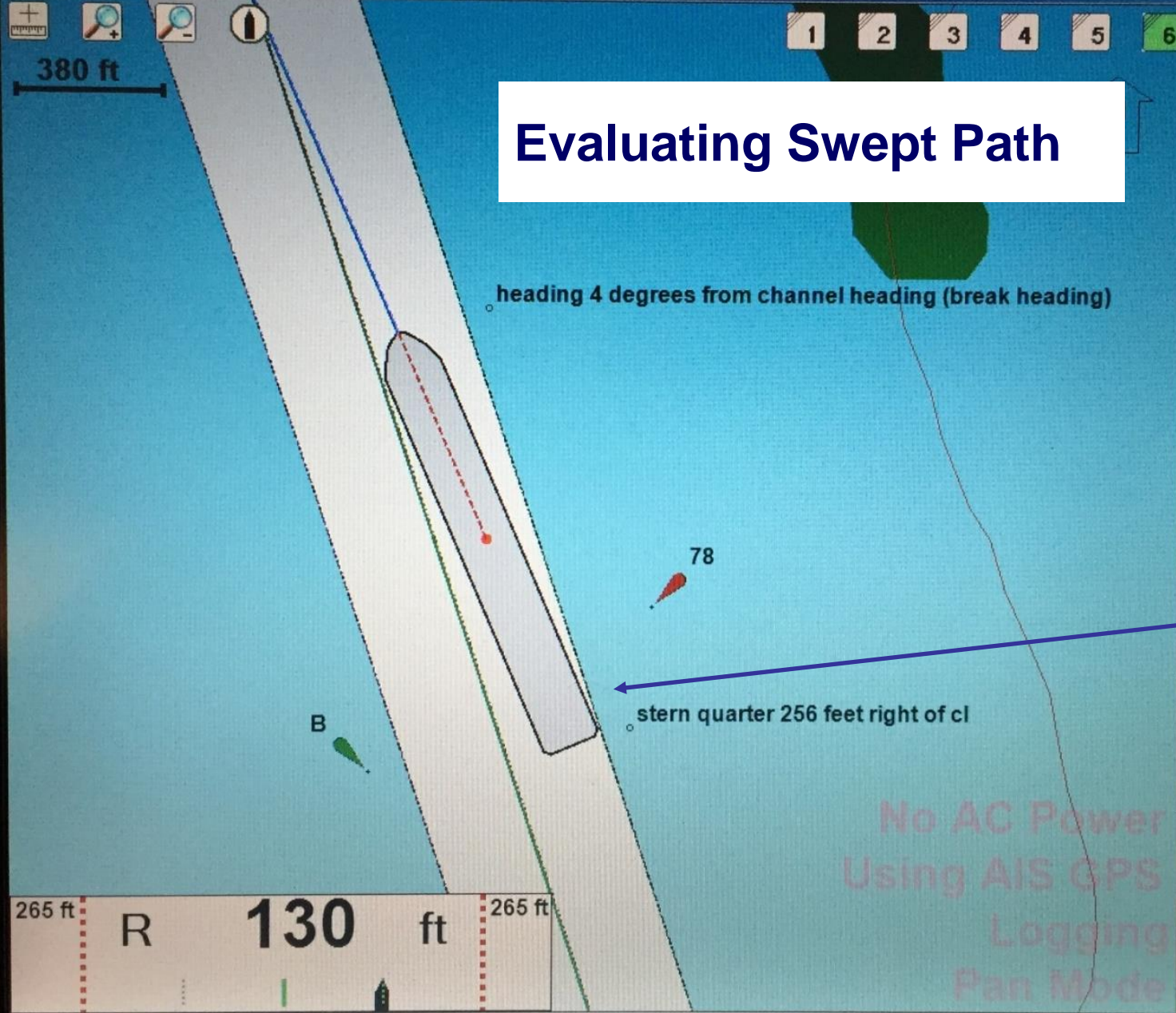


Class "A" Passing Class "A" at BC #1: 20KN North Wind, Ebb Current Resulting in Allision with Berthed Vessel





Evaluating Swept Path



AIS DGPS Accuracy Unknown	
HDG:	337.0°
COG:	337.0°
SOG:	6.0 _{kt}
ROT:	0.0 _{o/min}
NEXT:	Upper Bay
BRG:	341.4°
TTG:	00:38 ₁₂
DIST:	3.82 _{nm}
DEST:	Last Wpt
ETA:	17:55 ₁₅
DIST:	25.09 _{nm}
13:44:21 1/27/2013 Log Ref: 2939	

