ERDC/CHL TR-19-5

US Army Corps
of Engineers®
Engineer Research and
Development Center

ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

Charleston, South Carolina, Navigation Study

Charleston Harbor Deepening and Widening Ship Simulation Results

Dennis W. Webb, Keith Martin, and Gary C. Lynch

May 2019



Coastal and Hydraulics Laboratory

Approved for public release; distribution is unlimited.

The U.S. Army Engineer Research and Development Center (ERDC) solves the nation's toughest engineering and environmental challenges. ERDC develops innovative solutions in civil and military engineering, geospatial sciences, water resources, and environmental sciences for the Army, the Department of Defense, civilian agencies, and our nation's public good. Find out more at www.erdc.usace.army.mil.

To search for other technical reports published by ERDC, visit the ERDC online library at http://acwc.sdp.sirsi.net/client/default.

ERDC/CHL TR-19-5
May 2019

Charleston, South Carolina, Navigation Study

Charleston Harbor Deepening and Widening Ship Simulation Results

Dennis W. Webb, Keith Martin, and Gary C. Lynch

Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Final report

Approved for public release; distribution is unlimited.

Prepared for U.S. Army Corps of Engineers, Charleston District
69 Hagood Ave,
Charleston, SC 29412

Under Work Unit 137921, "Charleston Harbor Deepening and Widening Study, South Carolina (Post 45)"

Abstract

In 2016, the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (CHL), Ship-Tow Simulator (STS) was used to perform a navigation study assisting the Charleston District in evaluating different channel widening alternatives for larger containerships calling at the Port of Charleston. The widening proposals were associated with the proposed Charleston Harbor Deepening and Widening Project, known as Post 45. The Feasibility Study for the Post 45 project has already been completed.

This study was done at the CHL STS real-time simulator. Real-time refers to the fact that model time uses a 1:1 ratio to prototype time. Also, real-world environmental forces were simulated and acted upon the modeled ships during the study. These forces included currents, wind, waves, bathymetry, bank effects, and ship-to-ship interaction.

Simulations for the project's alternatives were conducted at CHL over a 6-week period from March through May 2016. More than 20 mariners including harbor pilots, docking pilots, and tractor tug captains participated in the testing and validation exercises. Most of the simulations involved containerships of either Post Panamax Generation 3 class or Post Panamax Generation 2 class.

Results, in the form of track plots and pilot questionnaires, were reviewed to develop final conclusions and recommendations.

DISCLAIMER: The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products. All product names and trademarks cited are the property of their respective owners. The findings of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

DESTROY THIS REPORT WHEN NO LONGER NEEDED. DO NOT RETURN IT TO THE ORIGINATOR.

Contents

Abstract ii

Figures and Tables vi

Preface viii

Unit Conversion Factors ix

1 Introduction 1

Background 1
Objective 3
Approach 6

2 Design Ships 10

3 Summary of All Runs Completed 11

4 Results 13

Wando River Turning Basin 14
Alternative 2 16
Alternative 2A 17
Alternative 3 18
Pilot questionnaires 18
Observations 19
Daniel Island Reach Turning Basin 19
Alternative 1 21
Alternative 2A 22
Alternative 3 23
Pilot questionnaires 23
Observations 23
Ordnance Reach Turning Basin 24
Alternative 2 27
Alternative 2A 27
Alternative 3 27
Pilot questionnaires 28
Observations 28
Fort Sumter Range – two-way traffic 29
Restricted runs 31
Unrestricted runs 32
Observations 33
Mount Pleasant Range 34
Bennis Reach – two-way traffic 34
Alternative 1 36
Alternative 2 37
Alternative 3 38

Observations 40
Hog Island Reach, Wando River Turn, and Drum Island Reach 41
Hog Island Reach 41
Two-way traffic in Hog Island Reach 42
Alternative 1 43
Alternative 2 43
Alternative 3 45
Observations 47
Drum Island Turn 48
Drum Island Turn one-way runs — containership Konway 49
Alternative 2 50
Alternative 3 50
Alternative 4 51
One-way runs — containership Daniella II 51
Alternative 1 52
Alternative 2 52
Alternative 3 53
Alternative 4 53
One-way runs — bulk carrier Danita II 54
Alternative 1 54
Alternative 2 55
Observations 55
One-way runs — Wando River 55
Alternative 1 56
Alternative 2 56
Alternative 3 57
Wando River pilot concerns 58
Observations 60
Clouter Creek Reach through Ordnance Reach 60
Two–way traffic through Clouter Creek Reach 61
Alternative 64
Observations 65
Daniel Island Bend to Ordnance Reach (North Charleston and Filbin Reach widening) 65
Alternative 3 66
Observations 67

5 Conclusions and Recommendations 68

References 69

Appendix A: Vessel Track Plots 70

Appendix B: Run Sheets 216

Appendix C: Final Questionnaires 279

Appendix D: Vessel Pilot Cards 292

Appendix E: John Cameron Letter 293

Report Documentation Page

Figures and Tables

Figures

Figure 1. Project location and feasibility recommended plan overview map. 2
Figure 2. Proposed widening. 3
Figure 3. Charleston Harbor pilot operating the ERDC STS. 6
Figure 4. Two simulated ships meeting in Charleston Harbor. 9
Figure 5. Wando River Turning Basin alternatives. 15
Figure 6. Comparison of Wando River Alternative 2A and 3 turning basins. 19
Figure 7. Daniel Island Reach Turning Basin Alternatives. 20
Figure 8. Comparison of Daniel Island Alternative 2A and 3 turning basins. 24
Figure 9. Ordnance Reach Turning Basin Alternatives. 26
Figure 10. Comparison of Ordnance Reach Alternative 2A and 3 turning basins. 29
Figure 11. Location of Fort Sumter Range runs. 29
Figure 12. Comparison between restricted and unrestricted runs. 33
Figure 13. Nonstructural widening at Mount Pleasant Range. 34
Figure 14. Bennis Reach Alternatives 1, 2, and 3. 35
Figure 15. Hog Island Reach, Drum Island Reach, Myers Bend, and the turn into the Wando River. 41
Figure 16. Track plots of all simulated vessels in Hog/Custom/Horse Reach widener. 48
Figure 17. Difference in effective beam of ships operating with 1° and 5° crab angle. 59
Figure 18. Comparison of simulator bow images: the *Daniella II* and the *Sovereign Maersk*. 60
Figure 19. View from *OOCL Beijing,* 19 May 2015 at Port of Long Beach. 60
Figure 20. Widening for Clouter Creek, North Charleston, and Filbin Creek Reaches. 62

Tables

Table 1. Original (see note) widening alternatives (Alt) 1 through 3. 4
Table 2. Simulation operators and visitors Charleston Harbor simulations March—May 2016. 8
Table 3. Summary of runs for each reach 11
Table 4. Summary of all scenarios of Daniella II turning in the Wando River Turning Basin. *Daniella II* is a 1201 × 160 × 49.9 ft containership. 16
Table 5. Summary of all simulations of the *Daniella II* turning in the Daniel Island Reach Turning Basin. *Daniella II* is a 1201 × 160 × 49.9 ft containership. 21
Table 6. Summary of all simulations of the *Konway* turning in the Ordnance Reach Turning Basin. The *Konway* is an 1102 × 141 × 45.9 ft containership. 25
Table 7. Summary of all two-way traffic simulations of the *Daniella II* in the Fort Sumter Range. The *Daniella II* is a 1201 × 160 × 49.9 ft containership. 30
Table 8. Summary of all two-way simulations of the *Daniella II* in Bennis Reach. The *Daniella II* is a 1201 × 160 × 49.9 ft containership. 35

Table 9. Summary of all two-way simulations of the *Daniella II* in Hog Island Reach. The *Daniella II* is a 1201 × 160 × 49.9 ft containership. 42

Table 10. Summary of composite one-way simulations of the *Konway* through Drum Island Turn. These runs are conducted without tug assistance as in real life. The *Konway* is an 1102 × 141 × 45.9 ft containership 50

Table 11. Summary of composite one-way simulations of the *Daniella II* through Drum Island Turn. The *Daniella II* is a 1201 × 160 × 49.9 ft containership 52

Table 12. Summary of composite one-way simulations of the *Danita II* through Drum Island Turn. The *Danita II* is 750 × 106 × 46 ft bulk carrier. 54

Table 13. Summary of composite one-way simulations of the *Daniella II* in Wando River. The *Daniella II* is a 1201 × 160 × 49.9 ft containership. 55

Table 14. Summary of all two-way simulations of the *Konway* in Clouter Creek Reach. The *Konway* is an 1102 x 141 × 45.9 ft containership. 61

Table 15. Summary of composite one-way simulations of the *Konway* from Daniel Island Reach to Ordnance Reach. The *Konway* is an 1102 × 141 × 45.9 ft containership. 66

Table 16. Final recommendations. 68

Preface

This study was conducted for the U.S. Army Corps of Engineers, Charleston District, under General Investigations, Work Unit 137921, "Charleston Harbor Deepening and Widening Study, South Carolina (Post 45)." The Project Manager was Ms. Holly Carpenter, and the Technical Lead was Ms. Sara Brown (CESAC-EN-H).

The work was performed by the Navigation Branch of the Navigation Division, U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (ERDC-CHL). At the time of publication of this report, Mr. Tim Shelton was Branch Chief; Dr. Jackie Pettway was Division Chief; and Mr. Charles E. Wiggins was the Technical Director for Navigation. The Director of ERDC-CHL was Dr. Ty V. Wamsley, and the Deputy Director was Mr. Jeffrey R. Eckstein.

The non-federal sponsor for the Post 45 Project was the South Carolina Ports Authority (SCPA). The Post 45 Project was cost shared with the SCPA, which was instrumental in coordinating the ship simulation testing schedule and results with the Charleston Harbor Pilots. Charleston Harbor Pilots Association, Moran Towing Corporation, and McAllister Towing and Transportation Co., Inc., provided volunteers to pilot the modeled existing and design ships for 1 week of model validation and 5 weeks of testing.

The Commander of ERDC was COL Ivan P. Beckman, and the Director of ERDC was Dr. David W. Pittman.

Unit Conversion Factors

Multiply	By	To Obtain
degrees (angle)	0.01745329	radians
feet	0.3048	meters
knots	0.5144444	meters per second
miles (US statute)	1,609.347	meters
tons (force)	8,896.443	Newtons

1 Introduction

Background

Charleston Harbor (Figure 1) is located in a natural tidal estuary formed around the confluence of the Cooper, Ashley, and Wando Rivers. The City of Charleston is located west of Charleston Harbor, between the Ashley and Cooper Rivers, Daniel Island, and between the Cooper and Wando Rivers. James Island and Morris Island are south of the harbor, with Mt. Pleasant and Sullivan's Island to the east and North Charleston to the north. The Harbor is under the oversight of the South Carolina State Port Authority (SCSPA). The entrance channel accesses the Atlantic Ocean to the southeast between Morris Island and Sullivan's Island.

The Charleston Harbor Federal navigation project consists of channels, turning basins, anchorage basin, contraction dikes, jetties, and dredged material disposal areas with limited two-way traffic. In 1996, the major interior channels were authorized to 45 feet (ft) mean lower low water (mllw), and the entrance channel was authorized to 47 ft mllw.

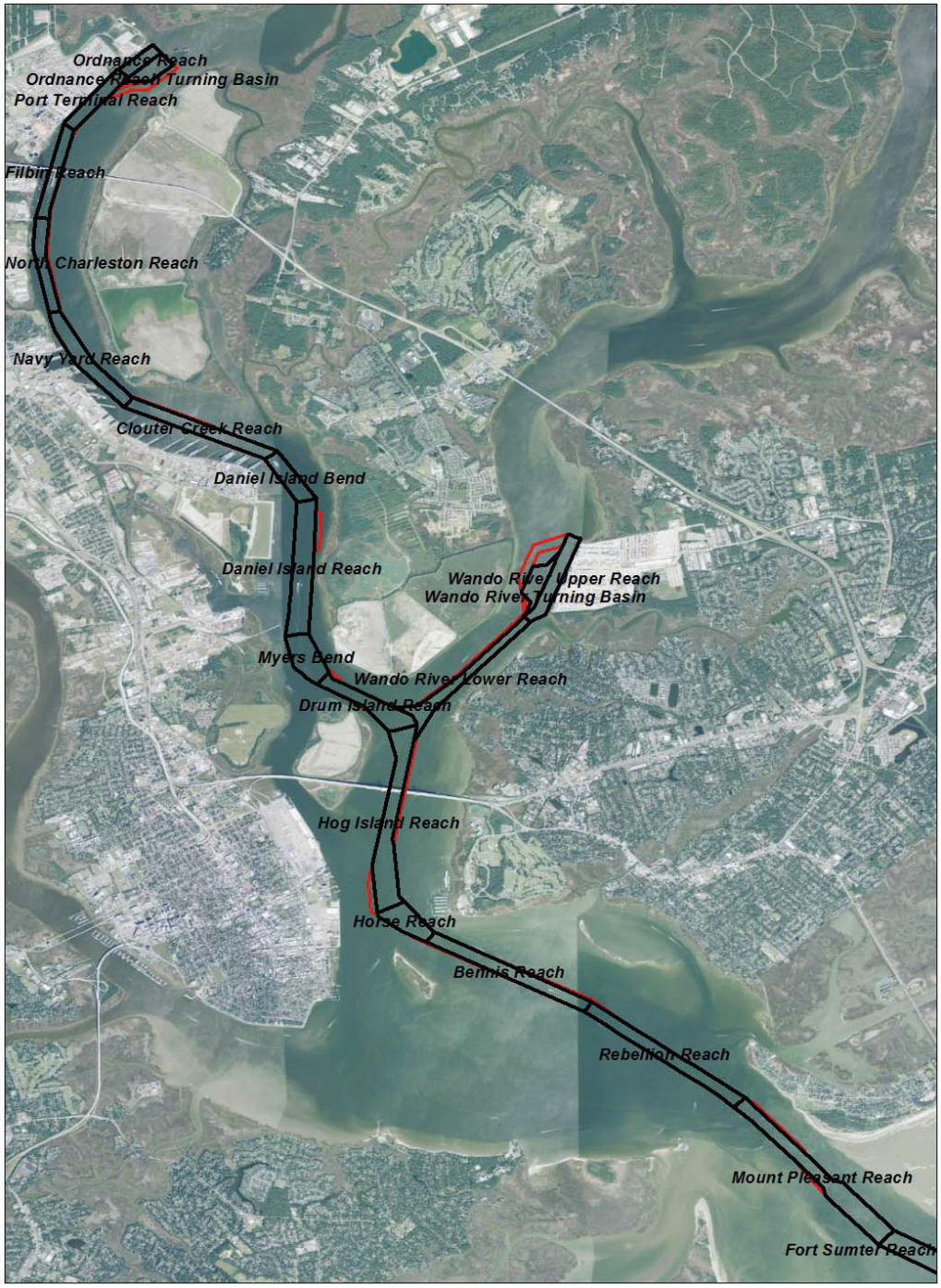
Figure 1. Project location and feasibility recommended plan overview map.



Objective

The purpose of this study was to assist the U.S. Army Corps of Engineers (USACE), Charleston District (SAC), in evaluating different widening alternatives (Figure 2) for the project design ships (Generation II and Generation III Post-Panamax containerships) and the Port of Charleston.

Figure 2. Proposed widening.



The widening proposals were associated with the proposed Charleston Harbor Deepening and Widening Project, known as Post 45. The Feasibility Study for Post 45 project was completed and includes a Recommended Plan. This plan deepens the entrance channel from 47 ft to 54 ft mllw, the lower harbor from 45 ft to 52 ft mllw, and the upper harbor from 45 ft to 48 ft mllw. The plan also involved widenings for additional two-way traffic and/or safe passage for the design ships. The feasibility-level widening recommendations were represented by Alternative 3 in this study. The evaluation looks at the adequateness of the widenings for the design ships. To analyze possible reductions to widenings while maintaining safety, two other alternatives were also simulated. These include Alternative 1, the existing channel with no widening, and Alternative 2, an intermediate widening between Alternative 1 and Alternative 3.

Feasibility level Alternative 3 was developed in part during meetings conducted, 25–26 January 2012. During these meetings, SAC provided large-scale plots of the navigation charts along with *ship cutouts*. The ship cutouts represent possible design ships at the same scale as the charts. This provided a means for the mariners to demonstrate the need for channel improvements. This exercise includes contributions from the SAC, U.S. Army Engineer Research and Development Center (ERDC), SCSPA, and Charleston Harbor and Docking Pilots.

A list of channel segments and recommended widths for Alternatives 1–3 is shown in Table 1.

Table 1. Original (see note) widening alternatives (Alt) 1 through 3.

Channel Segment	Existing / Alt 1	Alt 2	Alt 3
Fort Sumter Range	800 ft	NA	NA
Mount Pleasant Range	1000 ft tapering to 600 ft	NA	Asymmetric
Rebellion Reach	600 ft	NA	NA
Bennis Reach	600 ft	650 ft	700 ft
Horse Reach	varies	NA	NA
Custom House Reach Bend Widening Only	Varies	Varies + 150 ft	Varies + 275 ft
Hog Island Reach	600 ft	650 ft	700 ft
Wando River	400 ft	450 ft	500 ft

Channel Segment	Existing / Alt 1	Alt 2	Alt 3
Wando River Turning Basin	1400 ft	1440 ft	1790 ft
Drum Island Reach to Myers Bend Widening Only	Varies	Varies	Varies
Daniel Island Reach	880 ft	NA	NA
Daniel Island Reach Turning Basin	1440 ft	NA	1790 ft
Daniel Island Bend	750 ft	NA	NA
Clouter Creek Reach	600 ft	NA	600-650 ft
Navy Yard Reach	600 ft and 700 ft	NA	NA
North Charleston Reach	500 ft and 600 ft	NA	550 ft and 650 ft
Filbin Creek Reach	500 ft	NA	550 ft
Ordnance Reach	600 ft	NA	NA
Ordnance Reach Turning Basin	1400 ft	NA	1650 ft

Note: Alternatives 2A and 4 were developed during the testing program and will be presented later. The simulation study was initiated with three alternatives described in this Table.

No Alt 2 for Daniel Island Basin. This was added later as 2A.

The three alternatives are described as follows:

- Alternative 1 - No widening to existing channel
- Alternative 2 - Median widening (halfway between Alternatives 1 and 3)
- Alternative 3 - Maximum widening (the feasibility study plan).

During the study, two other alternatives were added as a result of observations during simulation testing. They are described as follows:

- Alternative 2A - Intermediate widening (between median (Alternative 2) and maximum (Alternative 3)
- Alternative 4 - Drum Island Reach widening only (also part of the feasibility study recommended plan).

Approach

The alternatives were evaluated by the ERDC, Coastal and Hydraulics Laboratory (CHL), using its Ship-Tow Simulator (STS). Data recorded during these simulations were post-processed into vessel track plots, included in Appendix A. Mariners were given run sheets at the end of each exercise, included in Appendix B. Additionally, pilot final questionnaire comments (Appendix C) and conversations were evaluated. Starting in the early 1980s, the ERDC STS is the USACE primary modeling tool for deep-draft navigation projects. STS technology was applied to over 70 harbor improvement projects along the Atlantic, Gulf, and Pacific Coasts as well as Alaska, Hawaii, and Puerto Rico. The Charleston Harbor 45 ft project was simulated at the ERDC STS during the early through mid-1990s. A photograph of the ERDC STS is shown in Figure 3.

Figure 3. Charleston Harbor pilot operating the ERDC STS.



The mariners control the simulated ship in a manner similar to a ship in real life. However, on the ERDC STS, pilots operate the ship's rudder and throttle rather than vocally issuing commands to a helmsman. Operations that were in control of the mariner include the rudder, engine, thrusters, and tugboats (position, direction, and engine).

Environmental forces acting upon the ship during the simulation included the following: current, wind, waves, bathymetry, bank force, and ship-to-

ship interaction. Computer databases were developed for simulation of the harbor as it exists. These databases were validated with experienced mariners. Once validated, modifications were made to reflect future conditions. A more detailed description of channel design using the STS was available in Webb (1994).

The study was initiated when SAC requested the assistance of ERDC to perform a navigation study. ERDC-CHL personnel visited Charleston District, 24–26 January 2012. The purpose of the trip was to attend a series of meetings with SAC, SCSPA, Charleston Branch Pilots Association (CBPA), and docking pilots to discuss the methodology of the Charleston simulation study and establish contact with the participants.

The reconnaissance trip of the harbor was conducted in March 2012. There was participation in vessel transits with the pilots to discuss navigation in Charleston Harbor and to take digital photographs and video that was used to develop the project's simulator visual scene database.

There are two basic types of simulator databases: visual and environmental. The visual databases include the visual scene, radar, and Electronic Chart Display and Information System (ECDIS). The environmental databases include current (magnitude and direction), bathymetry, and wind (speed and direction). Current databases were developed with output from a separate hydrodynamic model study. Bathymetry databases used the geometry from that same hydrodynamic model and were supplemented by additional data sources as necessary. Wind information was input at testing.

The Environmental Fluid Dynamics Code (EFDC) was used to develop the hydrodynamics for the Post 45 navigation study. EFDC is a three-dimensional, finite difference modeling code. It is capable of modeling hydrodynamics, salinity, and contaminant transport. Currents for the study were developed from the EFDC results at maximum flood and maximum ebb conditions. Flood and ebb current sets were developed based upon distance from the tidal boundary since the maximum flood and ebb occurs at different times for different locations in Charleston Harbor. For example, maximum flood at Wando River Turning Basin occurs earlier than maximum flood at the Ordnance Reach Turning Basin, because Ordnance Reach is farther inland.

All simulated scenarios (described by location, initial ship conditions, wind speed, current, and availability of tugs) were developed in conjunction with the Harbor and Docking Pilots, as approved by SAC. Conditions were chosen to provide a maximum credible worst-case scenario (i.e., the worst conditions under which the port operates on a regular basis).

Due to district priorities, real-time simulations were then scheduled after the Pre-Construction Engineering and Design phase. They were conducted during March, April, and May 2016. Table 2 lists the visitors for the simulation program. Validation was performed the week of 14–18 March 2016. During validation, repeated runs were made through the existing condition simulation databases. These databases were adjusted, with mariner input, until existing conditions were represented in the simulation. The same adjustments were then extrapolated for the alternatives tested.

Table 2. Simulation operators and visitors Charleston Harbor simulations March—May 2016.

Name	Date	Affiliation	Session	Purpose
Capt. Jason Teal	15–18 March	CBPA	Validation	Apprentice Harbor Pilot
Capt. Chris Thornton	15–16 March	CBPA	Validation	Harbor Pilot
Capt. Lawrence Lucas	16–18 March	CBPA	Validation	Harbor Pilot
Capt. Craig Mitchum	16–17 March	McAllister Towing	Validation	Docking Pilot
Sara Brown	15-18 March	SAC	Validation	Observer
Capt. George Tawes	4–8 April	Moran Towing	Basin Testing 1	Docking Pilot
Capt. Terry Suggs	4–8 April	McAllister Towing	Basin Testing 1	Docking Pilot
Capt. Edward Richardson		McAllister Towing	Basin Testing 2	Docking Pilot
Capt. Jon Dye	12–15 April	Moran Towing	Basin Testing 2	Docking Pilot
Capt. Josh Kicklighter	14–15 April	McAllister Towing	Basin Testing 2	Tug Captain
Capt. Rob Weil	19–22 April	CBPA	Testing 1	Harbor Pilot
Capt. Henry Lockwood	19–22 April	CBPA	Testing 1	Harbor Pilot
Capt. Brian Cisco	19–22 April	CBPA	Testing 1	Apprentice Harbor Pilot
Capt. Brian Curran	20–21 April	Moran Towing	Testing 1	Docking Pilot
Capt. Robert Leach	20–21 April	Moran Towing	Testing 1	Tug Captain
John Cameron	19–22 April	CBPA	Testing 1	Observer
Sara Brown	19–22 April	SAC	Testing 1	Observer

Name	Date	Affiliation	Session	Purpose
Capt. Crayton Walters	26–29 April	CBPA	Testing 2	Harbor Pilot
Capt. John Dukes	26–29 April	CBPA	Testing 2	Harbor Pilot
Capt. George Campsen	26–29 April	CBPA	Testing 2	Apprentice Harbor Pilot
Capt. Josh Kicklighter	27–28 April	McAllister Towing	Testing 2	Docking Pilot
Capt. Eddie Richardson	27–28 April	McAllister Towing	Testing 2	Tug Captain
Holly Carpenter	26–28 April	SAC	Testing 2	Observer
Capt. Whit Smith	26 April	CBPA	Testing 2	Observer
Barbara Melvin	26 April	SCSPA	Testing 2	Observer
Capt. Andrew McIntire	3–6 May	CBPA	Testing 3	Harbor Pilot
Capt. Bryan Sanders	3–6 May	CBPA	Testing 3	Harbor Pilot

All tests were conducted at the ERDC STS located in Vicksburg, MS. Figure 4 provides a picture of the inside of the simulator and what the pilots view when running the simulations.

Two-way traffic was simulated by pilots conning (i.e., controlling) different vessels in two separate simulated ship bridges. The vessels were in visual, radio, and radar contact with each other (also Figure 4).

Figure 4. Two simulated ships meeting in Charleston Harbor.



2 Design Ships

The following vessels were used in this study. The pilot card for each vessel is included in Appendix D. These ships were discussed during the feasibility phase of the project and selected with the approval of USACE economists. The ships were even keel, meaning the draft was the same along the length of the ship.

- Post Panamax Generation 3 (Hugh Leatherman Terminal [HLT] and Wando simulations) – *Daniella II* Containership: 1201 × 160 × 49.9 ft. The *Daniella II* was not an actual ship. It was an idealized ship based upon the hydrodynamics of another ship (the *Daniella*) operated by the Mediterranean Shipping Company. The *Daniella* was a 1200 ft × 167 ft containership.
- Post Panamax Generation 2 (North Charleston simulations) – *Konway* Containership: 1102 × 141 × 45.9 ft. The *Konway* was an idealized containership developed as a generic representation of ships this size.
- Bulk Carrier Ship (no tug assistance) (Drum Island Turning Basin simulations) – *Danita II* Bulk Carrier: 750 × 106 × 46 ft. The *Danita II* was an idealized bulk carrier developed to represent a ship this size.
- Tug Boats – three sizes (4000, 5000, and 6000 horsepower [hp]). All three tugs were used to help the containerships turn in the turning basins. The 6000 hp tug was also used as an ownship for the towing simulations performed for the turn at Drum Island. Ownship was the simulated vessel being operated by a mariner from a simulated bridge. It was not computer controlled or simulator-operator controlled during a simulation exercise.

3 Summary of All Runs Completed

The proposed widened alternatives were tested for each design ship. Tests were performed, as economically justified, for one- and/or two-way traffic. Along with harbor pilot conversations, economic justification, and considerations for safe and efficient navigation, two-way traffic was tested for Bennis Reach, Horse Reach, Hog Island Reach, and Clouter Creek Reach[1]. Two-way traffic contributes a small portion of the overall economic benefits of the Post 45 project. Table 3 includes a summary of all runs completed over the course of the simulations.

Table 3. Summary of runs for each reach.

Reach	Design Ship	Heading	# Runs
Wando River Turning Basin	*Daniella II*	Inbound	22
Daniel Island Reach Turning Basin	*Daniella II*	Inbound/Outbound	13 / 7
Ordinance Reach Turning Basin	*Konway*	Inbound	24
Fort Sumter Range	*Daniella II*	Two-way	12
Mount Pleasant Range	*Daniella II*	Two-way**	11
Bennis Reach	*Daniella II*	Two-way	21
Hog Island Reach	*Daniella II*	Two-way	18
Drum Island Turn	*Konway*	Inbound	9
	Daniella II	Inbound	11
	Danita II	Inbound/Outbound	6 / 3
Wando River	*Daniella II*	Inbound/Outbound	14 / 13
Clouter Creek Reach	*Konway*	Two-way	14
Daniel Island Reach to Ordnance Reach	*Konway*	Inbound/Outbound	5 / 5

** For testing purposes only, one-way traffic is planned for this reach.

[1]USACE. Final Integrated Feasibility Report and Environmental Impact Statement Charleston Harbor Post 45, Charleston, SC. June 2015.

The official scope of work for the Charleston Harbor simulation program contained 140 test scenarios, 108 require harbor pilot participation; 32 were turning basin tests requiring docking pilots. Most harbor pilot tests were two-way exercises that required two harbor pilots. A portion of the one-way simulations required a docking pilot to assist the harbor pilot; and a tractor tug captain to operate the tractor tug ownship. With the number of scenarios being studied, it was advantageous to reduce the number to make effective use of time. This was described within the scope of work[1]: "To reduce simulator time, preliminary evaluations of the alternatives will be conducted, and if possible, some runs will be eliminated. If an alternative is obviously either not wide enough or too wide, ERDC, CESAC, SCSPA, and the pilots can agree to eliminate it from further testing for that reach. The turning basin scenarios can be evaluated in the same manner." During testing, some alternatives were dropped or modified based upon observations during the tests and discussions immediately after each run.

[1] ERDC Coastal and Hydraulics Laboratory. Statement of Work for Charleston Harbor Improvements Ship Simulation Study. 2 November 2015.

4 Results

Results were presented in the form of track plots (Appendix A); pilot run sheets filled out after each exercise (Appendix B); and a final questionnaire from each pilot (Appendix C). Results were presented with the turning basin tests first. This was because they were tested first and also because they resulted in modifications to the alternatives. Results for harbor pilot runs were presented in different reaches progressing from the Atlantic Ocean, heading inland. Each area was discussed and included a summary table of tests and a description.

The data that were collected during a run includes the ship's position, heading, speed, as well as environmental forces acting upon it at each time it was collected. The speed, heading, and position were post-processed into the form of track plots that were input into the computer-aided-drawing software. This made possible the examination of individual and composite runs, and measuring distances between ships and obstacles to navigation (such as the channel edge, other ships, and other objects present in the environment). In the track plots, the instance of a ship leaving the plotted channel boundary during the run does not abort the exercise. In some instances, the bathymetry in the area was still deep enough to allow the ship to continue, even though the area was not within the federally defined channel. In others, the bathymetry may not be deep enough, but there were benefits in allowing the ship to continue. One benefit was the ability to observe the approximate added width the vessel needed to complete the run. In the event that multiple runs leave the channel boundary at that point, analysis of the ship's rudder angle, approach path, speed, and pilot comments help determine if that section needs to be further widened.

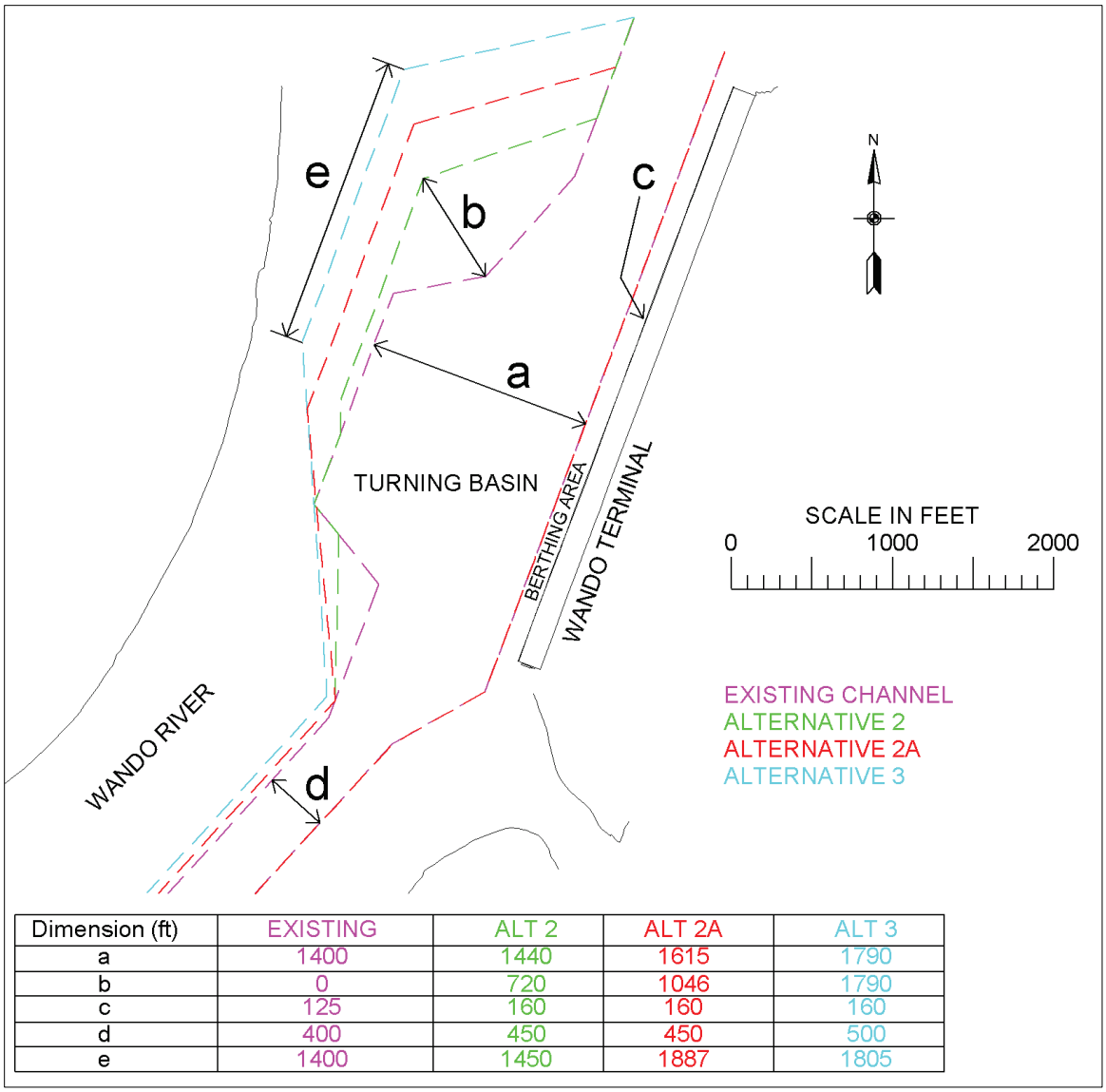
Navigation simulation studies were constrained to a somewhat limited number of exercises. Time and budget constraints, as well as the availability of mariners, all factored into the maximum number of tests that were run. That is why simulation scenarios were typically limited to the "maximum credible worst case conditions." These conditions included severe combinations of winds and currents under which the port expects to operate. This was standard practice to obtain a conservative result. Other aspects of the scenarios in this study were tug usage (number available) and docked ships (where and how many).

When subject matter experts evaluate these results, they will recognize the data being evaluated were based on a limited number of exercises, under extreme conditions that pilots may not encounter often. Additionally, there were other parameters, such as the design ships, and modified channels. These placed the mariner in unfamiliar territory with respect to his knowledge base. Pilots ran the tests using a two-dimensional visual representation of the three-dimensional world. The visual affects the depth perception of the pilot. Pilot's results from each scenario were often considered as a group when evaluating a widening proposal. This helped develop a picture of how the pilots approached the area. In most cases the resulting plot has a mass of ship tracks following a similar path with occasional tracks deviating or crossing the channel boundary. Those that deviated were analyzed further.

Wando River Turning Basin

Turning basin layouts for the Wando River Turning Basin run during the simulation tests are in Figure 5. Databases were initially developed for the Alternative 2 and Alternative 3 channels. Alternative 2 was the medium widening, and Alternative 3 was the maximum widening. There was no Alternative 1, since it refers to a deepening with no widening option that was not considered for Wando River Turning Basin. Alternative 2A was added after the first week of testing and was described in the results of Alternative 2.

Figure 5. Wando River Turning Basin alternatives.



Dimension (ft)	EXISTING	ALT 2	ALT 2A	ALT 3
a	1400	1440	1615	1790
b	0	720	1046	1790
c	125	160	160	160
d	400	450	450	500
e	1400	1450	1887	1805

The *Daniella II* was used as the ownship for all scenarios with the Wando River Turning Basin. A design draft of 49.9 ft was assumed for these runs. Scenarios for ebb and flood tidal currents were tested. Two wind conditions were tested: 20 knots and 30 knots. The wind direction was varied throughout the run. Pilots used two or three tugs at their discretion. If two tugs were used, the tugs are 4000 and 5000 hp. If three tugs are used, they are 4000, 5000, and 6000 hp. However, the pilots sometimes requested different combinations of tug horsepower. Since the horsepower of tugs can be specified in real life, the pilots were accommodated and given the tug horsepower they requested. Ships were also docked at Wando Terminal berths for these scenarios.

Track plots for all runs conducted for the Wando River Turning Basin Alternatives are shown in Appendix A, Plates 1–10. The corresponding run sheets are included in Appendix B. A summary of the scenarios is included in Table 4.

Table 4. Summary of all scenarios of Daniella II turning in the Wando River Turning Basin. *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Alt	Current	Wind	Tugs	Tugs Horsepower (hp)	Runs
1	2	All	All	3	4000 hp, 5000 hp, and/or 6000 hp	7
2	2A	Ebb	30K W	2	5000 hp and 6000 hp	3
3	2A	Ebb	30 K E	3	5000 hp (two) and 6000 hp	1
4	2A	Flood	20 K NE	2	5000 hp and 6000 hp	2
5	2A	Flood	20 K W	2	5000 hp and 6000 hp	2
6	2A	Flood	20 K W	3	4000 hp, 5000 hp and 6000 hp	1
7	3	Ebb	30 K W	2	5000 hp and 6000 hp	1
8	3	Ebb	30 K W	3	4000 hp, 5000 hp and 6000 hp 5000 hp, 5000 hp and 6000 hp	1 1
9	3	Flood	20 K W	2	4000 hp and 5000 hp 5000 hp and 6000 hp	1 1
10	3	Flood	20 K W	3	4000 hp, 5000 hp and 6000 hp	1

Alternative 2

Seven runs were conducted for Alternative 2. Five were with ebb tide currents, and two were with flood tide currents. Plate 1 shows all seven Alternative 2 runs with all conditions. Three of the seven runs ground early in the turning operation. Two other runs ground later in the turning. Two of the seven successfully turn in the Alternative 2 basin; however, the basin was considered inadequate by the pilots. With review, Alternative 3 was determined to be larger than necessary. Therefore, by consensus opinion, Alternative 2 was eliminated from further consideration, and Alternative 2A was developed. Alternative 2A, an approximate average between Alternatives 2 and 3, also straightened the western edge of Alternative 2.

Alternative 2A

Two scenarios were run in the Wando River Turning Basin Alternative 2A with ebb tide and 30 knots of wind from the west. Two tugs were used: one 5000 hp, the other 6000 hp. The track plots were shown in Plate 2. Both ships completed the turn within the channel limits but clipped a docked ship at the terminal. One of the ships came within 50 ft of the northwest side of the channel boundary. The other came no closer than 350 ft toward the same channel boundary.

One turn scenario was the Wando River Turning Basin Alternative 2A with ebb tide and 30 knots of wind from the east. This scenario used three tugs. The pilot in this run used a 5000 hp tug to replace the 4000 hp tug. Therefore, the run was conducted with two 5000 hp tugs and a 6000 hp tug. The track plot is shown in Plate 3. The turn was conducted in the approximate center of the turning basin. The ship came to within approximately 100 ft of the northwest channel edge.

Plate 4 contains the composite track plot for two ships turning in Alternative 2A, Wando River Turning Basin with flood tide and 20 knots of wind from the northeast. The runs were conducted with two tugs. One tug was 5000 hp, and the other was 6000 hp. The runs were conducted in the more southern end of the basin. Both runs came within approximately 140 ft of the northwest channel limit. One pilot comments that it was a “good run.”

Two runs, shown in Plate 5, were conducted, in the Wando River Turning Basin Alternative 2A, with flood tide and 20 knots of wind from the west. Two tugs were used; one was 5000 hp, and the other was 6000 hp. Both ships were turned more towards the southern end of the basin. One ship came within approximately 40 ft of the northwest channel limit. The other stays farther away from the northwest limit (160 ft) but came within approximately 150 ft of the southwest limit.

Plate 6 contains the track plot of a turn that was conducted with flood tide and 20 knots of wind from the west, in the Wando River Turning Basin Alternative 2A. Three tugs were used: 4000 hp, 5000 hp, and 6000 hp. The turn was in the center of the southern end of the basin, but the captain stated that the ship appeared to clip a barge and tug due to the ECDIS being “fairly off.”

Alternative 3

Plate 7 contains the track plot for one turn conducted in the Wando River Turning Basin Alternative 3, with ebb tide and 30 knots of wind from the west. Two tugs were used; one was 5000 hp, and the other was 6000 hp. The ship was turned in the middle of the basin, slightly northeast of the center. The ship came no closer than approximately 430 ft to the channel edge. The pilot noted that he could not hold the ship off the dock after turning due to a stronger wind than expected. The pilot stated that he needed one more tug and less wind.

Two runs were conducted in the Wando River Turning Basin Alternative 3, with ebb tide and 30 knots of wind from the west using three tugs. The composite track plot of the two runs is shown in Plate 8. The first pilot used 4000 hp, 5000 hp, and 6000 hp tugs and stated he had a hard time holding the ship off the dock due to the wind. The second docking pilot replaced the 4000 hp tug with a 5000 hp tug and did not have the same problem. One run came to the northern edge of the basin while the other was able to keep approximately 250 ft away from the edge.

Plate 9 contains track plots for two ships turning in the Wando River Turning Basin Alternative 3, with flood tide and 20 knots of wind from the west. Two tugs were used for this scenario. One run was conducted with a 5000 hp and 6000 hp tug; the other run was conducted with a 4000 hp and a 5000 hp tug. Both ships were turned with similarly shaped turning circles. One ship turned more in the middle of the basin, and the other was more towards the southern end. The ship turned more on the southern end came within 110 ft of the southern channel limit of the turning basin. One pilot stated that it “was a good run,” but felt the wind was setting the ship on the dock too quickly.

Plate 10 contains the turn undertaken in the Alternative 3 Wando River Turning Basin, with flood tide and 20 knots of wind from the west using three tugs. The tugs were 4000 hp, 5000 hp, and 6000 hp. The turn was conducted nearly centered in the turning basin, coming no closer than 320 ft to the northeast basin limit.

Pilot questionnaires

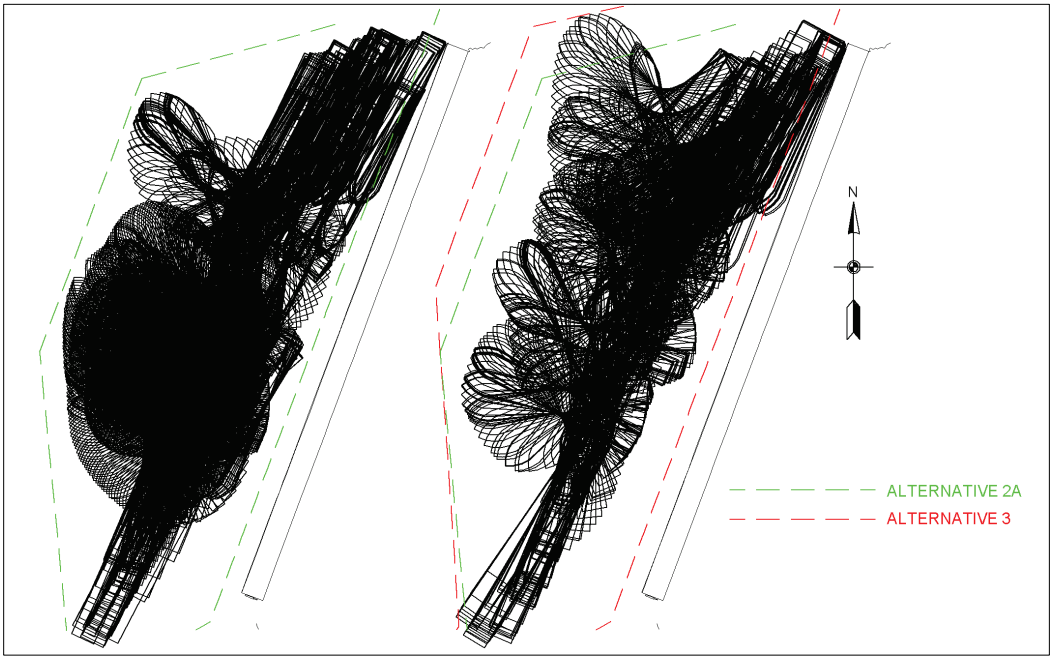
Pilot final questionnaires are included in Appendix C. The pilots state that the Alternative 2A basin provided adequate room to turn the *Daniella II*

and the additional room that was provided by Alternative 3 was nice but not necessary.

Observations

Alternative 2A was developed from the consensus opinion that Alternative 2 was not large enough, and Alternative 3 was larger than necessary, made by representatives of ERDC, CESAC, SCSPA, and the pilots. Two of the docking pilots commented that Alternative 3 was "probably not needed." Figure 6 compares all runs in Alternative 2A with those in Alternative 3 and superimposes the Alternative 2A channel on the Alternative 3 runs. Note that, other than one Alternative 3 run that touches the northern channel limit, the Alternative 3 runs generally had more clearance from the Alternative 2A channel than those runs with the Alternative 2A channel.

Figure 6. Comparison of Wando River Alternative 2A and 3 turning basins.

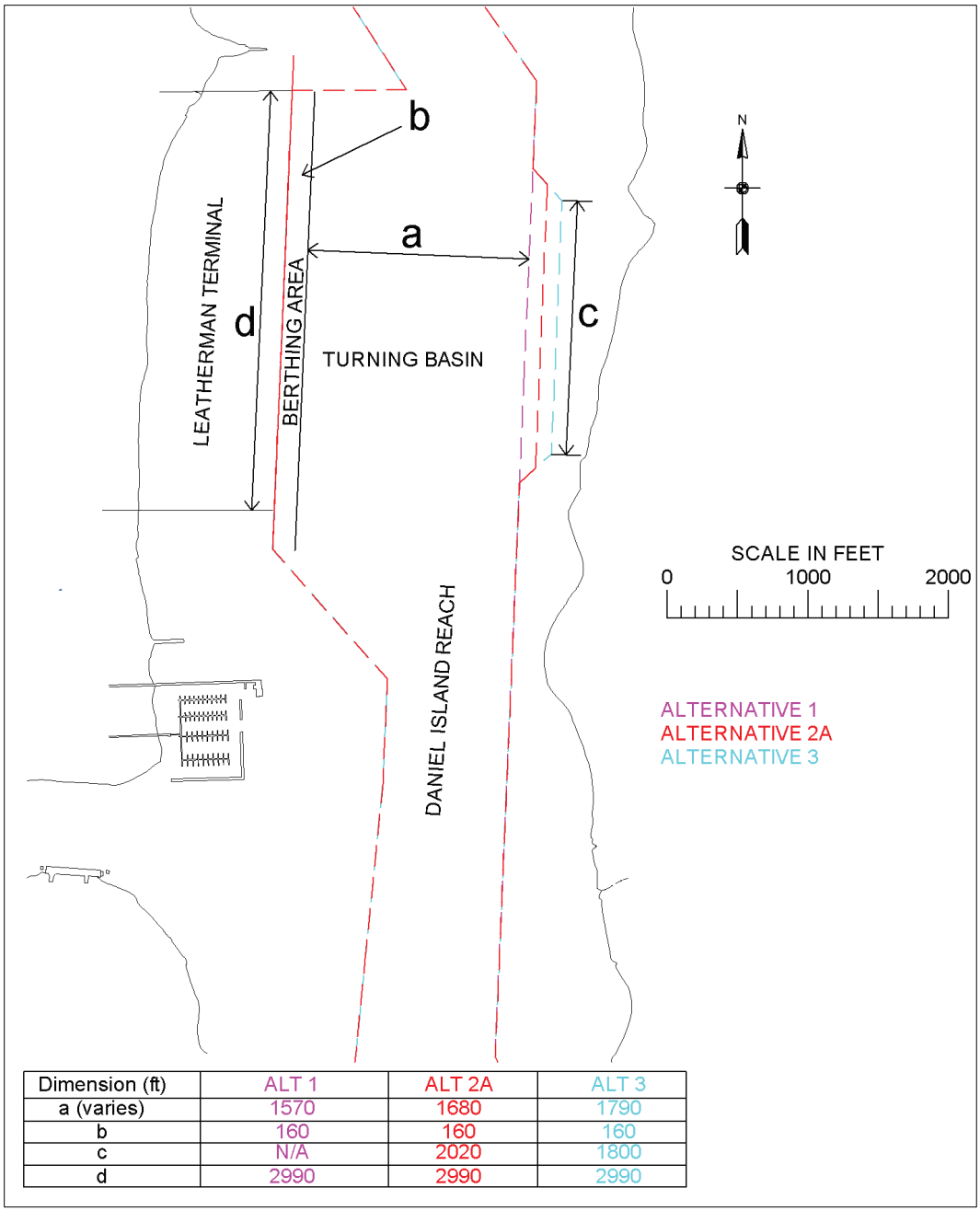


Daniel Island Reach Turning Basin

Daniel Island Turning Basin layouts for access to the Hugh K. Leatherman, Sr. Terminal (previously referred to as the New Navy Base Terminal and henceforth referred to as the Leatherman Terminal) that were run during simulation were shown in Figure 7. Databases were developed for Alternative 1 and Alternative 3 channels. Alternative 1 was the deepening without widening, and Alternative 3 was the maximum

widening. There was no Alternative 2 since it refers to an intermediate widening option that was not originally considered for this turning basin. Alternative 2A was added after the first week of testing and was shown in Figure 7. Alternative 2A was an approximate average between Alternative 1 (no widening) and Alternative 3 (maximum widening).

Figure 7. Daniel Island Reach Turning Basin Alternatives.



Dimension (ft)	ALT 1	ALT 2A	ALT 3
a (varies)	1570	1680	1790
b	160	160	160
c	N/A	2020	1800
d	2990	2990	2990

The *Daniella II* was used as the ownship for all simulations of the Daniel Island Reach Turning Basin. The *Daniella II* was a 1201 ft × 160 ft containership. The draft was 49.9 ft for the scenarios.

Scenarios were for both ebb and flood tidal currents. Wind was 20 knots from the northeast for all simulations. The wind condition was set per pilots' recommendations. The recommendations were given in the meetings of January 2012 and verified at time of simulation. Pilots had use of either two or three tugs. If two tugs were tested, the tugs were 4000 and 5000 hp. If three tugs were tested, they were 4000, 5000, and 6000 hp. Ships were also docked at Leatherman Terminal berths.

Track plots for runs of the Daniel Island Reach Turning Basin Alternatives are shown in Appendix A, Plates 11–19. The corresponding run sheets are included in Appendix B. A summary of all runs is shown in Table 5.

Table 5. Summary of all simulations of the *Daniella II* turning in the Daniel Island Reach Turning Basin. *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Alt	Heading	Current	Wind	Tugs	Tugs Horsepower (hp)	Runs
11	1	Inbound	Ebb	20K NE	2	4000 hp and 5000 hp	1
12	1	Outbound	Flood	20K NE	2	4000 hp and 5000 hp	4
13	2A	Inbound	Ebb	20K NE	2	4000 hp and 5000 hp	3
14	2A	Inbound	Flood	20K NE	2	4000 hp and 5000 hp	3
15	2A	Outbound	Ebb	20K NE	2	4000 hp and 5000 hp	4
16	2A	Outbound	Ebb	20K NE	3	4000 hp, 5000 hp, and 6000 hp	2
17	3	Inbound	Ebb	20K NE	2	4000 hp and 5000 hp	2
18	3	Inbound	Flood	20K NE	3	4000 hp, 5000 hp, and 6000 hp	4
19	3	Outbound	Ebb	20K NE	2	4000 hp and 5000 hp	5

In all tables in this report, K=knots

Alternative 1

Plate 11 contains the one simulation of an inbound ship using two tugs to turn in ebb tide with 20 knots of wind from the northeast. The ship ran aground at the beginning of the turn. The docking pilot noted that the ECDIS was off.

Four outbound runs were conducted for Alternative 1, Daniel Island Reach Turning Basin, with flood tide and two tugs. The composite track plot is shown in Plate 12. One runs aground. One of the other runs came within 160 ft of the eastern basin edge.

It was agreed that the Alternative 1 turning basin did not provide enough room, so most of the simulations focused on Alternatives 2A and 3. During these runs it was observed that Alternative 1 did not provide enough room. Therefore, by consensus opinion, Alternative 1 was eliminated from further consideration. Alternative 2A was developed to provide approximately half as much additional room as Alternative 3.

Alternative 2A

Plate 13 contains three inbound transits with turns in the Daniel Island Reach Turning Basin, Alternative 2A. The runs were conducted with ebb tide, 20 knots of wind from the northeast, and used two tugs. Two runs turned while remaining within the basin limits. Neither ship came closer than 180 ft to the eastern basin edge. An ECDIS malfunction caused the stern of the *Daniella II* to hit a docked ship.

Three inbound transits with turns in the Daniel Island Reach Turning Basin, Alternative 2A in flood tide and with 20 knots of wind from the northeast are shown in Plate 14. These turns used two tugs. The three ships performed similar turns just south of the middle of the basin. None of the three ships came closer than 300 ft to the eastern edge of the basin provided by Alternative 2A.

Four outbound runs were conducted with ebb tide and 20 knots of wind from the northeast. These runs are shown in Plate 15 and use two tugs. All turns were completed within the authorized basin limits. One ship came within approximately 40 ft of the eastern basin limit.

Plate 16 contains the track plots for two outbound turns run with ebb tide and 20 knots of wind from the northeast. Three tugs were used for these runs. The closest either ship came to the eastern basin limit is approximately 140 ft.

Alternative 3

Plate 17 contains the composite track plot for two inbound turns conducted in the Alternative 3 Daniel Island Reach Turning Basin with ebb tide and 20 knots of wind from the northeast. Two tugs were used for this simulation. Both runs were completed within the basin limits. The closest either ship came to the limit of the turning basin was approximately 180 ft.

Four inbound runs were conducted with flood tide and 20 knots of wind from the northeast. Three tugs were used for all five runs, shown in Plate 18. One run struck the dock with the ship stern while beginning the turn. Another ship left the basin on the southern end, south of the widened portion, by approximately 50 ft. If the ship turned farther north, it could remain in the widened portion. The other two runs turned farther north and had a 200 ft clearance to the east edge of the turning basin. The pilots did not comment as to whether or not additional tugs would help.

Plate 19 contains track plots for five outbound runs with ebb tide and 20 knots of wind from the northeast. Two tugs were used for each run. All vessels were turned within the channel limits. None of the runs came closer than 270 ft.

Pilot questionnaires

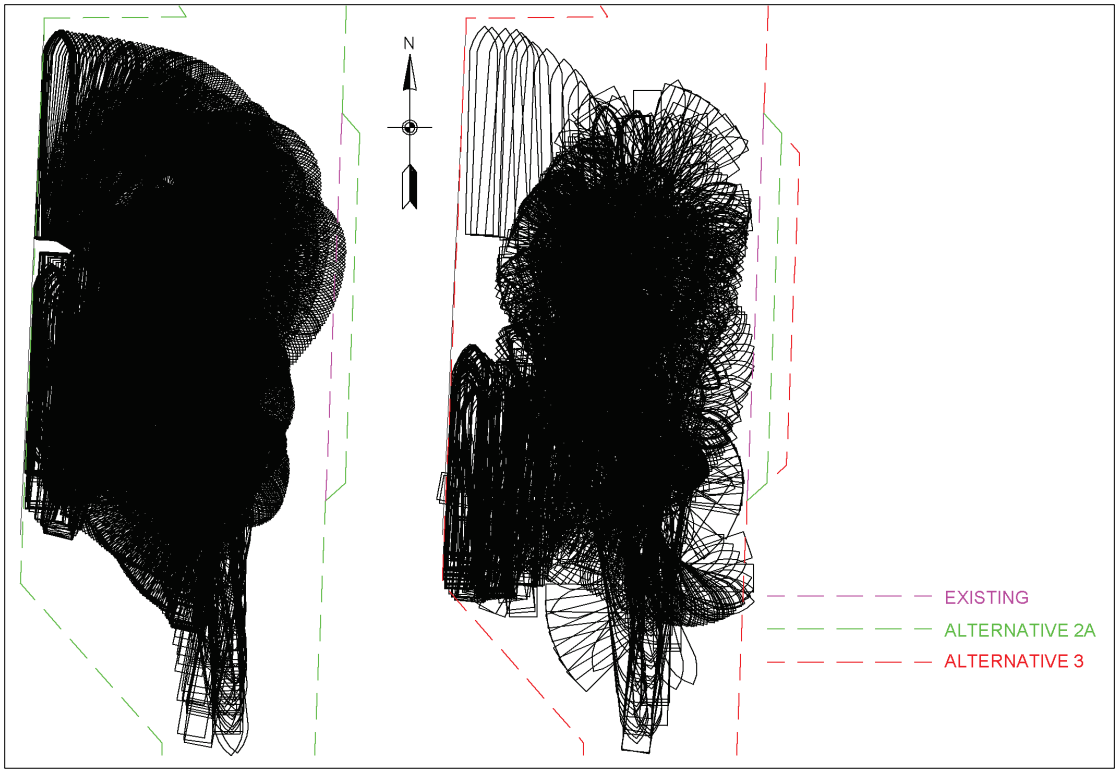
Pilot final questionnaires are included in Appendix C. The pilots stated that as in the Wando River Turning Basin, the Alternative 2A Daniel Island Reach Turning Basin provided adequate room to turn the *Daniella II* and that the additional room in Alternative 3 was nice but probably not needed.

Observations

Alternative 2A was developed from the input of representatives of ERDC, CESAC, SCSPA, and the pilots. Alternative 1 (no widening) was not large enough, and Alternative 3 was larger than necessary. One of the docking pilots commented that Alternative 3 was “probably not needed” for HLT. Another pilot stated that the “2A turning basin was adequate size to turn vessels” and that Alternative 3 was the “same with more room.” Figure 8 compares all runs of Alternative 2A with those in Alternative 3. Figure 8 also superimposes the existing channel limit on both widenings and the

Alternative 2A channel on all the Alternative 3 runs. Note that none of the Alternative 3 runs cross the Alternative 2A widener.

Figure 8. Comparison of Daniel Island Alternative 2A and 3 turning basins.



Ordnance Reach Turning Basin

Turning basin layouts that were used during simulation are shown in Figure 9. Databases were developed for the Alternative 2 and the Alternative 3 channels. Tests of the turning basin included a 50 ft widening on the east side of Filbin Creek Reach. Alternative 2 was the medium widening, and Alternative 3 was the maximum widening. There was not an Alternative 1, (i.e., the no-widening option). Alternative 2A was added after the first week of testing. The development of Alternative 2A is described later in this section.

The *Konway* was used as the ownship for all simulations of the Ordnance Reach Turning Basin. The *Konway* is an 1102 ft × 141 ft containership. The draft is 45.9 ft for simulations.

Per pilots' discussions, simulations are for both ebb and flood tidal currents, and wind was always 20 knots from the east. Pilots used either two or three tugs. If two tugs were used, the tugs were 4000 and 5000 hp.

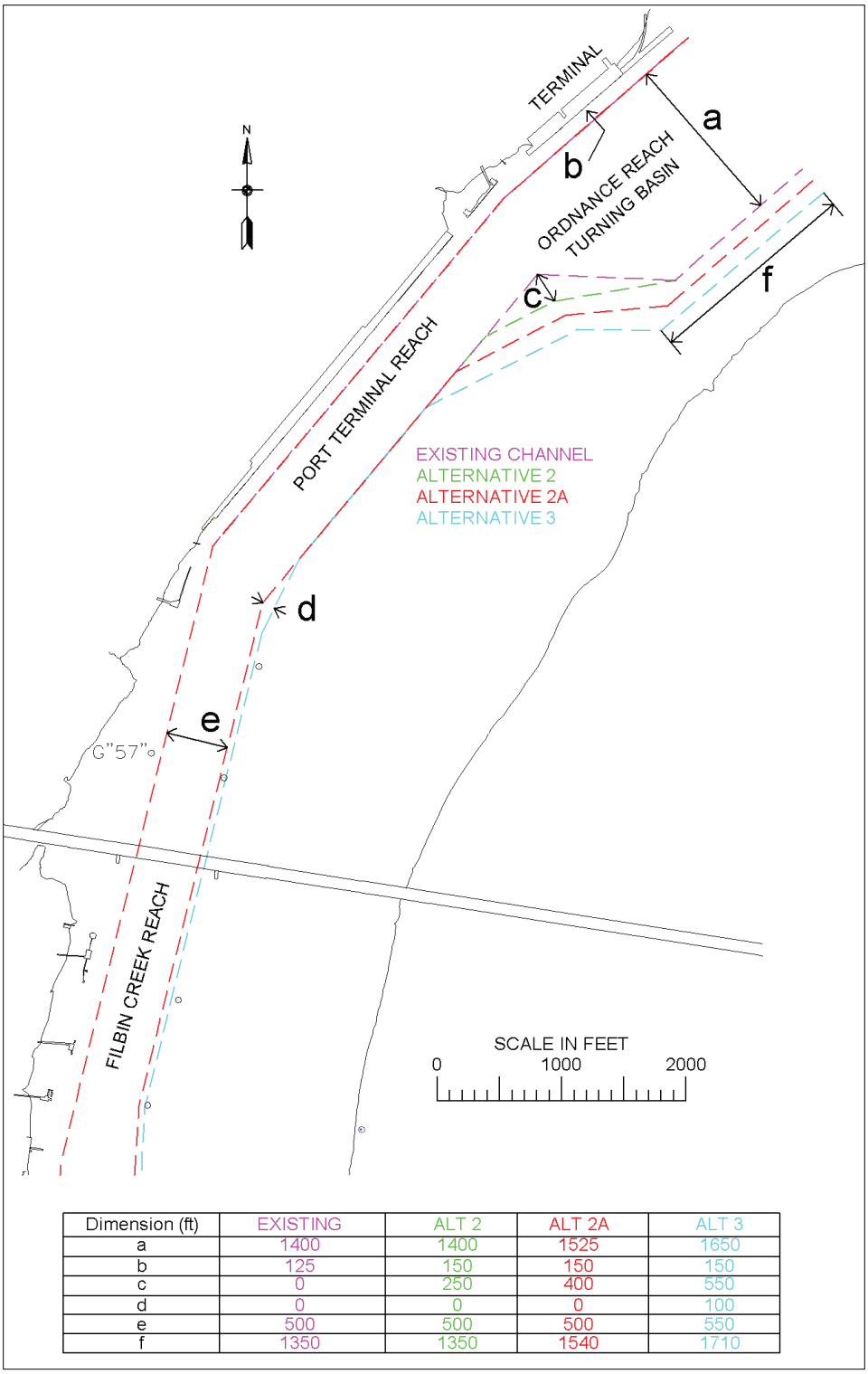
If three tugs were used, they were 4000, 5000, and 6000 hp. All runs were inbound. Any ships at berth during simulations were added at the pilots' request to represent docks in real life.

Track plots for all runs of the Ordnance Reach Turning Basin Alternatives are shown in Appendix A, Plates 20–28. The corresponding run sheets are included in Appendix B. Table 6 contains a listing of all runs for the Ordnance Reach Turning Basin.

Table 6. Summary of all simulations of the *Konway* turning in the Ordnance Reach Turning Basin. The *Konway* is an 1102 × 141 × 45.9 ft containership.

Plate	Alt	Current	Wind	Tugs	Tugs Horsepower (hp)	Runs
20	2	All	All	3	4000 hp, 5000 hp, and/or 6000 hp	8
21	2A	Ebb	20 knots E	2	4000 hp and 5000 hp	2
22	2A	Ebb	20 knots E	3	4000 hp, 5000 hp and 6000 hp	2
23	2A	Flood	20 knots E	2	4000 hp and 5000 hp	2
24	2A	Flood	20 knots E	3	4000 hp, 5000 hp and 6000 hp	2
25	3	Ebb	20 knots E	2	4000 hp and 5000 hp	3
26	3	Ebb	20 knots E	3	4000 hp, 5000 hp and 6000 hp	1
27	3	Flood	20 knots E	2	4000 hp and 5000 hp	4
28	3	Flood	20 knots E	3	4000 hp, 5000 hp and 6000 hp	1

Figure 9. Ordnance Reach Turning Basin Alternatives.



Dimension (ft)	EXISTING	ALT 2	ALT 2A	ALT 3
a	1400	1400	1525	1650
b	125	150	150	150
c	0	250	400	550
d	0	0	0	100
e	500	500	500	550
f	1350	1350	1540	1710

Alternative 2

Eight runs were conducted for Alternative 2. Six were with ebb tide currents, and two were with flood tide currents. Plate 20 shows all eight Alternative 2 runs under all conditions. Six of the eight runs grounded early in the turning operation. One run was able to completely turn within the basin limits. The remaining run grounded later in the turning maneuver. It was also observed that Alternative 3 might be larger than necessary. Therefore, by consensus opinion, Alternative 2 was eliminated from further consideration, and Alternative 2A was developed. Alternative 2A widths were an approximate average between Alternatives 2 and 3.

Alternative 2A

Plate 21 contains the track plots for two turns in ebb tide with 20 knots of wind from the east. Two tugs were used during the exercises. The closest either ship came to the southeast channel limit was approximately 250 ft.

Two turns were simulated in ebb tide with 20 knots of wind from the east and three tugs as shown in Plate 22. One run came within 90 ft of the southeast basin limit while the other ship remained over 250 ft away.

The composite track plots for two ships turning in the Alternative 2A channel with flood tide and 20 knots of wind from the east are shown in Plate 23. The runs were conducted using two tugs. Neither ship came within 250 ft of the southeast channel edge. Two runs were conducted under identical conditions with three tugs available. The composite track plots are shown in Plate 24. One ship came within approximately 150 ft of the southeast basin limit while the other only came within 300 ft. One pilot commented on the lack of bend widener in Alternative 2A, stating that they “need more room at the knuckle above buoy 58 and in the turning basin.” The “knuckle” (Filbin to Port Terminal Reaches) was modified, and added width was provided as part of the channel widening in Alternative 3.

Alternative 3

Plate 25 contains the track plots for three turns in the Alternative 3 Ordnance Reach Turning Basin. The runs were conducted with ebb tide and 20 knots of wind from the east. Two tugs were used for each run. All runs turned within the channel limits. One run came within 100 ft of the

northeast channel limit while the other two remained more than 350 ft away.

Plate 26 shows a track plot for the same exercise as in Plate 25, but with three tugs. The ship turned and got no closer than 450 ft to the southeast channel limit.

Four turns were conducted in the Alternative 3 channel with flood tide and 20 knots of wind from the east. Two tugs were available for use. The track plots are shown in Plate 27. One run came within 100 ft of the southeast basin edge, and another came within 150 ft. Neither of the other two runs came within 400 ft of the southeast channel edge.

Three tugs were used for an additional run with the same conditions as Plate 27. The results are shown in Plate 28. The run came within 25 ft of the southern end of the basin.

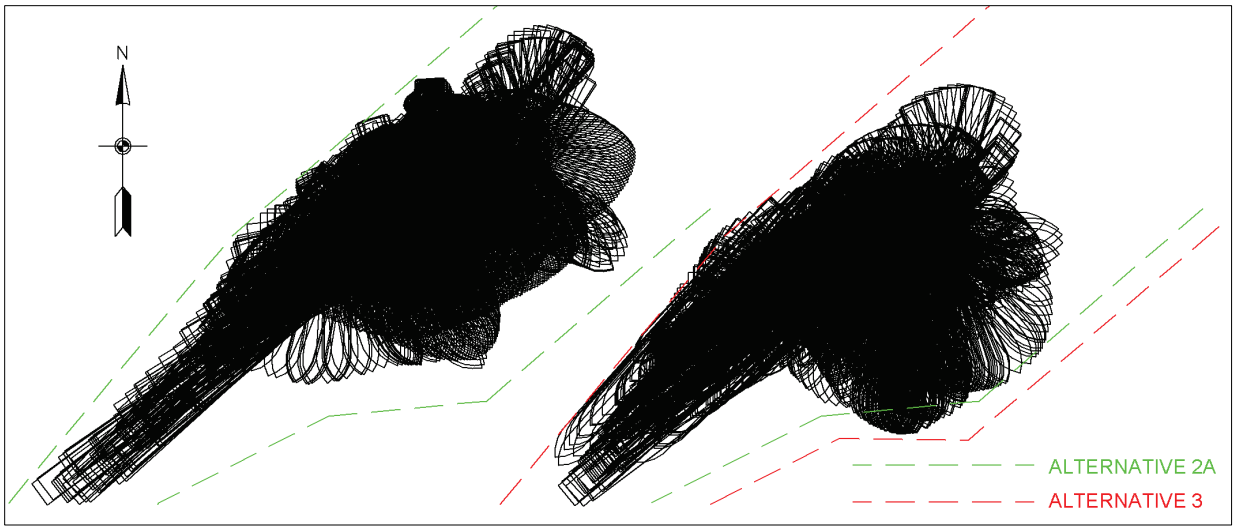
Pilot questionnaires

Pilot final questionnaires are included in Appendix C. The pilots stated that as in the Wando River and Daniel Island Reach Turning Basin, Alternative 2A basin provided adequate room to turn the *Konway,* and the additional room provided by Alternative 3 was nice but not needed.

Observations

The consensus of the representatives of ERDC, CESAC, SCSPA, and the pilots was that Alternative 2 was not large enough and Alternative 3 may have been larger than necessary; therefore, Alternative 2A was developed. One pilot stated that the 2A boundaries "[were] fine with 2 or 3 tugs. Ample room…," and that Alternative 3 was "[the] same with more room." Figure 10 compares all runs in Alternative 2A to those in Alternative 3. Figure 10 also superimposes the Alternative 2A channel on all the Alternative 3 runs.

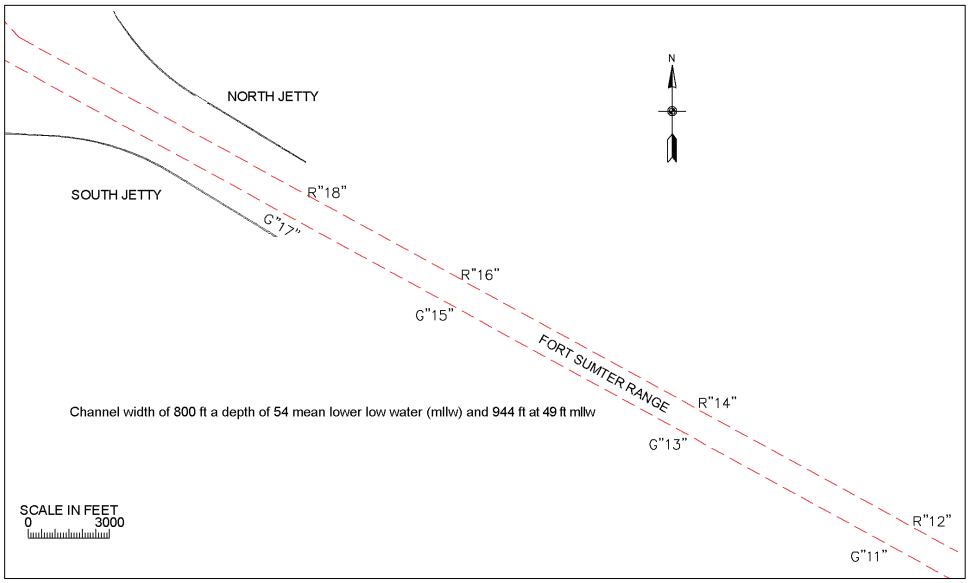
Figure 10. Comparison of Ordnance Reach Alternative 2A and 3 turning basins.



Fort Sumter Range – two-way traffic

Fort Sumter Range is the entrance channel for the Port of Charleston. The only channel improvement option simulated was Alternative 1. This was the no-widening, 800 ft channel width at 54 ft mllw depth, and 944 ft at 49 ft mllw alternative. This was the only alternative being considered in the study. These runs were to address two-way traffic issues. A relatively short reach of the Fort Sumter Range was chosen to represent the entrance. Outbound ships were started around the end of the jetties, east of buoys R18 and G17. Inbound runs began west of buoys G11 and R 12. The location of the two-way runs is shown in Figure 11.

Figure 11. Location of Fort Sumter Range runs.



Track plots of two ships meeting in the Fort Sumter Range (Entrance Channel) are shown in Plates 29–40, Appendix A. Due to scheduling and additional current information needs for Fort Sumter Range, tests for Fort Sumter Range were only conducted during the second and third weeks of testing. For all simulations, both inbound and outbound ships were the *Daniella II*. Runs were conducted for both ebb and flood tide with 30-knot winds from the northeast or the south-southwest. Due to the presence of right whales, ships transiting the Fort Sumter Range are restricted to a speed of 10 knots from November 1 until April 30. Simulations were conducted both with and without the speed restriction. Simulations were conducted for deepening without widening. Table 7 gives a summary of all two-way traffic simulations of the *Daniella II* in the Fort Sumter Range.

Table 7. Summary of all two-way traffic simulations of the *Daniella II* in the Fort Sumter Range. The *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Current	Wind	Restricted/ Unrestricted	Inbound Pilot	Outbound Pilot
29	Ebb	30K NE	R	3	8
30	Ebb	30K NE	R	6	5
31	Ebb	30K NE	R	6	5
32	Flood	30K NE	R	4	8
33	Flood	30K S-SW	R	5	6
34	Ebb	30K NE	U	4	8
35	Ebb	30K NE	U	5	6
36	Ebb	30K NE	U	6	5
37	Ebb	30K NE	U	5	6
38	Ebb	30K S-SW	U	6	5
39	Flood	30K S-SW	U	5	6
40	Flood	30K S-SW	U	5	6

Analysis of the track plots included clearance values. These clearances, to the channel edges and between the ships, were approximate distances at a given time during the meeting maneuver. Those measurements were taken at a point between the times the ships were approximately a ship's length apart, approaching each other, until they were approximately a ship's length apart after passing. These measurements were not necessarily at the time the ships were abeam. Typically, it was the shortest clearance during the maneuver. Approximate clearance values at other times during

the exercise may be given. This was true for all two-way runs, not just those in the Fort Sumter Range.

Restricted runs

Results for Pilot 3 (inbound) meeting Pilot 8 (outbound) with ebb tide and 30-knot wind from the northeast are shown in Plate 29. This was a restricted run with a maximum speed of 10 knots. Although both ships began the run at approximately the middle of their lane of the channel, both ships were forced south by the northeast wind. The inbound ship was near the center of the channel, and the outbound ship was approximately 60 ft from the channel edge when meeting. There was approximately 150 ft clearance between the ships when they meet.

Results for Pilot 6 inbound meeting Pilot 5 outbound with ebb tide and a wind of 30 knots from the northeast are shown in Plate 30. This was a restricted run with a maximum speed of 10 knots. The outbound ship remained on the south side of the channel after leaving the jetties. The outbound ship touched bottom on the starboard quarter after meeting the inbound ship, and the run ended. During meeting, the clearances to the channel limits were 180 ft for the inbound ship and 120 ft for the outbound ship. There was approximately 220 ft clearance between the ships. The pilots asked to repeat the run. The repeated run is shown in Plate 31. The run was similar to the previous run, but the outbound ship remained approximately 40 ft from the southern edge of the channel after the meeting.

Results for a speed-restricted run with Pilot 4 (inbound) meeting Pilot 8 (outbound) with flood tide and 30 knots of wind from the northeast are shown in Plate 32. The track plot indicated that the pilots had no trouble staying in their lane of the channel. Both ships had a clearance of approximately 90 ft to the channel's edge and approximately 350 ft between them. However, the pilots stated that they felt no wind for this exercise.

One speed-restricted run was conducted with flood tide and 30 knots of wind from the south-southwest. This vessel track is shown in Plate 33. Pilot 5 was inbound, and Pilot 6 was outbound. The outbound pilot stated that his ship required excessive use of rudder to stay on his side of the channel. He stated this was caused by the reduced speed and heavy set. The outbound ship grounded approximately a ship's length from the inbound ship. The inbound ship had approximately 200 ft clearance to

the channel limit. The distance between the ships was not given due to the grounding.

Unrestricted runs

Results for Pilot 4 (inbound) meeting Pilot 8 (outbound) with ebb tide and 30 knots of wind from the northeast are shown in Plate 34. Since the ship speed was unrestricted, the pilots transited the channel at 13 to 14 knots. The track plot shows the pilots were better able to control their ships and meet safely at these speeds. Inbound and outbound ships had approximately 250 ft and 60 ft clearance to the channel's edge, respectively. There was approximately 160 ft clearance between the ships.

The track plot for inbound Pilot 5 meeting outbound Pilot 6 with speed unrestricted is shown in Plate 35. This run was undertaken with 30 knots of wind from the northeast and ebb tide. The pilots were able to better control their ships due to the higher speed (13 to 14 knots). They kept well clear (approximately 380 ft clearance) of each other, with the outbound ship approximately 50 ft from the channel edge and the inbound ship approximately 80 ft from the channel edge at meeting. Pilot 5 stated "More than 10 knots necessary for safe passage of vessels."

Results for Pilot 6 (inbound) meeting Pilot 5 (outbound) with ebb tide and 30 knots of wind from the northeast are shown in Plate 36. Once again, the unrestricted speed allowed the pilots to better control their ships. The inbound ship had approximately 180 ft clearance to the channel limit; the outbound ship had approximately 70 ft clearance. There was approximately 220 ft clearance between the ships. One pilot stated that the safe passing was due to adequate speed in the offshore channel. The run was repeated with the pilots switching positions (Plate 37) with nearly identical clearances and results. The inbound ship had approximately 170 ft clearance to the channel limit; the outbound ship had approximately 60 ft clearance. There was approximately 220 ft clearance between the ships.

Results for an unrestricted speed exercise with Pilot 6 (inbound) meeting Pilot 5 (outbound) with ebb tide and 30 knots of wind from the south-southwest are shown in Plate 38. The pilots transited at 13 to 14 knots. The track plot showed the pilots were better able to control their ships and meet safely. The inbound and outbound ships had approximately 260 ft and 80 ft channel clearance, respectively. The ships were approximately

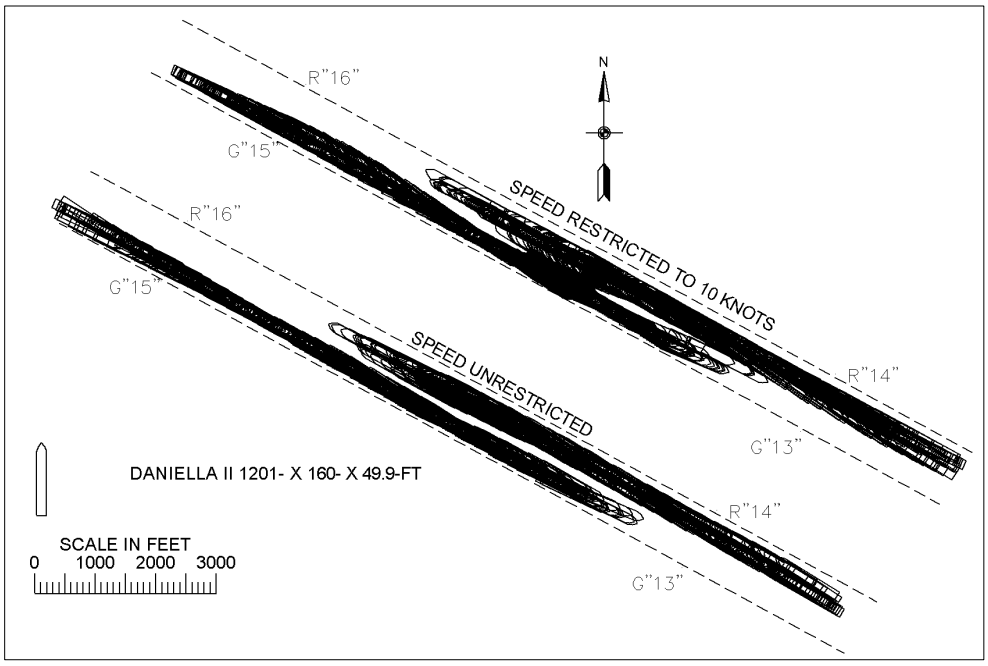
220 ft apart when they were abeam of each other. Once again the pilots stated that the higher speed was critical to the maneuver.

Plate 39 contains the track plot for two ships meeting in Fort Sumter Range with flood tide and 30 knots of wind from the south-southwest. Pilot 5 was inbound, and Pilot 6 was outbound. Ship speed was unrestricted for this exercise. The inbound and outbound ships had approximately 150 ft and 120 ft clearance to the channel's edge, respectively. There was approximately 240 ft clearance between the ships. The pilots stated they adequately controlled the ship with less rudder and were able to meet safely. The pilots requested to repeat the run. The repeat is shown in Plate 40 with similar results. The inbound and outbound ships had approximately 250 ft and 90 ft channel clearance respectively. The ships were approximately 210 ft apart when they were abeam of each other.

Observations

When the ship's speed was restricted to 10 knots, there was an obvious increase in the ship's effective beam and a decrease in steerage. While two-way traffic was viable at the slower speed, the ships simply did not handle as well. Figure 12 shows a comparison plot of all unrestricted and restricted runs.

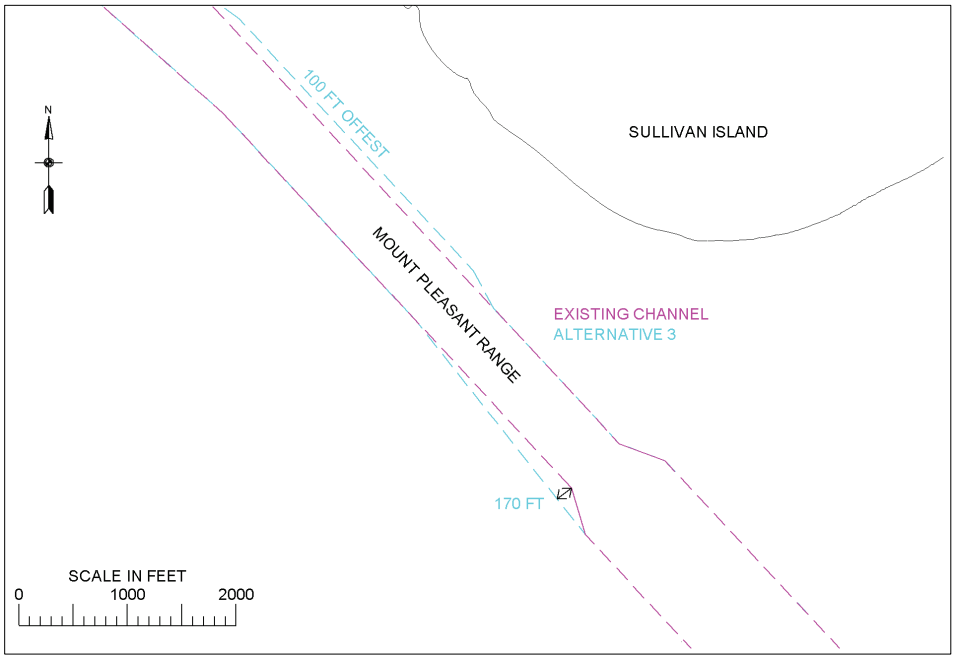
Figure 12. Comparison between restricted and unrestricted runs.



Mount Pleasant Range

Modifications to the Mount Pleasant Range (Figure 13) were designed to capture nonstructural natural deep areas that pilots indicated were already in use. In concurrence with the pilots' comments in the final questionnaire, this nonstructural alternative was found to be acceptable.

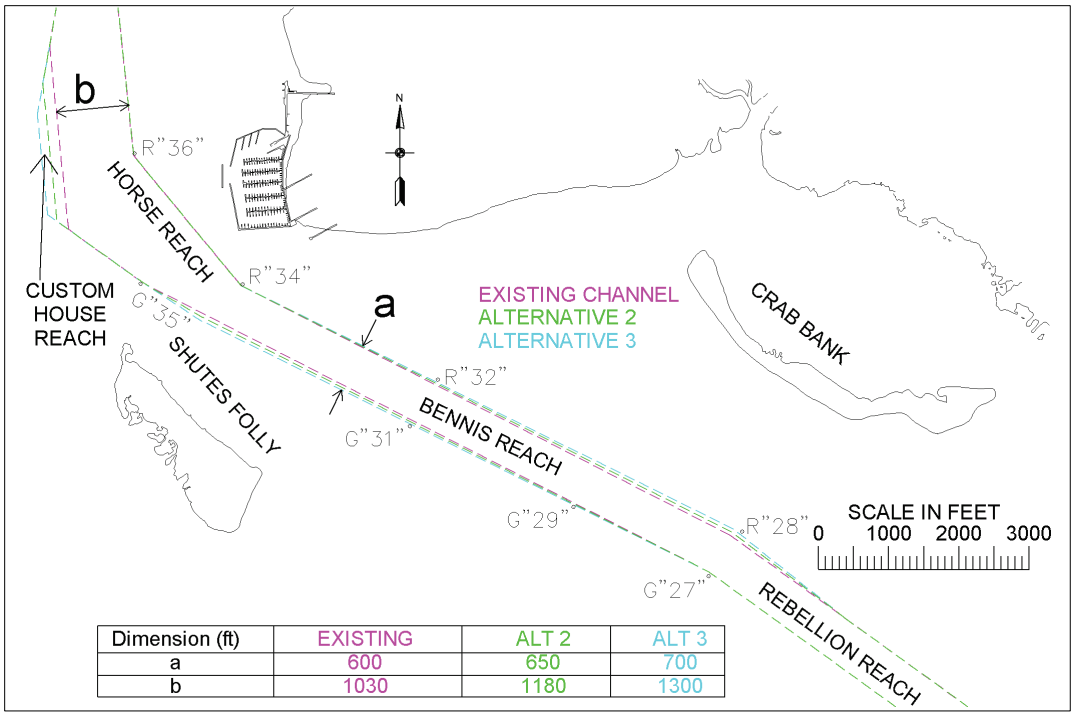
Figure 13. Nonstructural widening at Mount Pleasant Range.



Bennis Reach – two-way traffic

There were three alternatives for the Bennis Reach, shown in Figure 14. Alternative 1 was the deepening-without-widening alternative. Alternative 2 was the medium widening alternative of 50 ft in Bennis for a total of 650 ft and a widening of Hog/Custom/Horse intersection of 150 ft. Alternative 3 was the maximum widening alternative of 100 ft in the Bennis Reach for a total of 700 ft and a widening of 275 ft in the Hog/Custom/Horse intersection. For all simulations, both the inbound and outbound ship was the *Daniella II*. Runs were conducted for both ebb and flood tide with 30 knot wind from the northeast, south-southeast or south-southwest. Track plots of ships meeting and passing in the Bennis Reach are shown in Plates 41–61.

Figure 14. Bennis Reach Alternatives 1, 2, and 3.



A summary of all runs conducted in Bennis Reach is included as Table 8.

Table 8. Summary of all two-way simulations of the *Daniella II* in Bennis Reach. The *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Alt	Current	Wind	Inbound Pilot	Outbound Pilot
41	1	Ebb	30K S-SW	1	2
42	1	Flood	30K NE	1	2
43	1	Flood	30K S-SW	1	2
44	2	Ebb	30K NE	8	3
45	2	Ebb	30K NE	6	5
46	2	Ebb	30K S-SW	4	3
47	2	Ebb	30K S-SW	6	5
48	2	Flood	30K NE	4	8
49	2	Flood	30K NE	6	5
50	2	Flood	30K S-SW	5	6
51	2	Flood	30K S-SW	6	5
52	3	Ebb	30K S-SE	1	2
53	3	Ebb	30K S-SE	4	8
54	3	Ebb	30K NE	5	6

Plate	Alt	Current	Wind	Inbound Pilot	Outbound Pilot
55	3	Ebb	30K S-SE	1	2
56	3	Ebb	30K S-SW	1	2
57	3	Ebb	30K S-SW	1	2
58	3	Ebb	30K S-SW	6	5
59	3	Flood	30K NE	5	6
60	3	Flood	30K S-SW	8	4
61	3	Flood	30K S-SW	6	5

Alternative 1

The track plot of two ships (Pilot 1, inbound; Pilot 2, outbound) is shown in Plate 41. These ships met in Mount Pleasant Range in the Alternative 1 channel, with ebb tide and 30 knots of wind from the south-southwest. This was a short run with both ships starting in Bennis Reach. The ships met between buoys G31 and G29. The stern of the inbound ship clipped the northern edge of the channel. The outbound ship ran on the channel edge prior to the passing and had approximately 60 ft clearance at the meeting. There was approximately 100 ft clearance between the ships.

Plate 42 shows the track plot for an inbound ship, conned by Pilot 1, meeting an outbound ship, conned by Pilot 2. The test conditions were flood tide and 30 knots of wind from the northeast. This was a short run with both ships starting in Bennis Reach. The ships met near buoy G31. The stern of the outbound ship left the channel by approximately 50 ft. The inbound ship had approximately 20 ft clearance to the channel edge. There was approximately 130 ft clearance between the ships.

An Alternative 1 channel run, with Pilot 1 (inbound) meeting Pilot 2 (outbound) in flood tide with 30 knots of wind from the south-southwest is shown in Plate 43. This was a short run with both ships starting in Bennis Reach. The inbound ship left the channel by approximately 10 ft prior to meeting the outbound ship. The ships met near buoy G31. The stern of the outbound ship clips the channel's southern edge. There was approximately 130 ft clearance between the ships. The inbound ship had approximately 40 ft clearance to the channel limit during meeting.

Based upon the pilots' difficulties in remaining within the channel while passing, even with short, straight runs that did not involve either ship

turning into Bennis Reach, Alternative 1 was dropped from testing after these runs. If during simulations for Alternative 2 it became apparent that a narrow channel might be acceptable, then the option was always available to conduct additional simulations for Alternative 1.

Alternative 2

Plate 44 contains the Alternative 2 track plot for an inbound ship (conned by Pilot 8) meeting an outbound ship (conned by Pilot 3). The test conditions were ebb tide and 30 knots of wind from the northeast. The ships met near buoy G29. The inbound ship came within approximately 30 ft of the channel edge. The outbound ship had approximately 40 ft of clearance to the channel's edge, and there was approximately 200 ft between ships.

The Alternative 2 track plot of Pilot 6 (inbound) meeting Pilot 5 (outbound) in ebb tide with 30 knots of wind from the northeast is shown in Plate 45. The ships met between buoys R34 and R32. The outbound ship left the channel by approximately 30 ft. The outbound pilot stated that he used the extra area provided by Alternative 2, but the ship-to-ship interaction pulled his stern out of the channel. The inbound ship came within 10 ft of the channel edge near buoy R32. There was an approximate 200 ft clearance between the ships when they were abeam of each other.

The track plot of Pilot 4 (inbound) meeting Pilot 3 (outbound) in ebb tide with 30 knots of wind from the south-southwest is shown in Plate 46. They met near buoy G29. The inbound ship also left the channel by nearly 20 ft on the north while turning at the end of Rebellion Reach. There was approximately 130 ft clearance between the ships when they met, and the outbound ship had approximately 80 ft clearance to the channel's edge.

The two-way track plot, Plate 47, for ebb tide with 30 knots of wind from the south-southwest for Alternative 2, Pilot 6 (inbound) and Pilot 5 (outbound). The two ships met between buoys G29 and G31. Both ships remained in the channel. There was approximately 100 ft of clearance between the ships. The inbound ship had approximately 20 ft clearance to the channel's edge, and the outbound ship had approximately 60 ft clearance to the channel's edge. One pilot stated "Ship interaction too much post passing, there is no safety factor."

Plate 48 shows the results of a simulation of flood tide and a 30-knot wind from the northeast in the Alternative 2 channel. Pilot 4 was inbound, and Pilot 8 outbound. Pilot 8 utilized all of the widening on the west side of Hog/Custom/Horse Reach. The ships met just west of buoy R32. The outbound ship was approximately 50 ft out of the channel. The inbound ship was along the channel edge but not out of the channel. There was approximately 200 ft clearance between the ships.

The track plot of two-way traffic in the Alternative 2 channel with flood tide and 30 knots of wind from the northeast is shown in Plate 49. Pilot 6 was inbound, and Pilot 5 was outbound. The outbound pilot began his turn on Bennis Reach early and ended up on the north side of the channel near buoy R34. He then went out of the south side of the channel by approximately 50 ft near buoy G31 while meeting the inbound ship. The inbound ship had approximately 50 ft clearance to the channel's edge, and there was approximately 150 ft clearance between the ships.

Plate 50 contains the track plot for the two-way simulation of flood tide and 30 knots of wind from the south-southwest in Alternative 2. The inbound ship was conned by Pilot 5 while the outbound ship was conned by Pilot 6. The outbound ship left the west side of the channel by approximately 50 ft while turning in Hog/Custom/Horse Reach. The ships met just west of buoy G31. The outbound ship left the channel by approximately 25 ft. There was approximately 150 ft clearance between the ships. The inbound ship came to within approximately 30 ft of the channel edge near buoy R32.

Plate 51 contains the track plot for the Alternative 2 channel with flood tide and 30 knots of wind from the south-southeast with Pilot 6 (inbound) and Pilot 5 (outbound). Pilot 5 utilized the Alternative 2 Hog/Custom/Horse Reach widener as he made the turn into Bennis Reach. The two ships met just west of buoy G31 with the inbound ship leaving the channel by a little less than 40 ft. The clearance between the ships was approximately 170 ft. The inbound ship had approximately 40 ft clearance to the channel's edge near buoy R32. One pilot stated there was not enough room for any safety margin.

Alternative 3

The track plot of two ships (Pilot 1 inbound and Pilot 2 outbound) meeting in Bennis Reach in the Alternative 3 channel with ebb tide and 30 knots of

wind from the south-southeast is shown in Plate 52. This was a short run with both ships starting in the Bennis Reach. The ships met west of buoy G29. The inbound and outbound ships had approximately 60 ft of clearance to their respective channel's edge. There was approximately 150 ft clearance between the ships when they met.

Plate 53 shows the track plot of Pilot 4 (inbound) meeting Pilot 8 (outbound) near buoy G29. The exercise was undertaken in the Alternative 3 channel with ebb tide and 30 knots of wind from the south-southeast. The inbound ship left the channel by approximately 30 ft at the end of Rebellion Reach when turning onto Bennis Reach. The outbound ship was within 10 ft of the southern channel edge west of buoy G31 during the meeting. The inbound ship had approximately 70 ft clearance to the channel's edge during meeting. There was approximately 160 ft clearance between the ships.

Plate 54 contains the track plot for a short run conducted in Alternative 3 with ebb tide and 30 knots of wind from the northeast. The exercise was conducted with Pilot 5 inbound and Pilot 6 outbound. Both ships began in Bennis Reach and met west of buoy G29. The inbound ship had approximately 40 ft clearance to the channel's edge, and the outbound had approximately 100 ft clearance to the channel's edge. There was approximately 100 ft clearance between the ships when they met.

The track plot of two ships (Pilot 1 inbound and Pilot 2 outbound) meeting in Bennis Reach in the Alternative 3 channel with ebb tide and 30 knots of wind from the south-southeast is shown in Plate 55. This was a short run with both ships starting in Bennis Reach. The ships met west of buoy G29. The inbound and outbound ships had approximately 60 ft and 50 ft clearance to their respective channel edges. The clearance between the ships was approximately 180 ft.

Plate 56 contains the track plot of a short run in the Alternative 3 Bennis reach, with Pilot 1 inbound and Pilot 2 outbound, with ebb tide and 30 knots of wind from the south-southwest. The inbound ship had approximately 70 ft clearance to the channel's edge, and the outbound ship had approximately 50 ft clearance. There was approximately 120 ft clearance between the ships. The run was repeated at the pilots' request. That run is shown in Plate 57. The inbound and outbound ships had

approximately 30 ft and 35 ft clearance to their respective channel edges. The clearance between the ships was approximately 170 ft.

Plate 58 contains the track plot of a short run with Pilot 6 inbound and Pilot 5 outbound in the Alternative 3 Bennis reach with ebb tide and 30 knots of wind from the south-southwest. Both the inbound and outbound ships had approximately 40 ft clearance to their respective channel edges. There was approximately 90 ft clearance between the ships when they met.

Plate 59 contains the track plot of a run in which the outbound ship was delayed to ensure the ships met near buoy R36 in Horse Reach to test meeting in the widener. The simulation was conducted in the Alternative 3 channel with flood tide and 30 knots of wind from the northeast. Pilot 5 was on the inbound ship and Pilot 6 on the outbound ship. The outbound remained on the centerline in the widener, and the pilot stated he "didn't properly utilize the Custom House widener." This forced the inbound ship to run along the channel edge between buoys R34 and R36. There was more than 200 ft clearance between the ships when they met. The outbound ship had over 500 ft clearance to the edge of the Hog/Custom/Horse Reach widener because he did not properly utilize it.

Plate 60 contains the track plot of a short two-way run in Alternative 3, with flood tide and 30 knots of wind from the south-southwest. Pilot 8 was inbound, and Pilot 4 was outbound. The inbound ship had approximately 70 ft clearance to the channel edge, and the outbound ship had approximately 80 ft clearance to the channel edge. There was approximately 160 ft clearance between the ships.

Plate 61 contains the track plot of a short two-way run in Alternative 3, with flood tide and 30 knots of wind from the south-southwest. Pilot 6 was inbound, and Pilot 5 was outbound. The ships met near buoy R32. The inbound ship had approximately 35 ft clearance to the channel edge, and the outbound ship left the channel by approximately 30 ft. There was approximately 300 ft clearance between the ships.

Observations

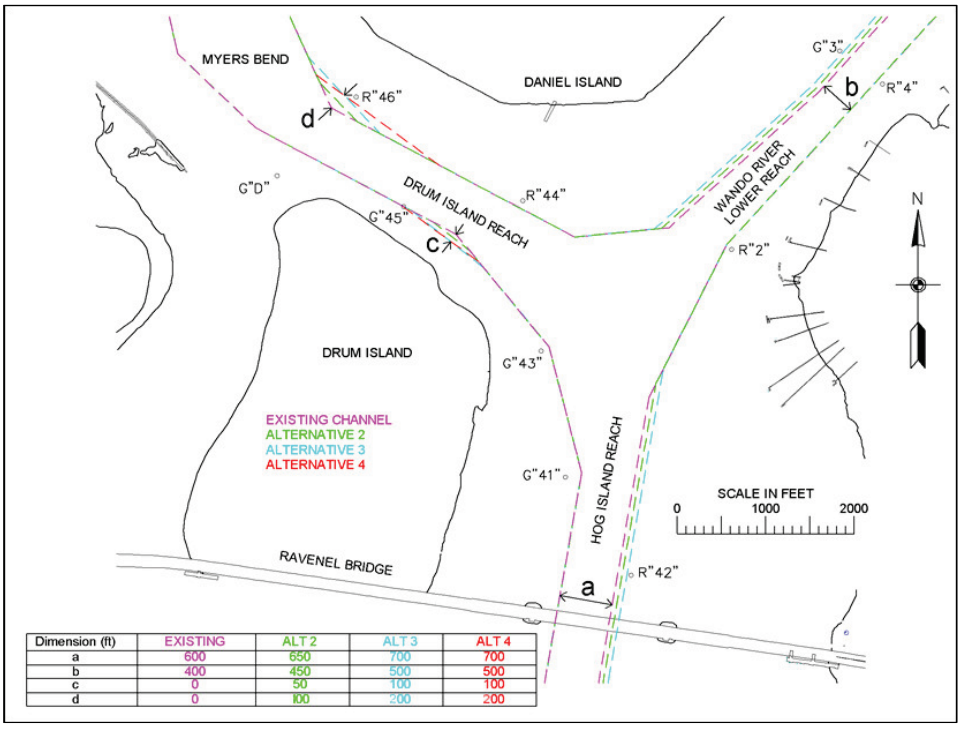
Alternative 1 did not provide adequate room for two-way traffic with ships the size of the *Daniella II*. Alternative 2 was an improvement, but ships in six of the eight runs left the channel. The results from Alternative 3 were not perfect, but the pilots unanimously stated in their final questionnaires

that it would "allow ships to meet safely." They also stated that it provides "sufficient room," "creates numerous opportunities for safe passing," and "ship handling the way it is supposed to be." The pilots did not voice support for either Alternative 1 or 2 other than to say that Alternative 2 is an improvement over Alternative 1. Observations for the Hog/Custom/Horse Reach widener is discussed with two-way traffic in Hog Island Reach due to overlapping scenarios.

Hog Island Reach, Wando River Turn, and Drum Island Reach

The area defined by the northern end of Hog Island Reach, Drum Island Reach, Myers Bend, and the turn into the Wando River was a comprehensive navigation system evaluated in this study via a series of simulation exercises. The improvements for the area are shown in Figure 15 and are as follows.

Figure 15. Hog Island Reach, Drum Island Reach, Myers Bend, and the turn into the Wando River.



Dimension (ft)	EXISTING	ALT 2	ALT 3	ALT 4
a	600	650	700	700
b	400	450	500	500
c	0	50	100	100
d	0	100	200	200

Hog Island Reach

Alternative 1 was the no-widening measure, and the channel width remains at 600 ft. Alternative 2 provided an additional 50 ft on the east

side of the channel for a total of 650 ft. Alternative 3 provided an additional 100 ft on the east side of the channel for a total of 700 ft.

Two-way traffic in Hog Island Reach

Results of the simulations of two-way traffic in Hog Island Reach are shown in Plates 62–79. Two-way traffic in Hog Island Reach was done with the *Daniella II* as both the inbound and outbound ship. The inbound ship was started on the northern end of Bennis Reach, which allowed testing of the turn at Hog/Custom/Horse Reach. The outbound ship started in the Wando River, which allowed testing of the Wando River channel widths as well as the turn into Hog Island Reach.

A summary of all two-way simulations of the *Daniella II* in Hog Island Reach is included as Table 9.

Table 9. Summary of all two-way simulations of the *Daniella II* in Hog Island Reach. The *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Alt	Current	Wind	Inbound Pilot	Outbound Pilot
62	1	Ebb	30K S-SW	1	2
63	1	Ebb	30K S-SW	2	1
64	1	Flood	30K NE	1	2
65	2	Ebb	30K NE	4	3
66	2	Ebb	30K S-SW	2	1
67	2	Ebb	30K S-SW	4	3
68	2	Flood	30K NE	4	5
69	2	Flood	30K NE	6	5
70	2	Flood	30K S-SW	6	5
71	2	Flood	30K S-SW	5	8
72	3	Ebb	30K NE	5	6
73	3	Ebb	30K NE	6	5
74	3	Ebb	30K S-SW	5	6
75	3	Ebb	30K S-SW	6	5
76	3	Flood	30K NE	1	2
77	3	Flood	30K NE	3	8
78	3	Flood	30K S-SW	5	6
79	3	Flood	30K S-SW	6	5

Alternative 1

The track plot of two ships (Pilot 1 inbound and Pilot 2 outbound) meeting in Hog Island Reach in the Alternative 1 channel with ebb tide and 30 knots of wind from the south-southwest is shown in Plate 62. The outbound ship made the turn from the Wando River in the approximate center of the channel and met the inbound ship at Horse Reach. The ships met south of Buoy R38 with approximately 60 ft clearance. The inbound ship came within approximately 15 ft of the channel edge at Buoy R38. The outbound ship had approximately 240 ft clearance to the edge of the Hog/Custom/Horse Reach widener. One pilot stated the meeting was "very close."

Plate 63 contains the track plot of two ships (Pilot 2 inbound and Pilot 1 outbound) meeting in Hog Island Reach in the Alternative 1 channel with ebb tide and 30 knots of wind from the south-southwest. Both ships stayed east of their halves of the channel. The inbound ship stayed in the channel while turning at Horse Reach. The outbound ship came within 25 ft of the channels edge when turning from the Wando River. The ships met just north of Buoy R38 with the inbound ship on the channel's edge where it remained for the length of Hog island Reach. The outbound ship had approximately 70 ft clearance to the channel edge at the meeting, and there was approximately 100 ft clearance between the two ships.

Two-way traffic in the Alternative 1 Hog Island Reach was tested one last time as shown in Plate 64. The run was conducted with flood tide and 30 knots of wind from the northeast. Pilot 1 was inbound, and Pilot 2 was outbound. Both ships remained in the channel while turning into Hog Island Reach. The two ships met near the bridge with the inbound ship going over 50 ft out of the channel. The outbound ship had approximately 30 ft clearance to the channel edge, and there was approximately 180 ft clearance between the ships. After this run, the pilots stated that meeting these two large ships in the deepened channel without widening was too dangerous, and they would not attempt it in real life. There was a consensus decision for no further testing of two-way traffic with the *Daniella II* in Hog Island Reach, Alternative 1.

Alternative 2

The track plot of two ships (Pilot 4 inbound and Pilot 3 outbound) meeting in the Alternative 2 Hog Island Reach with ebb tide and 30 knots of wind

from the northeast is shown in Plate 65. The ships met just north of Buoy R38, the inbound ship clipped the eastern channel edge. The outbound ship had approximately 40 ft clearance to the channel edge. The ships were approximately 180 ft apart when they were abeam of each other. Both ships remained in the channel for the remainder of the run.

Plate 66 shows the track plot of inbound Pilot 2 meeting outbound Pilot 1 in the Alternative 2 channel. The exercise was conducted with ebb tide and 30 knots of wind from the south-southwest. The ships met near Buoy G39. The inbound ship left the channel by approximately 30 ft, maintaining approximately 200 ft between the ships. The inbound ship had approximately 50 ft clearance to the channel edge during meeting. Neither the inbound nor outbound ship had problems making the turns at Alternative 2 Hog/Custom/Horse Reach or into/out of the Wando River.

The track plot for a two-way simulation in Hog Island Reach, Alternative 2, with ebb tide and 30 knots of wind from the south-southwest with Pilot 4 inbound and Pilot 3 Outbound, is shown in Plate 67. The ships met in the area of Buoy R38. The ships stayed in the channel boundaries; the outbound ship came to within approximately 30 ft of the channel edge, and the inbound came to within approximately 50 ft of the channel edge. There was approximately 200 ft clearance between the ships. Neither ship had issues with any other portion of the exercise. However, the inbound ship transit stopped before the ship entered into the Wando River. Note the ship was in good position to make the turn.

