

Bay Bridge Vessel Collision Mitigation

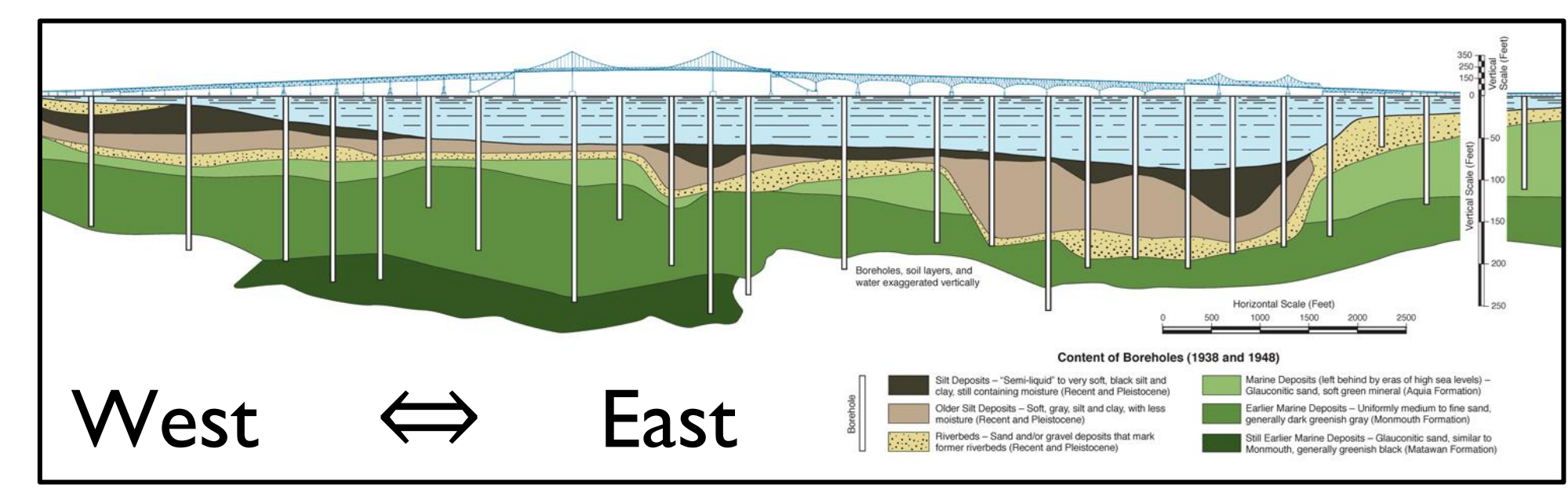
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Overview

The goal of this project is to design a structurally independent, collision mitigation system capable of arresting the forward momentum of heavy commercial vessels that traverse the Chesapeake Bay Bridge shipping channel.

Site Conditions



Design Criteria & Decision Matrix

Weight	Factor	Design			
		Mass Gravity	Flex Dolphin	Artificial Island	Floating Barrier
0.4	Installation Considerations	2.1	1.5	3.5	2.9
0.5	Overall Effectiveness	1.4	1.2	3.0	2.7
0.1	Other Considerations	2.0	3.0	1.6	3.4
1.0	Summation	1.8	1.5	3.1	2.8