4-5 degrees of leeway, 264' (80m) swept path



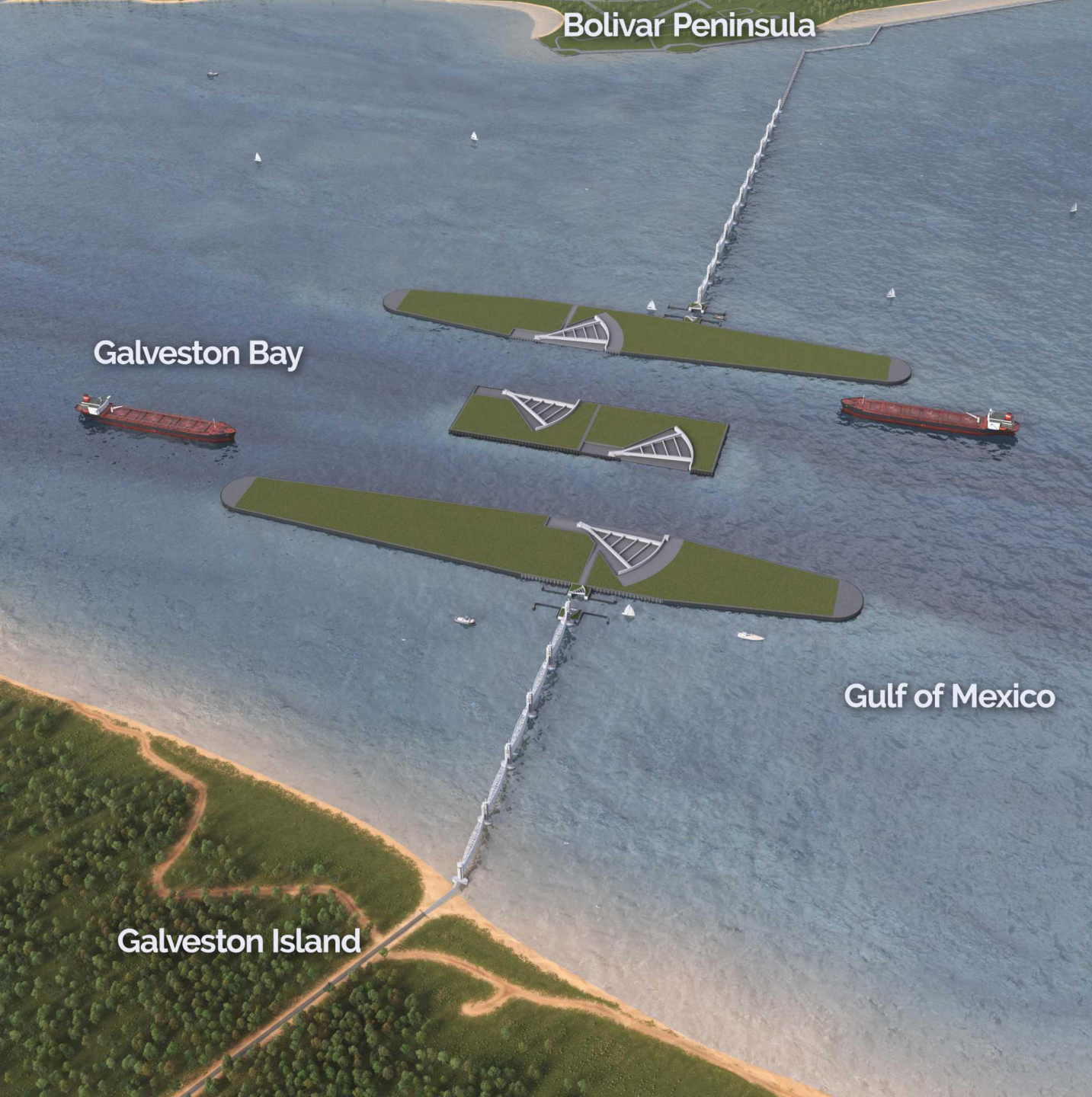
**Let's visit an ongoing
project...**

Use all Tools available!