Plate 68 contains the track plot of two-way traffic in Alternative 2 Hog Island Reach, flood tide and 30 knots of wind from the northeast with Pilot 4 (inbound) and Pilot 5 (outbound). The ships met just south of the Ravenel Bridge. The outbound ship clipped the corner of the channel by buoy G41. The inbound ship touched the eastern channel edge near buoy R38, just prior to and during the meeting the outbound ship. The outbound ship had approximately 150 ft clearance during the meeting and was stopped just after the meeting occurs. There was approximately 90 ft clearance between the ships during meeting. The inbound ship continued into the Wando River and clipped the corner by Buoy R2.

Plate 69 contains the track plot of two-way traffic in Alternative 2 Hog Island Reach with flood tide and 30 knots of wind from the northeast with Pilot 6 inbound and Pilot 5 outbound. The outbound ship touched

the channel edge near buoy G41. The two ships met just south of the bridge. The inbound ship was outside the east side of the Hog Island Reach for most of the reach and was approximately 30 ft out of the channel when meeting the outbound ship. The outbound ship had approximately 50 ft clearance to the channel edge. There was approximately 150 ft clearance between the ships when they met. The pilot stated that he had gotten too close to the red side.

The track plot of Pilot 5 inbound meeting Pilot 6 outbound in Alternative 2 Hog Island Reach, with flood tide and 30 knots of wind from the south-southwest, is shown in Plate 70. The two ships met just north of the Ravenel Bridge. Both ships were outside of the channel limits. The inbound ship was out by approximately 10 ft and the outbound by approximately 55 ft. There was approximately 250 ft clearance between the ships when they met.

Plate 71 shows the track plot of Pilot 5 inbound and Pilot 4 outbound in the Alternative 2 Hog Island Reach. The exercise was conducted with flood tide and 30 knots of wind from the south-southwest. The ships met just south of the bridge and stayed within the channel limits. However, both the inbound and outbound ship came within 5 ft of the channel edge. There was approximately 240 ft clearance between the ships during meeting. Neither the inbound nor outbound ship had problems making the turns at the Alternative 2 Hog/Custom/Horse Reach nor into/out of the Wando River.

Alternative 3

The track plot of Pilot 5 inbound and Pilot 6 outbound in the Alternative 3 Hog Island Reach was shown in Plate 72. The simulation was conducted with ebb tide and 30 knots of wind from the northeast. The ships met more in Horse Reach than in Hog Island Reach as intended. The area where they met is wider than Hog Island Reach, so the exercise does not provide much information on the effectiveness of Alternative 3 Hog Island Reach. Neither ship had any difficulty during the other portions of the run. One pilot termed this a “successful meeting.”

The track plot of Pilot 6 (inbound) and Pilot 5 (outbound) in Alternative 3 Hog Island Reach with ebb tide and 30 knots of wind from the northeast is shown in Plate 73. The two ships met just south of R38. The inbound ship left the channel by approximately 30 ft while making the turn at buoy R38. The Pilot stated “need all of the widener on the east side of Hog Isle Reach.”

The track plot of Pilot 5 inbound and Pilot 6 outbound in Alternative 3 Hog Island Reach with ebb tide and 30 knots of wind from the south-southwest is shown in Plate 74. The ships met at the junction of Horse Reach and Hog Island Reach. The area where they met is wider than Hog Island Reach, so the exercise provided limited information on the Alternative 3 Hog Island Reach. Neither ship had any difficulty during the other portions of the run.

Plate 75 illustrates the track plot of two-way traffic in Alternative 3 Hog Island Reach with ebb tide and 30 knots of wind from the south-southwest. The two ships met near buoy G39. The inbound ship cut across the corner near buoy R38. The outbound ship came to within approximately 30 ft of the western channel edge at the same location. The ships had approximately 300 ft clearance while abeam of each other. One pilot stated that he needed all of Alternative 3 in this simulation.

The track plot of Pilot 1, inbound, and Pilot 2, outbound, in the Hog Island Reach Alternative 3 with flood tide and 30 knots of wind from the northeast is shown in Plate 76. The ships met in the vicinity of buoy G39. The inbound ship came to the channel edge near buoy R38 while the outbound ship came to the channel edge at both the northern and southern end of Hog Island Reach. There was approximately 230 ft clearance between the ships when they met.

The track plot of Pilot 3 inbound and Pilot 8 outbound in the Alternative 3 Hog Island Reach is shown in Plate 77. The simulation was conducted with flood tide and 30 knots of wind from the northeast. The ships met south of the Ravenel Bridge near buoy G39. At the time of meeting, the inbound ship had approximately 50 ft clearance to the channel's edge, and the outbound ship had less than 40 ft clearance to the channel edge. The ships had approximately 200 ft clearance between them at this point.

The track plot of Pilot 5 inbound and Pilot 6 outbound in the Hog Island Reach Alternative 3 with flood tide and 30 knots of wind from the south-southwest is shown in Plate 78. The Pilots meet north of Ravenel Bridge. The inbound and outbound ships had approximately 90 ft and 30 ft clearance to the channel edge, respectively. The ships were approximately 170 ft apart when they were abeam of each other. The pilots were pleased with this simulation and felt this demonstrated the need for Alternative 3

and was “a repeatable scenario.” The inbound ship came to the channel edge near buoy R36.

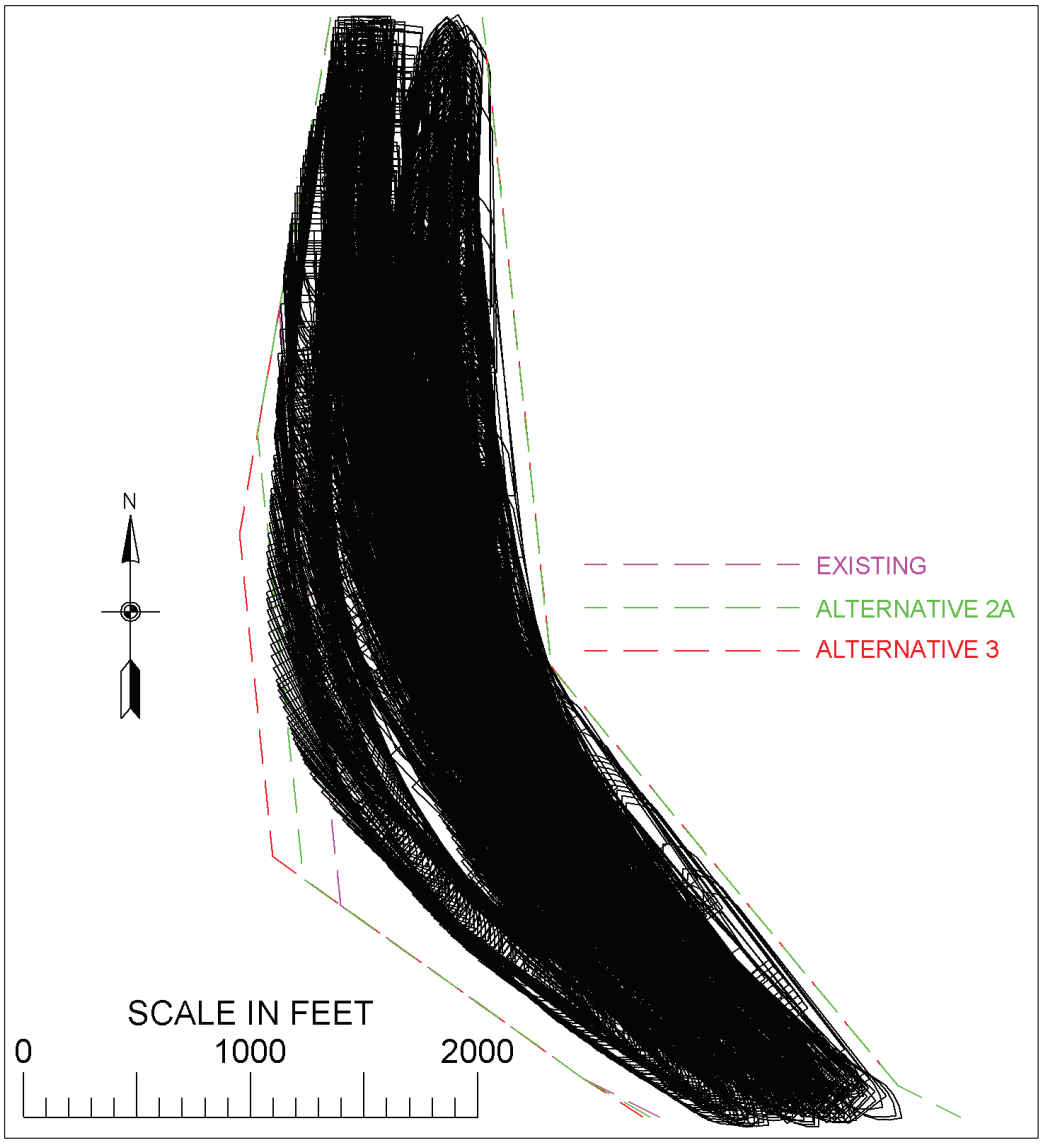
Plate 79 contains the track plot of two-way traffic in Alternative 3 Hog Island Reach with flood tide and 30 knots of wind from the south-southwest with Pilot 6 inbound and Pilot 5 outbound. The ships met just south of the Ravenel Bridge. Both ships had approximately 50 ft clearance to the channel edge. The ships were approximately 200 ft apart when they meet.

Observations

The results for the Alternative 3 Hog Island Reach were significantly better than Alternatives 1 and 2. Ships in several of the Alternative 3 simulations met closer to Horse Reach, limiting their usefulness in evaluating Hog Island Reach. The pilots supported Alternative 3, Hog Island Reach as they did Bennis Reach, stating in their final questionnaires that “[it will] allow ships to meet safely.” They also stated that it provided “sufficient room,” “created numerous opportunities for safe passing,” and “ship handling the way it is supposed to be.” Alternative 3 Hog Island Reach was necessary for two-way traffic of the *Daniella II*.

All tracks of ships passing through the Hog/Custom/Horse Reach widener are shown in Figure 16, including ships from Bennis Reach and Hog Island Reach simulations. It includes some ships meeting at the widener. Only one ship used any of the Alternative 3 widener.

Figure 16. Track plots of all simulated vessels in Hog/Custom/Horse Reach widener.



Drum Island Turn

There were four alternative channels for Drum Island Reach, Figure 15. This was the only portion of the study area containing an Alternative 4. Alternative 1 was the no-widening option. The other three widening options were pairs of bend wideners. Alternatives 2 widened the bend a maximum of 100 ft on the north side near buoy R46 and a maximum of 50 ft on the south side. Alternatives 3 and 4 consisted of widening the bend a maximum of 200 ft on the north side and a maximum of 100 ft on the south side. Alternative 4 was not in the original Charleston Harbor improvement plan but was developed during the simulation program. Drum Island Reach is extremely short. The majority of the reach's length

consists of the bend wideners at the east and west ends. Alternative 4 was designed such that the outside of both wideners were parallel to each other, providing a usable heading for Drum Island Reach.

Two-way traffic for bulk carriers had been considered for the Drum Island Reach before. However, the pilots stated that, due to Drum Island Reach's short length and severe turns at either end, they do not use the reach to meet two large vessels. Therefore, it was agreed that the simulations focus on one-way runs through the reach.

This report refers to the inbound and outbound approaches of the Drum Island Reach, collectively as the Drum Island Turn. This was a critical area in Charleston Harbor. One-way vessel passage was studied through a series of simulations with different ships, the largest of which required tug escort. Inbound transits were considered the most critical, especially during ebb tide. The inbound ship was pushed to the south by ebb tide currents from the Wando River. As the bow of the ship entered Drum Island Reach, the ebb currents were pushing only on the stern. This effectively turns the ship to starboard, the opposite way the ship needs to turn. Outbound runs were not as critical because the ebb tide currents were fairly well aligned with the channel as the ship enters the northern end of Hog Island Reach. For this reason, simulations focused on the inbound transit and ebb tide for this area rather than outbound.

Results for the one-way traffic runs in Drum Island Turn are shown in Plates 80–88. The track plots for one-way simulations are presented as composites, showing all runs for a set of conditions on one plate.

Drum Island Turn one-way runs — containership *Konway*

The containership *Konway* was chosen to represent large containership ship traffic that can transit the area without tug assistance. The *Konway* was 1102 × 141 × 45.9 ft. From observations of the other scenarios in the reach, it was agreed that widening was necessary. Therefore, the no-widening option, Alternative 1, was dropped from consideration for the *Konway* exercises. The majority of the runs were inbound with ebb tide because the ebb tide currents coming from the Wando River were considered critical for inbound ships turning into Drum Island Range. Originally, only inbound runs were planned for this scenario. It was the more difficult condition, due to the ebb tide currents hitting the stern of inbound ships. These currents are trying to turn the ship to starboard

while the pilot steers his ship to port. However, some outbound runs were added during the simulation program at the pilots' requests.

Table 10 presents a summary of composite one-way transits of the *Konway*, inbound and outbound through Drum Island Turn.

Table 10. Summary of composite one-way simulations of the *Konway* through Drum Island Turn. These runs are conducted without tug assistance as in real life. The *Konway* is an 1102 × 141 × 45.9 ft containership.

Plate	Alt	Heading	Current	Wind	Number runs
80	2	Inbound	Ebb	30 K NE	3
81	2	Inbound	Ebb	30 K S-SW	2
82	3	Inbound	Ebb	30 K NE	1
83	3	Outbound	Ebb	30 K NE	1
84	3	Inbound	Ebb	30 K S-SW	1
85	4	Inbound	Ebb	30 K NE	3
86	4	Outbound	Ebb	30 K NE	1
87	4	Inbound	Ebb	30 K S-SW	2
88	4	Outbound	Ebb	30 K S-SW	1

Alternative 2

The composite track plot for inbound runs for Alternative 2, ebb tide with 30 knot wind from the northeast, is shown in Plate 80. Three runs were conducted. One ship crossed the channel edge near buoy R46. The other two runs remained in the channel. Two runs were conducted with 30 knots of wind from the south-southwest. The composite track plot is shown in Plate 81. Both runs remained in the channel.

Alternative 3

One inbound run for Alternative 3, ebb tide with 30 knot wind from the northeast, is shown in Plate 82. The ship came within 60 ft of the channel boundary east of buoy R46. That pilot felt the Alternative 3 layout forced him into that position. It put him in a bad position for making the turn at Myers Bend. An outbound run under the same conditions was performed at the pilot's request. The ship remained near the center of the channel and is included in Plate 83. One run was conducted with 30 knots of wind from the south-southwest and is shown in Plate 84.

Alternative 4

The composite track plot for inbound runs for the Alternative 4, ebb tide with 30 knots of wind from the northeast, is shown in Plate 85. Three runs were conducted. Two of the runs were completed with pilots staying near the center of the channel. The third run swung east at the north end of Hog Island Reach, entered the mouth of the Wando River and left the channel near buoy R44. The pilot made the run "full ahead" with hard port rudder. It was not certain what caused the problem; it may have been a simulator anomaly and not a problem with the channel alignment. One pilot stated that Alternative 4 improved ship handling operations by enabling earlier initiation of the Myers Bend turn. The pilot stated that he was a "big fan of Alternative 4." An outbound run under the same conditions was performed at the pilot's request. The ship remained in the channel, coming within 50 ft during the turn near buoy R46 and the turn near buoy G41. The track plot is included in Plate 86. Two inbound runs were conducted with 30 knots of wind from the south-southwest. The composite plot is shown in Plate 87. One ship left the channel by approximately 10 ft near R44; that pilot had some difficulty with the wind, currents, and the ship's rudder. However, the pilot thought Alternative 4 was a good layout. An outbound run under the same conditions was performed at the pilot's request. The ship remained near the center of the channel, and the track plot is included in Plate 88.

One-way runs — containership *Daniella II*

The containership *Daniella II* was chosen to represent large containership traffic transiting the area with tug assistance. As was the case with the *Konway*, the majority of the runs were inbound with ebb tide. The ebb tide currents, from the Wando River, were considered critical for inbound ships turning onto Drum Island Range. For these simulations, a docking pilot was on the simulator ship bridge along with the harbor pilot. The tractor tug was operated as an ownship by the tractor tug captain.

The track plots for these simulations present only the *Daniella II*, the design ship for this exercise.

Table 11 presents a summary of composite one-way transits of the *Daniella II* through Drum Island Turn.

Table 11. Summary of composite one-way simulations of the *Daniella II* through Drum Island Turn. The *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Alt	Heading	Current	Wind	Number runs
89	1	Inbound	Ebb	30K NE	2
90	2	Inbound	Ebb	30K NE	5
91	2	Inbound	Ebb	30K S-SW	3
92	3	Inbound	Ebb	30K NE	4
93	3	Outbound	Ebb	30K NE	1
94	3	Inbound	Ebb	30K NE	2
95	3	Outbound	Ebb	30K NE	1
96	3	Inbound	Flood	30K S-SW	2
97	4	Inbound	Ebb	30K NE	1
98	4	Inbound	Ebb	30K S-SW	2
99	4	Inbound	Flood	30K NE	1

Alternative 1

Two runs were conducted with Alternative 1 (deepening, no widening). The runs were inbound with ebb tide and 30 knots of wind from the northeast. The composite track plot is shown in Plate 89. The runs were conducted with Pilot 2 conning the ownship. The first run ended when the tug grounded; the *Daniella II* was near the mouth of the Wando River. The second run crossed the south edge of the channel by approximately 10 ft, across from buoy R44. The tug line broke, but the *Daniella II* was able to complete the exercise. With observations from this and other scenarios for Alternative 1 and Alternative 2, it was the consensus opinion of ERDC, CESAC, SCSPA, and the pilots to drop Alternative 1 from additional testing of Daniel Island Turn.

Alternative 2

The composite track plot for inbound runs in Alternative 2, ebb tide with wind from the northeast, is shown in Plate 90. Five runs were conducted with Pilot 3 repeating a simulation. All runs remained in the channel; however, one ship came within 10 ft of the channel edge near buoy R46, and another came within 25 ft of the channel edge on the south side of Drum Island Reach. Multiple pilots commented that there was no "reserve" to maneuver on either the *Daniella II* or the tractor tug. "Reserve" indicated that there was no longer any option open to the pilot

for engine or rudder control. One pilot stated "completing the maneuver took 100% of the ship and tug effort." The composite track plot for ebb tide ran with 30 knots of wind from south-southwest and is shown in Plate 91. Three runs were conducted. Two of the runs left the channel edge near buoy R46. One left the channel by over 30 ft, and the other by approximately 5 ft. One ran aground.

Alternative 3

The composite track plot for inbound runs in Alternative 3, ebb tide with 30 knots of wind from the northeast, is shown in Plate 92. Four runs were conducted. One ship nearly grounded near the northwest end of the mouth of the Wando River but recovered to continue the exercise. The same ship nearly clipped the channel edge near buoys R46 and R48. A second ship came within 15 ft of the channel boundary at the turn by buoy R48. One pilot asked to run the scenario outbound. The track plot is shown in Plate 93. The ship came within 30 ft of the channel edge at the end of the run near buoy R41. The composite track plot for two inbound runs in Alternative 3, ebb tide with 30 knots of wind from the northeast, is shown in Plate 94. One ship left the channel by approximately 20 ft between buoys R44 and R46. One pilot asked to run the scenario outbound. The track plot showed the ship coming within 30 ft of the northern edge of Drum Island Reach between buoys R44 and R46 (Plate 95). Two inbound runs were conducted with flood tide and 30 knots of wind from the south-southwest. The composite plot is shown in Plate 96. Both runs remained toward the center of the channel. One ship was farther north while transiting Drum Island Reach. That pilot commented "[it] made tug line too long, but successful."

Alternative 4

One inbound run was conducted with Alternative 4, ebb tide with 30 knots of wind from the northeast. The track plot is shown in Plate 97. The run remained within the channel limits. The pilot steered his ship somewhat in a straight line from the south side of the channel near buoy G43 to the north side near buoy R46 to make the turn. The composite track plot for inbound runs in Alternative 4, ebb tide with 30 knots of wind from the south-southwest, is shown in Plate 98. Both runs remained in the channel. As with the run shown in Plate 97, these ships ran more of a straight course from buoy G43 to buoy R46. One inbound run (Plate 99) was conducted in Alternative 4, flood tide with 30 knots of wind from the

northeast. The run remained within the channel. The track plot indicated the pilot turned his ship in the middle of Drum Island Reach rather than running a straighter course as in Plates 97 and 98.

One-way runs — bulk carrier *Danita II*

The bulk carrier *Danita II* was chosen to represent large bulk carrier ship traffic that transits the area without tug assistance. The *Danita II* was 750 × 106 × 46 ft. Runs for the *Danita II* were only conducted for Alternatives 1 and 2. The consensus decision being that this scenario was not critical and simulation time was better spent on other testing conditions.

Table 12 is a summary of composite one-way simulations of the Danita *II* through Drum Island Turn.

Table 12. Summary of composite one-way simulations of the *Danita II* through Drum Island Turn. The *Danita II* is 750 × 106 × 46 ft bulk carrier.

Plate	Alt	Heading	Current	Wind	Number Runs
100	1	Inbound	Ebb	30K NE	1
101	1	Outbound	Ebb	30K NE	1
102	1	Inbound	Flood	30K NE	1
103	1	Outbound	Flood	30K NE	1
104	2	Inbound	Ebb	30K NE	2
105	2	Inbound	Flood	30K NE	2
106	2	Outbound	Flood	30K NE	1

Alternative 1

One inbound run was conducted for Alternative 1, ebb tide with 30 knots of wind from the northeast. The run is shown in Plate 100. The ship left the channel corner by less than 5 ft around buoy R46. The pilot stated that he “used all power and rudder possible.” An outbound run is shown in Plate 101. The vessel left the north side of the channel by nearly 50 ft near buoy R44. One inbound run was conducted for Alternative 1, flood tide with 30 knots of wind from the northeast. The run is shown in Plate 102. The ship remained near the center of the channel. One outbound run was conducted with Alternative 1, flood tide with 30 knots of wind from the northeast. The run is shown in Plate 103. The run remained near the center of the channel.

Alternative 2

Plate 104 shows the composite plot of two inbound runs. They were conducted with Alternative 2, ebb tide with 30 knots of wind from the northeast. Both runs remained in the channel with one ship coming within 60 ft of the turn southeast of buoy R46. Two inbound runs were conducted with Alternative 2, flood tide with 30 knots of wind from the northeast. The runs are shown in Plate 105. One run swung very far south and slightly crossed the southern edge of the channel across from R46. An outbound run in Alternative 2, flood tide with 30 knots of wind from the northeast, is shown in Plate 106. The ship grounded on the southeast corner of the mouth of the Wando River.

Observations

Alternative 4, Drum Island Reach, allowed the pilots to run a straighter course (the Alternative 4 design purpose) from the south side of Drum Island Reach, near buoy R43, to the north side, near buoy R46.

One-way runs — Wando River

The southern end of the Wando River channel is nearly 600 ft wide near buoy R2. It tapers to 400 ft near buoys G3 and R4. Alternative 1 was the no-widening option. Alternative 2 provided an additional 50 ft on the west side of the channel. Alternative 3 provided an additional 100 ft on the west side of the channel. The alternatives are shown in Figure 15.

Table 13 contains a summary of composite one-way simulations of the *Daniella II* in Wando River.

Table 13. Summary of composite one-way simulations of the *Daniella II* in Wando River. The *Daniella II* is a 1201 × 160 × 49.9 ft containership.

Plate	Alt	Heading	Current	Wind	Number Runs
107	2	Inbound	Ebb	30K NE	1
108	2	Outbound	Ebb	30K NE	2
109	2	Inbound	Ebb	30K S-SW	1
110	2	Outbound	Ebb	30K S-SW	1
111	2	Inbound	Flood	30K NE	1
112	2	Outbound	Flood	30K NE	1

Plate	Alt	Heading	Current	Wind	Number Runs
113	2	Inbound	Flood	30K S-SW	1
114	2	Outbound	Flood	30K S-SW	2
115	3	Inbound	Ebb	30K NE	2
116	3	Outbound	Ebb	30K NE	2
117	3	Inbound	Ebb	30K NE	5
118	3	Outbound	Ebb	30K NE	1
119	3	Inbound	Flood	30K NE	2
120	3	Outbound	Flood	30K NE	2
121	3	Inbound	Flood	30K S-SW	1
122	3	Outbound	Flood	30K S-SW	2

Alternative 1

Alternative 1 results for the turning basins confirmed that the no-widening option was not adequate. Focus was placed on the simulations for Alternatives 2 and 3. If simulation of Alternative 2 actually made it apparent that a narrow channel might be acceptable. The option was always available to simulate Alternative 1. However, no simulations were conducted for Alternative 1.

Alternative 2

Plate 107 contains the track plot of a single inbound run for Alternative 2, with ebb tide and 30 knots of wind from the northeast. The run remained in the channel but came within 10 ft of the eastern channel edge while turning into the Wando River.

The composite plot for two runs outbound from the Wando River in the Alternative 2 channel, with ebb tide and 30 knots of wind from the northeast, is shown in Plate 108. One run left the channel by over 20 ft at the end of the basin, across from Buoy R6. The pilot stated he used all of the Alternative 2 channel due to the “breeze.” The pilot was at first concerned that he cut the corner of the channel by the bridge, but both ships remained approximately 50 ft from the corner at R2.

Plate 109 contains a short inbound run with ebb tide and 30 knots wind from the south-southwest. The ship remained in the channel. The pilot described this run as a "routine transit."

An outbound transit for Wando River Alternative 2 is shown in Plate 110. The run was conducted with ebb tide and 30 knots wind from the south-southwest. The pilot had difficulty keeping his ship off the west side of the Wando River Channel, due to the wind. The ship did not actually leave the channel but came within 3 ft of the channel edge.

The track plot of a short inbound run is shown in Plate 111. The simulation was conducted with flood tide and 30 knots of wind from the northeast. The ship came within 30 ft of channel edge while entering the Wando River near Buoy R2. The pilot stated this is due to the lack of north set he was expecting with flood tide. A short outbound run under the same conditions is shown in Plate 112. The pilot described the run as "routine."

Plate 113 contains the track plot of an inbound run in the Alternative 2 Wando River Channel. The conditions for the exercise were flood tide with 30 knots of wind from the south-southwest. The run remained within the channel limits.

The composite track plot of two outbound runs in Alternative 2, with flood tide and 30 knots of wind from the south-southwest, is shown in Plate 114. Both ships left the edge of the channel by as much as 30 ft while leaving the turning basin and remained on the west side of the Wando River Channel for most of the reach.

Alternative 3

Plate 115 contains the track plots for two runs conducted inbound with ebb tide and 30 knots of wind from the northeast for Alternative 3. One run came within 30 ft of the eastern channel edge when turning into the Wando River.

Plate 116 contains two outbound runs conducted with ebb tide and 30 knots of wind from the northeast in the Alternative 3. The run that began further off the dock came within 5 ft of the edge of the channel, when leaving the basin. Both ships remained close to the center of the channel for most of the exercise. One Pilot stated that he liked Alternative 3 "a lot."

A track plot containing the results of five simulations in the Alternative 3 channel is shown in Plate 117. The runs were simulated with ebb tide and 30 knots of wind from the northeast. All runs remained in the channel. Plate 118 shows the track plot of one ship under the same conditions, except outbound. The ship remained in the channel.

Plate 119 contains the composite track plot of two inbound runs, in the Alternative 3 Wando River Channel, with flood tide and 30 knots of wind from the northeast. Both runs remained in the channel.

Plate 120 contains the composite track plot of two outbound runs in the Alternative 3 Wando River Channel with flood tide and 30 knots of wind from the northeast. Both ships clipped the corner of the basin as they entered the channel across from buoy R6. Once they left the basin, both ships remained in the channel for the duration of the exercise.

Plate 121 contains the track plot of an inbound run of Alternative 3, Wando River Channel. This run was conducted with flood tide and 30 knots of wind from the south-southwest. The ship cut the corner by buoy R2 and came within 10 ft of the channel. It then came within 40 ft of the eastern side of the channel, after passing buoy R4, and veered toward the western side of the channel near the basin.

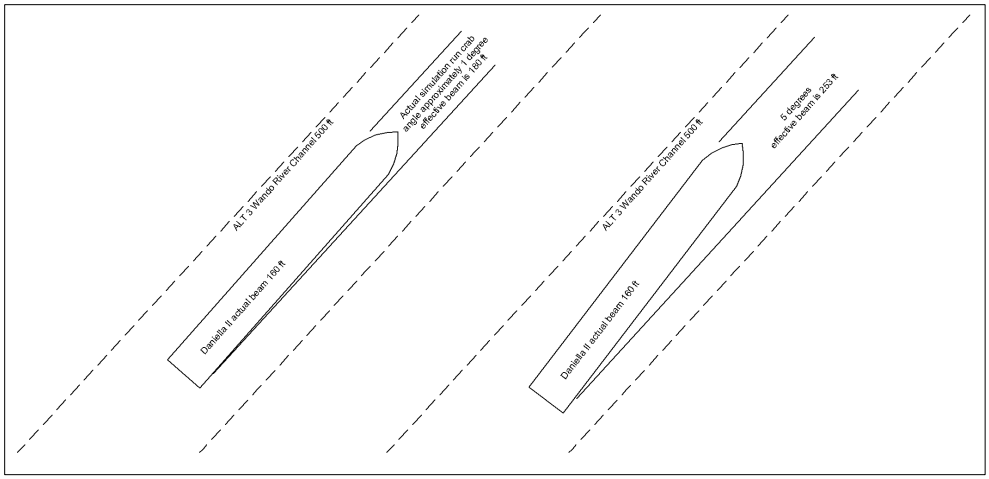
Plate 122 contains the track plots of two outbound runs in the Alternative 3 Wando River Channel. The runs were conducted with flood tide and 30 knots of wind from the south-southwest. One ship left the corner of the turning basin by approximately 60 ft when entering the channel across from buoy R6. Both ships remained in the channel for the remainder of the exercise.

Wando River pilot concerns

During testing, the pilots raised issues they considered important while the results from the Wando River Channel simulations were being analyzed. The first issue was not experiencing the approximate 5° crab angle they encounter on a regular basis when handling ships in the area. The second was the bow image of the *Daniella II*. It had fewer containers on deck than in real life. The containers in real life block their vision and make buoys more difficult to see.

The Wando River Channel is slightly longer than 1 mile and terminates at its northern end with the turning basin. All inbound traffic is going slowly in preparation to stop and turn. All outbound traffic is going slowly while getting speed up for the transit leaving the port. Slower vessel traffic is more susceptible to wind and the associated crab angle. The crab angle causes the ship to occupy more width in the channel than the ship's actual beam. This additional width is known as the "effective beam." Figure 17 illustrates the effect upon channel width requirements by comparing a vessel during simulation operating at approximately 1° crab angle with a ship rotated to represent 5° crab angle. The effective beam of the 5° ship is approximately 70 ft wider than the 1° ship.

Figure 17. Difference in effective beam of ships operating with 1° and 5° crab angle.



In addition, the pilots stated that they felt the visual representation of the *Daniella II*'s bow image lacked sufficient containers to realistically block their vision. Figure 18 compares the bow image of the 1201 ft × 160 ft *Daniella II* with that of the 1138 ft × 140 ft *Sovereign Maersk*. This image clearly shows more visual blockage on the *Sovereign Maersk* than the *Daniella II*. This was compared to a photograph (Figure 19) taken from the bridge of the *OOCL Beijing* at the Port of Long Beach, on 19 May 2015. The *OOCL Beijing* is 1100 ft long with a beam of 141 ft. Although the photograph was taken from the starboard side of the bridge, it clearly showed significant visual blockage.

Figure 18. Comparison of simulator bow images: the *Daniella II* and the *Sovereign Maersk*.

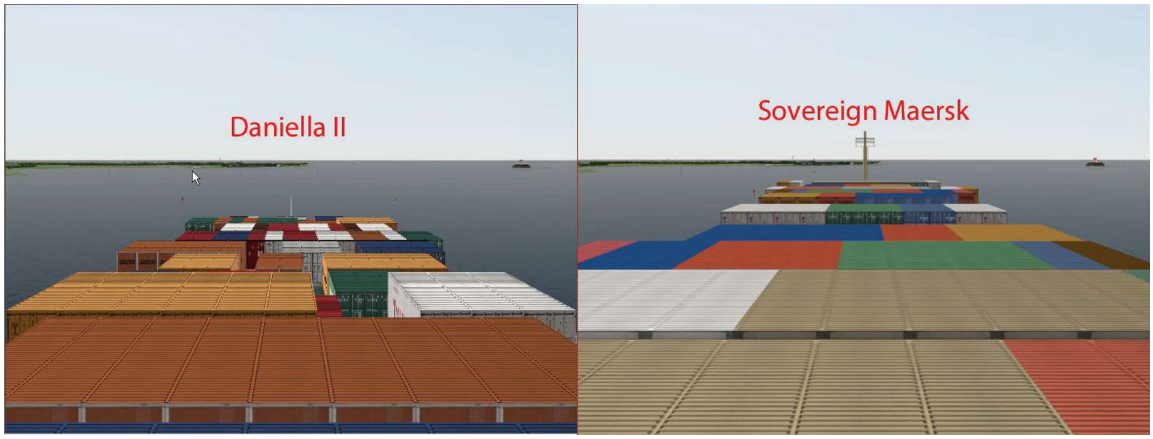
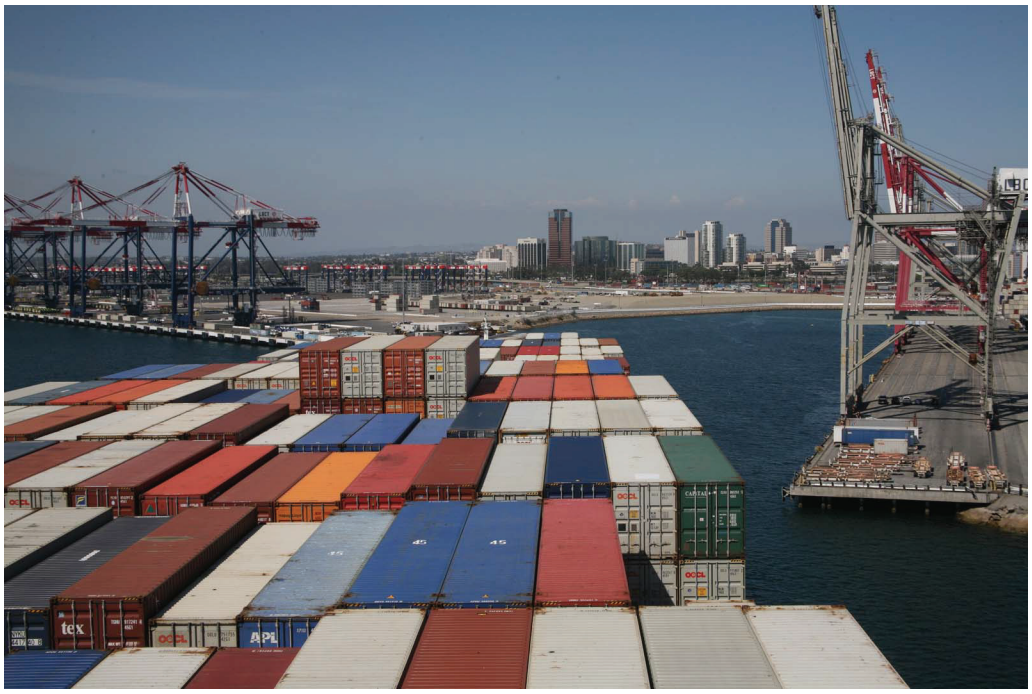


Figure 19. View from *OOCL Beijing,* 19 May 2015 at Port of Long Beach.



Observations

The Alternative 3 Wando River Channel was required for one-way traffic due to safety concerns.

Clouter Creek Reach through Ordnance Reach

There was one widening alternative for Clouter Creek Reach through Ordnance Reach. Figure 20 shows the existing channel (Alternative 1) and Alternative 3, the maximum widening. Alternative 3 increased the width of Clouter Creek Reach from 600 to 650 ft for approximately the northern half of the reach for two-way traffic. Alternative 3 increased the width of

North Charleston Reach and Filbin Creek Reach into Port Terminal reach (knuckle above buoy 58) by 50 ft.

The *Konway* was used as the ownship for all simulations of the Clouter Creek Reach through Ordnance Reach alternatives. The *Konway* was an 1102 ft × 141 ft containership. The draft was 45.9 ft for the simulations.

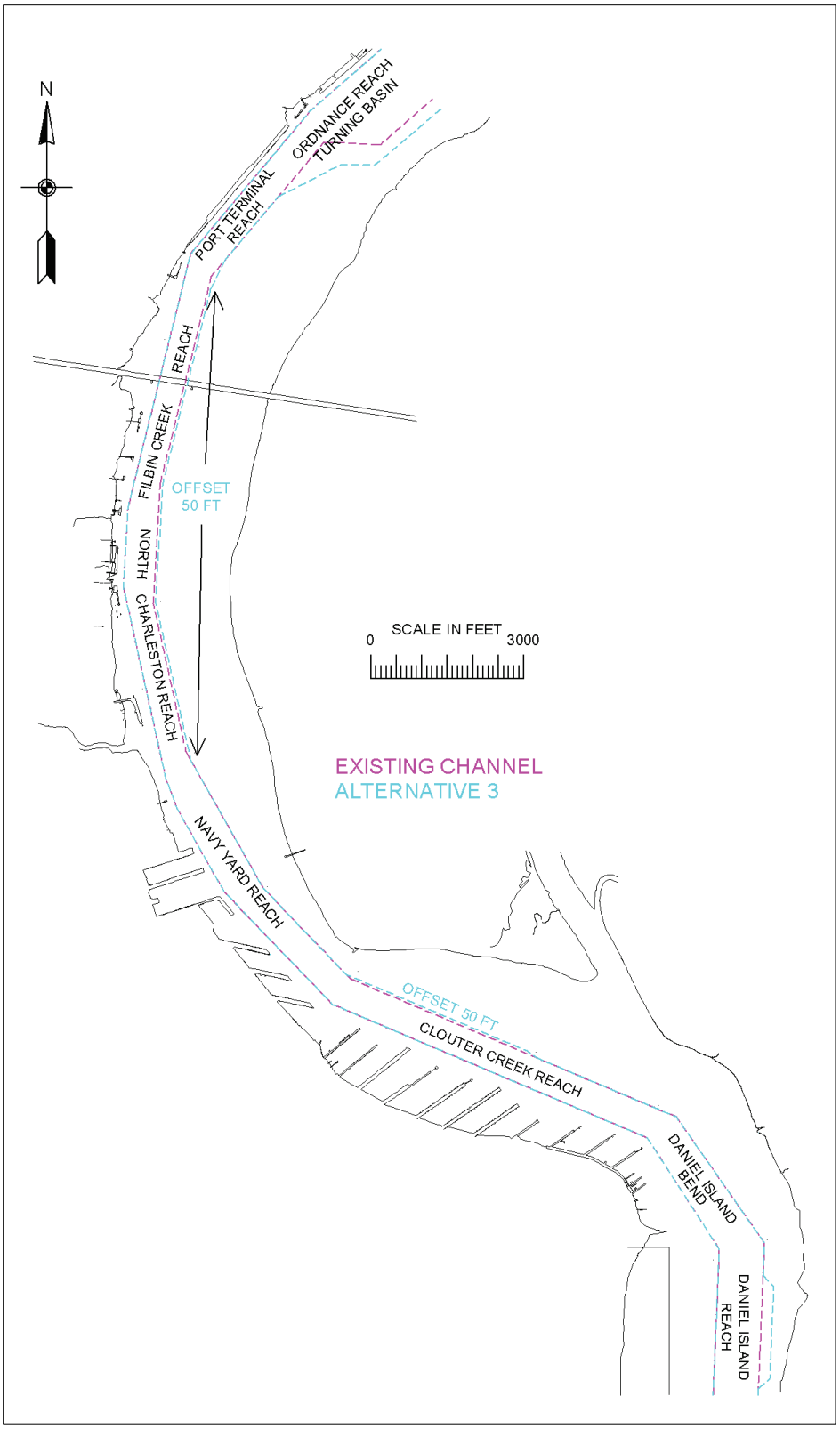
Two–way traffic through Clouter Creek Reach

A summary of all two-way simulations for Clouter Creek Reach through Ordnance Reach are shown in Table 14.

Table 14. Summary of all two-way simulations of the *Konway* in Clouter Creek Reach. The *Konway* is an 1102 x 141 × 45.9 ft containership.

Plate	Alternative	Current	Wind	Inbound Pilot	Outbound Pilot
123	1	Ebb	30K NE	1	2
124	1	Ebb	30K NE	1	2
125	1	Ebb	30K NE	7	2
126	1	Ebb	30K NE	7	2
127	1	Ebb	30K NE	7	2
128	3	Ebb	30K NE	2	1
129	3	Ebb	30K NE	4	3
130	3	Ebb	30K NE	5	6
131	3	Ebb	30K S-SW	1	2
132	3	Ebb	30K S-SW	6	5
133	3	Flood	30K NE	1	2
134	3	Flood	30K NE	4	3
135	3	Flood	30K S-SW	1	2
136	3	Flood	30K S-SW	6	5

Figure 20. Widening for Clouter Creek, North Charleston, and Filbin Creek Reaches.



Alternative 1

Track plots of two ships meeting in the Alternative 1 Clouter Creek Reach are shown in Plate 123. This run was conducted with Pilot 1 inbound and Pilot 2 outbound. The currents were ebb tide, and the wind was 30 knots from the northeast. This was a short exercise with the ships meeting near the middle of Clouter Creek Reach. Both ships remained in the channel with clearances less than 10 ft from the edge of channel. There was approximately 180 ft clearance between the ships.

Plate 124 contains the track plots of two ships meeting in the Alternative 1 Clouter Creek Reach with Pilot 1 inbound and Pilot 2 outbound. The simulation was conducted with ebb tide, and the wind is 30 knots from the northeast. The inbound ship went out of the channel by approximately 30 ft and when the run was stopped, was in position that made the turn to port at buoy R52 highly unlikely. The outbound ship was approximately 60 ft from the channel edge. There was approximately 150 ft clearance between the ships when they met.

Track plots of two ships meeting in the Alternative 1 Clouter Creek Reach are shown in Plate 125. This run was conducted with Pilot 7 inbound and Pilot 2 outbound. The currents were ebb tide, and the wind was 30 knots from the northeast. For this exercise, the outbound ship began in North Charleston, and the inbound ship began in Daniel Island Reach. The runs were started with the pilots attempting to meet in Clouter Creek Reach. They met just north of buoy R52 at the southern end of Navy Yard Reach. The outbound ship left the channel by approximately 50 ft. There was over 200 ft clearance between the ships. The inbound ship barely left the channel near buoy R52. The run was repeated and shown in Plate 126. The meeting occurred at the desired location in Clouter Creek Reach. The outbound ship left the channel by less than 20 ft, and there was approximately 100 ft clearance between the ships when they met. The pilots asked to try the run again, starting closer together. This run is shown in Plate 127. The outbound ship was approximately 80 ft out of the channel. The ships were approximately 150 ft apart when they met. After this, the pilots felt the existing width was insufficient to meet, so it was agreed to not attempt further simulations of the Alternative 1 channel for two-way traffic in Clouter Creek Reach. Alternative 1 would be back in the testing program if results from Alternative 3 indicate that there was extra room in the proposed improvement. The results indicated that Alternative 3 did not have extra room.

Alternative 3

Track plots of two ships meeting in the Alternative 3 Clouter Creek Reach are shown in Plate 128. This run was conducted with Pilot 2 inbound and Pilot 1 outbound. The currents were ebb tide, and the wind was 30 knots from the northeast. This was a short exercise with the ships meeting near the middle of Clouter Creek Reach. The inbound ship was at the channel edge, and the outbound ship was approximately 15 ft away from the channel edge when they met. There was approximately 220 ft clearance when they met.

Track plots of two ships meeting in the Alternative 3 Clouter Creek Reach are shown in Plate 129. This run was conducted with Pilot 4 inbound and Pilot 3 outbound. The currents were ebb tide, and the wind is 30 knots from the northeast. The ships were over 240 ft apart when they met. The outbound ship barely crossed the channel limits; the inbound ship was approximately 10 ft from the channel edge.

Plate 130 contains the track plots of two ships meeting in the Alternative 3 Clouter Creek Reach with Pilot 5 inbound and Pilot 6 outbound. The simulation was conducted with ebb tide, and the wind was 30 knots from the northeast. Both ships were approximately 30 ft from the channel edge when they met and were approximately 210 ft apart.

Track plots of two ships meeting in the Alternative 3 Clouter Creek Reach with ebb tidal currents and 30 knots of wind from the south-southwest are shown in Plate 131. This run was conducted with Pilot 1 inbound and Pilot 2 outbound. It was a short exercise with the ships meeting just west of buoy R50A. The inbound ship was at the channel edge. The outbound ship was approximately 80 ft from the channel boundary, and there was approximately 160 ft clearance between the ships.

Plate 132 contains the track plot of Pilot 6, inbound, meeting Pilot 5, outbound, in Alternative 3 Clouter Creek Reach. Conditions were ebb tide and 30 knots of wind from the south-southwest. The inbound ship came within approximately 20 ft of the channel edge.

Track plots of two ships meeting in the Alternative 3 Clouter Creek Reach with flood currents and 30 knots of wind from the northeast are shown in Plate 133. This run was conducted with Pilot 1 inbound and Pilot 2 outbound. The outbound ship ran along the edge of the channel during

meeting. The inbound ship cleared the channel edge by approximately 70 ft, and there was approximately 140 ft clearance between the ships.

Track plots of two ships meeting (Pilot 4 inbound and Pilot 3 outbound) in the Alternative 3 Clouter Creek Reach, with flood currents and 30 knots of wind from the northeast, are shown in Plate 134. Both ships were more than 20 ft from the channel edge. There was approximately 190 ft clearance between the ships.

Plate 135 contains the track plot of Pilot 1 inbound meeting Pilot 2 outbound in Alternative 3 Clouter Creek Reach, with flood tide and 30 knots of wind from the south-southwest. There was approximately 250 ft clearance between the ships. The inbound ship came to the channel edge. The outbound ship was approximately 50 ft from the edge.

Track plots of two ships meeting in the Alternative 3 Clouter Creek Reach with flood currents and 30 knots of wind from the south-southwest are shown in Plate 136. This run was conducted with Pilot 6 inbound and Pilot 5 outbound. The outbound ship left the channel by over 70 ft. The inbound ship did not use the widener.

Observations

Based upon simulation results and unanimous pilot comments, Alternative 1 was not adequate. The pilots' stated two-way traffic for these larger vessels cannot occur without widening. Alternative 3 was necessary for meeting these ships; however, several pilots stated that the 50 ft widening should be for a longer distance or even the entire Clouter Creek Reach.

Daniel Island Bend to Ordnance Reach (North Charleston and Filbin Reach widening)

It was deemed critical to keep the larger design ship away from the docks in North Charleston Reach and Filbin Creek Reach especially with future larger ships. Additionally, the larger ships needed more room to maneuver. Alternative 1, no widening, was run as part of testing of the Ordnance Turning Basin, Alternative 2 and 2A, in which the pilots indicated that they needed more room at the knuckle above buoy 58 (Filbin Reach to Port Terminal Reach). Ordnance Turning Basin Alternatives 2 and 2A did not include any channel widening between

Daniel Island Bend and Ordnance Reach Turning Basin. A summary of results is presented in Table 15.

Table 15. Summary of composite one-way simulations of the *Konway* from Daniel Island Reach to Ordnance Reach. The *Konway* is an 1102 × 141 × 45.9 ft containership.

Plate	Alternative	Heading	Current	Wind	Number runs
137	3	Inbound	Ebb	30K NE	2
138	3	Outbound	Ebb	30K NE	2
139	3	Outbound	Ebb	30K S-SW	1
140	3	Inbound	Flood	30K NE	2
141	3	Outbound	Flood	30K NE	1
142	3	Inbound	Flood	30K S-SW	1
143	3	Outbound	Flood	30K S-SW	1

Alternative 3

A composite track plot of two inbound runs with ebb tide and 30 knots wind from the northeast for Alternative 3 is shown in Plate 137. One ship left the channel approximately 60 ft on the east side between buoys R48 and R50; both ships cut the west corner across from R50. One ship crossed the channel and then left the channel by approximately 40 ft by buoy R52. One ship touched the east channel edge by R56. One ship crossed the channel line approximately 5 ft on the east side by buoy R58. The pilot that crossed the channel line several times commented that he used Alternative 3 for inbound turns to stay off the dock and to maximize his distance from docked ships.

Plate 138 contains the composite track plot for two outbound runs in the Alternative 3 channel. The runs were conducted with ebb tide currents and 30 knots of wind from the northeast. One run came to the channel edge near buoy R56. Other than that, the ships remained within the channel limits for the entire exercise. Both pilots stated they used the widening provided.

Plate 139 contains the track plot for one outbound run in the Alternative 3 channel. The run was conducted with ebb tidal currents and 30 knots of wind from the south-southwest. The ship remained within the channel limits for the entire exercise.

Two inbound runs were conducted in the Alternative 3 channel for flood tide and 30 knots of wind from the northeast. The composite track plot is shown in Plate 140. One ship left the channel by less than 10 ft on the east side, south of buoy R50. One ship cut the corner by approximately 15 ft by buoy R54. One ship came within 15 ft of the channel edge near buoy R54A. One ship touched the channel edge on the turn just north of buoy R58.

Plate 141 contains the track plot for one outbound run in the Alternative 3 channel with flood tide currents and 30 knots of wind from the northeast. The ship left the channel approximately 50 ft on the corner near buoy R54A but remained within the channel limits for the remainder of the exercise.

Plate 142 contains the track plot for one inbound run in the Alternative 3 channel with flood tidal currents and 30 knots of wind from the south-southwest. The ship touched the channel edge north of buoy R48A and again on the west side of the channel from buoy R50. The ship came to within 15 ft of the channel near buoy R52A.

Plate 143 contains the track plot for one outbound run in Alternative 3, with flood tidal currents and 30 knots of wind from the south-southwest. The ship tended to run against the east side of the channel. The ship touched the channel edge on the turn north of buoy R58. The ship went less than 10 ft out of the channel at the turn by buoy R54A and touched the channel edge by buoy R54. The ship also touched the channel edge by buoy R52A and left the channel by approximately 5 ft at buoy R52. The ship touched the channel corner on the west side across from buoy R50.

Observations

Alternative 3 seemed necessary for these transits. The pilots were very supportive of Alternative 3 saying it “allows for safe passage of large vessels” and without widening they would “pull moored ships off their docks.” The pilots also called Alternative 3, “[the] only solution for this area.”

5 Conclusions and Recommendations

Five weeks of simulation testing were completed for this study. A total of 203 exercises in eleven different reaches were included in this report. Up to four alternatives were tested for each area using three design ships. Nineteen mariners from Charleston Harbor participated in the testing program and the one-week validation. Recommendations are shown in Table 16.

Table 16. Final recommendations.

Reach	Recommended	Shown in
Wando River Turning Basin	Alternative 2A	Figure 5
Daniel Island Reach Turning Basin	Alternative 2A	Figure 7
Ordinance Reach Turning Basin	Alternative 2A	Figure 9
Fort Sumter Range	Alternative 1	Figure 11
Mount Pleasant Range	Alternative 3	Figure 13
Bennis Reach	Alternative 3	Figure 14
Hog Island Reach	Alternative 3	Figure 15
Drum Island Turn	Alternative 4	Figure 15
Wando River	Alternative 3	Figure 15
Clouter Creek Reach	Alternative 3	Figure 20
Daniel Island Reach to Ordnance Reach	Alternative 3	Figure 20

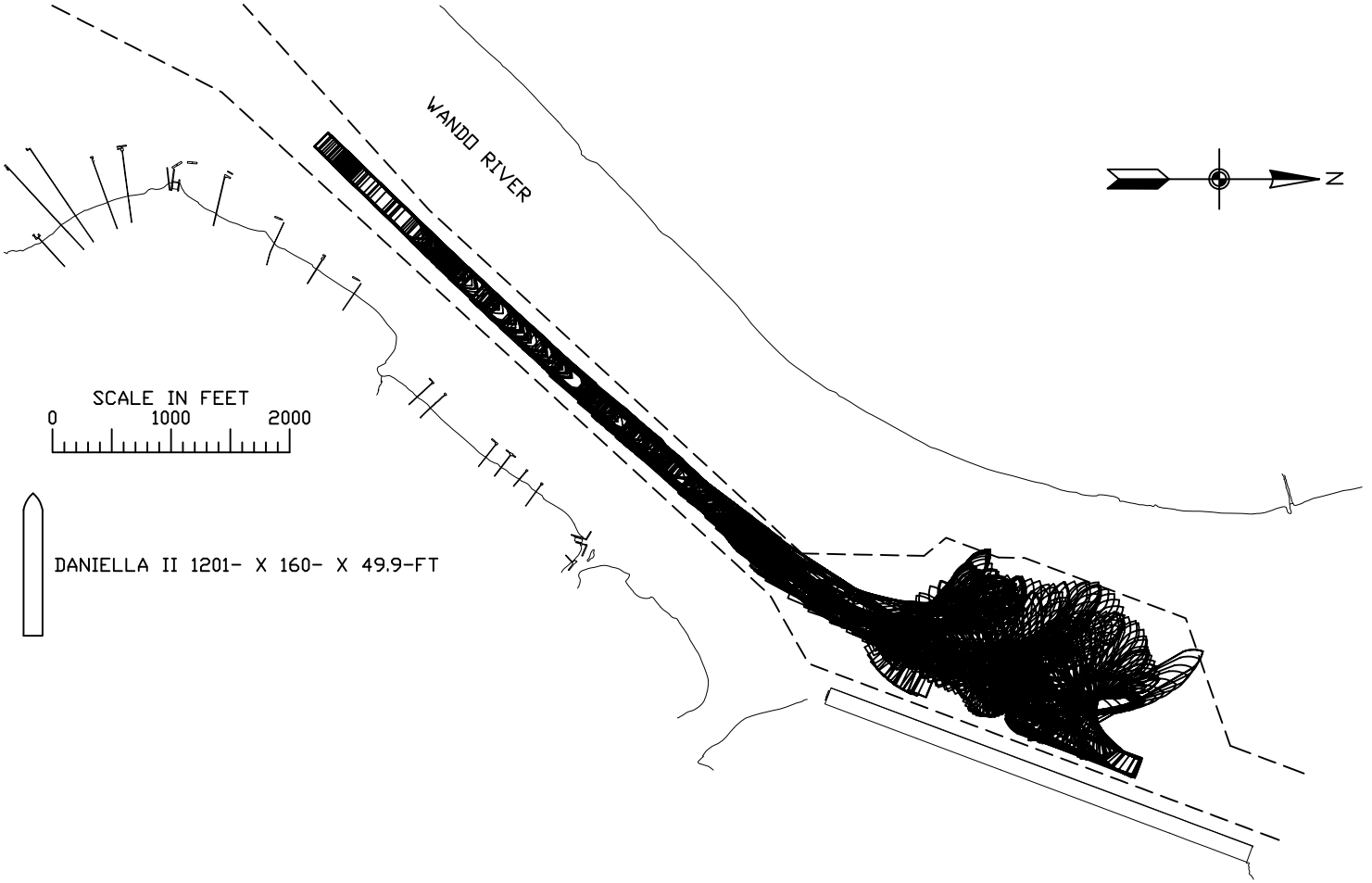
A draft copy of this report was furnished to the participating maritime organizations for review and comments. The distribution list included the CPBA, Moran Towing, McAllister Towing, and the South Carolina State Port Authority. No comments were received from Moran Towing, McAllister Towing, or the SCSPA. Written comments were provided by John Cameron, the Executive Director of the CPBA, in a letter dated 15 September 2016. This letter is included as Appendix E.

References

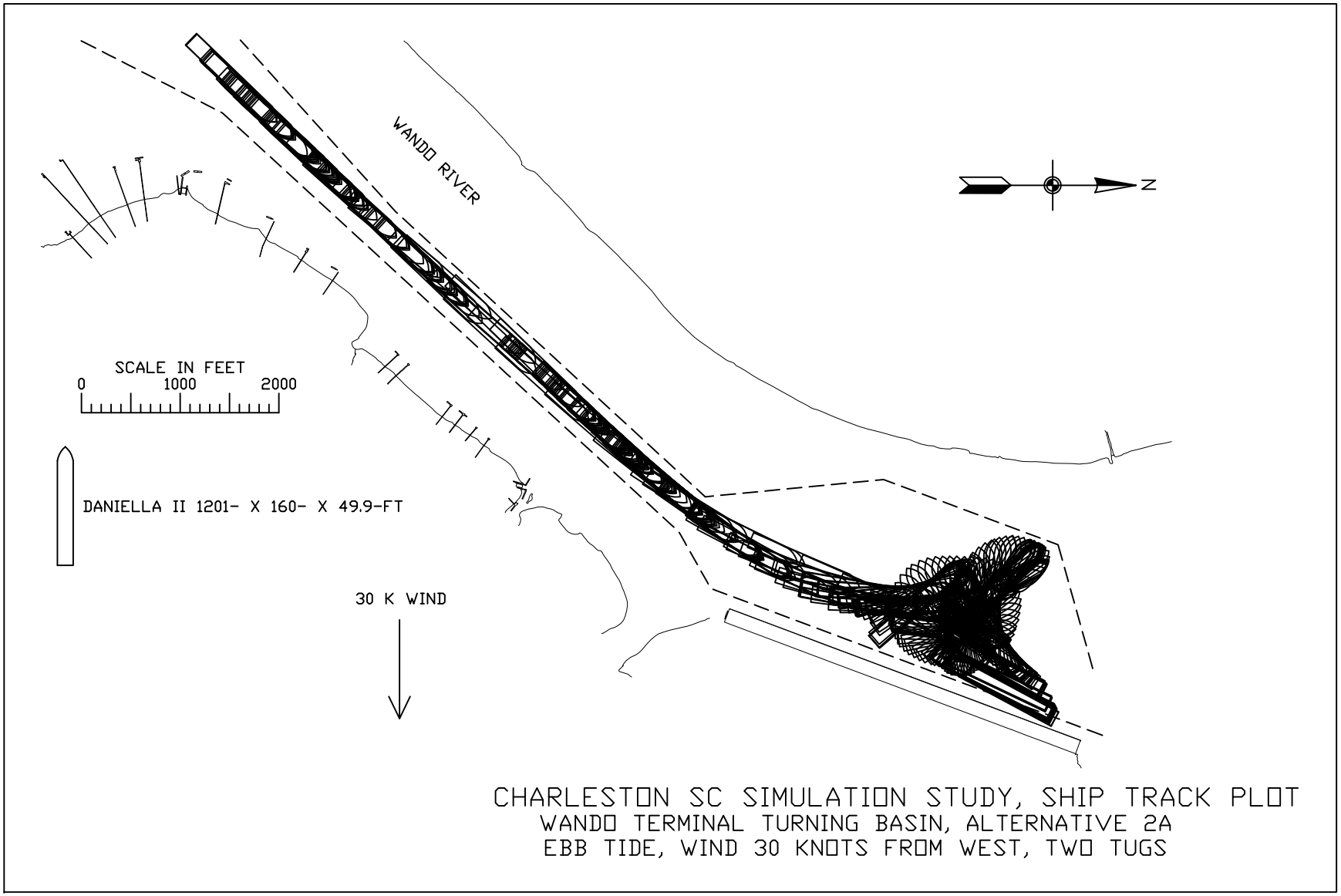
Webb, D. W. 1994. "Navigation Channel Design Using Real-Time Marine Simulator." In *Proceedings of the American Society of Civil Engineers Second International Conference on Dredging and Dredged Material Placement, 1994.*

Appendix A: Vessel Track Plots

PLATE 1



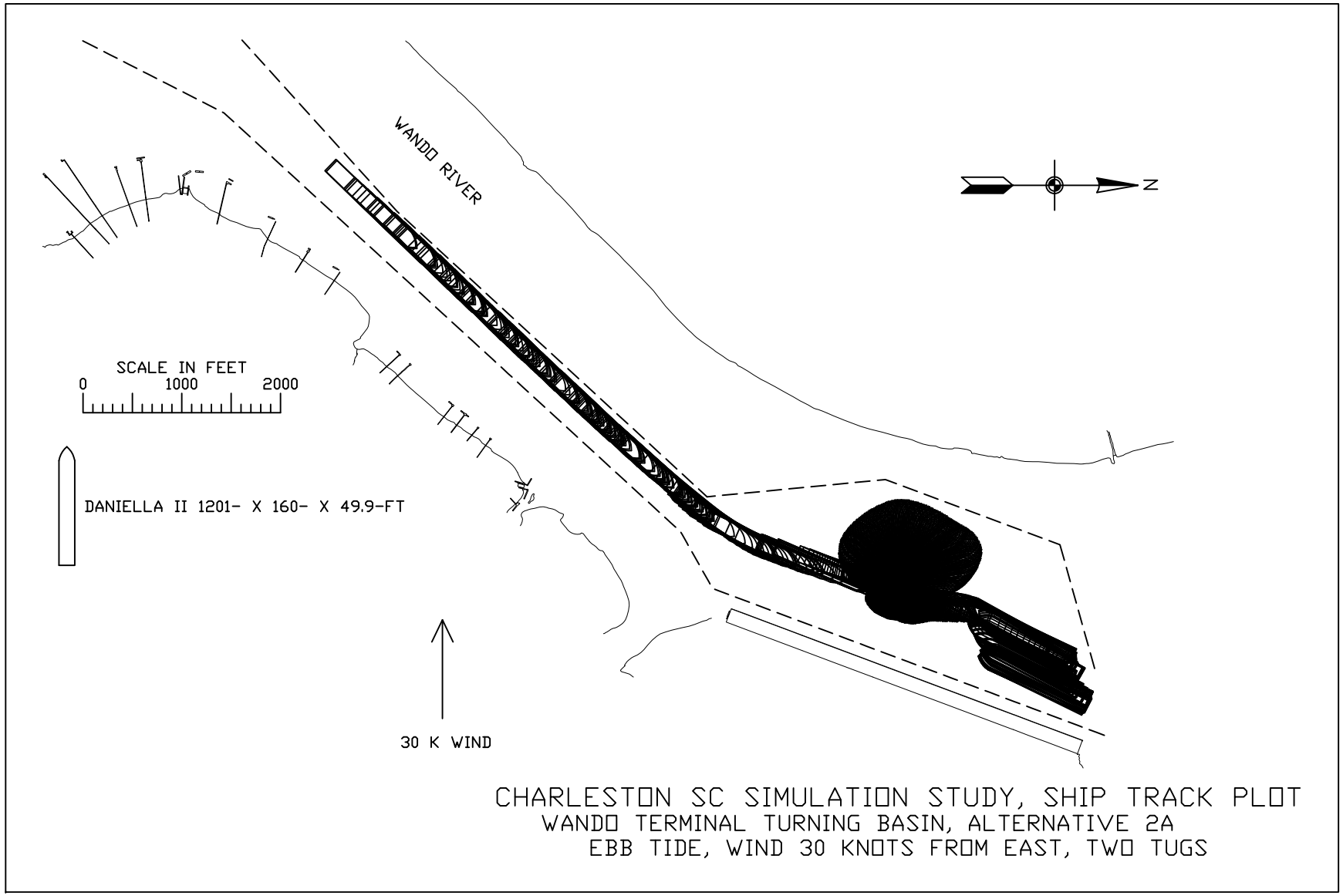
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 2
ALL RUNS



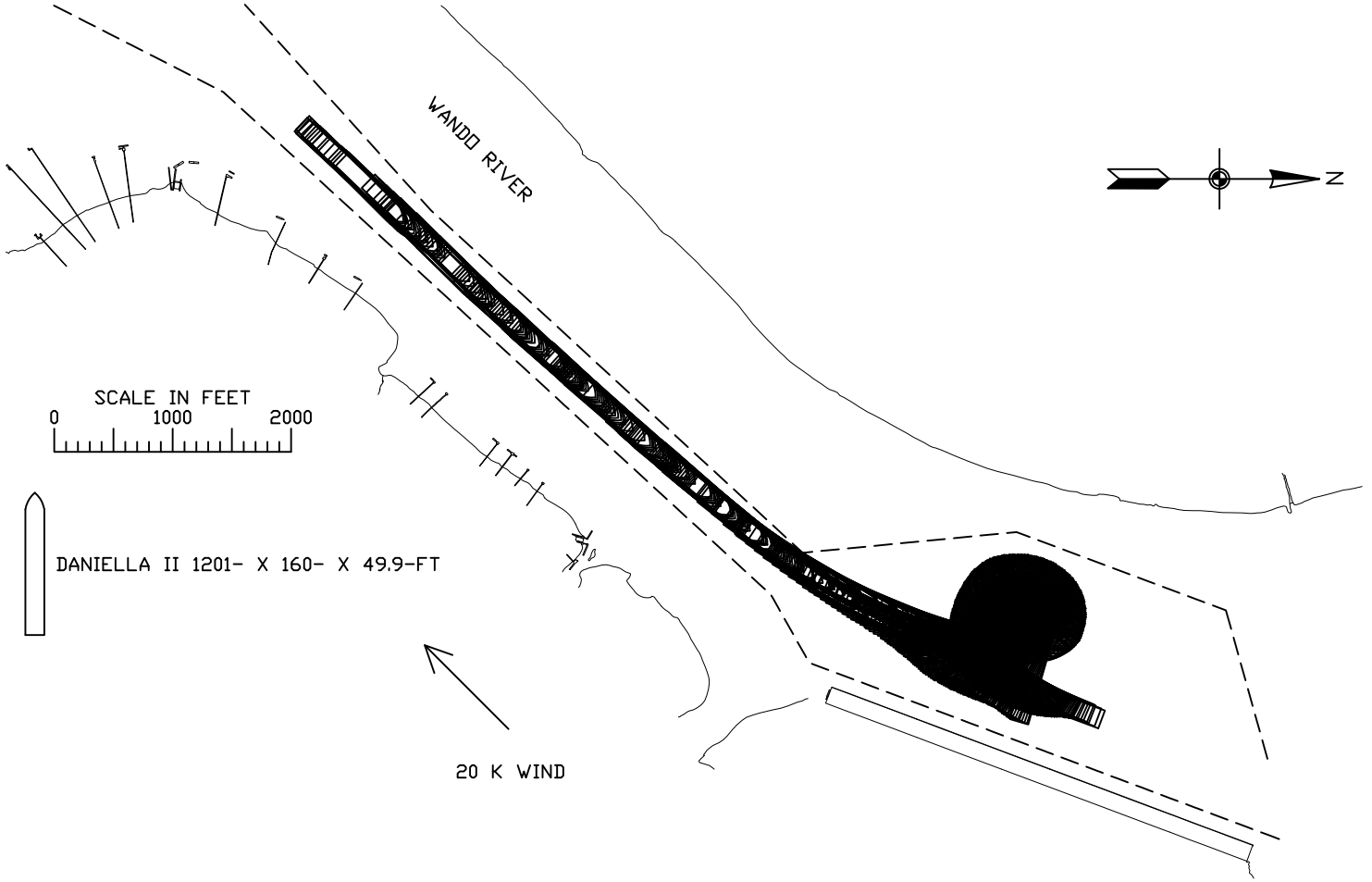
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM WEST, TWO TUGS

PLATE 2

PLATE 3



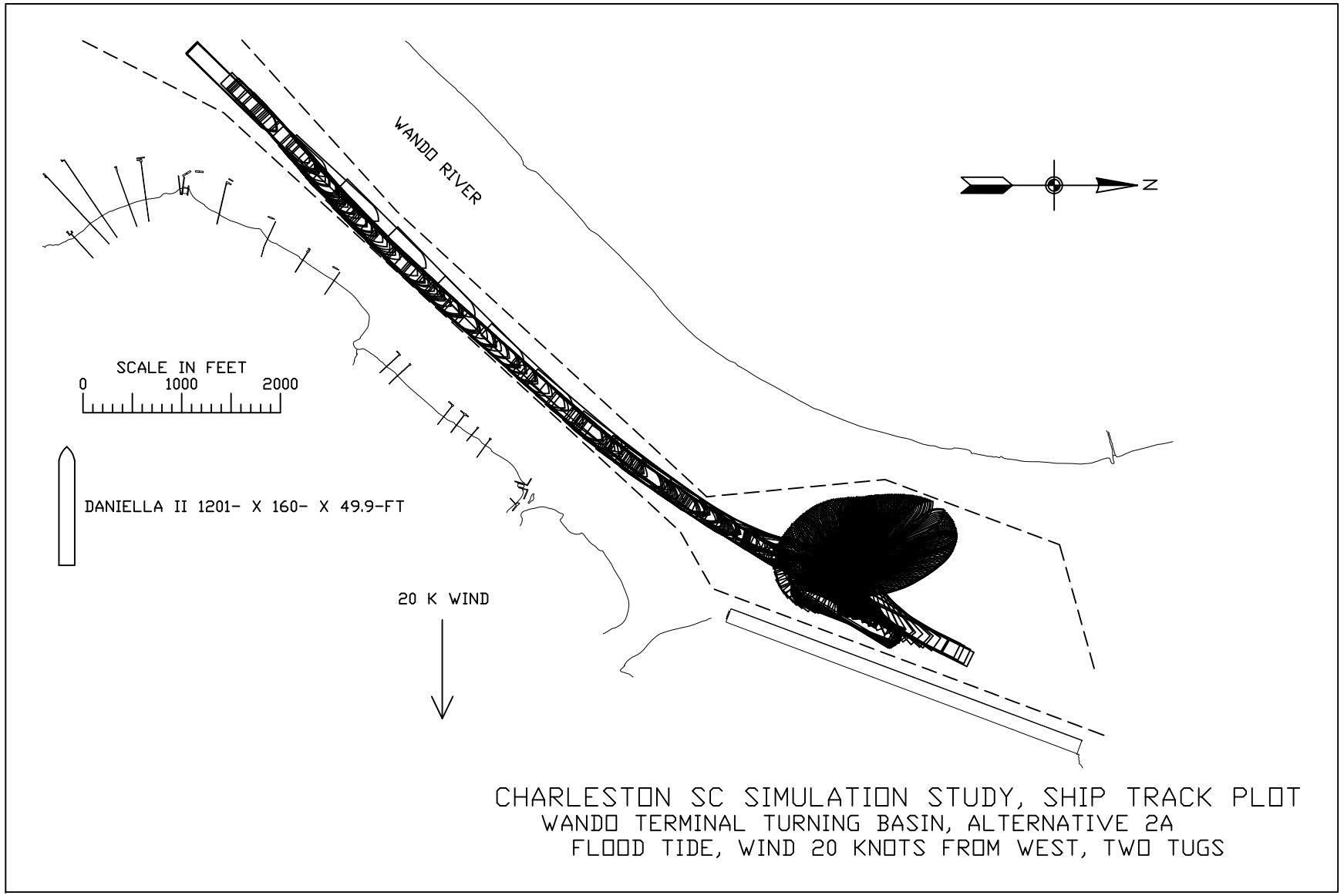
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM EAST, TWO TUGS



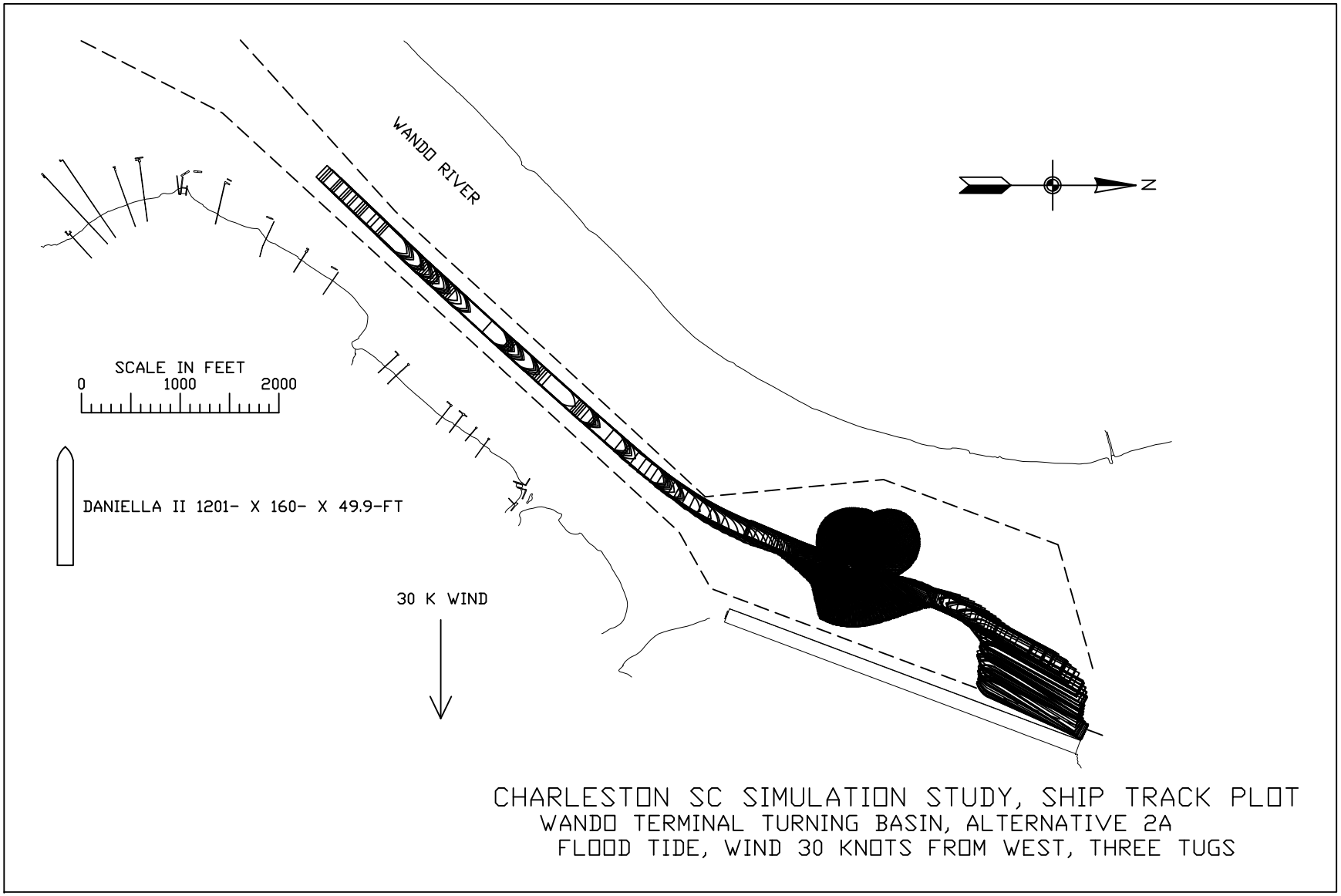
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 2A
FLOOD TIDE, WIND 20 KNOTS FROM NORTHEAST, TWO TUGS

PLATE 4

PLATE 5



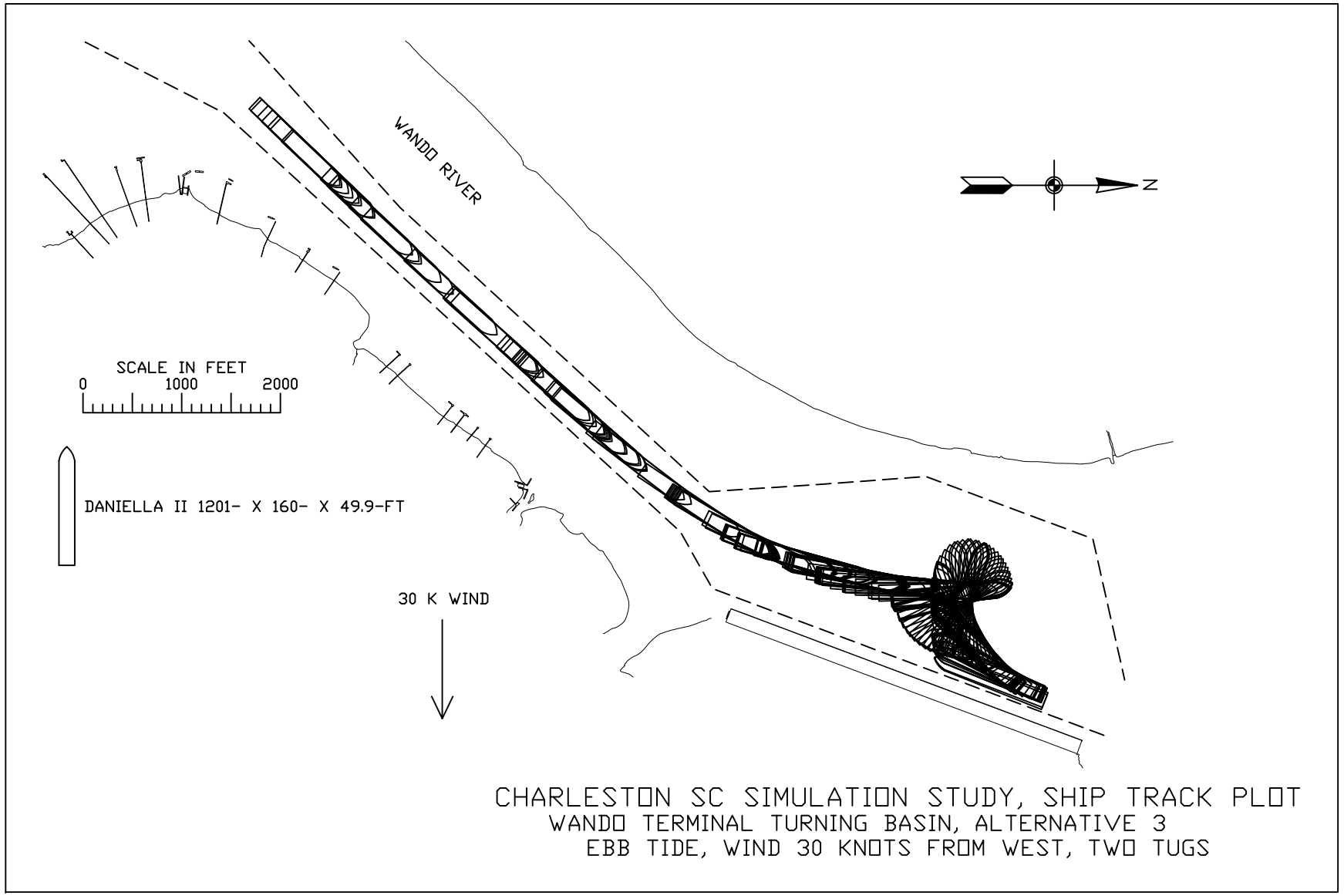
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 2A
FLOOD TIDE, WIND 20 KNOTS FROM WEST, TWO TUGS



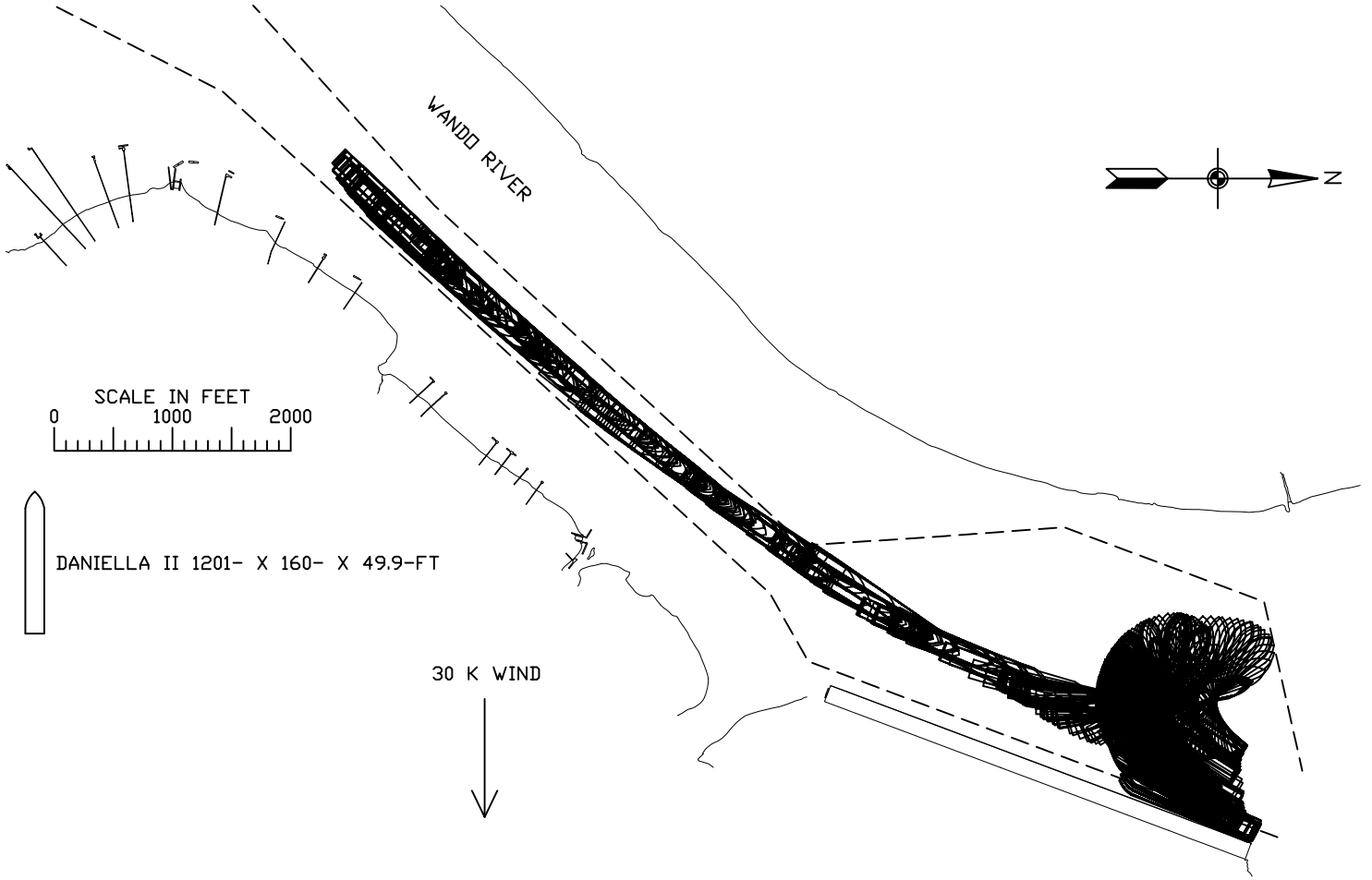
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM WEST, THREE TUGS

PLATE 6

PLATE 7



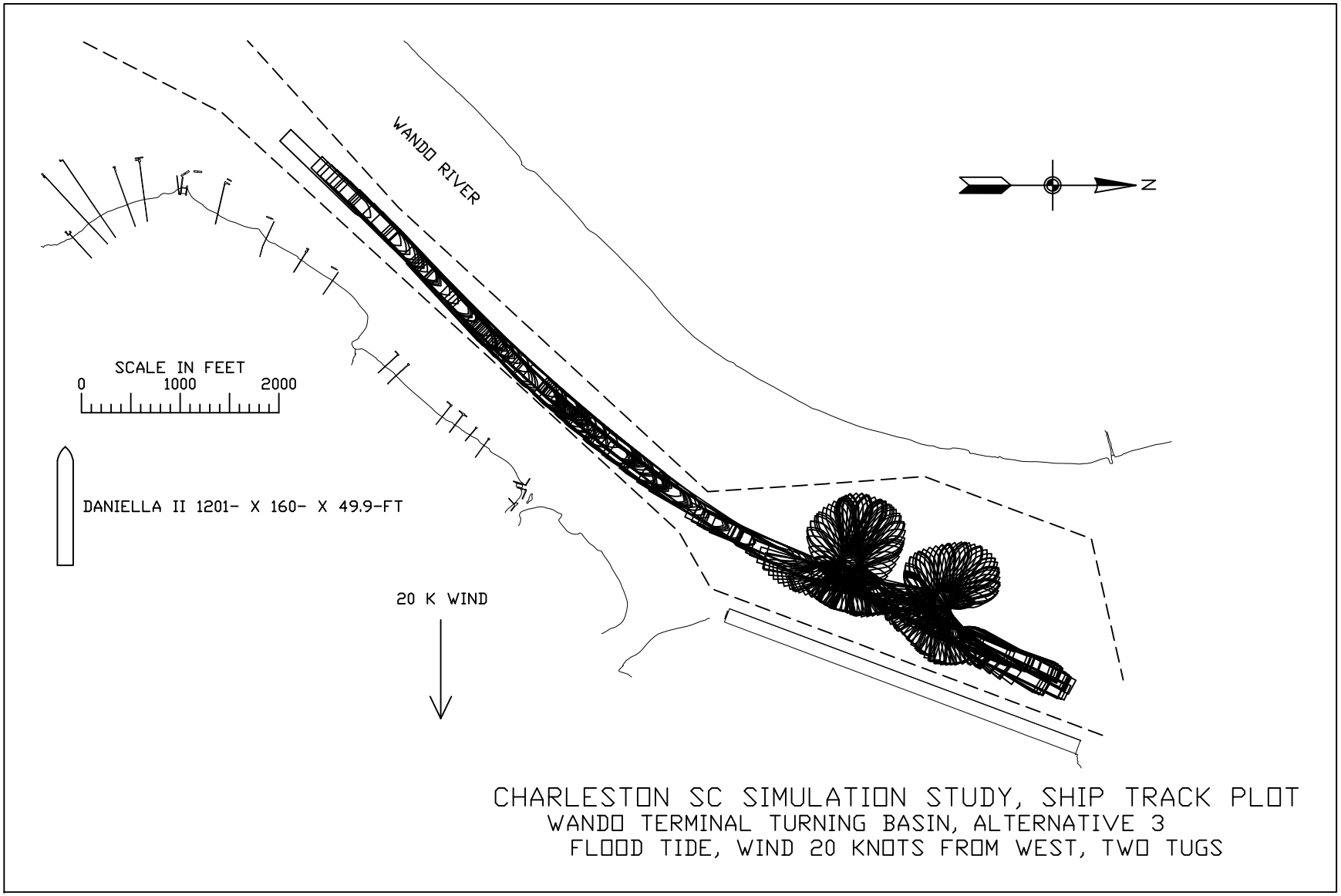
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM WEST, TWO TUGS



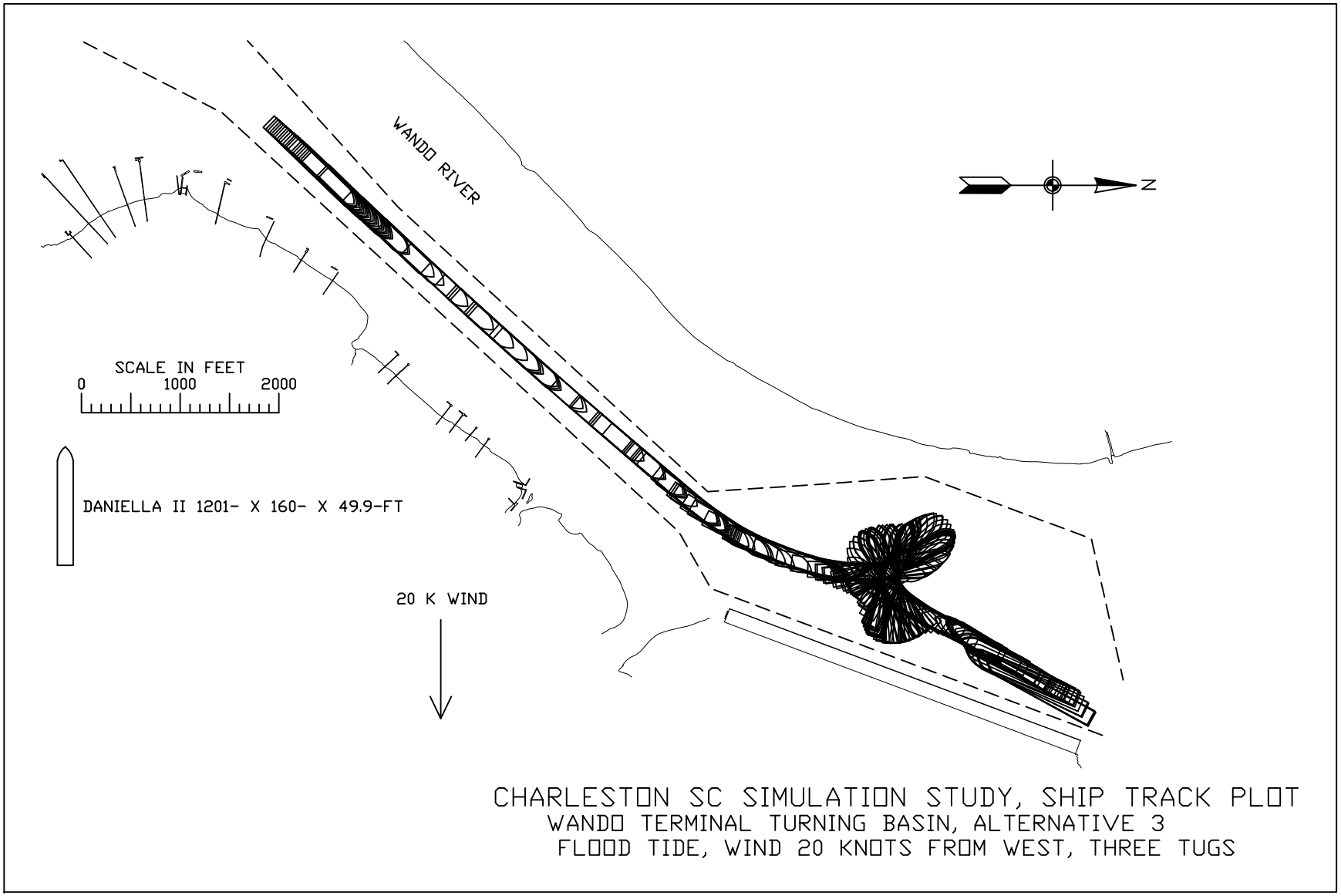
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM WEST, TWO TUGS

PLATE 8

PLATE 9



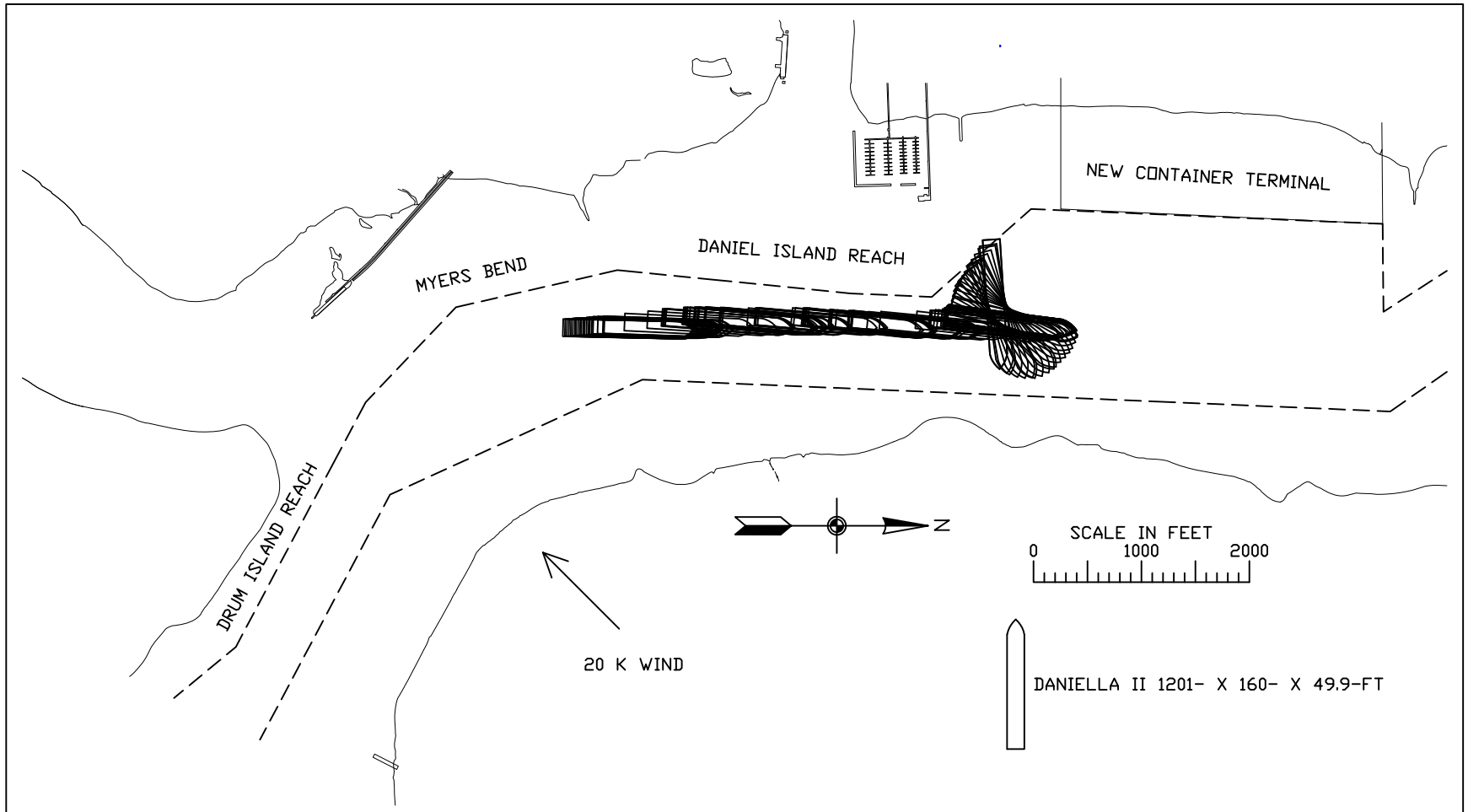
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 3
FLOOD TIDE, WIND 20 KNOTS FROM WEST, TWO TUGS



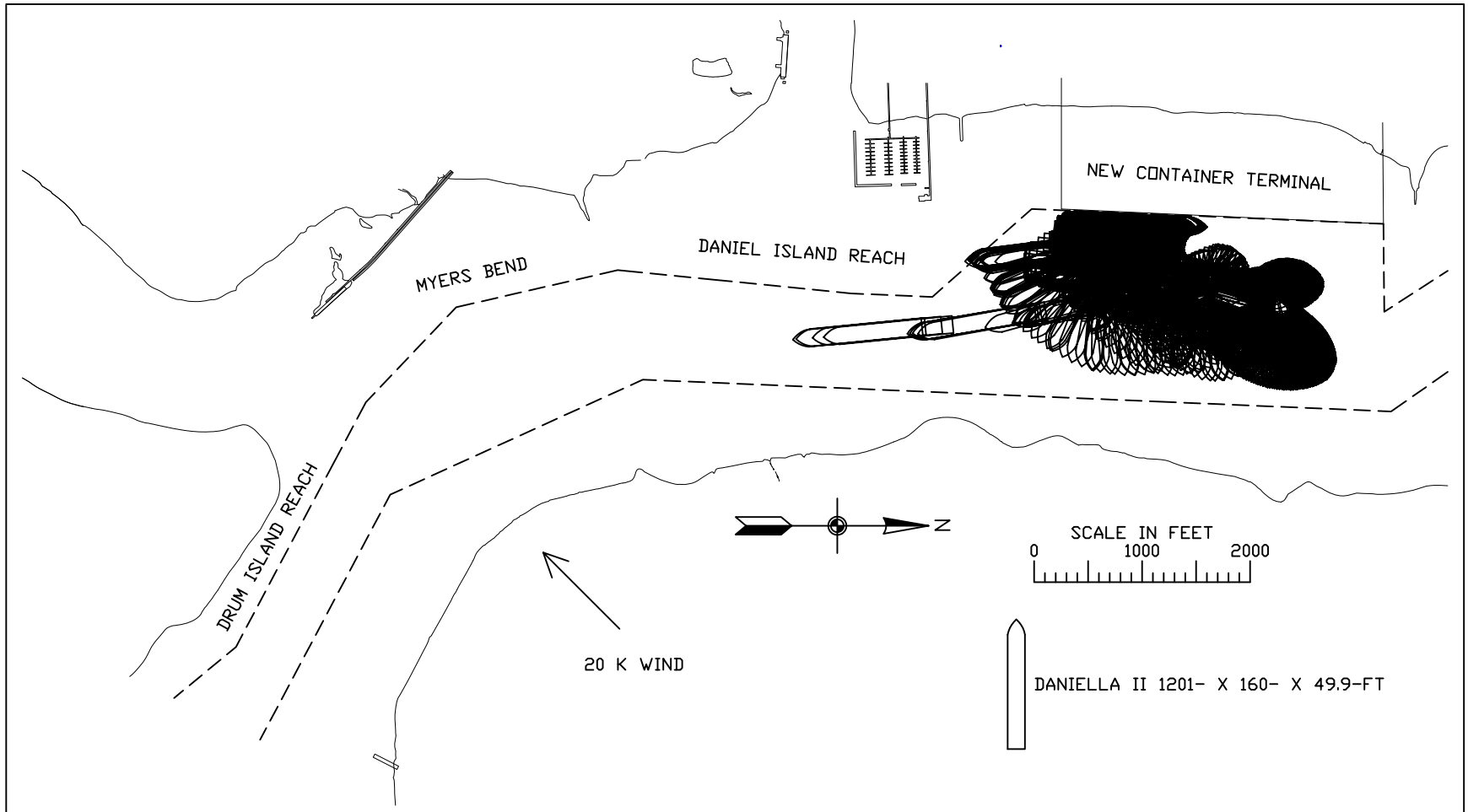
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO TERMINAL TURNING BASIN, ALTERNATIVE 3
FLOOD TIDE, WIND 20 KNOTS FROM WEST, THREE TUGS

PLATE 10

PLATE 11



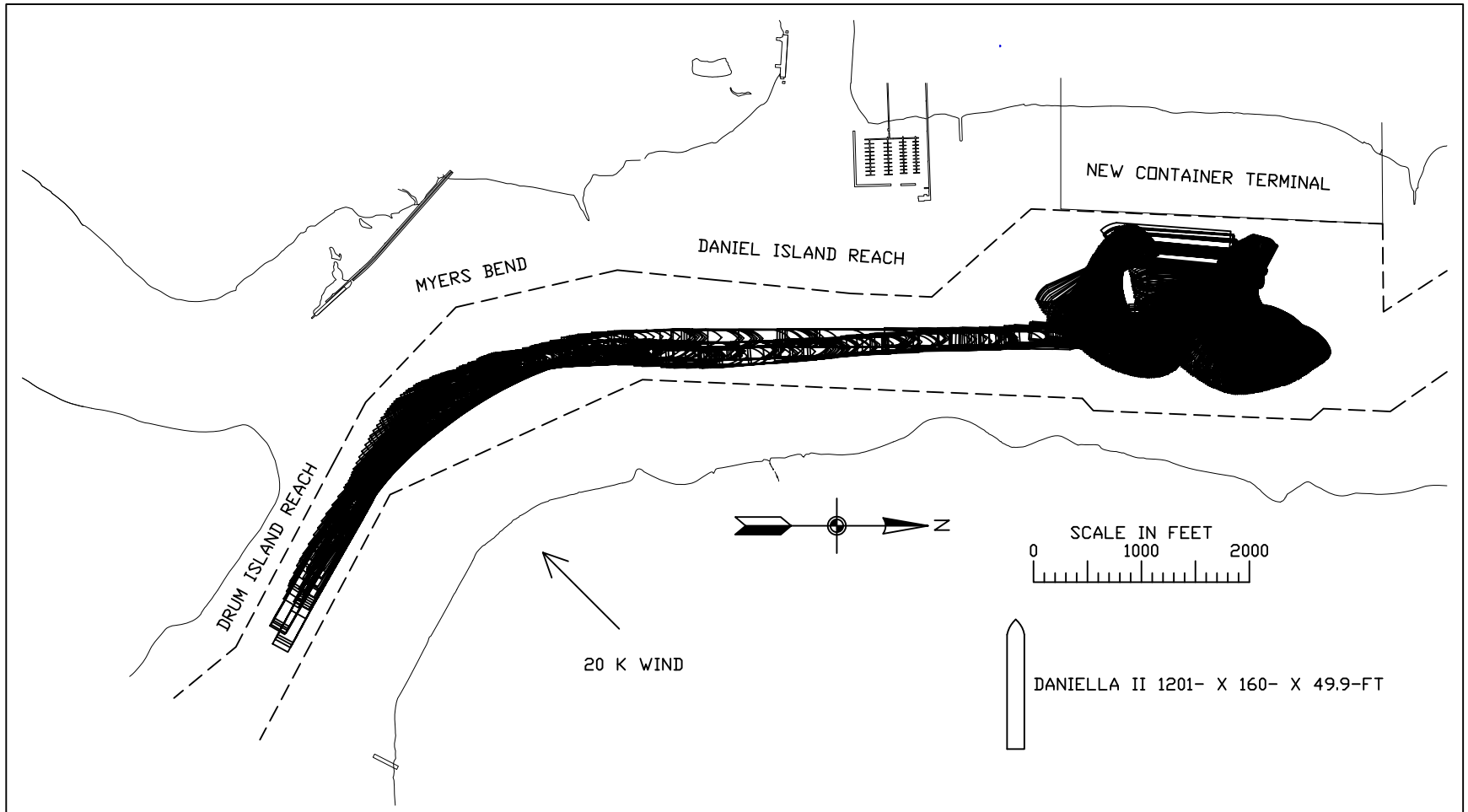
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 1
INBOUND, EBB TIDE
20 KNOTS FROM NORTHEAST , TWO TUGS



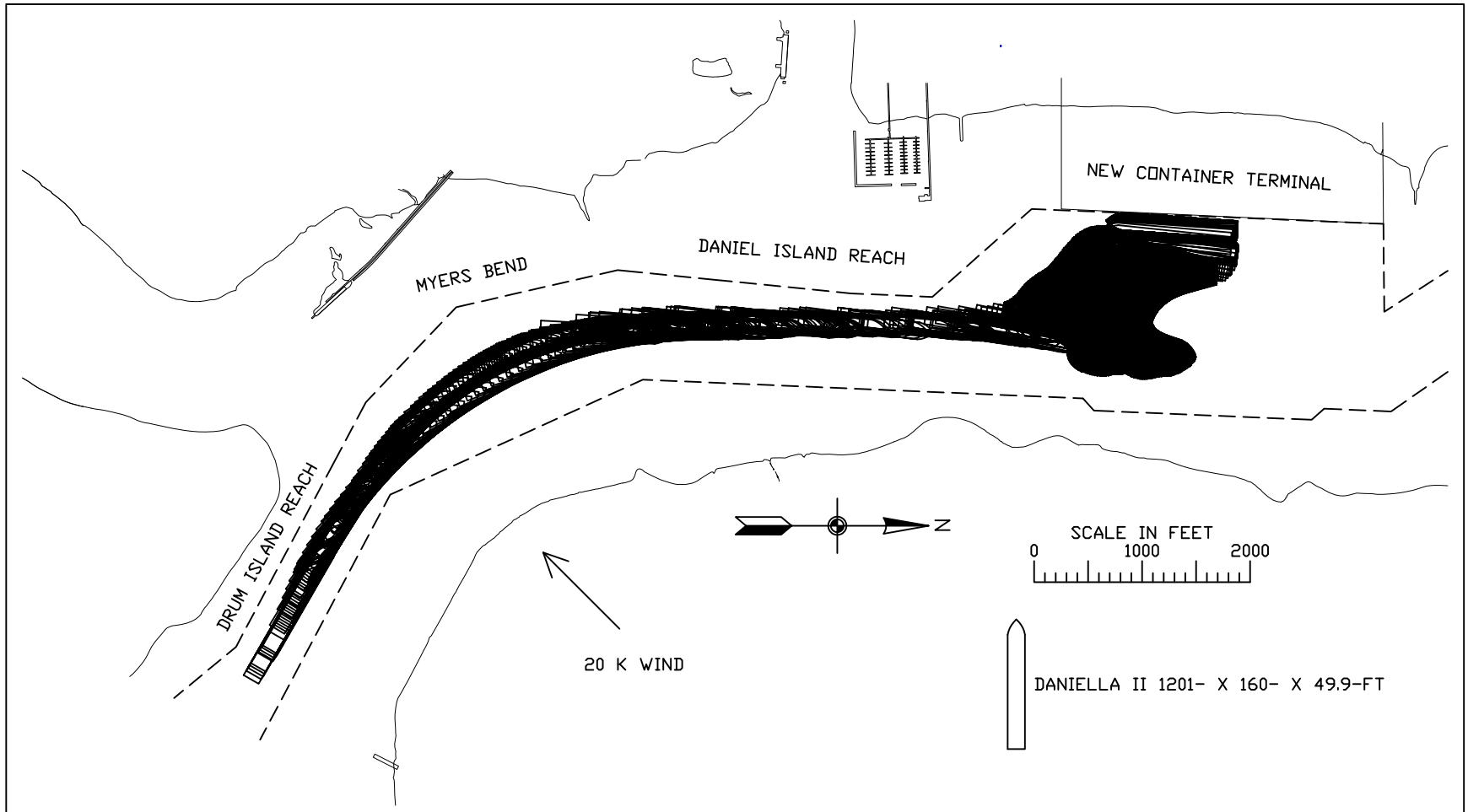
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 1
OUTBOUND, FLOOD TIDE
20 KNOTS FROM NORTHEAST , TWO TUGS

