

UNITED STATES NAVAL ACADEMY HYDROMECHANICS LABORATORY (NAHL)
EXPERIMENT PLANNING & PREPARATION FORM

INSTRUCTIONS: Fill in pages **1 & 2** of this form and bring it to the planning meeting with NAHL staff. This form serves to inform NAHL staff of proposed research/experimentation requiring any technical and facility support.

Name	
E-Mail Address	
Advisor	
Date of Meeting	
Experiment Type	☐ Capstone Project ☐ Independent/Honors Research Project ☐ Other (please explain)
Timeline	☐ Fall Semester Only ☐ Spring Semester Only ☐ Fall & Spring (2 semester) ☐ Summer
Project Title	

Problem Statement & Goals (What are you testing and why?)

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Measurements: What is being measured? How is it being measured?

Facility Support (Select all that apply)

- ☐ 120-Foot Towing Tank
- ☐ 380-Foot Towing Tank
- ☐ Dry Dock (End Of 380-Foot Towing Tank)
- ☐ Ballast Tank
- ☐ Re-Circulating Water Channel
- ☐ Coastal Engineering Laboratory
- ☐ Sediment Tank
- ☐ Field-work (other location requiring NAHL support)
- ☐ Other Support (please explain)

STOP! - Bring remaining pages to the planning meeting and fill in with NAHL help.

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Nature Of Instrumentation/Data Measurement		
Parameter/Variable	Instrument	Instrument Range/Capacity
<i>e.g. Model Resistance ($R_{T, MODEL}$) (LB)</i>	<i>e.g. 2 IN Block Gage (Force Block)</i>	<i>e.g. 0 LB – 10 LB</i>

Towing Tank Utilization Assessment (If Applicable)	
Does this experiment require wave-making capability/functionality?	☐ Yes ☐ No
Does this experiment require modification to existing towing tank conditions (e.g. shallow water)?	☐ Yes ☐ No
Model Characterization	☐ Displacement Hull ☐ Planing Hull ☐ Submersible ☐ Other
Scale Factor (λ) = L_{SHIP} / L_{MODEL}	
Model Length (L_{MODEL}) (FT)	
Model Beam (B_{MODEL}) (FT)	
Model Displacement (Δ_{MODEL}) (LB)	
Maximum Desired Towing Speed ($V_{MODEL, MAXIMUM}$) (FT/S) • 120 FT Towing Tank Limit = 13 FT/S • 380 FT Towing Tank (Low-Speed Carriage) Limit = 25 FT/S • 380 FT Towing Tank (High-Speed Carriage) Limit = 32 FT/S • VERIFY: Does $V_{MODEL, MAXIMUM}$ correlate to a reasonable Froude Number, Reynolds Number, and/or Strouhal Number?	

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Test Matrix			
Parameter/Variable	Variable Range (Minimum – Maximum)		Number Of Variations
	Model Scale	Full Scale	
<i>e.g. Model Speed (V_{MODEL})</i>	<i>e.g. 1.00 – 5.00 FT/S</i>	<i>e.g. 3.16 – 15.81 FT/S</i>	<i>e.g. 5 Total Variations (1 FT/S Speed Increments)</i>
<i>e.g. Model Depth</i>	<i>e.g. 1.00 – 3.00 FT</i>	<i>e.g. 10.00 – 30.00 FT</i>	<i>e.g. 3 Total Variations (1 FT Depth Increments)</i>
Total Number Of Experimental Runs Review <i>Number Of Variations</i> Column → Multiply All Unique Row Values Together (e.g. Total Runs = 5 Variations (Speed) × 3 Variations (Depth) = 15 Total Runs)			

Time Estimate - Experiment		
Event Description	Number Of Runs	Total Estimated Event Time (HR) • 120 FT TT = 8 MIN/Run • 380 FT TT (Calm) = 15 MIN/Run • 380 FT TT (Waves) = 20 MIN/Run
<i>e.g. Model Resistance, 1.00 FT Depth</i>	<i>e.g. 5 Total Runs (1 FT/S Speed Increments)</i>	<i>e.g. 0.67 HR (5 Runs × 8 MIN/Run = 40 MIN = 0.67 HR)</i>
Total Experimental Run Time (HR) <i>Total Estimated Event Time</i> Column → Add All Row Values Together		
Total Experimental Work Time (Days) Assume: 6 HR/Day Of Functional Towing Tank Test Time		

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Time Estimate - All Tasks		
Major Task	Estimated Student/Faculty Time (HR)	Estimated NAHL Staff Time (HR)
Model Design/Fabrication		
Instrument Setup/Calibration		
Model Ballasting/Rigging/Setup		
Computer Wiring/Setup/Configuration		
Towing Tank/Wave-Maker Setup		
Photography/Videography/Lighting Setup		
Total Experimental Run Time (From Above)		
Equipment Disassembly/Restoration		
Data Processing/Analysis		
Total Time Estimate (HR)		

NOTE: NAHL facility/support time is an incredibly valuable resource! At a commercial hydromechanics laboratory, basic experimentation costs range from \$2500/Day (120 FT towing tank equivalent) to over \$10,000/Day (380 FT towing tank equivalent). Additionally, average personnel costs here at USNA range from approximately \$50/HR (MIDN equivalent) to over \$90/HR (for technical staff).

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**Provide a basic sketch/drawing of the proposed experimental setup.
Digital drawings/files are highly encouraged and can be e-mailed directly
to NAHL.**

NOTE: NAHL staff members can provide technical assistance with a variety of computer-aided engineering tools, including Microsoft Excel, MATLAB, MaxSurf, Rhinoceros, and SolidWorks. Such consultation should occur very early in the experimental design/development process!