Galveston Bay Storm Surge Barrier System

IKE DIKE



Proposed and Authorized

\$19,000,000,000 Initial Commitment

Galveston Bay Storm Surge Barrier

AKA the "IKE DIKE"

Part of a 31 Billion Project

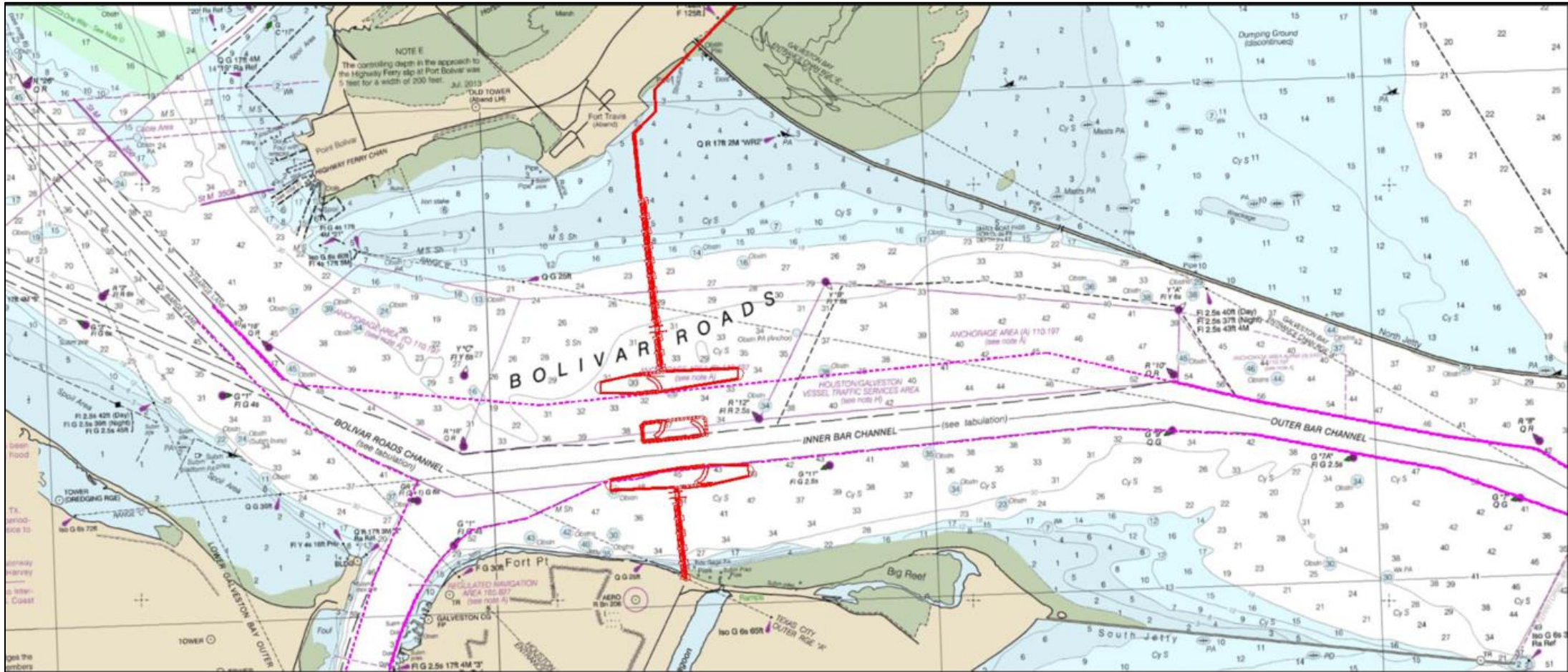
\$31,000,000,000 USD

Two 198m (650') Navigation Gates

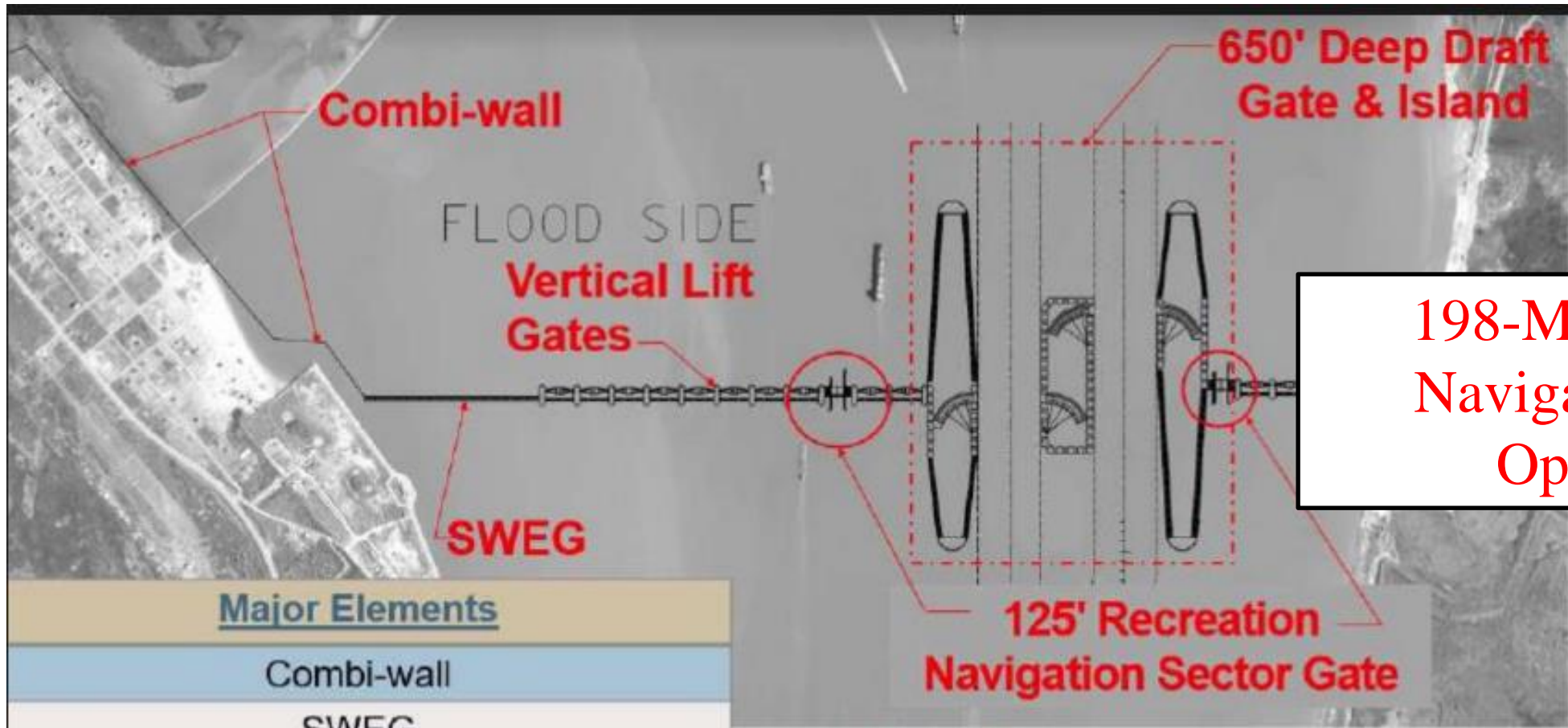
Proposed Navigation Gate Structures



Proposed Navigation Gate Structures



Gate Dimensions