PLATE 12

PLATE 13



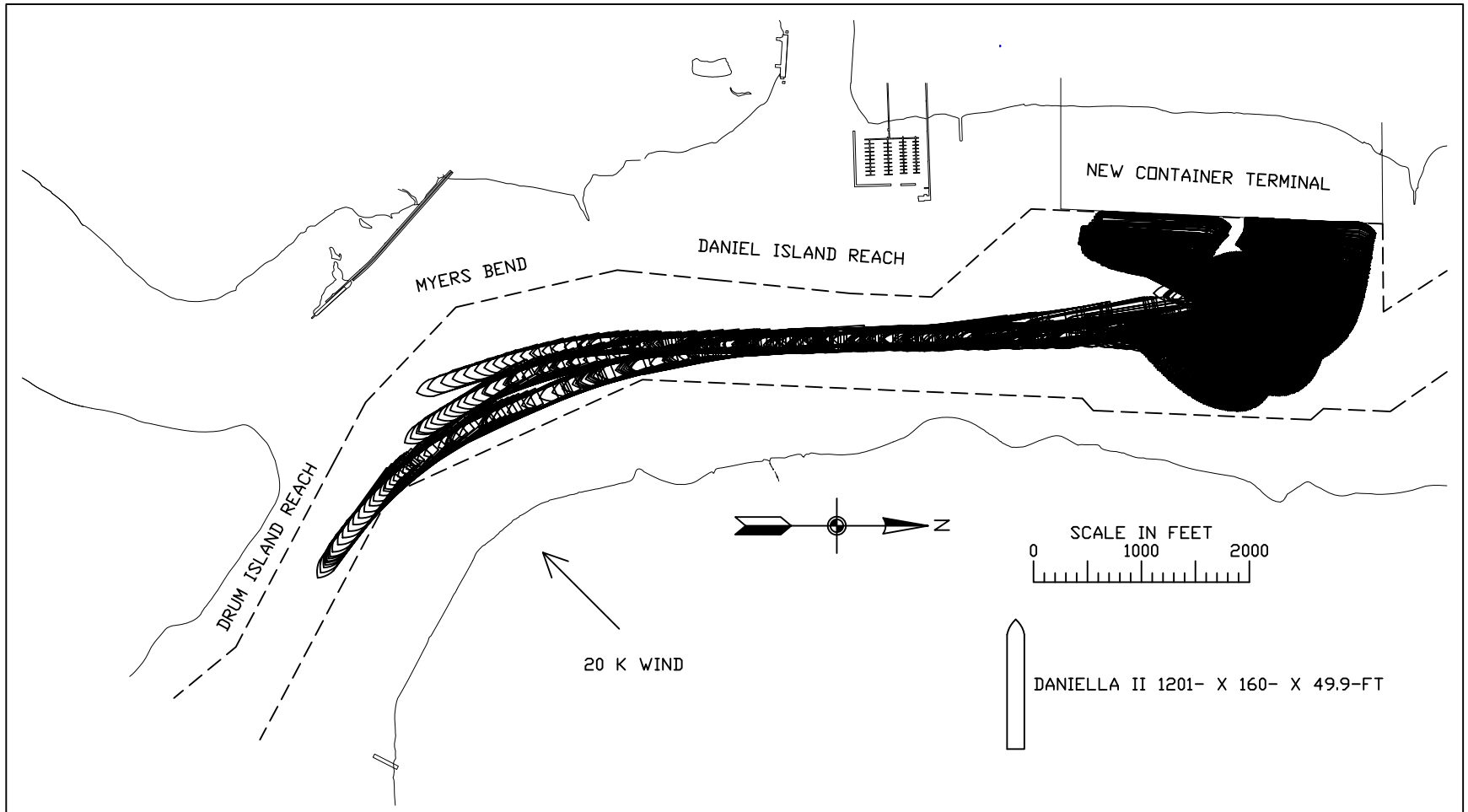
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 2A
INBOUND, EBB TIDE
20 KNOTS FROM NORTHEAST , TWO TUGS



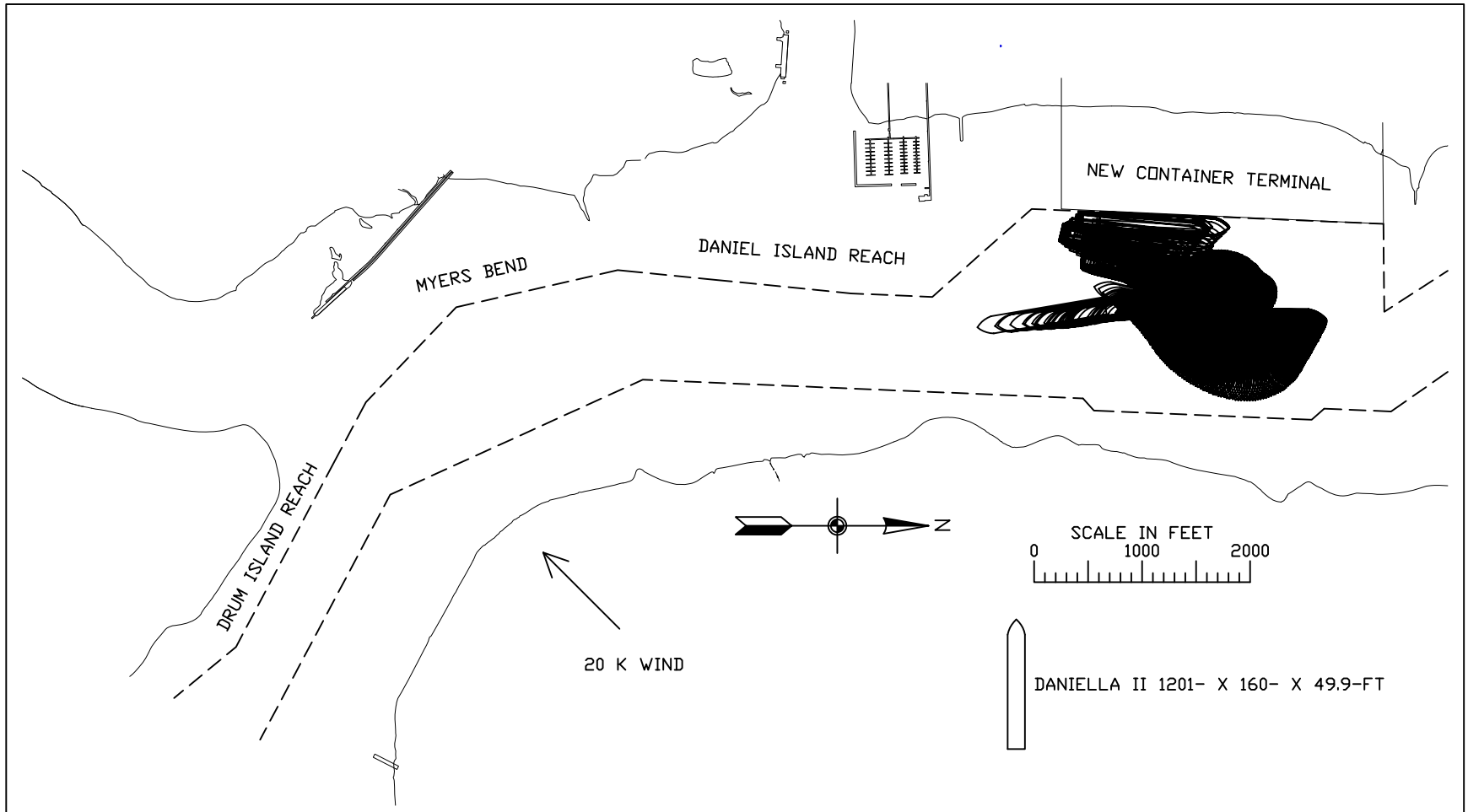
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 2A
INBOUND, FLOOD TIDE
20 KNOTS FROM NORTHEAST , TWO TUGS

PLATE 14

PLATE 15



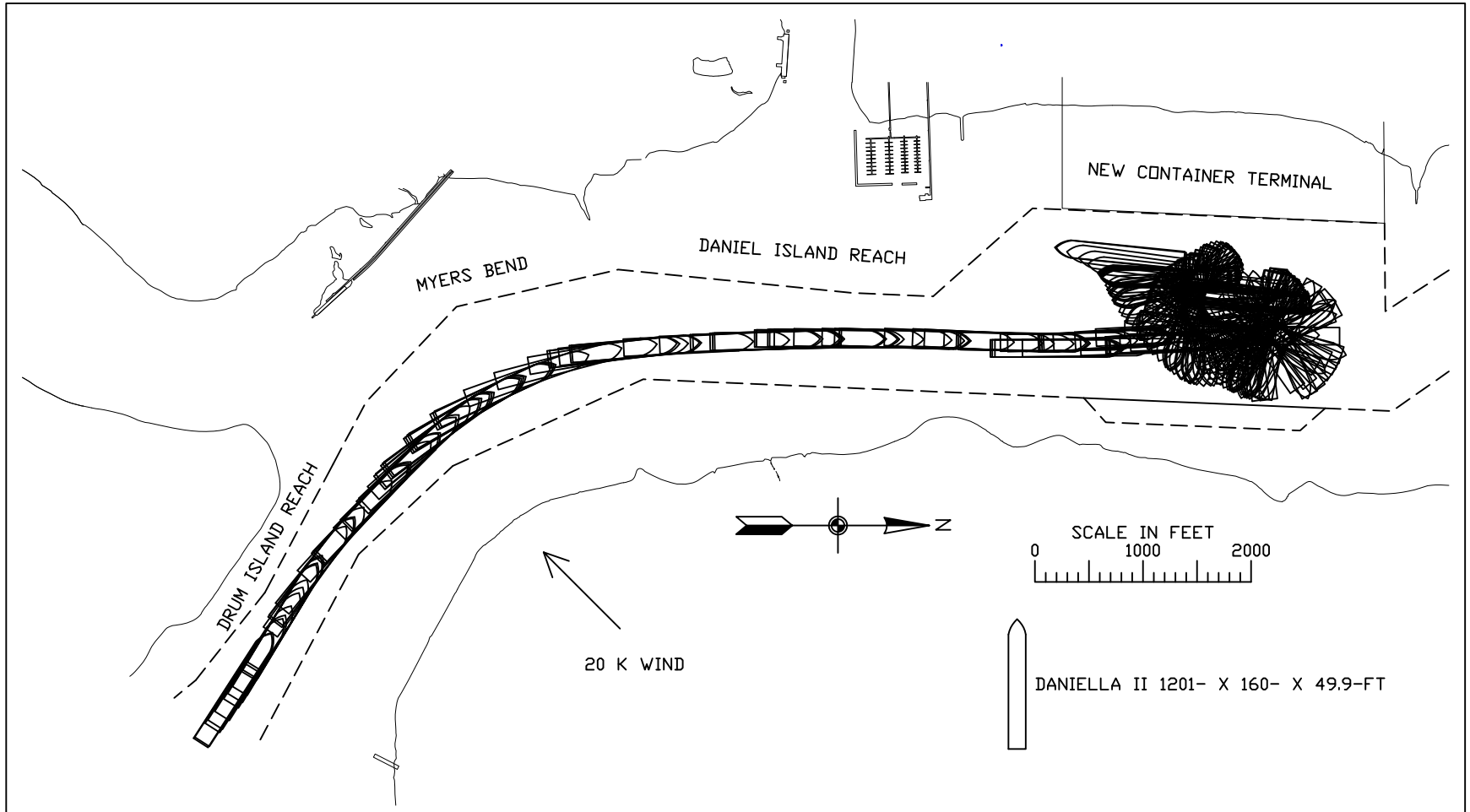
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 2A
OUTBOUND, EBB TIDE
20 KNOTS FROM NORTHEAST , TWO TUGS



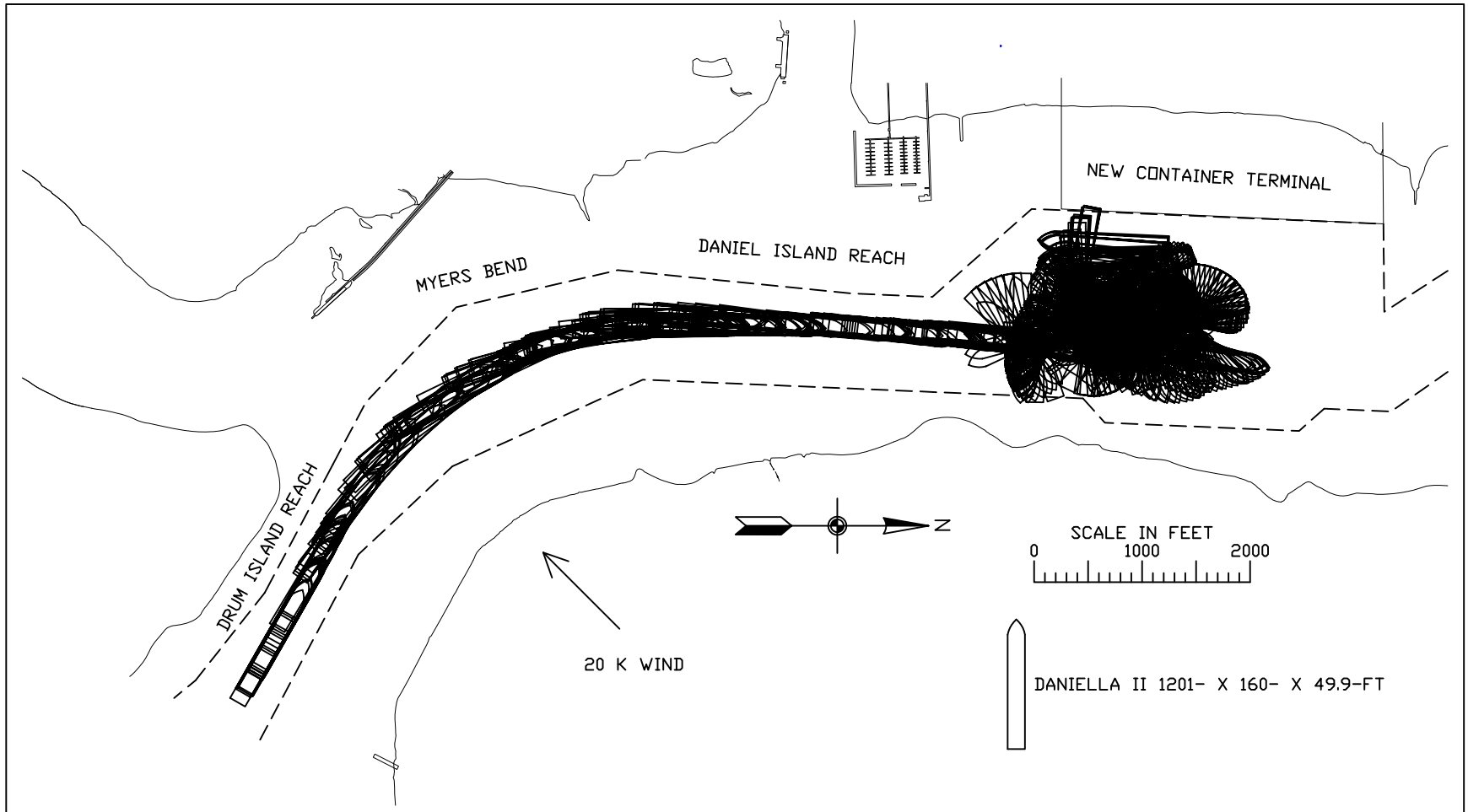
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 2A
INBOUND, EBB TIDE
20 KNOTS FROM NORTHEAST , THREE TUGS

PLATE 16

PLATE 17



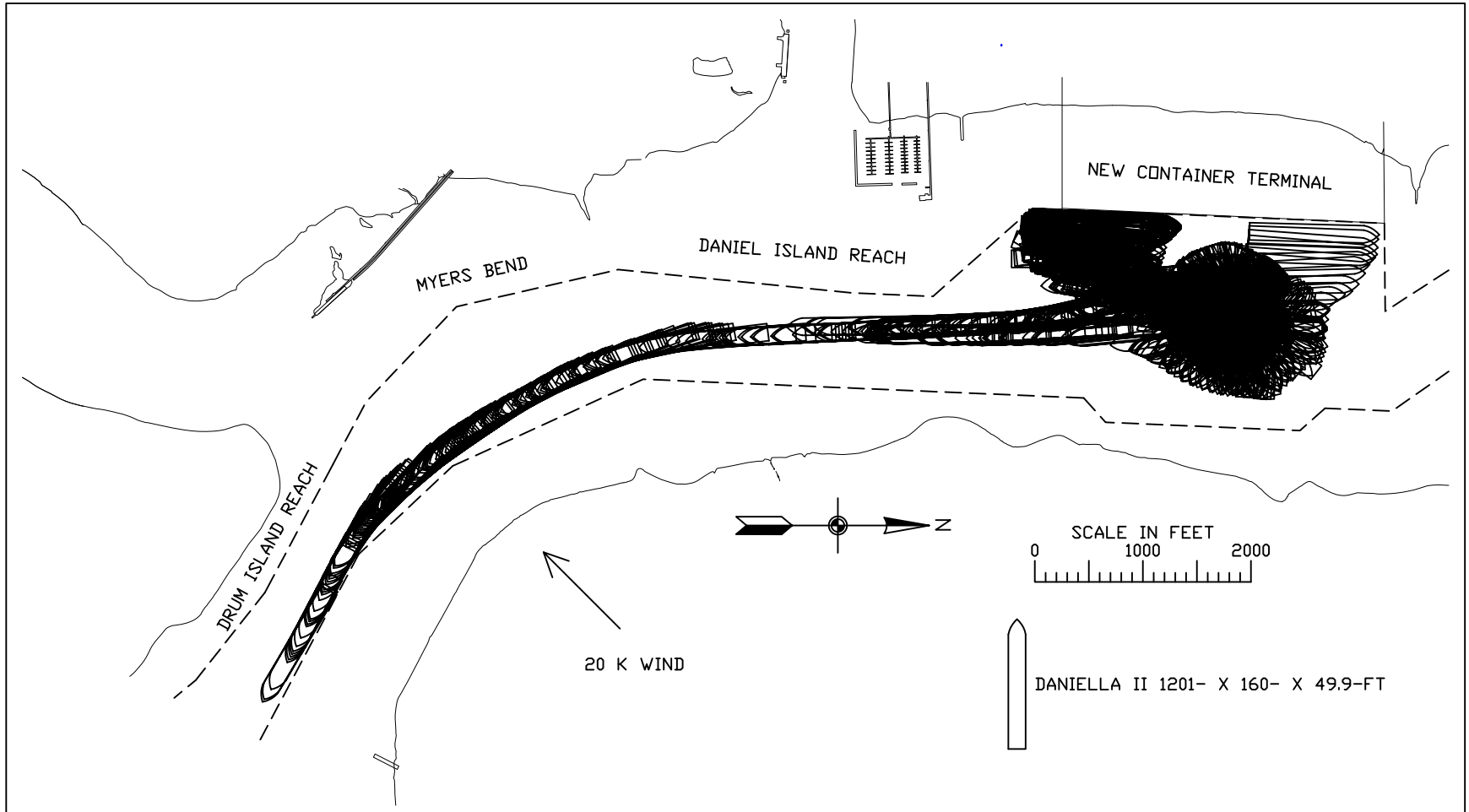
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 3
INBOUND,EBB TIDE
20 KNOTS FROM NORTHEAST , TWO TUGS



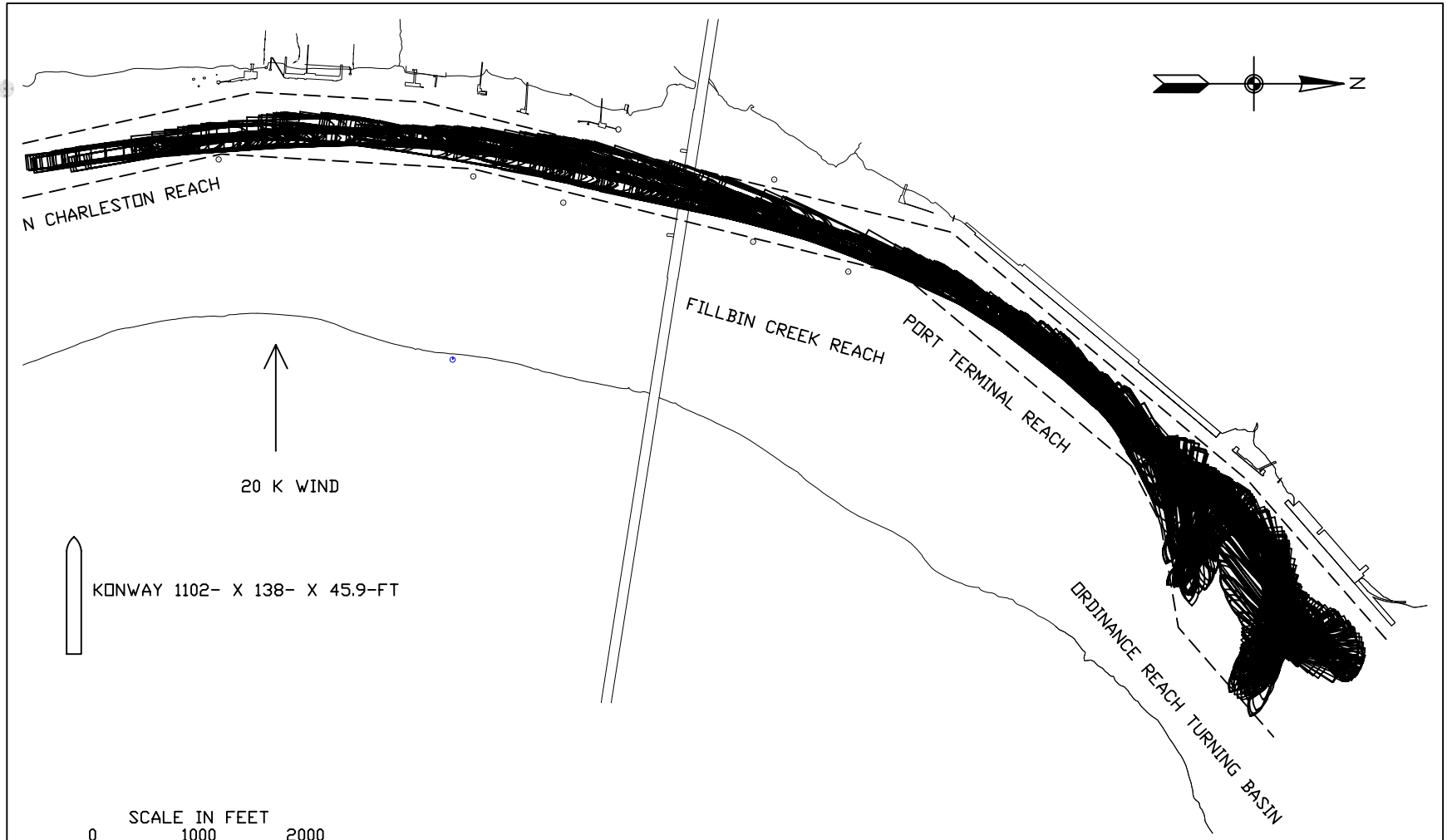
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 3
INBOUND, FLOOD TIDE
20 KNOTS FROM NORTHEAST , THREE TUGS

PLATE 18

PLATE 19



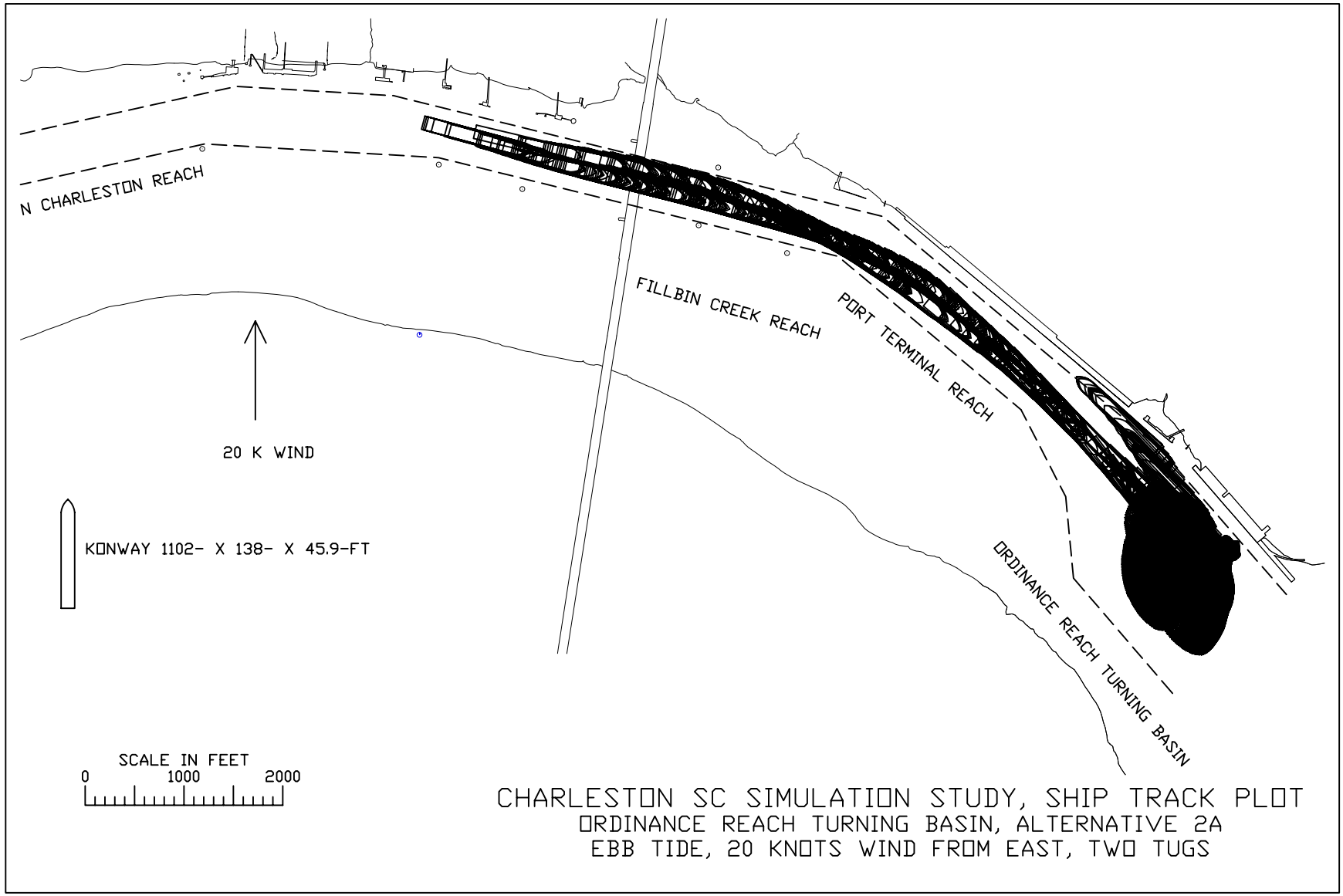
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
LEATHERMAN TERMINAL TURNING BASIN, ALTERNATIVE 3
OUTBOUND, EBB TIDE
20 KNOTS FROM NORTHEAST , THREE TUGS



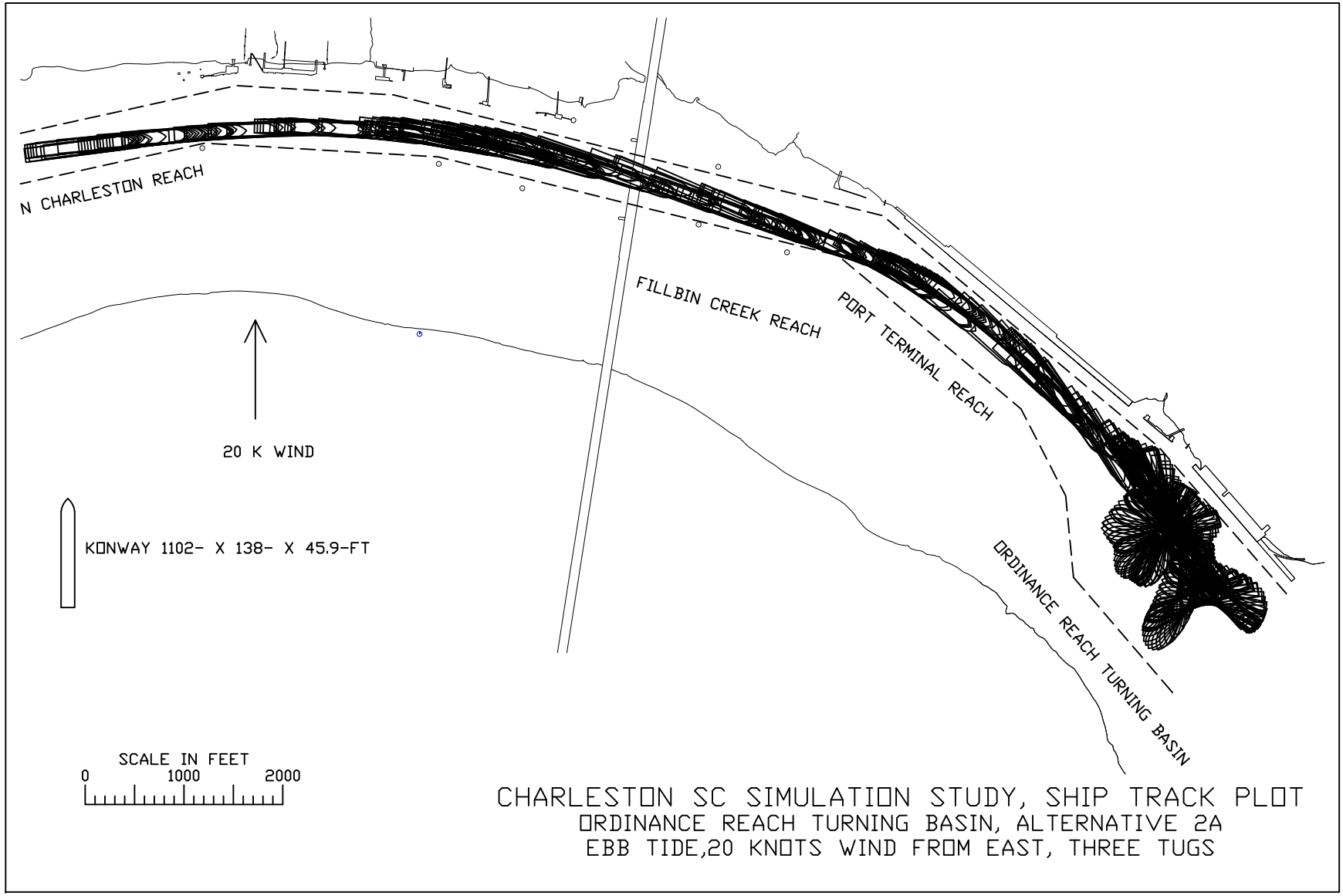
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 2
ALL RUNS

PLATE 20

PLATE 21



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 2A
EBB TIDE, 20 KNOTS WIND FROM EAST, TWO TUGS



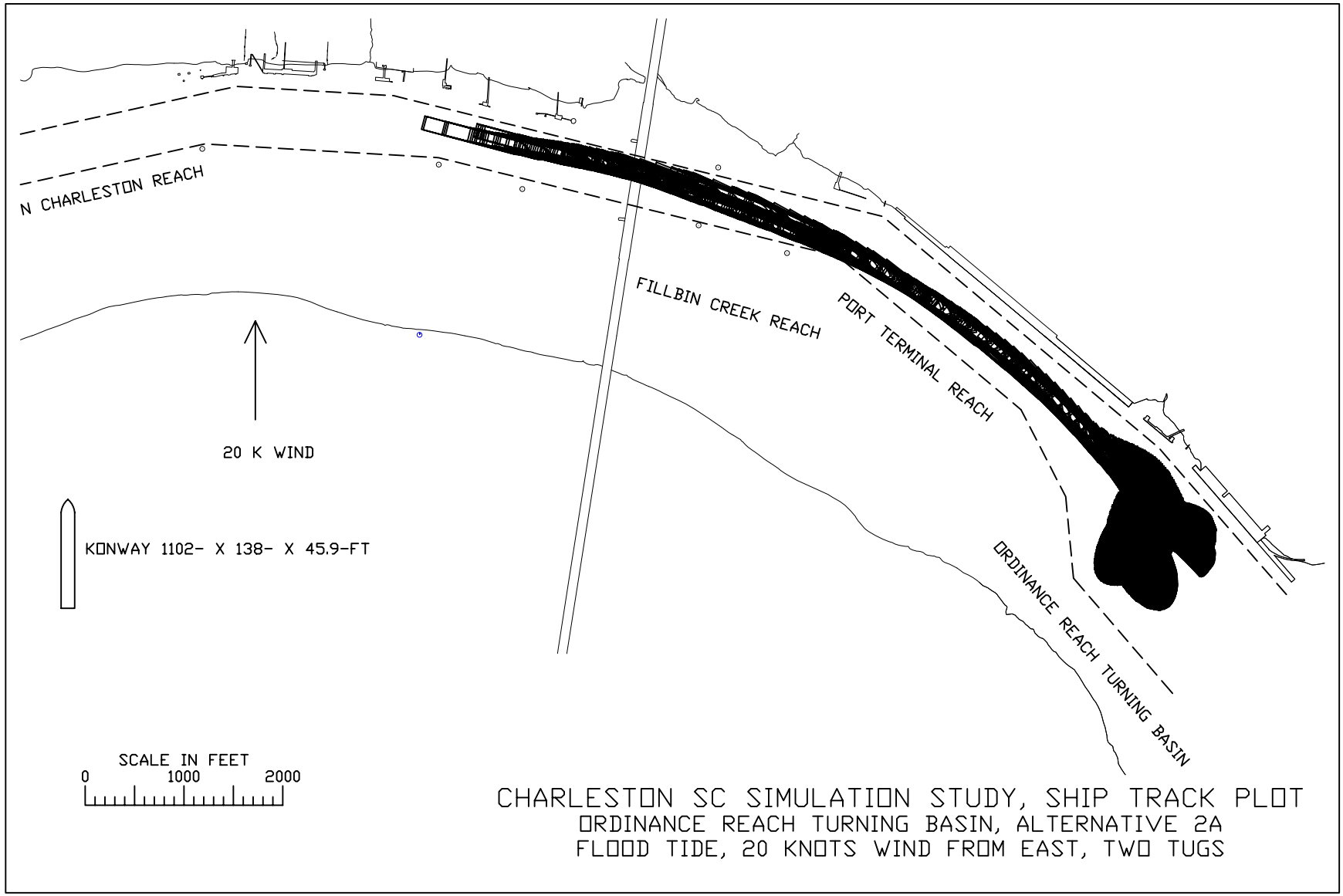
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

ORDINANCE REACH TURNING BASIN, ALTERNATIVE 2A

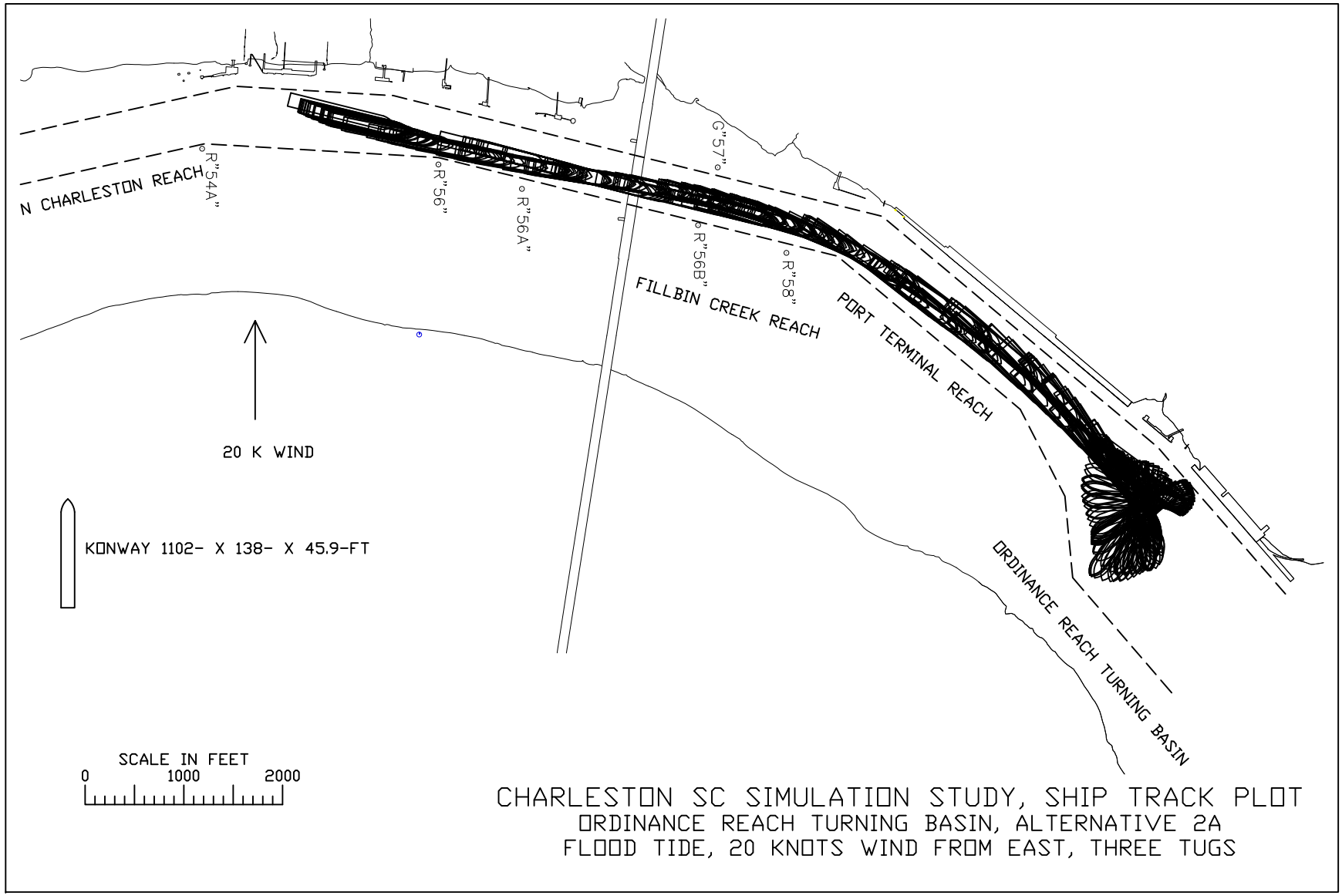
EBB TIDE,20 KNOTS WIND FROM EAST, THREE TUGS

PLATE 22

PLATE 23



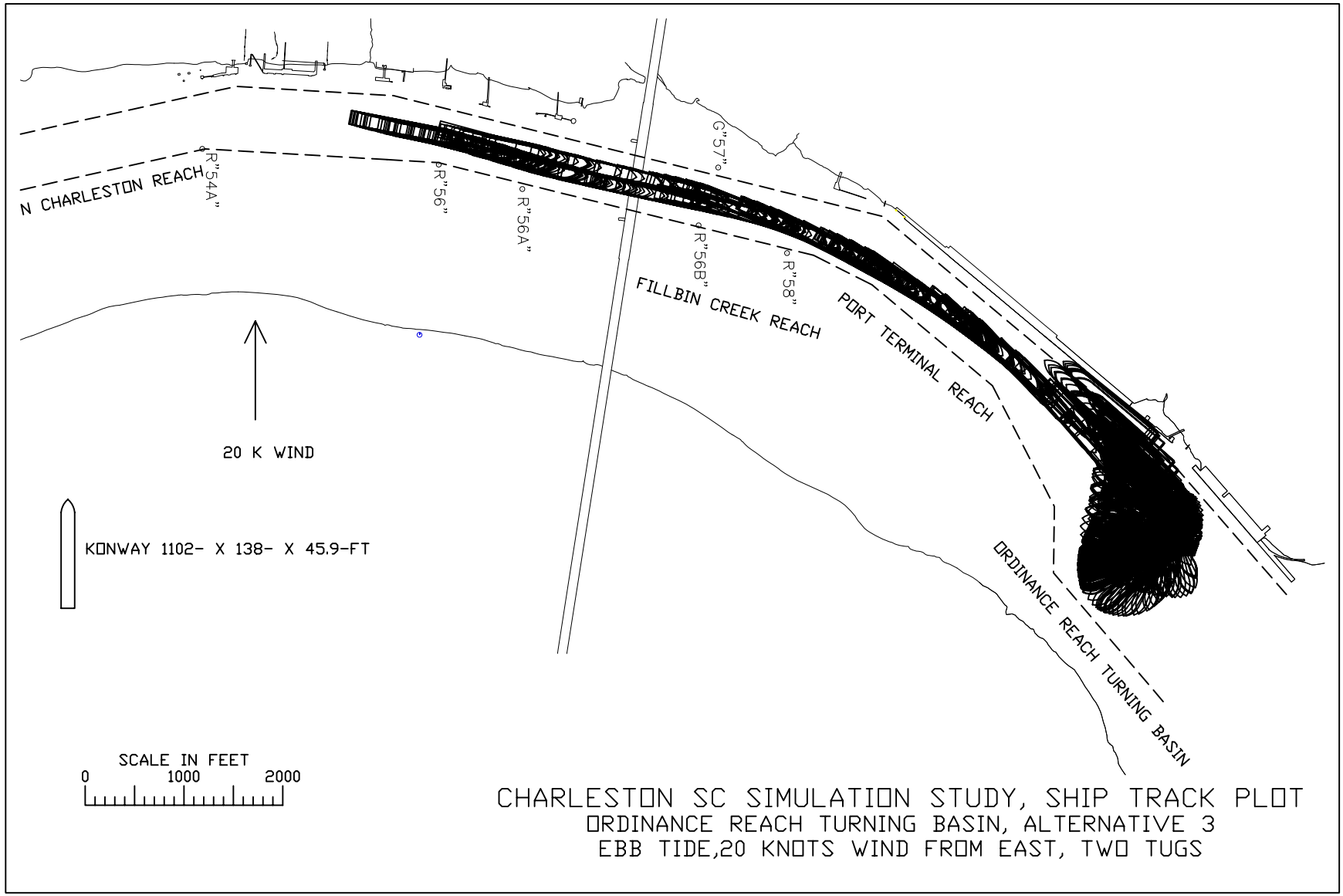
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 2A
FLOOD TIDE, 20 KNOTS WIND FROM EAST, TWO TUGS



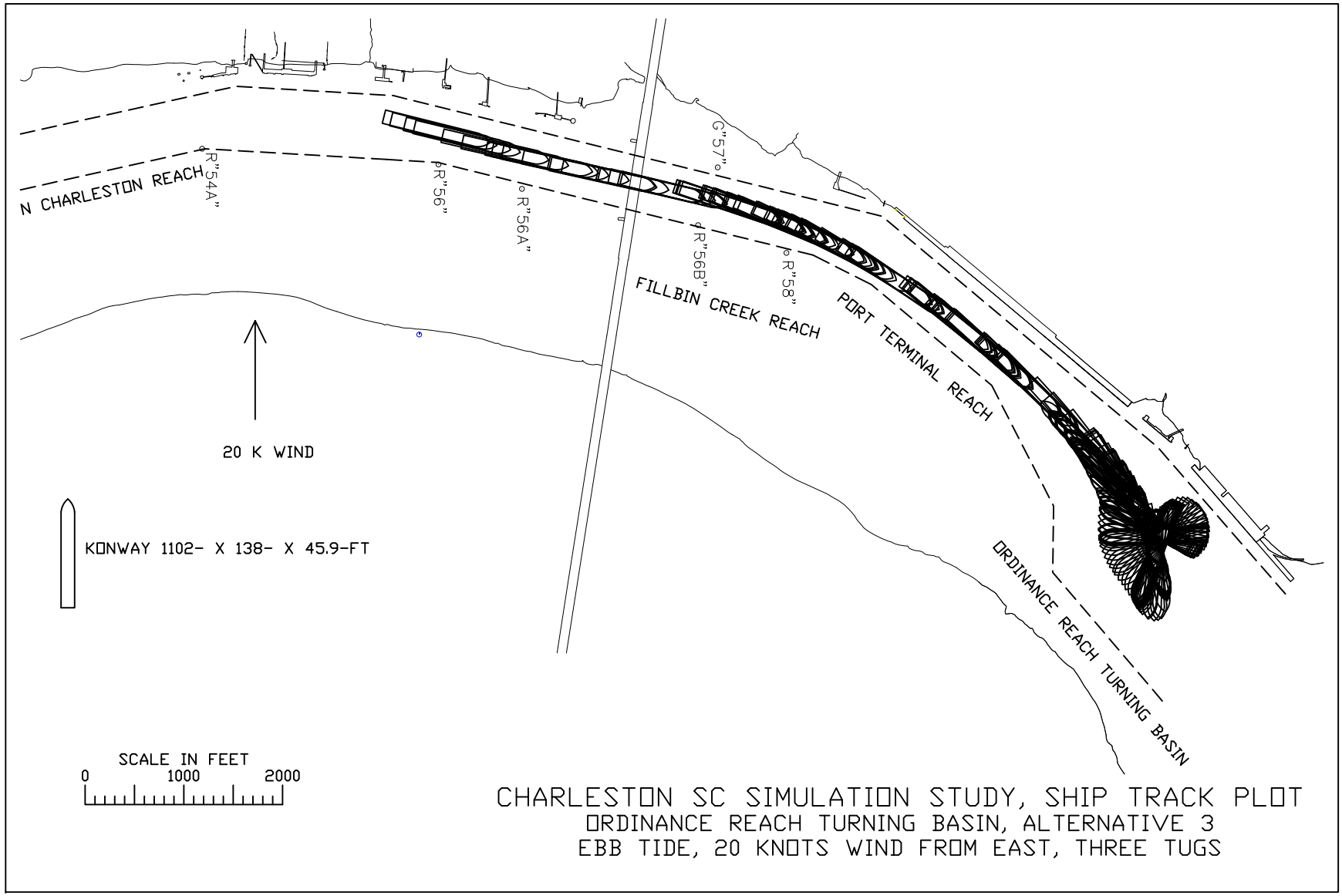
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 2A
FLOOD TIDE, 20 KNOTS WIND FROM EAST, THREE TUGS

PLATE 24

PLATE 25



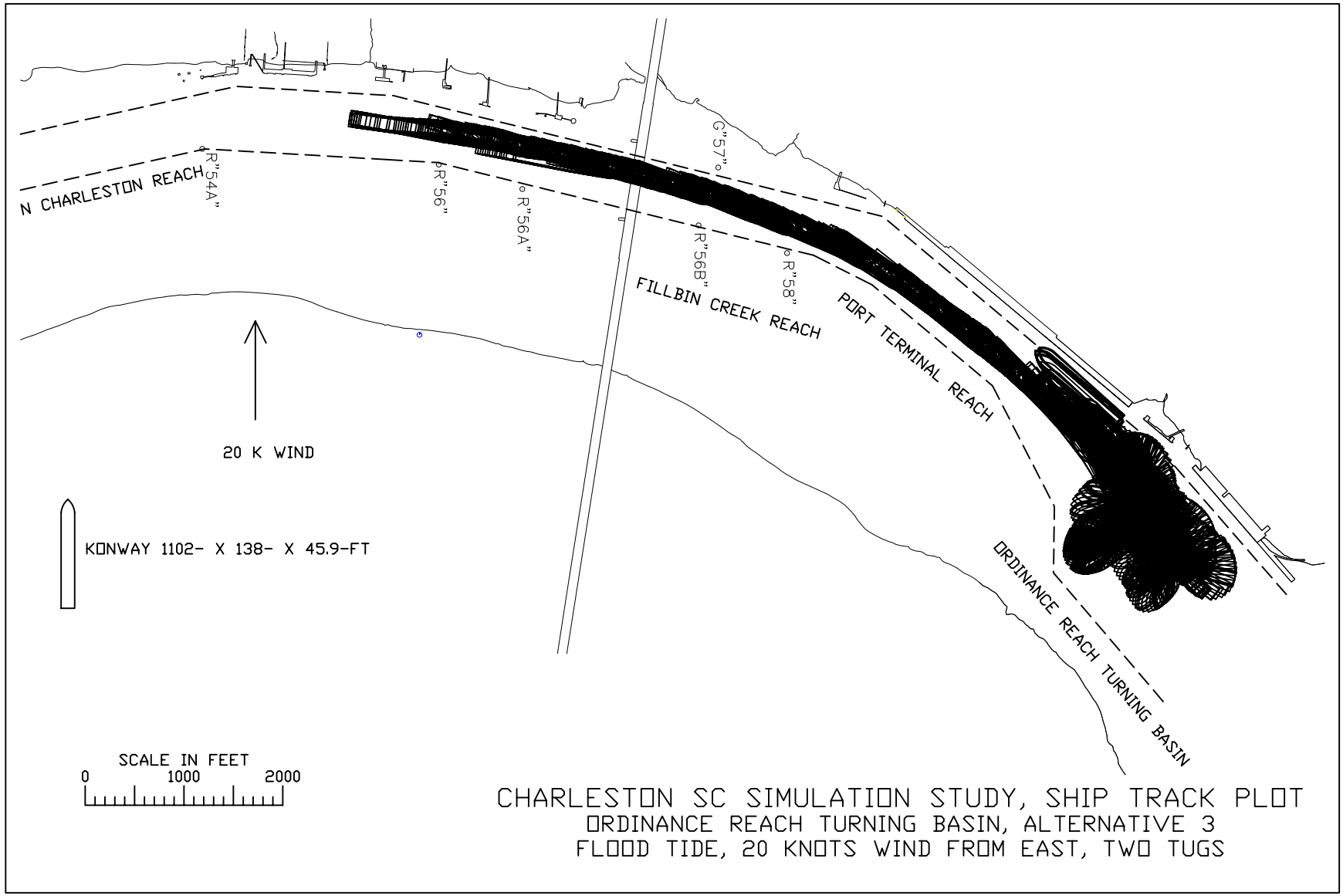
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 3
EBB TIDE,20 KNOTS WIND FROM EAST, TWO TUGS



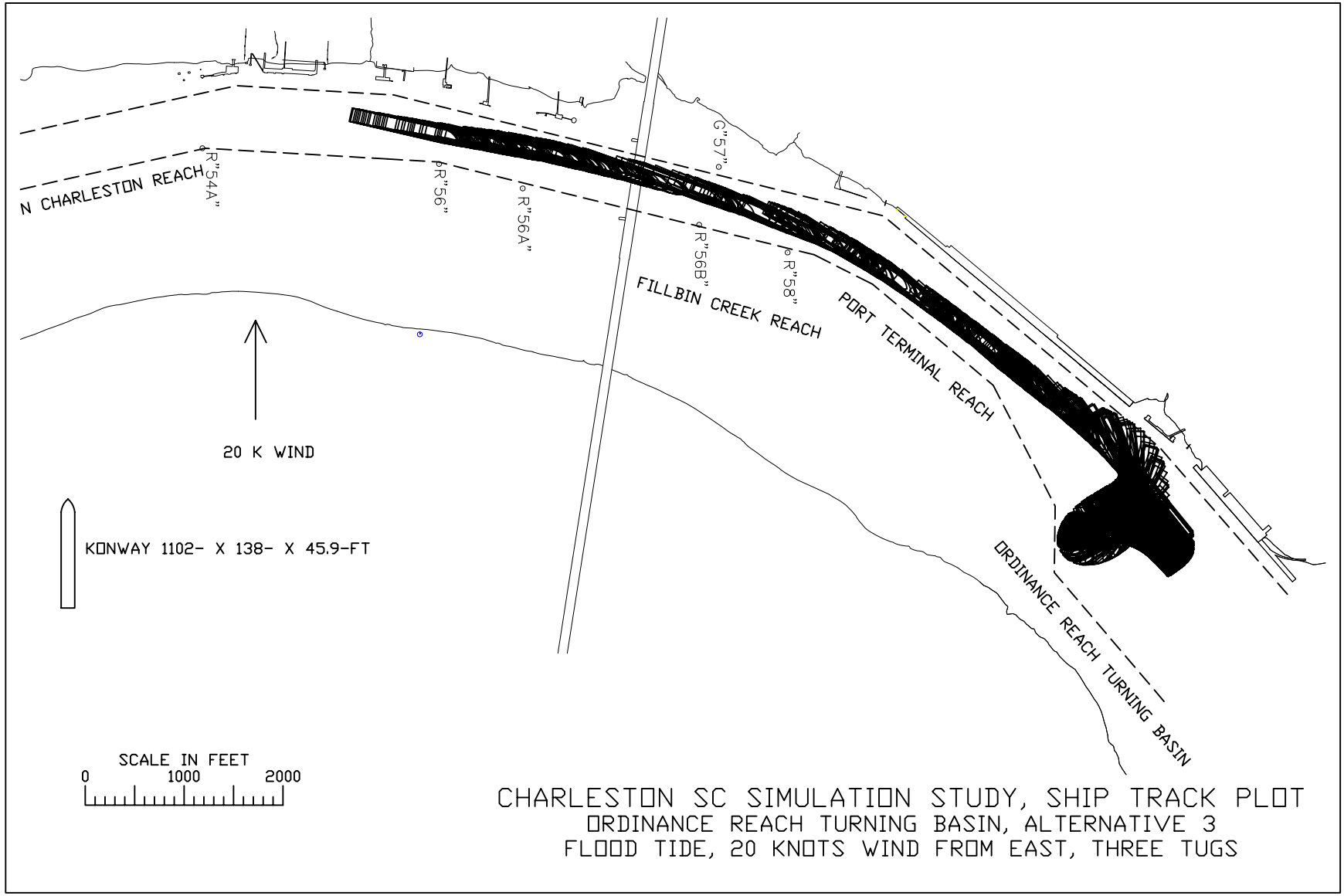
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 3
EBB TIDE, 20 KNOTS WIND FROM EAST, THREE TUGS

PLATE 26

PLATE 27



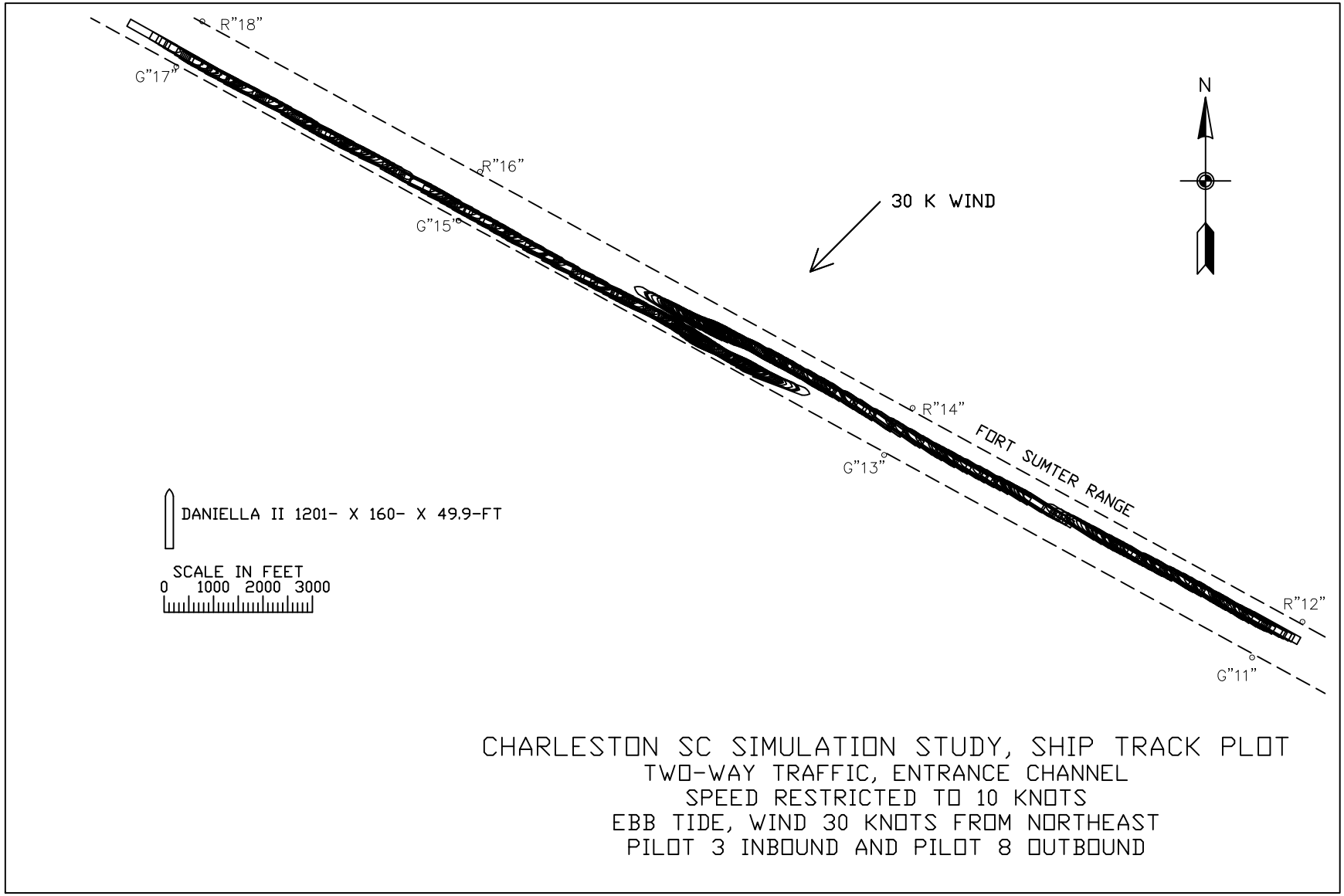
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 3
FLOOD TIDE, 20 KNOTS WIND FROM EAST, TWO TUGS



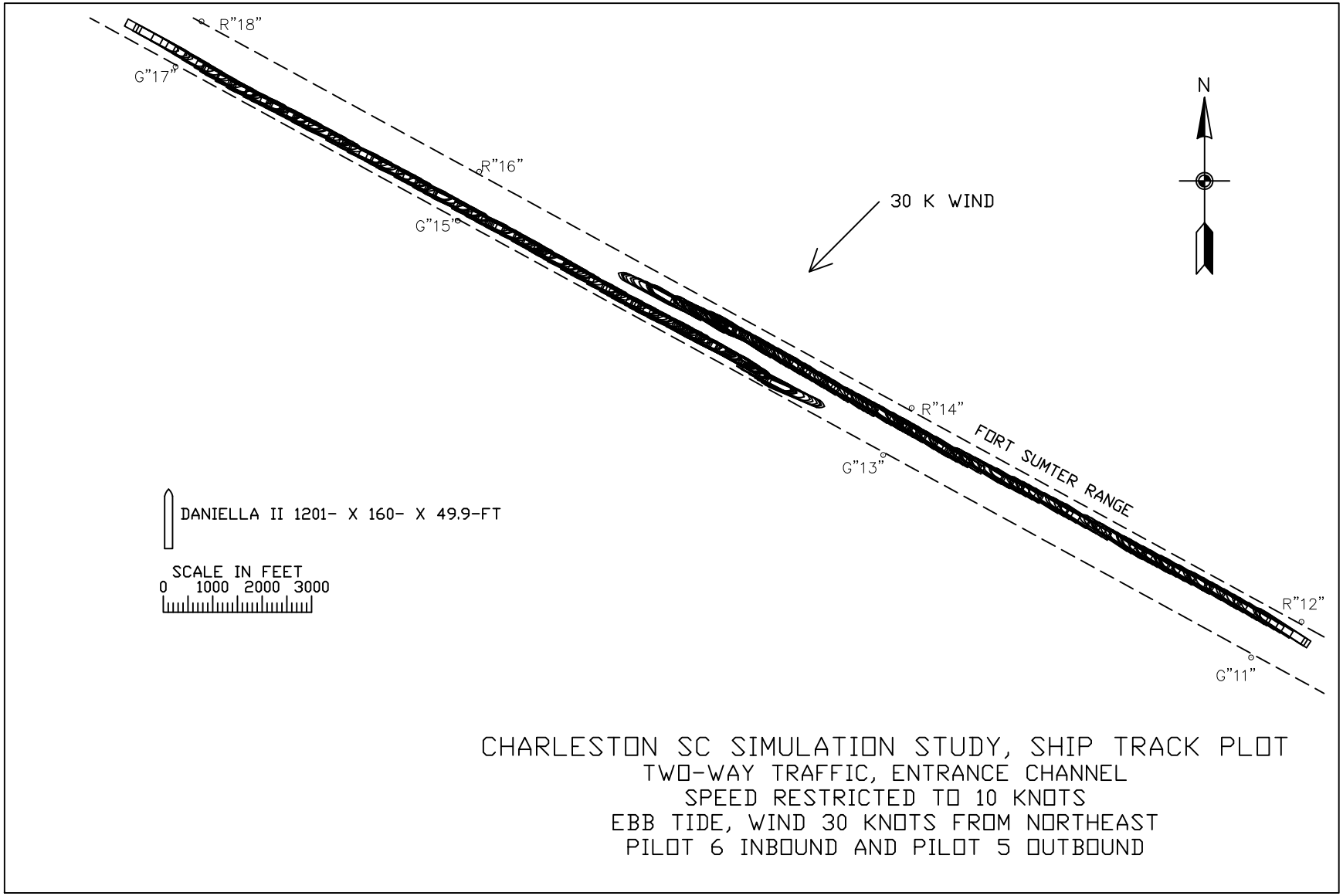
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
ORDINANCE REACH TURNING BASIN, ALTERNATIVE 3
FLOOD TIDE, 20 KNOTS WIND FROM EAST, THREE TUGS

PLATE 28

PLATE 29



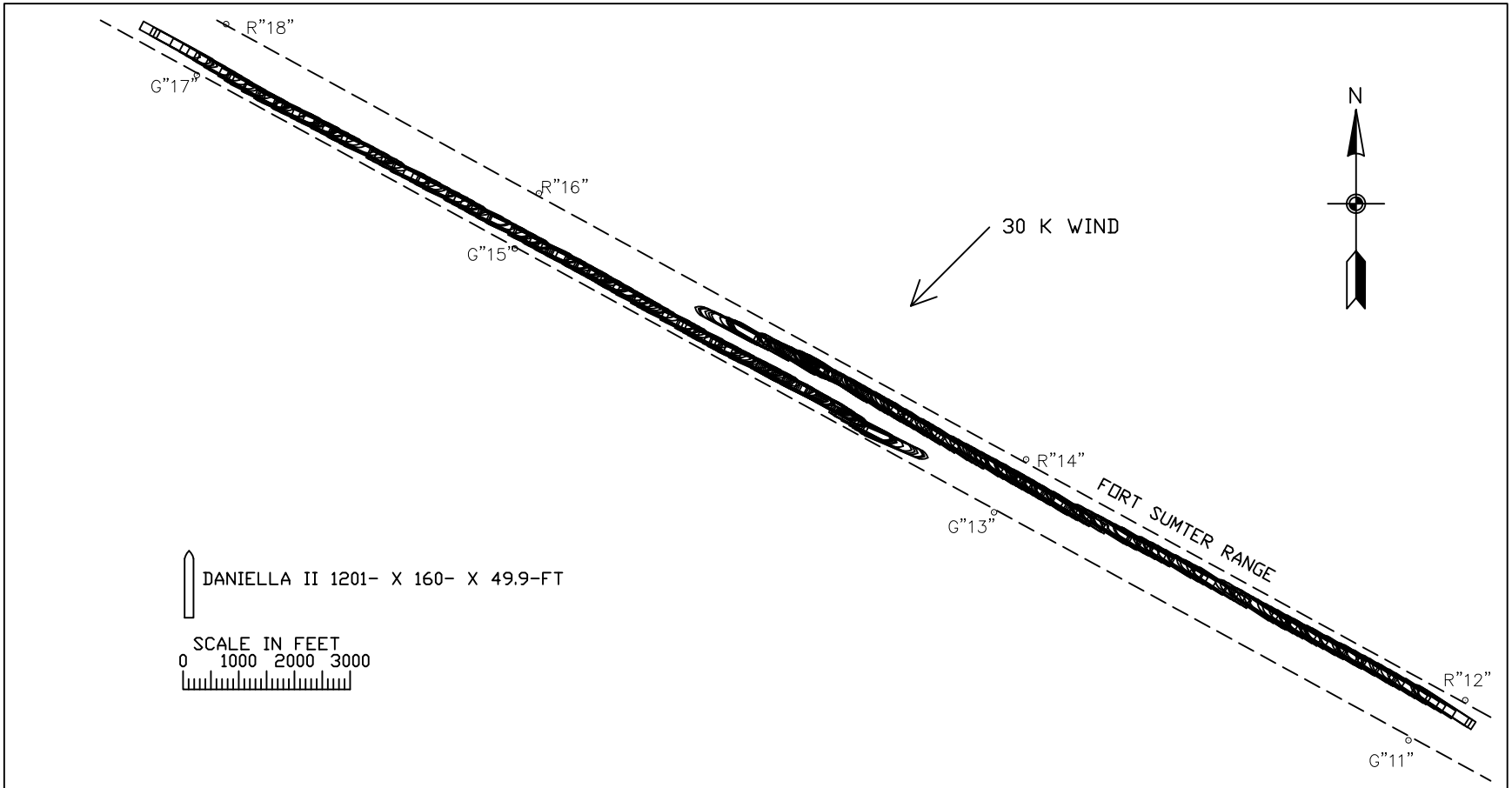
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED RESTRICTED TO 10 KNOTS
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 3 INBOUND AND PILOT 8 OUTBOUND



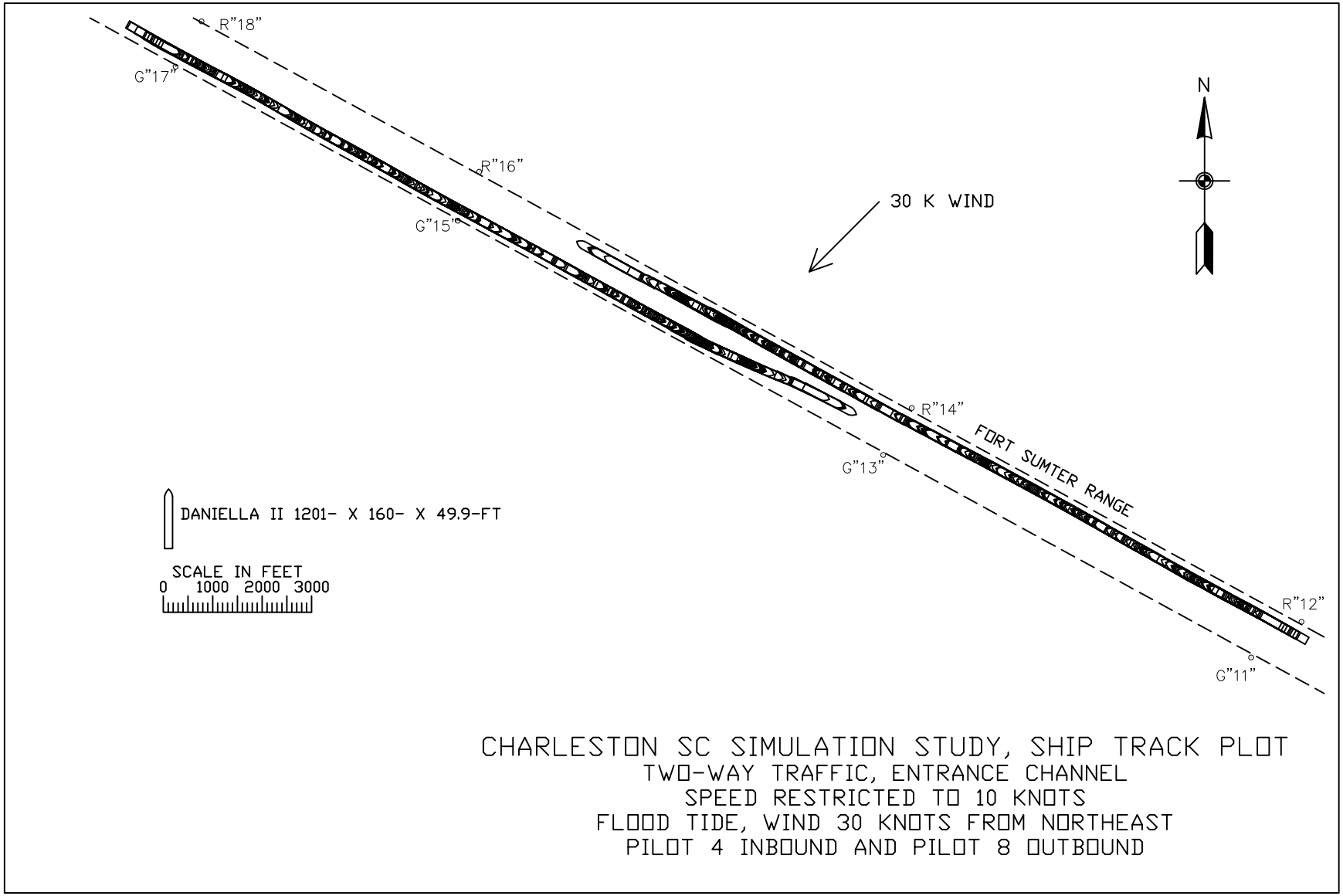
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED RESTRICTED TO 10 KNOTS
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND

PLATE 30

PLATE 31



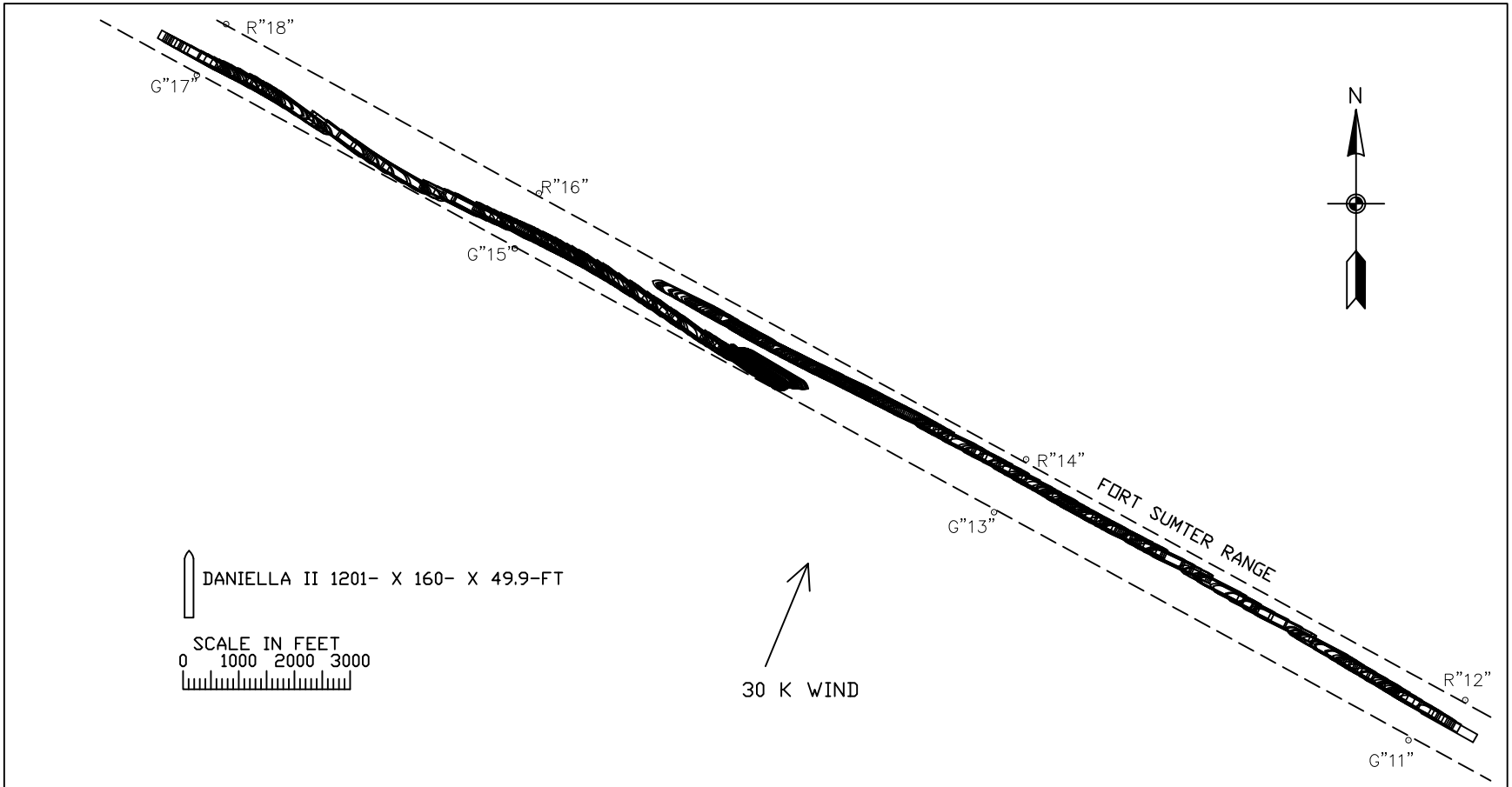
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED RESTRICTED TO 10 KNOTS
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND, REPEAT RUN



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED RESTRICTED TO 10 KNOTS
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 8 OUTBOUND

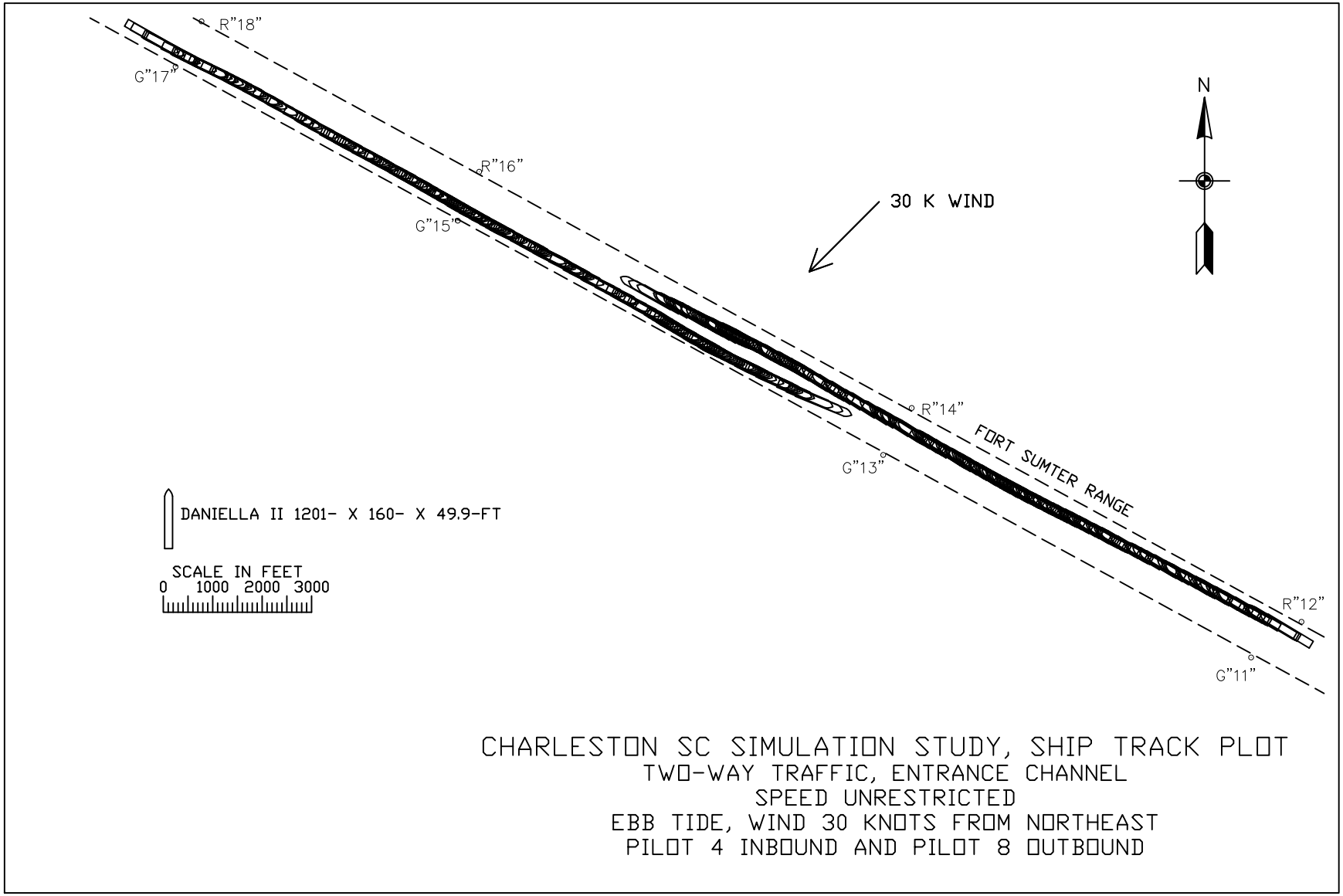
PLATE 32

PLATE 33



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

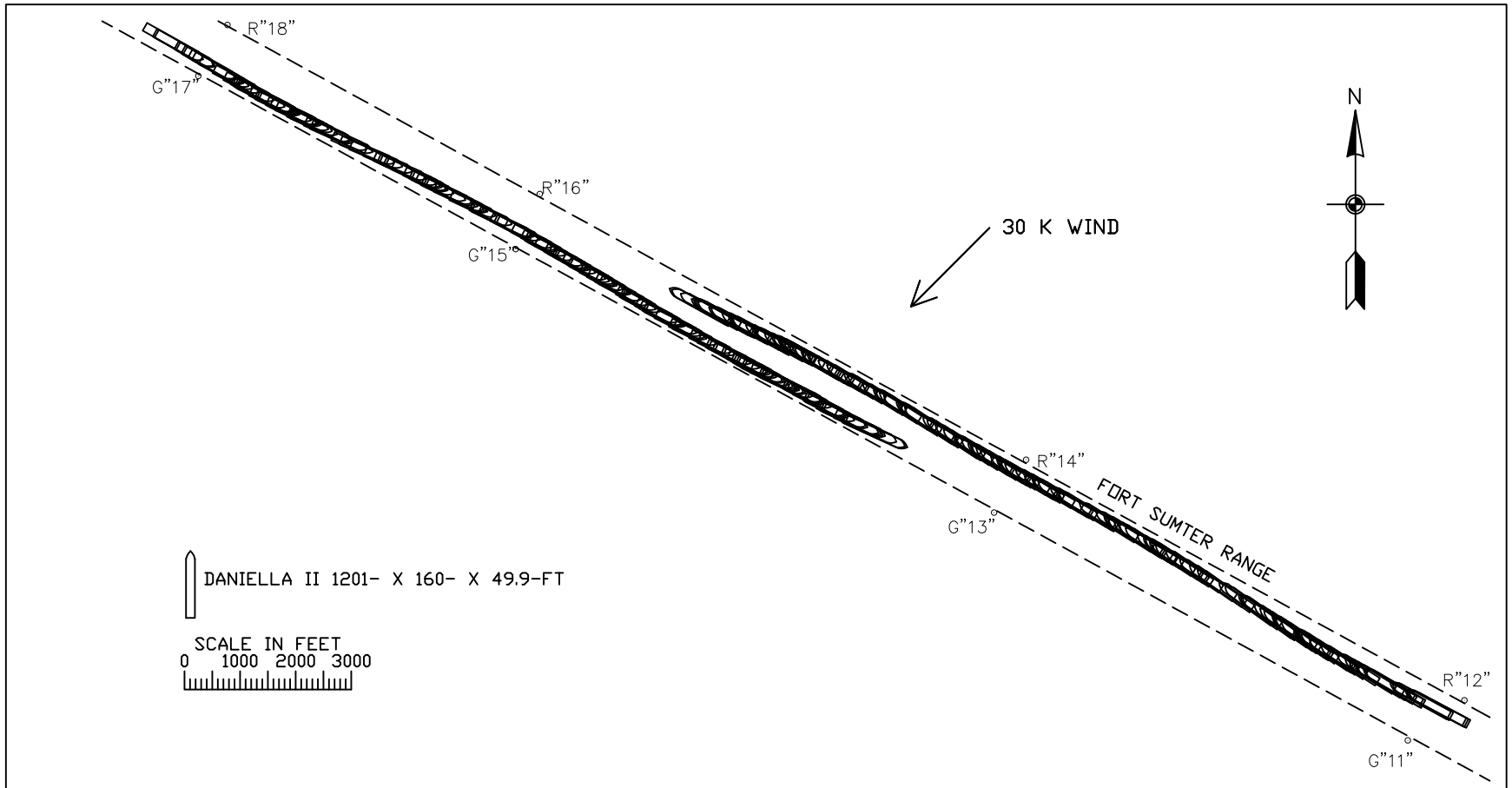
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED RESTRICTED TO 10 KNOTS
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND



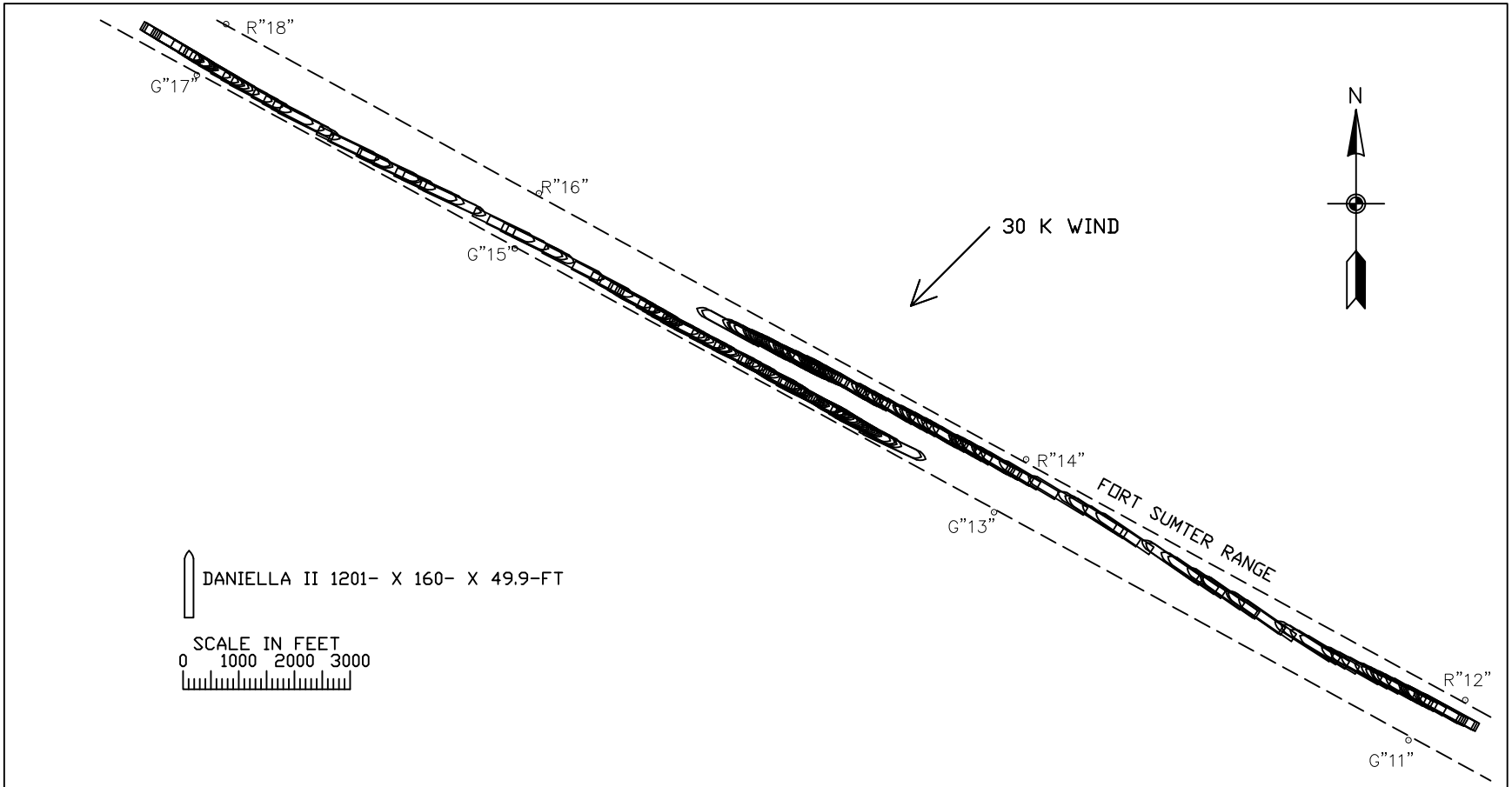
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 8 OUTBOUND

PLATE 34

PLATE 35



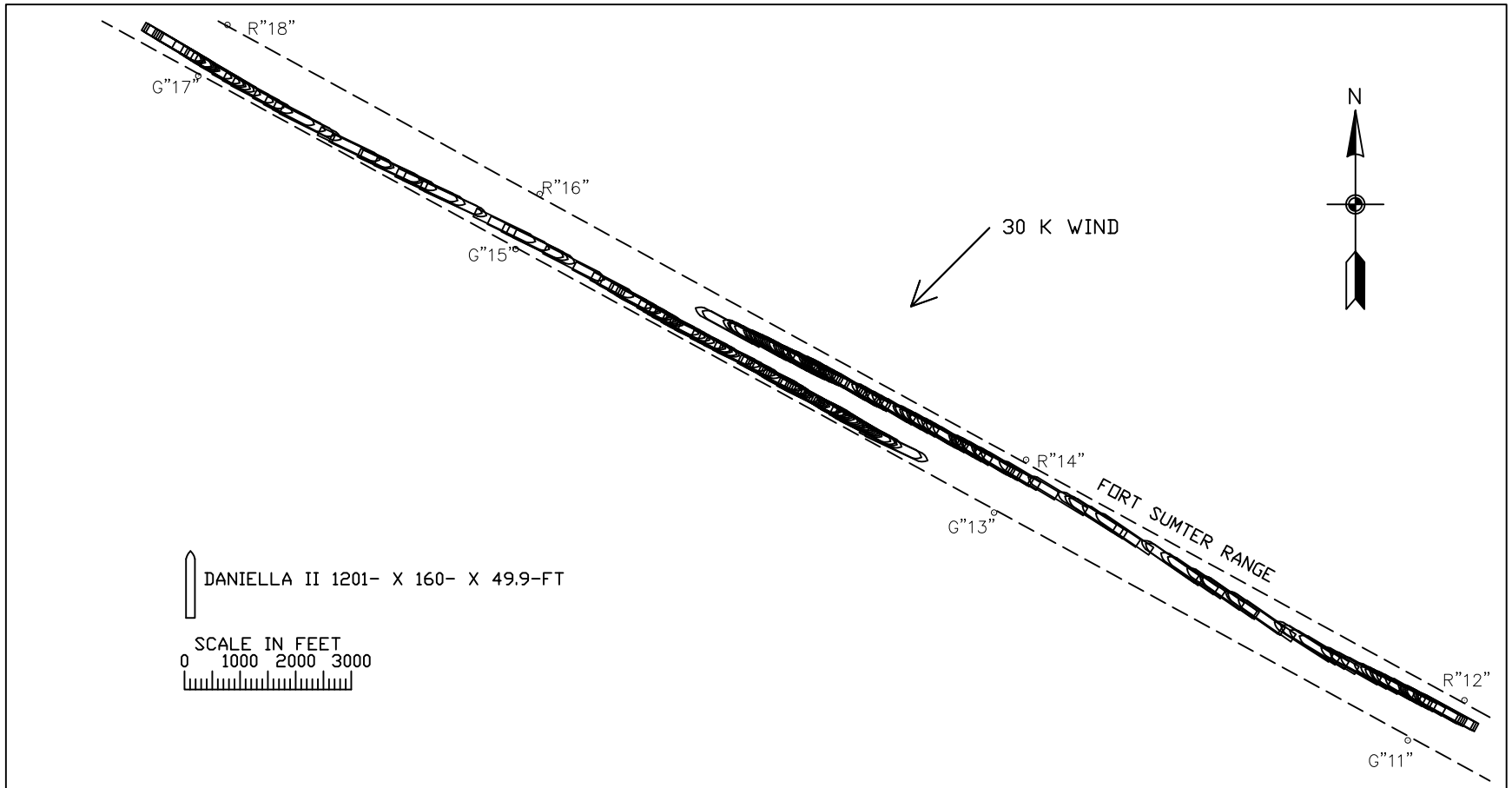
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND



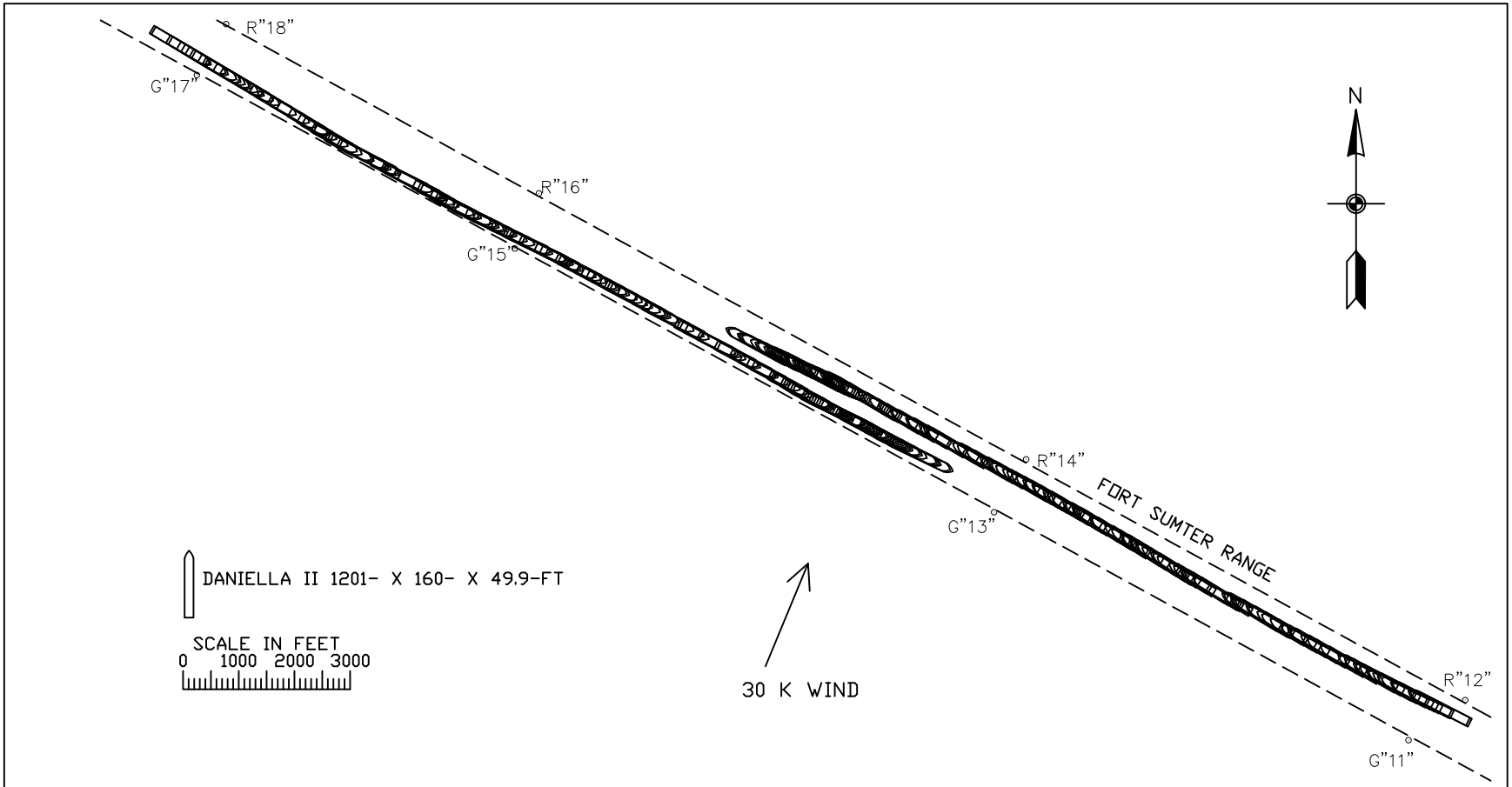
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND

PLATE 36

PLATE 37



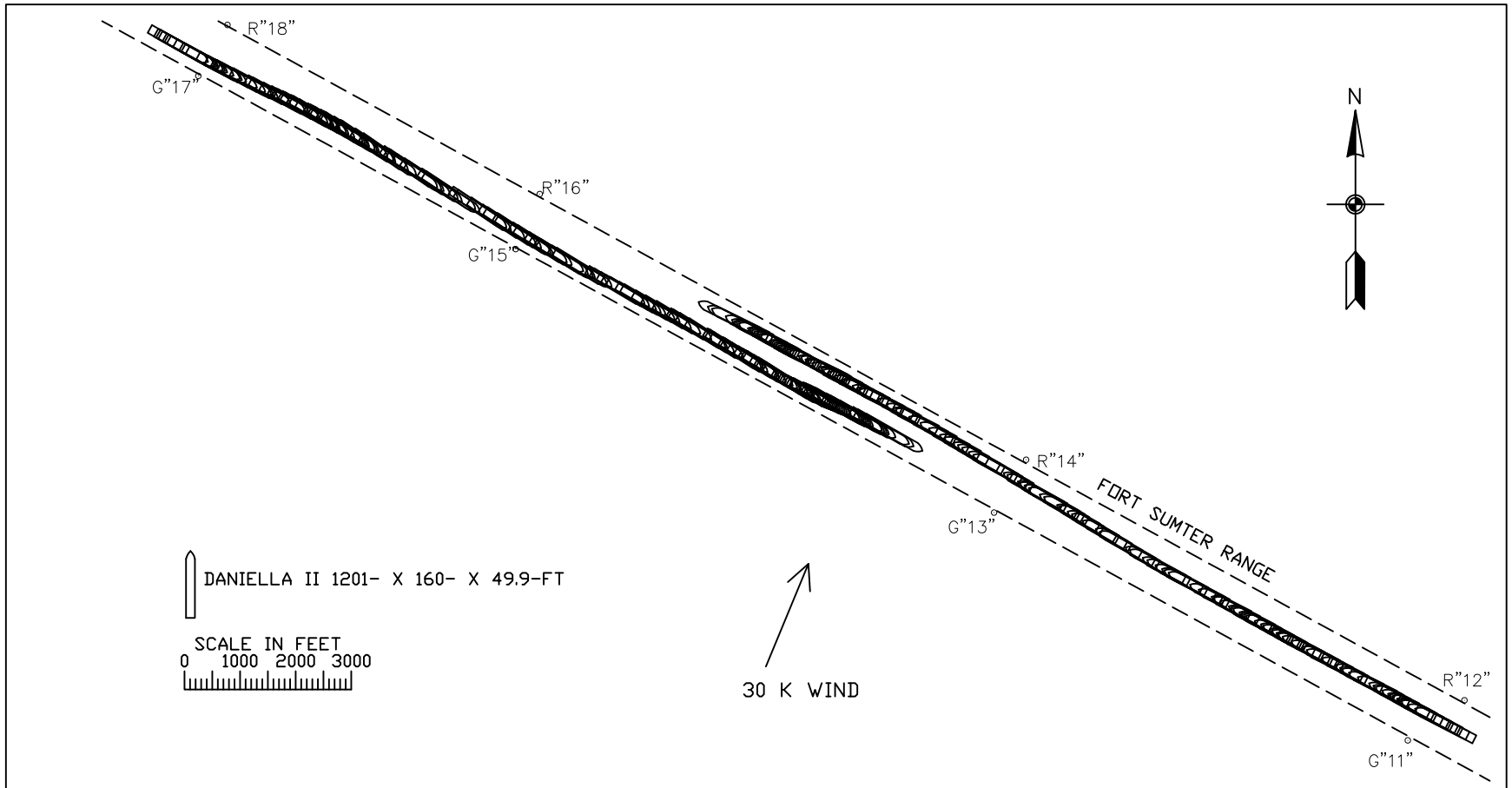
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND, REPEAT RUN



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND

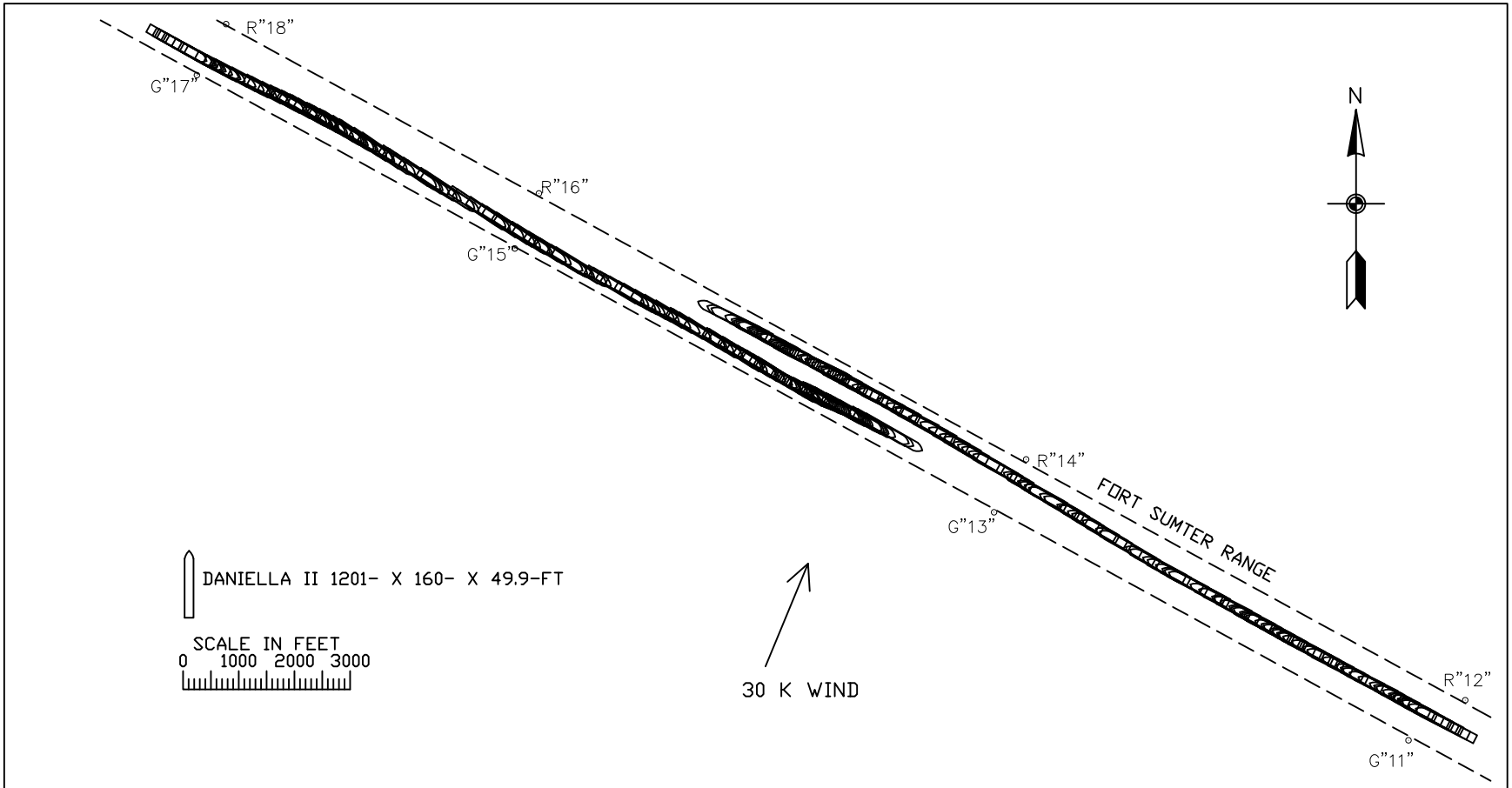
PLATE 38

PLATE 39



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

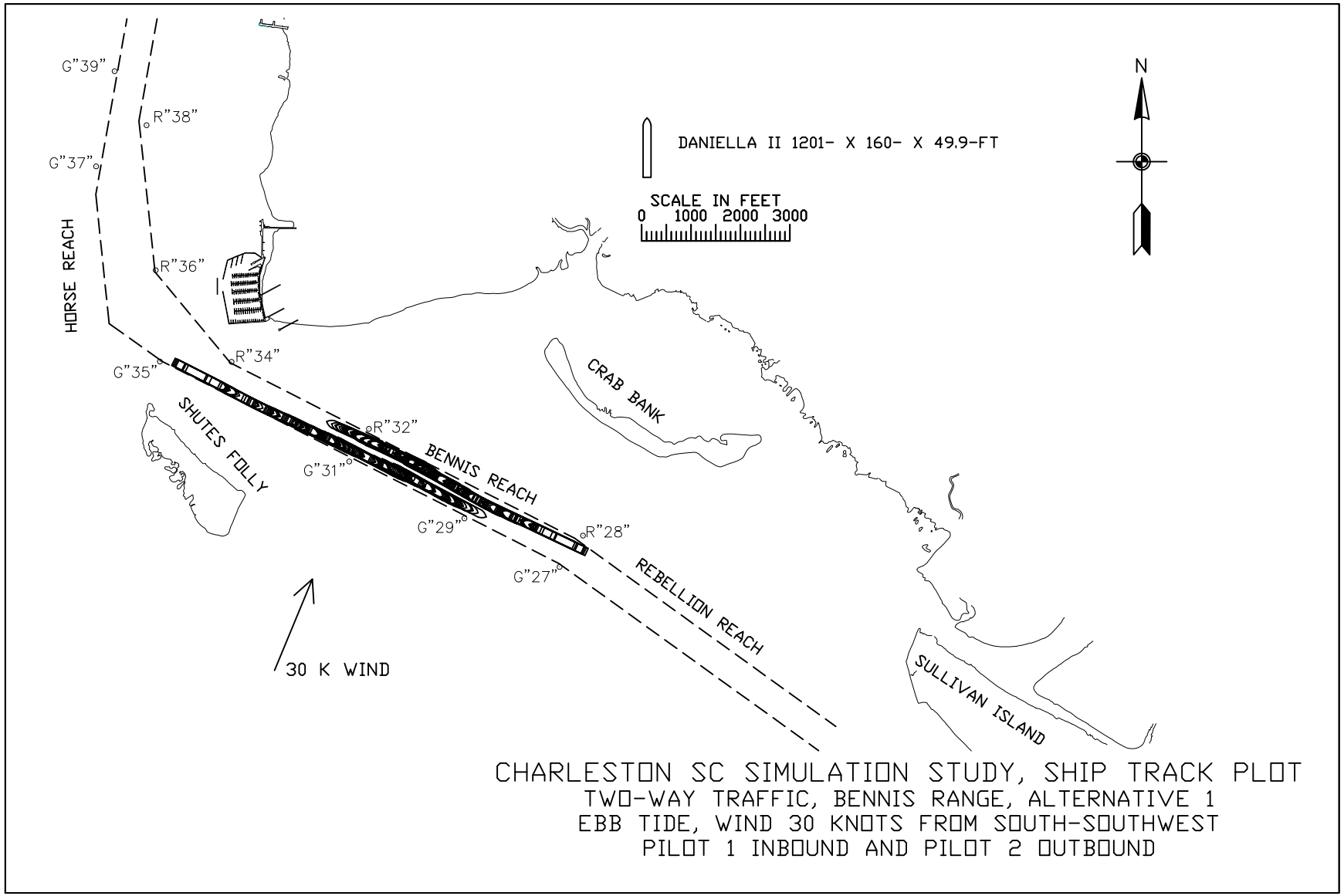
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND



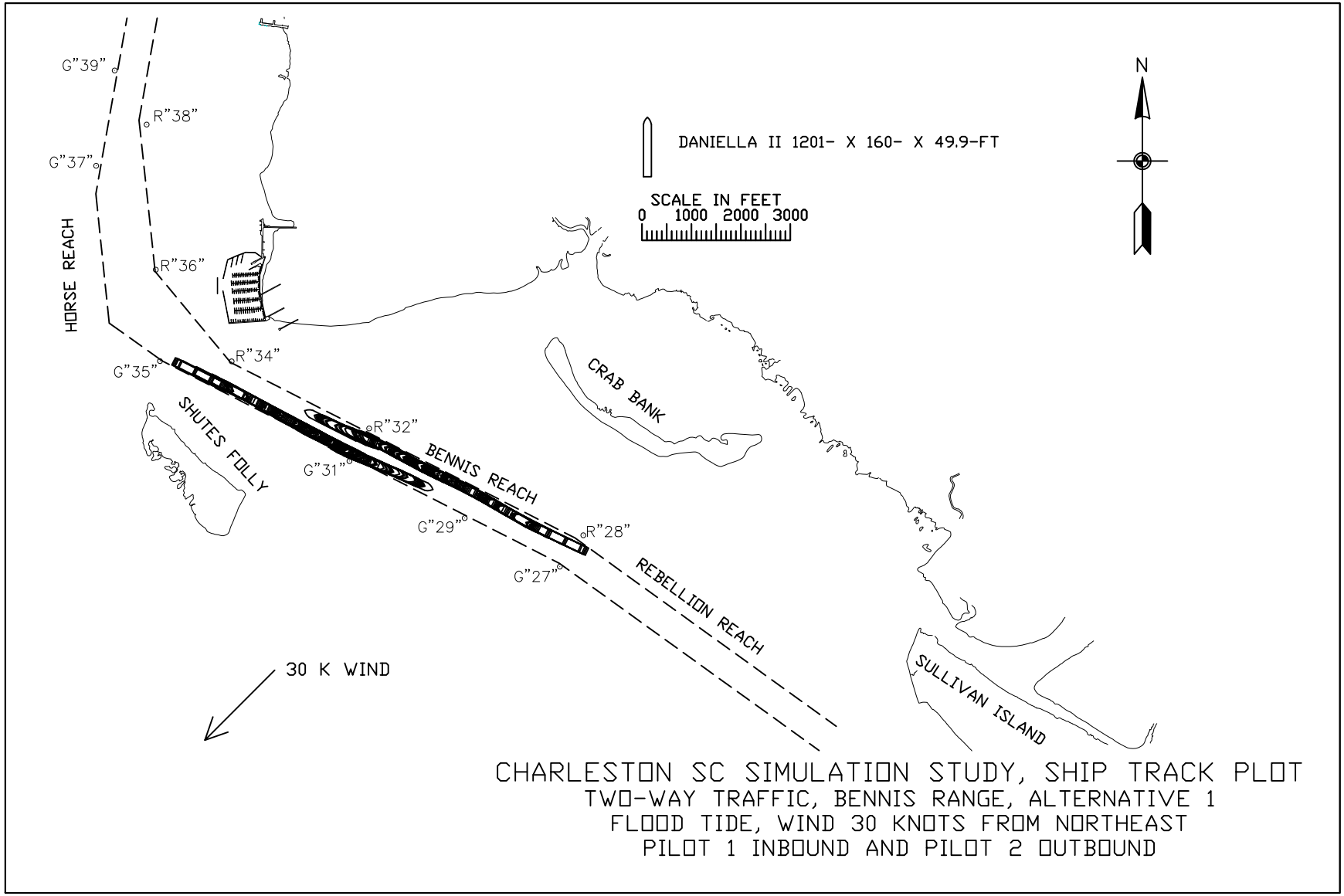
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, ENTRANCE CHANNEL
SPEED UNRESTRICTED
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND, REPEAT RUN