Scale:	1	2	3	4
	Worst	Third Best	Second Best	Best

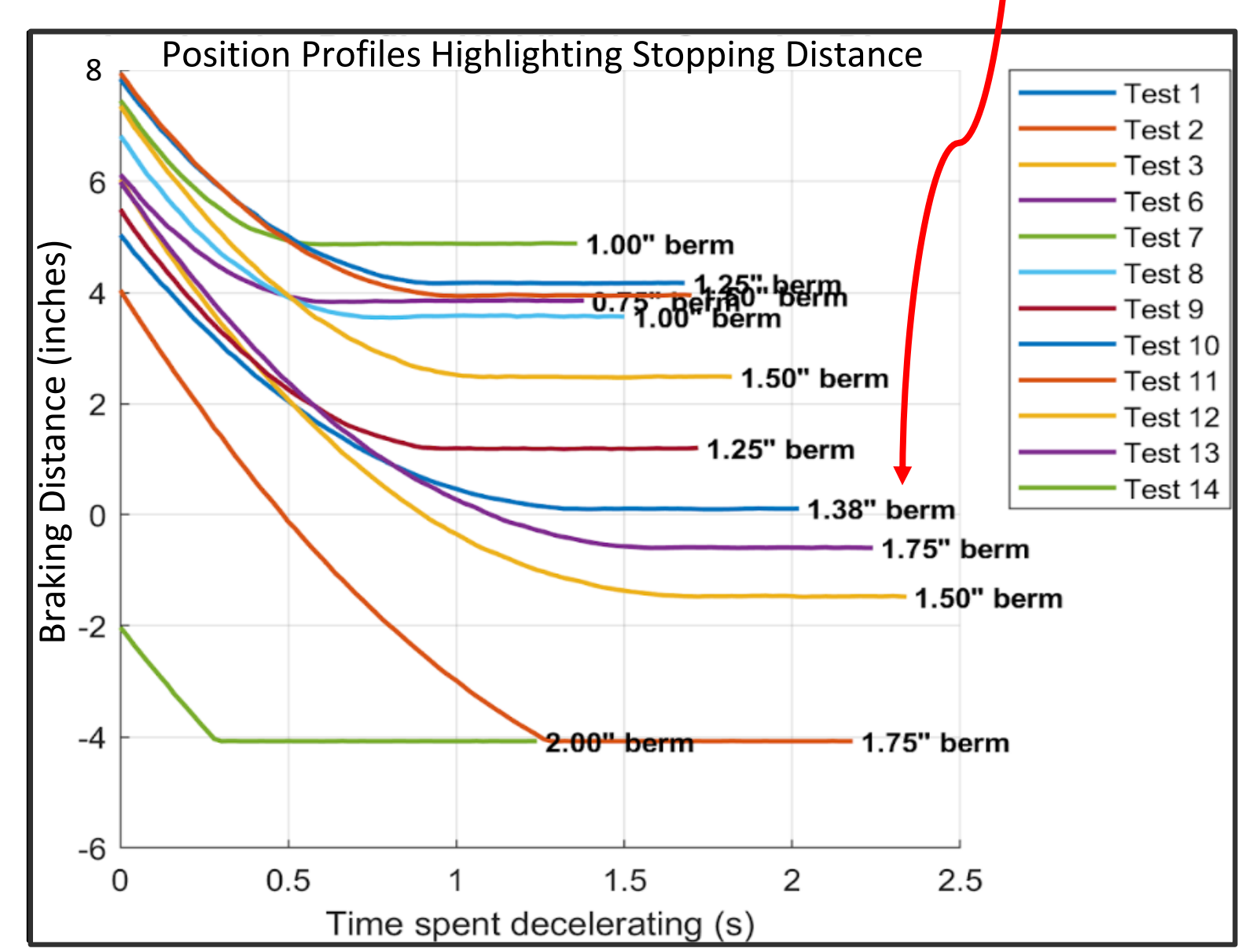