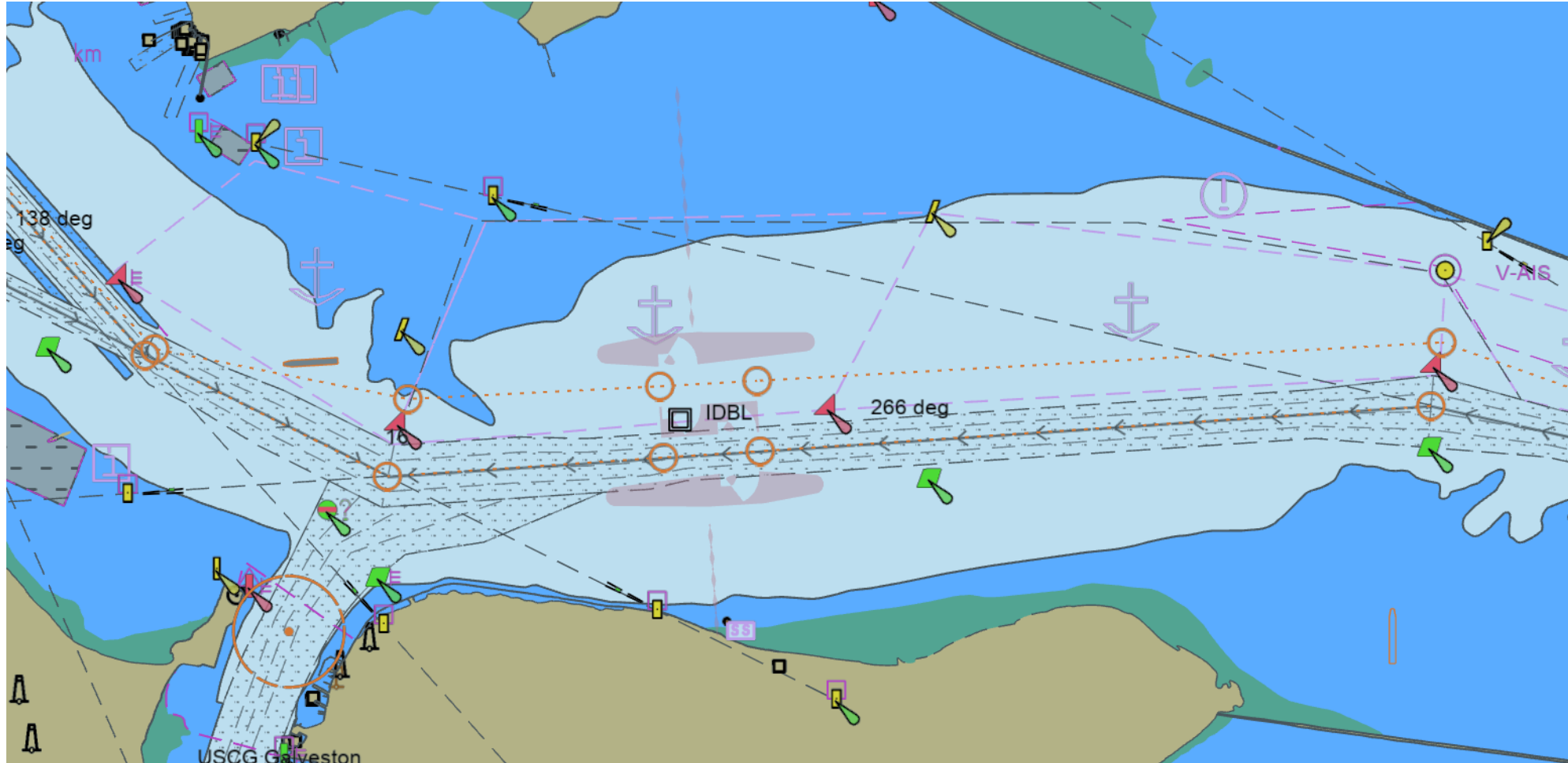


198-Meter-Wide
Navigation Gate
Openings

<u>Major Elements</u>	
Combi-wall	
SWEG	
Vertical Lift Gates	
125' Recreation Navigation Sector Gate	
650' Deep Draft Gate & Island	