PLATE 40

PLATE 41



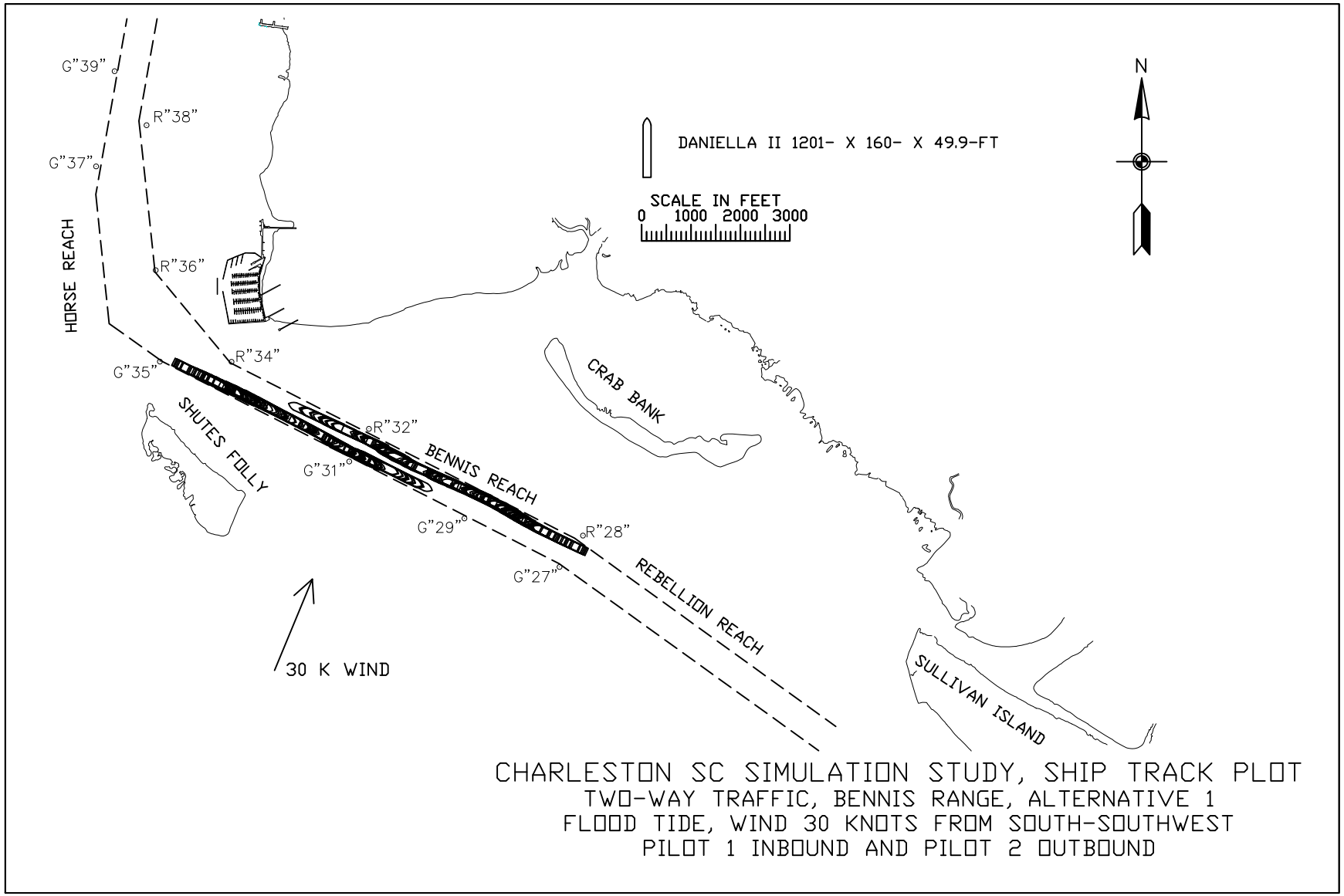
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND



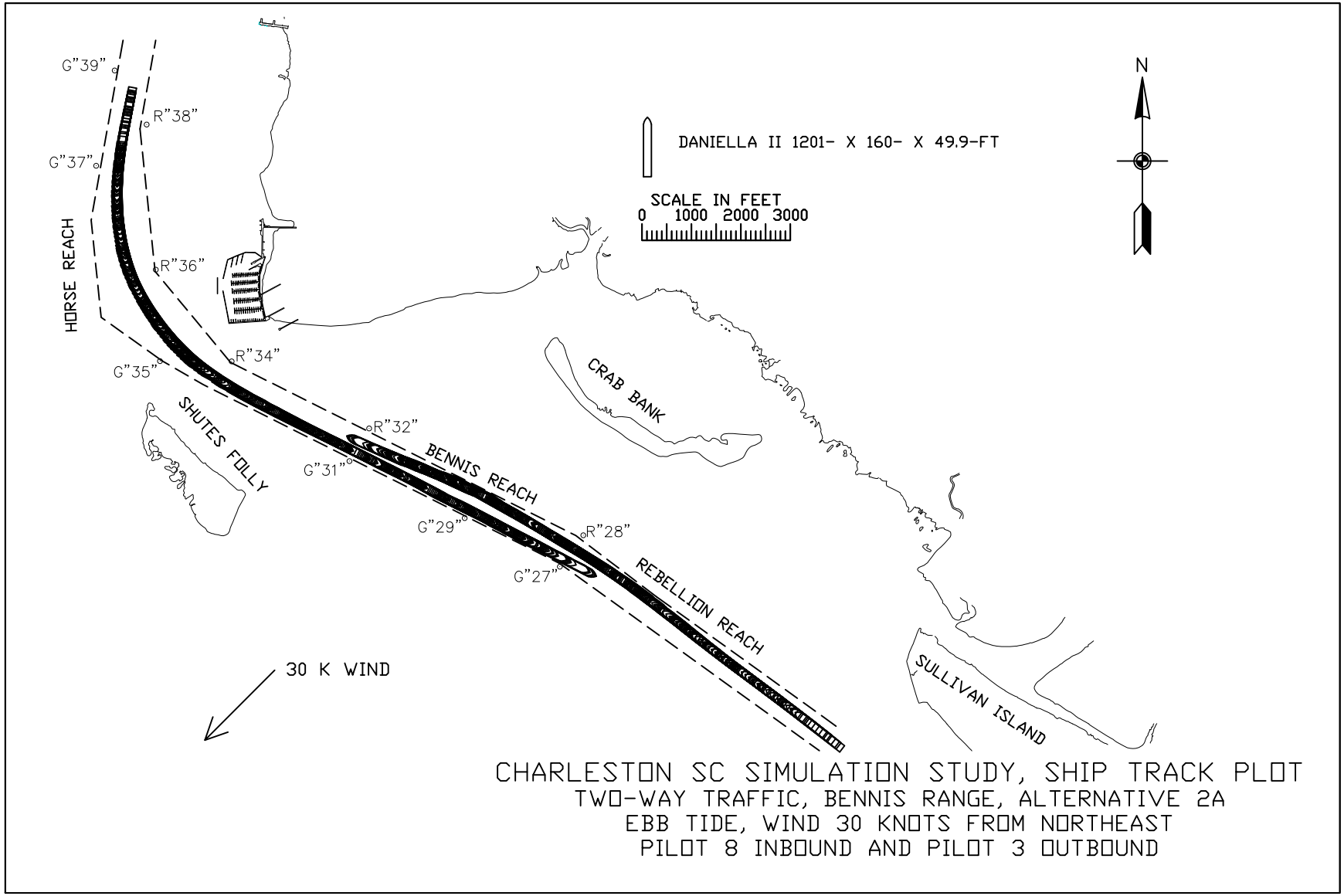
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 1
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND

PLATE 42

PLATE 43



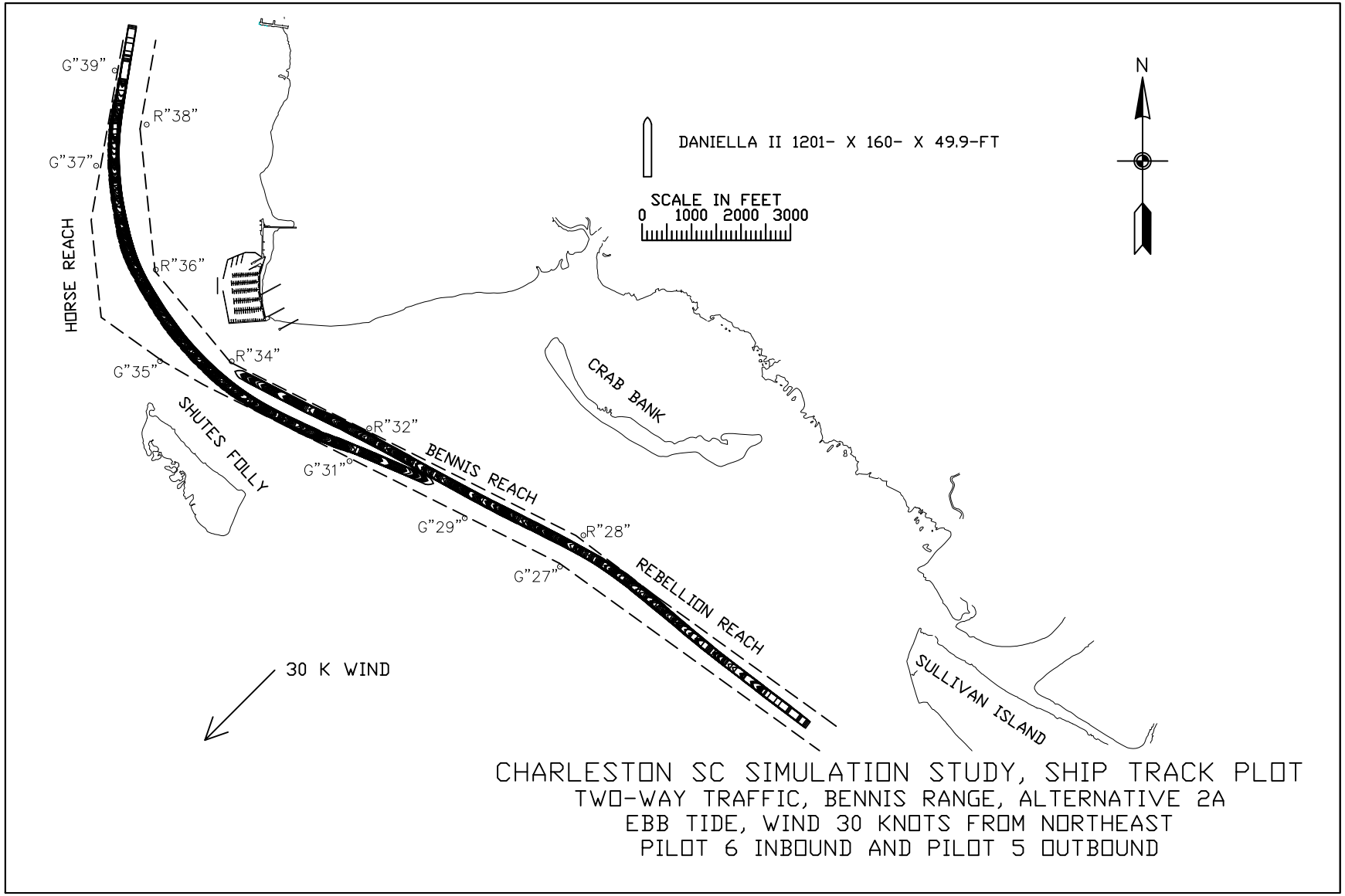
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 1
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND



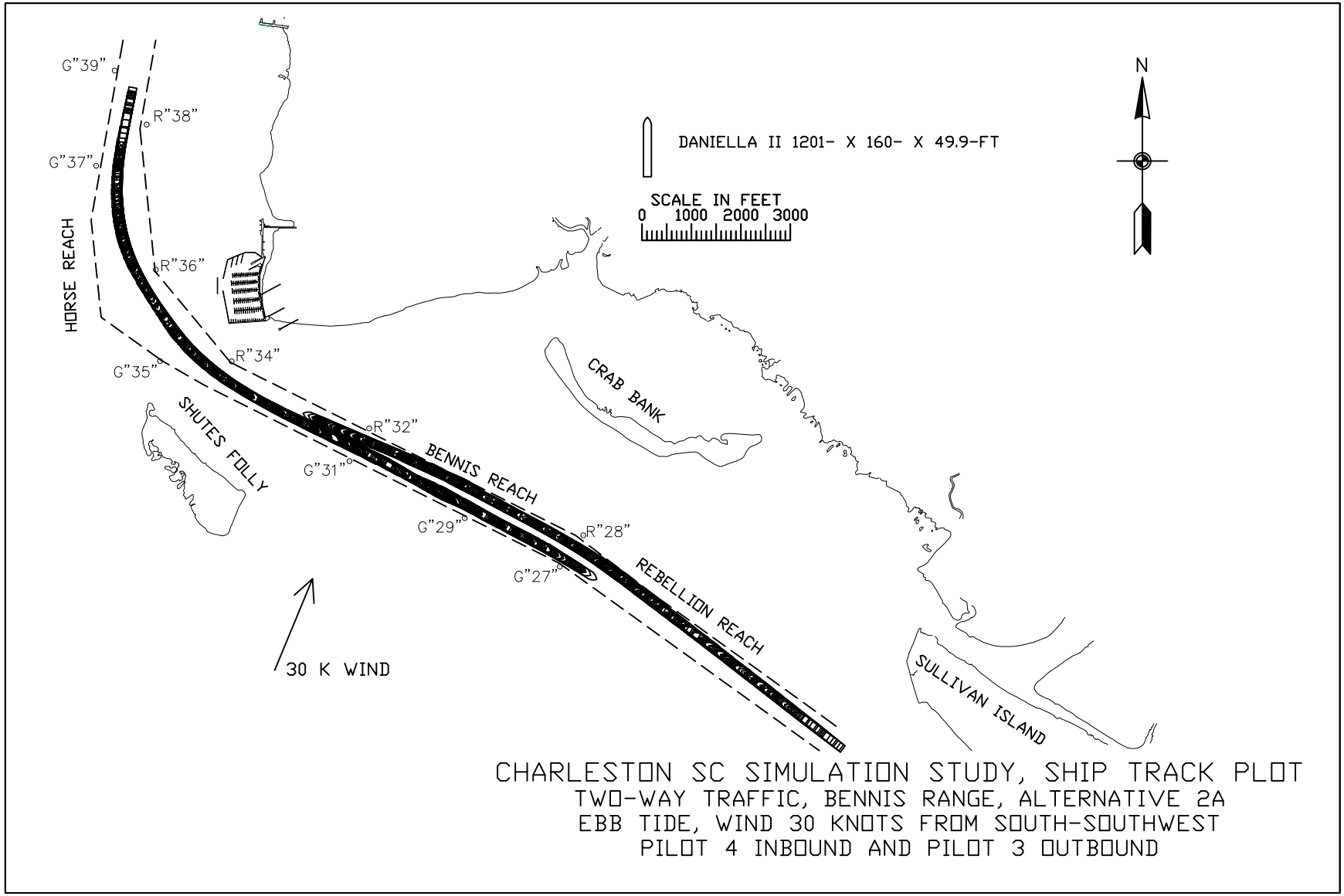
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 8 INBOUND AND PILOT 3 OUTBOUND

PLATE 44

PLATE 45



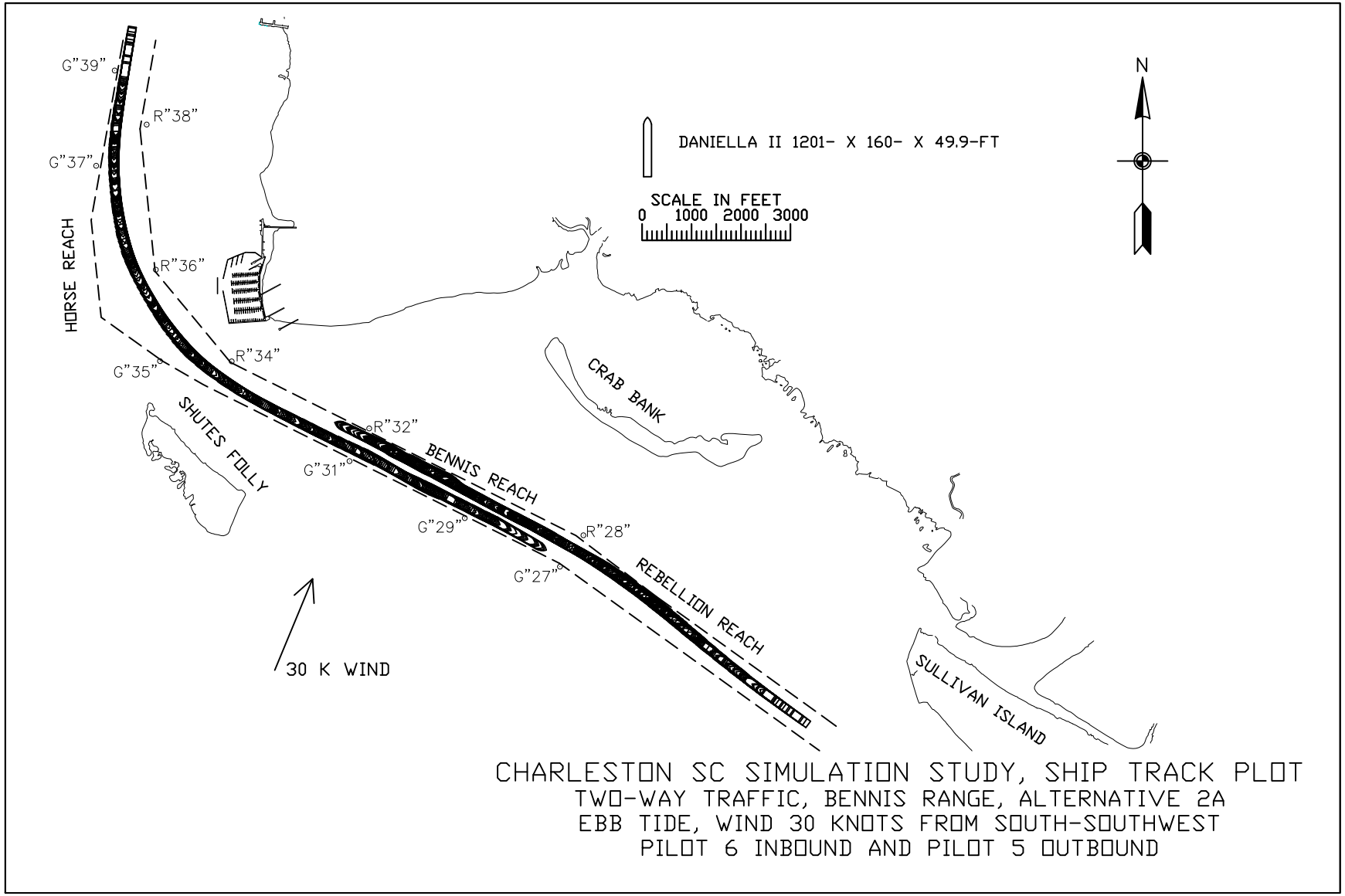
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



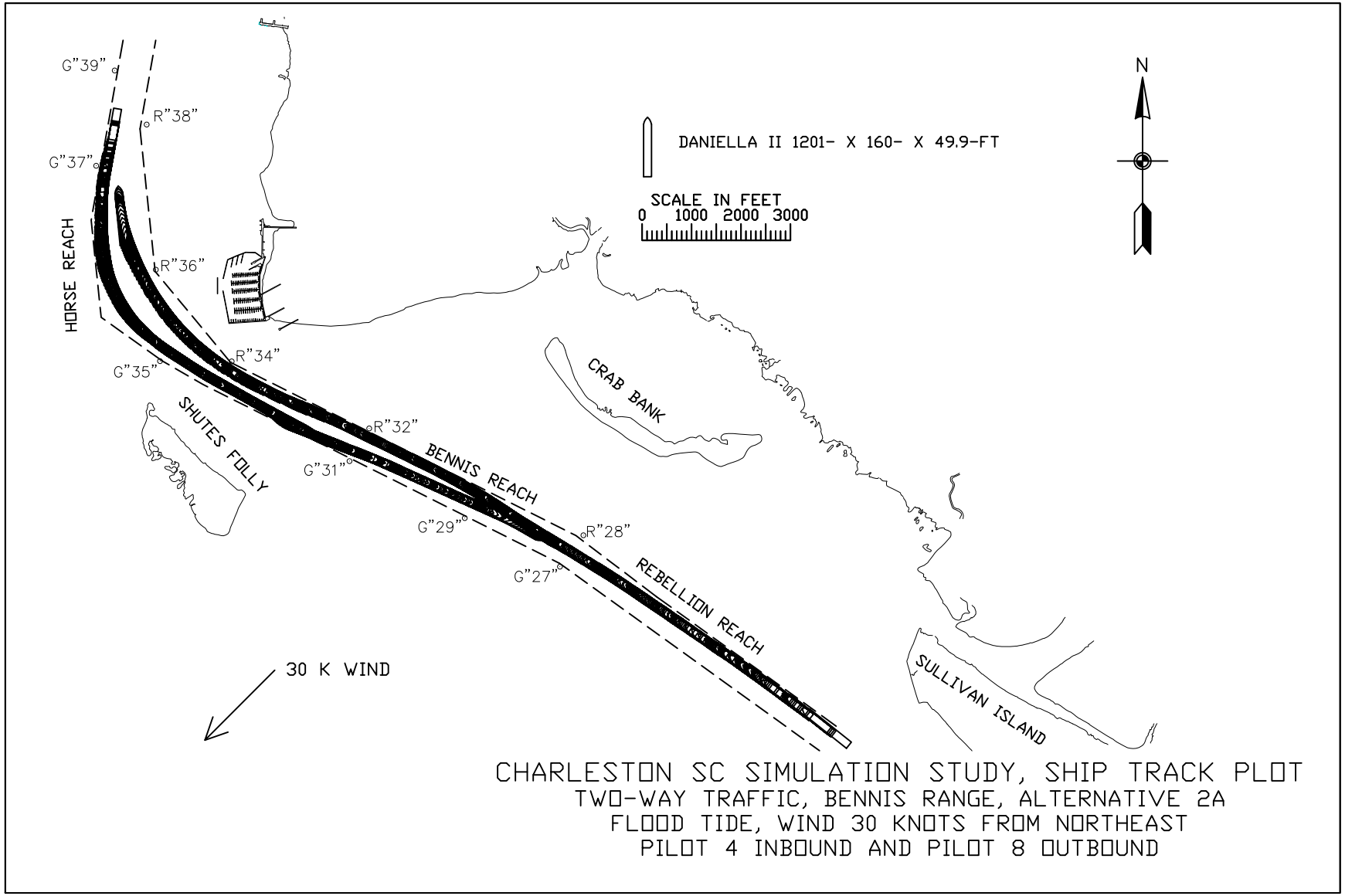
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 4 INBOUND AND PILOT 3 OUTBOUND

PLATE 46

PLATE 47



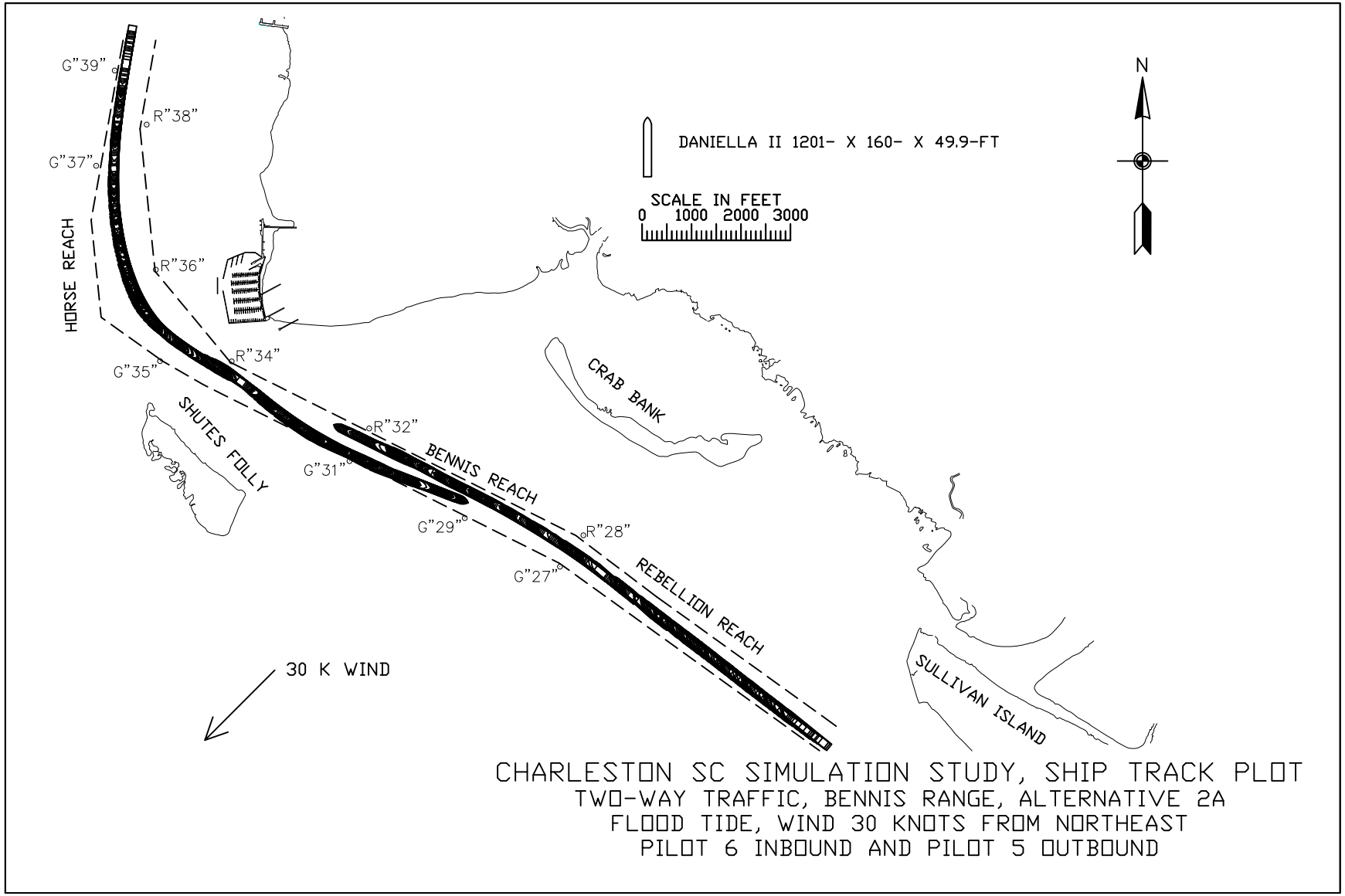
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



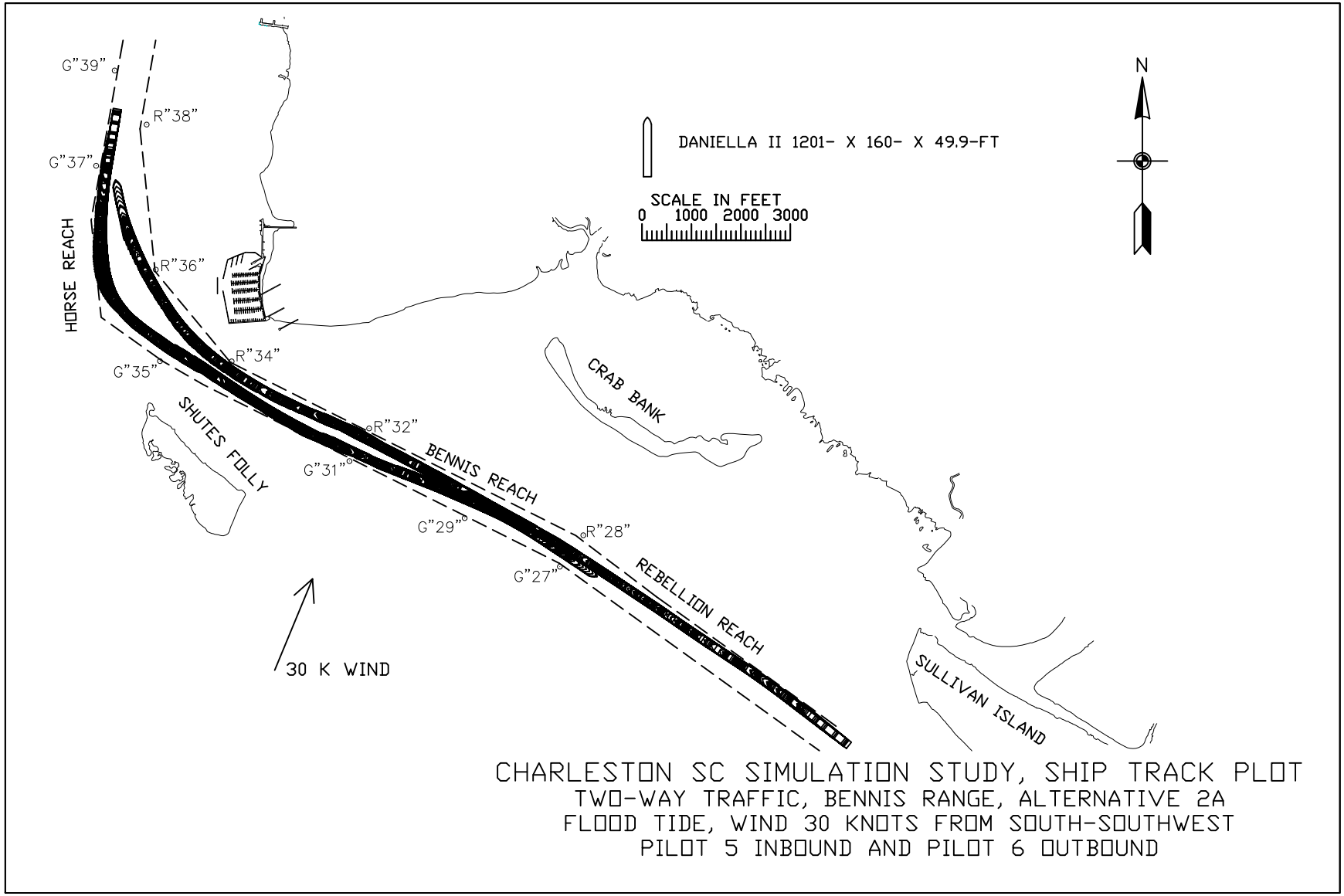
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 8 OUTBOUND

PLATE 48

PLATE 49



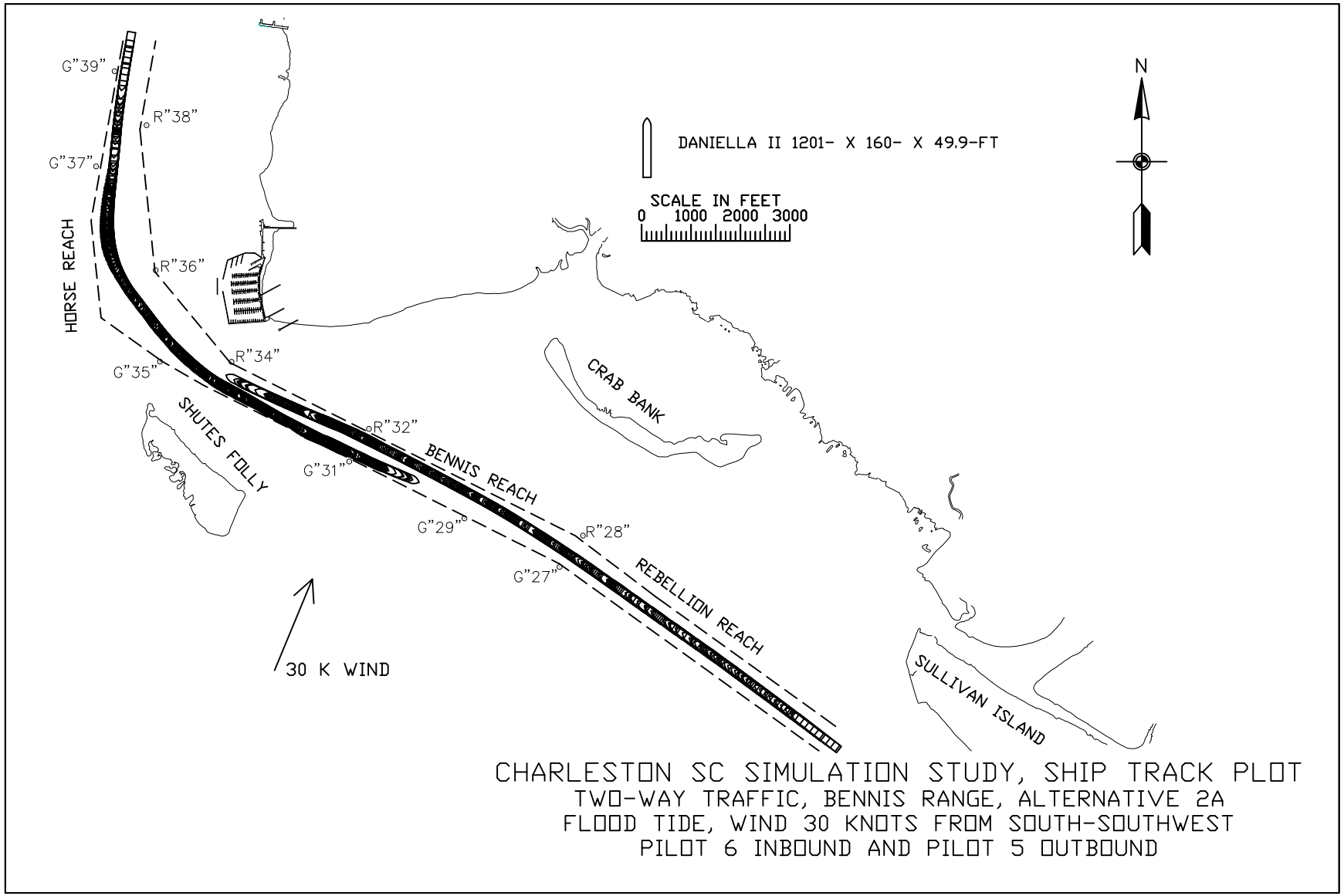
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



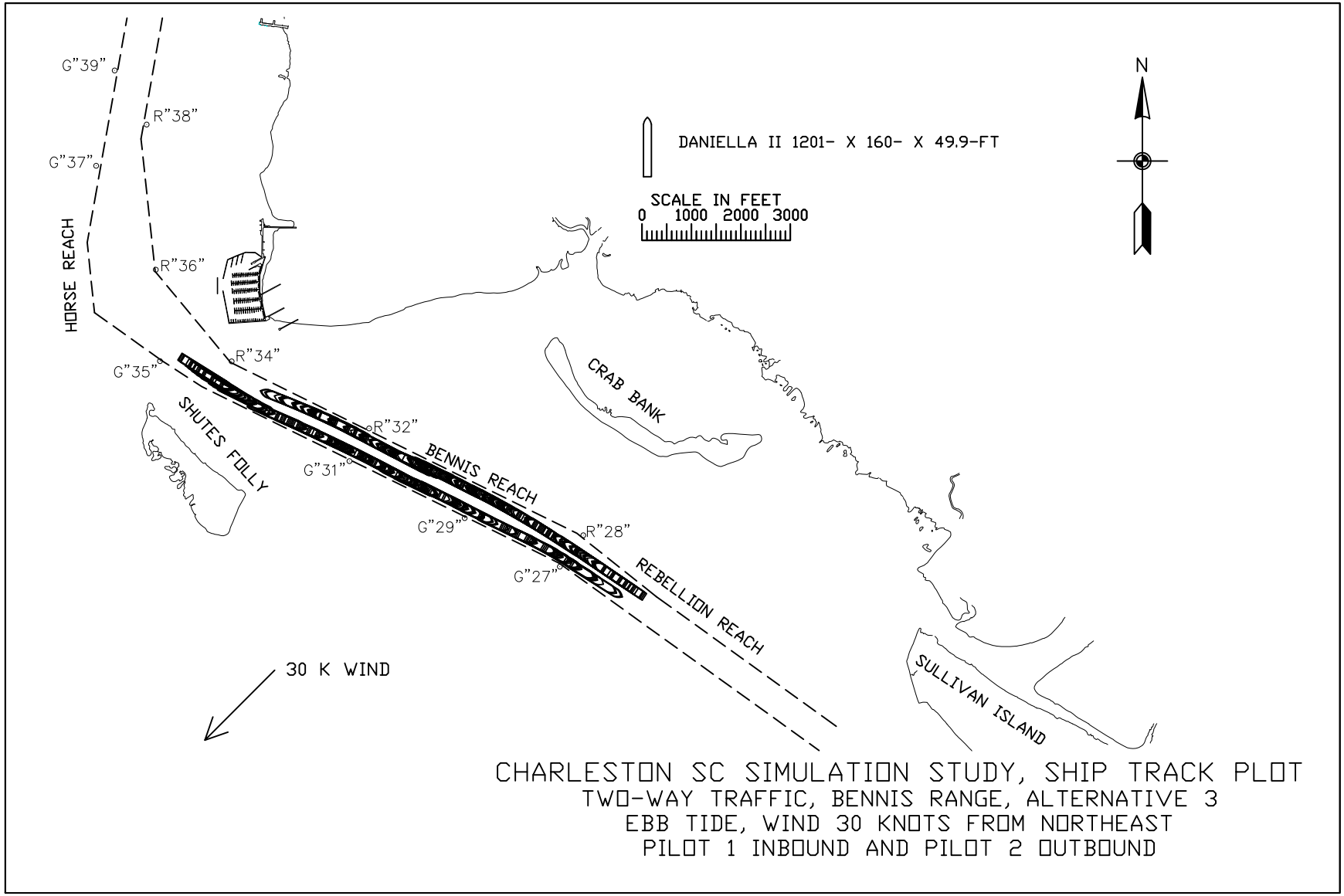
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND

PLATE 50

PLATE 51



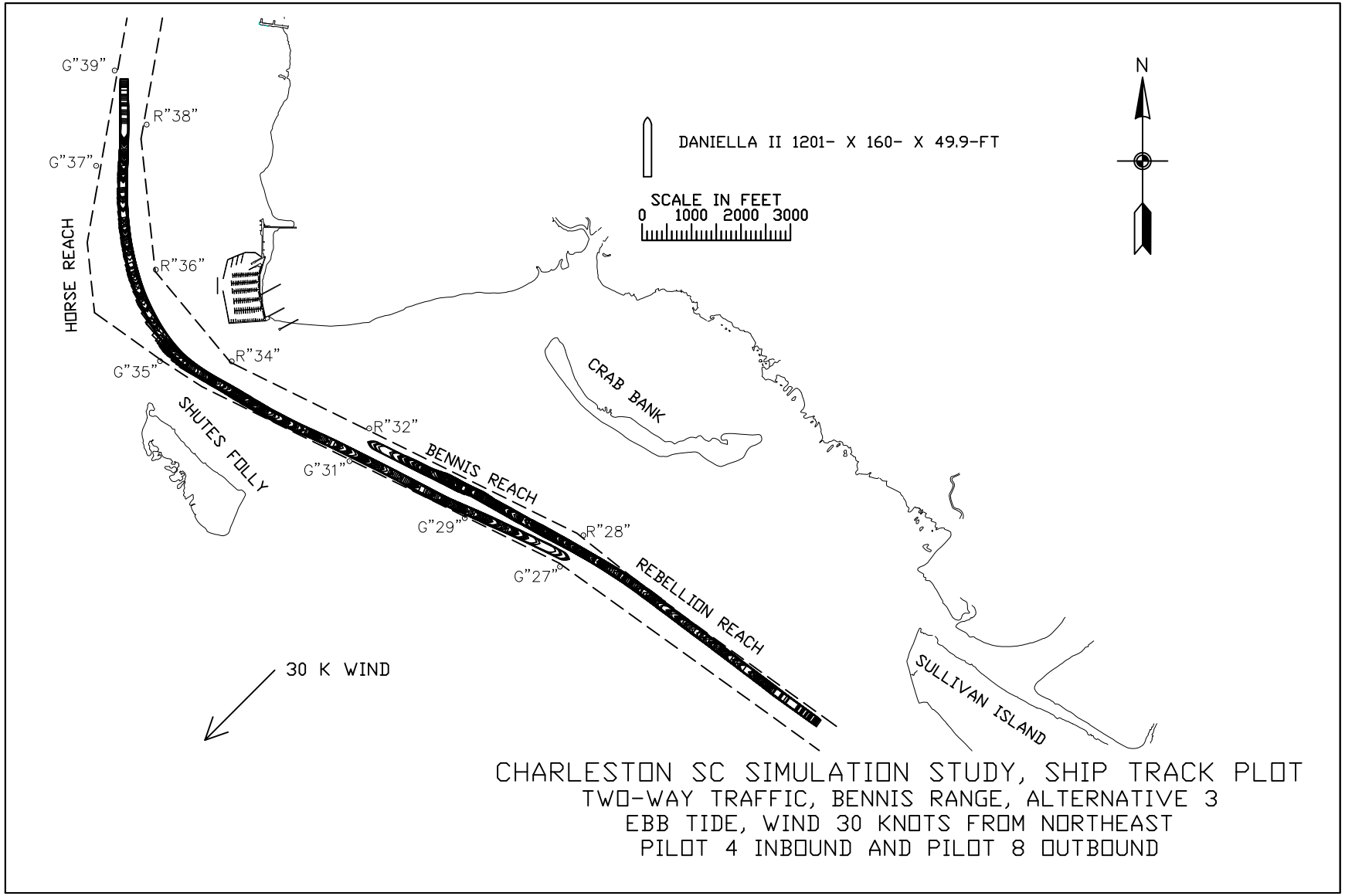
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



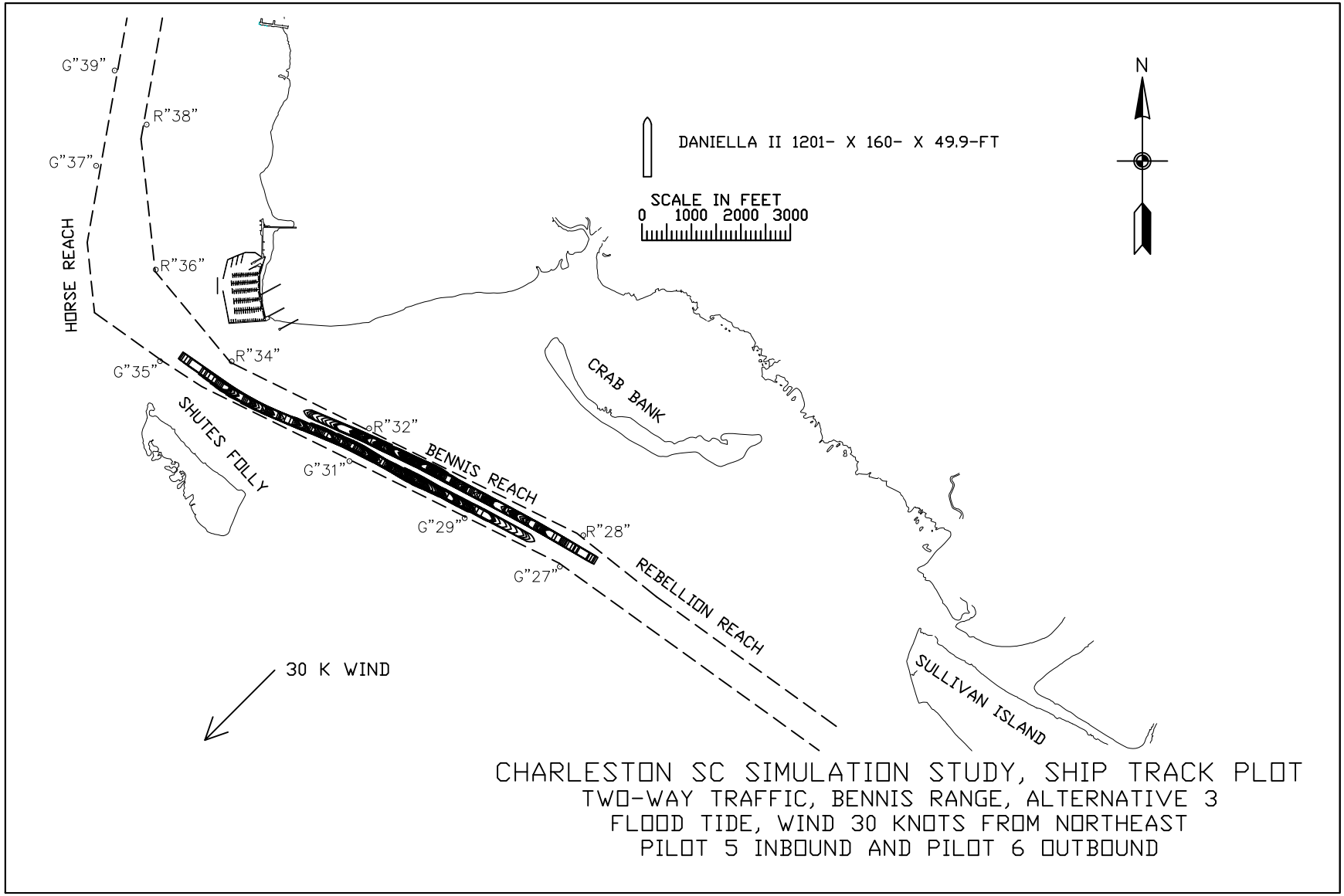
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND

PLATE 52

PLATE 53



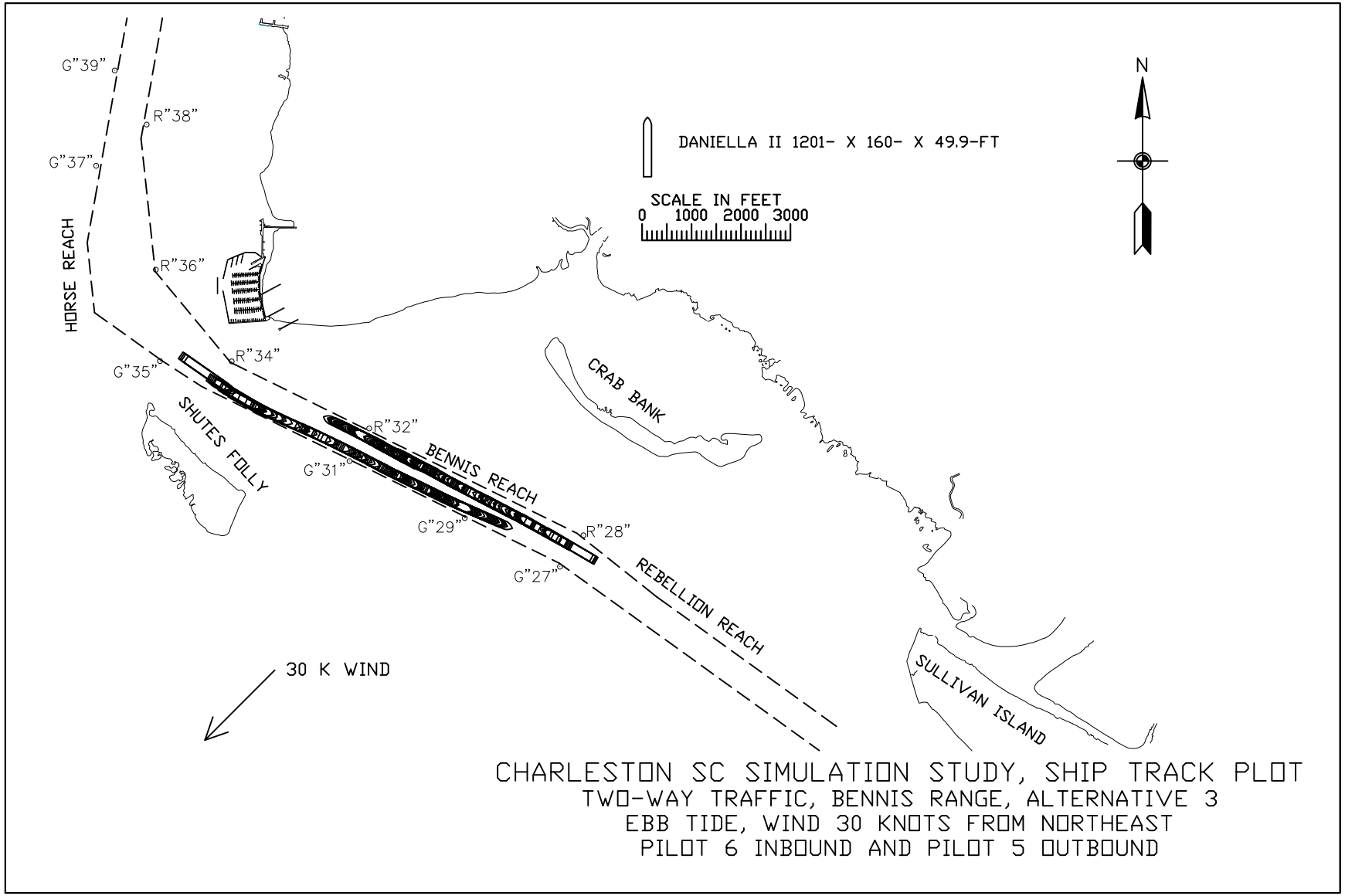
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 8 OUTBOUND



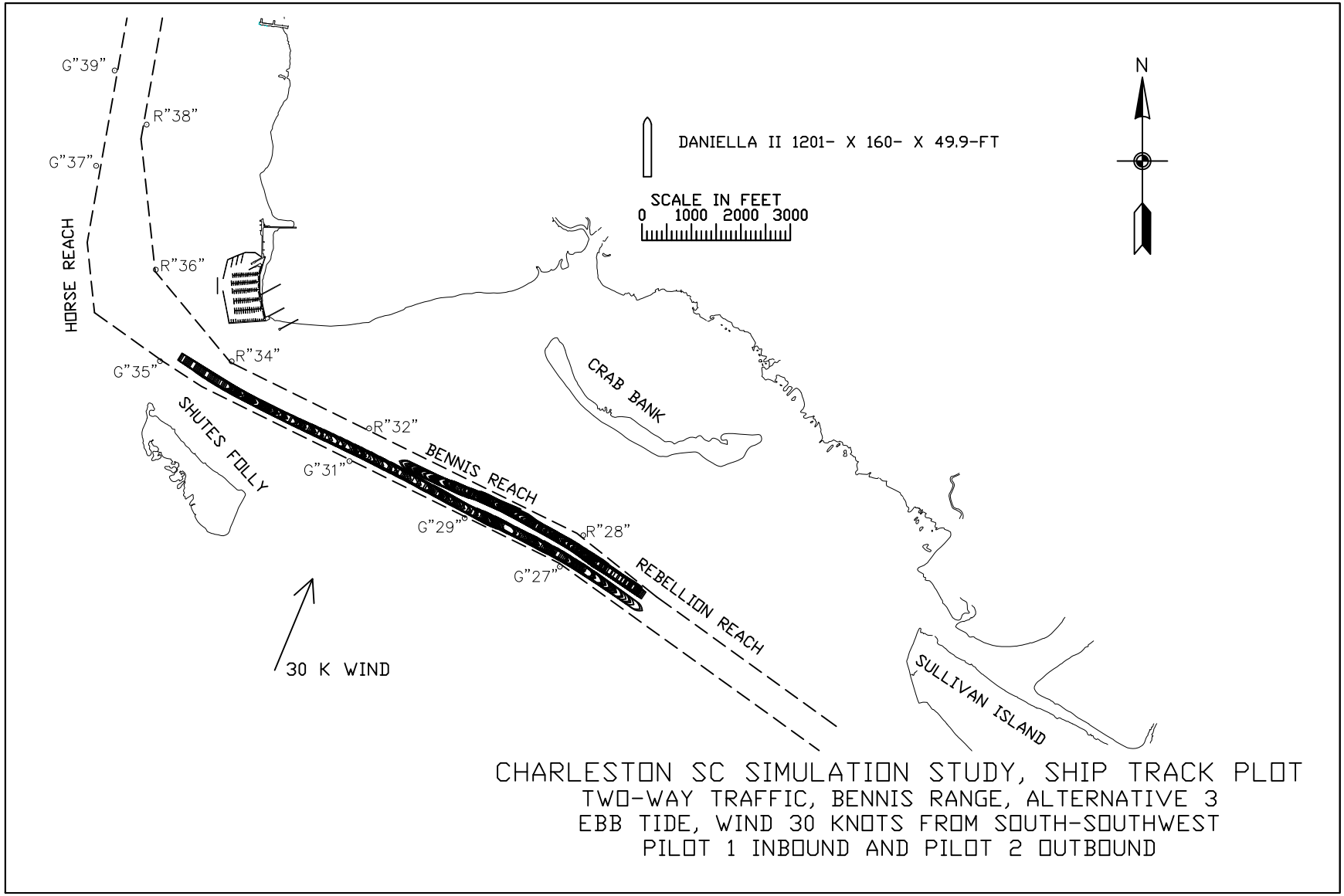
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND

PLATE 54

PLATE 55



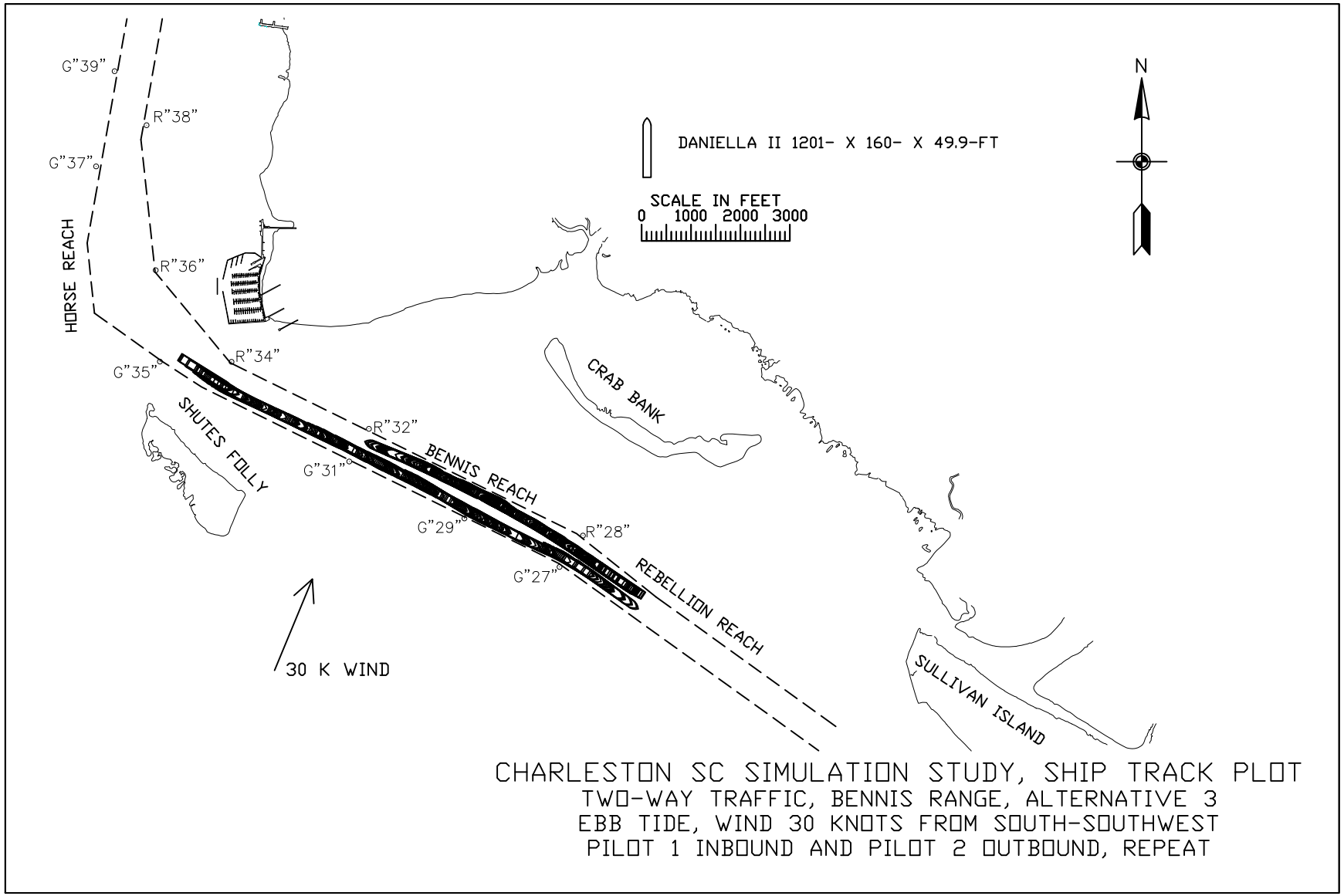
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



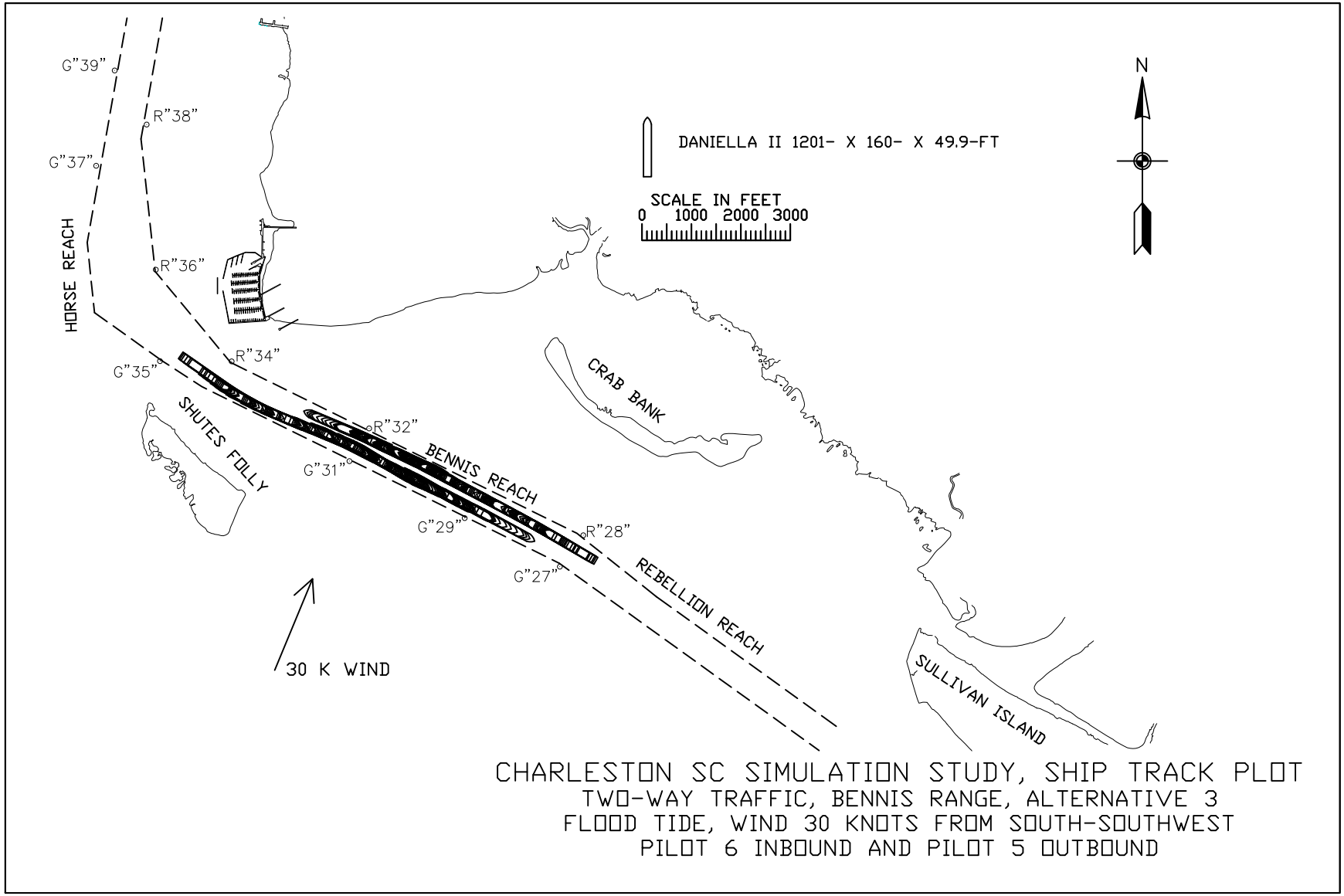
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND

PLATE 56

PLATE 57



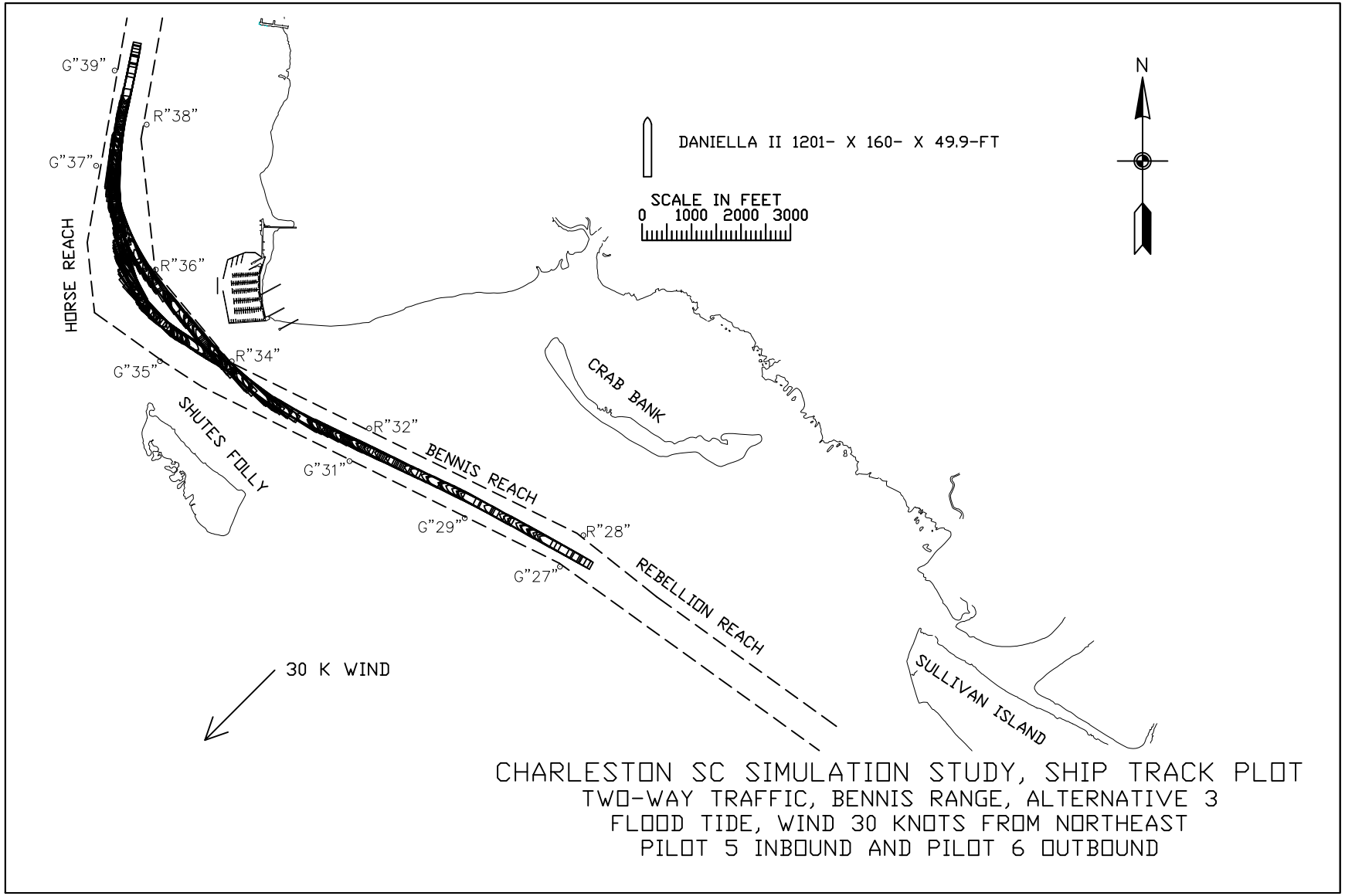
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND, REPEAT



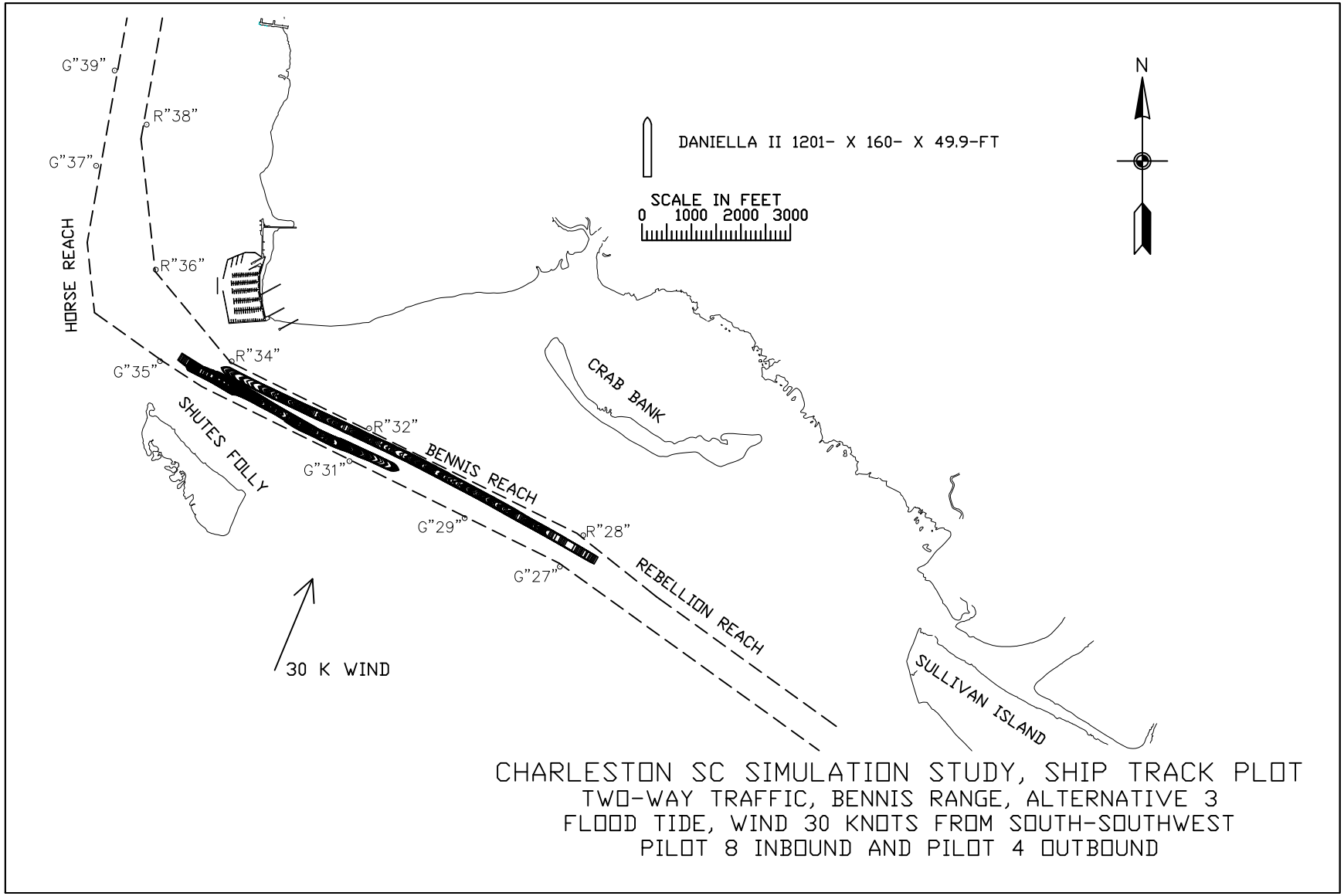
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND

PLATE 58

PLATE 59



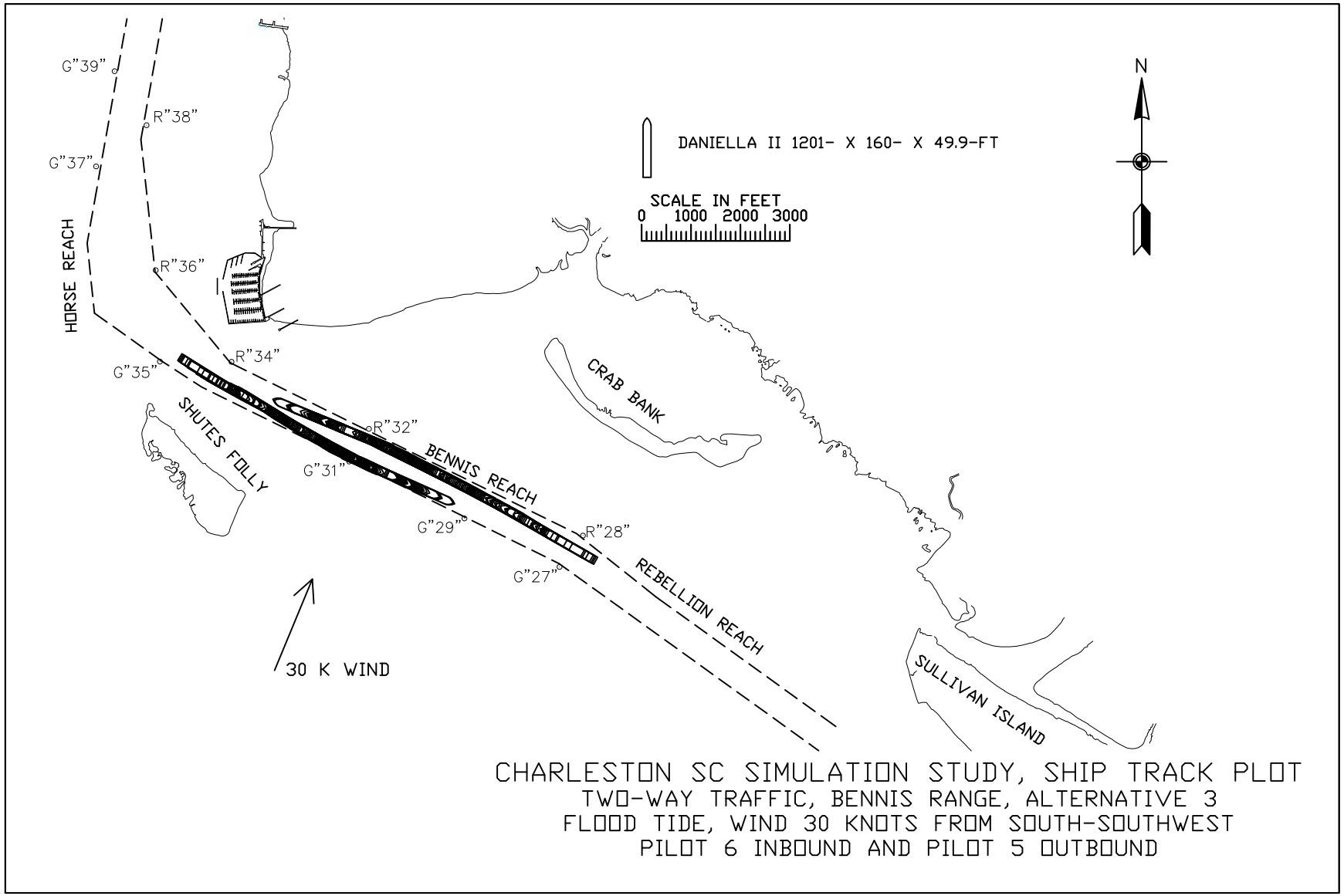
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND



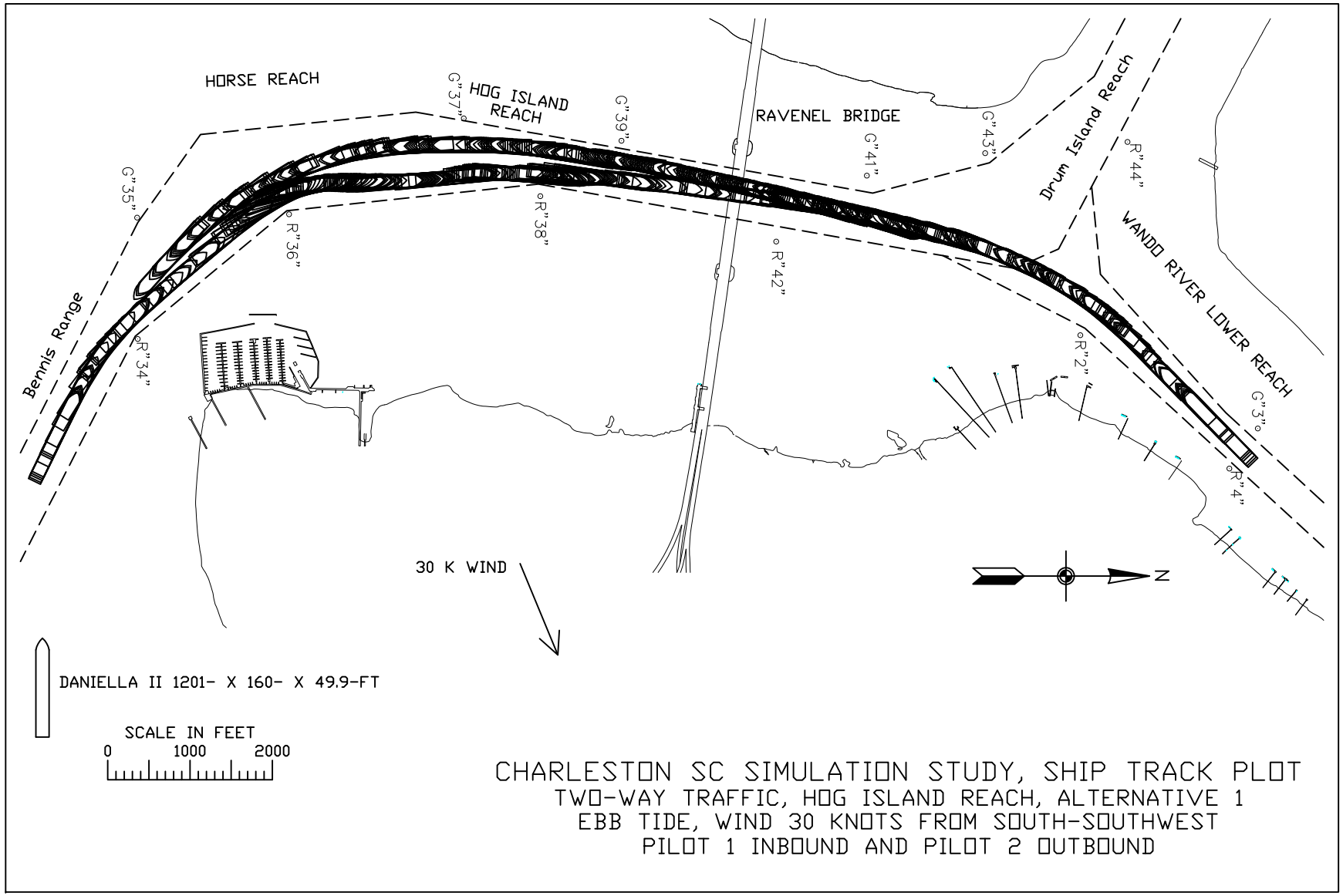
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 8 INBOUND AND PILOT 4 OUTBOUND

PLATE 60

PLATE 61



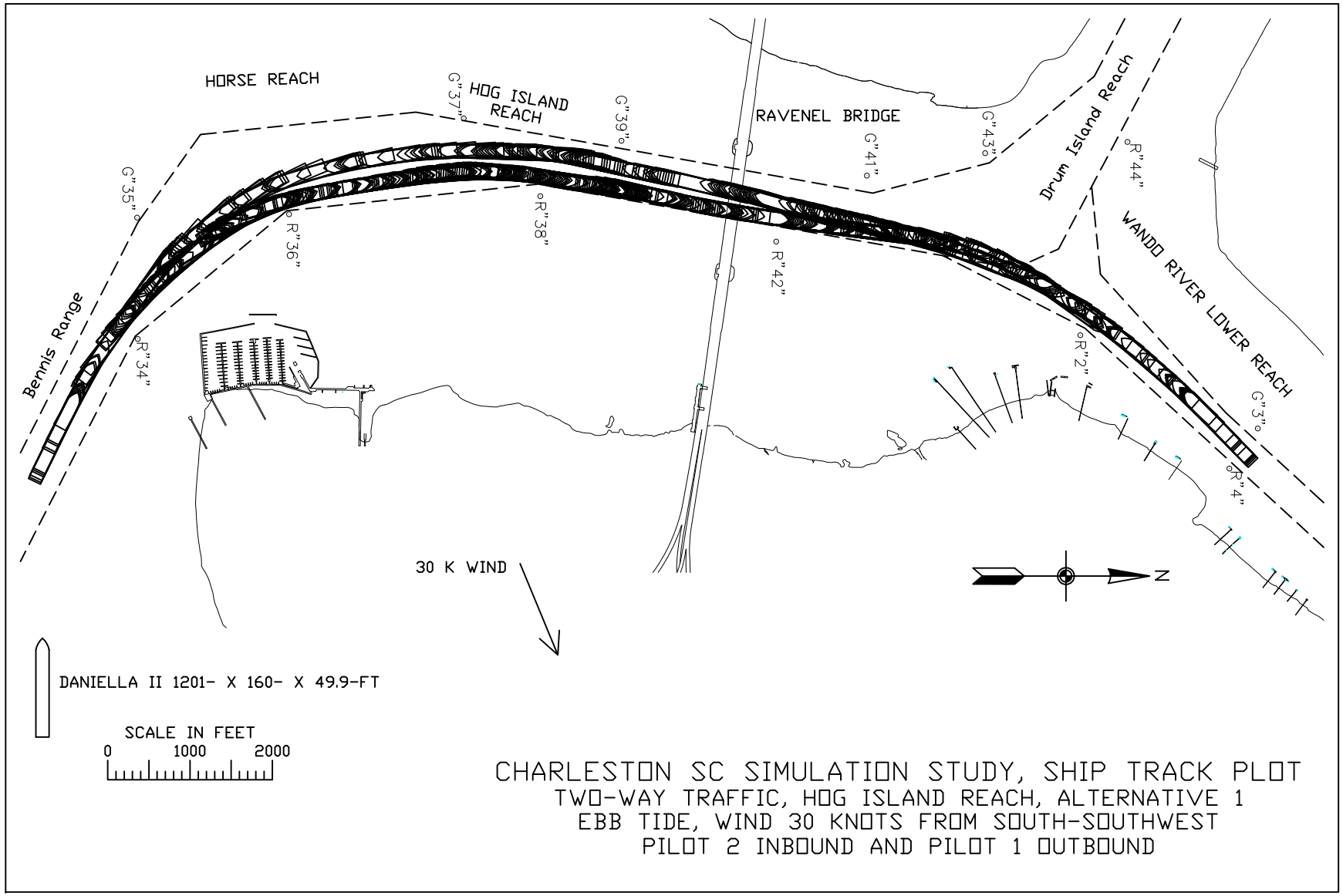
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, BENNIS RANGE, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND

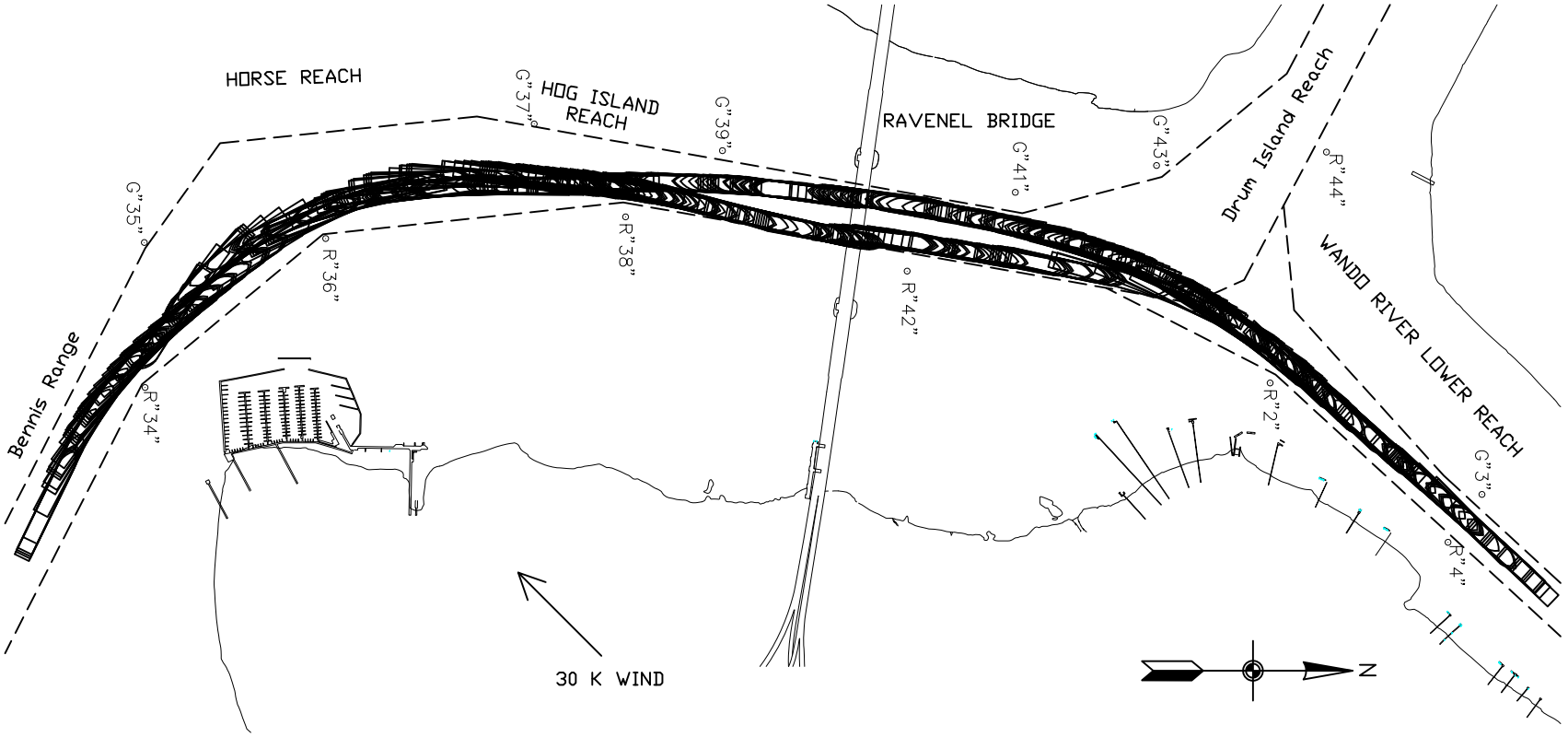
PLATE 62

PLATE 63



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 2 INBOUND AND PILOT 1 OUTBOUND

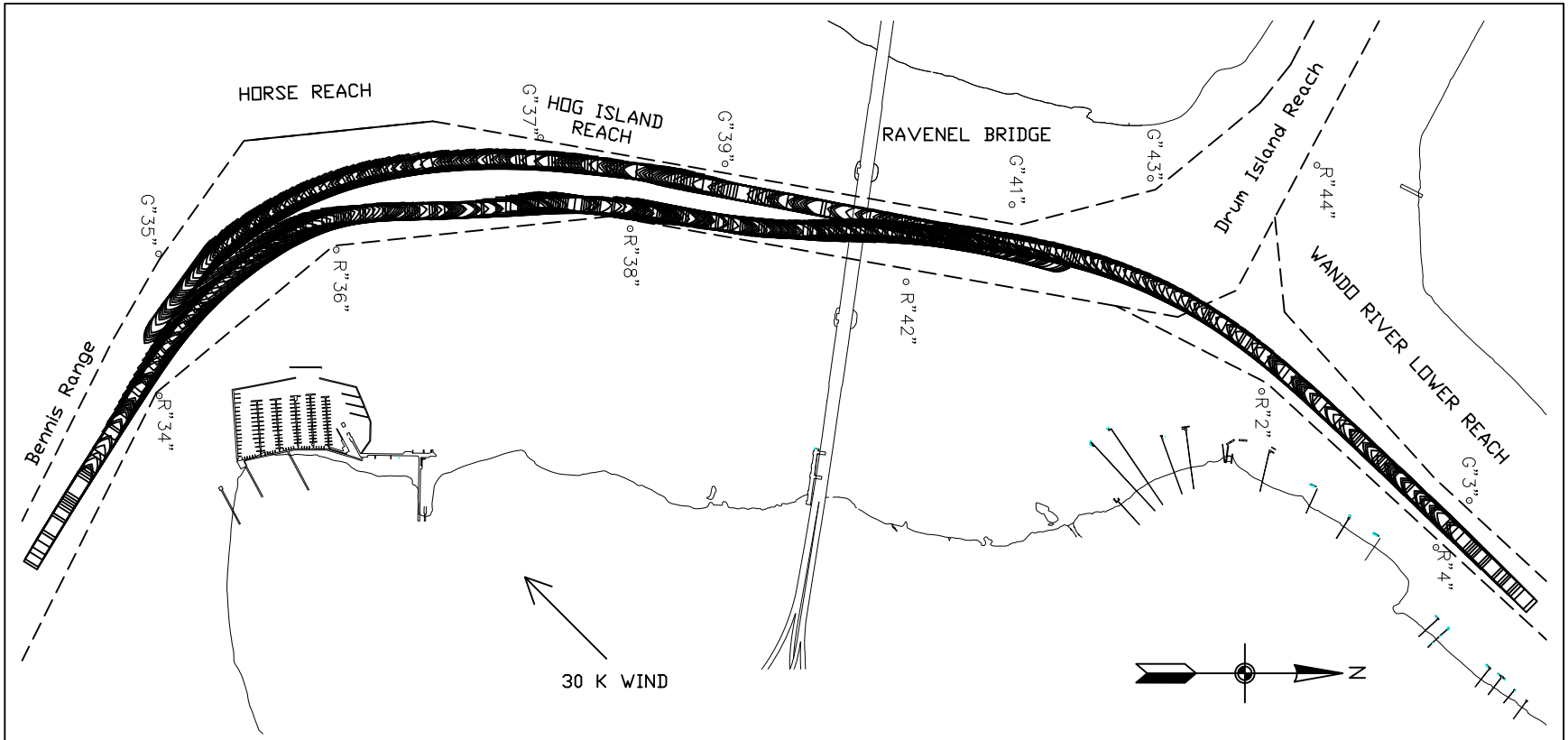


CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 1
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND

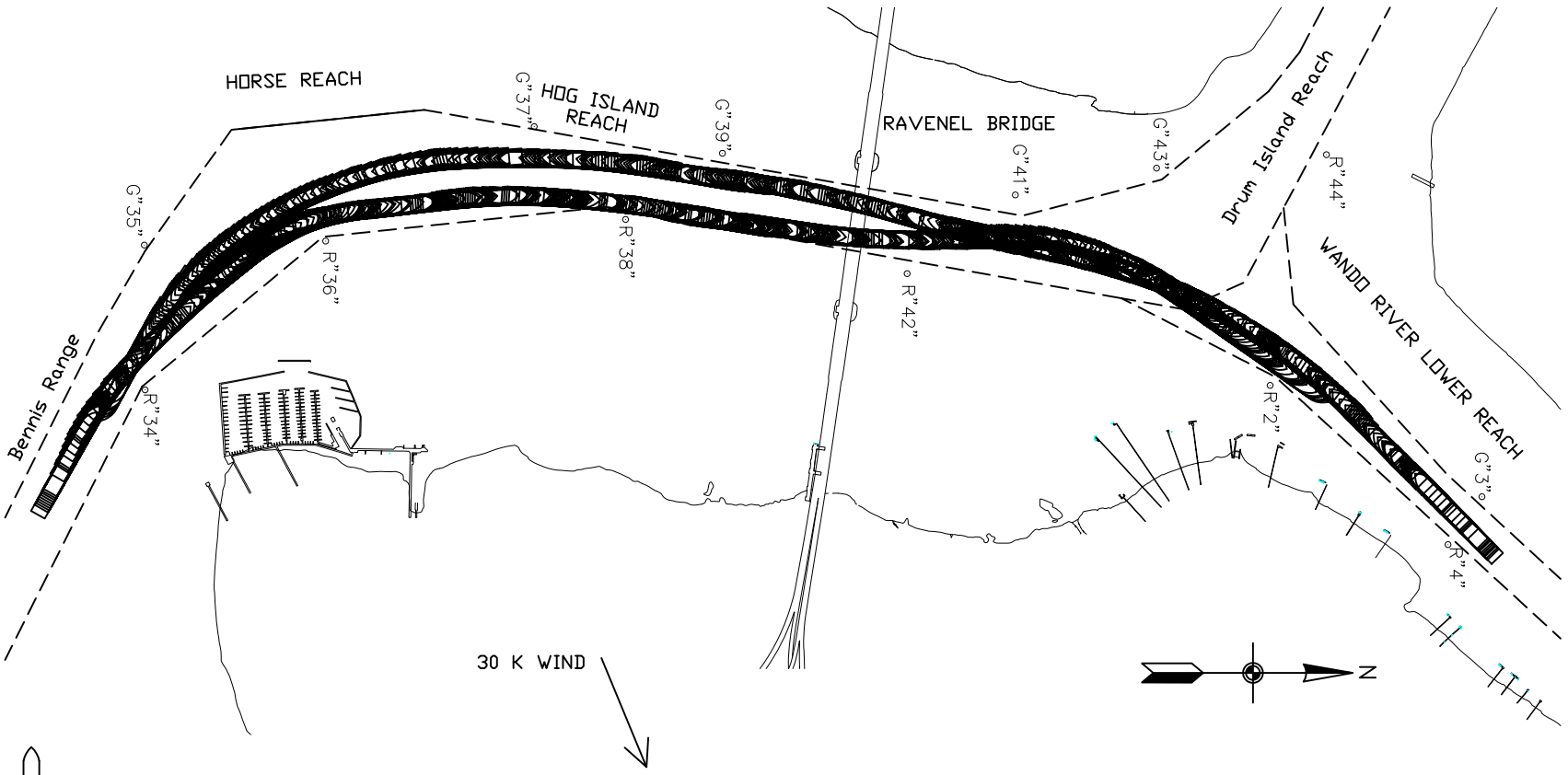
PLATE 64

PLATE 65



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

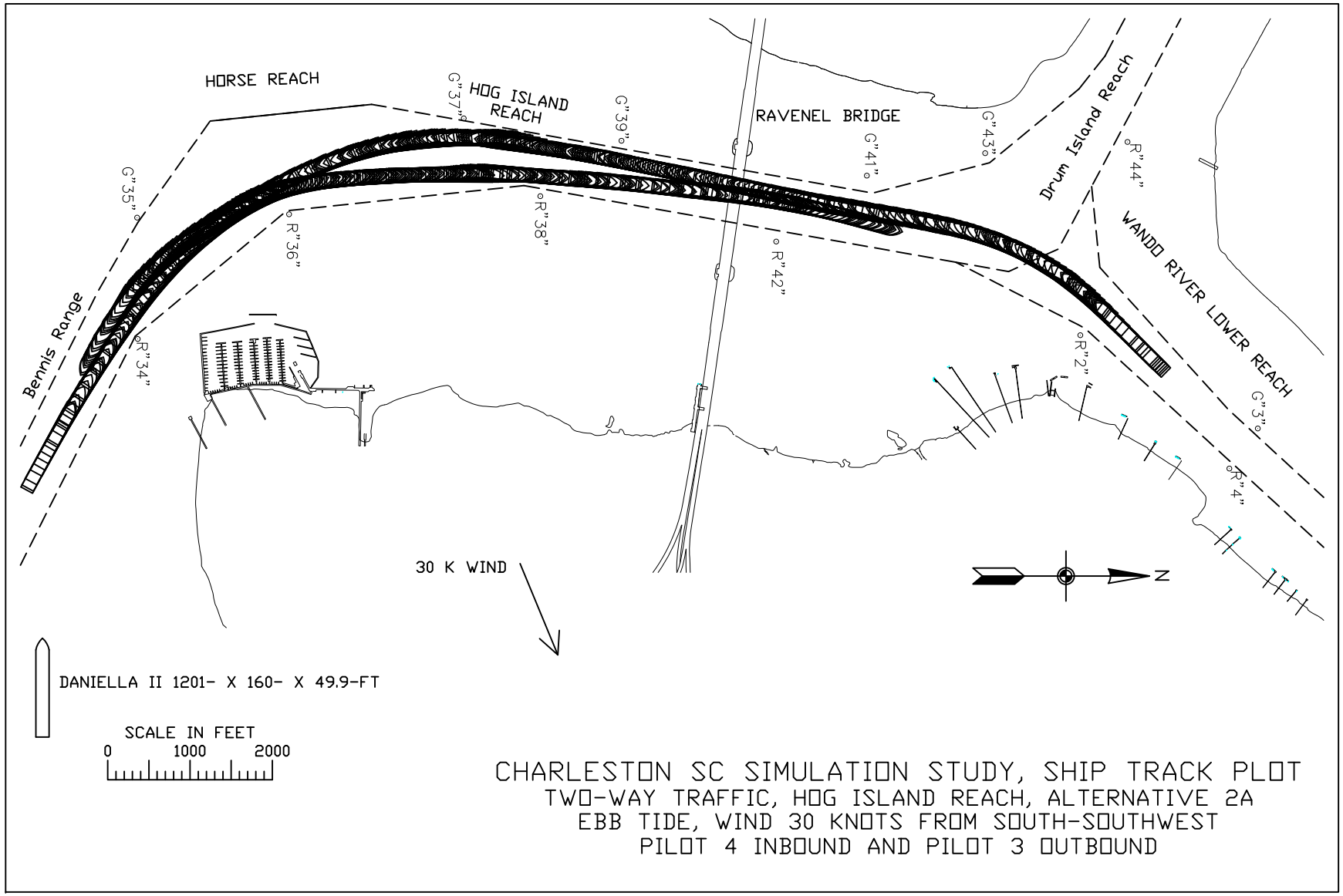
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 3 OUTBOUND



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 2 INBOUND AND PILOT 1 OUTBOUND

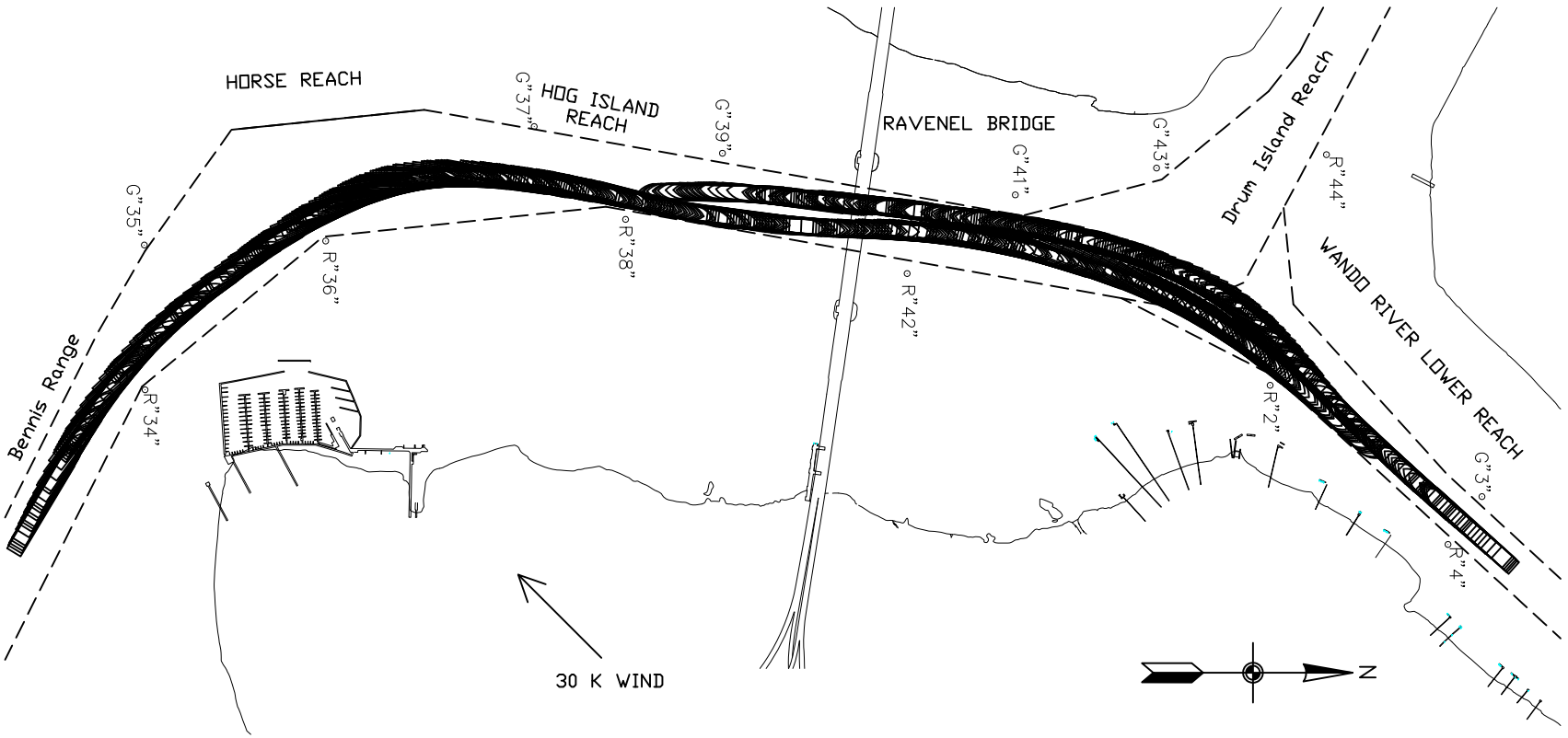
PLATE 66

PLATE 67



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 4 INBOUND AND PILOT 3 OUTBOUND

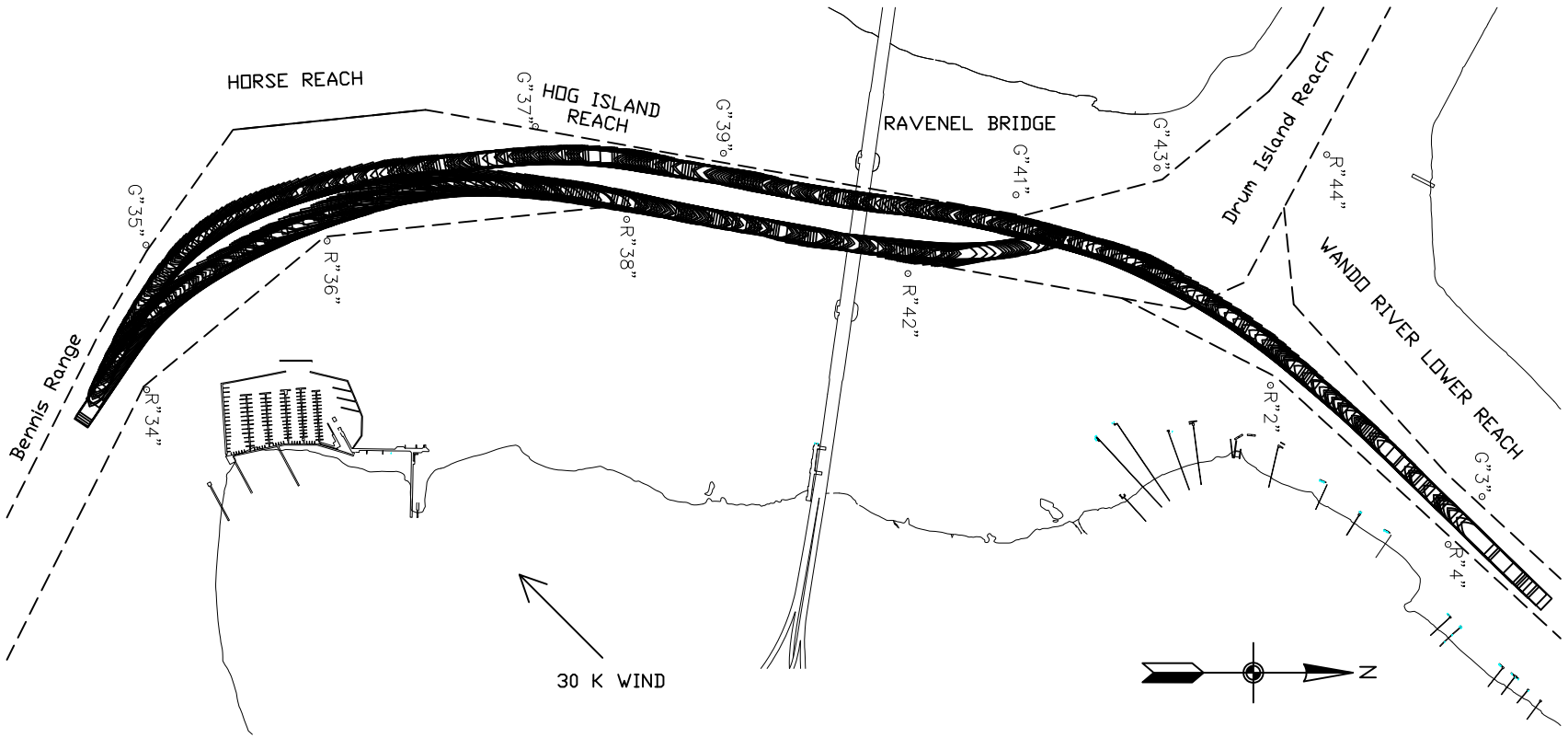


CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 5 OUTBOUND

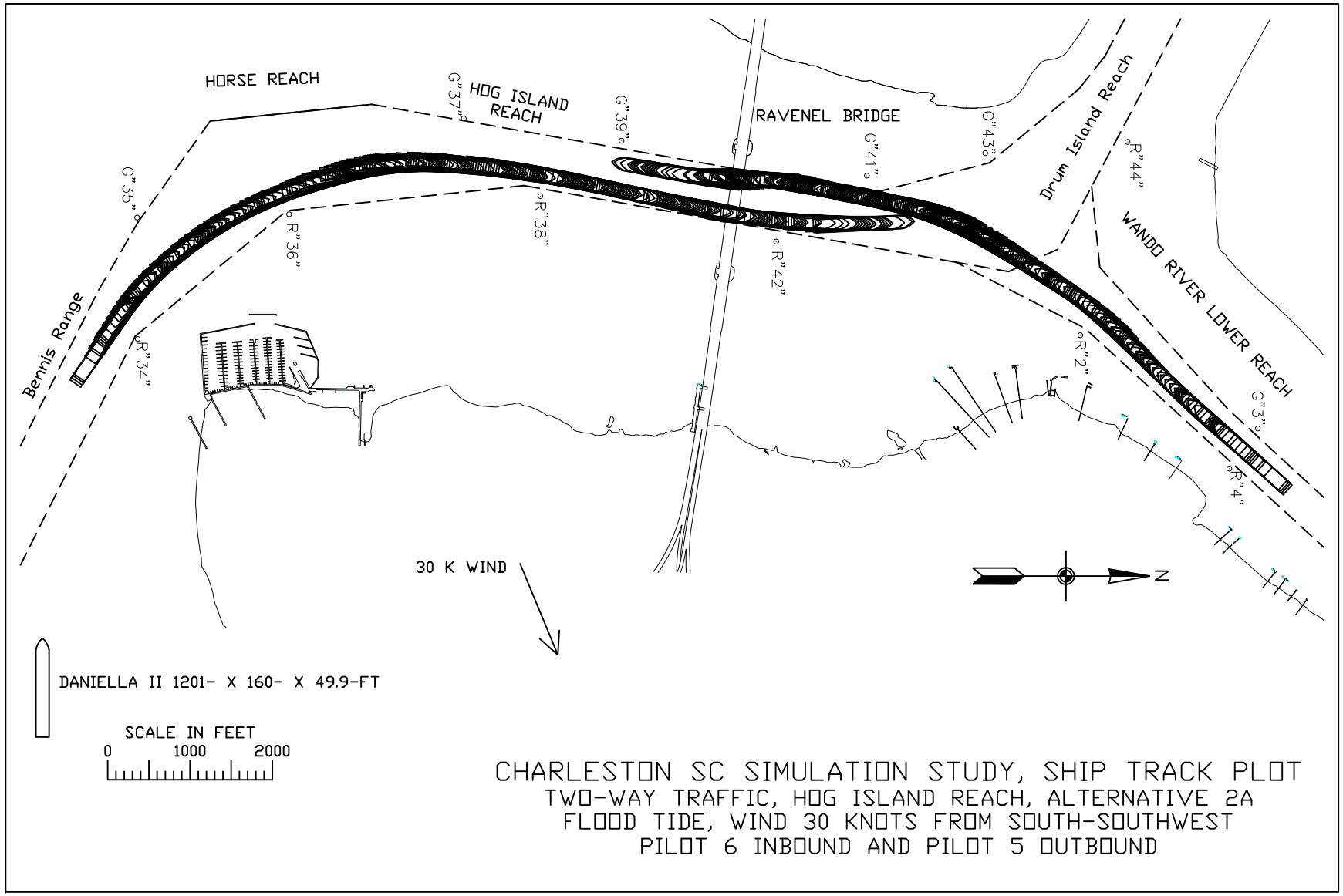
PLATE 68

PLATE 69



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

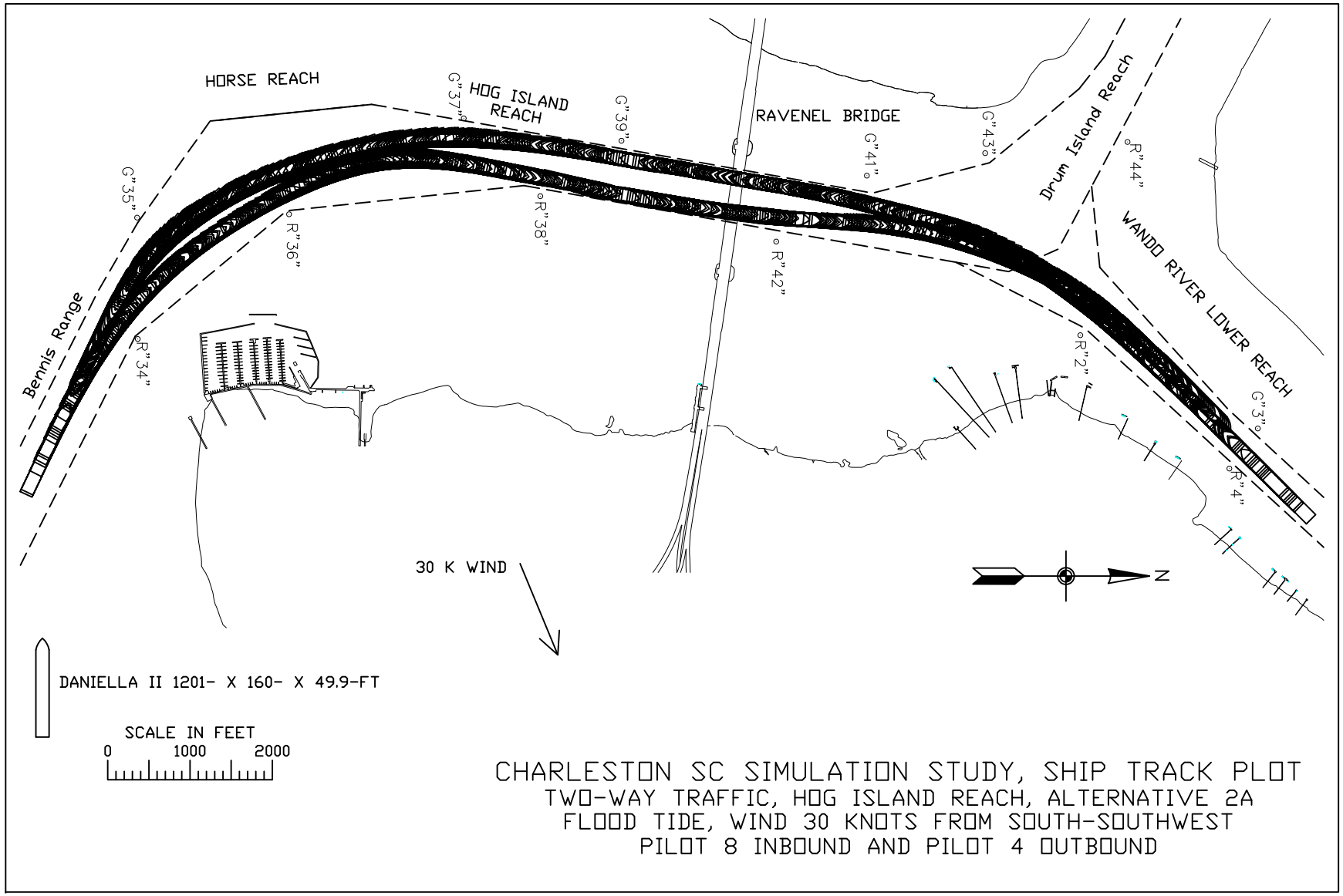
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND