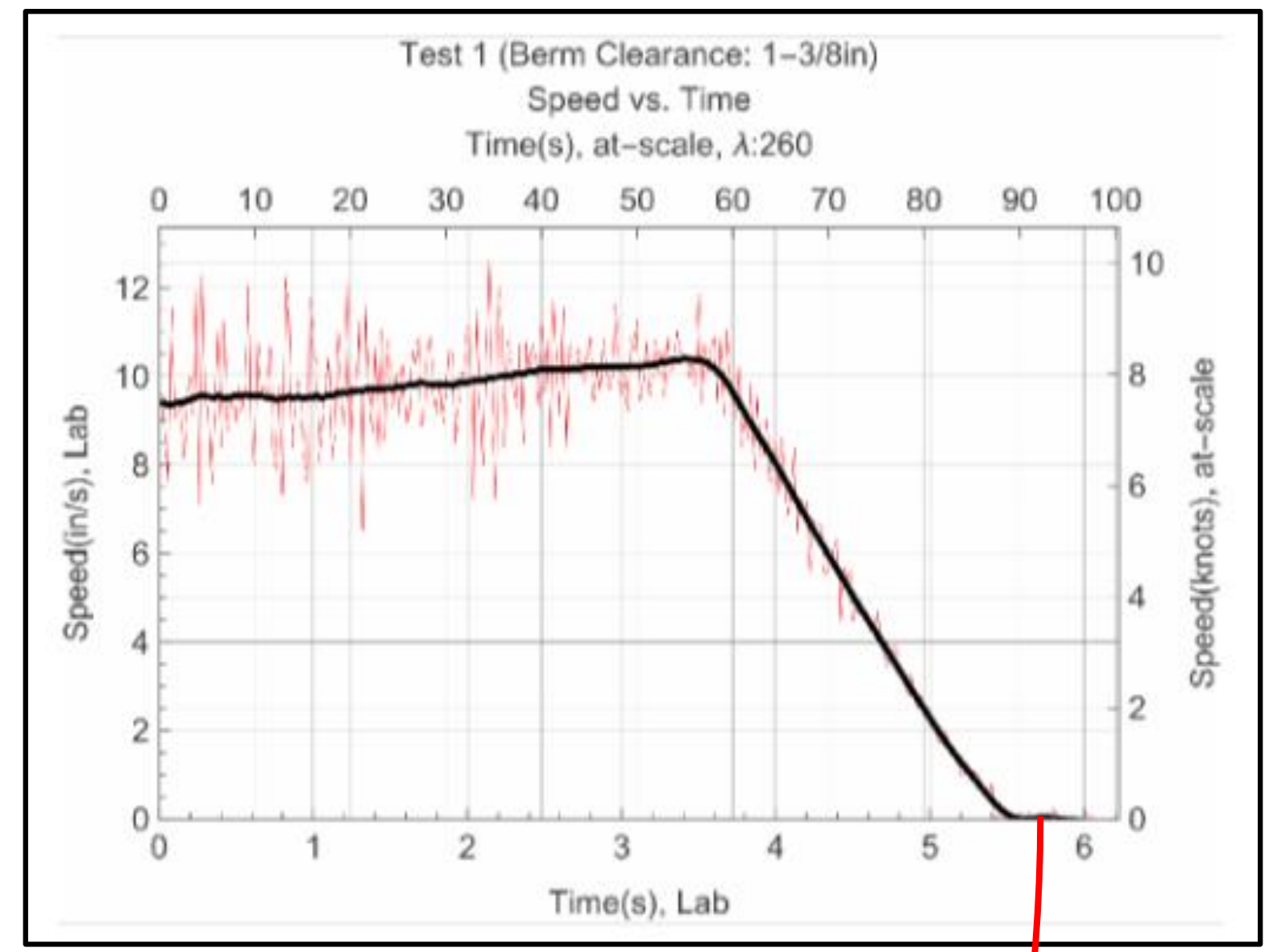
Design Requirements:

- Standalone Structure
- Must prevent collision with bridge for most heavy commercial vessels
- Must not impede recreational or light commercial traffic

Engineering Analysis

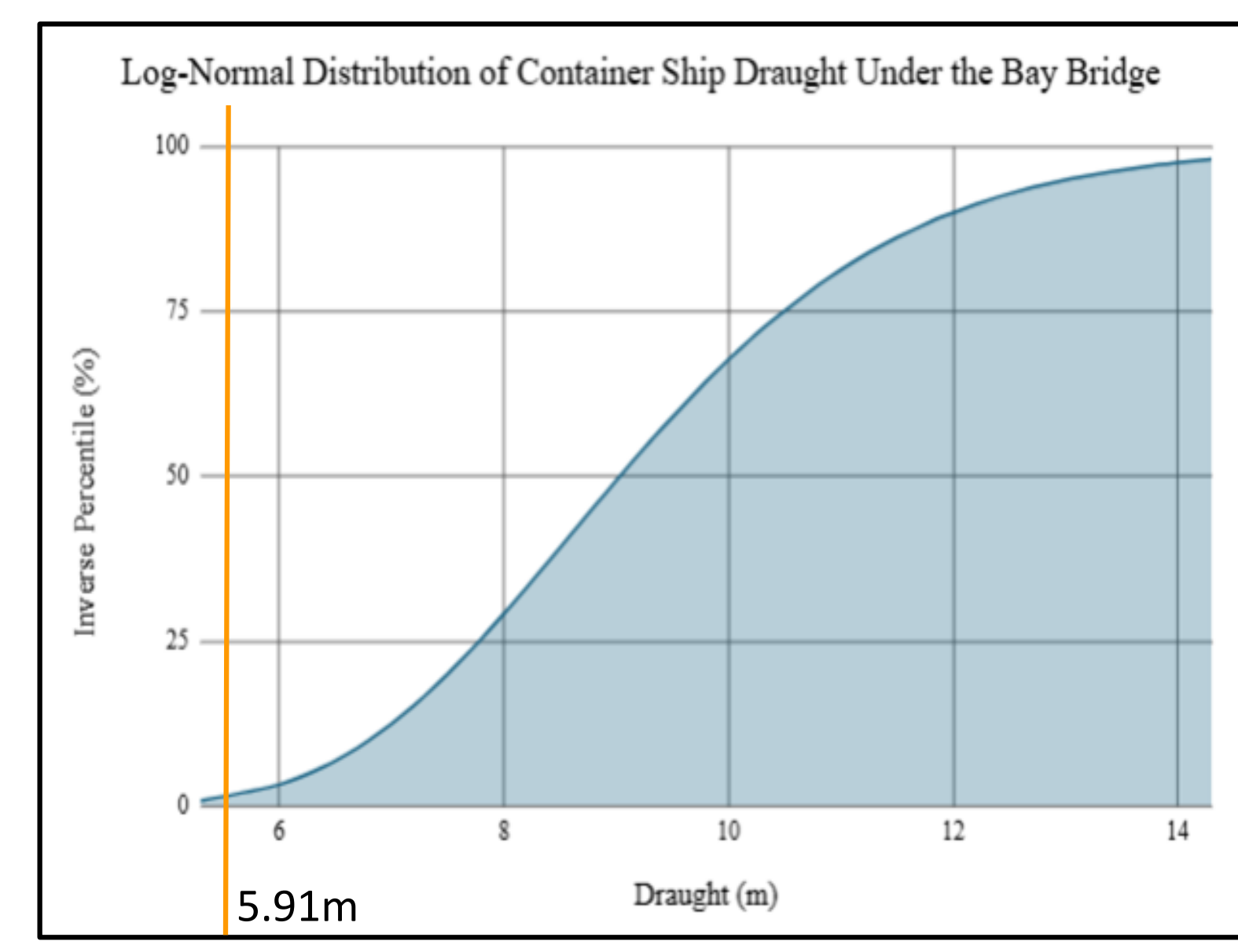
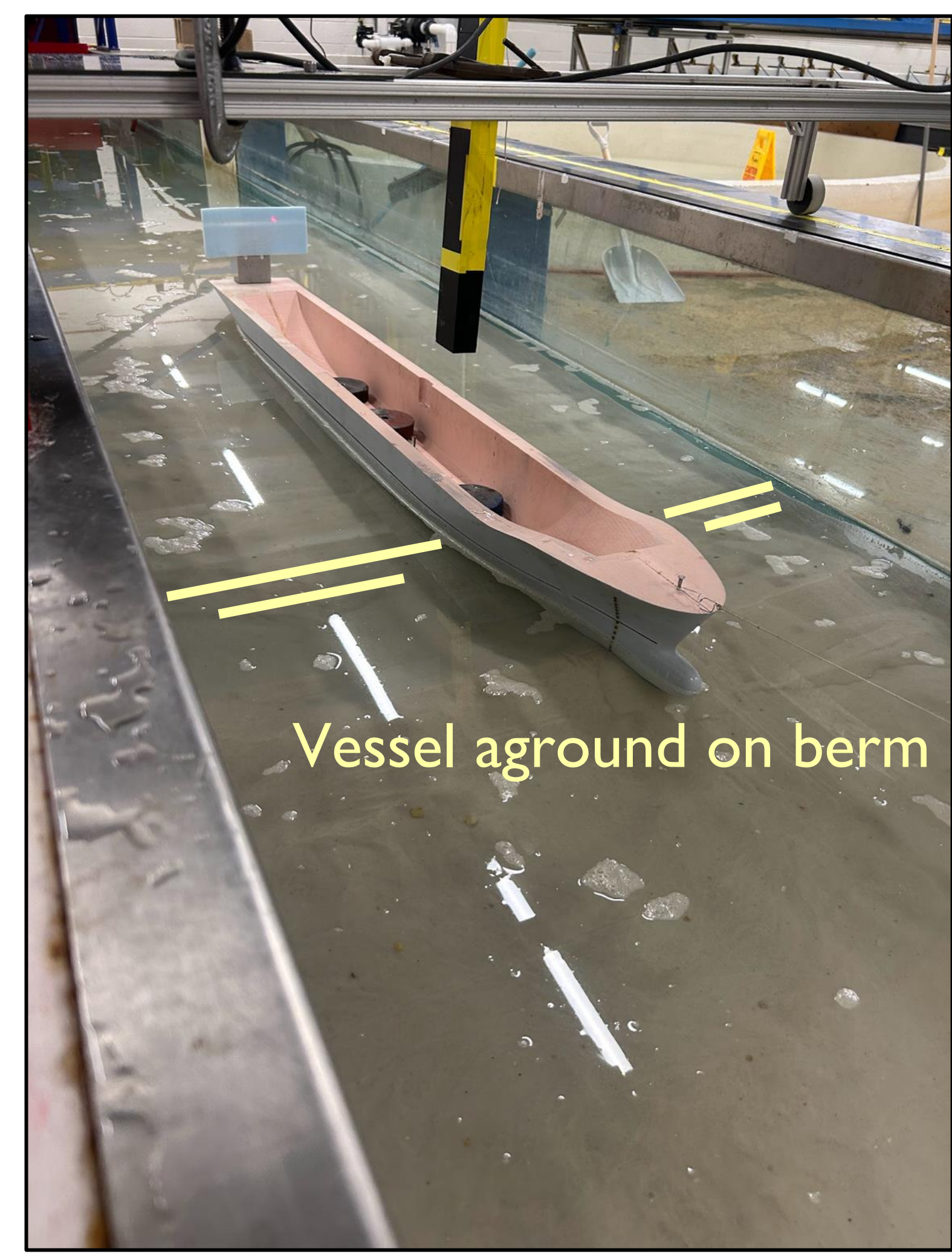
Experimental Campaign