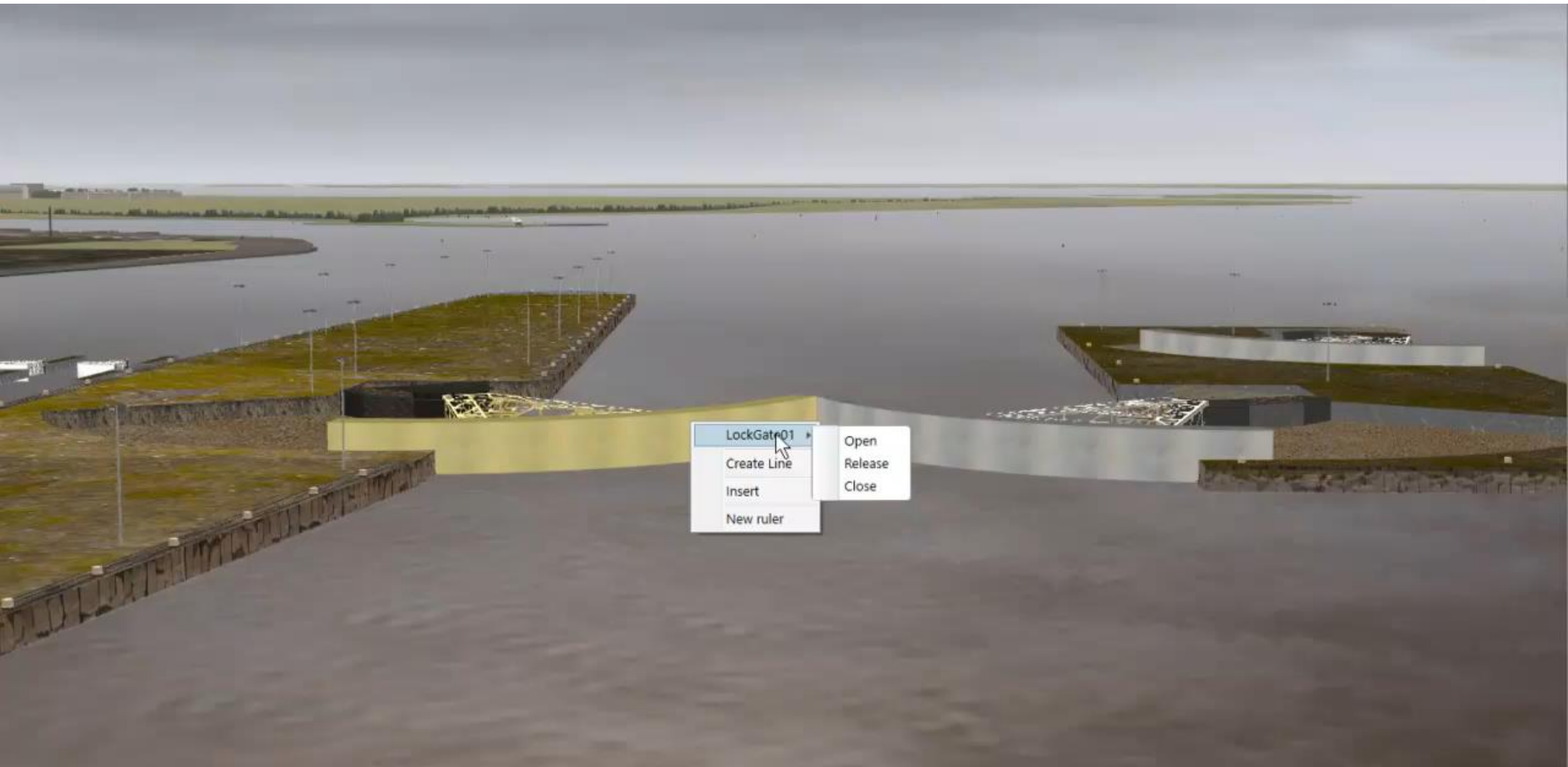
0.00 ft	0.00 ft
2.00 ft	
18.00 ft	16.00 ft
20.50 ft	2.50 ft
36.50 ft	16.00 ft

Example: ESRI Shapefile of Gate System on Pilot's ENC Chart (SEAiq System)