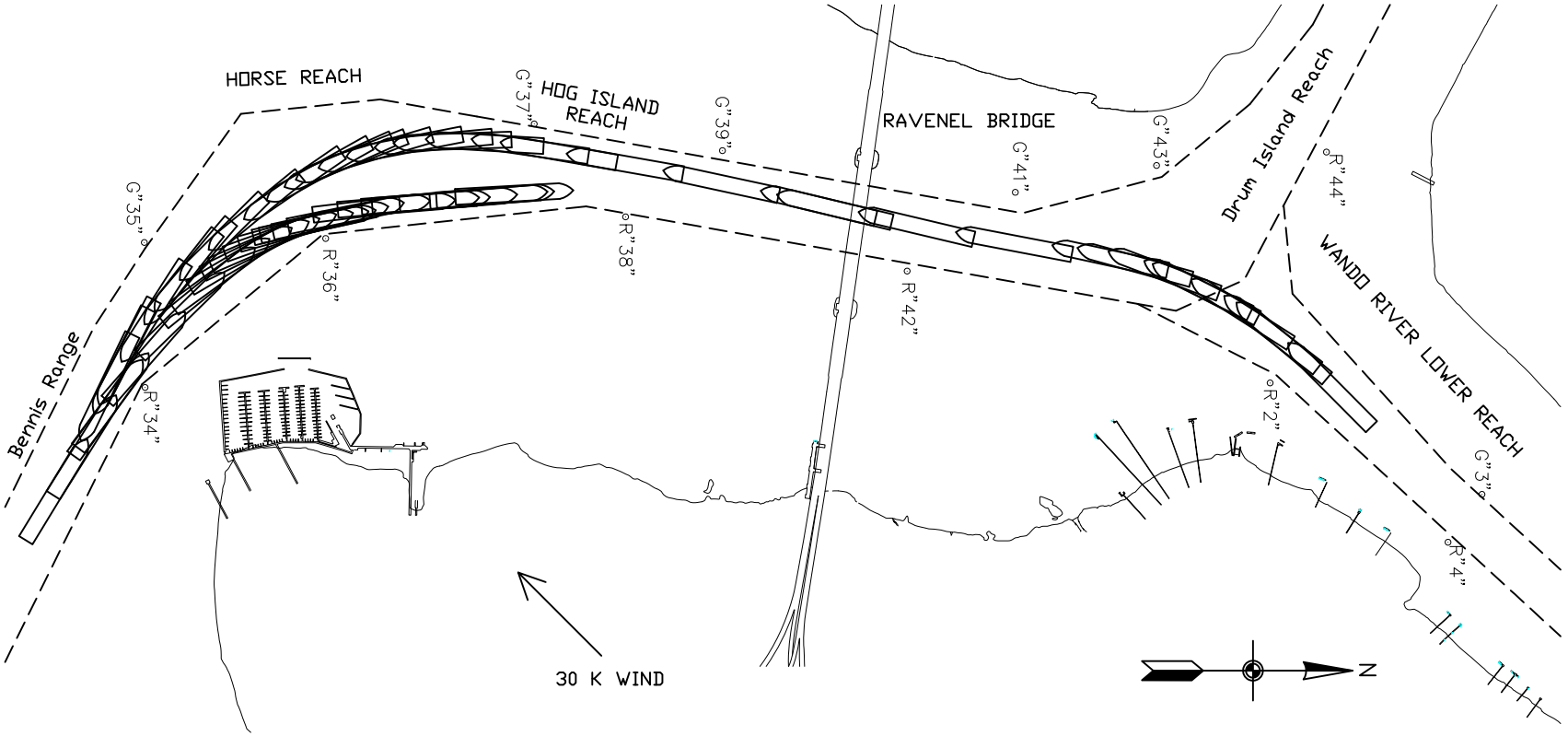
PLATE 70

PLATE 71



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 2A
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 8 INBOUND AND PILOT 4 OUTBOUND



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND

PLATE 72

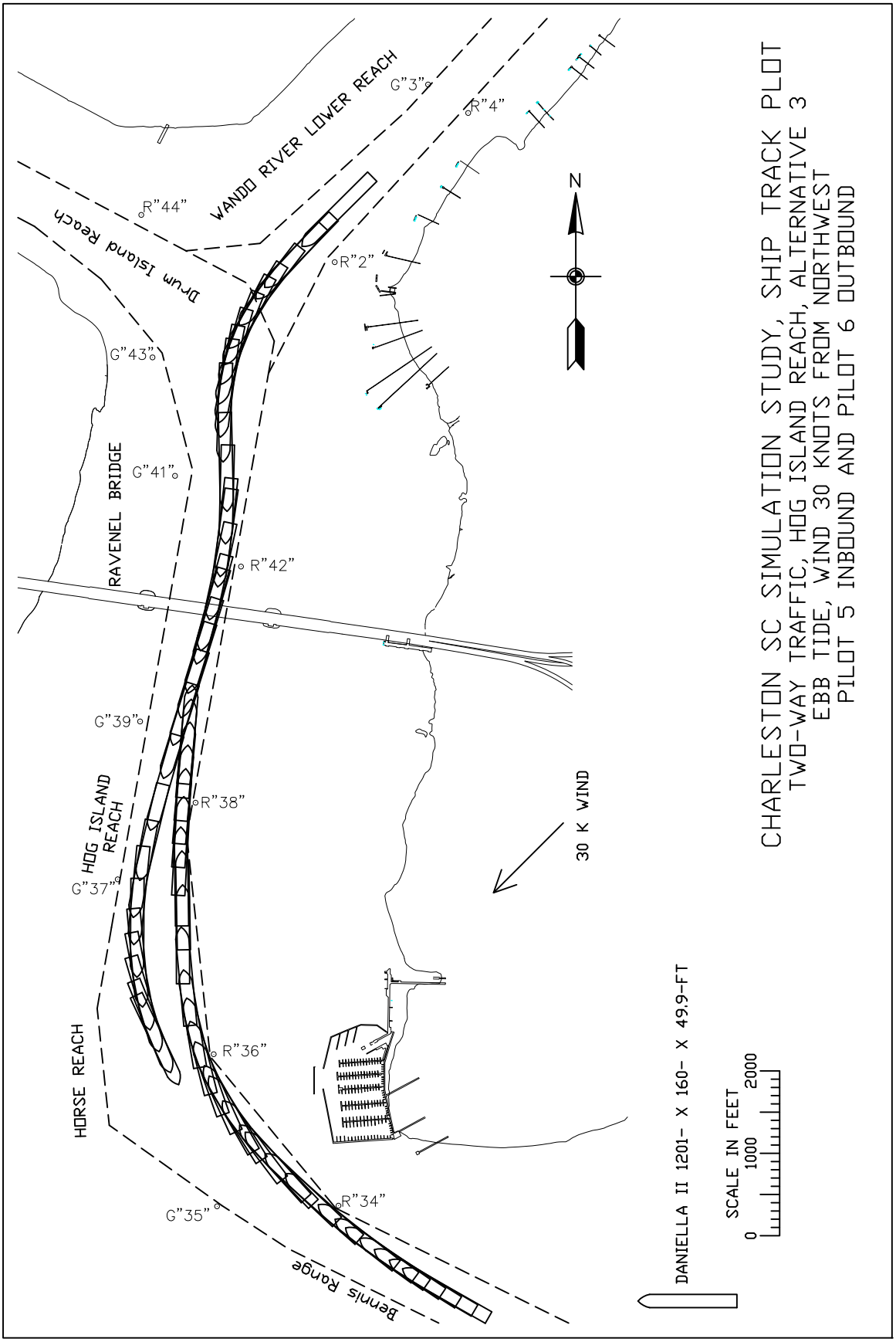
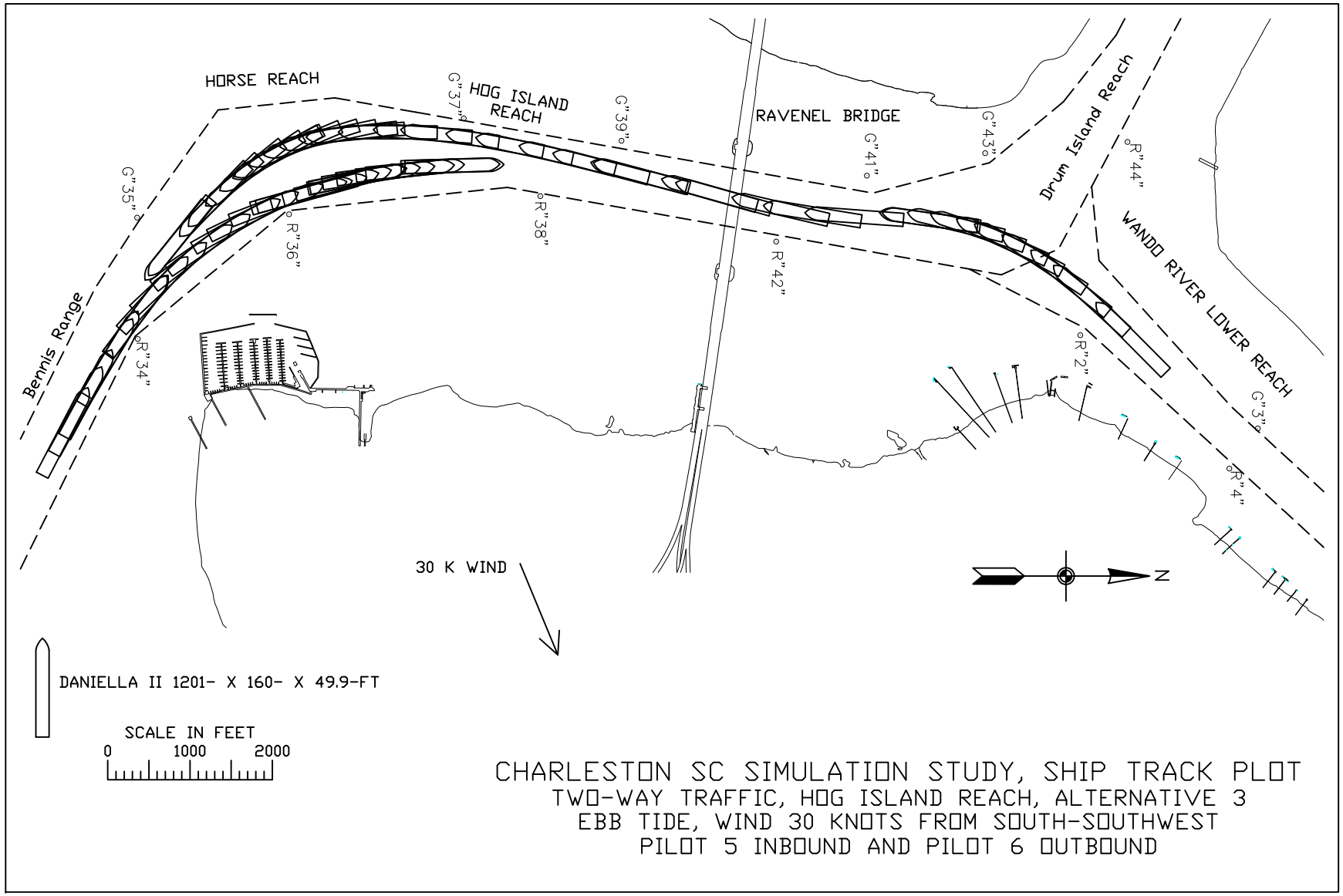

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND
WANDO RIVER LOWER REACH
Drum Island Reach
RAVENEL BRIDGE
HOG ISLAND REACH
HORSE REACH
Bennis Range
G"43"
G"41"
G"39"
G"37"
G"35"
G"3"
R"44"
R"4"
R"2"
R"42"
R"38"
R"36"
R"34"
N
30 K WIND
DANIELLA II 1201- X 160- X 49.9-FT
SCALE IN FEET
0
1000
2000

PLATE 73



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND

PLATE 74

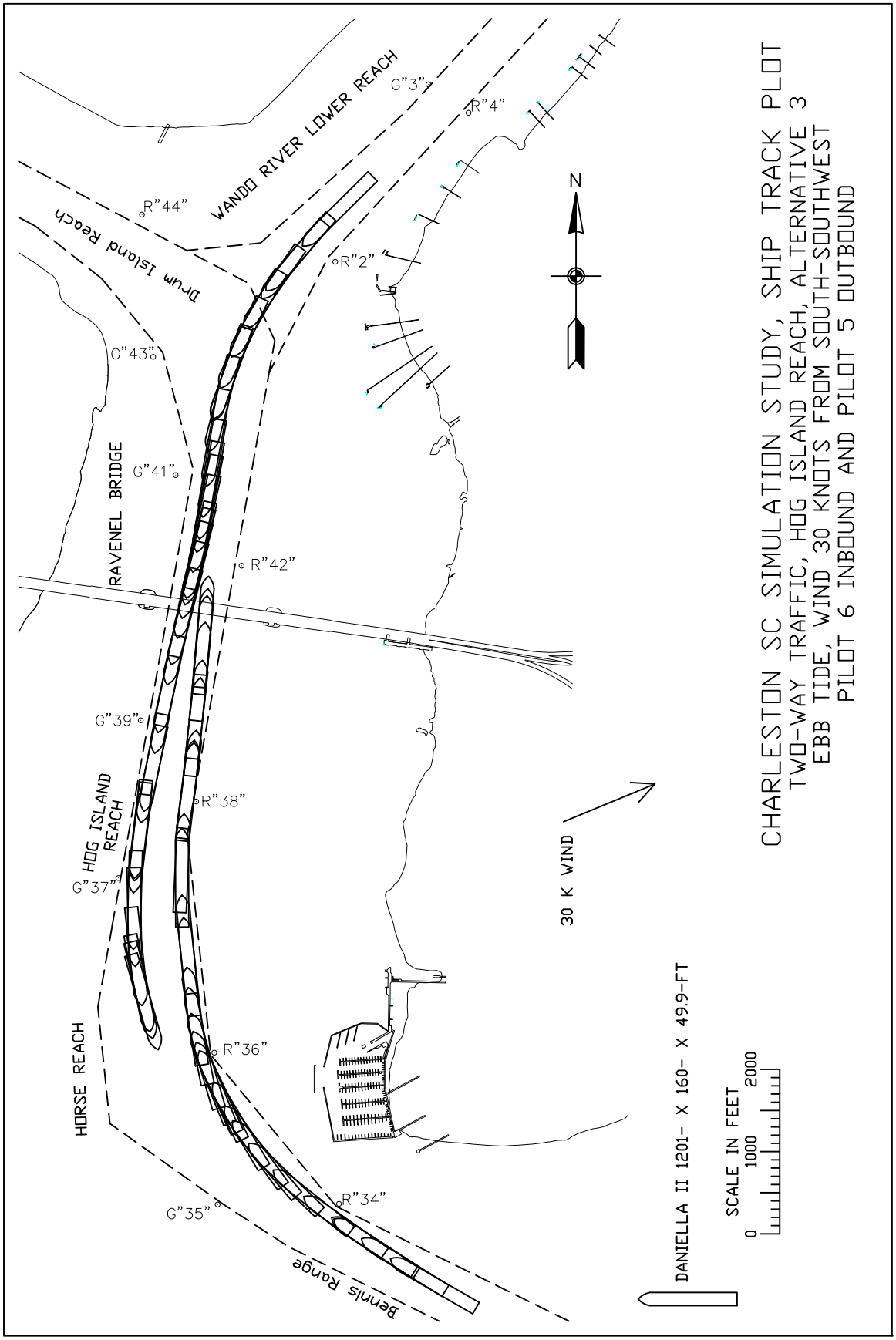
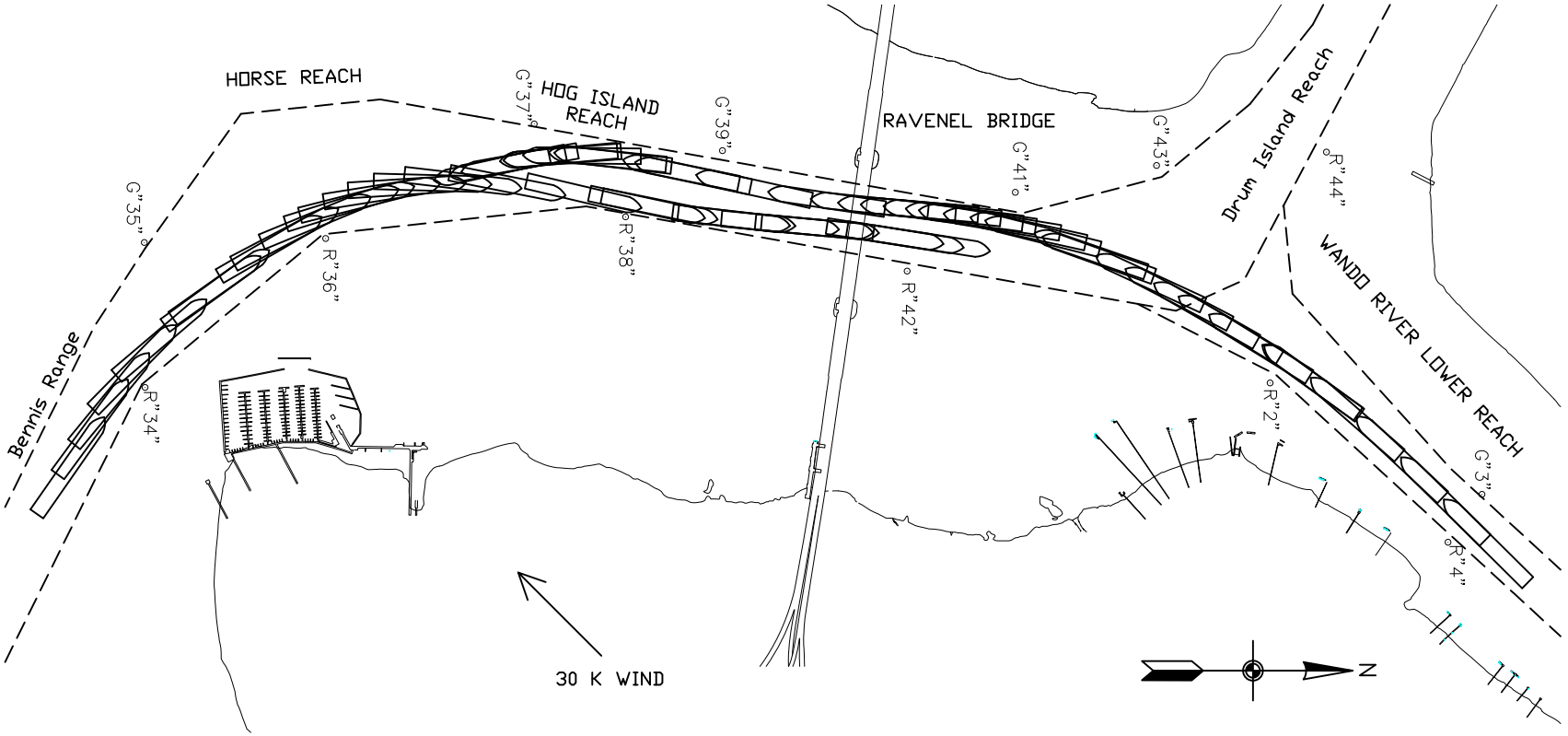

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND
WANDO RIVER LOWER REACH
Drum Island Reach
RAVENEL BRIDGE
HOG ISLAND REACH
HORSE REACH
Bennis Range
G"3"
G"43"
G"41"
G"39"
G"37"
G"35"
R"44"
R"4"
R"2"
R"42"
R"38"
R"36"
R"34"
N
30 K WIND
DANIELLA II 1201- X 160- X 49.9-FT
SCALE IN FEET
0
1000
2000

PLATE 75



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND

PLATE 76

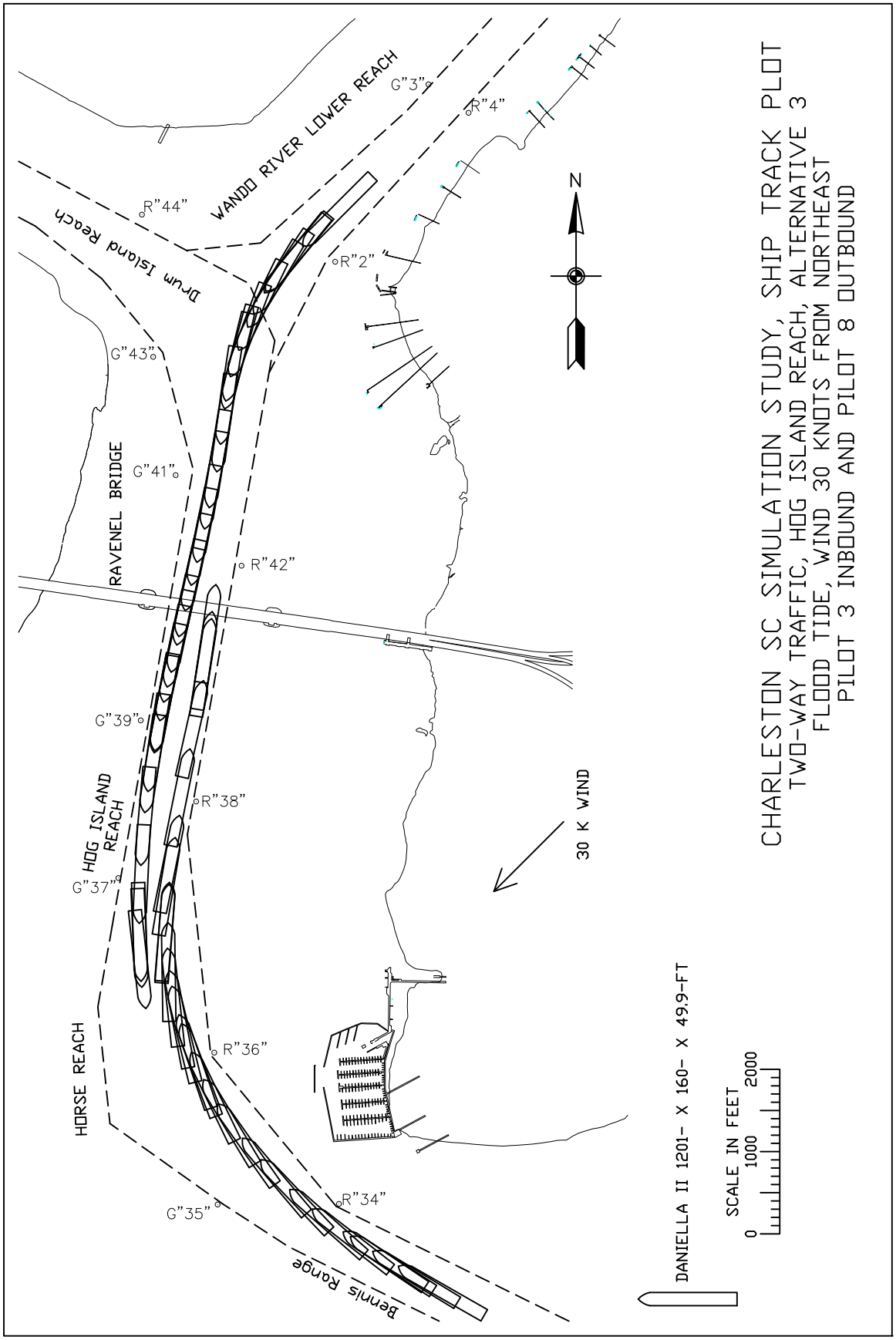
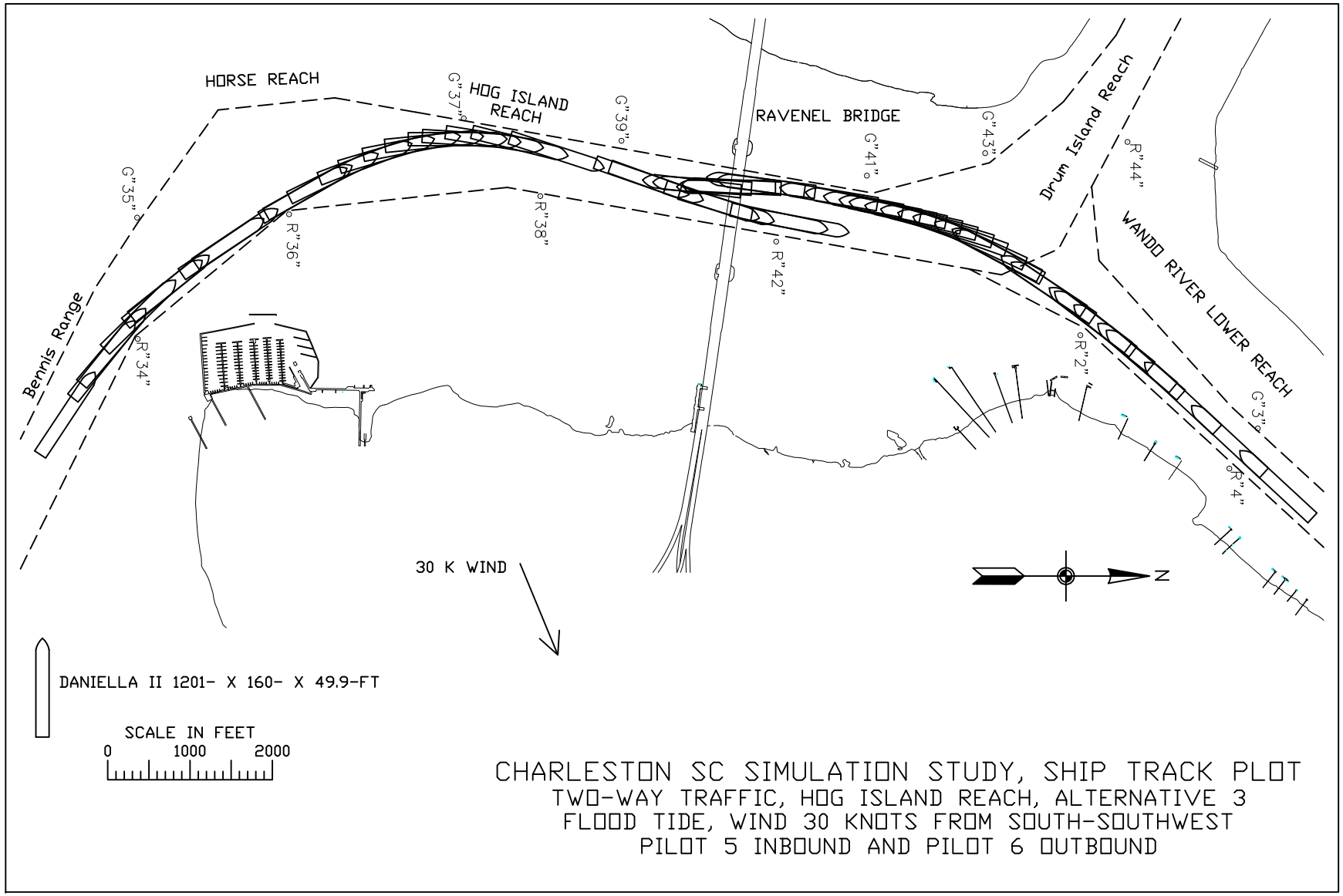

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 3 INBOUND AND PILOT 8 OUTBOUND
WANDO RIVER LOWER REACH
Drum Island Reach
HOG ISLAND REACH
HORSE REACH
RAVENEL BRIDGE
Bennis Range
G"3"
G"43"
G"41"
G"39"
G"37"
G"35"
R"44"
R"4"
R"2"
R"42"
R"38"
R"36"
R"34"
30 K WIND
N
DANIELLA II 1201- X 160- X 49.9-FT
SCALE IN FEET
0
1000
2000

PLATE 77



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND

PLATE 78

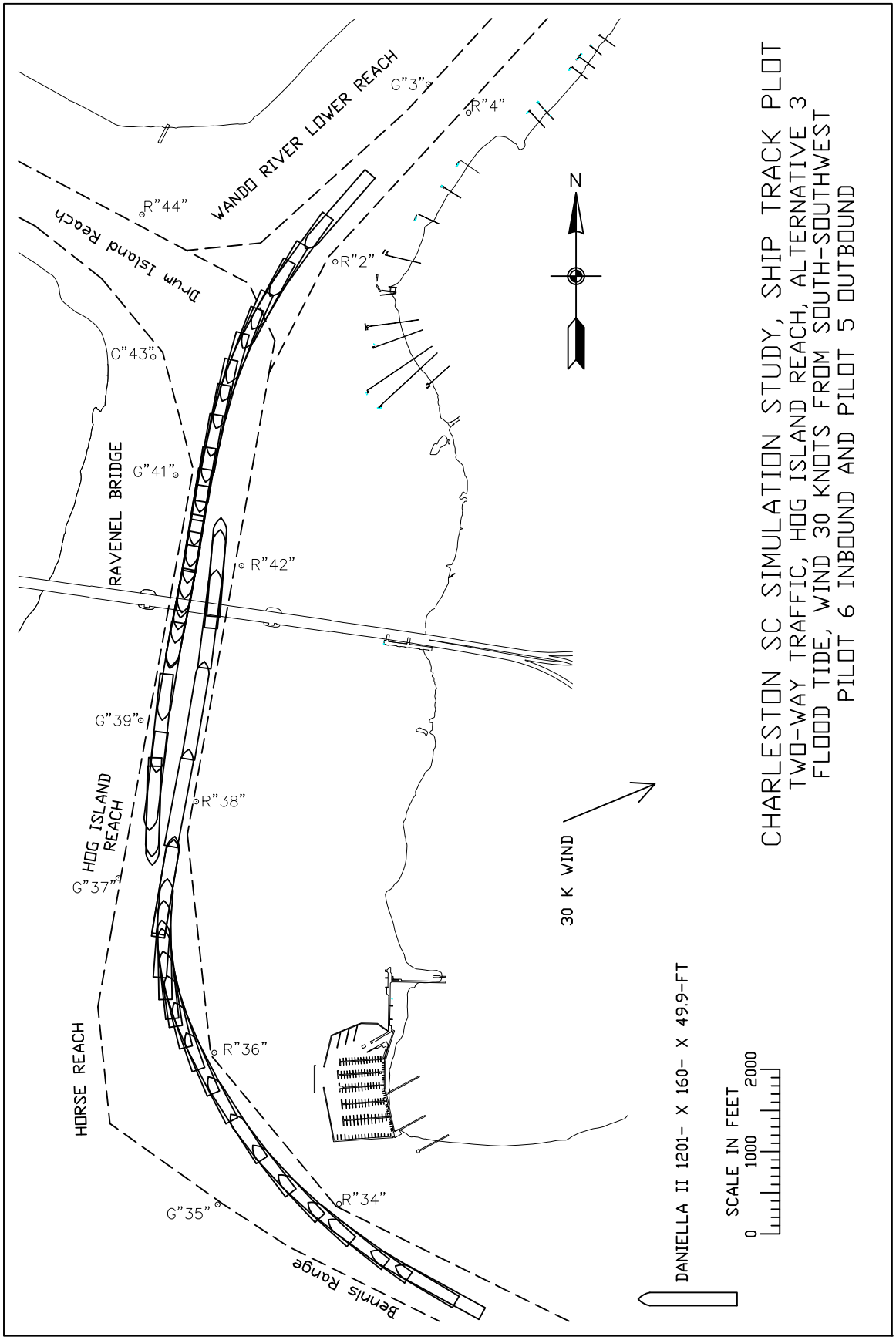
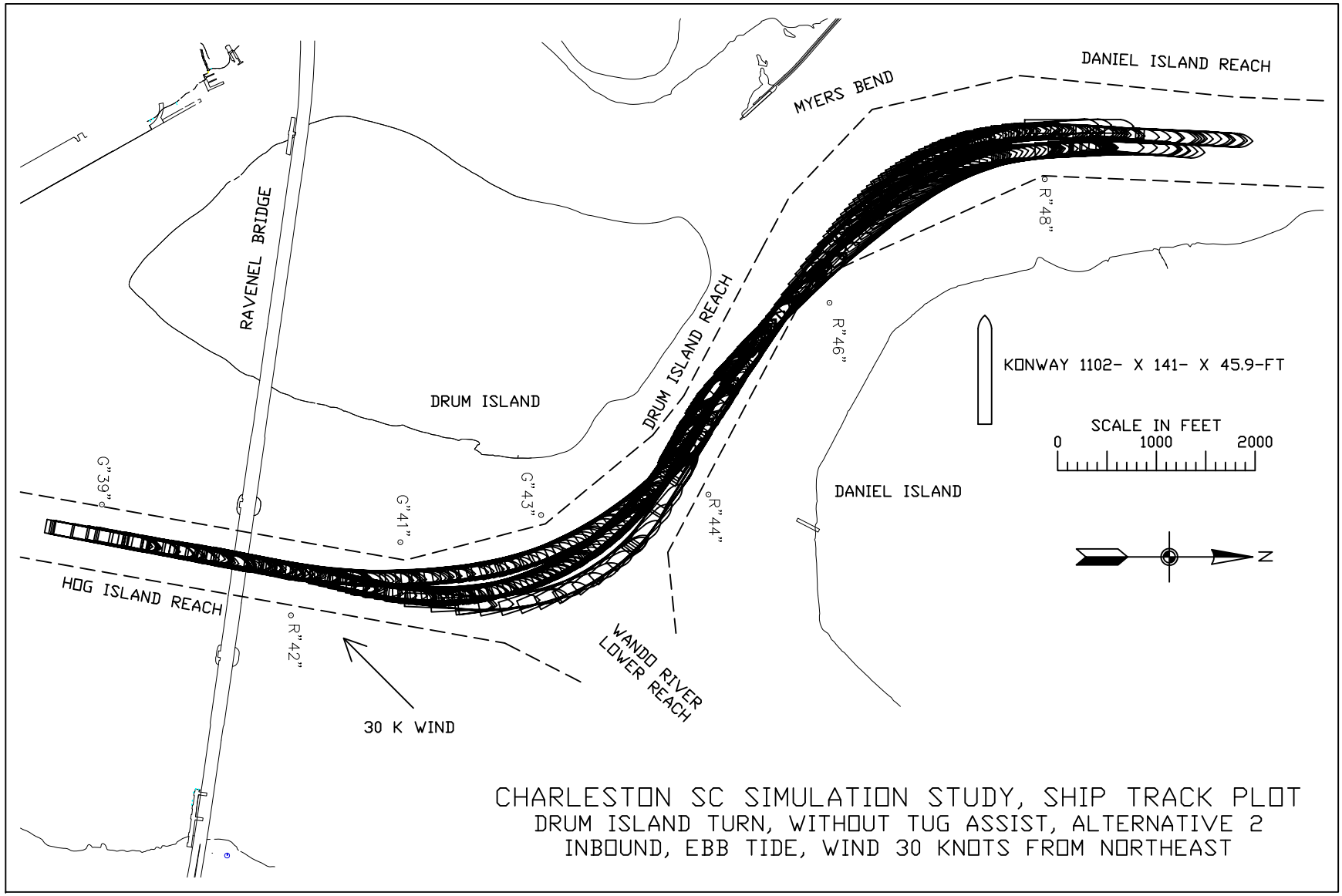

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, HOG ISLAND REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND
WANDO RIVER LOWER REACH
Drum Island Reach
HOG ISLAND REACH
HORSE REACH
Bennis Range
RAVENEL BRIDGE
G"43"
G"41"
G"39"
G"37"
G"35"
G"3"
R"4"
R"44"
R"2"
R"42"
R"38"
R"36"
R"34"
30 K WIND
N
DANIELLA II 1201- X 160- X 49.9-FT
SCALE IN FEET
0
1000
2000

PLATE 79

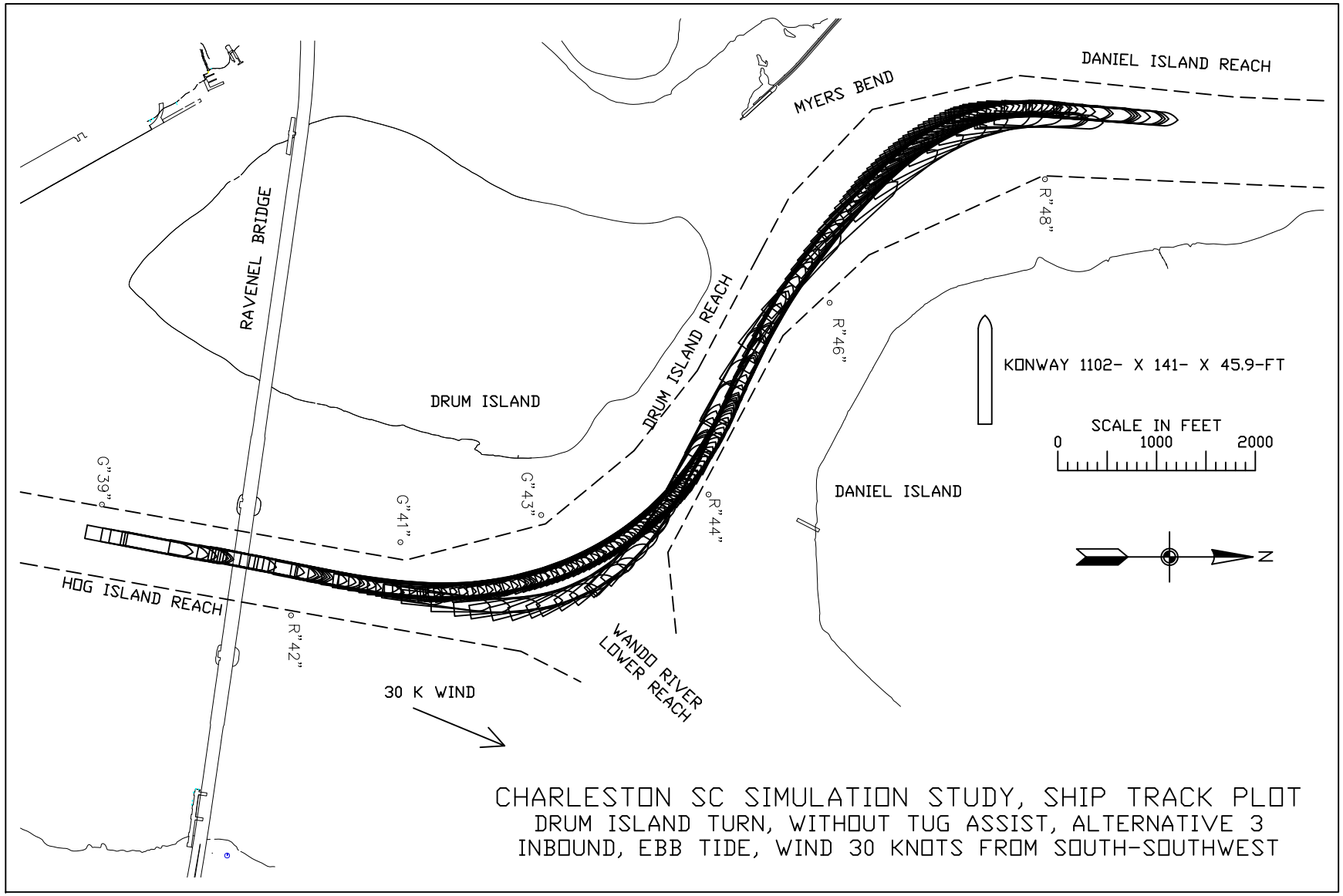


CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

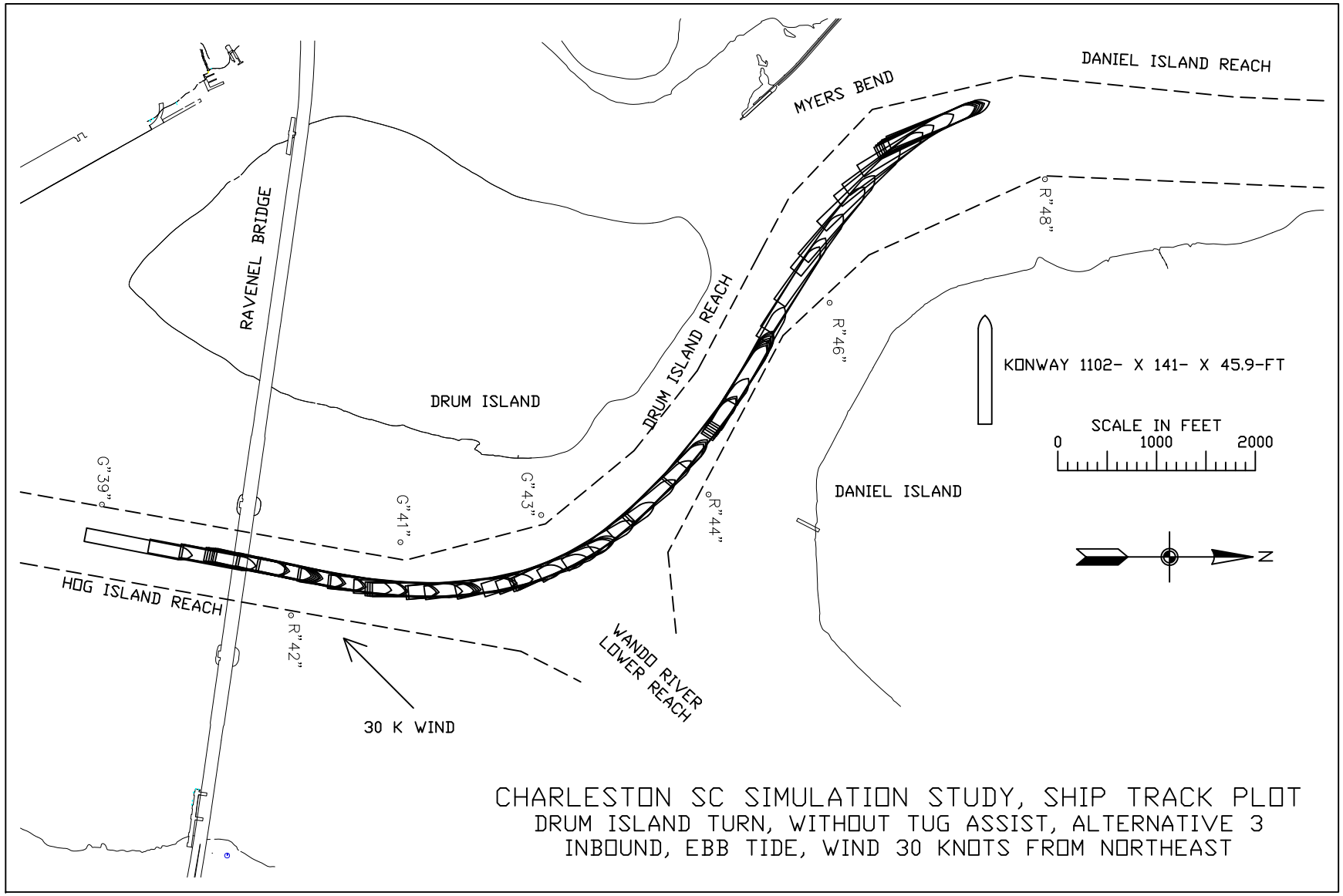
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 2
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 80

PLATE 81



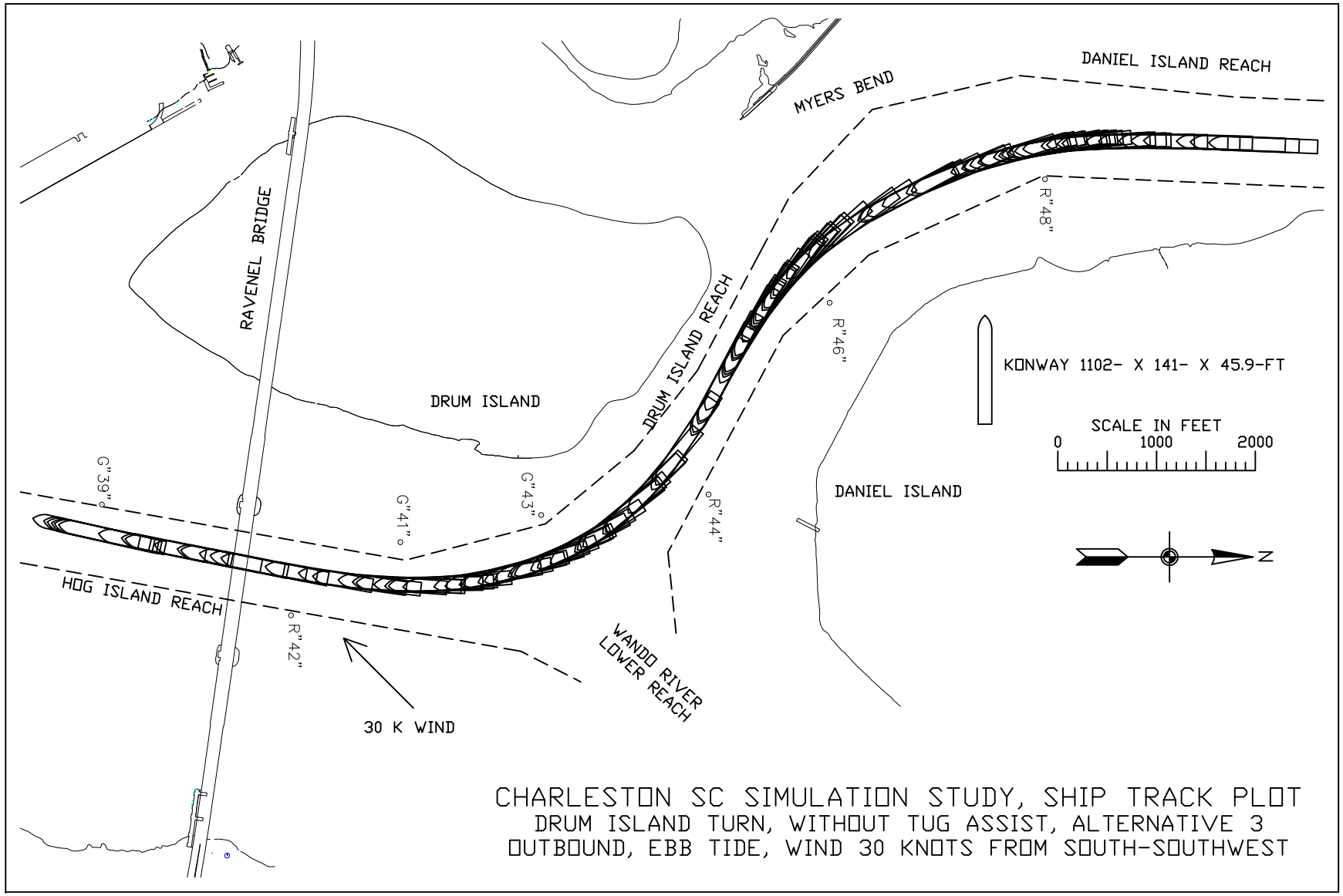
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



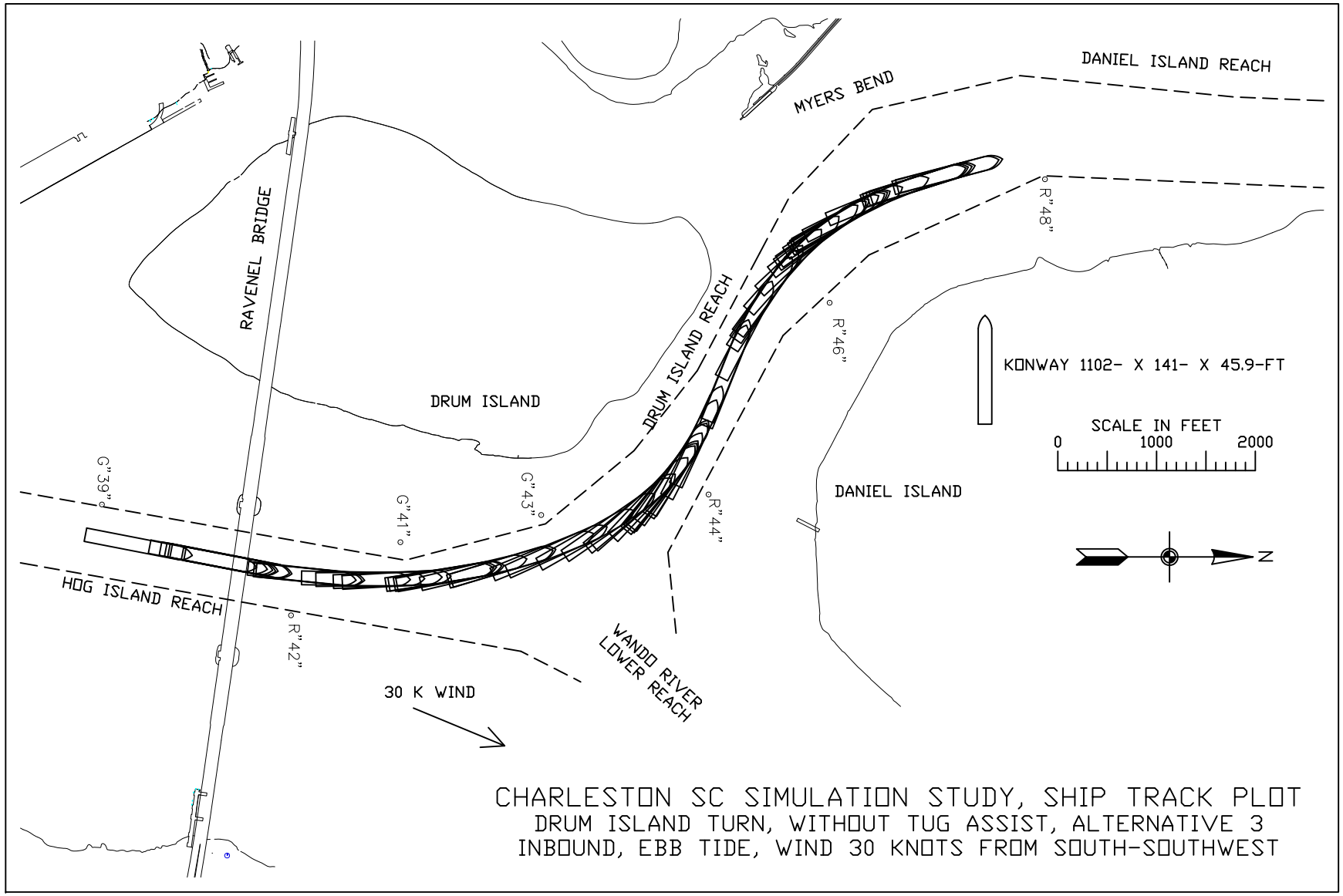
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 82

PLATE 83



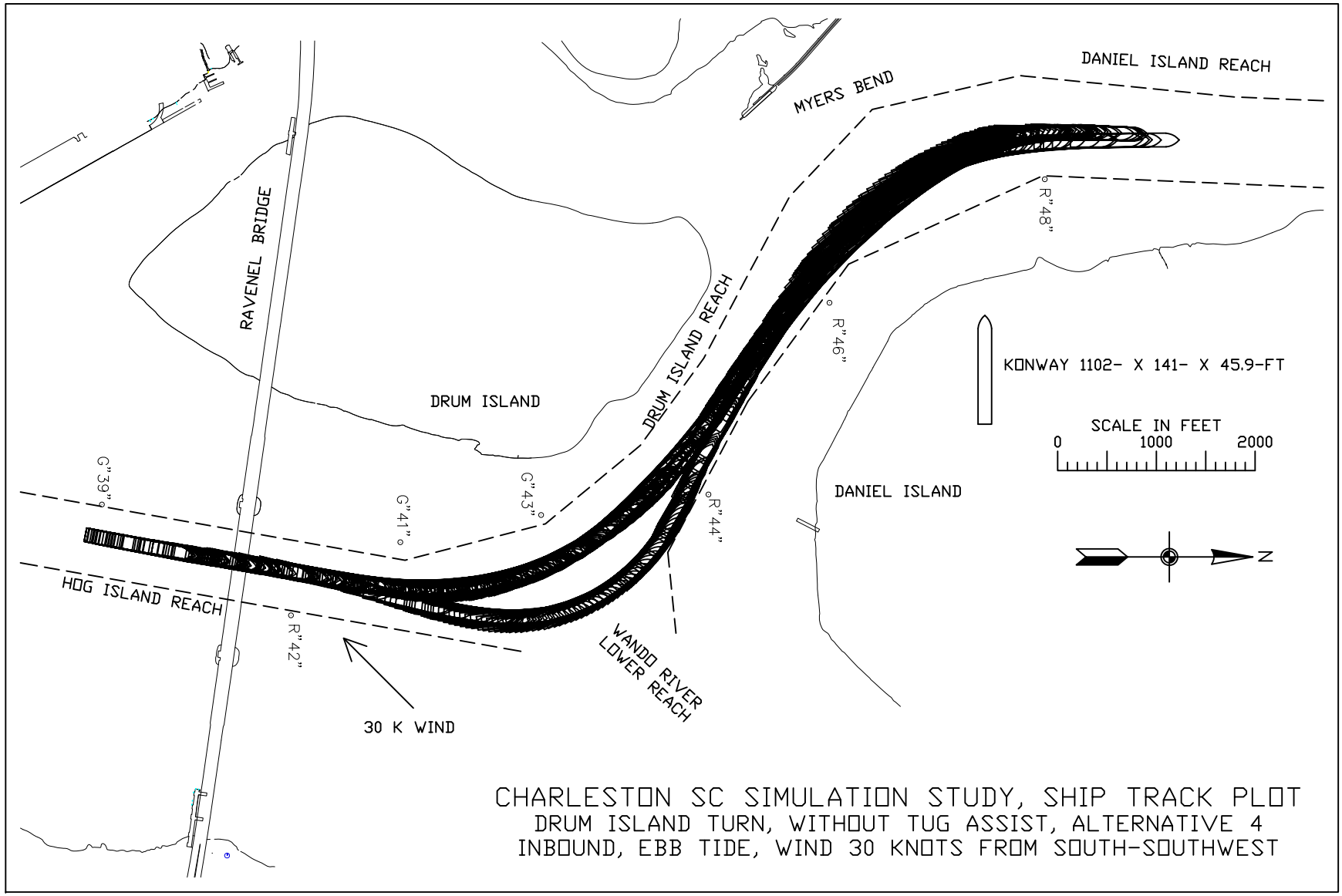
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



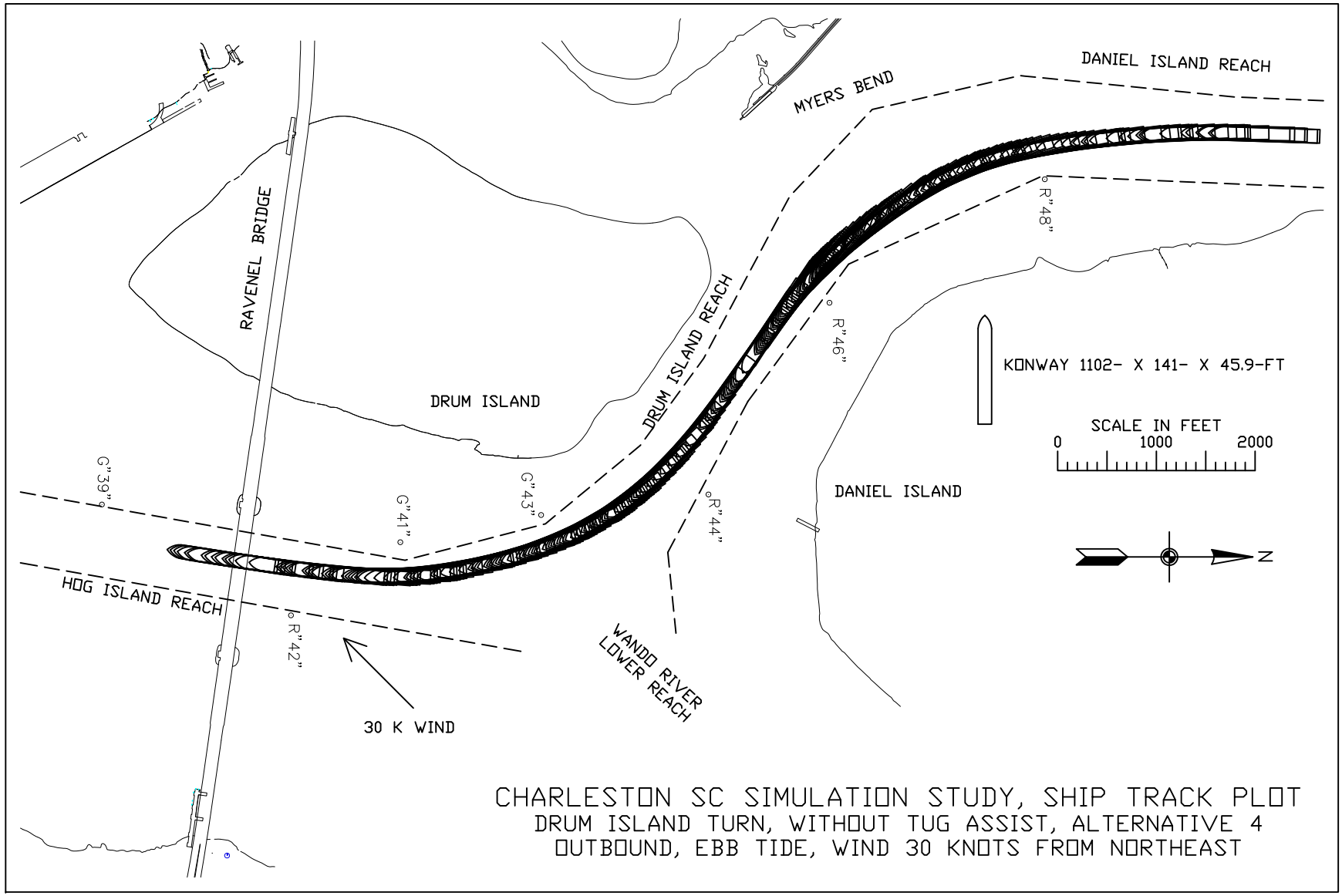
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 84

PLATE 85



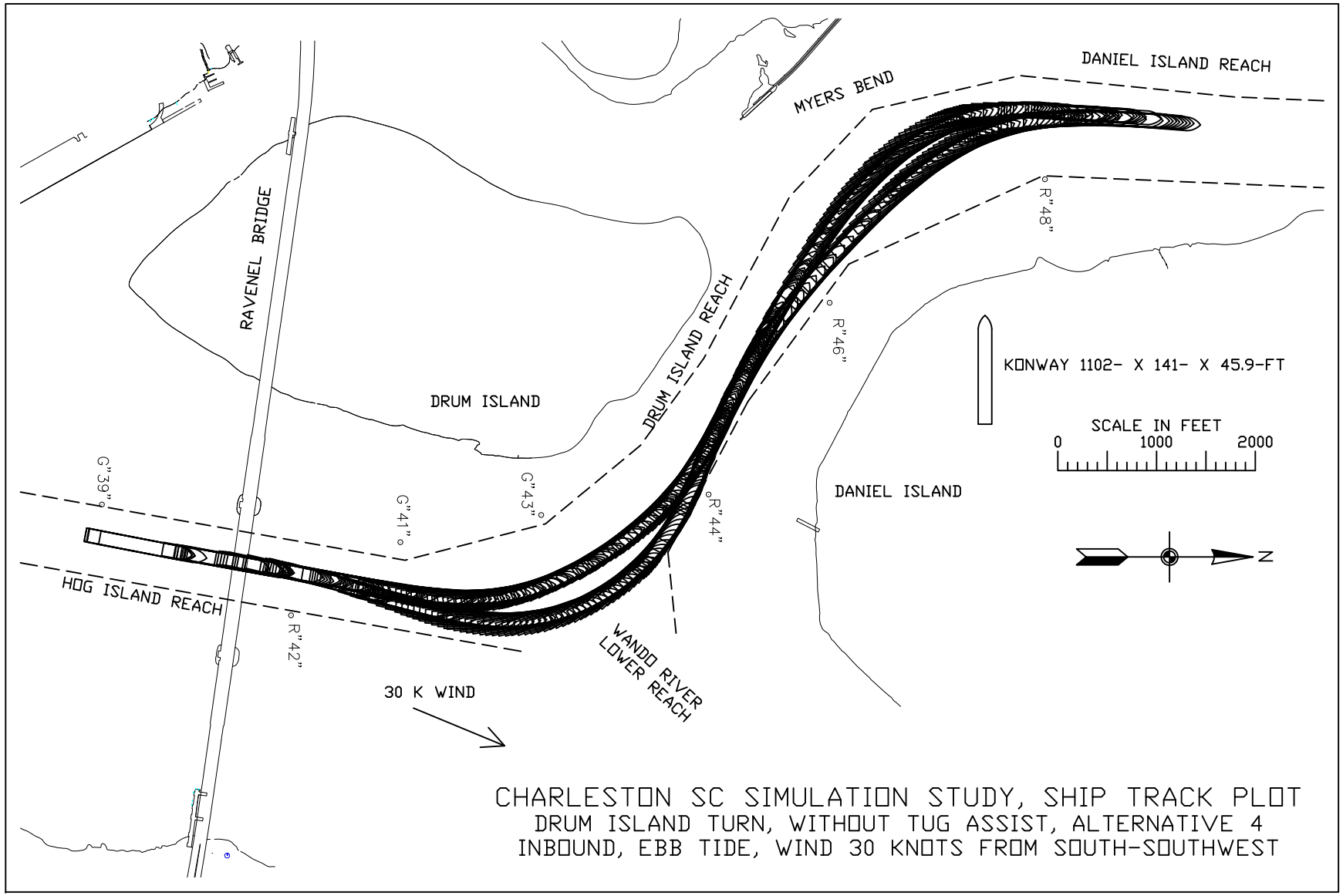
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 4
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



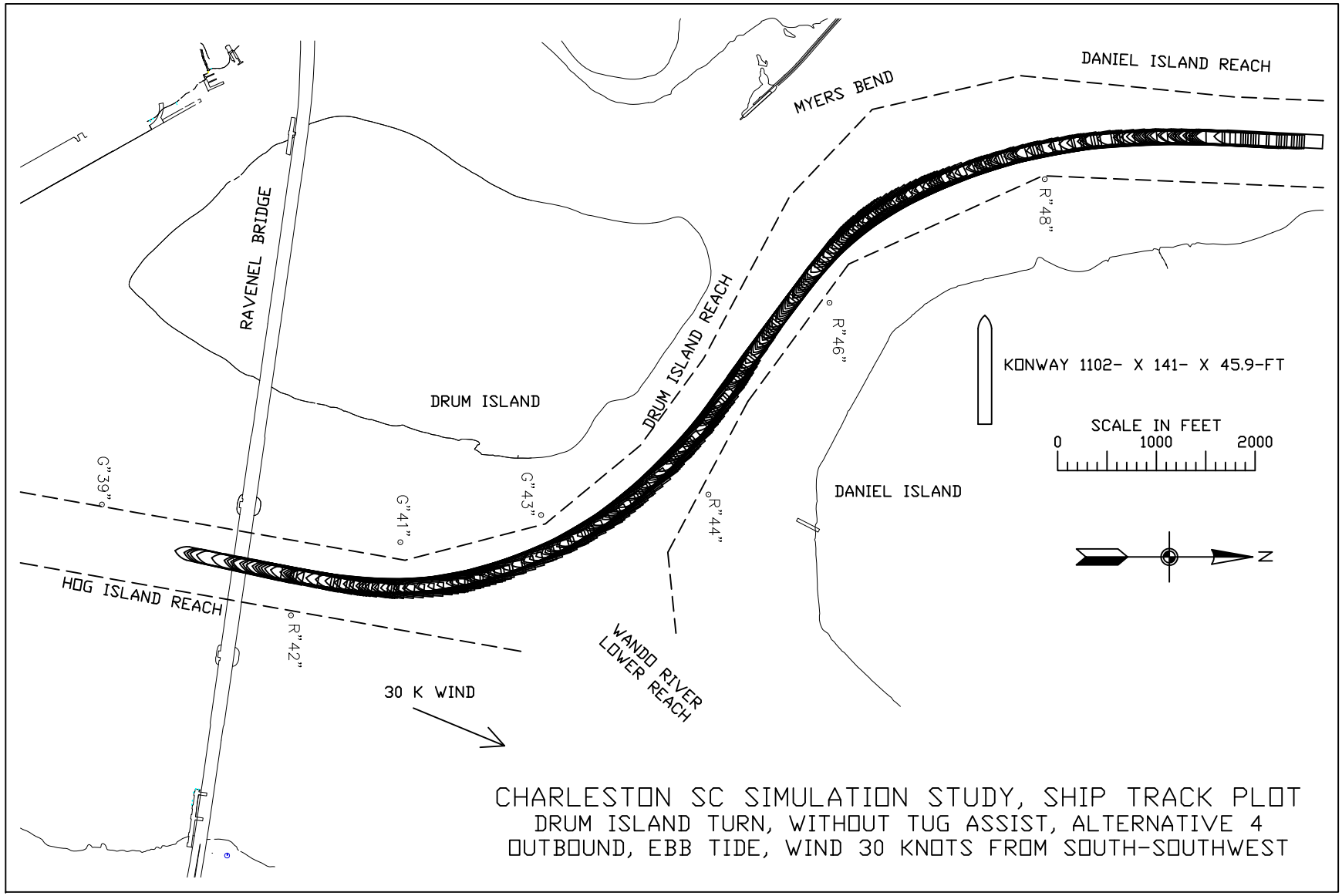
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 4
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 86

PLATE 87



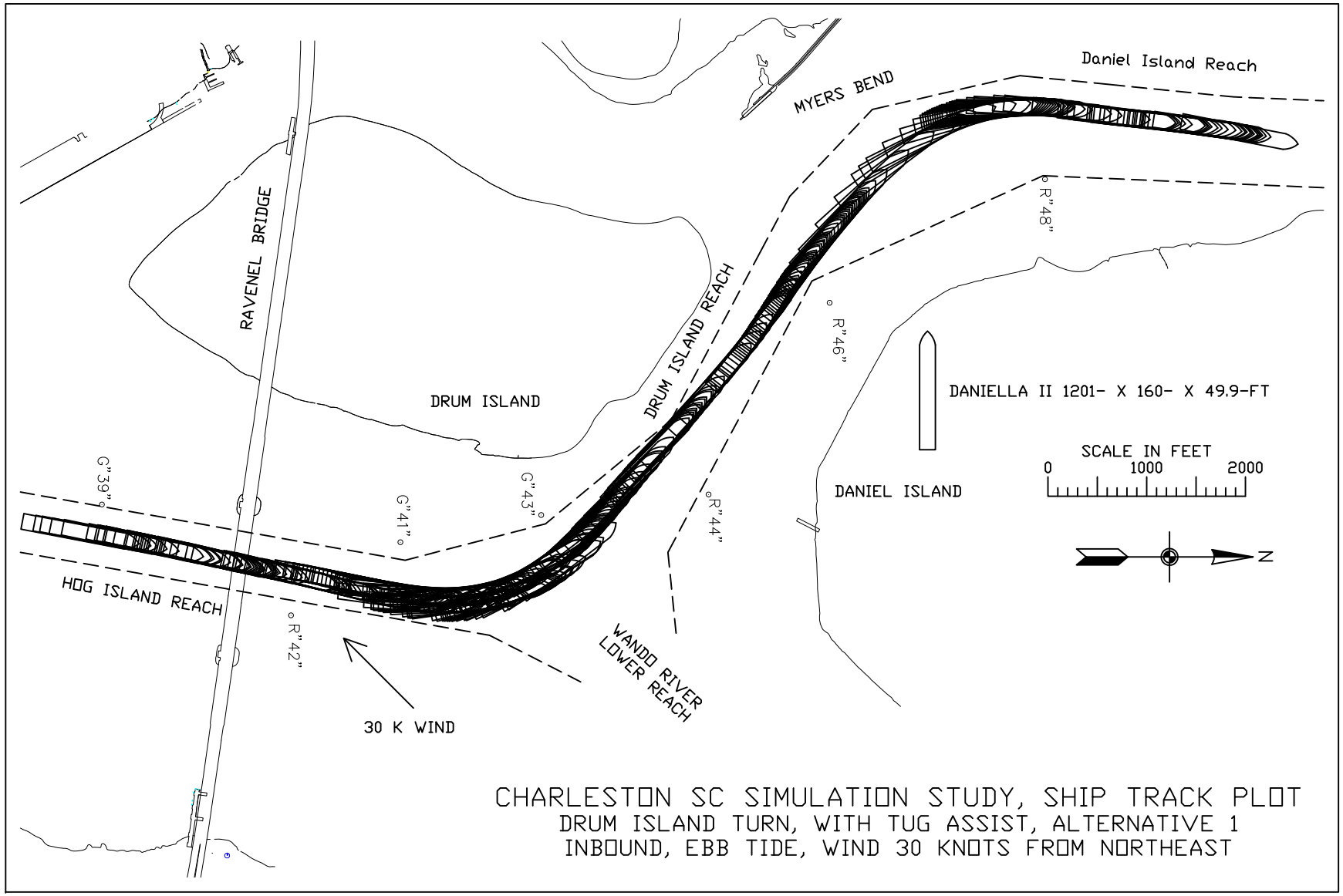
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 4
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



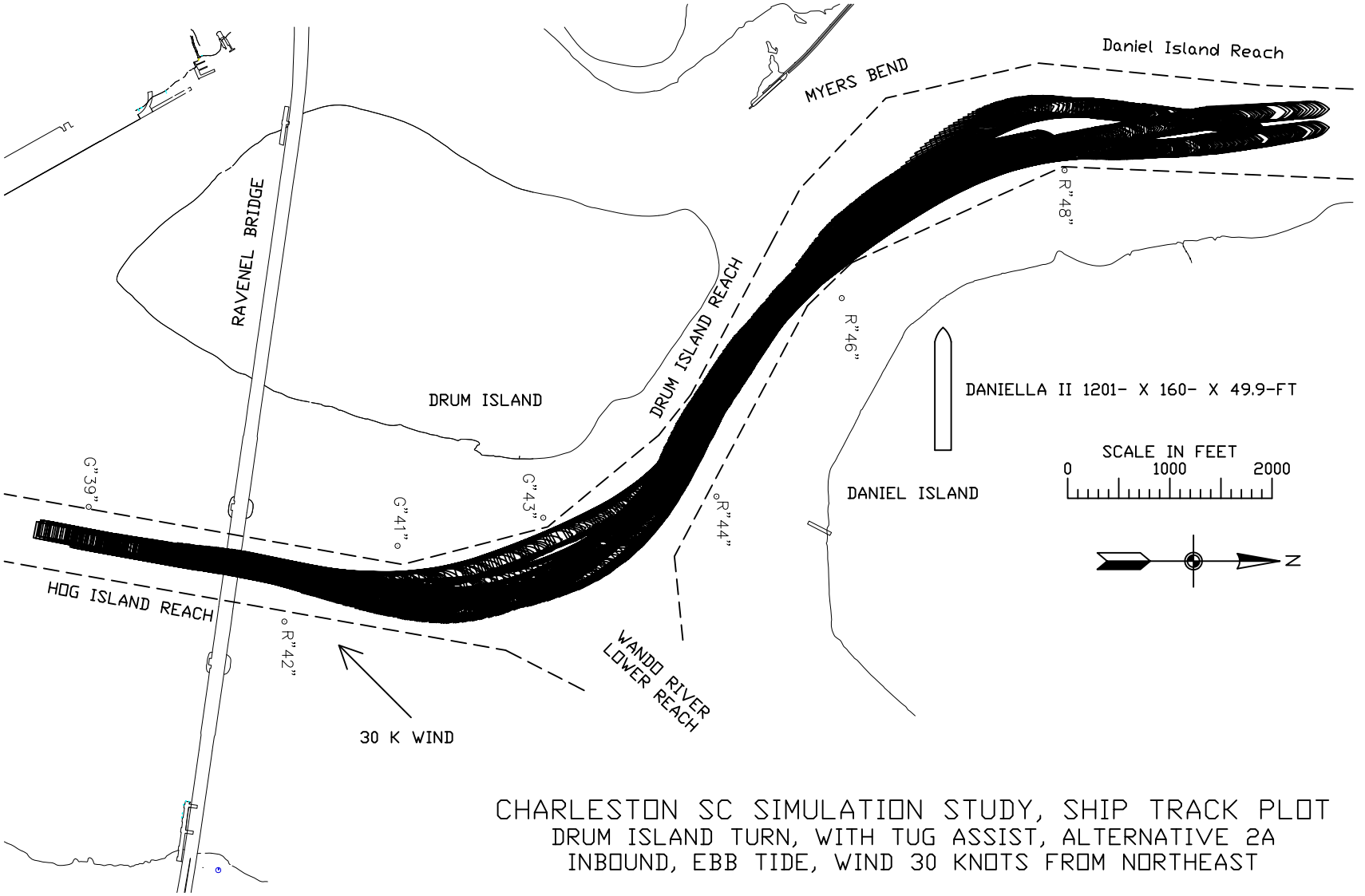
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 4
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 88

PLATE 89



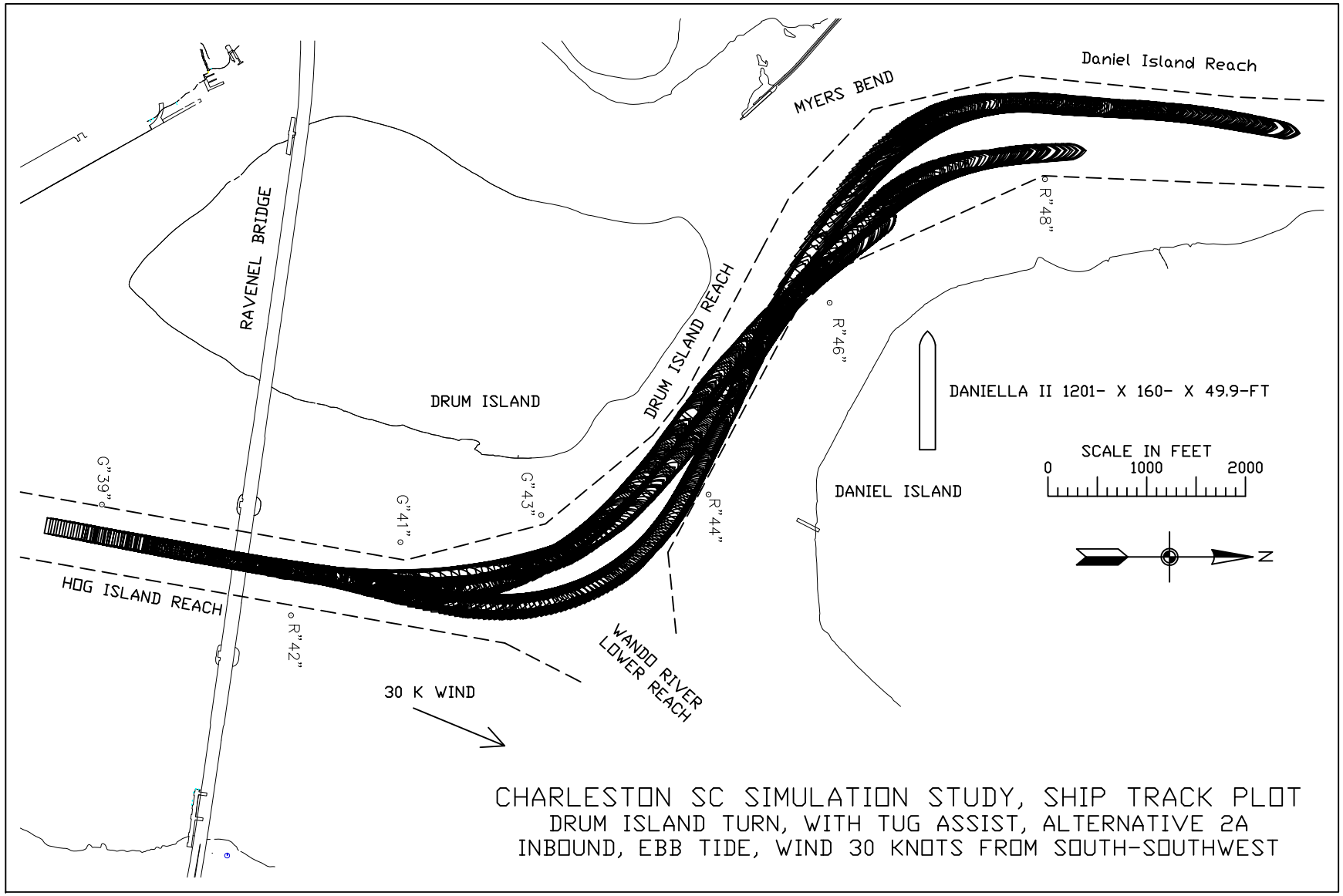
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 1
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST



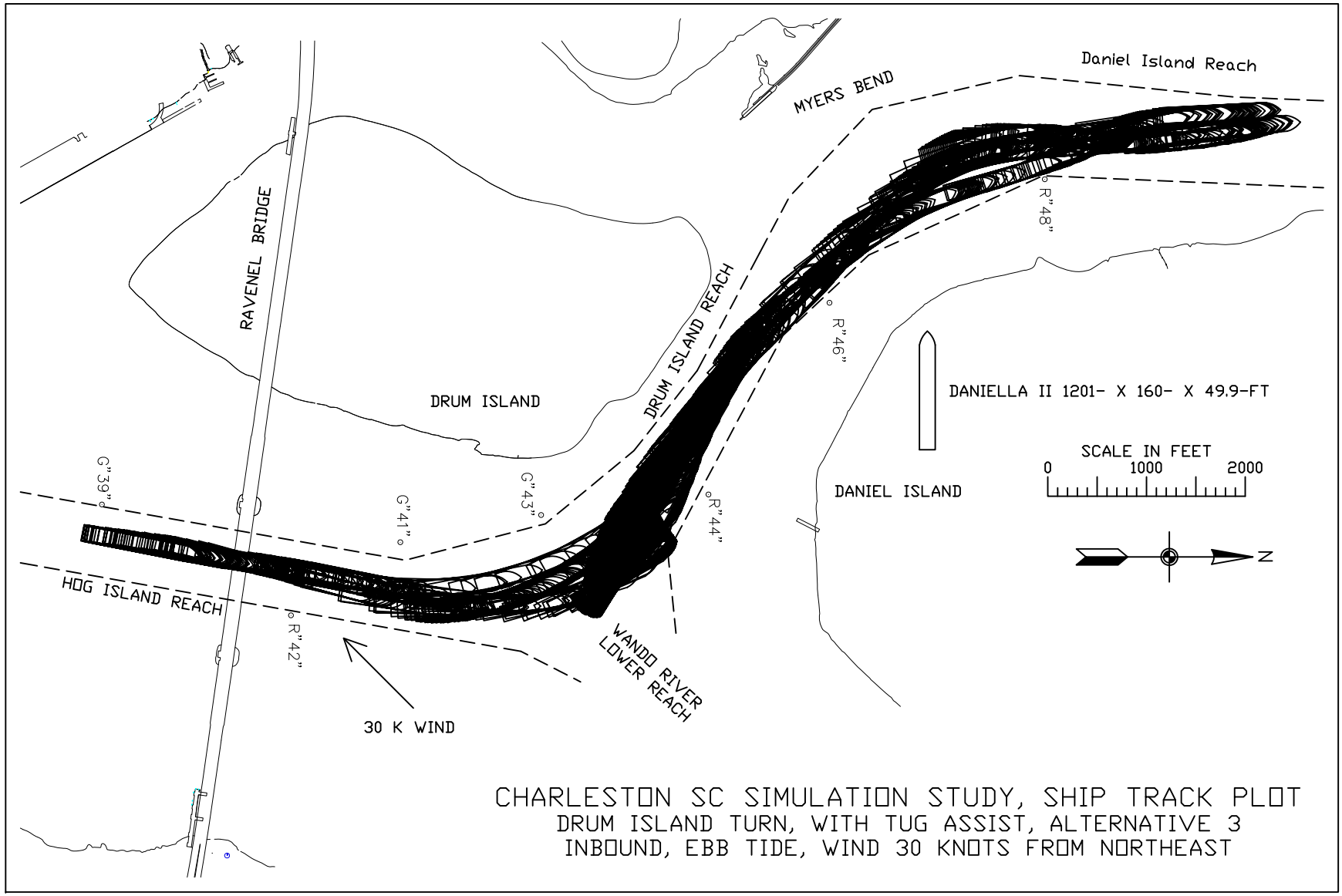
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 2A
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 90

PLATE 91



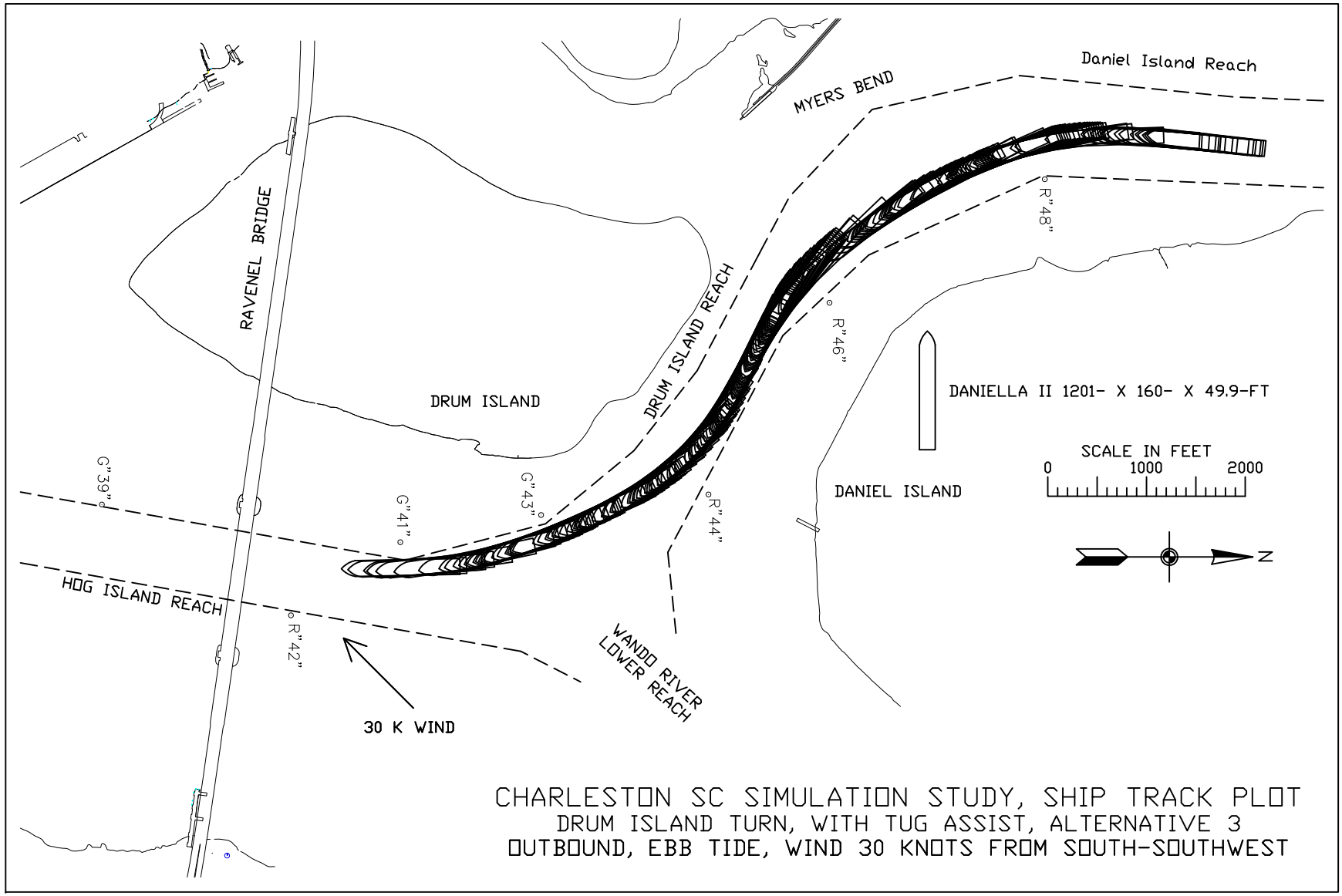
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 2A
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



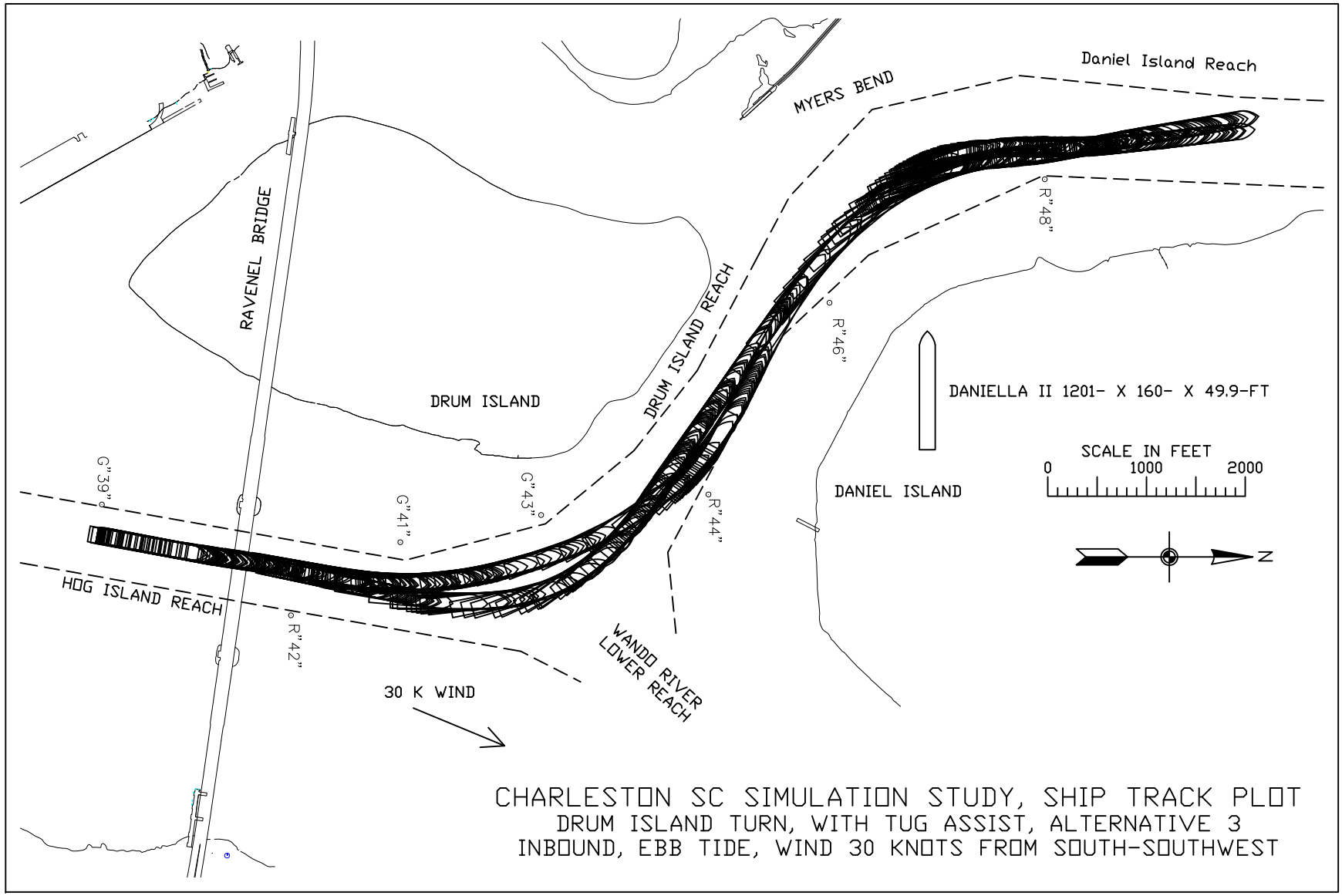
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 92

PLATE 93



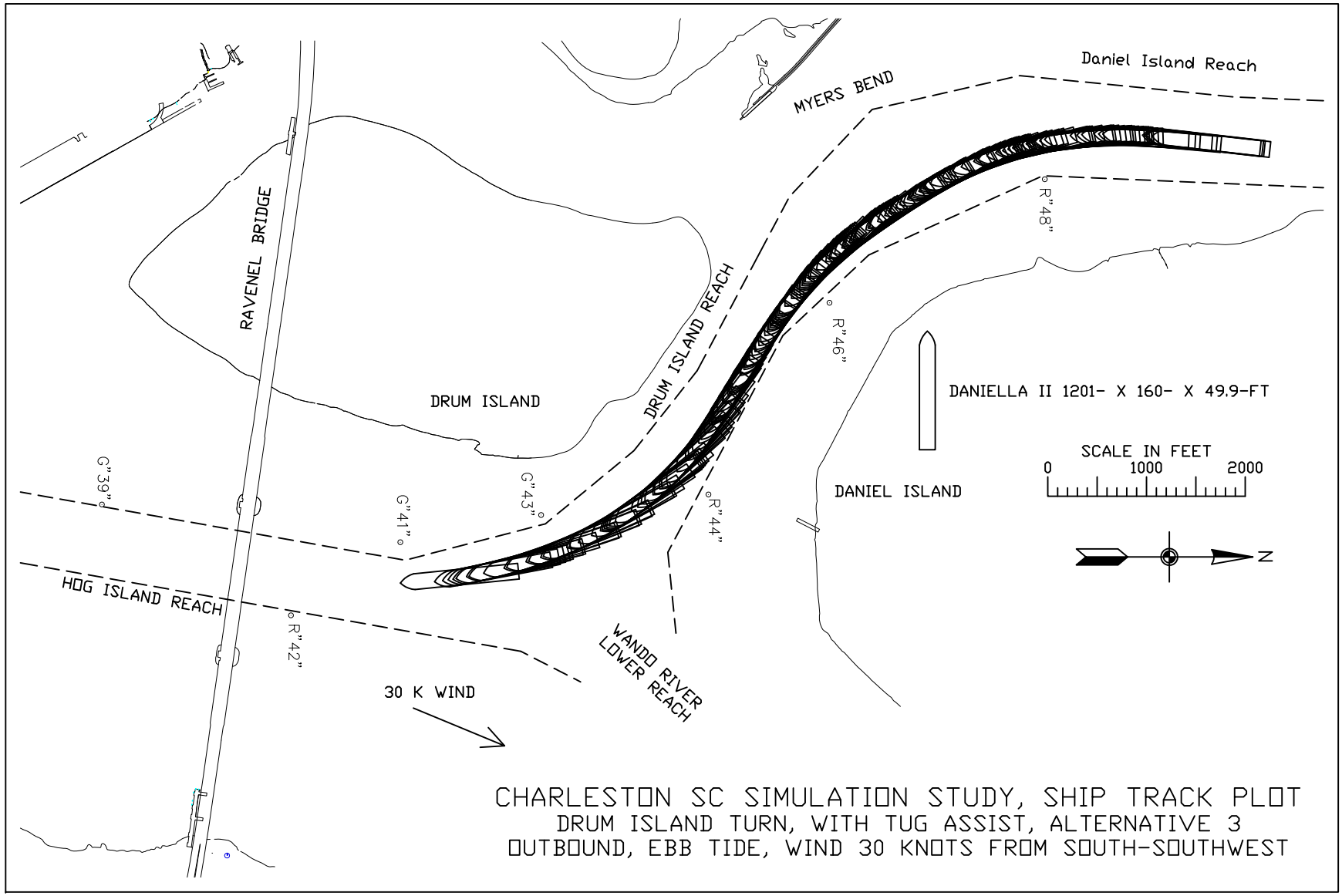
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



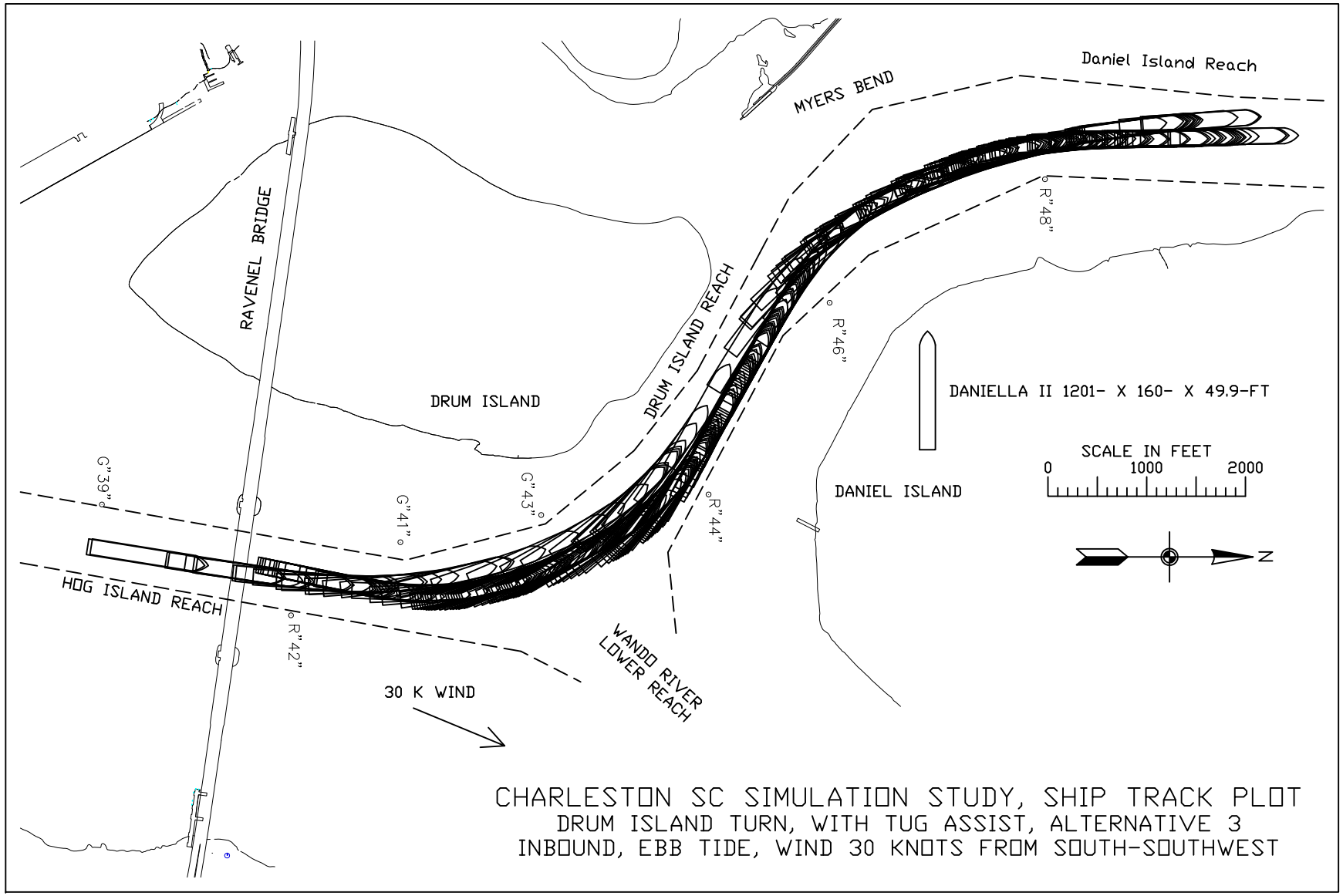
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 94

PLATE 95



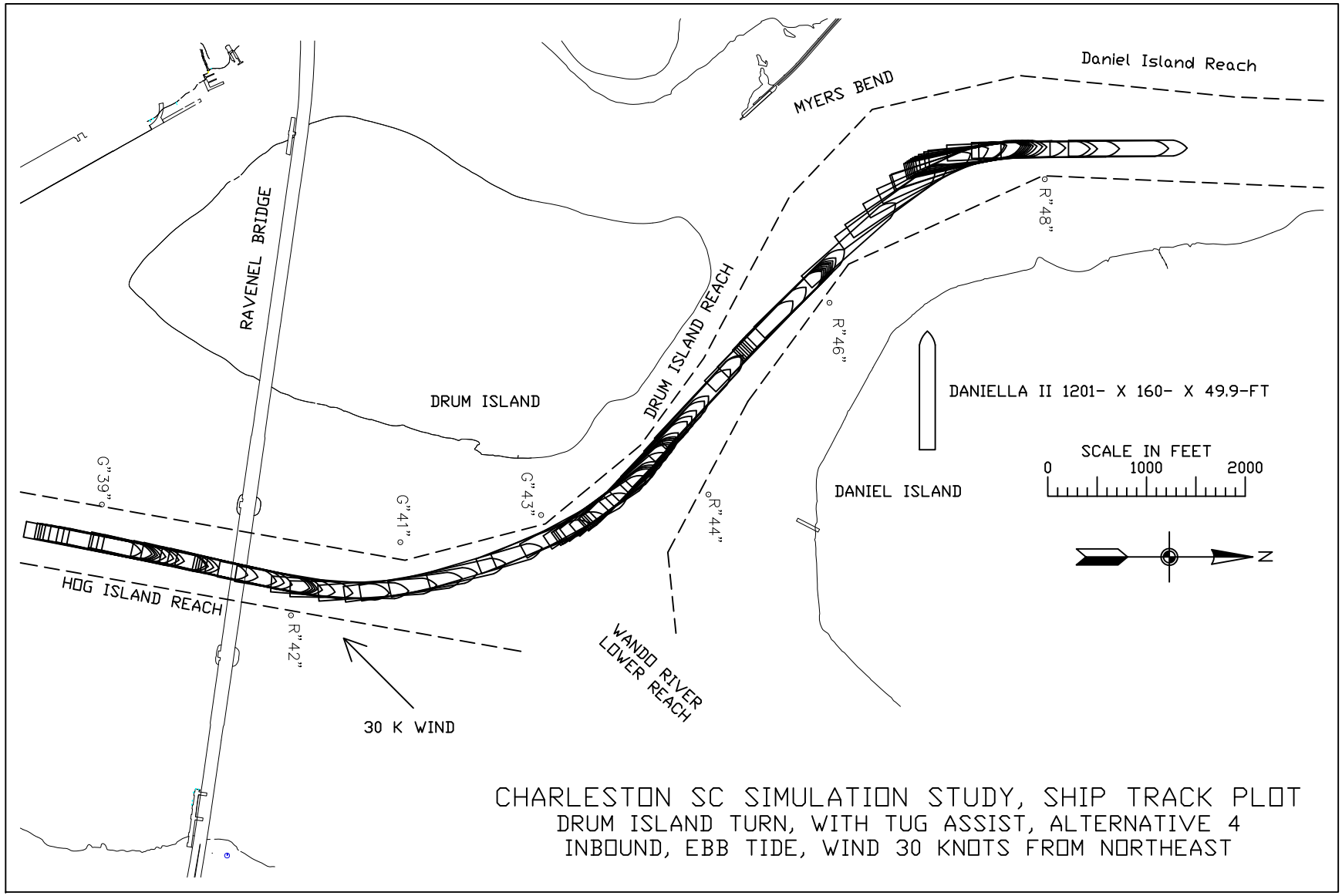
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST



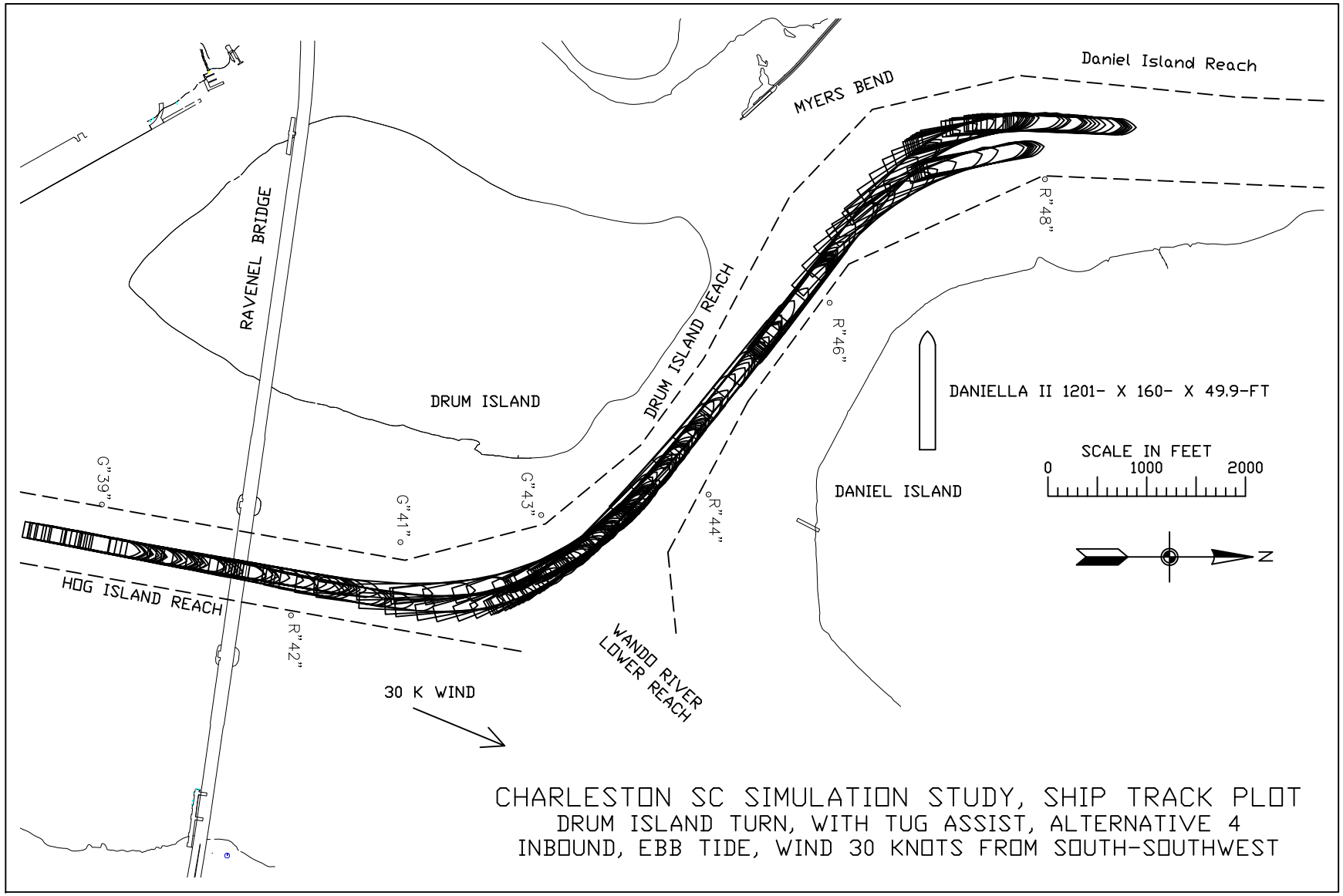
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 96