Design Criteria	Evermax	Panamax Model	Scaling Factor
Beam	165 ft	7.638 in	$\lambda = 260$
Draft	51.5 ft	2.379 in	$\lambda = 260$
Displacement	242K LT	30.02 lbs	$\lambda^3 = 1.76E7$
Speed	8.6 knots	0.85-0.95 ft/s	$\lambda^{1/2} = 16.1$



Lab Result:
 36% hull X-section interference will arrest momentum

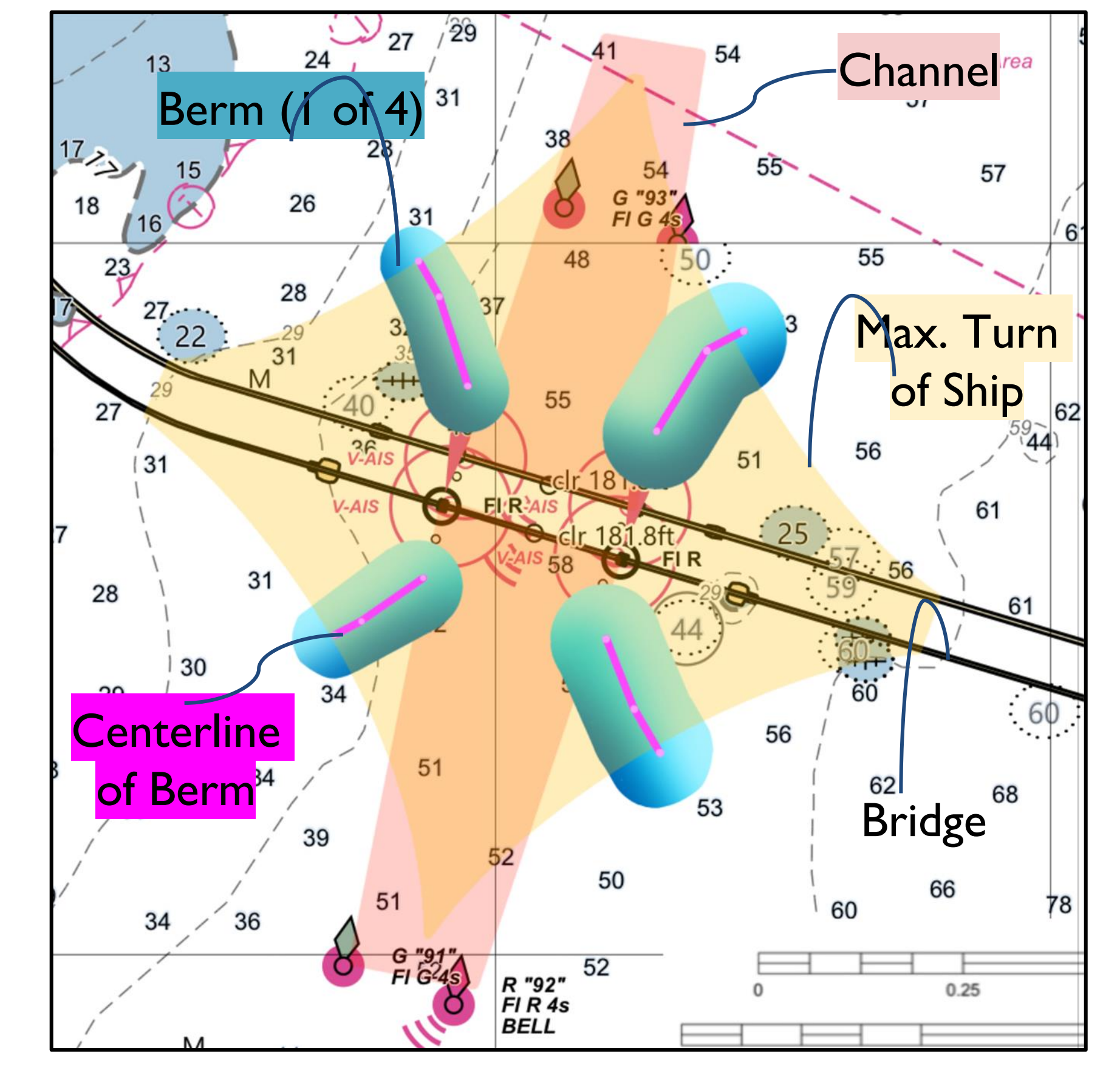
Empirical Relations



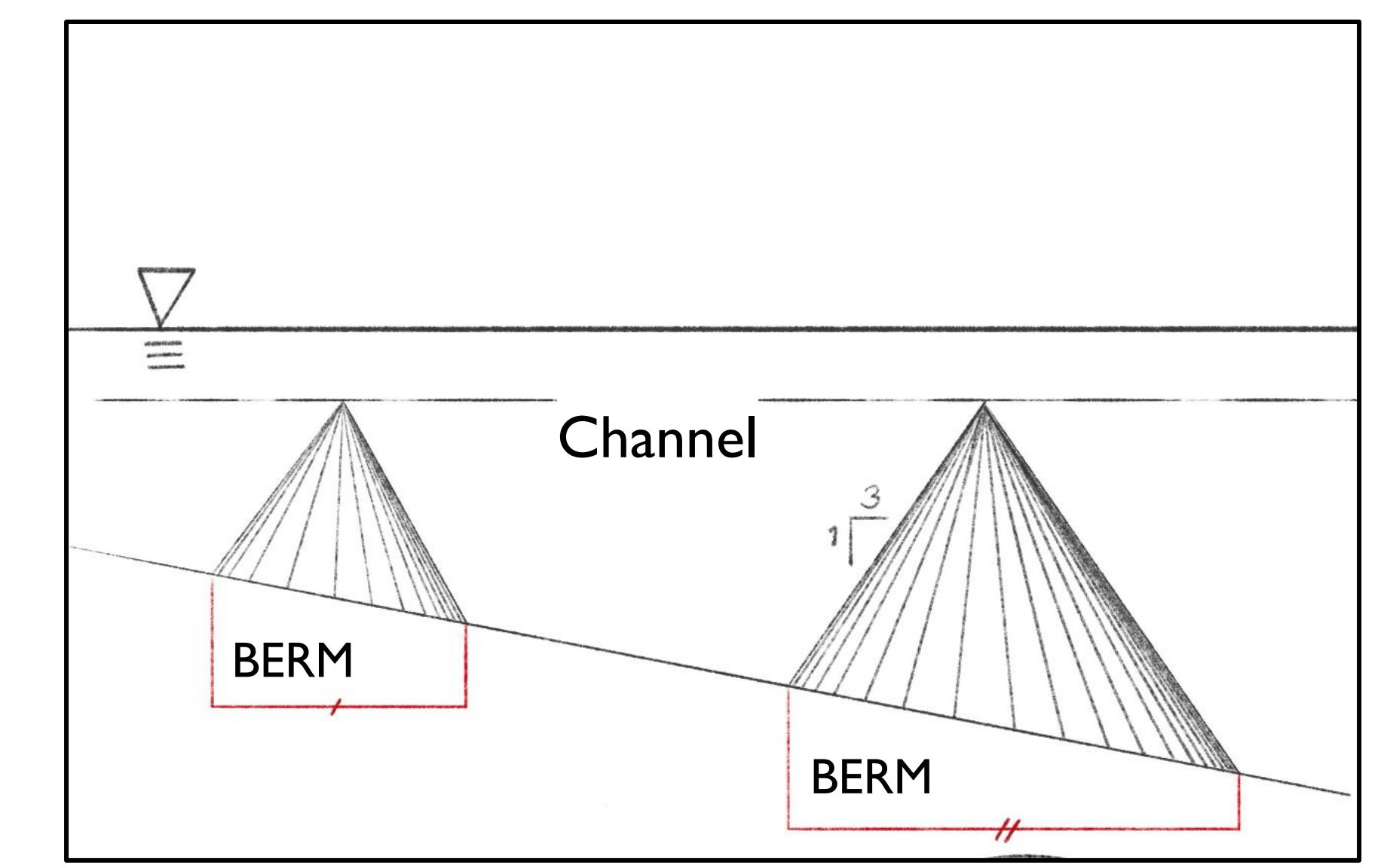
- For 36% interference:**
- Vessel statistics: 99% of sample (92 ships) draft exceeds 19.4ft (5.9m)
 - Depth to top of berm 12.4ft (3.8m)

Final Design

Site Top View



Berm/Channel X-Section (NTS)



References