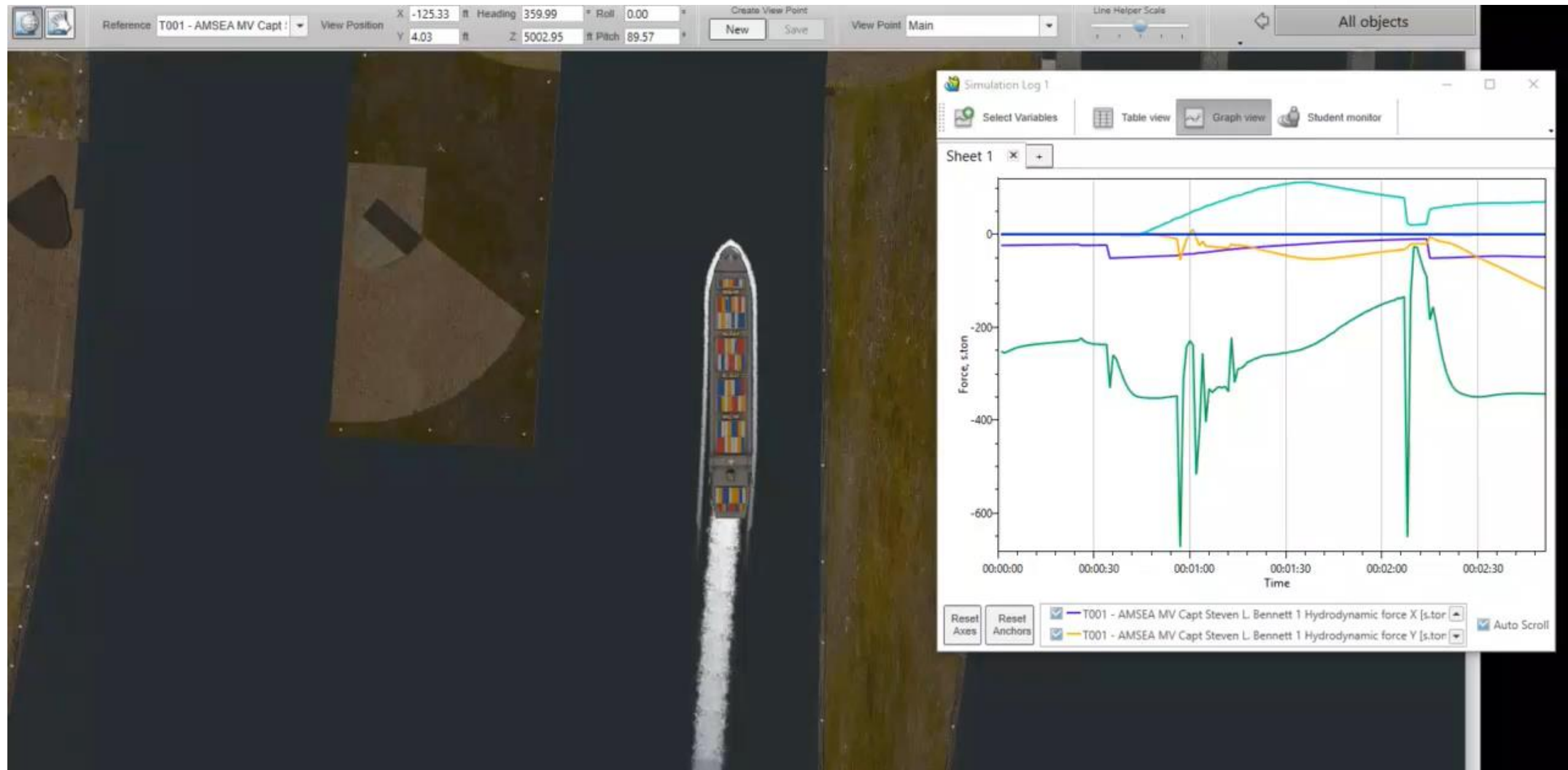


Passing Through the Ike Dike Aboard a Suezmax Tanker





Measuring Bank Effect





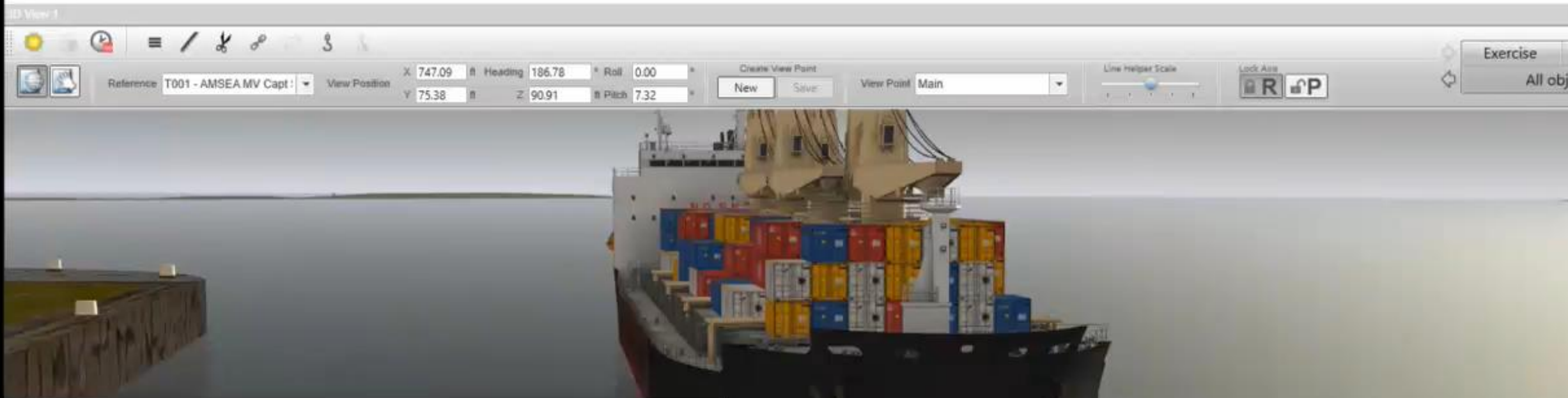
Measuring 700 tons of hydrodynamic force