PLATE 97



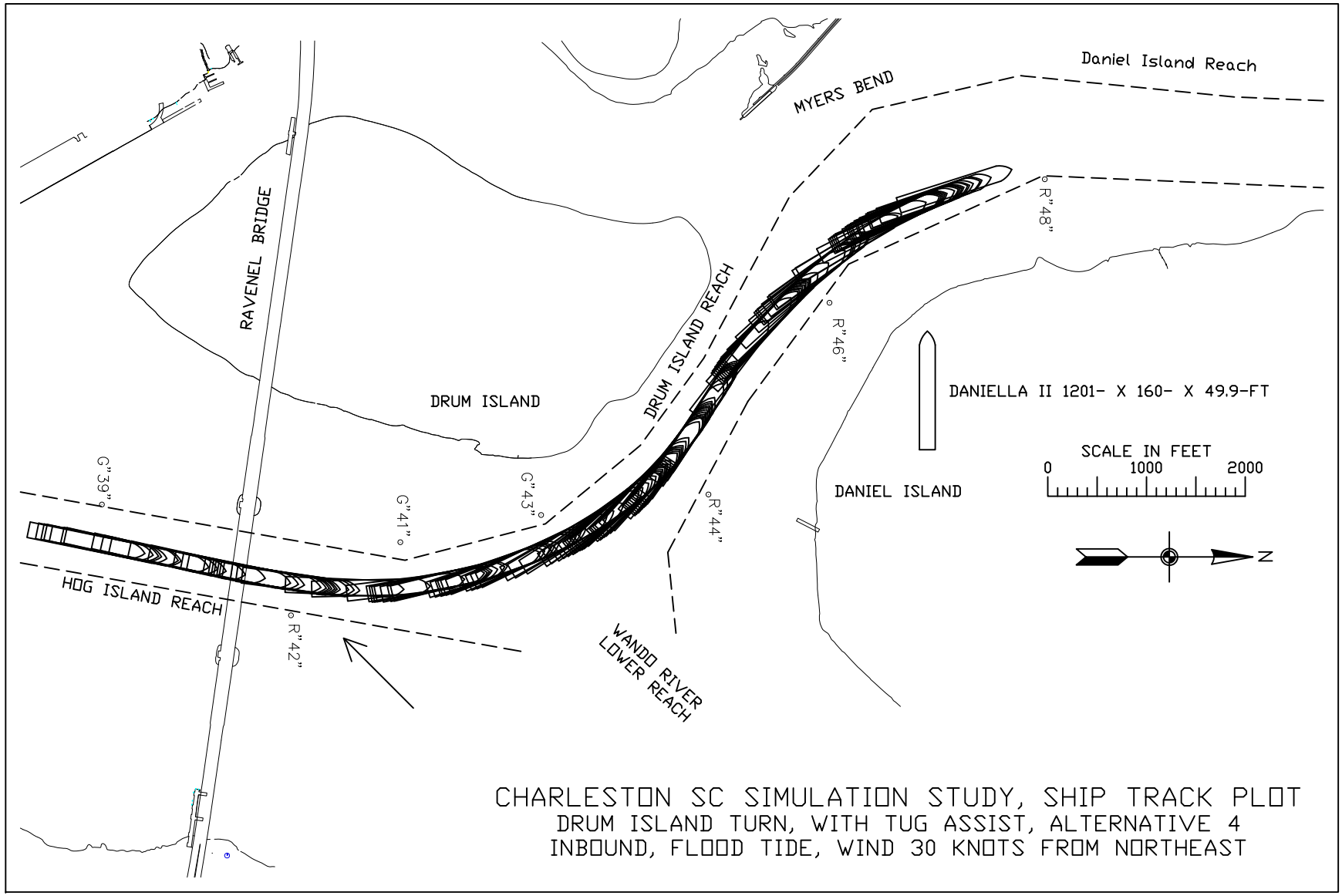
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 4
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST



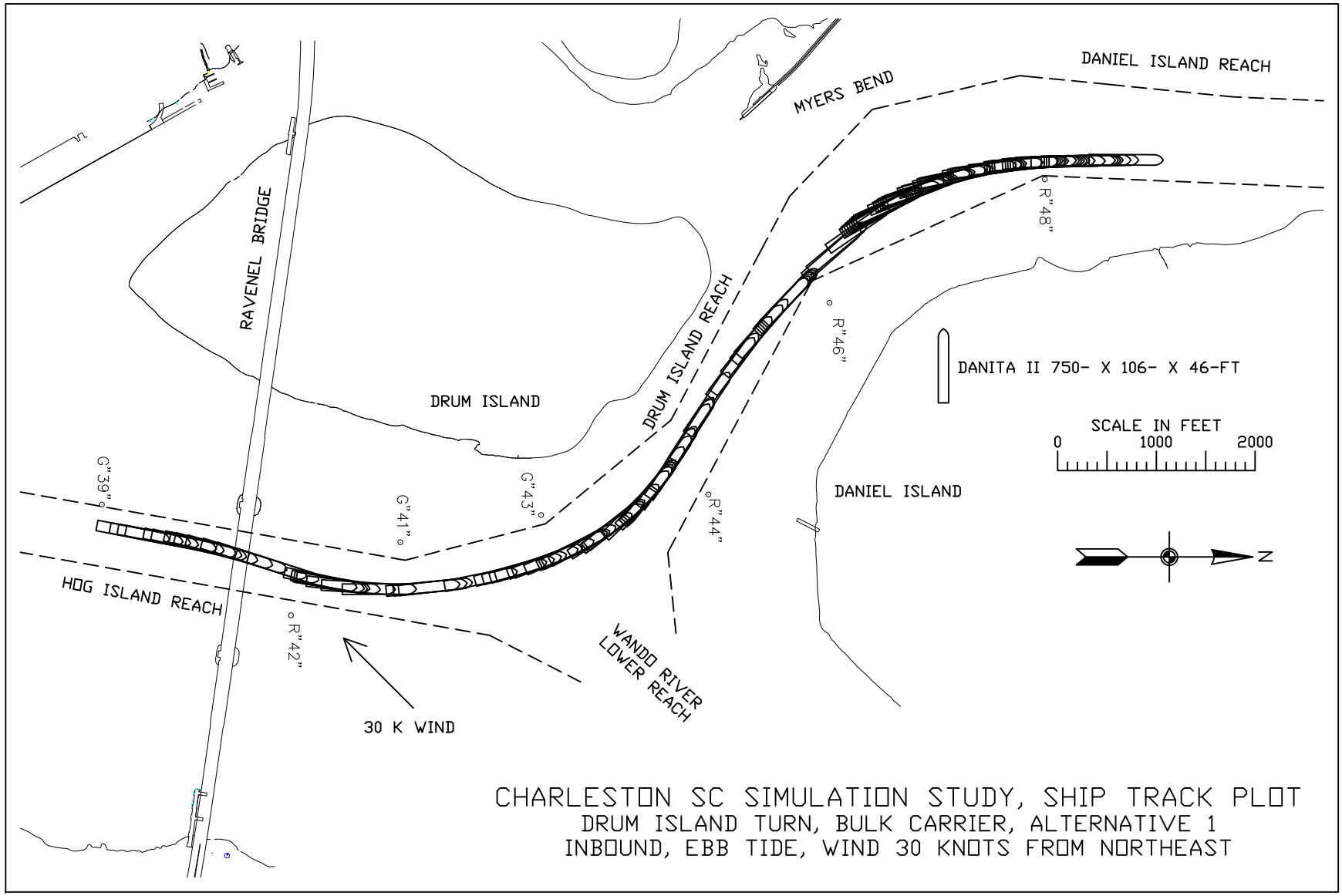
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 4
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 98

PLATE 99



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITH TUG ASSIST, ALTERNATIVE 4
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

DRUM ISLAND TURN, BULK CARRIER, ALTERNATIVE 1

INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 100

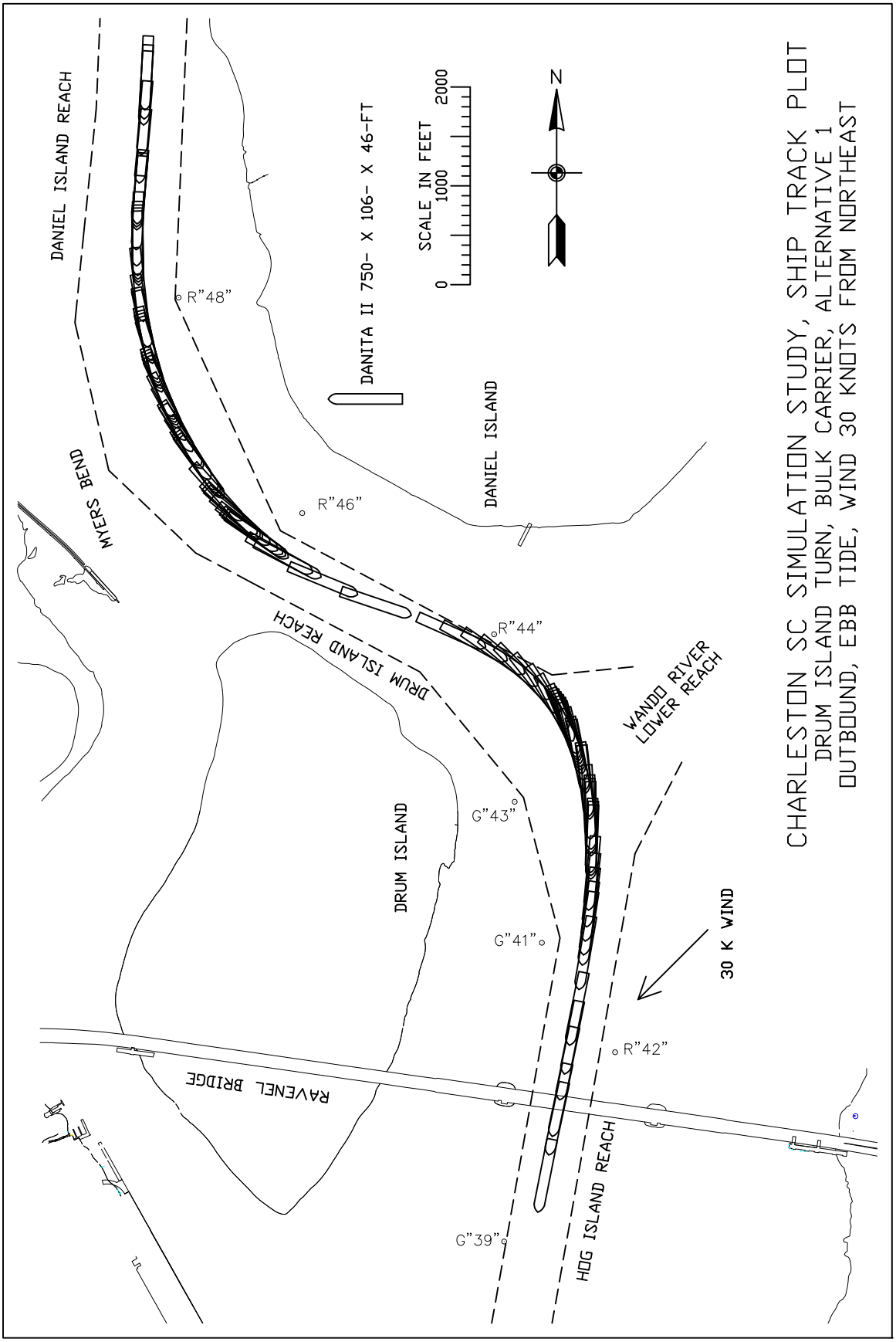
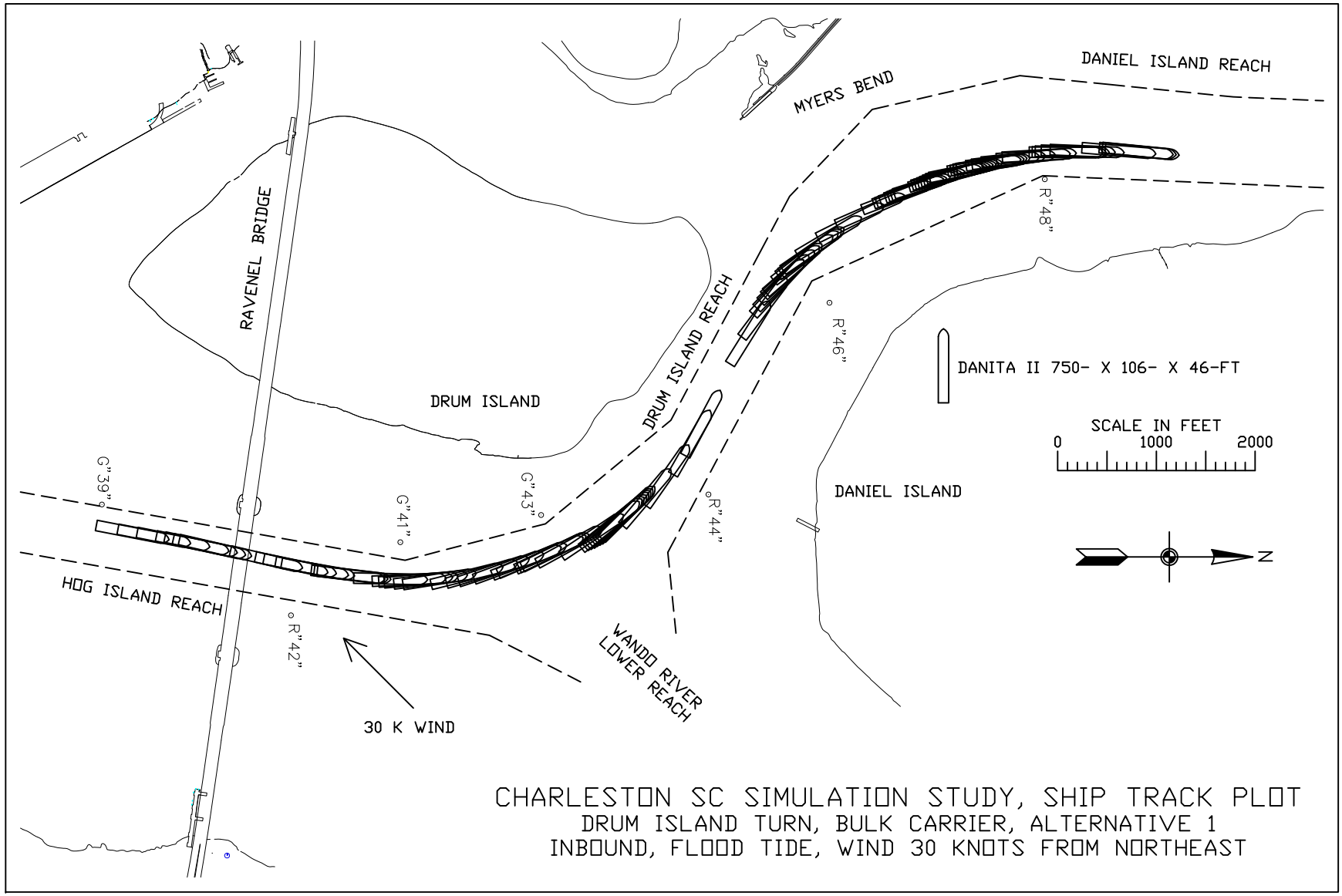

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, BULK CARRIER, ALTERNATIVE 1
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
DANIEL ISLAND REACH
MYERS BEND
DRUM ISLAND REACH
WANDO RIVER LOWER REACH
DRUM ISLAND
DANIEL ISLAND
HOG ISLAND REACH
RAVENEL BRIDGE
DANITA II 750- X 106- X 46-FT
SCALE IN FEET
0
1000
2000
N
30 K WIND
R"48"
R"46"
R"44"
G"43"
G"41"
R"42"
G"39"

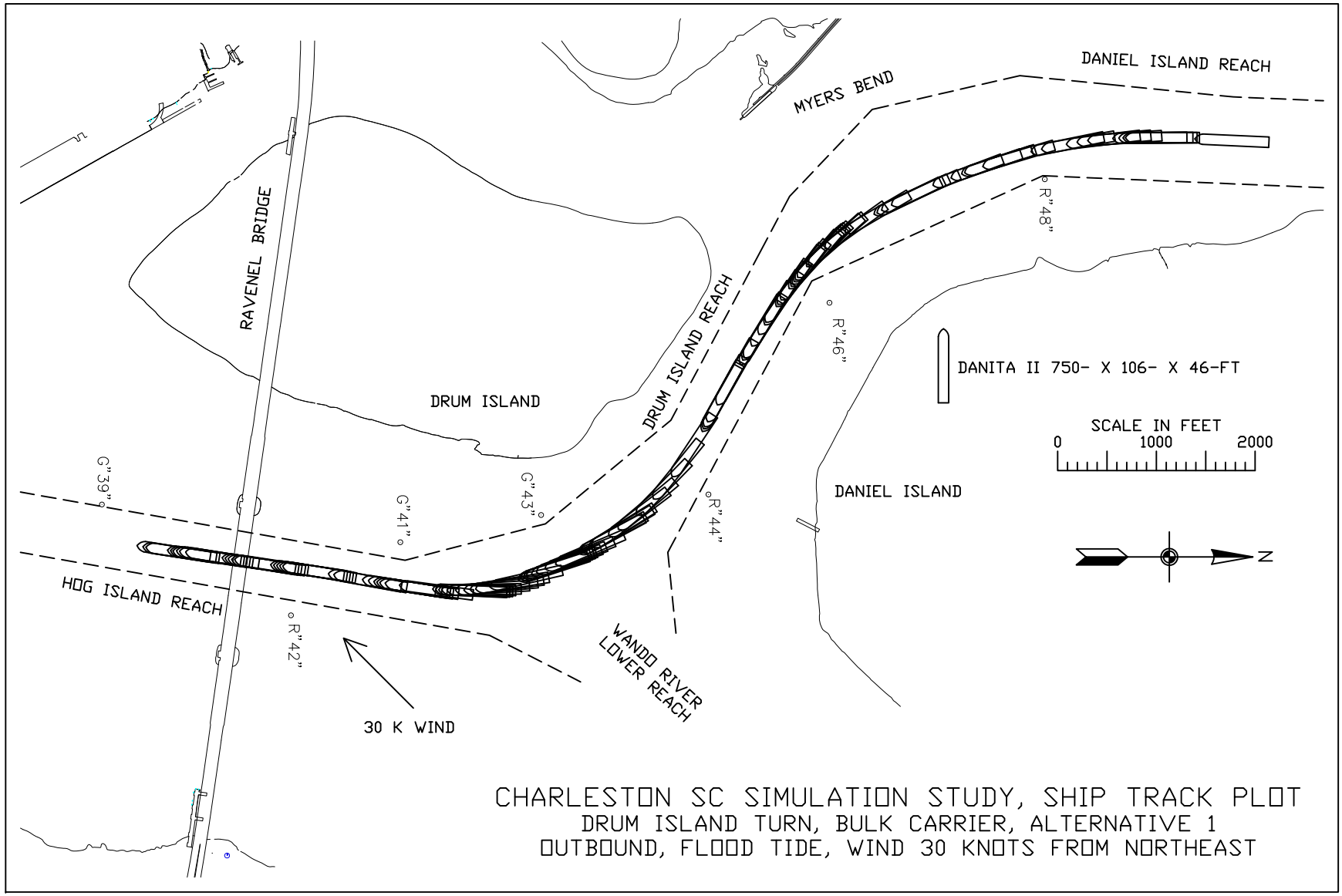
PLATE 101



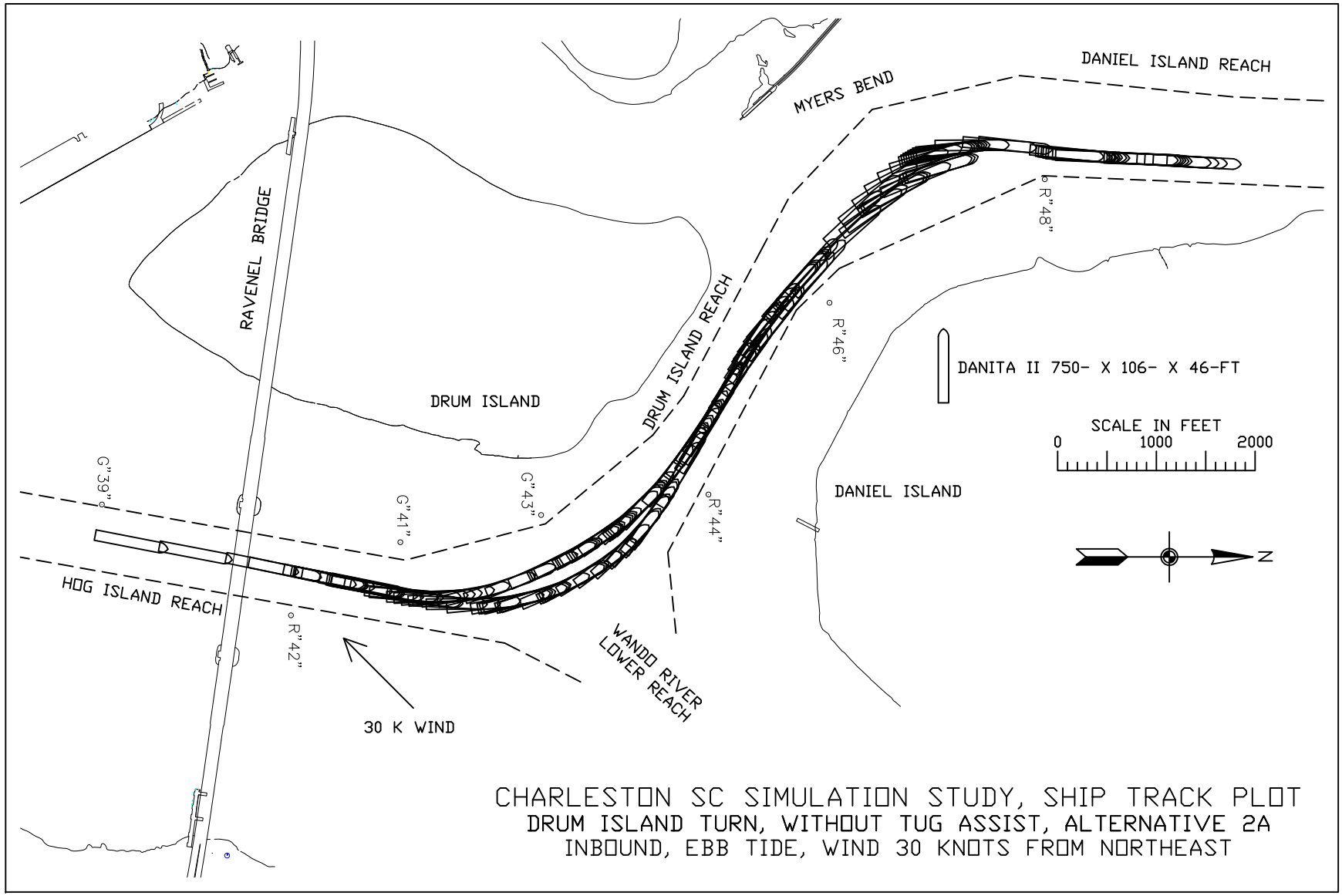
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, BULK CARRIER, ALTERNATIVE 1
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 102

PLATE 103



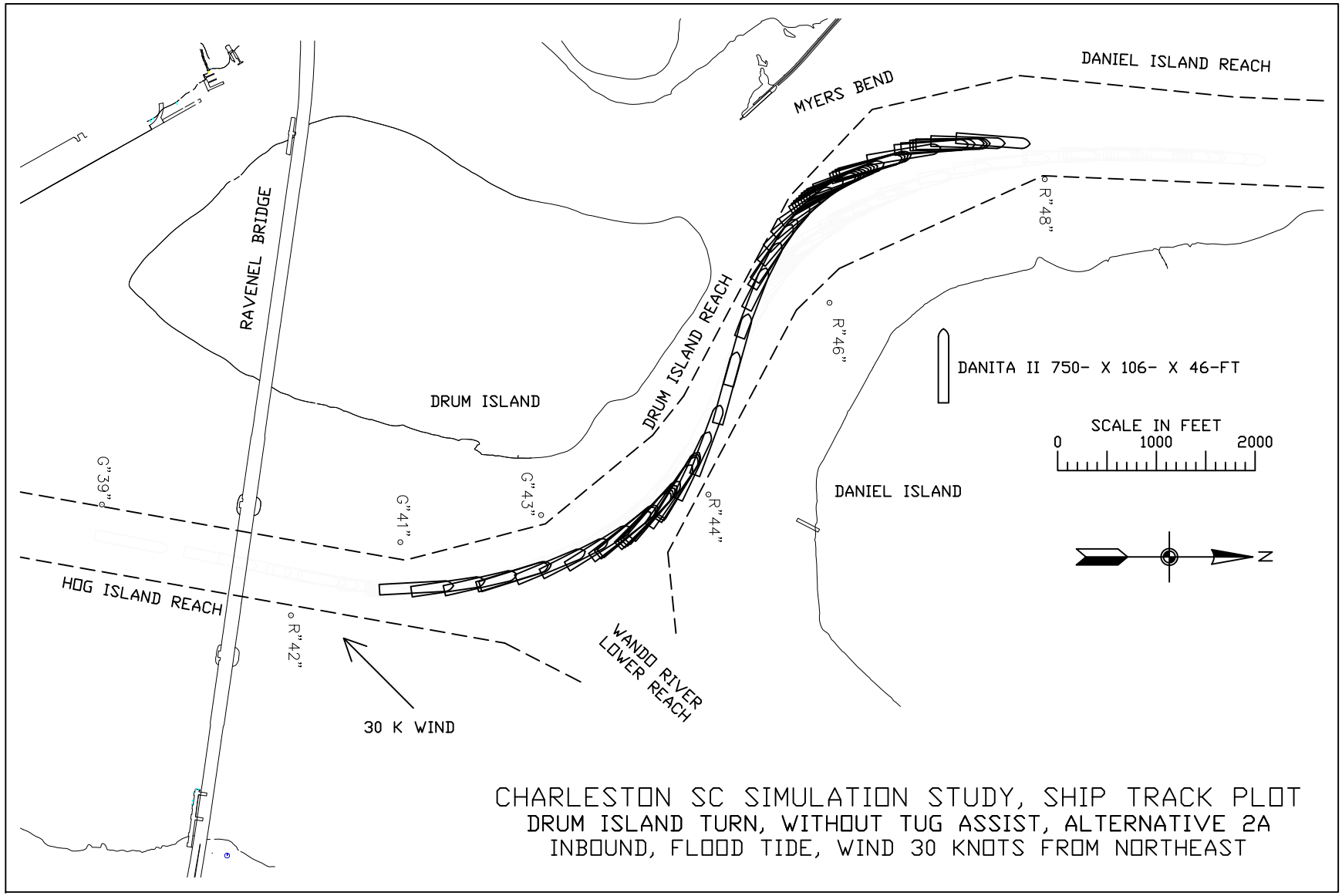
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, BULK CARRIER, ALTERNATIVE 1
OUTBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST



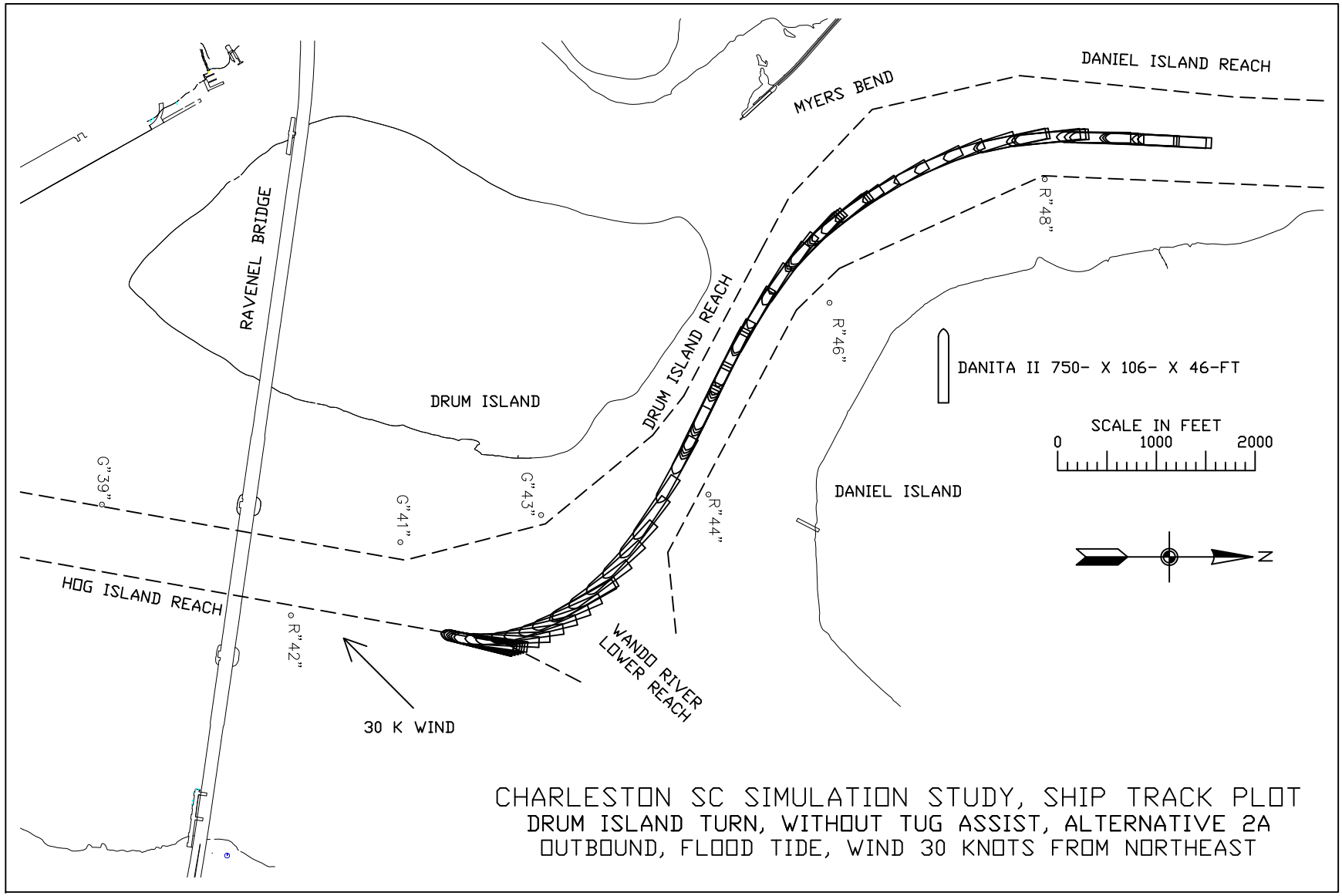
CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 2A
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 104

PLATE 105



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 2A
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
DRUM ISLAND TURN, WITHOUT TUG ASSIST, ALTERNATIVE 2A
OUTBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 106

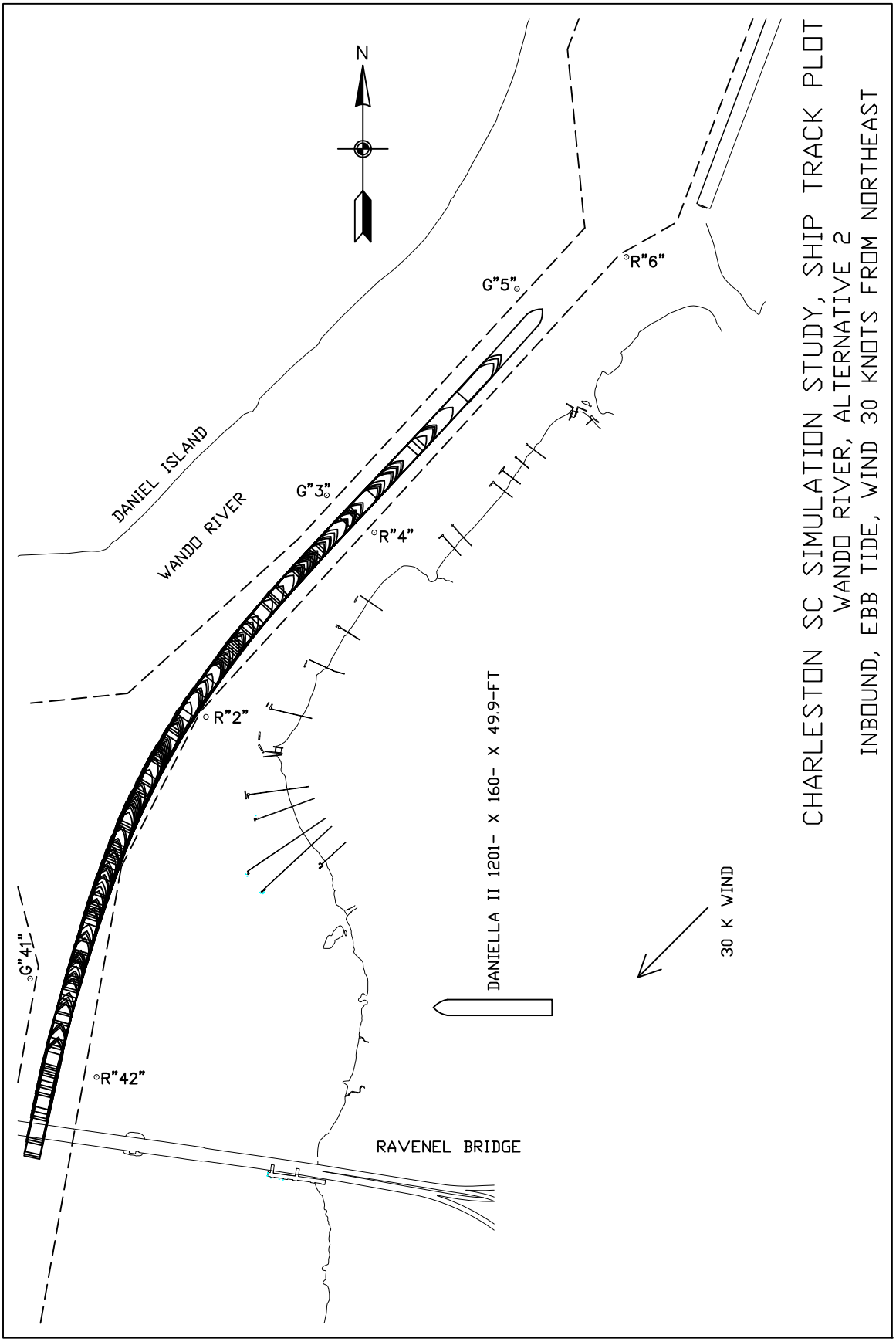
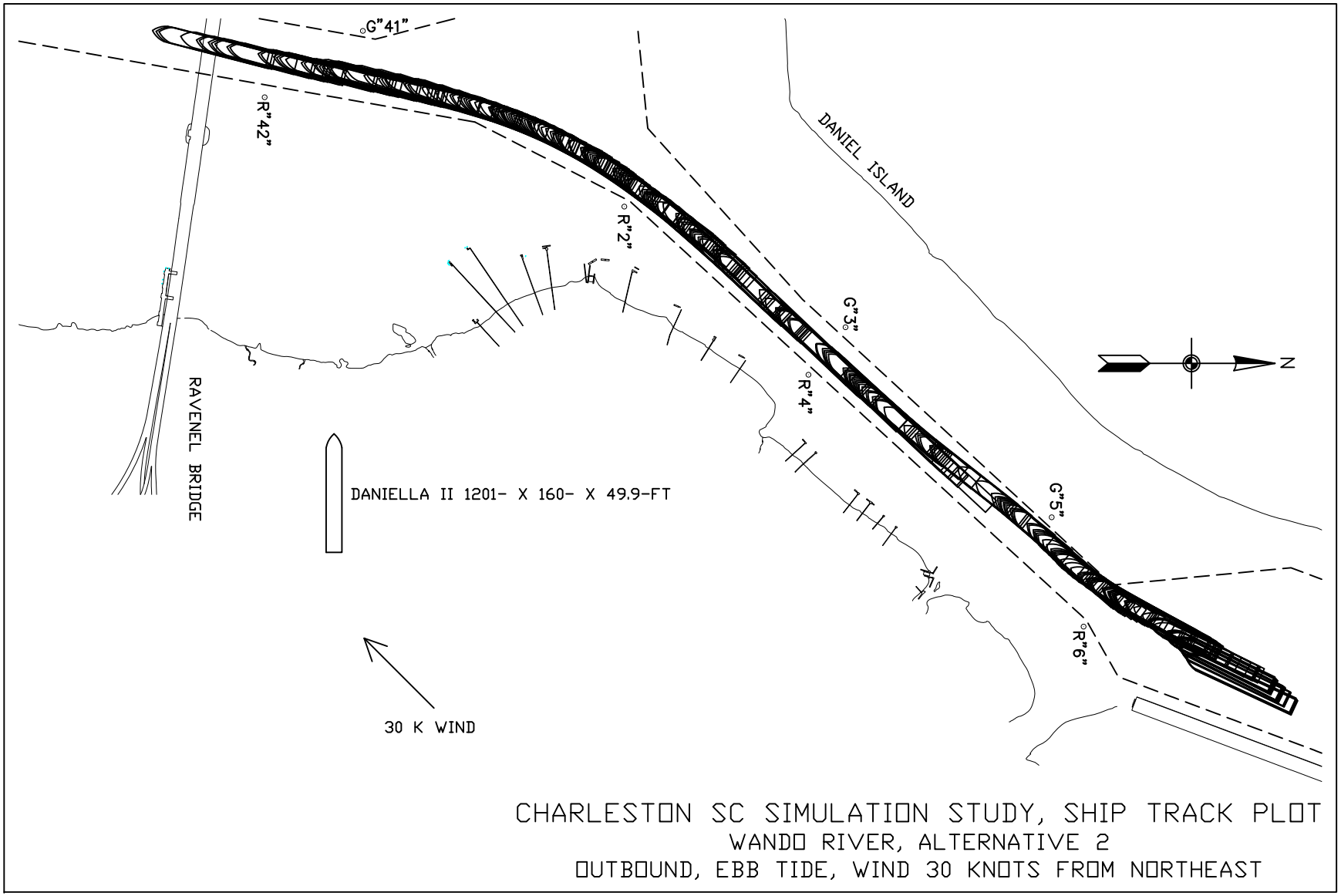

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
N
DANIEL ISLAND
WANDO RIVER
G"3"
G"5"
R"6"
R"4"
R"2"
G"41"
R"42"
RAVENEL BRIDGE
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND

PLATE 107



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 108

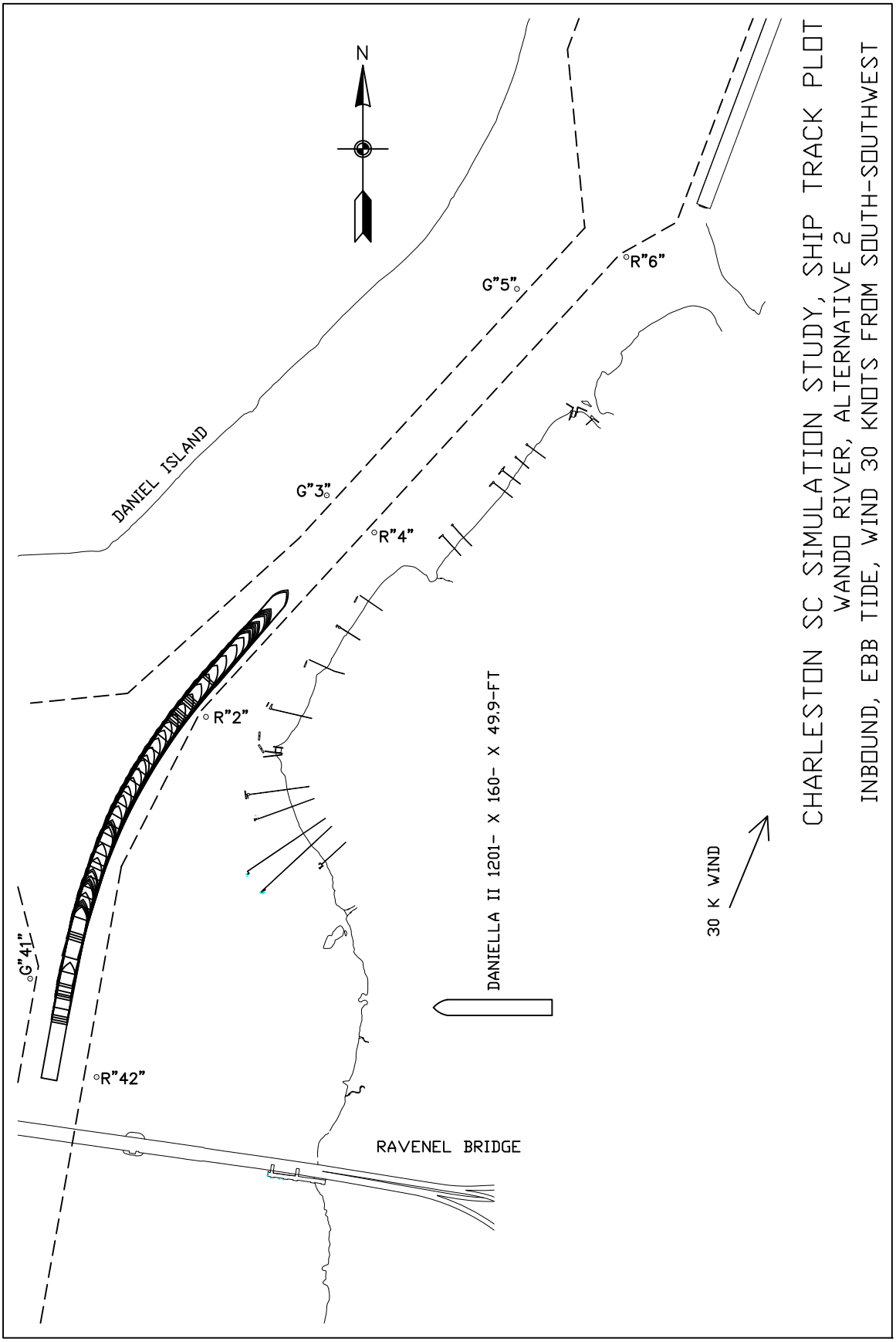
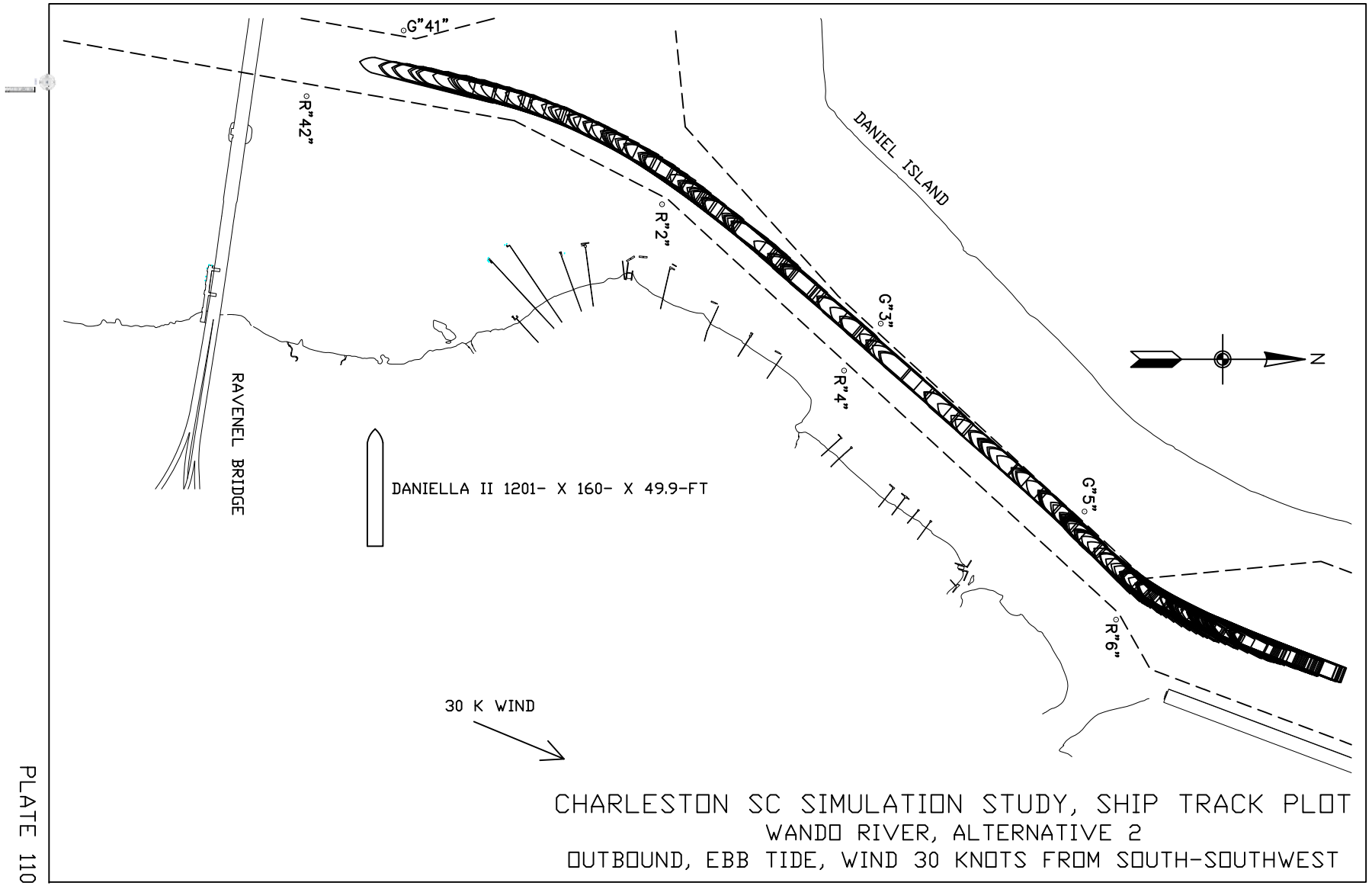

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
RAVENEL BRIDGE
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND

PLATE 109



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 110

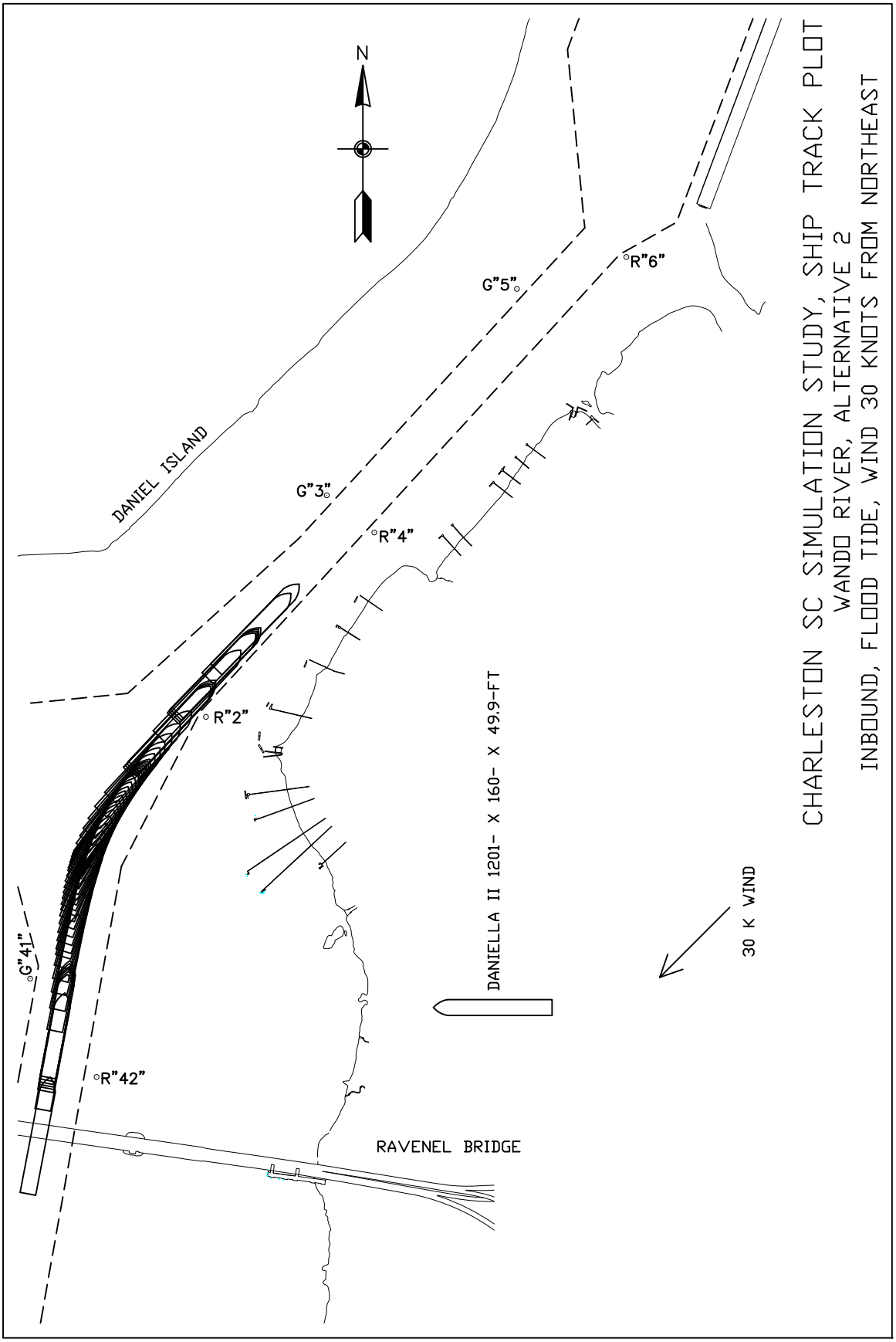
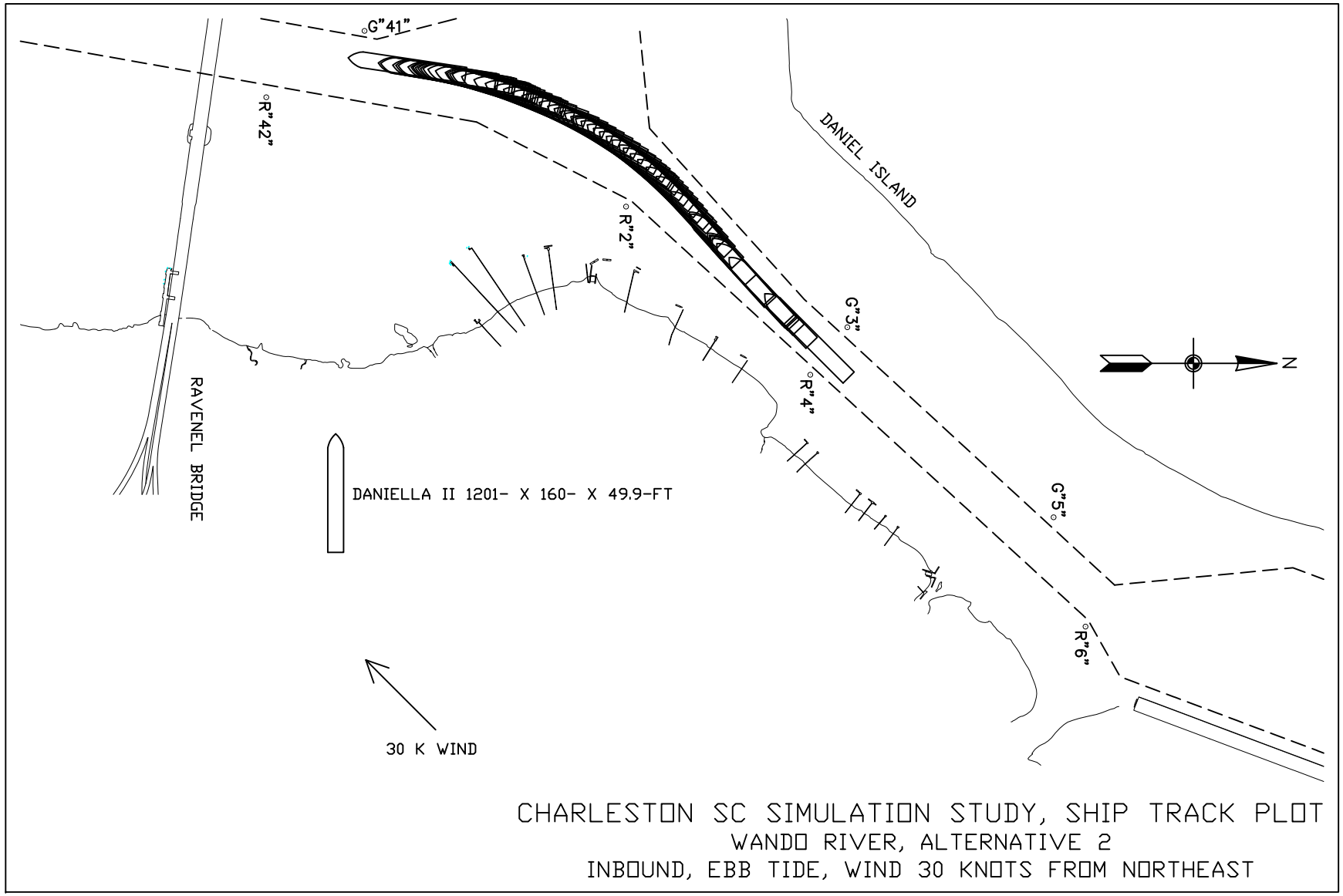

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND
RAVENEL BRIDGE

PLATE 111



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 112

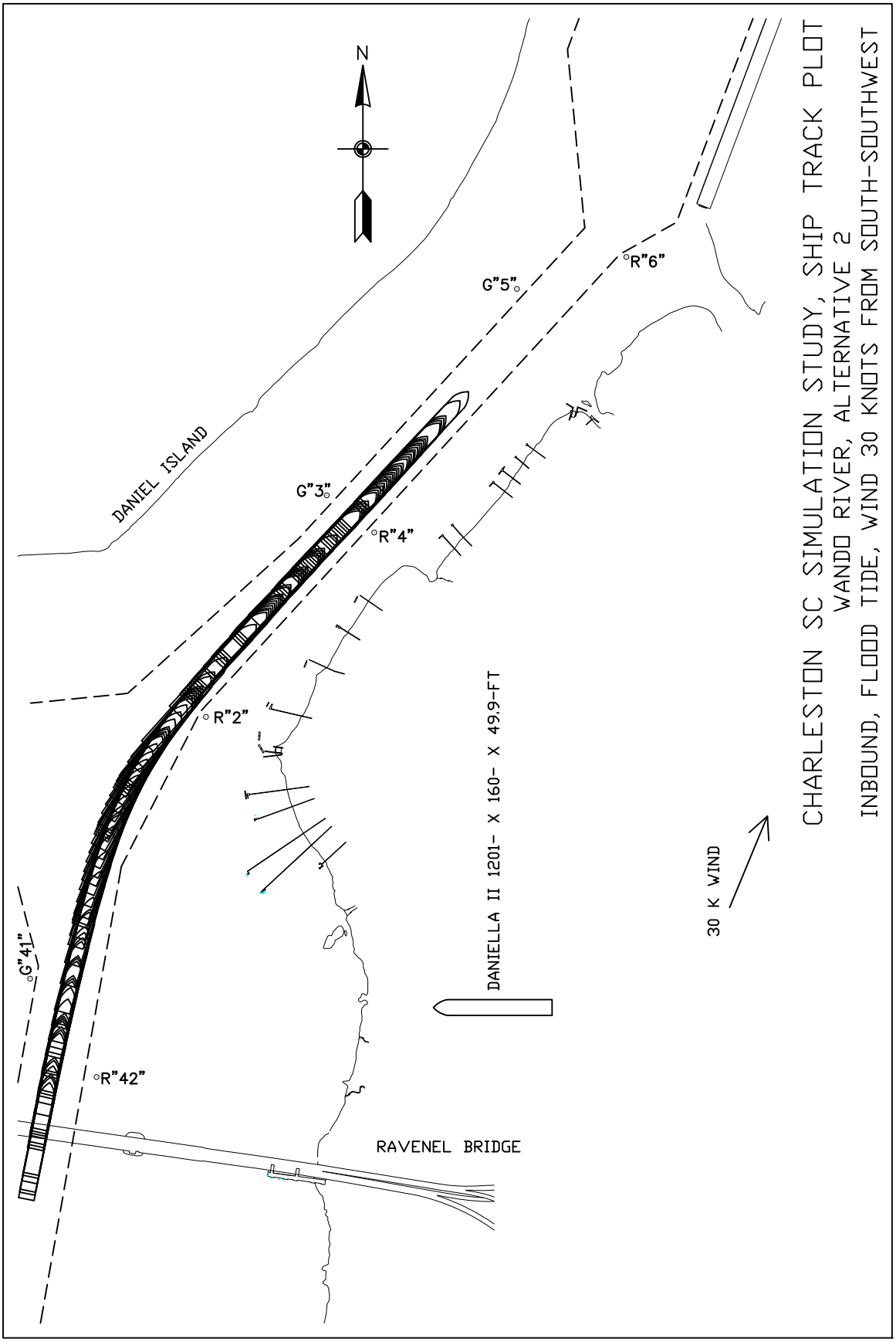
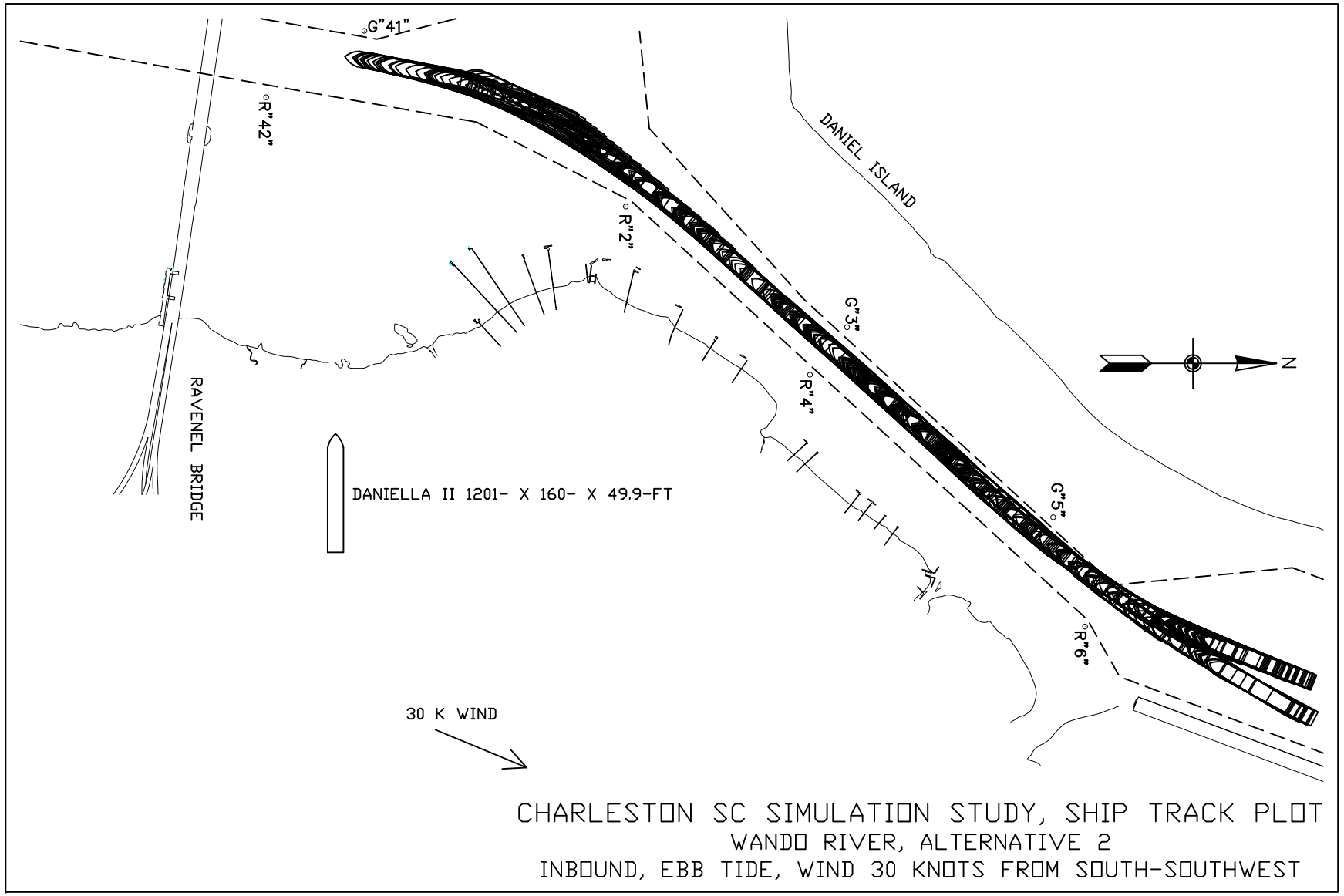

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
RAVENEL BRIDGE
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND

PLATE 113



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 2
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 114

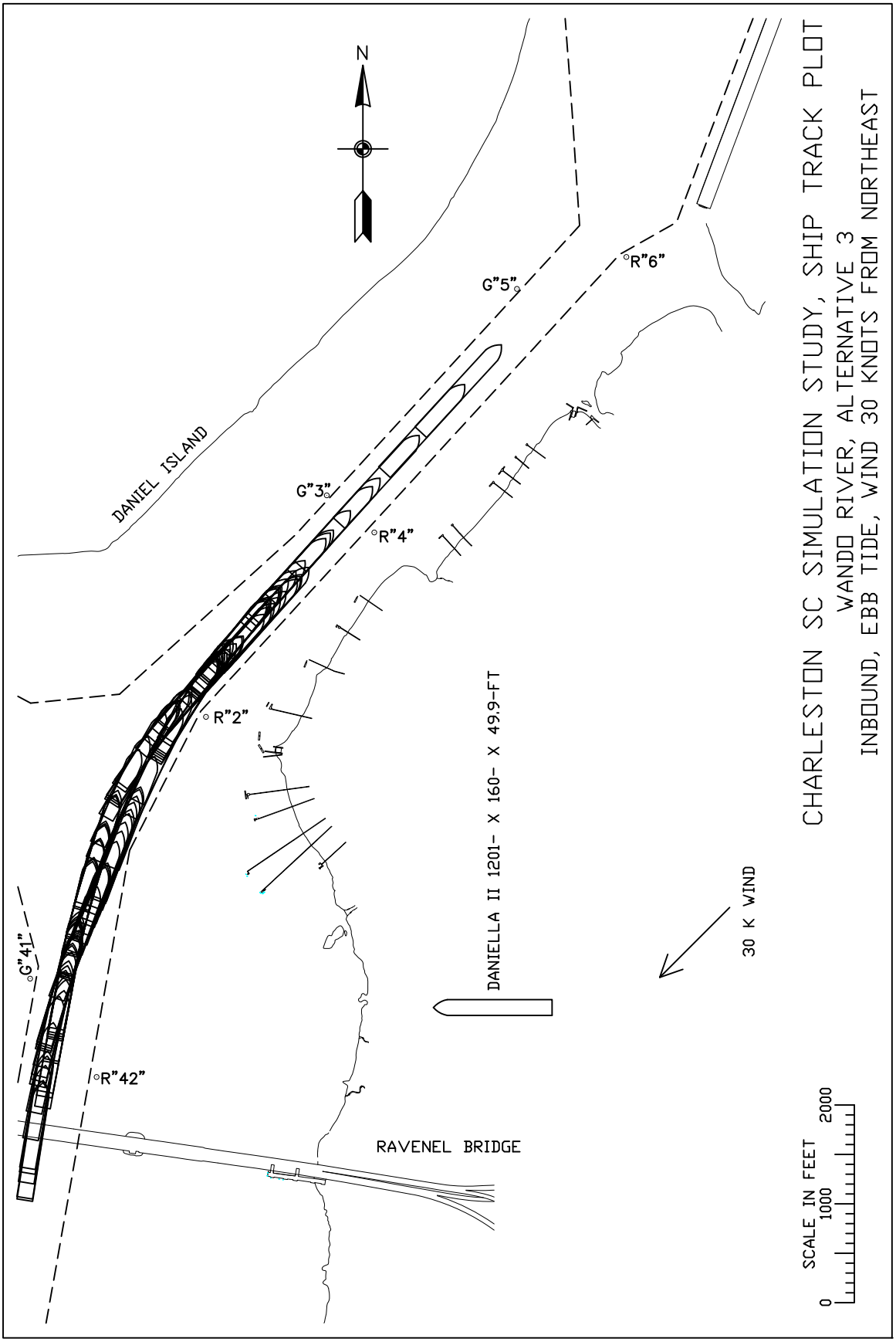
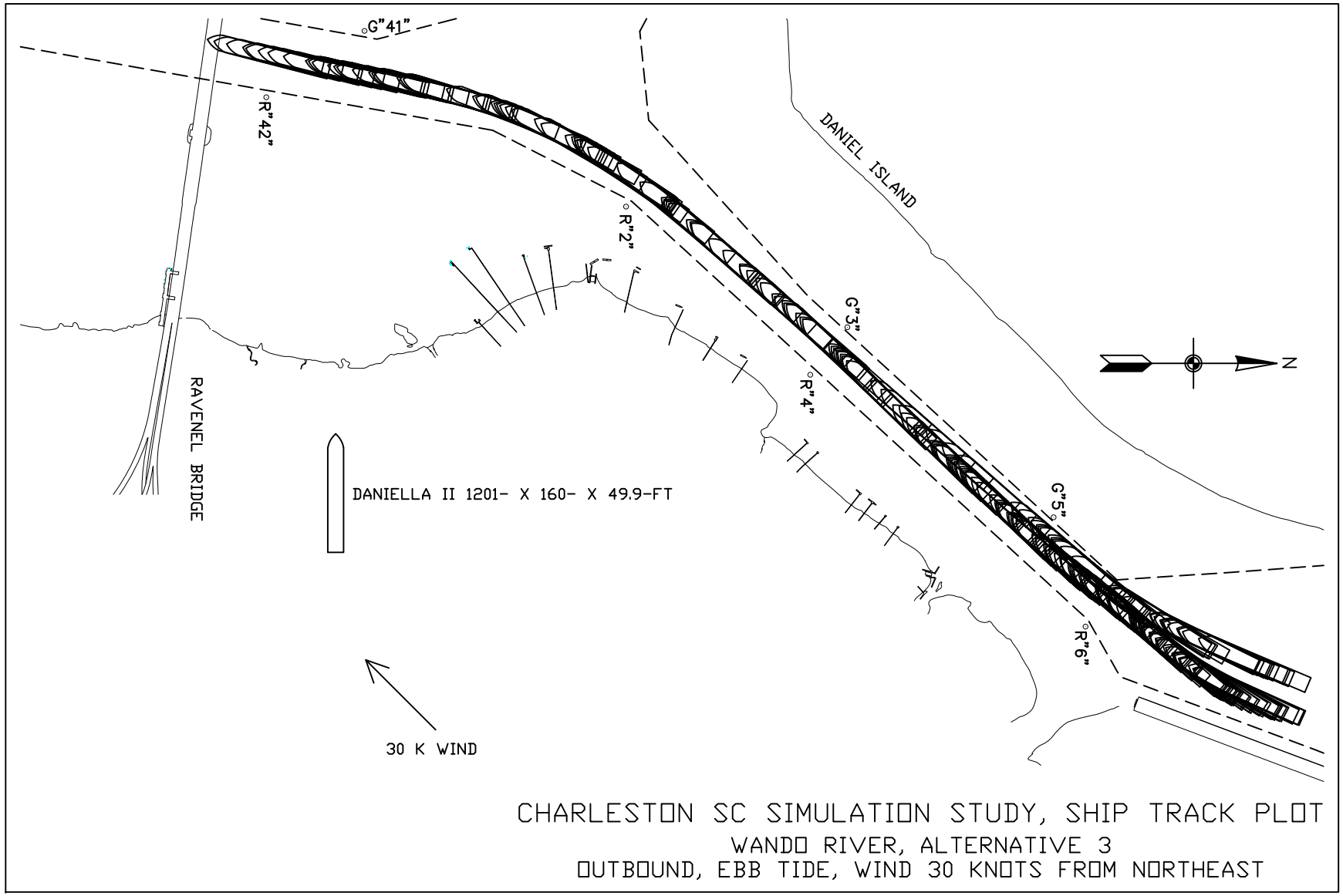

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND
RAVENEL BRIDGE
SCALE IN FEET
0
1000
2000

PLATE 115



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 116

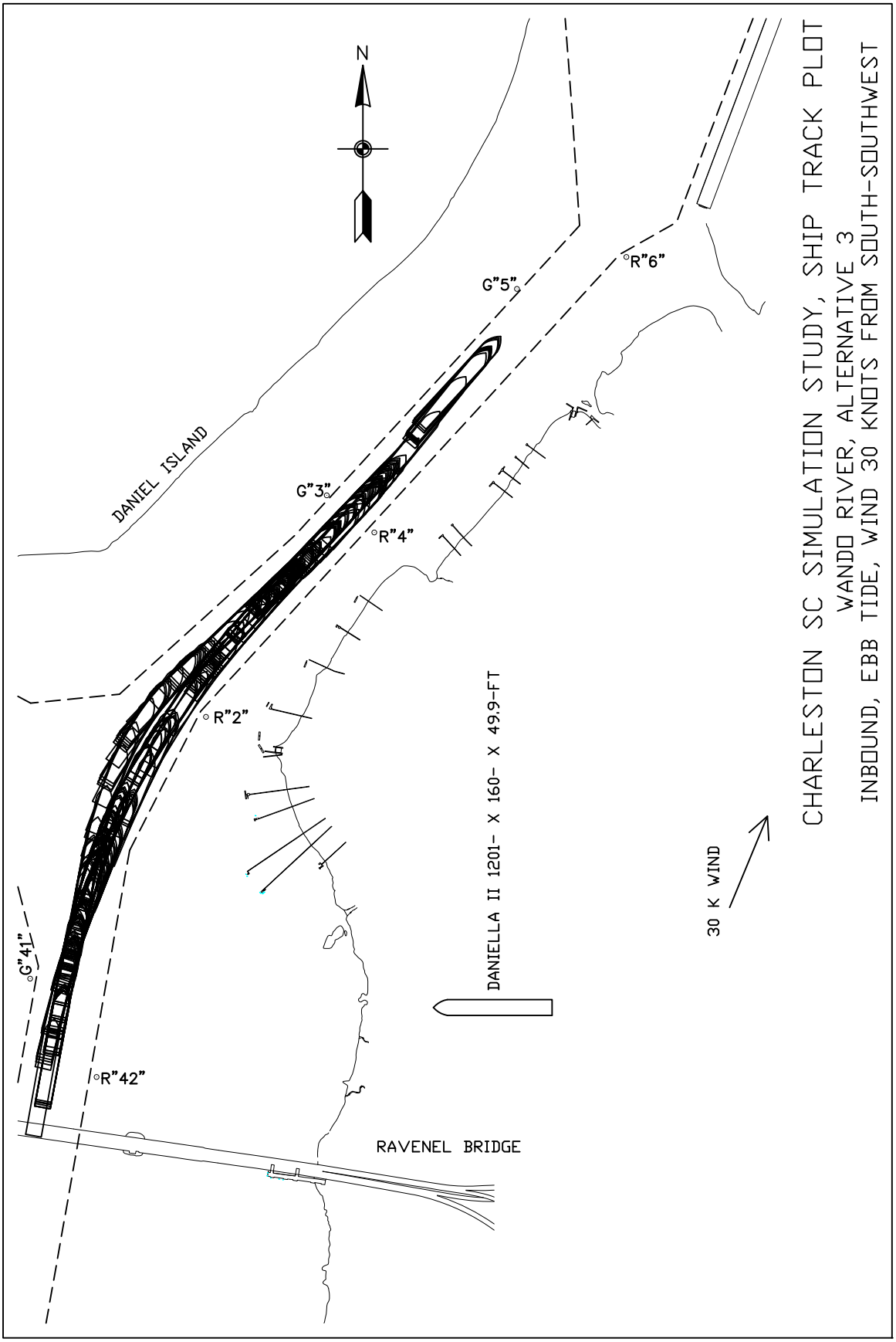
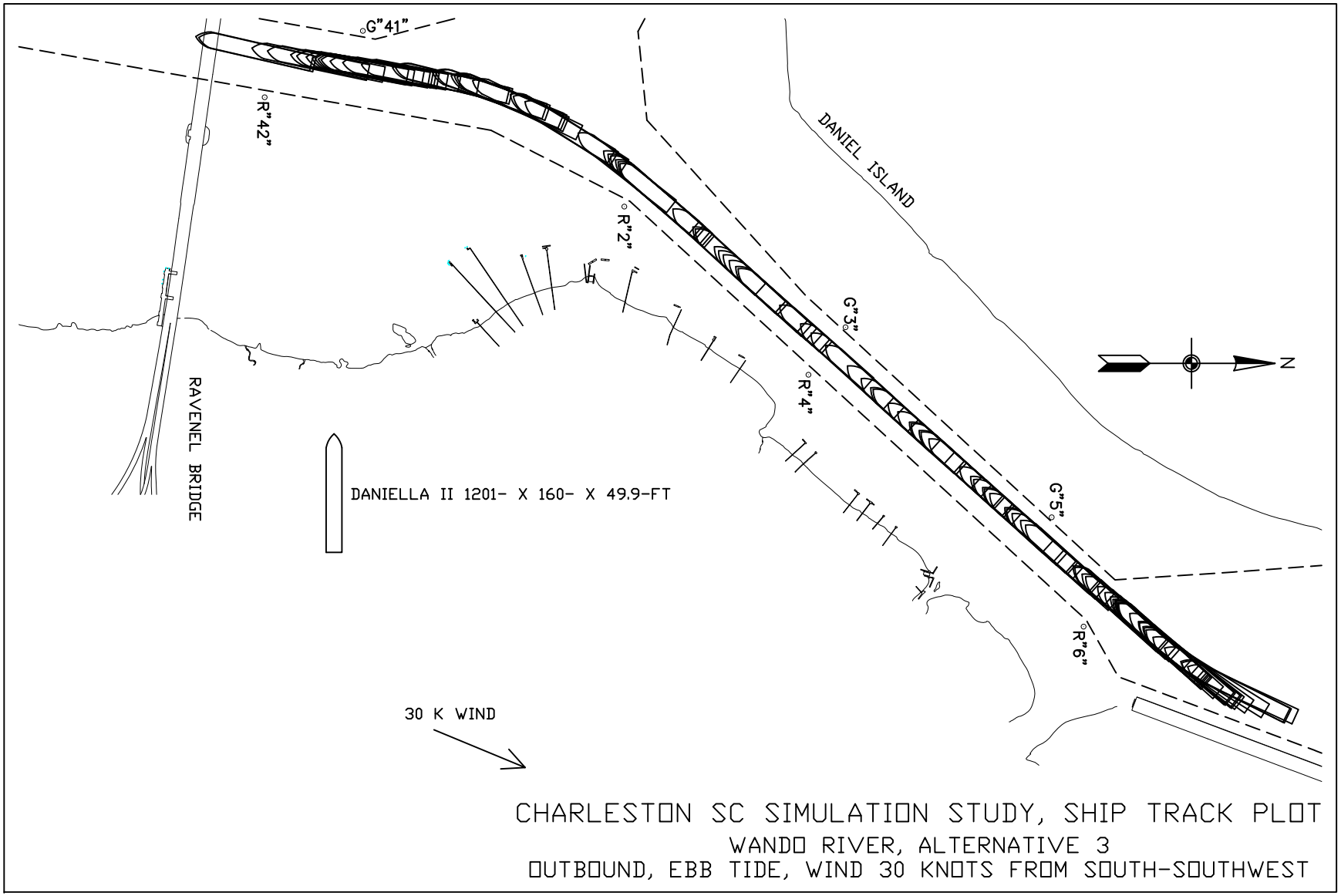

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND
RAVENEL BRIDGE

PLATE 117



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 118

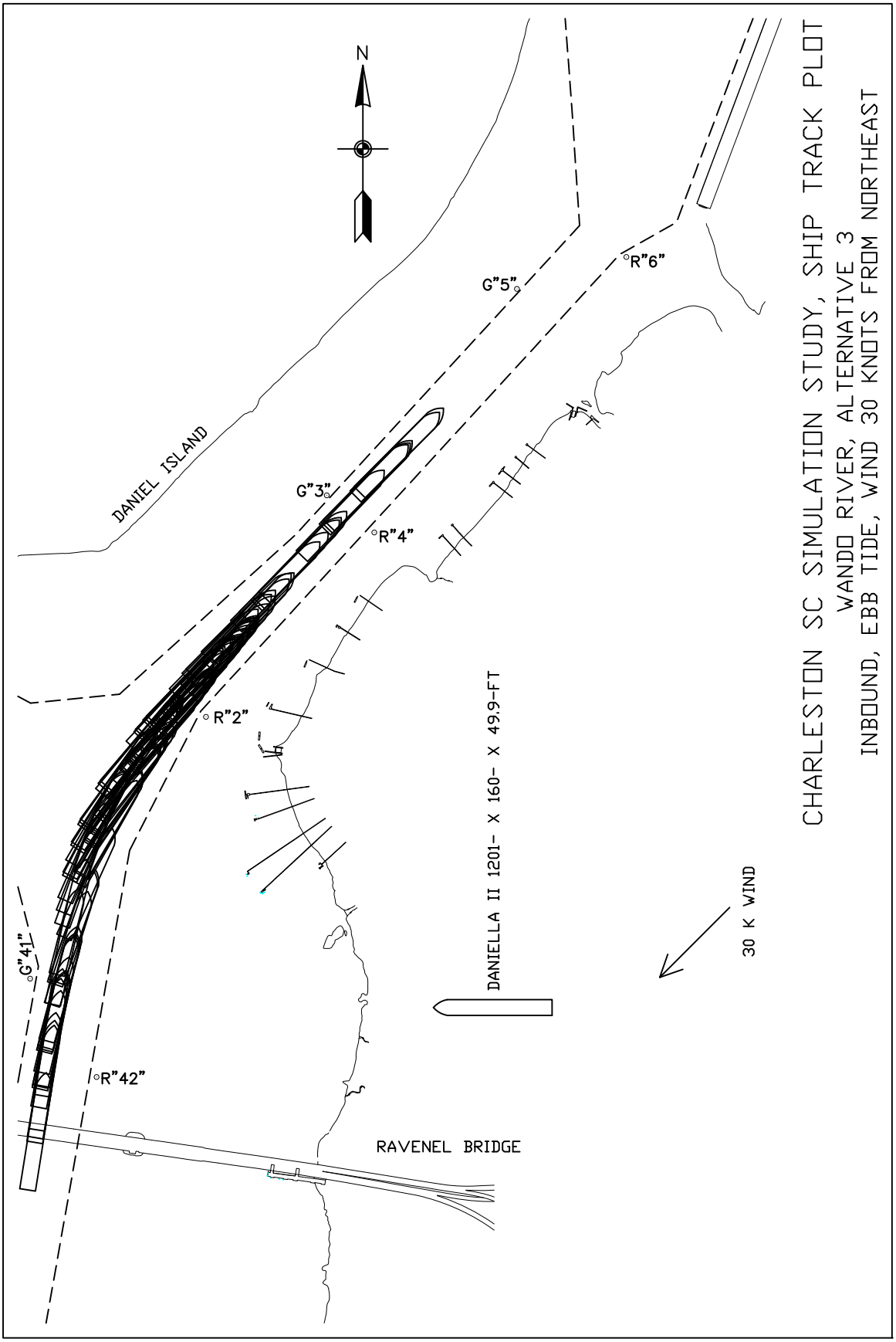
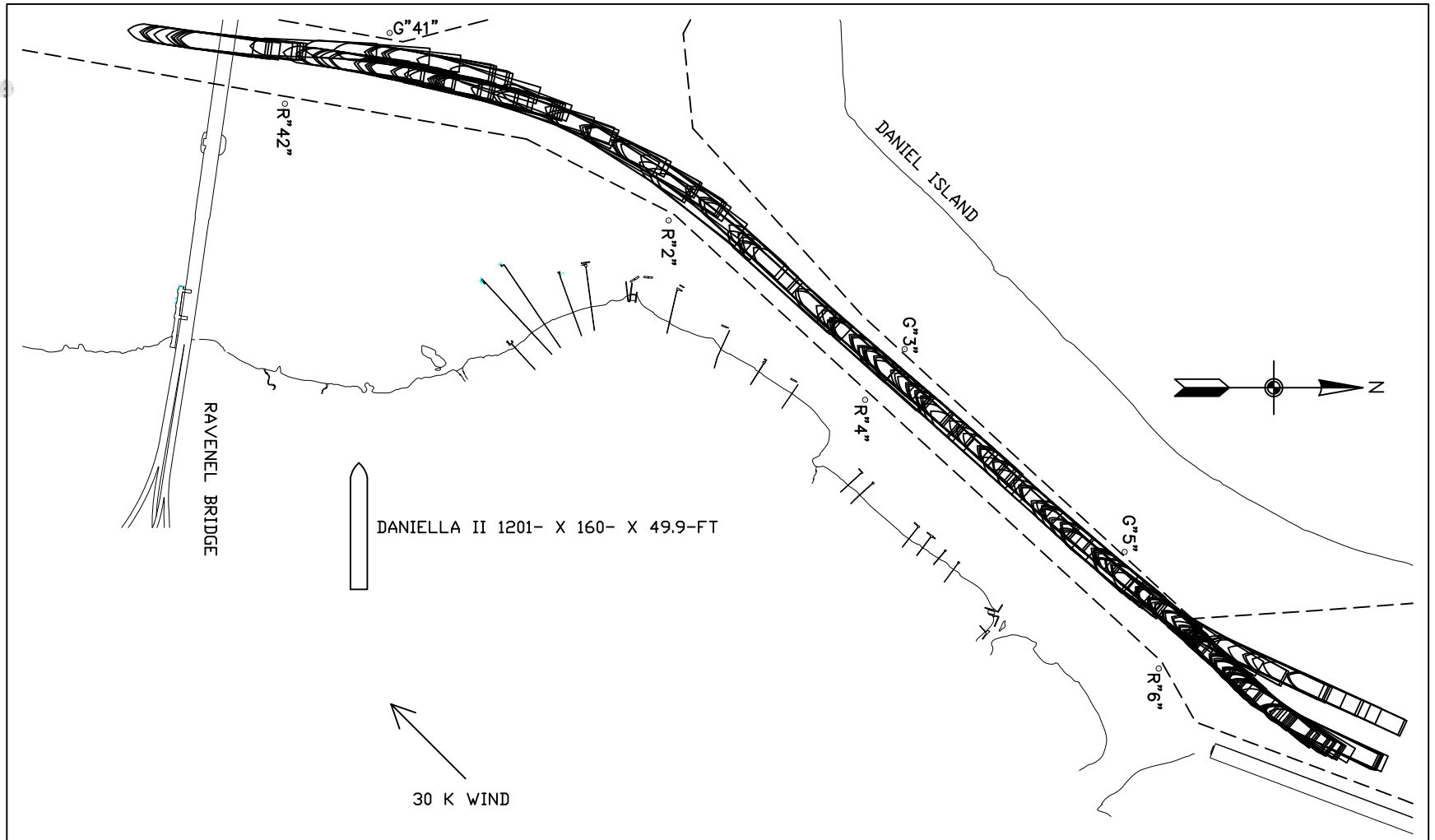

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
DANIELLA II 1201- X 160- X 49.9-FT
30 K WIND
RAVENEL BRIDGE

PLATE 119



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT

WANDO RIVER, ALTERNATIVE 3

OUTBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 120

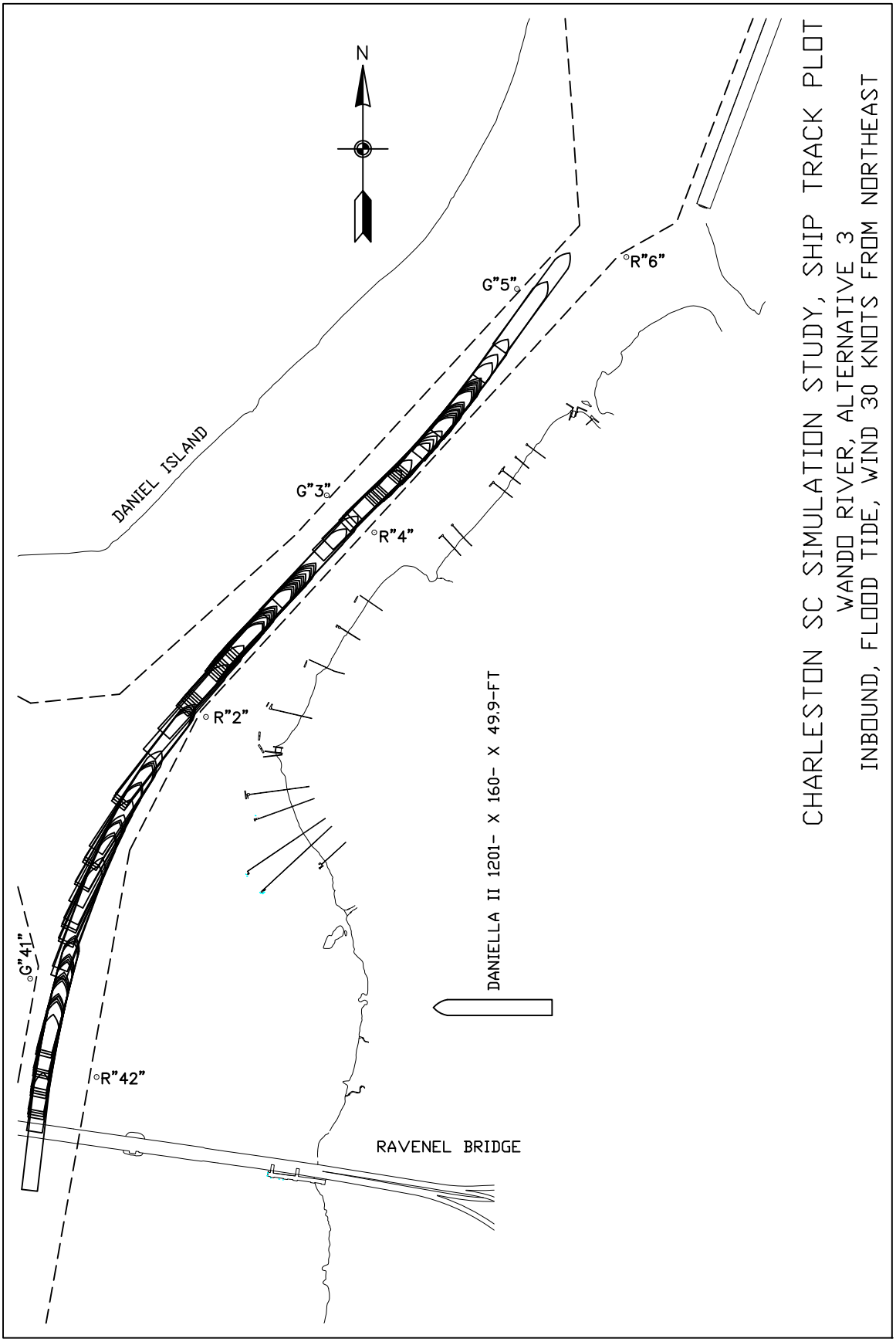
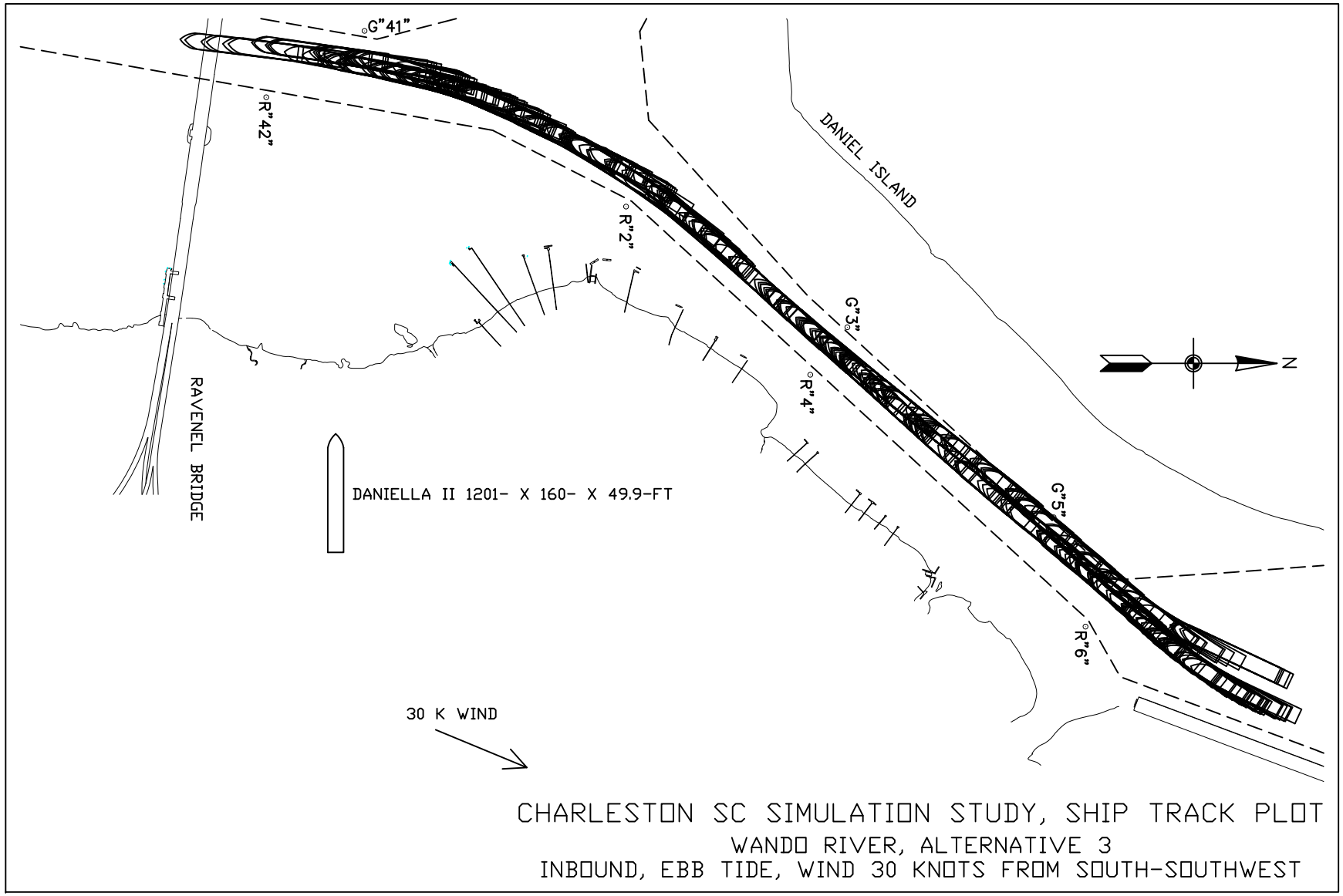

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
N
DANIEL ISLAND
G"5"
R"6"
G"3"
R"4"
R"2"
G"41"
R"42"
DANIELLA II 1201- X 160- X 49.9-FT
RAVENEL BRIDGE

PLATE 121



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
WANDO RIVER, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 122

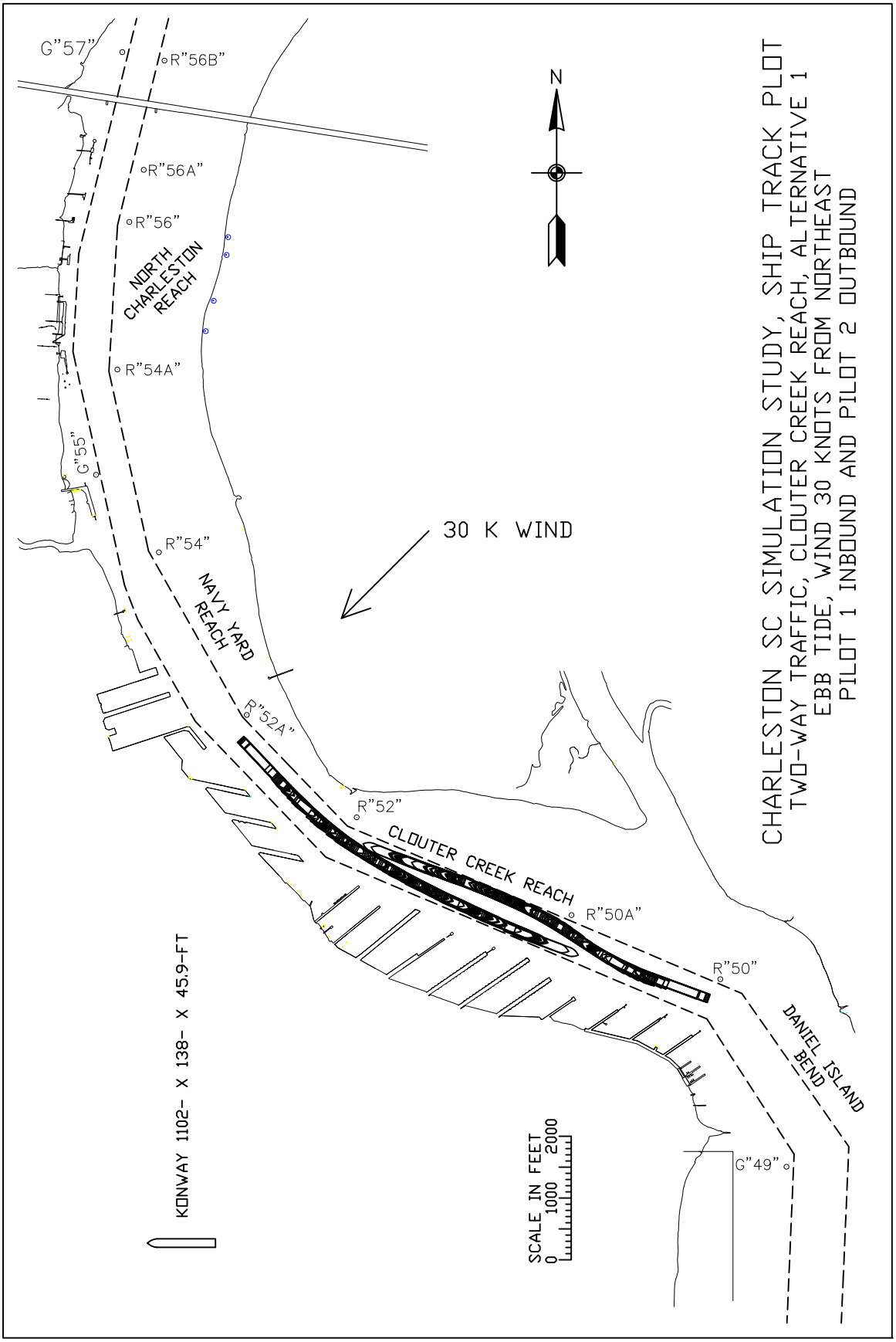

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 123

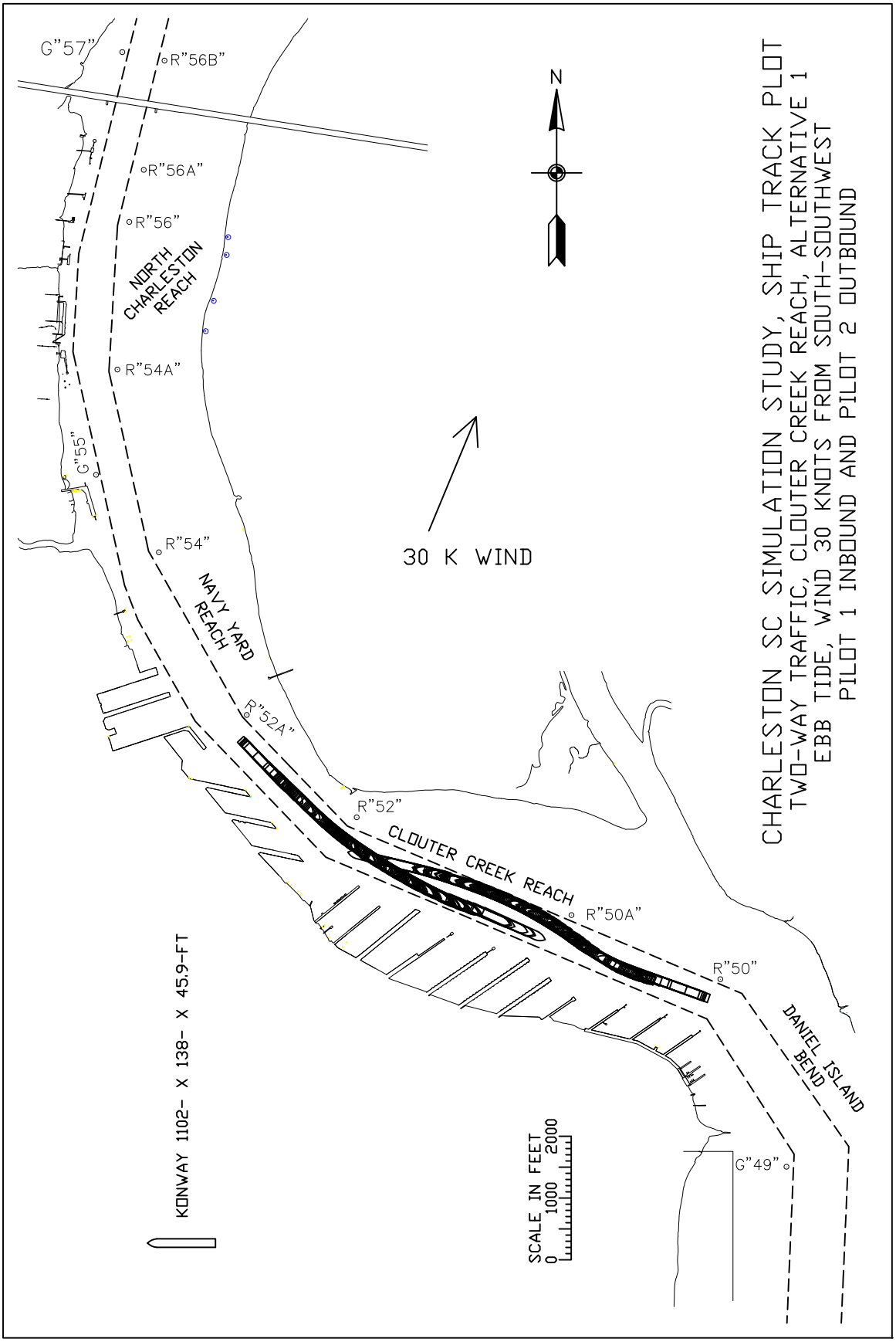

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 124

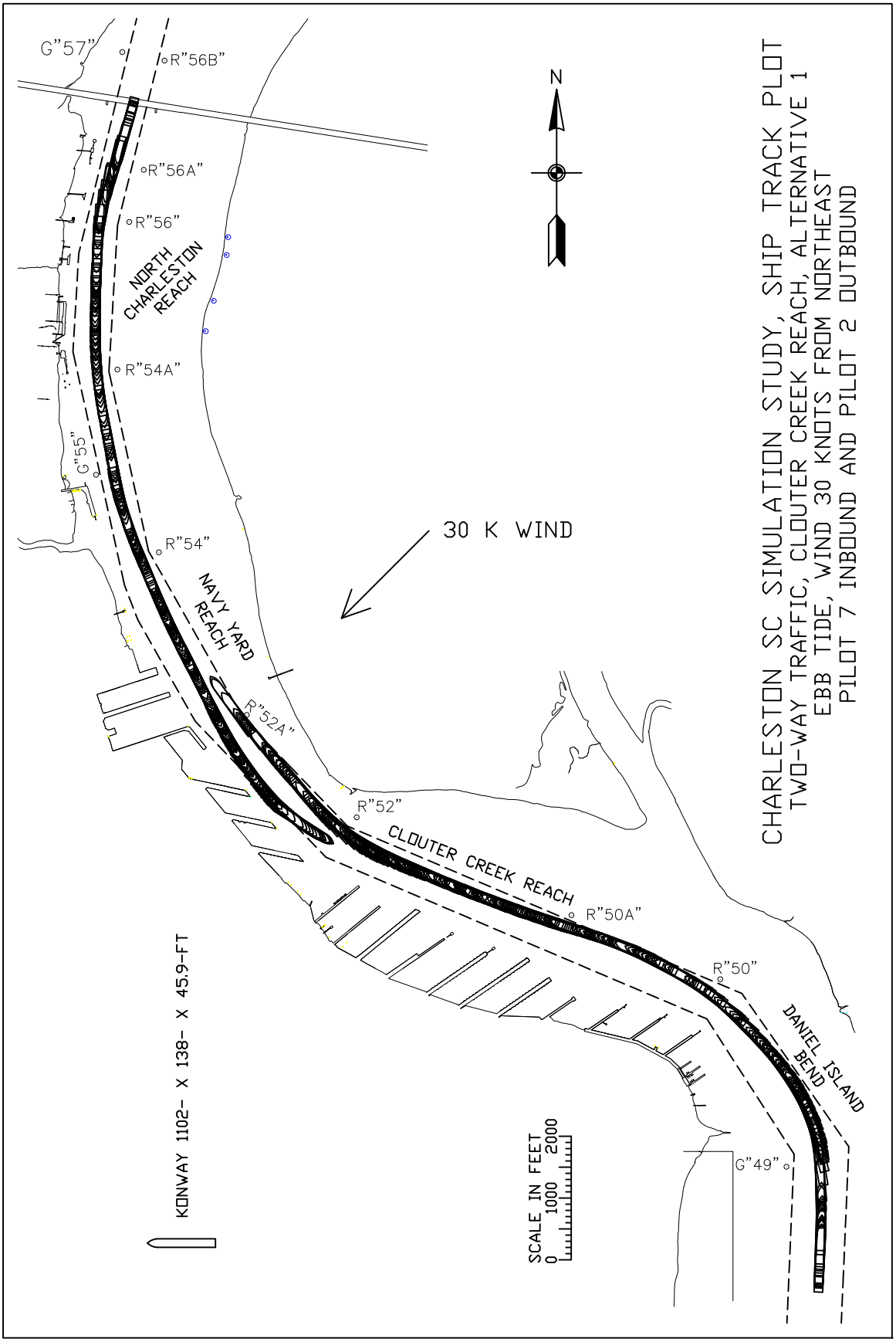
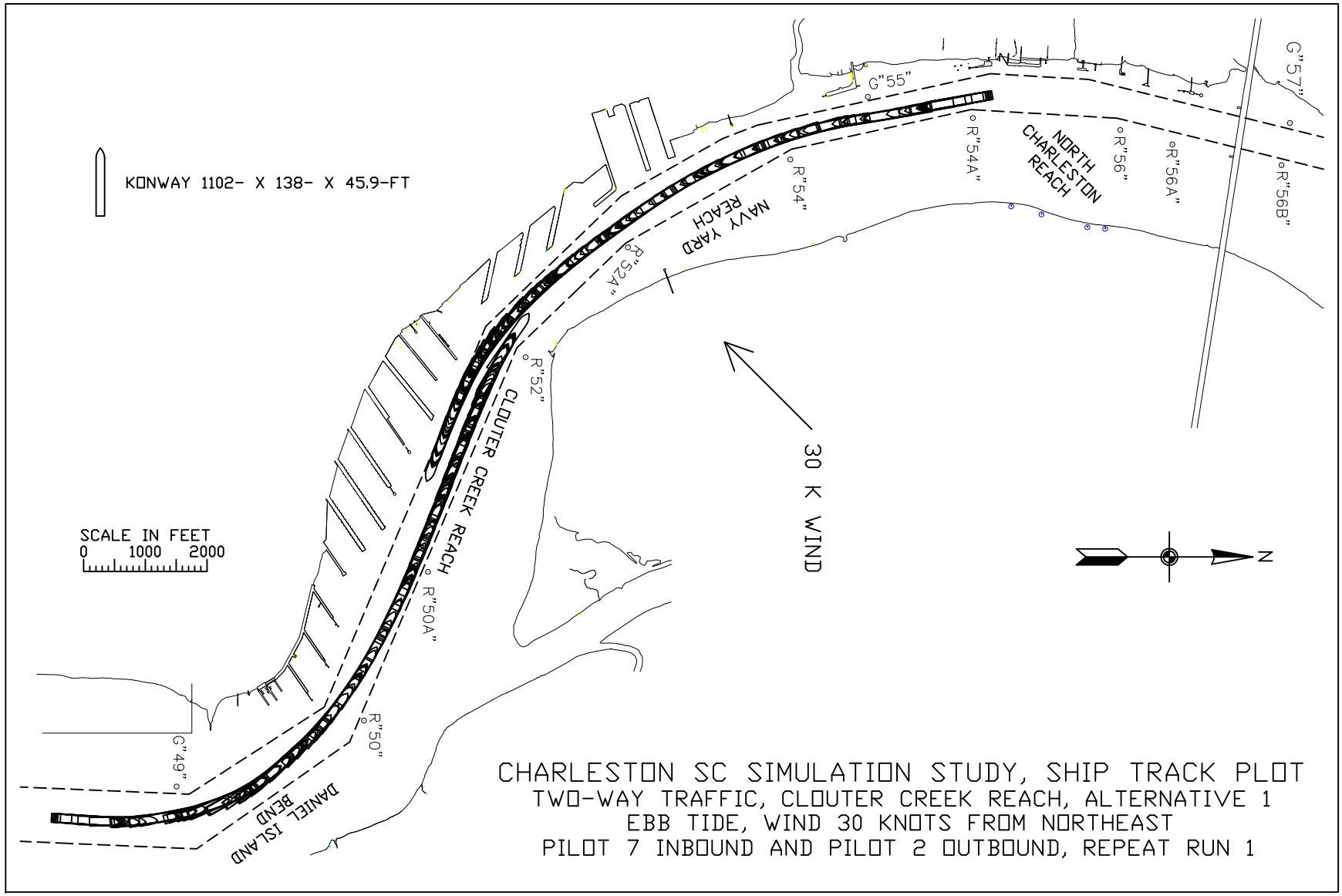

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 7 INBOUND AND PILOT 2 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 125



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 7 INBOUND AND PILOT 2 OUTBOUND, REPEAT RUN 1

PLATE 126

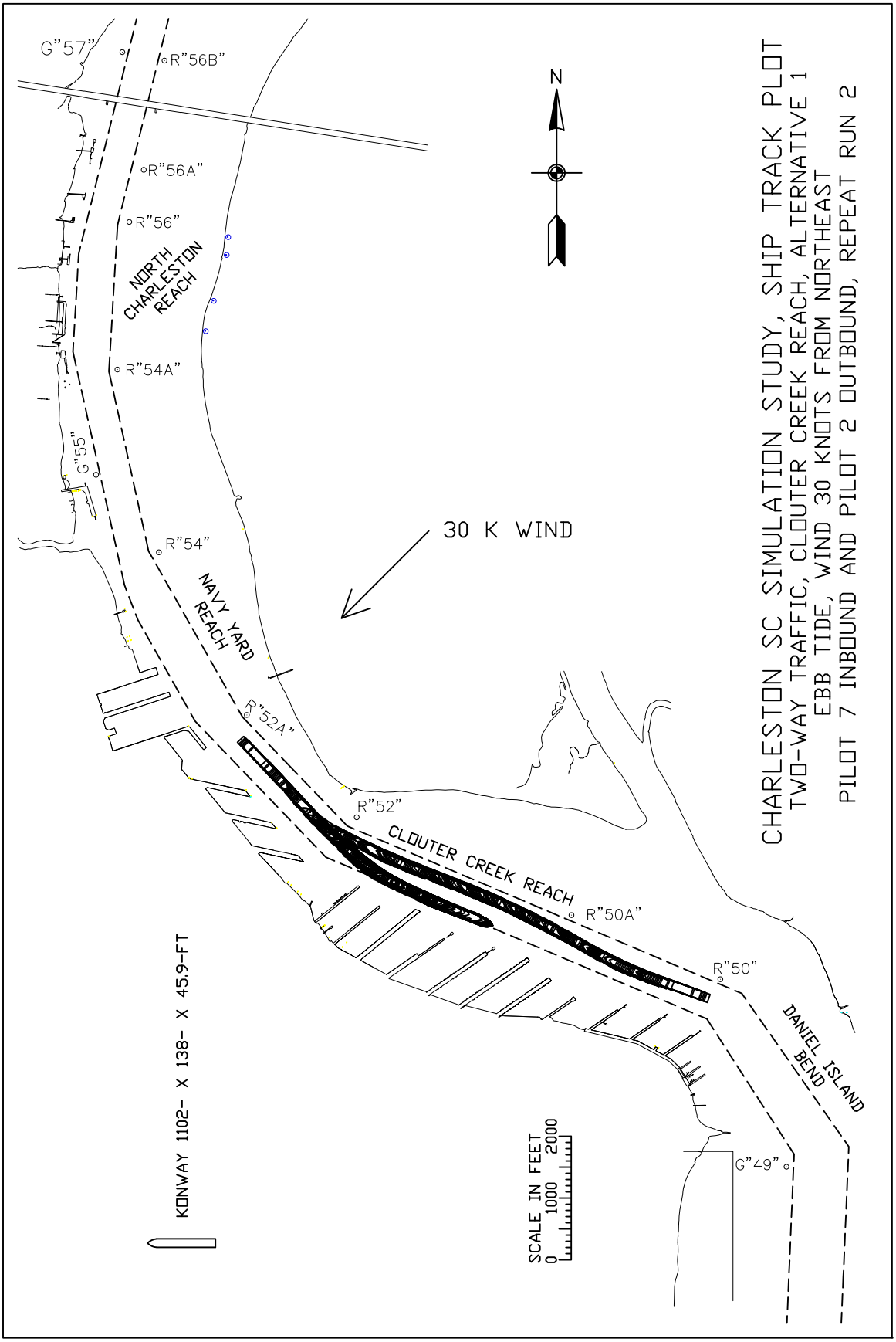

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 1
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 7 INBOUND AND PILOT 2 OUTBOUND, REPEAT RUN 2
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 127

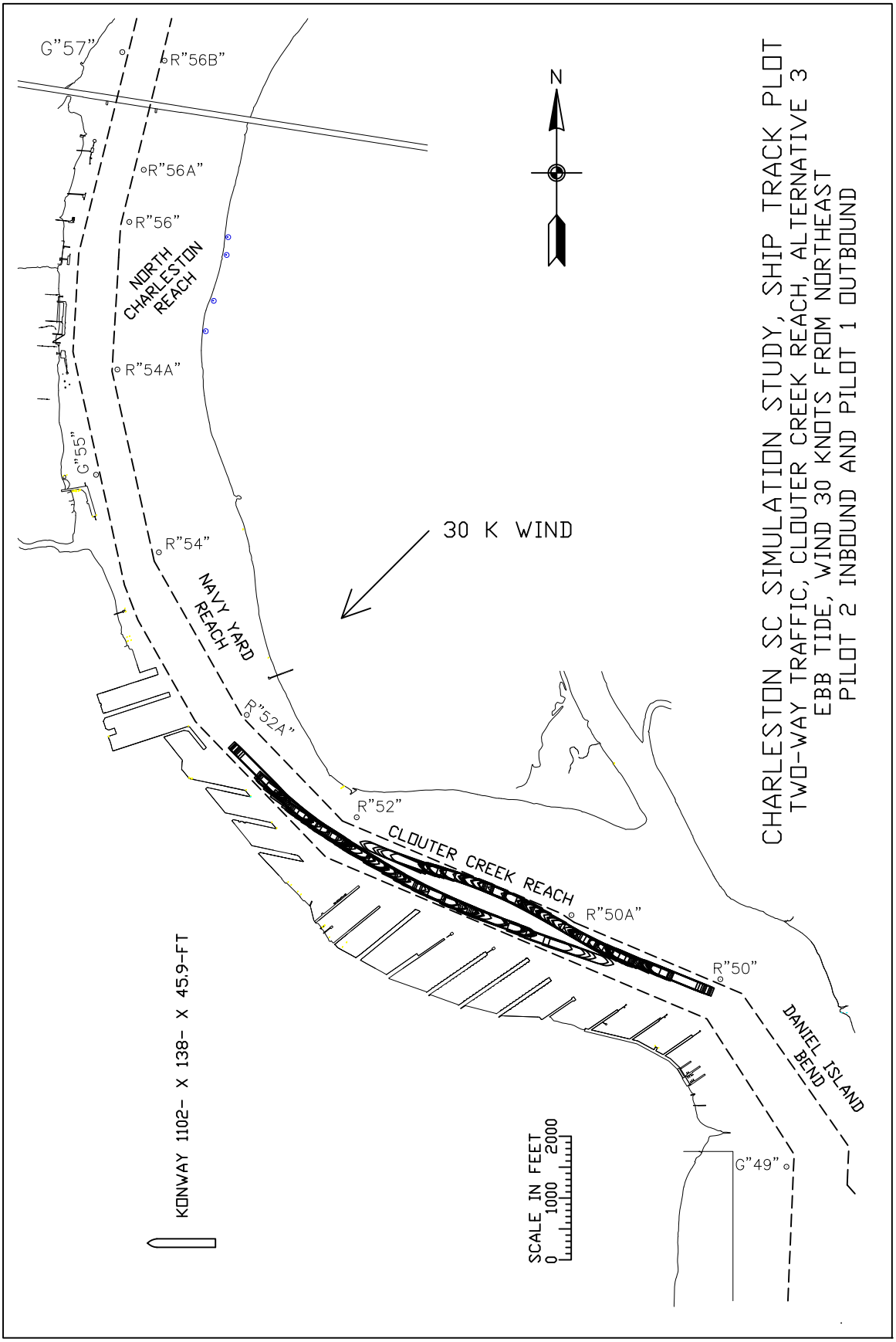

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 2 INBOUND AND PILOT 1 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 128

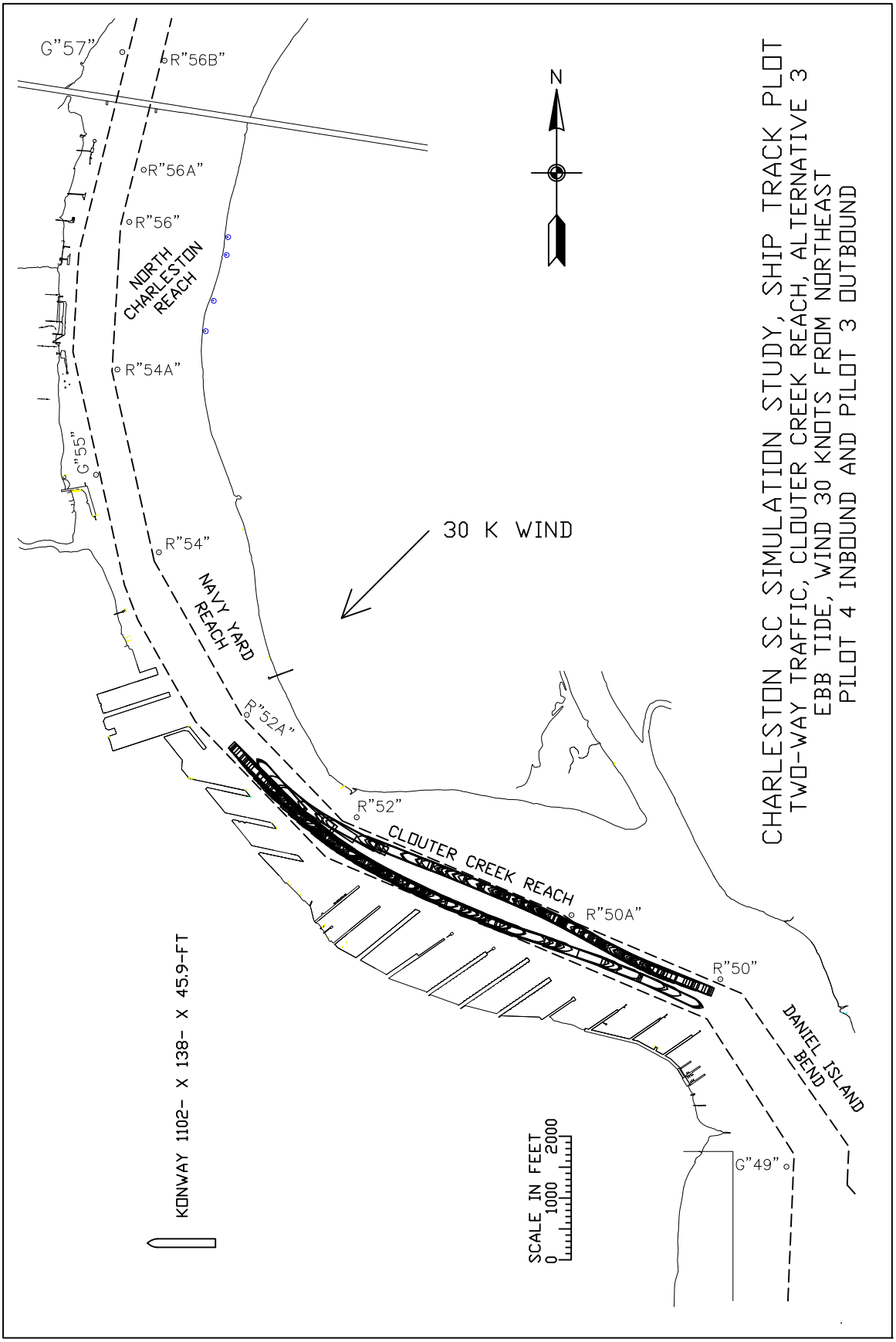

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 3 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 129

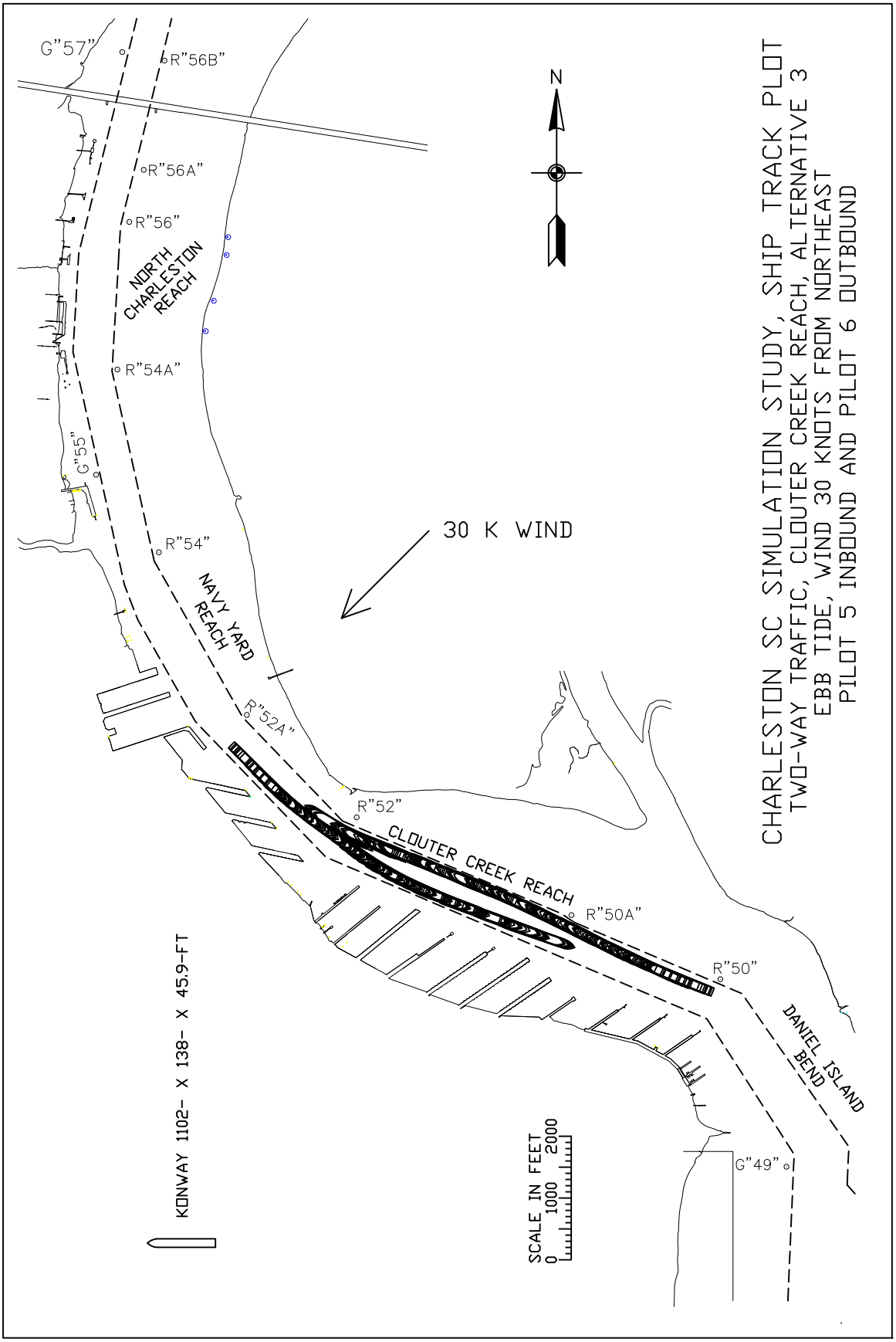

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 5 INBOUND AND PILOT 6 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 130

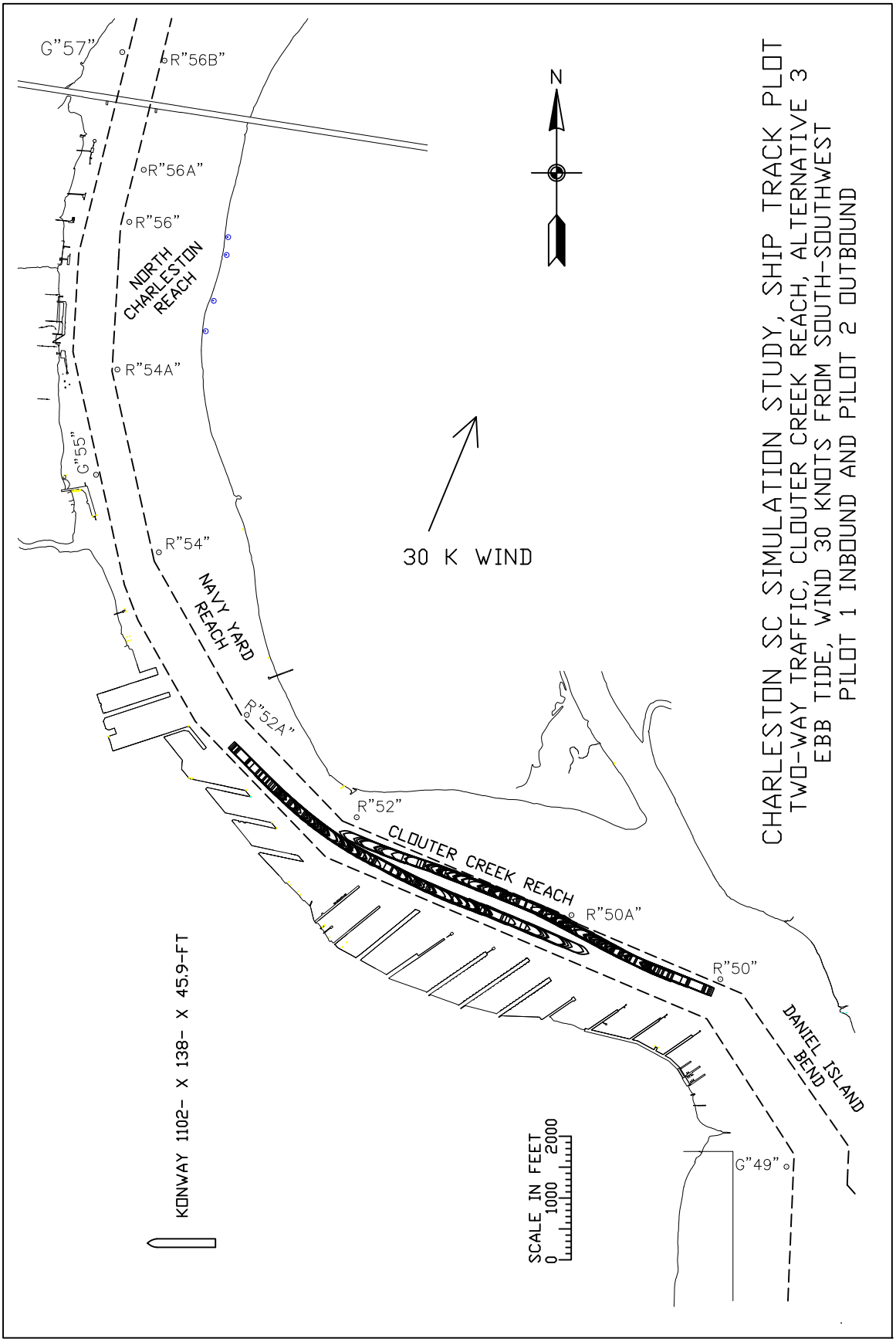

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 131

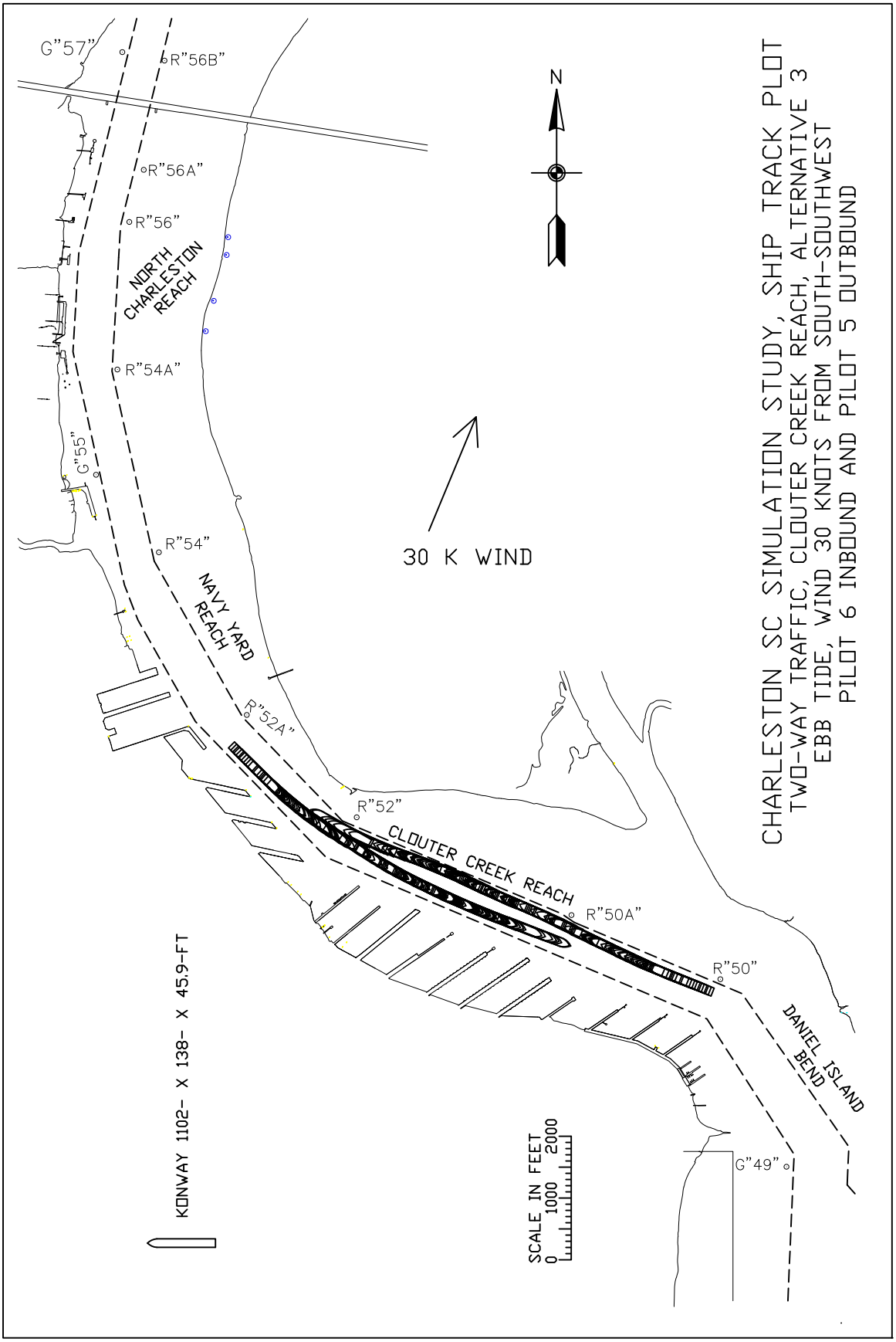

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 132

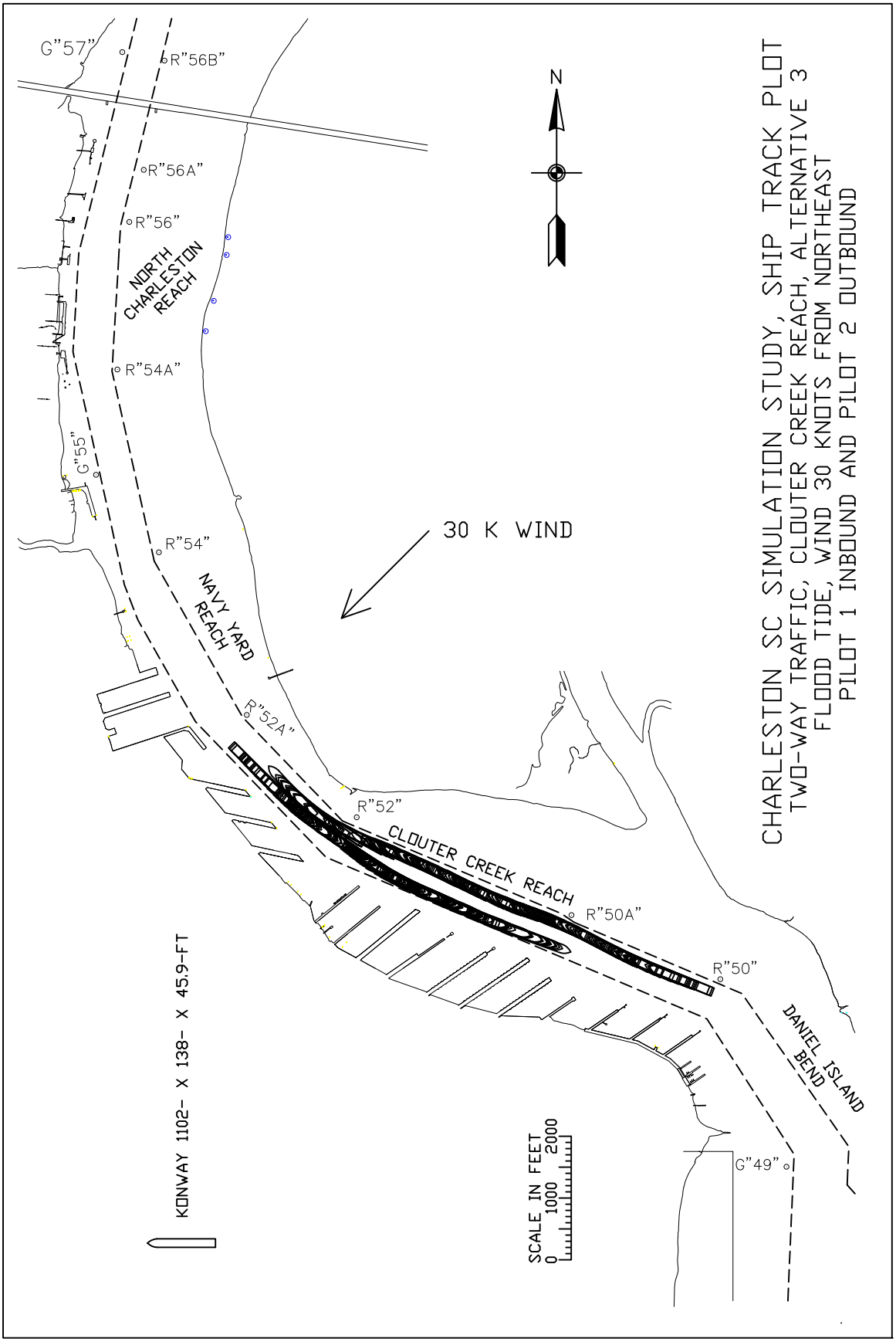

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 133

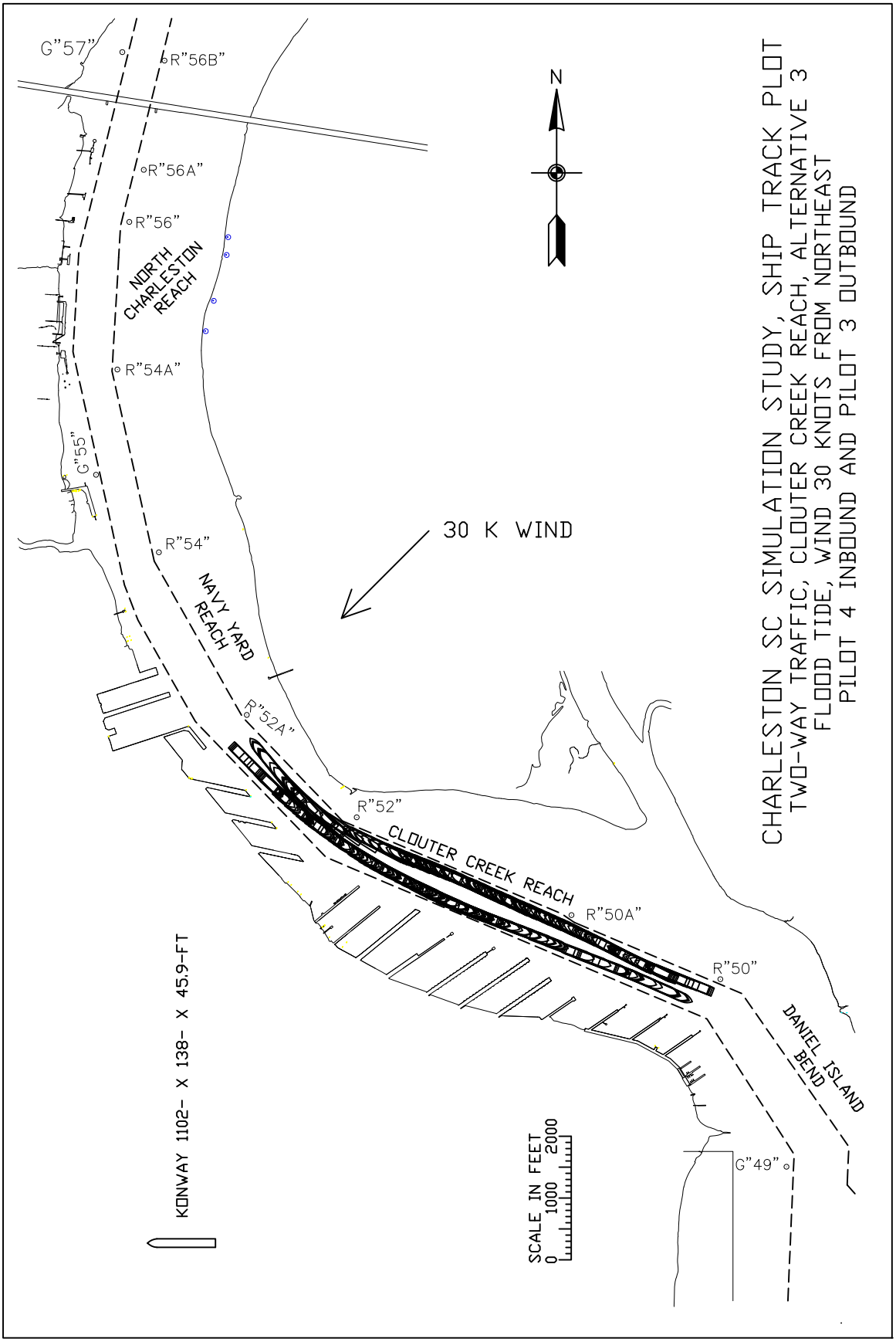

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM NORTHEAST
PILOT 4 INBOUND AND PILOT 3 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 134

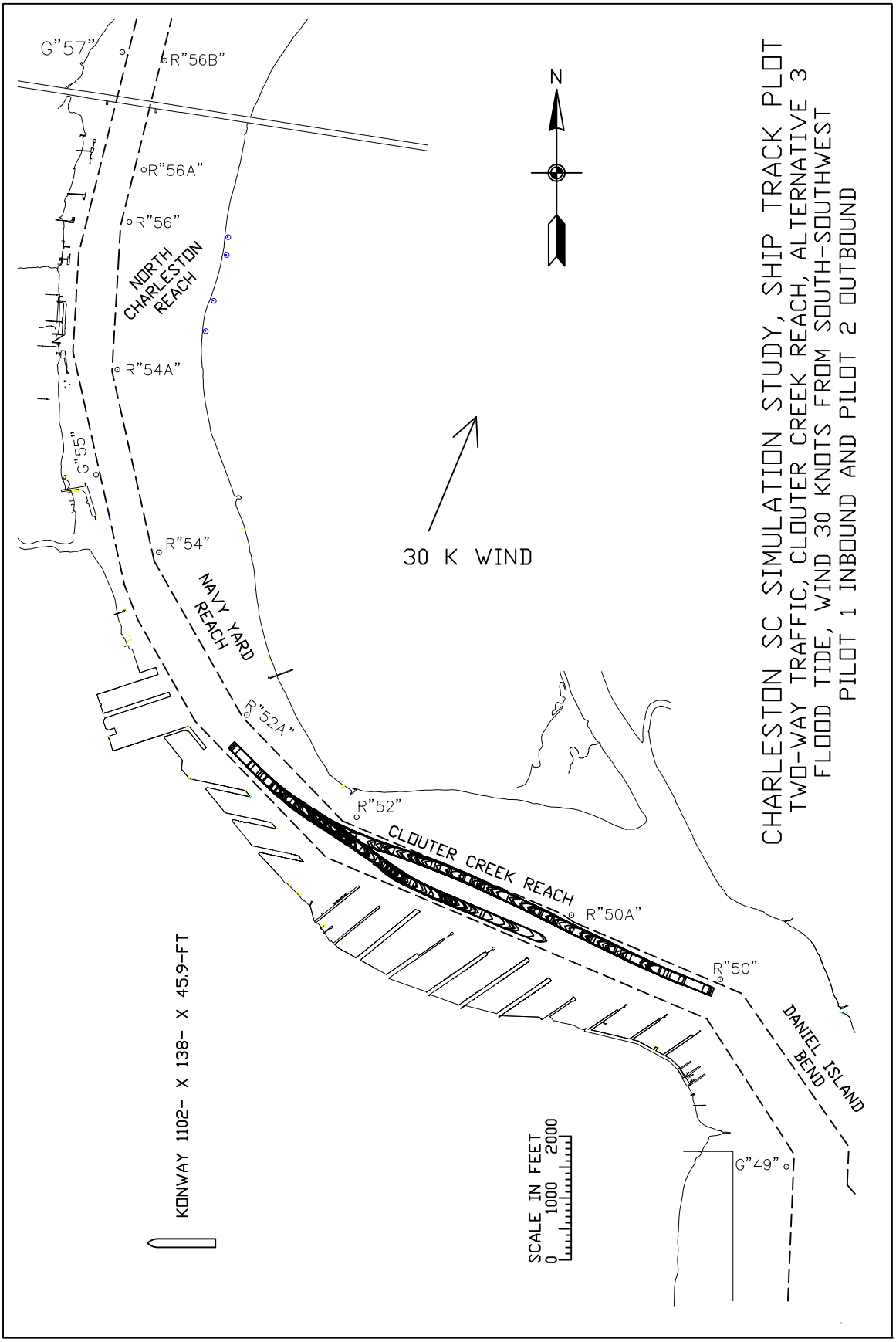

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 1 INBOUND AND PILOT 2 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 135

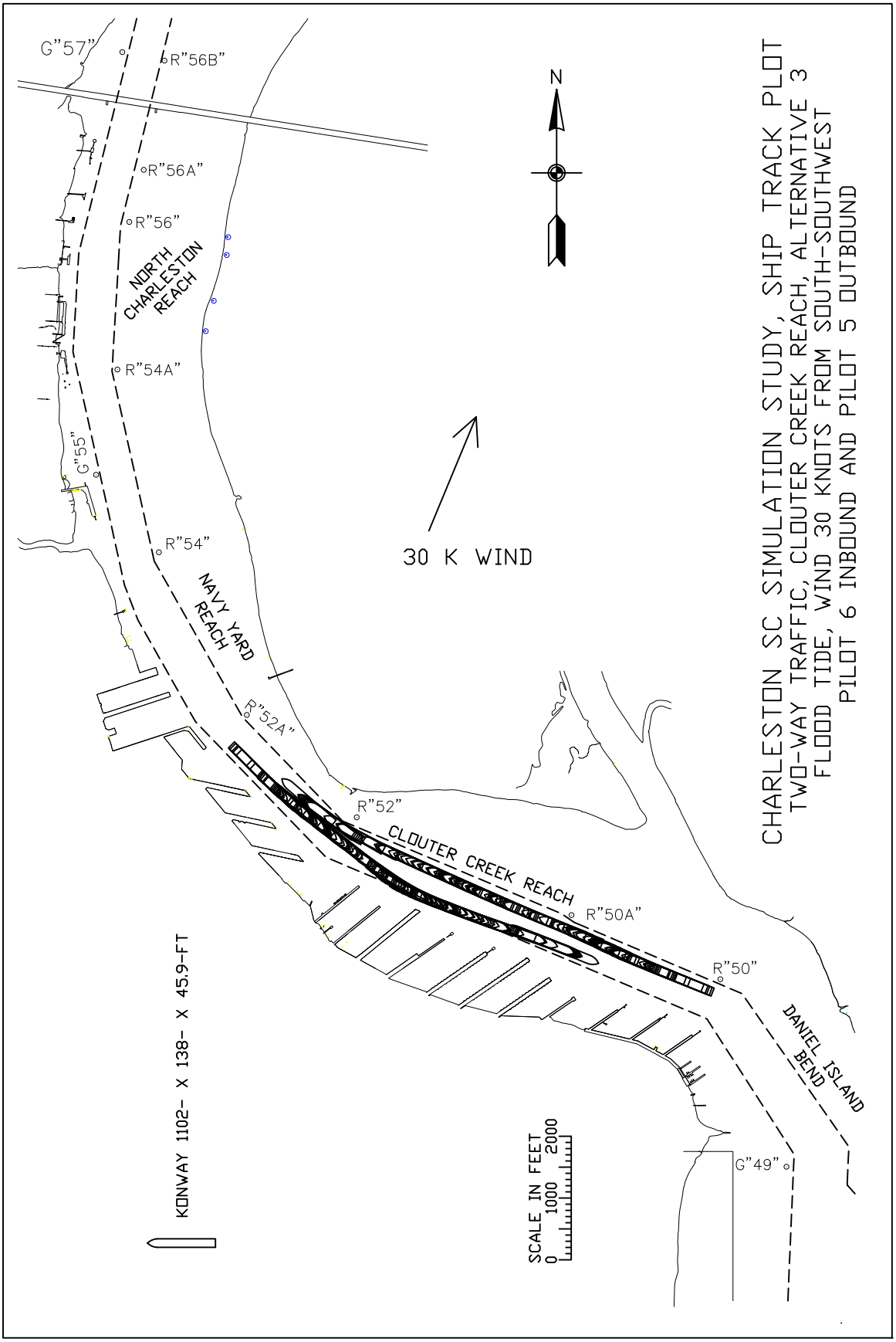

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
TWO-WAY TRAFFIC, CLOUTER CREEK REACH, ALTERNATIVE 3
FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST
PILOT 6 INBOUND AND PILOT 5 OUTBOUND
N
30 K WIND
G"57"
R"56B"
R"56A"
R"56"
NORTH CHARLESTON REACH
R"54A"
G"55"
R"54"
NAVY YARD REACH
R"52A"
R"52"
CLOUTER CREEK REACH
R"50A"
R"50"
DANIEL ISLAND BEND
G"49"
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000

PLATE 136

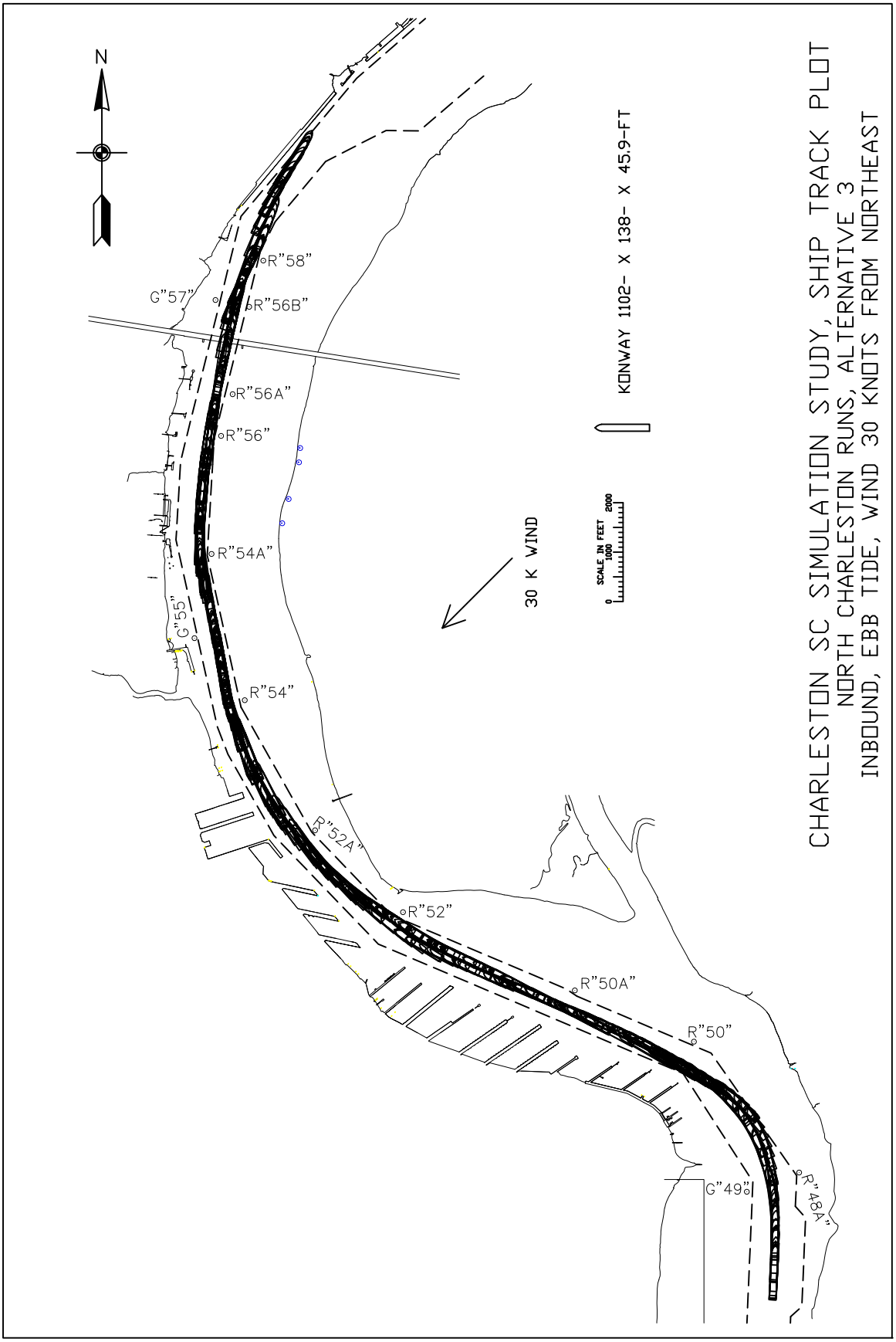
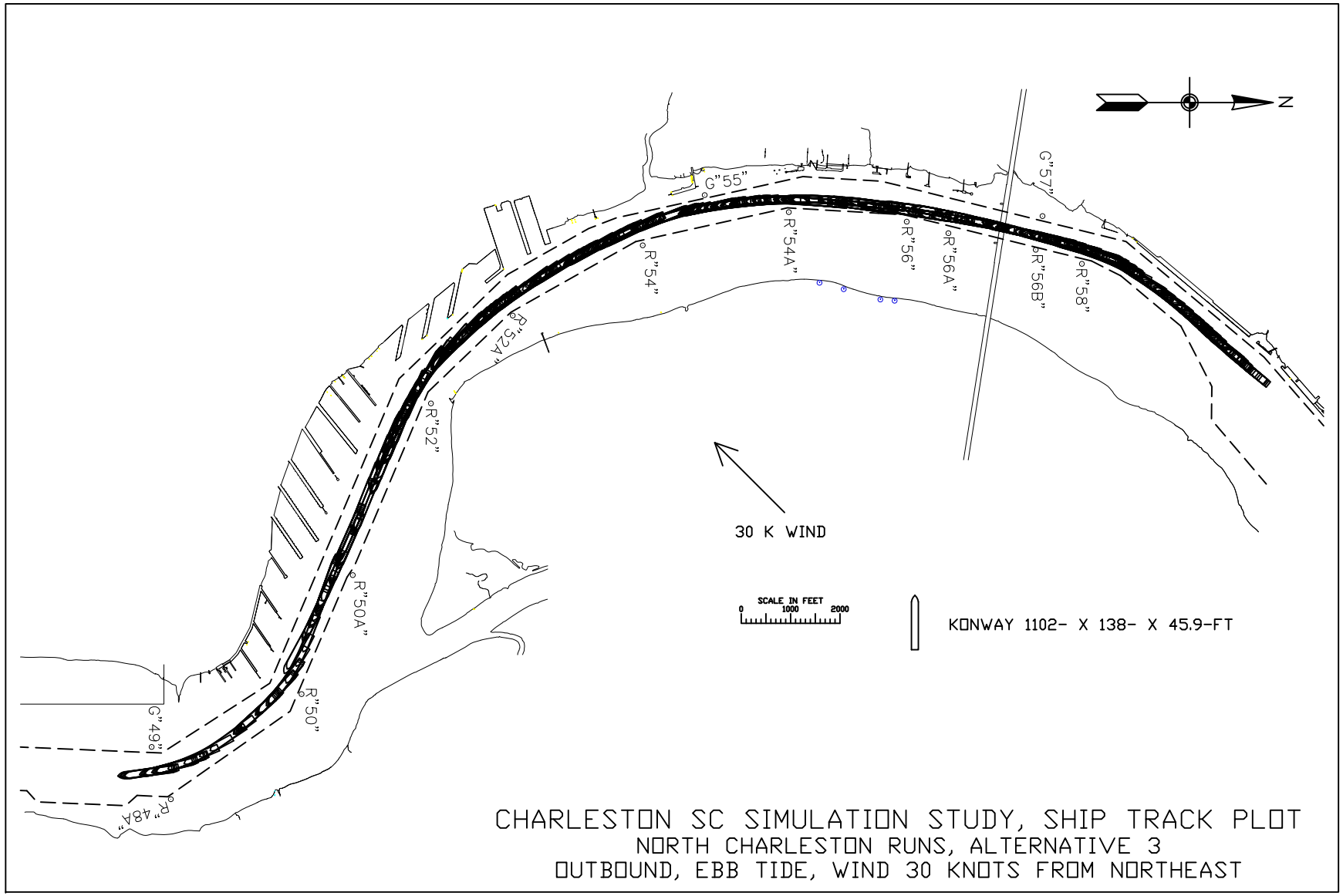

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
INBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0 1000 2000
30 K WIND
N
G"57"
R"58"
R"56B"
R"56A"
R"56"
R"54A"
G"55"
R"54"
R"52A"
R"52"
R"50A"
R"50"
G"49"
R"48A"

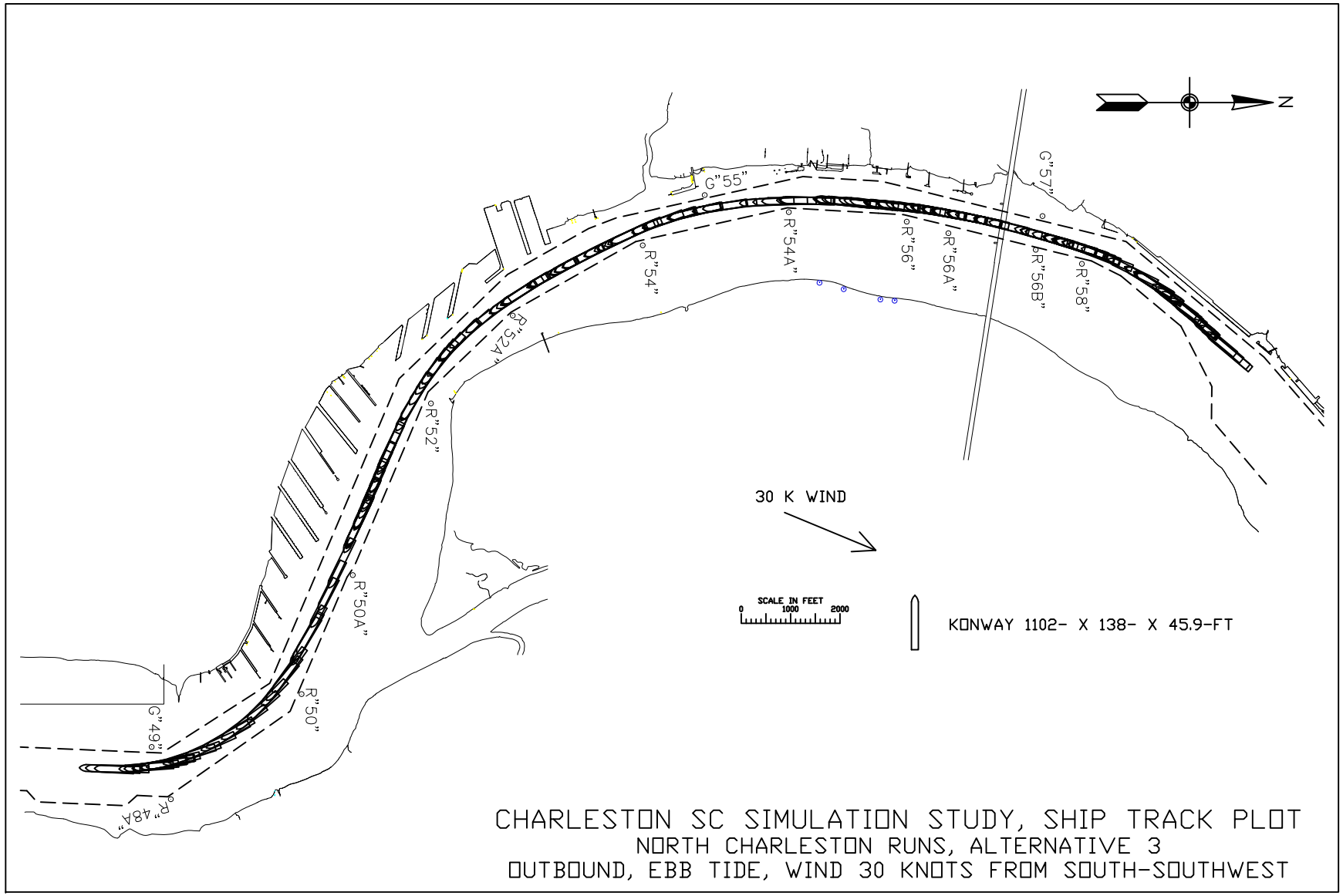
PLATE 137



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST

PLATE 138

PLATE 139



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

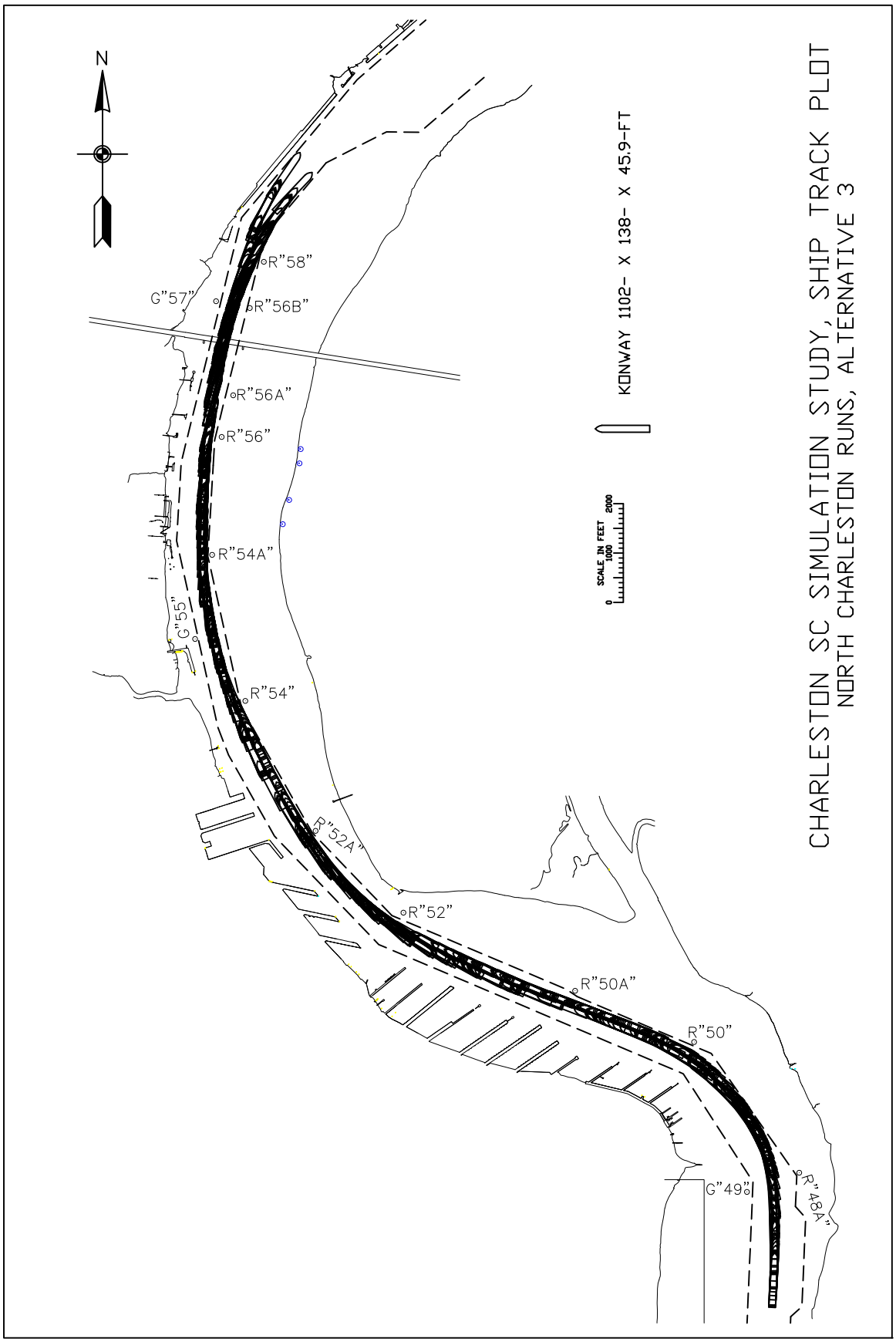

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0
1000
2000
N
G"57"
R"58"
R"56B"
R"56A"
R"56"
R"54A"
G"55"
R"54"
R"52A"
R"52"
R"50A"
R"50"
G"49"
R"48A"

PLATE 140

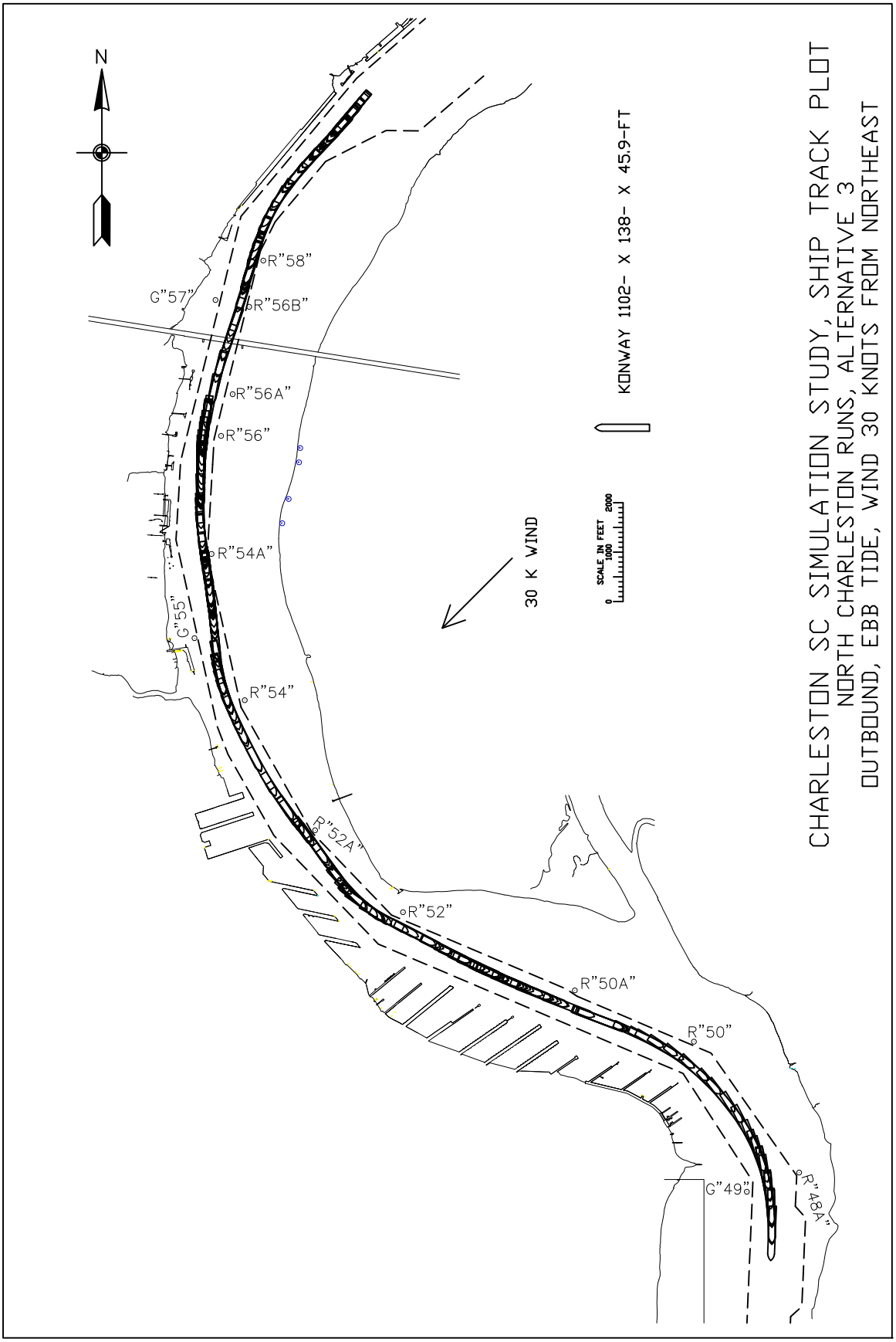
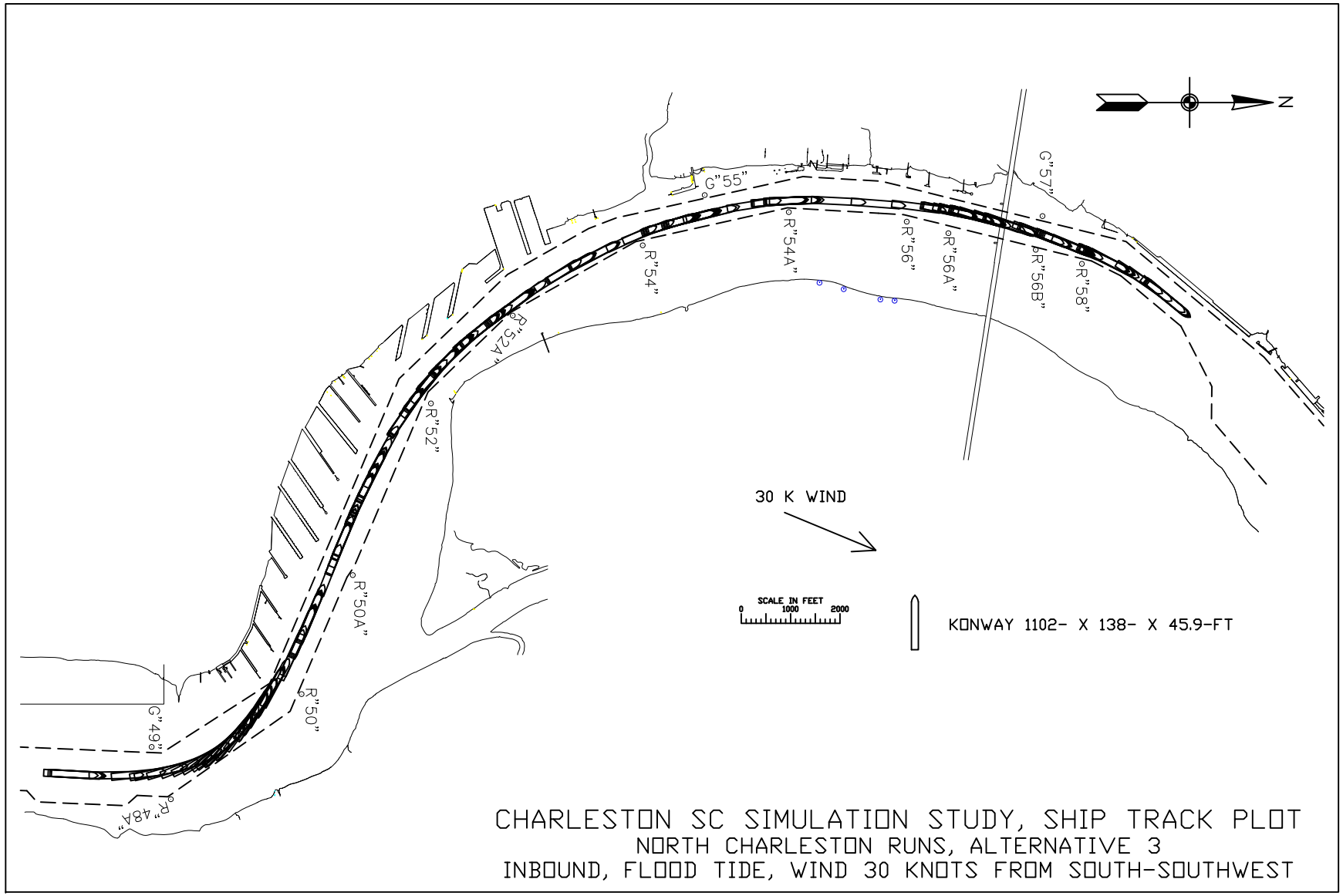

CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
OUTBOUND, EBB TIDE, WIND 30 KNOTS FROM NORTHEAST
N
KONWAY 1102- X 138- X 45.9-FT
SCALE IN FEET
0
1000
2000
30 K WIND
G"57"
R"58"
R"56B"
R"56A"
R"56"
R"54A"
G"55"
R"54"
R"52A"
R"52"
R"50A"
R"50"
G"49"
R"48A"

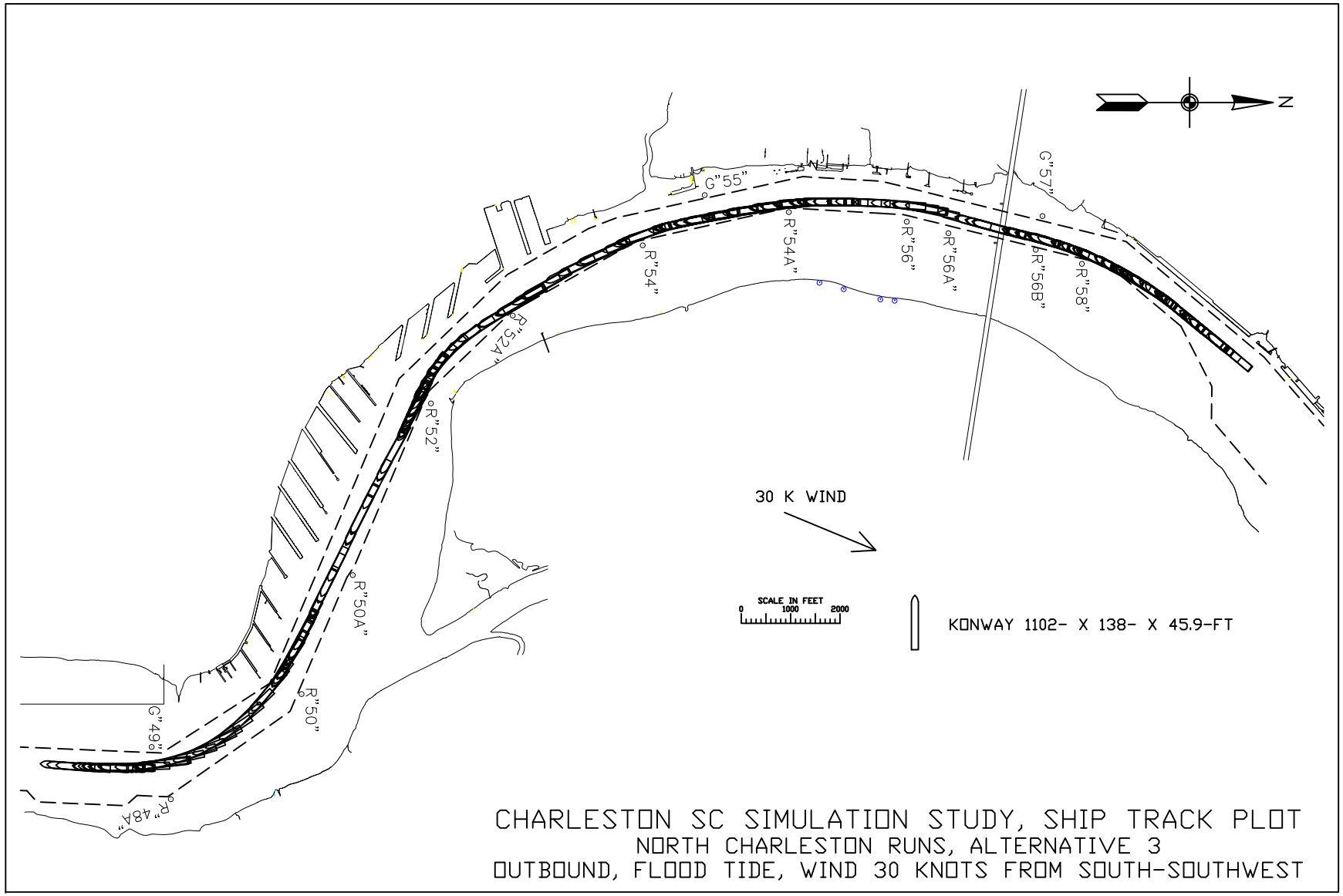
PLATE 141



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
INBOUND, FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

PLATE 142

PLATE 143



CHARLESTON SC SIMULATION STUDY, SHIP TRACK PLOT
NORTH CHARLESTON RUNS, ALTERNATIVE 3
OUTBOUND, FLOOD TIDE, WIND 30 KNOTS FROM SOUTH-SOUTHWEST

Appendix B: Run Sheets

Date:

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 1

Actual sequence run number: 1

Operator: SKM Bridge:

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: (**Alternative 2**) **Alternative 3**

Heading: (**Inbound**) Outbound

Tide : **Flood** (**Ebb**)

Dock: Port Side to

Wind Condition: (**1 30K W and Docked ship: *Daniela 2* at Berth 3**)

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: **2 (4000 and 5000 HP)**

(**3 (4000, 5000, and 6000 HP)**)

Filename: ~~W1E1311~~ W2IE1311

Start Time:

End Time:

Comments: Daniela targets @ berths 1 & 2 NOT berth 3
fuel barge alongside ship@berth 1

Date:

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 1

Actual sequence run number: 2

Operator: SKM Bridge: A

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heàding: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: *Daniela 2* at Berth 3

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IE1312

Start Time: 1030

End Time: 1055

Comments:

Date: 4/6/16

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 1

Actual sequence run number: 1

Operator: Johnston Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: 1 30K W and Docked ship: *Daniela 2* at ~~Berth~~ 3

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IE1321

Start Time: 9:50

End Time: 9:10

Comments: Ecdis problems, ~~boa~~ Ship showed a diff place in the channel than it actual was

Tug didn't clear

Ship ~~Boat~~ itself didn't apear to either

~Daniela targets @ berths 1&2 not berth 3

fuel barge alongside ship @ berth 1

Date: 4/6/16

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 1

Actual sequence run number: 2

Operator: Johnston Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: Alternative 2 **Alternative 3**

Heading: Inbound Outbound

Tide : **Flood** Ebb

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: *Daniela 2* at Berth 3

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IE1322

Start Time: 10:29

End Time: 10:48

Comments: Grounded w/ bow on turning basin boundary
ECDIS not matching w/ instruction & visual

Date: 4/26/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 4

Actual sequence run number: 1

Operator: Johnston Bridge: B 190°

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) Outbound

Tide : (Flood) (Ebb)

Dock: Port Side to

Wind Condition: 1 30K W and Docked ship: *Daniela 2* at Berth 3

(2 20K W and Docked ship: *Daniela 2* at Berth 2)

Tugs: (2 (4000 and 5000 HP)) Tug 12 Tug 16

3 (4000, 5000, and 6000 HP)

Filename: W2IE2211

Start Time: 11:24 Comp Clock: 5:25

End Time: 11:45 5:43

Comments:

This was ebb not Flood

Date: 4/6/16

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 3

Actual sequence run number: 1

Operator: SKM Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: *Daniela 2* at Berth 3

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IF1321

Start Time: 1115

End Time: 1131

Comments: Grounded

Date: 4/6/16

Captain Terry Suggs (Pilot 1), - McAlister Towing

Test Matrix Run Number: 4

Actual sequence run number: 2

Operator: Johnston Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) **Outbound**

Tide : (Flood) **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: *Daniela 2* at Berth 3

(**2** 20K W and Docked ship: *Daniela 2* at Berth 2)

Tugs: (**2** (4000 and 5000 HP)) Tug 12 Tug 16

3 (4000, 5000, and 6000 HP)

Filename: W2TF2212

Start Time: 11:53 Comp clock: ~~5:55~~ 5:55

End Time: 12:18 Comp clock 6:18

Comments: Locks problems still

B

No File

Date:

Run Sheet: Turning Basin Run 1 Captain Terry Suggs (1), - McAlister Towing

Wando Turning Basin Ship MSC Daniella 2 (1201- x 160- x 49.9 ft)

Basin: **Alternative 2**

Heading: **Inbound**

Tide : **Flood**

Dock: Port Side to

Wind Condition: **1 30K** Docked ship: Daniela at Berth 3

Tugs: **Three** 4000, 5000, and 6000 HP

Filename: **W2IF1311**

Start Time:

End Time:

Comments: Good run, still alot of set from the wind. If you where turning for outbound. We should try and get Ship over to the far East bank.

TFS

Date: 14 APR 2016

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 2

Actual sequence run number: 1

Operator: MJS Bridge: C

(W)ando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A** (2 in output filename) **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: **Port Side to**

Wind Condition: (1) 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: (2) (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IE1231

Start Time: [redacted] 08:55 (0846

End Time: 09:19

Comments: TUG & RUDDER CLIPPED MSC 6K

Date: 4/12/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 2

Actual sequence run number: 2

Operator: Johnston Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: (Alternative 2A (2 in output filename)) Alternative 3

Heading: (Inbound) Outbound

Tide : Flood (Ebb)

Dock: Port Side to

Wind Condition: (1 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2)

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: (2 (5000 and 6000 HP))

3 (4000, 5000, and 6000 HP)

Filename: ~~W2IE1242~~ W2IE1242

Start Time: 10:43 Com 4:43

End Time: 11:16 5:16

Comments:
Made turn in basin, clipped Daniela while docking

at Low speed
thread rudder tug1 force tug2 force

Date: 4/14/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 1

Actual sequence run number: 1

Operator: SKM Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IE1341

Start Time: 0250

End Time: 0340 (?)

Comments: Ran w/ 30 kts out of East rather the West

Date: 4/27

Captain Eddie Richardson (Pilot 6), - McAllister Towing

Test Matrix Run Number:

Actual sequence run number: 2

Operator: MCA Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IF1262 — saved as W2IF1261

CHECK TIMES FOR LOG AND EXCEL

Start Time: 0517

End Time: 0536

Comments: Good Run!

Date: 4/27/2016

Captain Eddie Richardson (Pilot 6), ~~McAllister Towing~~ 7 KICKLIGHTER

Test Matrix Run Number: ~~#~~

Actual sequence run number: 1

Operator: MJS Bridge: C

W AND D **Navy Base Basin** Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: (1) **Inbound** **Outbound**

Tide : (1) **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: (1) 30K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: (2) (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IF127.1

Start Time: 0826

End Time: 0906

Comments:

Re-run for Parameter Log

Date: 4/12/16 Eddie Richardson (Pilot 3)

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 4

Actual sequence run number: 1

Operator: SKM Bridge: A

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2**

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: 2 (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IF2291

Start Time: 0941

End Time:

Comments: 1st run of the week (warm-up run)

Date: 4/14/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 4

Actual sequence run number: 1

Operator: SKM Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IF2241

Start Time: 0850

End Time: 0920 (?)

Comments:

Date: 4/14/16

Captain Edward Richardson (Pilot 3), - McAllster Towing

Test Matrix Run Number: 3

Actual sequence run number: 1

Operator: Johnston Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: Alternative 2A (2 in output filename) **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: W2IF2331

Start Time: 9:00

End Time: 9:40

Comments: Back of ship appeared to clip barge as well as tug. Captains Ecdis was fairly off.

044 .6

5 St Bow

5

6 St Ctn

Date: 4/6/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 6

Actual sequence run number: 1

Operator: Johnston Bridge: C

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2** (Alternative 3)

Heading: (**Inbound**) Outbound

Tide : **Flood** (**Ebb**)

Dock: Port Side to

Wind Condition: (**1** 30K W and Docked ship: *Daniela 2* at Berth 3)

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: (**2** (4000 and 5000 HP))

3 (4000, 5000, and 6000 HP)

Filename: W3IE1211

Start Time: 5:09 (comp 11:16)

End Time:

Comments: COULD NOT HOLD SHIP OFF DOCK AFTER TURNING, NEEDED 1- MORE TUG. OR LESS WIND.

Date:

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 5

Actual sequence run number: 1

Operator: SKM Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: Alternative 2 (Alternative 3)

Heading: (Inbound) Outbound

Tide : Flood (Ebb)

Dock: Port Side to

Wind Condition: (1 30K W and Docked ship: *Daniela 2* at Berth 3)

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (4000 and 5000 HP)

(3 (4000, 5000, and 6000 HP))

Filename: W3IE1321

Start Time:

End Time:

Comments: Impacted ship @ berth 2. Probably due to berthed ships @ 1 & 2 being backed @ in berth 3.

Daniela @ berths 1 & 2 w/ fuel barge alongside @ berth 1

ACT. 3 THE TURN WENT WELL. HAD A HARD TIME HOLDING OFF THE BERTH WITH 30 KTS OF WEST WIND.

G.W.T.

Vessel shapes too far apart, re-run playback

Date: 4/13/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 5

Actual sequence run number: 1

Operator: SKM Bridge: B

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: **2** ~~(5000 and 6000 HP)~~

3 ~~(4000~~ 5000, 5000, and 6000 HP)

Filename: W3IE1341

Start Time: 1057

End Time:

Comments: Replaced the 4000 with a 5000hp tug.

Date: 4/8/16

Captain Terry Suggs (Pilot 1), - McAlister Towing

Test Matrix Run Number: 9

Actual sequence run number: 1

Operator: SKM Bridge: C

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: *Daniela 2* at Berth 3

2 20K W and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (~~4000~~ and 5000 HP) ⇒ 60000 not 40000 hp

3 (4000, 5000, and 6000 HP)

Filename: W3IF2211

Start Time: 0839

End Time:

Comments: Good run, after turning ship, felt like the wind was sitting the ship on the dock to fast. not normal characteristics. TKS

Date: 13 APR 2016

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 8

Actual sequence run number: 1

Operator: MJS Bridge: B

Wando **Turning Basin** Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Port Side to

Wind Condition: **1** 30K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

2 20K W and Docked ship: Daniela at Berths 1 (with fuel barge) and 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)



Filename: W3IF2241

Start Time: 02:38

End Time: 03:20

Comments:

AA

START TIME BEGINS WHEN WE OPEN THE EXERCISE FOR RECORD KEEPING

Date: 4/6/16

Captain Terry Suggs (Pilot 1), - McAlister Towing

Test Matrix Run Number: 17

Actual sequence run number: 1

Operator: Johnston MTS Bridge: C

Wando Turning Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: Alternative 2 (Alternative 3)

Heading: (Inbound) Outbound

Tide : (Flood) Ebb

Dock: Port Side to

Wind Condition: 1 30K W and Docked ship: *Daniela 2* at Berth 3

(2 20K W and Docked ship: *Daniela 2* at Berth 2)

Tugs: 2 (4000 and 5000 HP)

(3 (4000, 5000, and 6000 HP))

Filename: W3IF2311

Start Time: 10:17

End Time: 10:48

Comments:

GOOD ONE!

Docking Pilot Run Sheets

Navy Terminal Turning Basin

Date: 4/19/16 ~~Pilot 5~~

~~Captain Brian Curren (Pilot 5), - Moran Towing~~

Test Matrix Run Number:

Actual sequence run number: 1

Operator: Bridge: C

6 Port bow
5 St Bow

Navy Base Basin

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Alt 1

Heading: **Inbound** **Outbound**

001
5

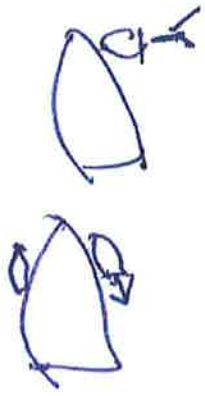
Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)



Filename: N1IF1251

Start Time: 5:30 (5:13)

End Time: 5:49

Comments:

Ran aground, Ecdis off, dipped channel

Date: 14 APR 2016

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 29

Actual sequence run number:

Operator: MJS Bridge: C

(3) Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

[1] Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** (Outbound)

Tide : **Flood** (Ebb)

Dock: Port Side to Dock Starboard Side to

Wind Condition: (1) 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: (2) (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N10E1231

Start Time: 09:34 (09:29)

End Time: 09:54

Comments:

Ex. PAUSED TO REBOOT 3 SCREENS.

Date: 4/19/16 Captain Curran 5

Captain ~~Edward Richardson (Pilot 3), - McAlister Towing~~

Test Matrix Run Number:

Actual sequence run number: 1

Operator: J Johnston Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3** (Alt 1)

Heading: **Inbound** (Outbound)

Tide : **Flood** (Ebb)

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

3 10
B 15

Filename: N10E1251

Start Time:

End Time:

Comments: Ran Aground, after completing turn. Didn't realize he needed to completed turn & ~~make~~ continue run

Opened Exercise 2:41

Saved Exercise 3:04

Saved Record file 3:53

Captain Curran

Date: 4/9/16 5

Captain Edward Richardson (Pilot 3). - McAllister Towing

Test Matrix Run Number:

Actual sequence run number: 2

Operator: Johnston Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3** Alt 1

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N10E1252

Start Time: 2

End Time:

Comments:

Opened ~~4:01~~ 3:53

Saved Exersive 401

End time 4:33

Ran aground, after completing turn

Date: 4/19/16 6

~~Captain Edward Richardson (Pilot 3), - McAlister Towing~~

Test Matrix Run Number:

Actual sequence run number: 1

Operator: Johnston Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3** Alt1

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: 1 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N10E126 1

Start Time: 4:44 (4:34)

End Time: 5:13

Comments:

✓

Date: 14 APR 2016

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 10

Actual sequence run number: 1

Operator: MJS Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N2IE1231

Start Time: 10:03 (09:57)

End Time: 10:29

Comments:

BOW NEVER CLOSER THAN 150 FROM ORIGINAL CHANNEL BOUNDARY

Date: 4/14/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 10

Actual sequence run number: 1

Operator: SKM Bridge: B

Navy Base Basin Ship CNTNR4O: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1 20K NE and Docked ship: *Daniela 2* at Berth 2**

Tugs: **2 (5000 and 6000 HP)**

3 (4000, 5000, and 6000 HP)

Filename: N2IE1241

Start Time: 0441

End Time: 0508

Comments: Session died. ECDIS differential caused a collision between stern and docked ship.

Date: 4/14/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 70

Actual sequence run number: 2

Operator: SKM Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1 20K NE and Docked ship: *Daniela 2* at Berth 2**

Tugs: **2 (5000 and 6000 HP)**

3 (4000, 5000, and 6000 HP)

Filename: N2IE1242 -

Start Time: 05

End Time:

Comments:

Date: 4/14/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 12

Actual sequence run number: 1

Operator: Johnston Bridge: ~~B~~ A

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: Alternative 2A (2 in output filename) **Alternative 3**

Heading: Inbound **Outbound**

Tide : Flood **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N2IF1231

Start Time: 10:43

End Time: 11:18

Comments: ✓

5
6

Date: 4/14/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 12

Actual sequence run number: 1

Operator: SKM **Bridge:** B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide: **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N2IF1241

Start Time: 0937

End Time: 1000 (?)

Comments:

Date:

Captain Eddie Richardson (Pilot 6), - McAllister Towing

Test Matrix Run Number:

Actual sequence run number: 1

Operator: MCA Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: 1 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: ~~N2C~~ ~~N2C5~~ N2IF1261

Start Time: 0405

End Time: 0428

Comments:

Date: 4/12/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 14

Actual sequence run number: 2

Operator: SKM Bridge: A

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N20E1232

Start Time: 1350

End Time:

Comments: (1) Modified .tgm file for TUG16 to reflect max pull/push of 70 tons - on Stbd Bow

(2) TUG10.tgm remains @ a max of 50 tons - Stbd Qtr

↳ was having trouble getting stern off the dock

Date: 4/12/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 14

Actual sequence run number: 1

Operator: Johnston Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 In output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

32.50.328
79.55.159

Dock: Port Side to Dock Starboard Side to

Wind Condition: 1.20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N20E1241

Start Time: 2:20

End Time: 2:44

Comments:

Completed Run

003
Sp 0

5 B
4 5 Q

3

Date: 4/27

Captain ~~Eddie Richardson (Pilot 6)~~, - McAllister Towing (6) (7) Foster Kirkland Lightbourn

Test Matrix Run Number:

Actual sequence run number: 1

Operator: Bridge:

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

2 Panamax in lower berths

Wind Condition: 1 20K NE and Docked ship: ~~*Daniela 2*~~ at Berth 2

Tugs: 2 (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N20E1261

Start Time: 0215

End Time: 0259

Comments:

Going through Drum Island Turn

Date: 4/27

Captain ~~Eddie Richardson (Pilot 6)~~, - McAllister Towing Josh Kicklighter (7)

Test Matrix Run Number:

Actual sequence run number: 1

Operator: MCA Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N20E1271

Start Time: 0300

End Time: 0334

Comments:

Date: 4/14/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 13

Actual sequence run number: 1

Operator: Johnston Bridge: A

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: (Alternative 2A (2 In output filename)) **Alternative 3**

Heading: **Inbound** (Outbound)

Tide : **Flood** (Ebb)

Dock: Port Side to Dock Starboard Side to

Wind Condition: (1 20K NE and Docked ship: *Daniela 2* at Berth 2)

Tugs: **2** (5000 and 6000 HP)

(3 (4000, 5000, and 6000 HP))

Filename: N20E1331

Start Time: 12:02

End Time: 12:25

Comments: ✓

N 32.50.292
W079.55.960
003
0

5000 St Bow
5000 St Qt
6000

Brad Colorado
GIWW
Galveston
504 862 2680

Date: 4/14/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 13

Actual sequence run number: 1

Operator: SKM Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: Alternative 2A (2 in output filename) Alternative 3

Heading: Inbound Outbound

Tide : Flood Ebb

Dock: Port Side to Dock Starboard Side to

Wind Condition: 1 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (5000 and 6000 HP)

3 (4000, 5000 → 5000, and 6000 HP)

Filename: N20E1341

Start Time: 1024

End Time:

Comments:

Date:

Captain ~~Eddie Richardson (Pilot 6)~~, Terry Suggs Pilot 1 - McAllister Towing

Test Matrix Run Number:

Actual sequence run number: 1

Operator: Bridge:

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** Alternative 3

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: ~~N3E1211~~ N3IE1211

Start Time:

End Time:

Comments:

Date: 4/13/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 16

Actual sequence run number: 1

Operator: Johnston Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** Alternative 3

Heading: Inbound **Outbound**

Tide : **Flood** Ebb

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N3IE1231

Start Time: 11:57

End Time: 12:29

Comments: Real Feels the current

Daniela @ 32.50.442
079.55.951
003
0

Port bow → 16
St ~~Gate~~
St aft → 10N

5 →
0 ↗

309
7

Date: 4/8/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 18

Actual sequence run number: 1

Operator: SKM Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (4000 and 5000 HP) 6000hp not 4000

3 (4000, 5000, and 6000 HP)

Filename: N3IF1211

Start Time: 1039

End Time:

Comments: Exceeded basin boundary just a bit

Date: 4/8/16

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 18

Actual sequence run number: 1

Operator: Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 1** Alternative 3

Heading: Inbound **Outbound**

Tide : Flood **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: 1 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N3IF1221

Start Time: 10:35

End Time: 11:00

Comments:

Date: 4/13/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 18

Actual sequence run number: 1

Operator: Johnston Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** (Alternative 3)

Heading (Inbound) **Outbound**

Tide : (Flood) **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: (**1** 20K NE and Docked ship: *Daniela 2* at Berth 2)

Tugs: (2 (5000 and 6000 HP))

3 (4000, 5000, and 6000 HP)

Filename: N3IF1231

Start Time: 0953

End Time:

Comments:

haven't Run yet

5000
6000

Date:

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 18

Actual sequence run number: 2

Operator: Bridge:

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide: **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N3IF1232

Start Time: 1032

End Time:

Comments:

Date:

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 18

Actual sequence run number: 1

Operator: MTS Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: Inbound **Outbound**

Tide : Flood **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N3IF1241

Start Time: 0558 (05:49)

End Time: 06:29

Comments:

Date: 4/8/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 20

Actual sequence run number: 1

Operator: SKM Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** (**Outbound**)

Tide : **Flood** (**Ebb**)

Dock: Port Side to Dock Starboard Side to

Wind Condition: (**1 20K NE and Docked ship: *Daniela 2* at Berth 2**)

Tugs: (**2 (4000 and 5000 HP)** 6000)

3 (4000, 5000, and 6000 HP)

Filename: N30E1211

Start Time: 0916

End Time:

Comments: I would think a small tug of 4 or 5,000 hp and the ships bow thrusts of 3 to 4000 hp would be stronger than the aft tug of 6000 hp. But the stern came out much faster TKS

Date: 4/13/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 20

Actual sequence run number: 1

Operator: Johnston Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** Alternative 3

Heading: **Inbound** Outbound

Tide : **Flood** Ebb

Dock: Port Side to Dock Starboard Side to

Wind Condition: 1 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: 2 (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N30E1231

Start Time: 2:18

End Time: 2:48

Comments: ✓

5 St Bow
6 St Qtr

Date: 4/13/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 20

Actual sequence run number: 2

Operator: SKM Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N30E1242

Start Time: 0834

End Time:

Comments:

Date: 4/13/16

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 20

Actual sequence run number: 3

Operator: SKM Bridge: B

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 In output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: N30E1243

Start Time: 1064

End Time:

Comments: Spare TUGION had tgm File adjusted to a maximum push/pull of 97 tons. Max for Charleston dockings pilots is 80 tons. Pilot said he did notice a difference in the tug after this change was made.

Date: 4/20

Captain ~~Edward Richardson~~ (Pilot 3), - McAlister Towing Brian Curran (5)

Test Matrix Run Number:

Actual sequence run number: 1

Operator: Alisa Bridge: C

Navy Base Basin Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Dock: Port Side to Dock Starboard Side to

Wind Condition: **1** 20K NE and Docked ship: *Daniela 2* at Berth 2

Tugs: **2** (5000 and 6000 HP)

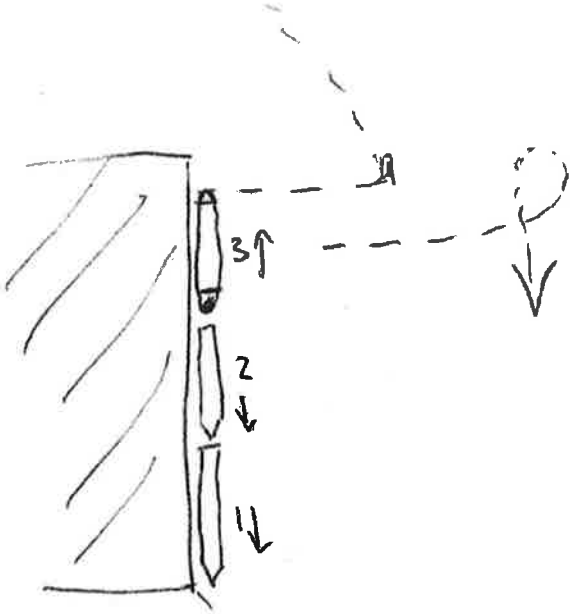
3 (4000, 5000, and 6000 HP)

Filename: N30E124 (5)

Start Time: 1103

End Time:

Comments:



1 & 2 are panamax container ships and are targets facing D/S

3 is a Daniela (CNTNR40) facing U/S.

Docking Pilot Run Sheets

Ordinance Reach Turning Basin

Date: SEPT 2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 022

Actual sequence run number: 1

Operator: MJS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) Outbound

Tide : **Flood** (**Ebb**)

Dock: Starboard Side to

Wind Condition: (1) 20K E and Docked ship: Panamax RORO at TC

Tugs: (2) (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 022E1221

Start Time: 16:01

End Time: 16:42

Comments:

Tug 12 (4000) and Tug 16 (5000)

Tugs did not have enough HP power. Bow of the ship was very close to the edge of the channel while turning.

Date: 5 APR 2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 22

Actual sequence run number: 1 - 2

Operator: MJS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: D2IE1222

Start Time: 1656

End Time:

Comments: STARTED ON BRIDGE, CURRENTS ARE TYPICAL @ 8:00

GROUNDED BOW ON TURN

- NOT ENOUGH HP WITH TUGS.
- ALSO WHEN THE CONTAINER CRANES ARE BOOM DOWN, ~~IT~~ RESTRICTS THE PASSING AREA IN BERTH #1 AT ACE.

AEA.

Date: 4/5/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 21

Actual sequence run number: 1 ~~2~~ iteration 2

Operator: Martin Bridge: A

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: (**Alternative 2**) **Alternative 3**

Heading: (**Inbound**) Outbound

Tide : **Flood** (**Ebb**)

Dock: Starboard Side to

Wind Condition: (**1 20K E and Docked ship: Panamax RORO at TC**)

Tugs: **2** (4000 and 5000 HP)

(**3** (4000, 5000, and 6000 HP))

Filename: 02IE312

Start Time: 14:09

End Time:

Comments:

Port Bow Tug hit docked containership.

Got very close to RoRo with stern of ownship. Tug may have gone through RoRo.

Date: 5 APR 2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 021

Actual sequence run number: 1

Operator: MJS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) Outbound

Tide : **Flood** (Ebb)

Dock: Starboard Side to

Wind Condition: (1) 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

(3) (4000, 5000, and 6000 HP)

Filename: 02IE1321

Start Time: 13:54

End Time: 14:16

Comments:

Date: 5APR 2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 021

Actual sequence run number: 1-2

Operator: MTS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) Outbound

Tide : **Flood** (Ebb)

Dock: Starboard Side to

Wind Condition: (1) 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

(3) (4000, 5000, and 6000 HP)

Filename: 02IE1322

Start Time: 14:30

End Time: 14:56

Comments: GROUNDED ON THE BOW MAKING THE TURN.

INBOUND SPEED DOES SEEM ACCURATE.
- DEAD SLOW BELL ACHIEVED CURRENT MAINTAINING SETS. SEEMS LIKE THE VESSEL SHOULD SLOW DOWN ON EBB TIDE.

Date: 5 APR 2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 021

Actual sequence run number: 1-3

Operator: MTS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 021E1323

Start Time: 15:04

End Time: 15:41

Comments:

IT APPEARS THAT THE MAX. EBB CURRENT IS NOT CORRECT. IT SHOULD RUN AT A VELOCITY OF AVG. 1.5 KTS UP TO 2.2 KTS ON SPRING TIDE.

Date: 4/5/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 23

Actual sequence run number: 1

Operator: Martin Bridge: A

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 02IF1311

Start Time: 15:06

End Time:

Comments:

Date: 4/5/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 23

Actual sequence run number: 2

Operator: Johnston Bridge: A

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) Outbound

Tide : (Flood) **Ebb**

Dock: Starboard Side to

Wind Condition: (1 20K E and Docked ship: Panamax RORO at TC)

Tugs: **2** (4000 and 5000 HP)

(3 (4000, 5000, and 6000 HP))

Filename: O2IF1312

Start Time: 16:10

End Time: 16:53

Comments:

Changed Tugs to Tug 10
Tug 12
Tug 16 > was 2x Tug 16 in iteration1

Ran aground

Date: 4/12/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 22

Actual sequence run number: 1

Operator: SKM Bridge: A

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1 20K E and Docked ship: Panamax RORO at TC and containership at terminal**

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: OZIE1231

Start Time: 1043

End Time:

Comments:

Date: 4/5/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 23

Actual sequence run number: 3

Operator: Johnston Bridge: A

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: (Alternative 2) **Alternative 3**

Heading: (Inbound) Outbound

Tide : (**Flood**) **Ebb**

Dock: Starboard Side to

Wind Condition: (1 20K E and Docked ship: Panamax RORO at TC)

Tugs: **2** (4000 and 5000 HP)

(**3** (4000, 5000, and 6000 HP))

Filename: O2IF1313

Start Time: 17:08

End Time: 17:43

Comments:

Moved closer to bridge

Tugs : Tug 10 stern
Tug 12 > bow
Tug 16

- FLOOD TIDE NEEDS TO BE STRONGER.
SHIP DIDNT SET UP THE RIVER LIKE I THOUGH IT WOULD.
Appeared as tug & boat didnt clear the bend TFJ

Date: 4/6/16

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 23

Actual sequence run number: 1

Operator: SCM Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 021F1321

Start Time: 1153

End Time:

Comments: Ground

NEED MORE ROOM AT THE KNUCKLE
ABOVE BERTH 58 AND IN THE TURNING BASIN.

Capt.

Date: 4/8/2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 2G

Actual sequence run number: 1

Operator: MTS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1 20K E and Docked ship: Panamax RORO at TC**

Tugs: **2 (4000 and 5000 HP)**

3 (4000, 5000, and 6000 HP)

Filename: 03E1221

Start Time: 06:07

End Time:

Comments:

Date: 4/13/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 26

Actual sequence run number: 1

Operator: SKM Bridge: A

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC and containership at terminal

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 03IE1231

Start Time: 0404

End Time: 04 37

Comments: ✓

Full 50
Half 30
Empty 20

Date:

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 26

Actual sequence run number:

Operator: MJS Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2A (2 in output filename)** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC and containership at terminal

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 03IE1241

Start Time: 0455 START, NOT LOG TIME (04:42)

End Time: 05:24

Comments:

MARIO DID A GREAT JOB! — CAP. DYE

Date: 4/7/16

Captain Terry Suggs (**Pilot 1**), - McAlister Towing

Test Matrix Run Number: 25

Actual sequence run number: 1

Operator: Johnston Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** (Alternative 3)

Heading: (Inbound) Outbound

Tide : **Flood** (Ebb)

Dock: Starboard Side to

Wind Condition: (~~1~~ 20K E and Docked ship: Panamax RORO at TC)

Tugs: **2** (4000 and 5000 HP)

(3 (4000, 5000, and 6000 HP))

Filename: O3IE1311

Start Time: 10:50

End Time: 10:55

Comments:

Date: 4/8/16

Captain Terry Suggs (Pilot 1), - McAlister Towing

Test Matrix Run Number: 28

Actual sequence run number: 1

Operator: Bridge:

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: Alternative 2 (Alternative 3)

Heading: (Inbound) Outbound

Tide : (Flood) Ebb

Dock: Starboard Side to

Wind Condition: (1 20K E and Docked ship: Panamax RORO at TC)

Tugs: (2 (4000 and 5000 HP))

3 (4000, 5000, and 6000 HP)

Filename: 03IF1211

Start Time: 1206

End Time:

Comments:

Date: 4/8/2016

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: ~~B~~ 2B

Actual sequence run number: 4 / 1

Operator: Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** Alternative 3

Heading: Inbound Outbound

Tide : Flood **Ebb**

Dock: Starboard Side to

Wind Condition: 1 20K-E and Docked ship: Panamax RORO at TC

Tugs: 2 (~~4000~~ 5000 and 5000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 03IF1221

Start Time: 11:25

End Time: 11:57

Comments:

THE CURRENT DID NOT SEEM TO BE THE ACCURATE VELOCITY.

AW

Date: 4/13/16

Captain Edward Richardson (Pilot 3), - McAlister Towing

Test Matrix Run Number: 28

Actual sequence run number: 1

Operator: Johnston Bridge: B

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2A (2 in output filename)** Alternative 3

Heading: **Inbound** Outbound

Tide: **Flood** **Ebb**

Dock: Starboard Side to

Wind Condition: **1** 20K E and Docked ship: Panamax RORO at TC and containership at terminal

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: O3IF1231

Start Time: 10:57

End Time: 11:26

Comments: ✓

5 Port → 16

6 Stb → 20N

Date:

Captain Jon Dye (Pilot 4), - Moran Towing

Test Matrix Run Number: 28

Actual sequence run number:

Operator: Bridge:

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2A (2 in output filename)** Alternative 3

Heading: Inbound Outbound

Tide : Flood **Ebb**

Dock: Starboard Side to

Wind Condition: 1 20K E and Docked ship: Panamax RORO at TC and containership at terminal

Tugs: **2** (5000 and 6000 HP)

3 (4000, 5000, and 6000 HP)

Filename: 03IF124

Start Time: 0348

End Time: 0348

Comments:

Date: 4/7/16

Captain George Tawes (Pilot 2), - Moran Towing

Test Matrix Run Number: 27

Actual sequence run number: 1

Operator: Allison Bridge: B Tug mA

Ordinance Reach (North Basin) Ship CNTNR41: *Ship Konway* (1102- x 138- x 45.9 ft)

Basin: **Alternative 2** (Alternative 3)

Heading: (Inbound) Outbound

Tide : (Flood) **Ebb**

Dock: Starboard Side to

Wind Condition: (1) 20K E and Docked ship: Panamax RORO at TC

Tugs: **2** (4000 and 5000 HP)

(3) (4000, 5000, and 6000 HP)

Filename: 03IF13021

Start Time: 1028

End Time:

Comments:

Area A: Two-way traffic in Entrance Channel

Date: 4/28/2016

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4) (8) George Campsen

Test Matrix Run Number: 3

Actual sequence run number: 3

Inbound (Ownship1) Pilot #: 4 Outbound (Ownship2) Pilot #: 8 8

Operator: MJS Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1**

Heading: **Inbound** **Outbound** (3) **Both**

Tide : **Flood** (2) **Ebb**

Wind Condition: (1) **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition A1E1BB3

Inbound Filename: A1E1I43 Outbound Filename: A1E1083

Inbound Start Time: 0939 Outbound Start Time: SAVED AS A1E1BB1

Inbound End Time: 1013 Outbound End Time:

Comments:

WIND FELT REALISTIC THIS TIME

Area A: Two-way traffic in Entrance Channel

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 3

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: (Restricted A) or Unrestricted U

Channel Alternative: (**Alternative 1**)

Heading: **I**nbound **O**utbound (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition A1E1B3I

Inbound Filename: A1E1E61 Outbound Filename: A1E1051

Inbound Start Time: 1057 Outbound Start Time:

Inbound End Time: 1120 Outbound End Time:

Comments:

STRONG SET COMING OUT OF JETTIES OUTBOUND 4-5° SET ON TRANSIT. WHEN STRAIGHT END OUT TO MEET INBOUND VESSEL SHIP SET EXCESSIVELY TO SOUTH SIDE OF CHANNEL. WHEN COMPENSATED FOR SET, TOUCHED BOTTOM ON STARBOARD QUARTER.

Increased footprint of ship w/ leeways is a concern; interactions w/ meetings doesn't allow for acceptable safety margins. (BS) no allowance for steering failures (mech or human) or mech failures.

Area A: Two-way traffic in Entrance Channel

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 4

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or Unrestricted U

Channel Alternative: **Alternative 1**

Heading: **I**nbound **O**utbound **B**oth

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition A1E2BB2

Inbound Filename: A1GI62 Outbound Filename: A1E1052

Inbound Start Time: Outbound Start Time:

Inbound End Time: 1133 Outbound End Time:

Comments:

Appears clear T

Area A: Two-way traffic in Entrance Channel

Date: 4/28/2016

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4) George Campson (pilot 8)

Test Matrix Run Number: 1

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 4 Outbound (Ownship2) Pilot #: 8

Operator: MJS Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition A1F1BB1

Inbound Filename: A1F1I41 Outbound Filename: A1F1081

Inbound Start Time: 0741 Outbound Start Time:

Inbound End Time: 0811 Outbound End Time:

Comments: PILOTS FELT NO WIND EFFECTS.

Area A: Two-way traffic in Entrance Channel

Date: 5/6/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number:

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: SKM Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: (Restricted A) or Unrestricted U

Channel Alternative: (**Alternative 1**)

Heading: Inbound **Outbound** (**Both**)

Tide : (**Flood**) **Ebb**

Wind Condition: **1** 30K NE

(**2** 30K SSW)

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition A1F2BB1

Inbound Filename: A1F2161 Outbound Filename: A1F2051

Inbound Start Time: 0219 Outbound Start Time:

Inbound End Time: 0238 Outbound End Time:

Comments: ~~Grounded~~ Got to a point where the outbound had two choices: ground or collide with inbound

OUTBOUND VESSEL REQUIRED EXCESSIVE USE OF RUDDER IN AN EFFOR TO STAY ON OWN SIDE OF CHANNEL. WITH REDUCED SPEED AND HEAVY SET, THERE IS A DRAMATIC LOSS OF RESPONSE OF A VESSEL OF THIS (OR ANY) SIZE. TOUCHED BOTTOM OR GROUNDED ABOUT A SHIP LENGTH FROM INBOUND VESSEL (AM)

Forced to use more rudder for excessive time periods. Delays in time of shifting rudder (hard over to hard over) when meeting →

outbd vessel exasbensted. the already compounded environmental effects of wind and restricted vessel SOG. (BS)

Had to jockey ships bell between slow and half. (41 RPM) (51 RPM)

IN order to maintain 9.2 - 10.1 kts.

Area A: Two-way traffic in Entrance Channel

Date: 4/28/2016

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4) (8) George Campsen

Test Matrix Run Number: 3

Actual sequence run number: 4

Inbound (Ownship1) Pilot #: 4 Outbound (Ownship2) Pilot #: 8

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition A1E1BBU

Inbound Filename: U1E1I41 Outbound Filename: U1E1081

Inbound Start Time: 1014 Outbound Start Time:

Inbound End Time: 1032 Outbound End Time:

Comments:

UNRESTRICTED RUN. 1.0 KNOT TIDE ADDED

STARTING SOG = 13.5 KTS

Area A: Two-way traffic in Entrance Channel

Date: 5/03/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 34

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or (Unrestricted U)

Channel Alternative: (**Alternative 1**)

Heading: **I**nbound **O**utbound (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition U1E1BB1

Inbound Filename: U1E1IS1 Outbound Filename: U1E1O61

Inbound Start Time: Outbound Start Time:

Inbound End Time: 0343 Outbound End Time:

Comments:

* MORE THAN 10 KTS NECESSARY FOR SAFE PASSAGE OF VESSELS (ARM)

Tried to slow speed, to decrease interaction speed at time of meeting. Necessary to maintain steady increased speeds over 10 kts. (BS)

Area A: Two-way traffic in Entrance Channel

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 34

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or Unrestricted U

Channel Alternative: **Alternative 1**

Heading: **I**nbound **O**utbound **B**oth

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition U1E1BB1

Inbound Filename: U1E1I61 Outbound Filename: U1E1O51

Inbound Start Time: 1014 Outbound Start Time:

Inbound End Time: 1035 Outbound End Time:

Comments:

SAFE PASSING DUE TO ADEQUATE SPEED IN OFFSHORE CHANNEL.

Speed was maintained to make Good Courses ~~about~~ over the ground to safely stay in channel and meet ships. (BS)

Area A: Two-way traffic in Entrance Channel

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 34

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or (Unrestricted U)

Channel Alternative: (**Alternative 1**)

Heading: **I**nbound **O**utbound (**B**oth)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition U1E1BB2

Inbound Filename: U1E1I62 Outbound Filename: U1E1052

Inbound Start Time: Outbound Start Time:

Inbound End Time: 1127 Outbound End Time:

Comments:

Area A: Two-way traffic in Entrance Channel

Date:

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 44

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or Unrestricted U

Channel Alternative: **Alternative 1**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition U1E2B31

Inbound Filename: U1E2I61 Outbound Filename: U1E2O51

Inbound Start Time: 1041 Outbound Start Time:

Inbound End Time: 1054 Outbound End Time:

Comments:

SAFE PASSAGE DUE TO ADEQUATE SPEED IN OFFSHORE CHANNEL. (ARM)

Speed of 13.8kt SOG was able to safely pass; holding up leeways of 1+6° were held and was able to make good COG to stay in channel. (BS)

Area A: Two-way traffic in Entrance Channel

Date: 5/6/14

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 24

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or Unrestricted U

Channel Alternative: **Alternative 1**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition U1F2BB1

Inbound Filename: U1F2I51 Outbound Filename: U1F2O61

Inbound Start Time: 0238 Outbound Start Time:

Inbound End Time: 0253 Outbound End Time:

Comments:

WITH INCREASE OF SPEED, SET IS REDUCED AND CONTROL OF VESSEL POSITIONING IS MAXIMIZED. MET INBOUND VESSEL IN DESIRED POSITION. (AM)

WAS able to use smaller rudder #s and was able to adequately control vessel when meeting the OUTBOUND vessel. (BS)

Area A: Two-way traffic in Entrance Channel

Date: 5/6/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 24

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: SKM Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Speed: Restricted A or (Unrestricted U)

Channel Alternative: (**Alternative 1**)

Heading: **I**nbound **O**utbound (**Both**)

Tide : (**Flood**) **Ebb**

Wind Condition: **1** 30K NE

(**2** 30K SSW)

Filename = Area (A or U) + Alternative + Tide + Wind + Heading +Pilot + Repetition U1F2BB2

Inbound Filename: U1F2I52 Outbound Filename: U1F2062

Inbound Start Time: Outbound Start Time:

Inbound End Time: 0329 Outbound End Time:

Comments:

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 7

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: MCA Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B1E1BB1

Inbound Filename: B1E1BS1 Outbound Filename: B1E1061

Inbound Start Time: 4:39 Outbound Start Time:

Inbound End Time: 5:39 Outbound End Time:

Comments:

No comment. (AM)

Surprised I hadn't grounded before. Meeting seaward of 25 buoys. Could have used a widener. (BS)

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 8

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound Outbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B1E2BB1 (rename Log says BB2)

Inbound Filename: B1E2I61 Outbound Filename: B1E2O51

Inbound Start Time: 0421 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

MEETING IN CHANNEL JUST ABOVE 24 BUOY. POSITIONED WELL, BUT SHIP INTERACTION CAUSED LOSS OF CONTROL. SPECIFICALLY STERN SUCTION PULLED BOW TO STARBOARD.

post mtg scenario was not ideal. positioned so close to channel combined with close dtms mtg of 2 14k TEU ships. *Too much post meeting interaction to have adequate safety margin (BS)

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 5

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B1F1BB2

Inbound Filename: B1F1I62 Outbound Filename: B1F1052

Inbound Start Time: 0404 Outbound Start Time:

Inbound End Time: 0421 Outbound End Time:

Comments: Outbound clipped green side boundary w/ his stern

MEETING WAS OK BUT SHIP INTERACTION PREVENTED SAFE PASSAGE (ARM)

No wideners and simulation prevented inbound to give outbd sufficient room this too much ship interaction w/o the proposed wideners of Mt pleasant. (BS)

Area B: Two-way traffic in Mount Pleasant Range

Date:

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 6

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 4

Operator: Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B1F2BB

Inbound Filename: B1F2I31 Outbound Filename: B1F2041

Inbound Start Time: 0137 Outbound Start Time:

Inbound End Time: 0221 Outbound End Time:

Comments: Outbound ship hangsing out of the green side

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 6

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: Johnston Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **B**oth

Tide: **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B1F2BB1

Inbound Filename: B1F2I51 Outbound Filename: B1F2O61

Inbound Start Time: ~~5:39~~ ~~00:00~~ (5:39) 5:45 Outbound Start Time:

Inbound End Time: 5:56 Outbound End Time:

Comments:

grounded

NO comment (AM)

Flood tide push and grounded prior to meeting.; widener seems to be an attractive option though haven't simulated yet. (BS).