New K-Sim Physics Engine allows for allision force calculations





Measuring Ship to Ship Forces



Measuring 900 tons of hydrodynamic force

3D View 1

Reference: T001 - AMSEA MV Capt : View Position

X: -125.33 ft Heading: 359.99 ° Roll: 0.00 °

Y: 4.03 ft Z: 5002.95 ft Pitch: 89.57 °

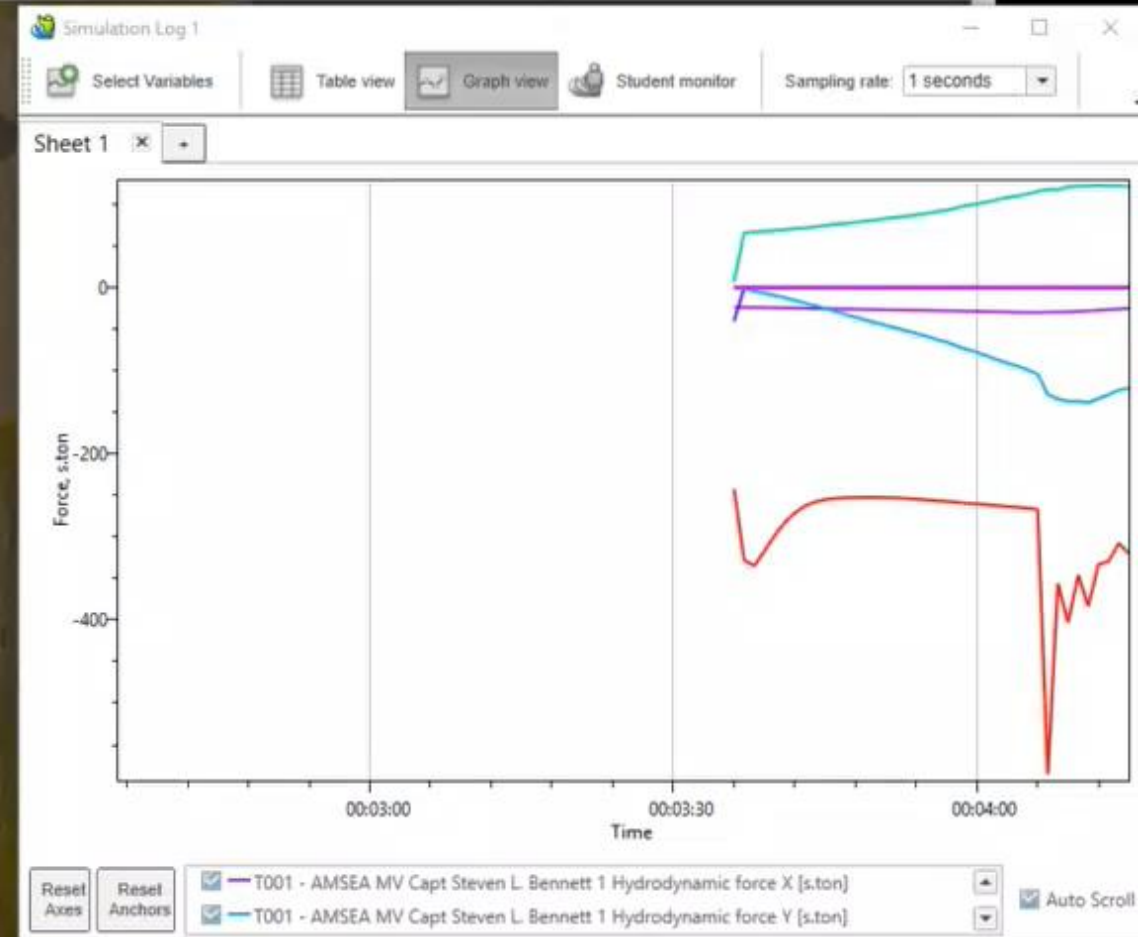
Create View Point: New Save

View Point: Main

Line Helper Scale

Exercise Students

All objects



Take a Round Turn



What We Screened in the Simulator

Timings

General current behavior

Bank forces

Interaction forces

Soft grounding behavior

What's Next?

Validation of simulator forces

Validation of meeting behavior

Accounting for water displacement
and pressures

Questions?