Area B: Two-way traffic in Mount Pleasant Range

Date: 4/19/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 10

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 1 Outbound (Ownship2) Pilot #: 2

Operator: SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** **Outbound** (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading (B for Both) +Pilot + Repetition B3E1BB1

Inbound Filename: ~~B3E1BB1~~ B3E1I11 Outbound Filename: B3E1O21

Inbound Start Time: 0404 Outbound Start Time: 0404

Inbound End Time: 0455 Outbound End Time:

Comments:

Paused @ 15:08 to reset Outbound - ran aground
May need to delete a few time steps in the track plot

Area B: Two-way traffic in Mount Pleasant Range

Date: 4/19/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 11

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 1 Outbound (Ownship2) Pilot #: 2

Operator: ~~MCA~~ Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: ~~**1** 30K NE~~

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3ET BB2

Inbound Filename: ~~B3EBBB2~~ B3ETI12 Outbound Filename: B3 E1 022

Inbound Start Time: 0457 Outbound Start Time:

Inbound End Time: 0517 Outbound End Time:

Comments:

Added 2ft of tide

Area B: Two-way traffic in Mount Pleasant Range

Date: 4/28/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 11

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 3 Outbound (Ownship2) Pilot #: 4

Operator: SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** **Outbound** (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3E1B31

Inbound Filename: B3E1I31 Outbound Filename: B3E1041

Inbound Start Time: 0520 Outbound Start Time:

Inbound End Time: 0536 Outbound End Time:

Comments: Speed dropped off for inbound ship. May be a squat calculation issue

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/4/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 12

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Ce Outbound (Ownship2) Pilot #: 5

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **B**oth

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3E2BB1

Inbound Filename: B3E2I61 Outbound Filename: B3E2O51

Inbound Start Time: 0438 Outbound Start Time:

Inbound End Time: 0503 Outbound End Time:

Comments:

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 9

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: McIntire Outbound (Ownship2) Pilot #: Sanders

Operator: Johnston Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** **Outbound** (**Both**)

Tide : (**Flood**) **Ebb**

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3F1BB2

Inbound Filename: B3F1IS2 Outbound Filename: B3F1062

Inbound Start Time: ~~7:00~~ 7:00 (7:55) Outbound Start Time:

Inbound End Time: 8:14 Outbound End Time:

Comments:

* Currents didn't extend out ~~to~~ all the way to the jetties

USED EXTENDED AREA ABOVE BUOY 24 (EASTERN SIDE OF CHANNEL) WHERE TO MEET ON FLOOD TIDE (AM)

More wide, more better. ALT 3. A FAN. (BS)

Area B: Two-way traffic in Mount Pleasant Range

Date: 4/19/14

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 10

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 1 Outbound (Ownship2) Pilot #: 2

Operator: MCA | SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3F2BB1

Inbound Filename: ~~B3F2BB1~~ B3F2I11 Outbound Filename: B3F2021

Inbound Start Time: ~~0515~~ 0517 Outbound Start Time:

Inbound End Time: 0535 Outbound End Time:

Comments:

Area B: Two-way traffic in Mount Pleasant Range

Date: 4/28/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 10

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 3 Outbound (Ownship2) Pilot #: 4

Operator: SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3F2BB1

Inbound Filename: B3F2E31 Outbound Filename: B3F2041

Inbound Start Time: 0537 Outbound Start Time:

Inbound End Time: 0553 Outbound End Time:

Comments: Stern on outbound clipped green side boundary and reduced bin speed

Area B: Two-way traffic in Mount Pleasant Range

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 10

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 6 Outbound (Ownship2) Pilot #: 5

Operator: MJS Inbound Bridge: A Outbound Bridge: C

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition B3F2BB1

Inbound Filename: B3F2I61 Outbound Filename: B3F2OB1

Inbound Start Time: 1003 Outbound Start Time:

Inbound End Time: 1024 Outbound End Time:

Comments:

Inbound simulation ran as expected (BS)

MET INBOUND VESSEL IN APPROPRIATE SPOT BY THE ALT 3 AREA AT THE NORTH END OF MOUNT PLEASANT RANGE. THE EXTRA SPACE PROVIDED BY ALT 3 IS ESENTIAL. (AM)

Area H: Two-way traffic in Bennis Range

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 78

Actual sequence run number: 1

Inbound (~~Ownship1~~ 2) Pilot #: 1 Outbound (~~Ownship2~~ 1) Pilot #: 2

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H1E2BB1

Inbound Filename: H1E2I11 Outbound Filename: H1E2021

Inbound Start Time: ~8:19 (813) Outbound Start Time:

Inbound End Time: 8:25 Outbound End Time:

Comments: ✓

Area H: Two-way traffic in Bennis Range

Date: 4/21/10

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: ~~83~~ 75

Actual sequence run number: 1

Inbound (~~Ownship1~~ 2) Pilot #: 1 Outbound (~~Ownship2~~ 1) Pilot #: 2

Operator: Johnston Inbound Bridge: ~~B~~ B Outbound Bridge: ~~B~~ A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** ~~**Alternative 3**~~

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

H1F1BB1

~~H1F1BB1~~

~~H3F1BB1~~

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Inbound Filename: H1F1I11 Outbound Filename: H1F1O21

Inbound Start Time: 07:53 (7:35) Outbound Start Time:

Inbound End Time: 07:59 Outbound End Time:

Comments: ✓

Outbound 32.46.933
079.54.739 117 s

Inbound: 32.46.373
079.53.324 297 s

✓

Area H: Two-way traffic in Bennis Range

Date: 4/12/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 76

Actual sequence run number: 1

Inbound (~~Ownship1~~) Pilot #: 1 (2) Outbound (~~Ownship2~~) Pilot #: 2 (1)

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H1F2BB1

Inbound Filename: H1F2I11 Outbound Filename: H1F2021

Inbound Start Time: 8:06 (7:59) Outbound Start Time:

Inbound End Time: 8:13 Outbound End Time:

Comments: ✓

Area H: Two-way traffic in Bennis Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 81

Actual sequence run number: 1

Inbound (~~Ownship1~~ 2) Pilot #: George campson Outbound (~~Ownship~~2) Pilot #: walters

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** A+2

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2E1BB1

Inbound Filename: 5:04 (4:48) H2E1I81 Outbound Filename: H2E1031

Inbound Start Time: 5:19 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

+0.5 tide

10 N
16
IN Bound Below Bridge

Area H: Two-way traffic in Bennis Range

Date: ~~5/5~~ 5/4

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 81

Actual sequence run number: 1

Inbound (Ownship 2/1) Pilot #: ~~McIntire~~ Sanders Outbound (Ownship 1/2) Pilot #: ~~Sanders~~ mc in line

Operator: ~~MCA~~ Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alternative 2

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2E1BB1

Inbound Filename: H2E1I61 Outbound Filename: H2E1051

Inbound Start Time: 0820 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

GOOD UTILIZATION OF ALT 2 AREA, BUT SHIP INTERACTION PULLED STERN OF MY VESSEL OUT OF CHANNEL (ARM)

SHIP INTERACTION TOO MUCH to be practical; between 2 simulated 14k ships (BS)

✓

Area H: Two-way traffic in Bennis Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 82

Actual sequence run number: 1

Inbound (Ownship) Pilot #: Dukes 4 Outbound (Ownship) Pilot #: Walters 3

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** AH2

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: ~~1 30K NE~~

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2E2B B1

Inbound Filename: H2E2I41 Outbound Filename: H2E2O31

Inbound Start Time: 4:12 (3:58) Outbound Start Time:

Inbound End Time: 4:29 Outbound End Time:

Comments:

+.5 m tide

Area H: Two-way traffic in Bennis Range

Date: 5/4

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 82

Actual sequence run number: 1

Inbound (Ownship 2) Pilot #: Sanders Outbound (Ownship 1) Pilot #: McIntyre

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (~~1201 x 160 x 49.9~~ ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alt 2

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2E2BB1

Inbound Filename: H2E2IG1 Outbound Filename: H2E2O51

Inbound Start Time: 0845 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Drove inbound vessel as would in real scenario, up the middle of the red side. Ship interaction too much post passing that no safety factor there (BS)

✓

Area H: Two-way traffic in Bennis Range

Date: 26 APR 2016

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4) GEORGE ~~E~~ CAMPSEN (PILOT 8)

Test Matrix Run Number: 79

Actual sequence run number: 1

Inbound (Ownship 2) Pilot #: 4 Outbound (Ownship 1) Pilot #: 8

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** ALT (2)

Heading: **Inbound** **Outbound** (**B**oth)

Tide : (**F**lood) **Ebb**

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2F1BB1

Inbound Filename: H2F1I41 Outbound Filename: H2F1088

Inbound Start Time: 0531 (0517) Outbound Start Time:

Inbound End Time: 05 48 Outbound End Time:

Comments: ⌋

Area H: Two-way traffic in Bennis Range

Date: 5/4/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 79

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 6 Outbound (Ownship) Pilot #: 5

Operator: MJS Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alternative 2A

Heading: Inbound Outbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2F1BB1

Inbound Filename: H2F1I61 Outbound Filename: H2F1O51

Inbound Start Time: 0524 Outbound Start Time:

Inbound End Time: 0542 Outbound End Time:

Comments:

ADDED 0.5 m OF TIDE

USED ALL OF ALT 2 AREA TO MEET INBOUND VESSEL. EXCESSIVE SHIP INTERACTION (AM)

Leaves no room for margin of safety; shedding the stbd side of channel with no room. (BS)

✓

Area H: Two-way traffic in Bennis Range

Date: 4/26/16 B

Bridge A Pilot

Capt. ~~Grayton Walters (Pilot 3)~~ **and** John Dukes (Pilot 4) George Campsen (8)

Test Matrix Run Number: 80

Actual sequence run number: 1

~~Inbound~~ Outbound (Ownship) Pilot #: [redacted] 4 ~~Outbound~~ Inbound (Ownship) Pilot #: [redacted] 8

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** AH 2A

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2F2BB1

Inbound Filename: ~~H2F2B~~ H2F2I81 07:55 (M32) Outbound Filename: H2F2041

Inbound Start Time: 8:14 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments: ✓

✓

Area H: Two-way traffic in Bennis Range

Date: 5/4/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 80

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 6 Outbound (Ownship) Pilot #: 5

Operator: MK Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** (ALT. 2A)

Heading: **Inbound** **Outbound** (**Both**)

Tide : (**Flood**) **Ebb**

Wind Condition: **1** 30K NE

(**2** 30K SSW)

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H2F2BB1

Inbound Filename: H2F2I61 Outbound Filename: H2F2051

Inbound Start Time: 0735 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

EXTREME SITUATION IN ALT 2. USED ALL AND EXRA TO MEET VESSEL (AM)

used every bit of WIDENER ALT leaving no safety factor; in reality would expect more bank cushion / suction effect (BS)

✓

Area H: Two-way traffic in Bennis Range

Date: 4/22/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 85

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 1 Outbound (Ownship) Pilot #: 2

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3E1BB1

Inbound Filename: H3E1I11 Outbound Filename: H3E1021

Inbound Start Time: 0243 Outbound Start Time:

Inbound End Time: 0255 Outbound End Time:

Comments: Inbound clipped red boundary

Meeting elapsed time => 5:00

Area H: Two-way traffic in Bennis Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4) George Campsen (8)

Test Matrix Run Number: 85

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 4 Outbound (Ownship) Pilot #: 8

Operator: SKM Inbound Bridge: BJ Outbound Bridge: AG

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3E1BB1

Inbound Filename: H3E1I41 Outbound Filename: H3E1081

Inbound Start Time: 1016 Outbound Start Time:

Inbound End Time: 1045 Outbound End Time:

Comments:

✓

Area H: Two-way traffic in Bennis Range

Date: ~~4/22~~ 4/ 5/5 (5) McINTIRE (6) Sanders

Capt. ~~Crayton Walters (Pilot 3)~~ **and** ~~John Dukes (Pilot 4)~~

Test Matrix Run Number: 85

Actual sequence run number: 1

Inbound (Ownship 2) Pilot #: 85 Outbound (Ownship 1) Pilot #: 26

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3E1BB1

Inbound Filename: H3E1I51 Outbound Filename: H3E1O21

Inbound Start Time: 2010 Outbound Start Time:

Inbound End Time: 2055 Outbound End Time:

Comments:

Area (H:) Two-way traffic in Bennis Range

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 85

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 6 Outbound (Ownship) Pilot #: 5

Operator: MSS Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound Outbound Both

Tide : **Flood** Ebb

Wind Condition: 1 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Inbound Filename: H3E1BB1 H3E1I61 Outbound Filename: H3E1051

Inbound Start Time: 0520 Outbound Start Time:

Inbound End Time: 0534 Outbound End Time:

Comments:

NO Comment (AM)

Successful meeting of the two vessels. (BS)

✓

Area H: Two-way traffic in Bennis Range

Date: 4/22/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 86

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 1 Outbound (Ownship) Pilot #: 2

Operator: Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** **Outbound** (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: **1** 30K NE

(**2** 30K SSW)

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3E2BB1

Inbound Filename: H3E2I11 Outbound Filename: H3E2O21

Inbound Start Time: 0131 Outbound Start Time:

Inbound End Time: 0225 Outbound End Time:

Comments: Inbound stern left channel after passing.

Meeting time (hours) ⇒ 05:40

↑ elapsed

Area H: Two-way traffic in Bennis Range

Date:

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 86

Actual sequence run number: 2

Inbound (Ownship 2) Pilot #: 2 Outbound (Ownship 1) Pilot #: 1

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3E23B2

Inbound Filename: H3E2122 Outbound Filename: H3E2012

Inbound Start Time: 0225 Outbound Start Time:

Inbound End Time: 0237 Outbound End Time:

Comments: Inbound stern clipped (red) north channel boundary

✓

Area H: Two-way traffic in Bennis Range

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 86

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 6 Outbound (Ownship) Pilot #: 5

Operator: MAS Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Inbound Filename: H3E2BB1 H3E2IG1 Outbound Filename: H3E2O51

Inbound Start Time: 0507 Outbound Start Time:

Inbound End Time: 0519 Outbound End Time:

Comments:

NEEDED MORE SPEED TO STAY CLOSE TO BANK (STARBOARD)

SUCESSFUL MEETING (ARM)

Good situation. manageable bank and ship interactions.

Good Simulation.

✓

Area H: Two-way traffic in Bennis Range

Date: 4/13/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 83

Actual sequence run number: 1

Inbound (Ownship) Pilot #: McIntire Outbound (Ownship) Pilot #: Sanders

Operator: Johnsto Inbound Bridge: B 9 Outbound Bridge: A 7.5

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound Outbound Both

Tide: **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3F1BB1

Inbound Filename: H3F1I51 Outbound Filename: H3F1O61

Inbound Start Time: 10:40 (10:25) Outbound Start Time:

Inbound End Time: 10:53 Outbound End Time:

Comments:

didnt properly utilize the customhouse widener; used ℄ of channel to a fault. (BS)

BECAUSE OUTBOUND VESSEL FAILED TO USE ALT. 3 ARE INBOUND VESSEL COULD NOT MAKE TURN FOR THE BRIDGE. (AM)

✓

Area H: Two-way traffic in Bennis Range

Date:

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4) George Campsen (8)

Test Matrix Run Number: 84

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 5 Outbound (Ownship) Pilot #: 4

Operator: SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3F2BB1

Inbound Filename: H3F2IB1 Outbound Filename: H3F2OB1

Inbound Start Time: 0234 Outbound Start Time:

Inbound End Time: 0243 Outbound End Time:

Comments: Inbound "hugged" red side ~~for~~ prior to the passing and Nuns stern over the edge just before the pass occurred. He pulled it back in just as the two ships met.

✓

Area H: Two-way traffic in Bennis Range

Date: 5/5/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 84

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 6 Outbound (Ownship) Pilot #: 5

Operator: MS Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound Outbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3F2BB1

Inbound Filename: 0448 H3F2BB1 Outbound Filename: H3F2051

Inbound Start Time: 0507 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

WAS ABLE TO MAINTAIN RUN ALONG STARBOARD BANK SHIP INTERACTION HIGH. (AM)

Good situation; less interaction w/ bank and acceptable ship interactions. WAS able to maintain middle of the Red side.

✓

Area H: Two-way traffic in Bennis Range

Date: 4/29/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 83A

Actual sequence run number: 1

Inbound (Ownship) Pilot #: 3 Outbound (Ownship) Pilot #: 4 Outbound2: 3

Operator: Inbound Bridge: A Outbound Bridge: B 02: C

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: Inbound **Outbound** (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition H3E1BB2

Inbound Filename: H3E1IB1 Outbound Filename: H3E1041 H3E1031

Inbound Start Time: 0254 Outbound Start Time:

Inbound End Time: 0309 Outbound End Time:

Comments: 3 ship run => 1 inbound & 2 outbounds
Inbound & 2nd outbound met as outbound was approaching the turn and as the inbound was leaving the turn. As they passed outbound 2's stern left channel boundary. However, there has always been plenty of water there naturally.

✓

Area J: Two-way traffic in Hog Island Range

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 114

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 1 Outbound (Ownship2) Pilot #: 2

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J1E2 BB1

Inbound Filename: 9:29 (9:42) J1E2I1 Outbound Filename: J1E2021

Inbound Start Time: 9:44 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

very close, Ships came to about 0 ~ 75 ft (at least) within one another

* moved outbound Ships closer to bridge to allow ships to meet in less "ideal" location

Area J: Two-way traffic in Hog Island Range

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: ~~11~~ 114

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 2 Outbound (Ownship2) Pilot #: 1

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition ~~J1E2B~~ J1E2B B2

Inbound Filename: ~~9:49~~ (9:45) Outbound Filename: J1E2O12

Inbound Start Time: 10:07 J1E2I2~~2~~ Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Pilots switched running who was inbound & who was outbound

~~[illegible]~~

Area J: Two-way traffic in Hog Island Range

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 111

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 1 Outbound (Ownship2) Pilot #: 2

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

J1F1BB1

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Inbound Filename: J1F1I11 Outbound Filename: J1F1021

Inbound Start Time: 0825 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

- met under bridge
  - "best case" Scenario

Area J: Two-way traffic in Hog Island Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 117

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Dukes 4 Outbound (Ownship2) Pilot #: ~~Dukes~~ walters 3

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** (Alt 2)

Heading: **Inbound** **Outbound** (**Both**)

Tide : **Flood** (**Ebb**)

Wind Condition: ~~**1** 30K NE~~

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2E1BB1

Inbound Filename: 3:04 (2:54) Outbound Filename: J2E1031

Inbound Start Time: 3:20 J2E1E41 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

moved outbound ship back In order to meet under bridge or closer

Area J: Two-way traffic in Hog Island Range

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 118

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Weil Outbound (Ownship2) Pilot #: Lockwood

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alt 2a

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2E2BB1

Inbound Filename: 10:41 (10:18) Outbound Filename: J2E2011

Inbound Start Time: 10:59 J2E2I21 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area J: Two-way traffic in Hog Island Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 118

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 4 Dukes Outbound (Ownship2) Pilot #: Walters 3

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alt 2

Heading: Inbound **Outbound** Both

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2E2BB1

Inbound Filename: 2:33 (2:13) Outbound Filename: J2E2031

Inbound Start Time: 2:51 J2E2I41 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

+ had to add .5 meter of tide for squat effect

Area J: Two-way traffic in Hog Island Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 115

Actual sequence run number: 1 John Dukes 4 George Campsen (5)

Inbound (Ownship1) Pilot #: ~~George Campsen~~ Outbound (Ownship2) Pilot #: ~~John Dukes 4~~

Operator: Johnston Inbound Bridge: ~~A~~ B Outbound Bridge: ~~B~~ A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alt 2

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2F1BB1

Inbound Filename: 3:36 (3:27) Outbound Filename: J2F1081

Inbound Start Time: 3:55 J2F1I41 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

+.5 m tide

Area J: Two-way traffic in Hog Island Range

Date: 5/4

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 115

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: B Outbound (Ownship2) Pilot #: A

Operator: MCA Inbound Bridge: Sanders Outbound Bridge: McIntyre

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alt 2

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2F1 BB1

Inbound Filename: J2F1I61 Outbound Filename: J2F1051

Inbound Start Time: 0916 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

WAS too close on the inbd (red) side for this Alt 2 scenario. (BS)

EXCESSIVE BANK CUSION ON BRIDGE AND INTERACTION WITH INBOUND SHIP (AM)

Area J: Two-way traffic in Hog Island Range

Date: 5/4

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 1/6

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: B Sanders Outbound (Ownship2) Pilot #: Mc Intire

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alt 2

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2F2BB1

Inbound Filename: J2F2I61 Outbound Filename: J2F2O51

Inbound Start Time: 0938 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

SHIP INTERACTION. VERY HIGH. (AM)

too much interaction when trying to balance giving ont bound enough room and not interacting w channel bank. (BS)

Area J: Two-way traffic in Hog Island Range

Date: 4/27/16

Capt. Crayton Walters (Pilot 3) and John Dukes (Pilot 4) Campson 8

Test Matrix Run Number: 116

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 4

Operator: SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3** Alternative 2

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J2F2BB1

Inbound Filename: J2F2I81 Outbound Filename: J2F2041

Inbound Start Time: 0823 Outbound Start Time:

Inbound End Time: 0852 Outbound End Time:

Comments:

Area J: Two-way traffic in Hog Island Range

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 121

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: MJS Inbound Bridge: ~~B~~ ~~A~~ C Outbound Bridge: ~~B~~ ~~C~~ A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **B**oth

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3E1BB2

Inbound Filename: J3E1I52 Outbound Filename: J3E1062

Inbound Start Time: 0835 Outbound Start Time:

Inbound End Time: 0907 Outbound End Time:

Comments:

Successful meeting. (BS)

NO COMMENT (ARM)

Area J: Two-way traffic in Hog Island Range

Date: 9/ 3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 127

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Sanders Outbound (Ownship2) Pilot #: McIntire

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3E1BB1

Inbound Filename: J3E1I61 Outbound Filename: J3E1051

Inbound Start Time: 8:28 (8:16) Outbound Start Time:

Inbound End Time: 8:39 Outbound End Time:

Comments:

+.5 tide

need all of the widener on the east side of Hog Isle Reach (BS

WOULD WANT TO MEET ~~FORTHD~~ CLOSER TO BRIDGE ON EBB TIDE (AM)

Area H: Two-way traffic in Bennis Range

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 122

Actual sequence run number: 2

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: MS Inbound Bridge: C Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3E2BB2

Inbound Filename: J3E2[illegible]I52 Outbound Filename: J3E2062

Inbound Start Time: 0908 Outbound Start Time:

Inbound End Time: 0929 Outbound End Time:

Comments:

GREAT MEETING SITUATION - SPEED ALWAYS AN ISSUE.
AS LONG AS SHIPS MEET ON STRAIGHT REACH, NOT TOO MUCH INTERACTION.
(AM)

post-meeting, experienced a dramatic interaction to port. perhaps the skidding of the others (ontbd) exasberated the interactions. (BS)

Area J: Two-way traffic in Hog Island Range

Date: 9/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: ~~120~~ 122

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Sanders Outbound (Ownship2) Pilot #: McIntire

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3E2B31

Inbound Filename: J3E2I61 Outbound Filename: J3E2051

Inbound Start Time: 8:53 Outbound Start Time:

9:06

Inbound End Time: Outbound End Time:

Comments:

+.5m tide

Needed every bit of Alt 3 (BS)
IN this Simulation

AS IN 121 - AS OUTBOUND VESSEL, I ATTEMPT TO ALLOW INBOUND VESSEL TO GET UP THE RIVER AS CLOSE TO BRIDGE PRIOR TO MEETING. IN REAL SCENARIO, THIS IS CRITICAL TO MAKING TURN ONTO BENNIS REACH ON EBB TIDE (AM)

Area J: Two-way traffic in Hog Island Range

Date: 4/20/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 119

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Lockwood 1 Outbound (Ownship2) Pilot #: 2 Weil

Operator: Johnston Inbound Bridge: A Outbound Bridge:

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition 6 1/2 J3F1BB1

6

Inbound Filename: J3F1BB1 JBFII1 Outbound Filename: J3F1021

Inbound Start Time: 10:50 (1029) Outbound Start Time:

Inbound End Time: 11:08 Outbound End Time:

Comments:

No ship to Ship interaction felt

↳ Run again closer together

Area J: Two-way traffic in Hog Island Range

Date: 4/29/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 119

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 3 Outbound (Ownship2) Pilot #: 8

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** **Outbound** (**Both**)

Tide : (**Flood**) **Ebb**

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3F1BB1

Inbound Filename: J3F1I31 Outbound Filename: J3F1081

Inbound Start Time: 0317 Outbound Start Time:

Inbound End Time: 0338 Outbound End Time:

Comments: Inbound clipped red side boundary as the ships passed and then hung over the red side after the passing

Area J: Two-way traffic in Hog Island Range

Date: 4/3/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 120

Actual sequence run number:

Inbound (Ownship1) Pilot #: McIntire Outbound (Ownship2) Pilot #: Sanders

Operator: Johnston Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound Outbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3F2BB2

Inbound Filename: J3F2I52 Outbound Filename: J3F2062

Inbound Start Time: 9:58 (9:45) Outbound Start Time:

Inbound End Time: 10:08 Outbound End Time:

Comments:

Moved outbound ship back towards wando

INBOUND SHIP OUT OF POSITION ON TURN (AM)

A better simulation, due to initial positioning of ships to meet on Hog Isle to utilize the Alt 3 widener.

*This would be a repeatable scenario. (BS)

Area J: Two-way traffic in Hog Island Range

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 120

Actual sequence run number: 2

Inbound (Ownship 2) Pilot #: 6 Outbound (Ownship 1) Pilot #: 5

Operator: MJS Inbound Bridge: A Outbound Bridge: C

Inbound and Outbound Ships CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition J3F2BB2

Inbound Filename: J3F2BB2I62 Outbound Filename: J3F2052

Inbound Start Time: 0546 Outbound Start Time:

Inbound End Time: 0611 Outbound End Time:

Comments:

no comment (AM)

successful meeting of the two vessels (BS)

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/27

Capt. Crayton Walters (Pilot 3) **or** John Dukes (Pilot 4)

Test Matrix Run Number: 15

Actual sequence run number: 1

Operator: Allison Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound

Tide : **Ebb**

Wind Condition: 1 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C2EIE31

Start Time: 0457

End Time: 0515

Comments

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/26

Capt. Crayton Walters (Pilot 3) **or** John Dukes (Pilot 4)

Test Matrix Run Number: 15

Actual sequence run number: 1

Operator: Allison Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C2E1I41

Start Time: 0352

End Time: 0419

Comments

CMTNR41

C

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Cisco 7

Test Matrix Run Number: 36 (C?) → 15 on final matrix

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE 2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: C2E1I71

Start Time: 0302

End Time: 0335

Comments: Should've been more set towards G43 due to Ebb & wind pushing on her starboard beam.

Area C: ***One way traffic through Drum Island Turn for large containerships*** (CNTNR41)

Date: 4/20/16

Capt. Henry Lockwood (Pilot 1) **or** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 16

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C2E2I21

Start Time: 0335

End Time: 0406

Comments: Ship behaved like normal. I think the ebb tide from Wando could've been more prevalent setting ship down on G43 buoy. Otherwise seemed realistic.

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/22/24

Capt. Crayton Walters (Pilot 3) **or** John Dukes (Pilot 4)

Test Matrix Run Number: 16

Actual sequence run number: 1

Operator: Allison/Sam Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound**

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C2E2I31

Start Time: 0423

End Time: 0456

Comments

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 5/4/2016

Capt. Andrew McIntire (Pilot 5) **or** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 17

Actual sequence run number: 1

Operator: NJS Ship Bridge: A

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition C3E1I5 1

Filename: C3E1I5 1

Start Time: 0309

End Time: 0328

Comments

IN AN EFFORT TO ADHEAR TO BOUNDRY LINES OF ALT 3, I WAS UNABLE TO MAKE TURN INTO MEYERS BEND SUCCESSFULLY WITHOUT RUNNING AGROUND ON WEST BANK.

(ARM)

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/26/16

Capt. Crayton Walters (Pilot 3) **or** John Dukes (Pilot 4)

Test Matrix Run Number: 17A

Actual sequence run number: 1

Operator: Johnston Ship Bridge: A

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound Outbound

Tide : **Ebb**

Wind Condition: 1 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C3E1031

Start Time: 9:53 (9:47)

End Time: 10:17

Comments

- Horse Island he ran as if he was meeting a ship Capt
- Wanted to cont Run through Hog island Reach turn

17
18
29
30

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **or** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 18

Actual sequence run number: 1

Operator: SKM Ship Bridge: B

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound**

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition C3E2I61

Filename: C3E2I61

Start Time: 0309

End Time: 0325

Comments

used every bit if not too much of the stbd (red) side of Drum Isle range; could have used more Room and this would have made the turn into myers more succesful as I could have initiated my turn to stbd. sooner (BS)

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/26/16

Capt. Crayton Walters (Pilot 3) **or** John Dukes (Pilot 4)

Test Matrix Run Number: 18A

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound**

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition [illegible]

Filename: C4 E1 I41

Start Time: 0850

End Time: 0906

Comments

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 5/5/16

Capt. Andrew McIntire (Pilot 5) **or** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 184

Actual sequence run number:

Operator: SKM Ship Bridge: A

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C4EIE51

Start Time: 0213

End Time: 0241

Comments

MADE THE TURN INTO DRUM ISLAND REACH, INBOUND, WITH HARD PORT RUDDER AND FULL AHEAD ENGINES. STILL CAUGHT THE TOP WESTERN EDGE OF ~~B~~ DRUM ISLAND REACH.

ALSO USED ALL OF ALT 4 AREA FOR TURN INTO MYERS BEND HARD STBD AND ~~FULL~~ HALF AHEAD (ARM)

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **or** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 17

Actual sequence run number: 1

Operator: MJS Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound

Tide : Ebb

Wind Condition: 1 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: [redacted] C4E1I61

Start Time: 0244

End Time: 0304

Comments

The Alt 4 cut at the Western end of Drum Isle Range enables an earlier initiation of turn into Myers bend. This is an improvement to the "chokept" of Drum Island / Cooper River Bridges scenarios as noted in the US Coast Pilot. Alt 4 would be an improvement to ship handling ops in this area particularly in regards to a likely increase in 2 way traffic w/in the port. Big Fan of Alt 4. (B5) Esp. w/ NE Ebb simulations.

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/26/16

Capt. Crayton Walters (Pilot 3) or John Dukes (Pilot 4)

Test Matrix Run Number:

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C4E1041

Start Time: 0906

End Time: 0930

Comments

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 5/5/16

Capt. Andrew McIntire (Pilot 5) **or** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 18B

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C4E2S1

Start Time: 0245

End Time: 0301

Comments

UTILIZED EASTERN SIDE OF HOG ISLAND REACH ABOVE THE BRIDGE. JUST ABOVE THE BRIDGE STARTED TURN WITH HARD PORT AND FULL AHEAD, AND MAINTAINED RUDDER AND ENGINE THROUGHOUT TURN. STILL GOT INTO NORTH EAST CHANNEL BOUNDRY ON DRUM ISLAND REACH. USED ALT 4 AREA TO TURN INTO MYERS BEND. REQUIRED HARD STARBOARD RUDDER AND FULL AHEAD ENGINE TO OVERCOME WIND AND TIDE EFFECT.

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 5/5/2016

Capt. Andrew McIntire (Pilot 5) **or** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 18 B

Actual sequence run number: 1

Operator: MCF Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound**

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: C4E2I61

Start Time: 0217

End Time: 0244

Comments

WAS able to make turn onto drum isle range as intended, however ebb tide into myers was caught me a bit by surprise. Knowing this was able to begin turn earlier on next simulations (EBB, NE, ALT4)

*The Alt 4 cut at the W. end on Drum Isle range enables an earlier initiation of turn into myers, thus its appeal. (BS)

Area C: ***One way traffic through Drum Island Turn for large containerships***

Date: 4/26/16

Capt. Crayton Walters (Pilot 3) **or** John Dukes (Pilot 4) on George Campsen (Pilot 5)

Test Matrix Run Number: 183

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Filename: ~~C4E2051~~ C4E2081

Start Time: 0931

End Time: 0952

Comments

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/19/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** ✓ Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 25

Actual sequence run number: 1

Harbor Pilot #: 2

Operator: Johnston Ship Bridge: B Tug Bridge: fl

- Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

- Tide : **Ebb**
- Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D1E1I21 Tug Filename: 11

6

Ship Start Time: 10:32

Ship End Time: 10:11

Comments:

Tug went out of channel

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/19/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2) ✓

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 25

Actual sequence run number: 2

Harbor Pilot #: 2

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide: **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D1E1I22 Tug Filename:

Ship Start Time: 10 52 (10 46)

Ship End Time: 1113

Comments: Tug line broke, but still made run
↳ use lesser tug & strength which caused it to break
* Should re-run

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20/16

✓ Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 27

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D2E1I11 Tug Filename:

Ship Start Time: 2:30 (0213)

Ship End Time:

Comments:

Added .3m tide to bottom

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/19/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 27

Actual sequence run number: 1

Harbor Pilot #:

Operator: SKM Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D2E1I21 Tug Filename:

Ship Start Time: 0807

Ship End Time: 0844

Comments: Added 0.3m of tide to the bottom

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 26 APR 2016

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. ~~Brian Curran~~ RICHARDSON Tug Captain: Capt. ~~Robert Leach~~ KILCLIGHTER

Test Matrix Run Number: 27

Actual sequence run number: 1

Harbor Pilot #: 3

Operator: MJS Ship Bridge: A Tug Bridge: B

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative (2)** **Alternative 3** **Alternative 4**

Heading: **(Inbound)** Outbound

Tide : **(Ebb)**

Wind Condition: (1) 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D2E1I31

Ship Filename: Tug Filename:

Ship Start Time: 0350 (0341)

Ship End Time: 0406

Comments: Wrong ECDIS on this run.

Ship rudder was full over to port
Ergin was full ahead. Tug was indirect aa
full to stbd. We used every inch of 92 drum
island channel. We Then had had stbd rdder
on to ship in Myers Bend. Used tug full to port indirect.

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/27/16

✓ Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 27

Actual sequence run number: 1

Harbor Pilot #:

Operator: Johnston Ship Bridge: A Tug Bridge: B Tug Bridge: C

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

8 Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition ~~D2E 01~~ 1

Ship Filename: ~5:50 (534) Tug Filename: D2E1I32

Ship Start Time: 6:07

Ship End Time:

Comments:

C/ Tug 161 → St Bow → Cap Richardson

B/ Tug 10N → Stern → Cap Kicklighter

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 26 APR 2016

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. ~~Brian Curran~~ Richardson Tug Captain: Capt. ~~Robert Leach~~ Kicklighter

Test Matrix Run Number: 27

Actual sequence run number: 1

Harbor Pilot #: 4

Operator: MJS Ship Bridge: A Tug Bridge: B

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D2 ~~E~~ I I 4 1

Ship Filename: Tug Filename:

Ship Start Time: 0426 (0416)

Ship End Time: 0447

Comments:

Completing the maneuver took 100% of the ship + tug effort. It was marginal from a safety standpoint. More room at the West side of Drum on the red side would have increased safety margin

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date:

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 28

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: Allison Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D2E2I11 Tug Filename:

Ship Start Time: 0305 (0250)

Ship End Time:

Comments:

Tug Line 175'

Turning 43. Turned early anticipating Wind set to red buoys. Ended up far rite.

Turning 46. Hard to break ship to rite due to SW set to North + Wind turning moment to left

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/19/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 28

Actual sequence run number: 1

Harbor Pilot #:

Operator: SKM Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D2E2I21 Tug Filename:

Ship Start Time: 0844

Ship End Time: 0911

Comments: Grounded

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 26 APR 2016

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: ~~Capt. Brian Curran~~ RICHARDSON Tug Captain: Capt. ~~Robert Leach~~ KIRKLIGHTER

Test Matrix Run Number: 28

Actual sequence run number: 1

Harbor Pilot #: 4

Operator: MJS Ship Bridge: A Tug Bridge: B

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D2E2I41

Ship Filename: Tug Filename:

Ship Start Time: 0458 (0447)

Ship End Time: 0515

Comments:

On the inbound transit to the new terminal, it was essintial that I used everything I had (tugs, hard-over rudder commands, and full ahead bells) to remain in the channel. Making the turn through Drum Island I used the entire channel and was dangerously close to the west side just to make the turn without the stern swinging onto drum Island.

More room on the west side of drum island reach would be much more advantageous, as well as more room on the southeast corner.

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 20 April

Harbor Pilot: Capt. ~~Henry Lockwood~~ (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 29

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: Allison Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D3E1I11 Tug Filename:

Ship Start Time: 5:05

Ship End Time: 5:44

Comments:

+ 0.3 tide

Captain was unhappy with how it felt, running again

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 29

Actual sequence run number: 2

Harbor Pilot #: 1

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D3E1I12 Tug Filename:

Ship Start Time: 5:53 (5:44)

Ship End Time: 6:18

Comments:

+0.3 tide

Clipped channel, at turn, almost grounded speed dropped to 0.1 but able to recover

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** ✓ Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: ~~09~~ ~~28~~ 29

Actual sequence run number: 1

Harbor Pilot #: 2

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1 30K NE**

~~2 30K SSW~~

8

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: ~~D3E1I21~~ D3E1I21, Tug Filename:

Ship Start Time: 8:59 (8:53)

Ship End Time: 9:19

Comments: ✓

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/26/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: ~~Capt. Brian Curran~~ Eddie Richardson

Tug Captain: Capt. ~~Robert Leach~~ Josh Kicklighter

Test Matrix Run Number: 29

Actual sequence run number: 1

Harbor Pilot #:

Operator: Johnston Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D3E1I31

Ship Filename: ~8:59 (Tug Filename:

Ship Start Time: 9:17

Ship End Time:

Comments:

8

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2) ✓

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 290ut

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D3E1021 Tug Filename:

Ship Start Time: 8:02 (7:55)

Ship End Time: 8:19

Comments: ✓

M

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** ✓ Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 30

Actual sequence run number: 1

Harbor Pilot #: 2

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide: **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D3E2F21 Tug Filename:

Ship Start Time: 10:10 (9:55)

Ship End Time: 10:27

Comments:

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/26/16

✓ Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: ~~Capt. Brian Curran~~ Eddie Richardson Tug Captain: ~~Capt. Robert Leach~~ Kicklighter

Test Matrix Run Number: 30

Actual sequence run number: 1

Harbor Pilot #:

Operator: Johnston Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D3E2I31

Ship Filename: 9:22 (9:18) Tug Filename:

Ship Start Time: 9:45

Ship End Time:

Comments: ✓

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2) ✓

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 3 Dout

Actual sequence run number: 1

Harbor Pilot #: ~~2~~ 2

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D3E2021 Tug Filename:

Ship Start Time: 8:32 (8:28)

Ship End Time: 8:45

Comments: ✓

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** ✓ Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: ~~24~~ 30h

Actual sequence run number: 1

Harbor Pilot #: 2

Operator: Johnston Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : ~~Ebb~~ Flood

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D3F2IE21 Tug Filename:

Ship Start Time: 9:39 (9:27)

Ship End Time: 9:55

Comments:

made tug line too long, but successful

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide w/out ~~***with tug assist***~~

Date: 4/26/16

✓ Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 30A

Actual sequence run number: 1

Harbor Pilot #: 3

Operator: Johnston Ship Bridge: A Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** (**Alternative 3**) **Alternative 4**

Heading: (**Inbound**) Outbound

Tide : **Ebb** (Flood)

Wind Condition: **1** 30K NE

(2 30K SSW)

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D3FZI31

Ship Filename: 10:34 (10:29) Tug Filename:

Ship Start Time: 10:47

Ship End Time:

Comments:

Re-run for lat/lons

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 9/26/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. ~~Brian Curran~~ Richardson Tug Captain: ~~Capt. Robert Leach~~ Kicklighter

Test Matrix Run Number: 30A

Actual sequence run number: 1

Harbor Pilot #: 4

Operator: SKM Ship Bridge: C Tug Bridge: B

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D4E2I41 Tug Filename:

Ship Start Time: 1024

Ship End Time: 1043

Comments:

Rerun for lat/lons

***Area D:** One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist*

Date: 4/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 30B

Actual sequence run number: 1

Harbor Pilot #:

Operator: Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D4E2I31 Tug Filename:

Ship Start Time: 0919

Ship End Time: 0938

Comments: Rerun for Lat/Longs

Re-run for lat/long

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/26/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. ~~Brian Curran~~ Richardson Tug Captain: Capt. ~~Robert Leach~~ Josh Kicklighter

Test Matrix Run Number: 303

Actual sequence run number: 1

Harbor Pilot #: 4

Operator: SKM Ship Bridge: C Tug Bridge: B

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: DAE2I41 Tug Filename:

Ship Start Time: 1043

Ship End Time: 1103

Comments:

Re-run for Lat/Longs

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Docking Pilot: Capt. ~~Brian Curran~~ Eddie Richardson Tug Captain: ~~Capt. Robert Leach~~ Josh Kicklighter

Test Matrix Run Number: 30C

Actual sequence run number: 1

Harbor Pilot #: 4

Operator: SKM Ship Bridge: A Tug Bridge: B

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: **Inbound** Outbound

Tide : **Ebb** Flood

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition D4F1I41

Ship Filename: Tug Filename:

Ship Start Time: 0948

Ship End Time: 1003

Comments: 2 tugs ⇒ one ownship (TUG10) & one operator-controlled (TUG16)

Area D: One way traffic through Drum Island Turn for large containerships at ebb tide with tug assist

Date: 4/20

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Docking Pilot: Capt. Brian Curran Tug Captain: Capt. Robert Leach

Test Matrix Run Number: 25

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: Allison Ship Bridge: B Tug Bridge: A

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: D1E1I11 Tug Filename:

Ship Start Time:

Ship End Time: 0346

Comments:

. 3 tide added

Data file empty. No LOG file

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date:

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 32

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E1E1I11

Start Time: 0936

End Time: 1003

Comments:

Turn @ 43 is easie on simulator than real conditions.
Turn @ 46 is extremely hard to make. Never would attempt passing another vessel. Used all power + rudder possible. Widener would ease conditions

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/19/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 34

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** Outbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E1E1011

Start Time: 1059

End Time: 1115

Comments:

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4|19|16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 31

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E1F1I11

Start Time: 1003

End Time: 1036

Comments:

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/19/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 33

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E1F1011

Start Time: ~~1003~~ 1038

End Time: ~~1036~~ 1059

Comments:

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/19

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 36

Actual sequence run number: 1

Operator: MCA Ship Bridge: C

Ship ~~TANK10L~~ Bulkcod: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E2E1I11

Start Time: 0851

End Time:

Comments:

Turn @ 43 is earlier on simulation than real conditions.

Turn @ 46 difficult. Needed 4 used more power than actually available in real conditions.

Widener would definitely make the turn safer & easier

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date:

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 36

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E2E1I21

Start Time: 0247

End Time: 0301

Comments:

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/19

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 35

Actual sequence run number: 1

Operator: Ship Bridge: C

Ship ~~TANK10L~~ BulkCOL *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E2F1I11

Start Time:

End Time:

Comments:

~~Record playback for bridge pilot info.~~

- left turn on 43 is easier on simulator than real conditions
- Rt turn @ 46 is very difficult due to bank effects. Even though transit appears good the conditions would be better if widener was present. Passing would not be possible under present conditions.
Did not anticipate flood tide for turn @ 43.
Never made turn @ 46. Widener may have helped. Not Sure.

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** (Capt. Rob Weil (Pilot 2))

Test Matrix Run Number: 35

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship TANK10L: *Danita II* (750- x 106- x 46-ft)

Channel Alternative: **Alternative 1** (**Alternative 2**) **Alternative 3**

Heading: (Inbound)

Tide : (**Flood**) **Ebb**

Wind Condition: (**1** 30K NE)

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E2F1I21

Start Time: 0210

End Time: 0227

Comments:

Area E: One way traffic through Drum Island Turn for Bulk Carriers (Inbound Only)

Date: 4/20

Harbor Pilot: ~~Capt. Andrew McIntire (Pilot 5)~~ **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 37

Actual sequence run number: 1

Operator: Ship Bridge:

Ship BULKC06L *MS Magnitogorsk (707- x 104- x 37.7-ft)*

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3** **Alternative 4**

Heading: Inbound Outbound

Tide : **Flood** **Ebb**

Wind Condition: 1 30K NE

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: E2F1011

Start Time:

End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/26/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 97

Actual sequence run number: 1

Harbor Pilot #: 3

Operator: SKM Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : **Flood** Ebb

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition I2EI I3I

Ship Filename: Tug Filename:

Ship Start Time: 0728

Ship End Time: 808

Comments:

Area I: ***One way traffic in and out of Wando Terminal***

Date: 4/24/2016

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 101

Actual sequence run number: 1

Harbor Pilot #: 4

Operator: MJS Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition I2E1041

Ship Filename: Tug Filename:

Ship Start Time: 0910

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 5/5/16

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 101

Actual sequence run number: 1

Harbor Pilot #: 5

Operator: SKM Ship Bridge: A Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : **F**lood **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: IZE1051 Tug Filename:

Ship Start Time: 0350

Ship End Time: 0407

Comments: Cut the corner on the red side as he exited the Wando.

USED ALL OF ALT 2 AREA IN WANDO RIVER (AND THEN SOME) DUE TO NE BREEZE. CUT CORNER FOR TURN TO BRIDGE

Area I: One way traffic in and out of Wando Terminal

Date: 5/5/16

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 98

Actual sequence run number: 1

Harbor Pilot #: 5

Operator: SKM Ship Bridge: A Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound Outbound

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I2E2I51 Tug Filename:

Ship Start Time: 0408

Ship End Time: 0418

Comments:

ROUTINE TRANSIT (AM)

Area I: One way traffic in and out of Wando Terminal

Date: 5/5/2016

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot (6))

Test Matrix Run Number: 102

Actual sequence run number: 1

Harbor Pilot #: 6

Operator: MS Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** (**Alternative 2**) **Alternative 3**

Heading: Inbound (Outbound)

Tide : Flood (Ebb)

Wind Condition: **1** 30K NE

(2) 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I2E2061 Tug Filename:

Ship Start Time: 0407

Ship End Time: 0432

Comments:

Ebb tide caught ships Stbd Qtr. too close on Gr side again. like in the Fld tide scenario. (BS)

Area I: One way traffic in and out of Wando Terminal

Date:

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 95

Actual sequence run number: 1

Harbor Pilot #:

Operator: MCA Ship Bridge: A Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **O**utbound

Tide : Flood **E**bb

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I2FI1ST Tug Filename:

Ship Start Time: 0311

Ship End Time: 0328

Comments:

DID NOT EXPERIENCE NORTHERLY SET FROM FLOOD TIDE. TURNED VERY EARLY IN ANTICIPATION OF NORTH SET. HARD STBD RUDDER AND FULL AHEAD ENGINES. WOUND UP ON EAST SIDE OF CHANNEL IN GOOD POSITION

Area I: One way traffic in and out of Wando Terminal

Date: 5|5|16

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 99

Actual sequence run number: 1

Harbor Pilot #: 5

Operator: SKM Ship Bridge: A Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide : **F**lood **E**bb

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I2F1051 Tug Filename:

Ship Start Time: 0328

Ship End Time: 0340

Comments:

ROUTINE RUN (ARM)

Area 1: One way traffic in and out of Wando Terminal

Date: 5/5/2016

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 96

Actual sequence run number: 1

Harbor Pilot #: 6a

Operator: MJS Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2A** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide : **F**lood **E**bb

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I2F2I61 Tug Filename:

Ship Start Time: 0313

Ship End Time: 0335

Comments:

Good simulation of Fld and SSW Anoes on simulator model. Buoy placements of Alt 2 looks good from the ~~[illegible]~~ inbd pt of view.

Area I: One way traffic in and out of Wando Terminal

Date: 4/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 100

Actual sequence run number:

Harbor Pilot #: 3

Operator: Johnston Ship Bridge: ~~Tug Bridge:~~

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound Outbound

Tide : Flood Ebb

Wind Condition: 1 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition I2F20 31

Ship Filename: 9:58 (9:29) Tug Filename:

Ship Start Time: 10:14

Ship End Time:

Comments:

3

N 32.49.947
W 079.53.614
210
3

Area 1: One way traffic in and out of Wando Terminal

Date: 5/5/2016

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 102

Actual sequence run number: 1

Harbor Pilot #: 6

Operator: MAS Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide: **F**lood **E**bb

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I2F2061 Tug Filename:

Ship Start Time: 0335

Ship End Time: 0407

Comments:

Got a bit too close on the #5 Buoy (GR) WDO River. Would likely interact w/ bank in this case. Was a bit crowded on the GR side (BS)

Area I: One way traffic in and out of Wando Terminal

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 105

Actual sequence run number: 1

Harbor Pilot #: 2

Operator: SKM Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **O**utbound

Tide : Ebb Flood

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3E1I2R Tug Filename:

Ship Start Time: 0520

Ship End Time: 0529

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/28

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 1

Actual sequence run number: 105

Harbor Pilot #:

Operator: MCA Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3EIE31 Tug Filename:

Ship Start Time: 0754

Ship End Time: 0815

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 109

Actual sequence run number: 1

Harbor Pilot #:

Operator: MCA Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide : Ebb Flood

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3E1011 Tug Filename:

Ship Start Time: 0818

Ship End Time:

Comments: Starting @ center of Wando Terminal

Area I: One way traffic in and out of Wando Terminal

Date: 4/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** ~~John Dukes (Pilot 4)~~

Test Matrix Run Number: 109

Actual sequence run number: 1

Harbor Pilot #:

Operator: Johnston Ship Bridge: ~~Tug Bridge:~~

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition I3E1031

Ship Filename: ~10:37 (10:28) Tug Filename:

Ship Start Time: ~~10:28~~ 10:50

Ship End Time:

Comments:

Captain said he liked the Alt 3 turn a lot

~~210~~ 205

Area I: One way traffic in and out of Wando Terminal

Date: 4/20

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** (Capt. Rob Weil (Pilot 2))

Test Matrix Run Number: 106

Actual sequence run number: 1

Harbor Pilot #: 2

Operator: SKM Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** (**Alternative 3**)

Heading: (Inbound) **O**utbound

Tide : (Ebb)

Wind Condition: **1** 30K NE

(**2** 30K SSW)

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3E2I21 Tug Filename:

Ship Start Time: 0531

Ship End Time: 0542

Comments: Would not have made it in the existing Channel widths. W/SSW wind I was not able to get STBD rot to make the inbound turn.

Area I: One way traffic in and out of Wando Terminal

Date: 2 - Weil

Harbor Pilot: ~~Capt. Andrew McIntire (Pilot 5)~~ **OR** ~~Capt. Bryan Sanders (Pilot 6)~~

Test Matrix Run Number:

Actual sequence run number:

Harbor Pilot #:

Operator: Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide : **F**lood Ebb

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3E2I22 Tug Filename:

Ship Start Time: 0941

Ship End Time: 0954

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/20

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2) (RW)

Test Matrix Run Number: 105 7 Cisco

Actual sequence run number: 1

Harbor Pilot #: 3

Operator: Allison Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide : **F**lood **Ebb**

Wind Condition: ~~1 30K NE~~

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3E2I91 Tug Filename:

Ship Start Time: 0941

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/28/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4) George Campsen B

Test Matrix Run Number: 16a

Actual sequence run number: 2

Harbor Pilot #: 5

Operator: Johnston Ship Bridge: C ~~Tug Bridge:~~

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition I 3 E 2 I B 2

Ship Filename: 5:21 (518) Tug Filename:

Ship Start Time: 5:30

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/20

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2) Capt Cisco (3)

Test Matrix Run Number: 110

Actual sequence run number: 1

Harbor Pilot #: 3

Operator: Allison Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3E2037 Tug Filename:

Ship Start Time: 0903

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/26

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 103

Actual sequence run number: 1

Harbor Pilot #: 3

Operator: MCA Ship Bridge: A Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : Flood **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3F1 I31 Tug Filename:

Ship Start Time: 10:48

Ship End Time: 11:10

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4) George Campsen B

Test Matrix Run Number: 103

Actual sequence run number: 1

Harbor Pilot #:

Operator: Johnston Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : Flood **Ebb**

Wind Condition: 1 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition I 3 F 1 I B 1

Ship Filename: 5:36 Tug Filename:

Ship Start Time: 5:54

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/20/16

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 107

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: SKM Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : **Ebb** Flood

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3F1011 Tug Filename:

Ship Start Time: 0543

Ship End Time: 0816

Comments: Started @ center of Wando Terminal

Area I: One way traffic in and out of Wando Terminal

Date: 4/28

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 107

Actual sequence run number: 1

Harbor Pilot #:

Operator: Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3F1031 Tug Filename:

Ship Start Time: 0840

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/28/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4) George Campson 8

Test Matrix Run Number: 104

Actual sequence run number: 1

Harbor Pilot #: 5

Operator: Johnston Ship Bridge: C Tug ~~Bridge~~:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound **Outbound**

Tide : Flood **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Title + Wind + Heading +Pilot + Repetition I3F2I81

Ship Filename: 4:35 (4:26) Tug Filename:

Ship Start Time: 4:48

Ship End Time:

Comments:

4/2

Area I: One way traffic in and out of Wando Terminal

Date: 4/20

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 108

Actual sequence run number: 1

Harbor Pilot #: 1

Operator: Allison Ship Bridge: C Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: **I**nbound **O**utbound

Tide : **E**bb Flood

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: I3F2011 Tug Filename:

Ship Start Time: 0837

Ship End Time:

Comments:

Area I: One way traffic in and out of Wando Terminal

Date: 4/28

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: Q20 108

Actual sequence run number: 1

Harbor Pilot #:

Operator: Ship Bridge: Tug Bridge:

Ship CNTNR40: *MSC Daniella 2* (1201- x 160- x 49.9 ft)

Channel Alternative: **Alternative 1** **Alternative 2** **Alternative 3**

Heading: Inbound Outbound

Tide : Flood ~~Ebb~~

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: ~~I3F2031~~ I3F2031 Tug Filename:

Ship Start Time: 0818

Ship End Time:

Comments: Check name ~~maybe I3F2011~~

Area G. Two way traffic through or Clouter Creek .

Date: 4/21

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 61

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Outbound (Ownship2) Pilot #:

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships ~~CNTNR20L: *KMSS Dainty* 965 x 106 x 41 ft~~ CNTNR41

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G1E1BB1

Inbound Filename: G1E1I21 Outbound Filename: G1E1O21

Inbound Start Time: 0351 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek .

Date: 4/21

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 62

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Outbound (Ownship2) Pilot #:

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships CNTNR~~20L: *KMSS Dainty* 965 x 106 x 41 ft~~ CNTNR40

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** ~~30K~~ NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G1E2BBJ

Inbound Filename: G1E2I11 Outbound Filename: G1E2021

Inbound Start Time: 0403 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek . CNTNR25L

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2) Cisco (pilot 3)

Test Matrix Run Number: 59

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: B (Apprentice) Outbound (Ownship2) Pilot #: 2

Operator: SKM Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G1F1BB1

Inbound Filename: G1F1I71 Outbound Filename: G1F1021

Inbound Start Time: 0300 Outbound Start Time:

Inbound End Time: 0319 Outbound End Time:

Comments:

** => No pilot ID

Area G. Two way traffic through or Clouter Creek . * CNTNR41

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 59*

Actual sequence run number:

Inbound (Ownship1) Pilot #: Outbound (Ownship2) Pilot #:

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G1F1BB2

Inbound Filename: G1F1I72 Outbound Filename: G1F1OZ2

Inbound Start Time: 0319 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek . CNTNR 41

Date: 4/21/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: ~~000~~ 59*

Actual sequence run number:

Inbound (Ownship1) Pilot #: 7 Outbound (Ownship2) Pilot #: 2

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition GIF1BB~~0~~3

Inbound Filename: GIFI7B Outbound Filename: GIF1023

Inbound Start Time: 0337 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek .

Date: 4/21

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 69

Actual sequence run number: 1

Inbound (Ownship 2) Pilot #: Outbound (Ownship 1) Pilot #:

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3E1BB1

Inbound Filename: ~~G3E1I2~~ G3E1I21 Outbound Filename: ~~G3E1I1~~ G3E1011

Inbound Start Time: 0455 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek . CNTNR41

Date: 4/28/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 69

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 4 Outbound (Ownship2) Pilot #: 3

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3E1BB1

Inbound Filename: G3E1I41 Outbound Filename: G3E1O31

Inbound Start Time: 0413 Outbound Start Time:

Inbound End Time: 0432 Outbound End Time:

Comments: CNTNR41 wit panamax ships
Out bound vessel's stern hussed green side after the passing of the inbound vessel, holding a large crab L.

Area G. Two way traffic through or Clouter Creek .

Date: 5/4/2016

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 73

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 5 Outbound (Ownship2) Pilot #: 6

Operator: MS Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3E1B1B1

Inbound Filename: G3E1I51 Outbound Filename: G3E1O61

Inbound Start Time: 0242 Outbound Start Time:

Inbound End Time: 0303 Outbound End Time:

Comments:

UTILIZED ALTERNATIVE 3 AREA TO ACCOMMODATE OUTBOUND VESSEL ON EBB TIDE. (AM)

Alt. 3 enabled safe passage of vessels (BS)

Area G. Two way traffic through or Clouter Creek .

Date:

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 70

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Outbound (Ownship2) Pilot #:

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships ~~CNTNR20L: *KMSS Dainty* 965 x 106 x 41 ft~~ CNTNR41

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3E2BB1

Inbound Filename: G3E2I11 Outbound Filename: G3E2O21

Inbound Start Time: 0506 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek .

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 74

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: McIntire Outbound (Ownship2) Pilot #: Bryan Sanders

Operator: Inbound Bridge: A Outbound Bridge: B

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* ~~965- x 106- x 41 ft~~ CNTNR41

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **I**nbound **O**utbound **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3E2BB1

Inbound Filename: G3E2I51 Outbound Filename: G3E2O61

Inbound Start Time: 0231 Outbound Start Time:

Inbound End Time: 0241 Outbound End Time:

Comments:

NO Comment. (BS)

FULLY UTILIZED ALTERNATIVE 3 AREA IN ORDER TO ~~MEET~~ ACCOMODATE TWO LARGE VESSELS.

Area G. Two way traffic through or Clouter Creek .

Date: 4/28/16

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 67

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: Outbound (Ownship2) Pilot #:

Operator: Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships ~~CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft~~ -> CNTNR41

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3F1BB1

Inbound Filename: G3F1I11 Outbound Filename: G3F1021

Inbound Start Time: 0426 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek . CNTNR41

Date: 4/28/16

Capt. Crayton Walters (Pilot 3) **and** John Dukes (Pilot 4)

Test Matrix Run Number: 71

Actual sequence run number: 1

Inbound (Ownship1) Pilot #: 4 Outbound (Ownship2) Pilot #: 3

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR20L: *KMSS Dainty* 965- x 106- x 41 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3F1BB1

Inbound Filename: G3FII41 Outbound Filename: G3F1031

Inbound Start Time: 0432 Outbound Start Time:

Inbound End Time: 0448 Outbound End Time:

Comments: CNTNR41 not Panamax vessel

Area G. Two way traffic through or Clouter Creek . CNTNR41

Date:

Capt. Henry Lockwood (Pilot 1) **and** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 68

Actual sequence run number: 1

~~Inbound~~ Out (Ownship1) Pilot #: 1001

~~Outbound~~ INBOUND (Ownship2) Pilot #: (6)

Operator: Inbound Bridge: Outbound Bridge:

Inbound and Outbound Ships CNTNR20L: ~~*KMSS Dainty* 965 x 106 x 41 ft~~ CNTNR41

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3F2BB1

Inbound Filename: G3F2I11 Outbound Filename: G3F2021

Inbound Start Time: 0445 Outbound Start Time:

Inbound End Time: Outbound End Time:

Comments:

Area G. Two way traffic through or Clouter Creek .

Date: 5/4/16

Capt. Andrew McIntire (Pilot 5) **and** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 72

Actual sequence run number: 1

~~Inbound~~ Outbound (Ownship1) Pilot #: McIntire ~~Outbound~~ Inbound (Ownship2) Pilot #: Bryan Sanders

Operator: SKM Inbound Bridge: B Outbound Bridge: A

Inbound and Outbound Ships CNTNR20L: ~~KMSS Dainty 965 x 106 x 41 ft~~ → CNTNR41

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: Inbound **Outbound** **Both**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition G3F2B31

Inbound Filename: G3F2I61 Outbound Filename: G3F2O51

Inbound Start Time: 0152 Outbound Start Time:

Inbound End Time: 0228 Outbound End Time:

Comments:

Simulated widener allowed turn from clouter creek 293 to 315 with less bank cushion. better for turn. Good thing the extra 50 ft. (BS)

NO COMMENT (AM)

Area F One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 8/4/2016

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 53

Actual sequence run number:

Operator: MFS Ship Bridge: A

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3E1IS1

Start Time: 0334

End Time: 0419

Comments:

USED ALT 3 AREAS FOR INBOUND TURNS AND TO STAY OFF THE DOCK. AND MAXIMIZE DISTANCE FROM DOCKED SHIPS

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 5/5/2016

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 53

Actual sequence run number: 1

Operator: MJS Ship Bridge: A

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3E1I61

Start Time: 1037

End Time: 1131

Comments:

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 5/5/16

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** Capt. Bryan Sanders (Pilot 6)

Test Matrix Run Number: 57

Actual sequence run number: 1

Operator: SKM Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3E1031

Start Time: 1037

End Time: 1120

Comments:

UTILIZATION OF ALTERNATIVE AREAS PROVED BENEFICIAL FOR OUTBOUND TRANSIT. SPECIFICALLY IN TURN FOR HWY526 - DOM HOLT BRIDGE AND TO INCREASE DISTANCE FROM WESTERN BANK TERMINALS AND DOCKED VESSELS. (ARM)

*See comments

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 5/4/16

Harbor Pilot: Capt. Andrew McIntire (Pilot 5) **OR** (Capt. Bryan Sanders (Pilot 6))

Test Matrix Run Number: 57

Actual sequence run number: 1

Operator: SKM Ship Bridge: B

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** (**Alternative 3**)

Heading: **Inbound** (**Outbound**)

Tide : **Flood** (**Ebb**)

Wind Condition: (**1** 30K NE)

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3E1061

Start Time: 0335

End Time: 0419

Comments: Run was missing berthed ships, see run 53.

(BS) Utilised the drawn in widenens as a way to minimize interaction with in reality, berthed ships and Navy yard. All widenens including clouter creek were great. esp on Ebb w/ NE 30. Widenens N of. Don Holt Bridge esp. helpful on Ebb/wind conditions. This was most realistic simulation yet in my opinion.

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 4/27/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 58

Actual sequence run number: 1

Operator: SKM Ship Bridge: A

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3E2031

Start Time: 3:21

End Time: 4:02

Comments:

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 22/April

Harbor Pilot: Capt. Henry Lockwood (Pilot 1) **OR** Capt. Rob Weil (Pilot 2)

Test Matrix Run Number: 57

Actual sequence run number:

Operator: Ship Bridge:

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition F3F1I11

Ship Filename: ℗

Start Time: 0300

End Time: 0336

Comments:

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 4/28/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4) or George Campsen B

Test Matrix Run Number: 51

Actual sequence run number: 1

Operator: Johnston Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition F 3F 1 I B 1

Ship Filename: 2:41 (2:24)

Start Time: 3:23

End Time:

Comments:

+2 bulk carrier targets

002
B

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date: 4/28/16

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4) George Campsen

Test Matrix Run Number: 55

Actual sequence run number: 1

Operator: Johnston Ship Bridge: C

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition F3F1081

Ship Filename: 3:29 (3:23)

Start Time: 4:19

End Time:

Comments:

w/2 bulk carrier targets

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date:

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4) George Campsen (5)

Test Matrix Run Number: 52

Actual sequence run number:

Operator: MCB Ship Bridge: B

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3F2I4

Start Time: 0233

End Time: 0313

Comments:

Area F. One way traffic through or Clouter Creek , North Charleston, and Filbin Creek Reaches.

Date:

Harbor Pilot: Capt. Crayton Walters (Pilot 3) **OR** John Dukes (Pilot 4)

Test Matrix Run Number: 56

Actual sequence run number: 1

Operator: MCA Ship Bridge: B

Ship CNTNR41 Containership *Konway* 1102- x 138- x 45.9 ft

Channel Alternative: **Alternative 1** **Alternative 3**

Heading: **Inbound** **Outbound**

Tide : **Flood** **Ebb**

Wind Condition: **1** 30K NE

2 30K SSW

Filename = Area + Alternative + Tide + Wind + Heading +Pilot + Repetition

Ship Filename: F3F2041

Start Time: 0316

End Time:

Comments:

Appendix C: Final Questionnaires

Charleston Harbor Docking Pilots – Final Questionnaire

Name: Jonathan Dye (843) 412-6288 jonbdye@gmail.com

Date: 4-14-2016

Please base your responses upon your simulator runs.

Basin: Wando

1) Alt 2A (2 and 3 tugs):

The runs I made on Alt 2A were easily negotiated with the space in the turning basin. The 3 tug model was more safely dockable with the stronger wind model.

2) Alt 3 (2 and 3 tugs):

Alt 3 was quite roomy but probably not needed.

Basin: New Terminal (Navy Docks)

3) Alt 2A (2 and 3 tugs):

This model appeared to be safer undocking with 3 tugs on ebb tide. The 2A Turning Basin was adequate size to turn vessels. Flood tide was ok with 2 tugs, but three seemed better

4) Alt 3 (2 and 3 tugs):

Alt 3 was the same as above with more room.

Basin: North Charleston

5)Alt 2A (2 and 3 tugs):

Alt 2A run fine with 2 or 3 tugs. Ample room

6) Alt 3 (2 and 3 tugs):

Same as above with more room.

7) Comments in general on the deepening project and the ship simulations you participated in.

I really enjoyed participating with the crew at ERDC. The simulations seemed to be realistic and challenging. Although I'd like to have as much room as possible in the harbor, and the turning basins in particular, the Alt 3 scenario is probably unnessessary.

EELRICHARDSON@YAHOO.COM

Charleston Harbor Docking Pilots – Final Questionnaire

Name: EDWARD A. RICHARDSON JR.

Date: 4/14/16

Please base your responses upon your simulator runs.

Basin: Wando

1) Alt 2A (2 and 3 tugs):

BASIN SIZE SEEMED TO BE ADEQUATE FOR TURNING VESSELS ON ANY TIDE AND VARIOUS WIND CONDITIONS.

2) Alt 3 (2 and 3 tugs):

BASIN SIZE WOULD BE NICE AND GIVE ~~LESS~~ MORE ROOM FOR ERROR BUT PROBABLY NOT NEEDED AT THIS TIME WITH THIS SIZE OF VESSEL.

YOU CAN APPLY THESE COMMENTS TO NEW TERMINAL AND TO NORTH CHARLESTON.

Basin: New Terminal (Navy Docks)

3) Alt 2A (2 and 3 tugs):

4) Alt 3 (2 and 3 tugs):

Basin: North Charleston

5)Alt 2A (2 and 3 tugs):

6) Alt 3 (2 and 3 tugs):

7) Comments in general on the deepening project and the ship simulations you participated in.

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: John Dukes Date: 4/29/16

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

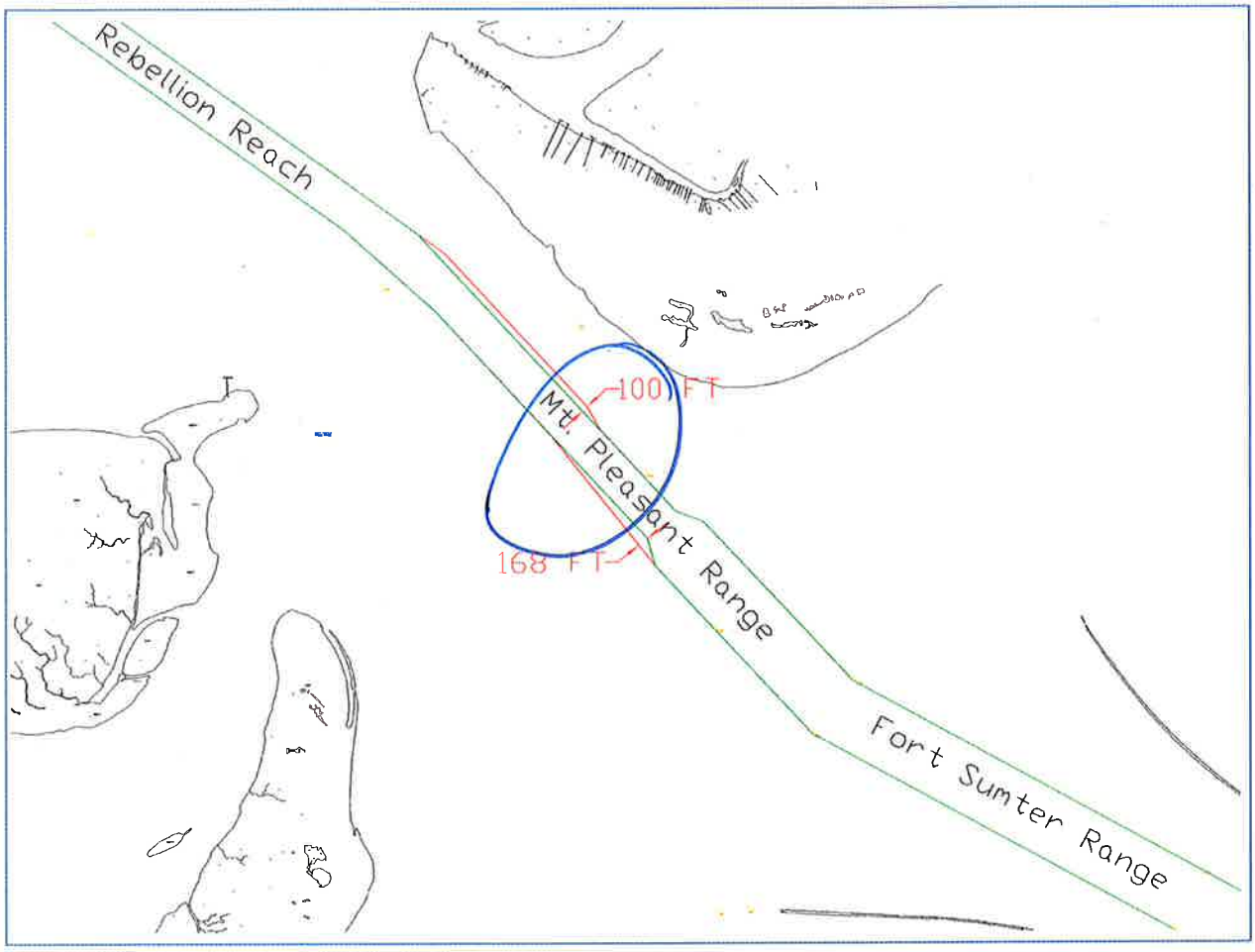


Figure 1 Mount Pleasant Range

Alt 1 is not workable with larger ships.

Alt 3's bowtie shape creates a bottleneck that makes meeting large ships problematic. It would be nice if that was not there for safe passing.

get back in the center before the turn into woods.

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

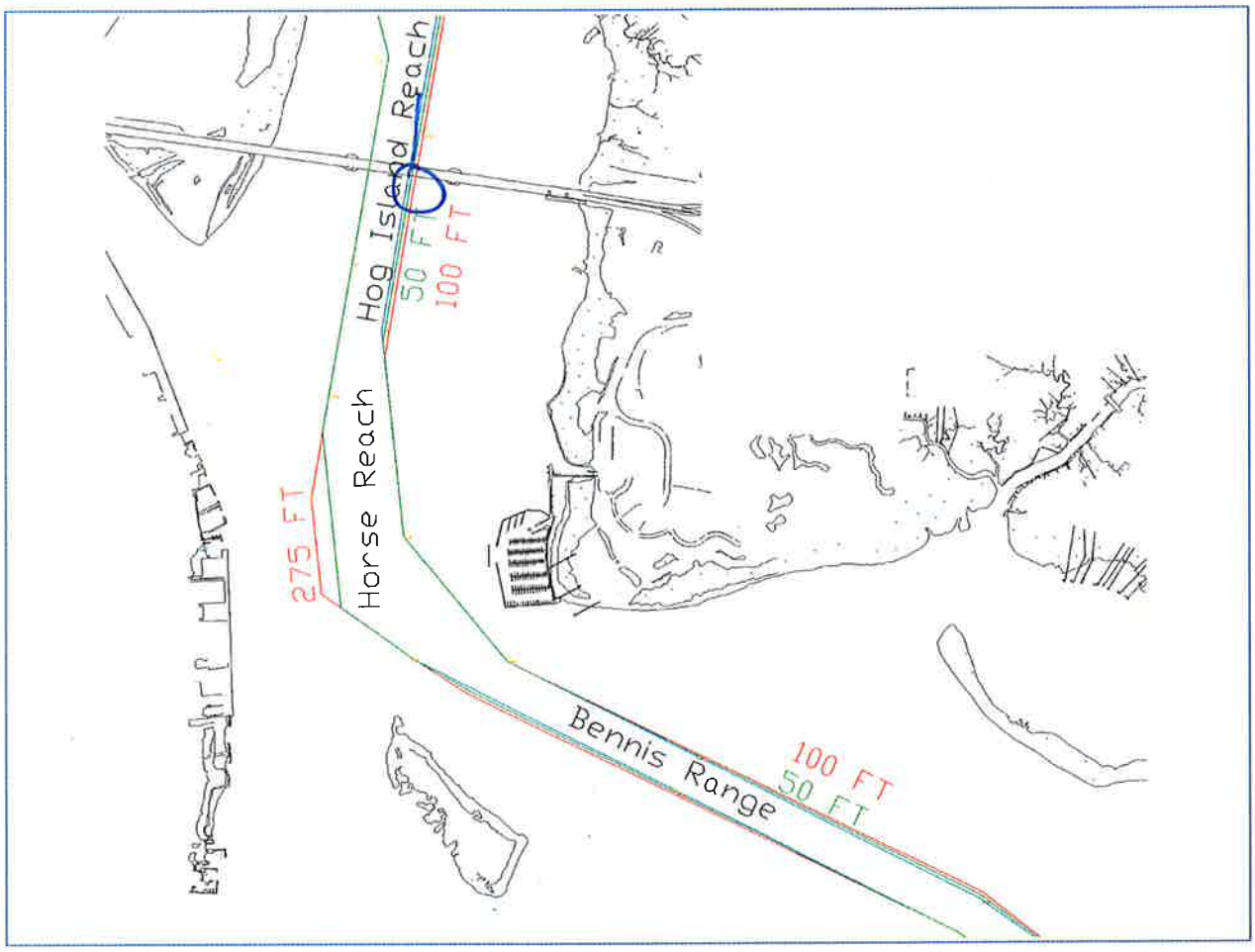


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

Alt 1 is not workable for passing large trips.

Alt 2 same

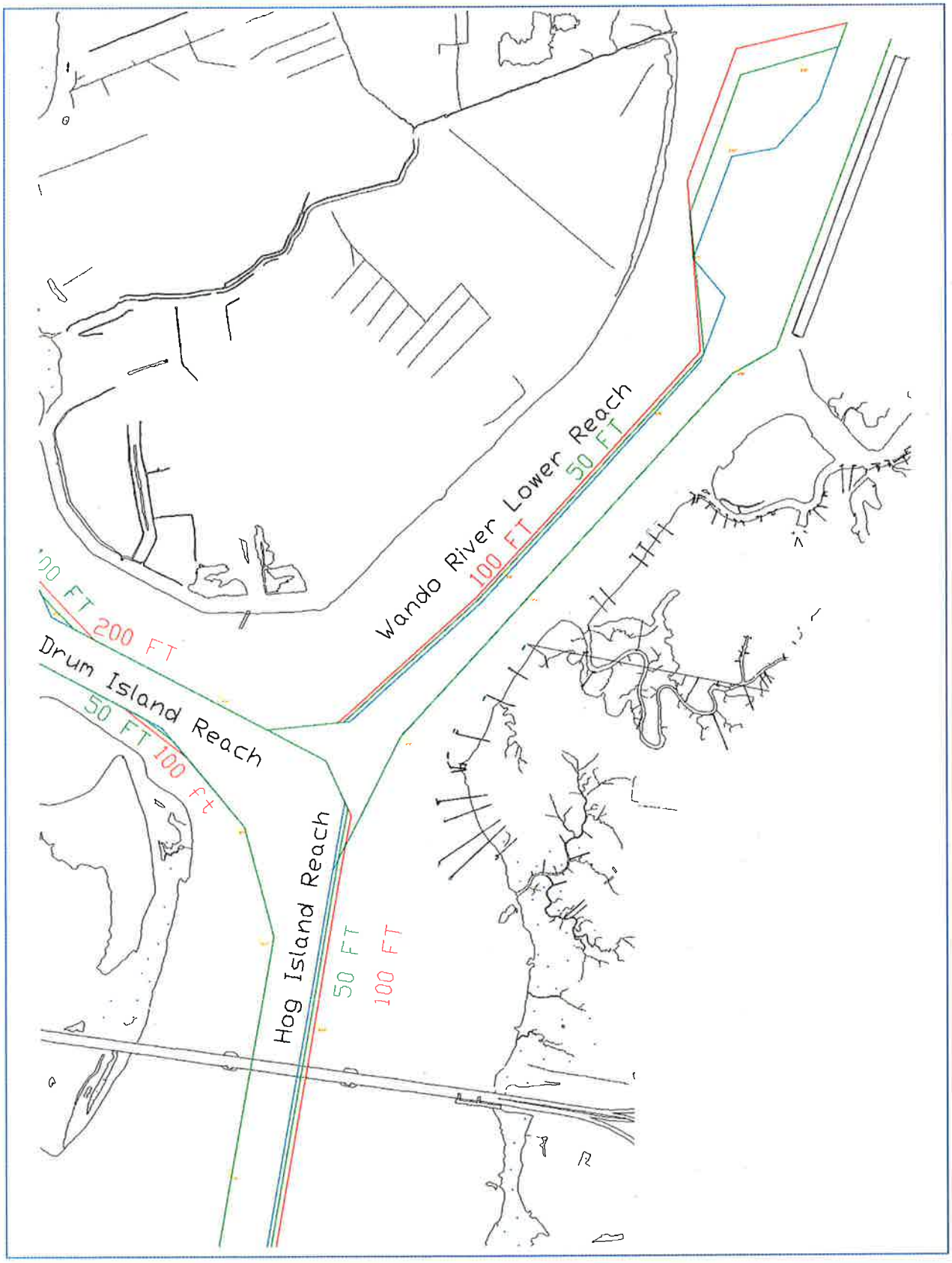
Alt 3 will allow us to safely pass large ships and even multiple ships (ie two inbound, two outbound)

* Hog Island extra 100' allows inbound Cooper River bound ship to get on the right side of channel to help soften the turn without stern grounding.

Moreover if meeting off city or under bridge, extra room allows outbound ship room to

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).



Alt 3 allows room for the ship to curb and room for tugs alongside.

Figure 3 Wando River

Alt 1 doesn't allow for safe transit – stern runs aground

Alt 2 – same

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

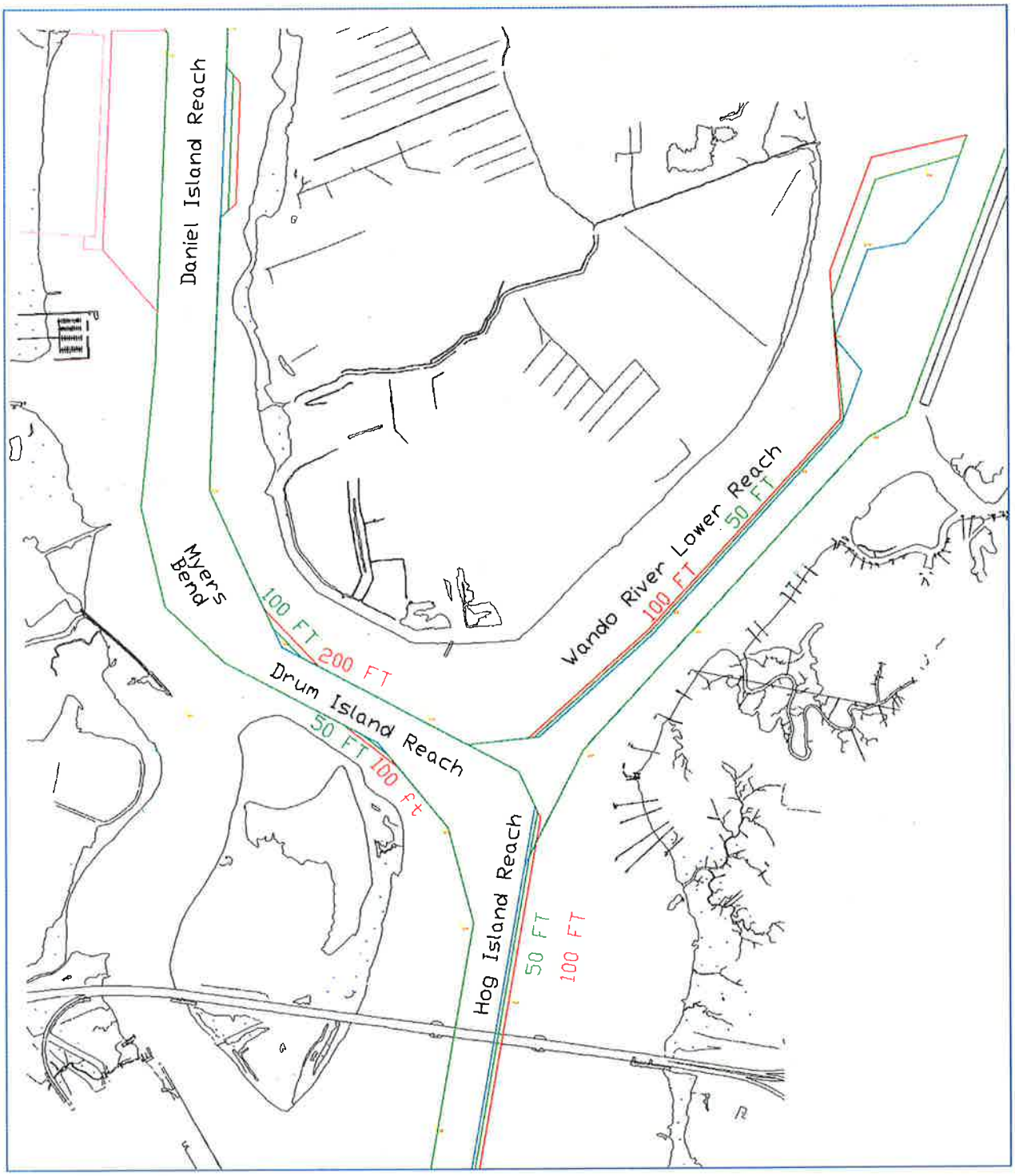


Figure 4 Drum Island Reach

Alt 1 doesn't work

Alt 2 doesn't work

Alt 3 This will work for one way traffic w/ tugs

Alt 4 " Same

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

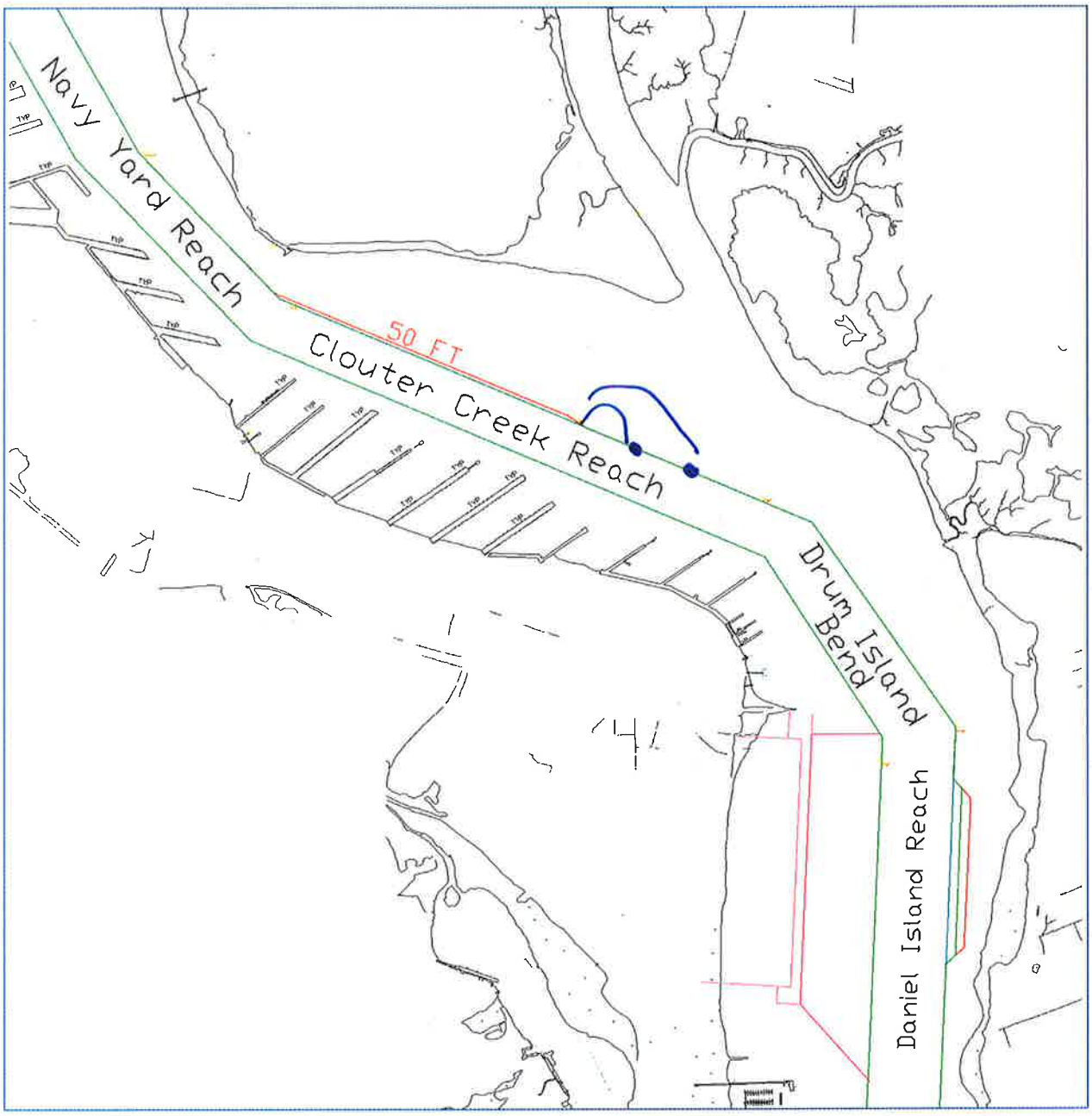


Figure 5 Clouter Reach

Alt 1 – no two way traffic possible with larger ships

Alt 3 allows us to pass two large ships. However it would be better if the widening extended another 1000' feet. Now it is only several ship lengths long.

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

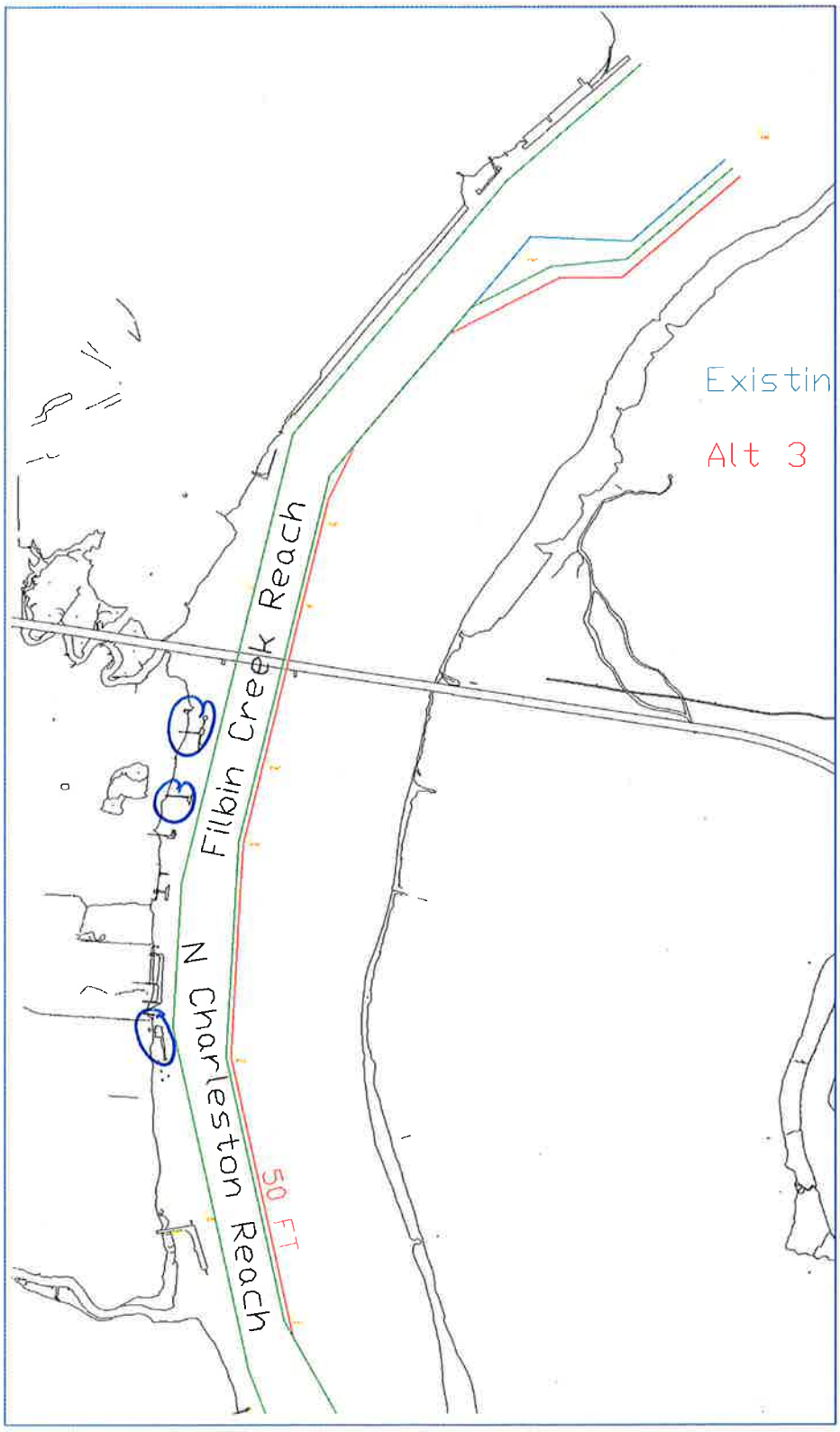


Figure 6 North Charleston and Filbin Creek Reaches

Alt 1 – I fear we will pull tankers moored on tanker row off of their berths. Also during simulations channel width was insufficient!

Alt 3 – gave adequate room to turn and more space so that we would not pull moored ships off their docks

7) Comments in general on the deepening project and the ship simulations you participated in.

Very accurate, and staff was happy to amend the program in the few instances that we thought needed adjustment. There are a few places that may need to be revisited, such as the bottleneck at buoy 24' Mt Pleasant reach. However, the facility and simulation is amazing. The staff is great.

I find that Alt 3 or 4 is the only solution that will work if we are going to safely move these larger vessels in Charleston.

John Dukes

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: George Campsen Date: 4-29-16

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

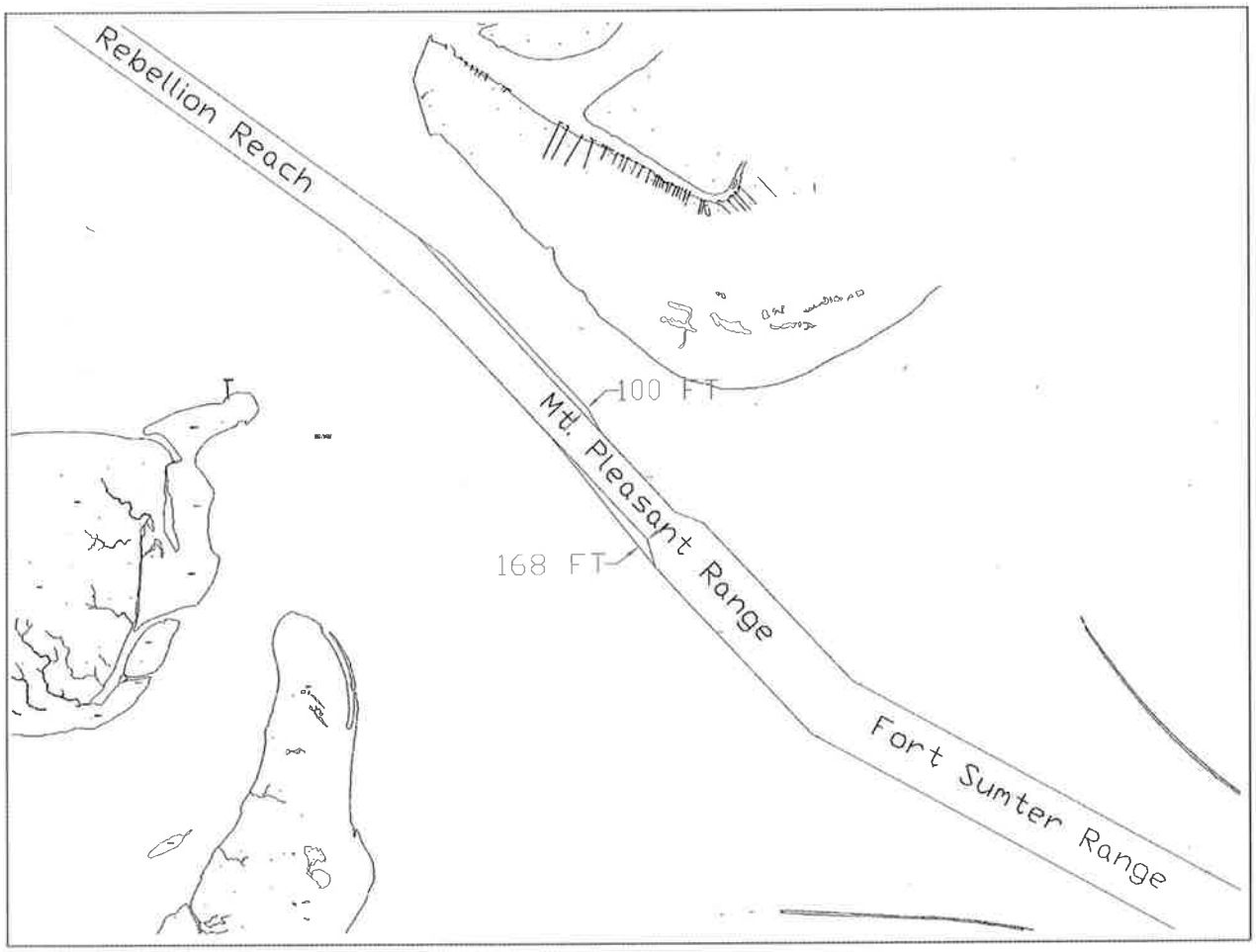


Figure 1 Mount Pleasant Range

Alt 1: This option does not allow the passing and meeting of larger ships. It is simply too tight to manuever these ships in a passing & meeting scenario.

Alt 3: Alt 3 does not allow the passing & meeting of ships near the current 24 buoy's position. The bottleneck created there inhibits large ships from passing & meeting there. If the bottleneck in this area were eliminated, ships could easily pass & meet anywhere on the reach. The bottleneck is a real issue!

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

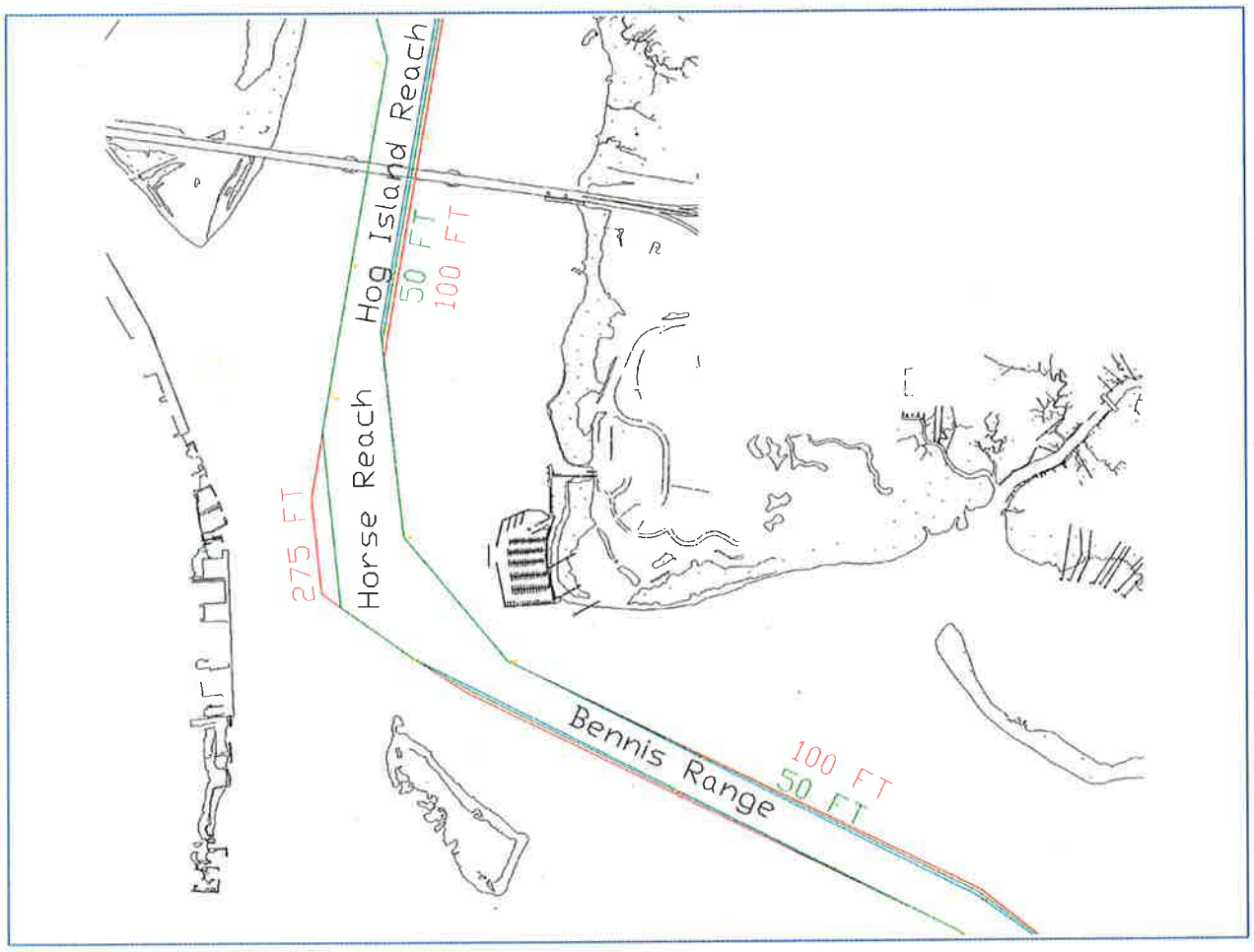


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

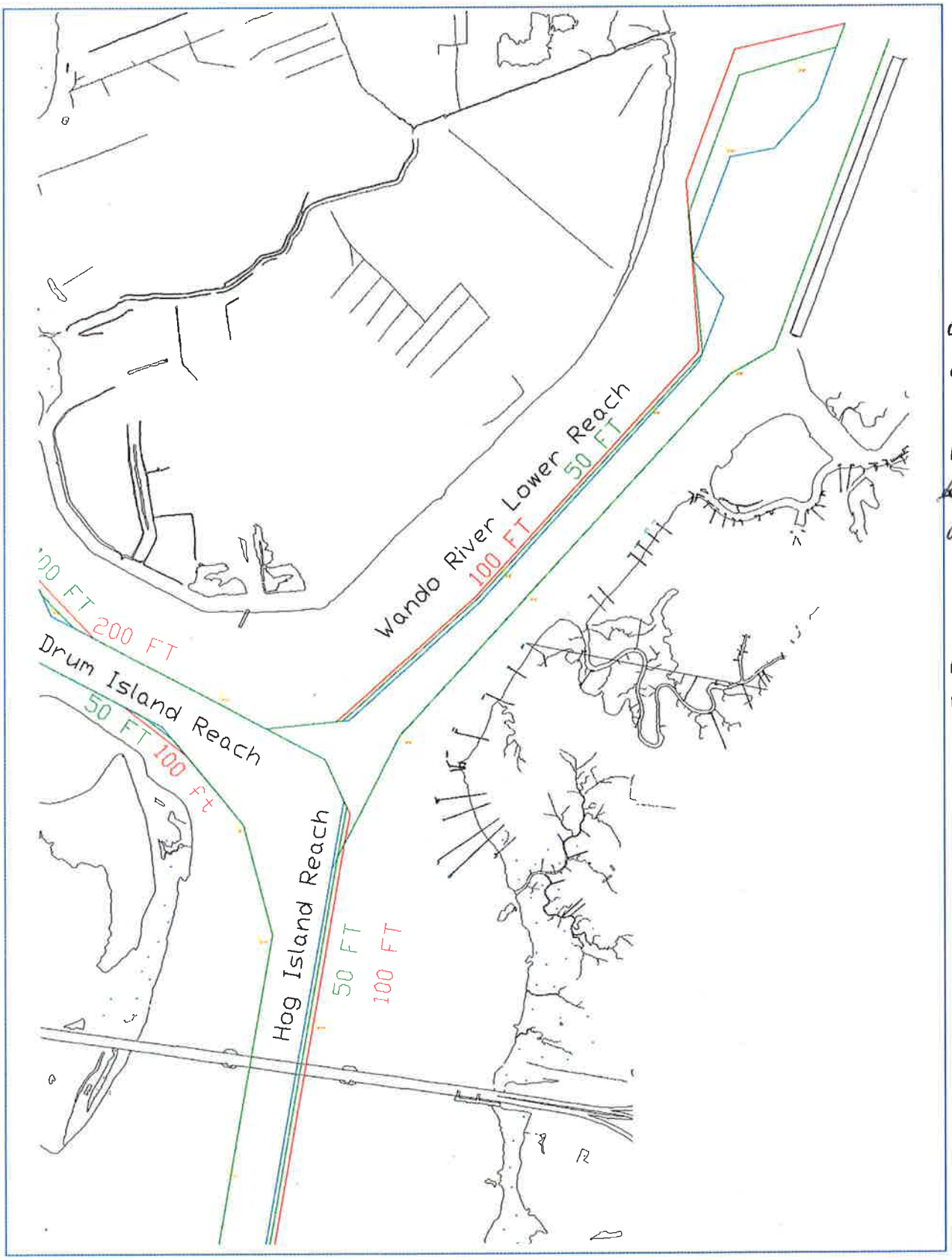
Alt1: Unworkable on the large ships

Alt 2: Also un workable with large ships. Unsafe to pass & meet in these locations, which is standard practice currently.

Alt 3: Alt 3 allows for the passing & meeting of not only large ships, but also multiple ships at the same time (ie 2 outbounds, 2 inbounds). This creates true 2-way traffic by allowing the large ships to swing their sterns after recooperating from a meeting situation.

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).



Alt 1: Almost laughable. Not realistic.

Alt 2: Also not realistic to handle the larger, next generation of ships with this alternative.

Alt 3: ~~Always~~ ~~Appropriate~~ Safe allows for safe navigation of larger ships in and out of the Wando River.

Figure 3 Wando River

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

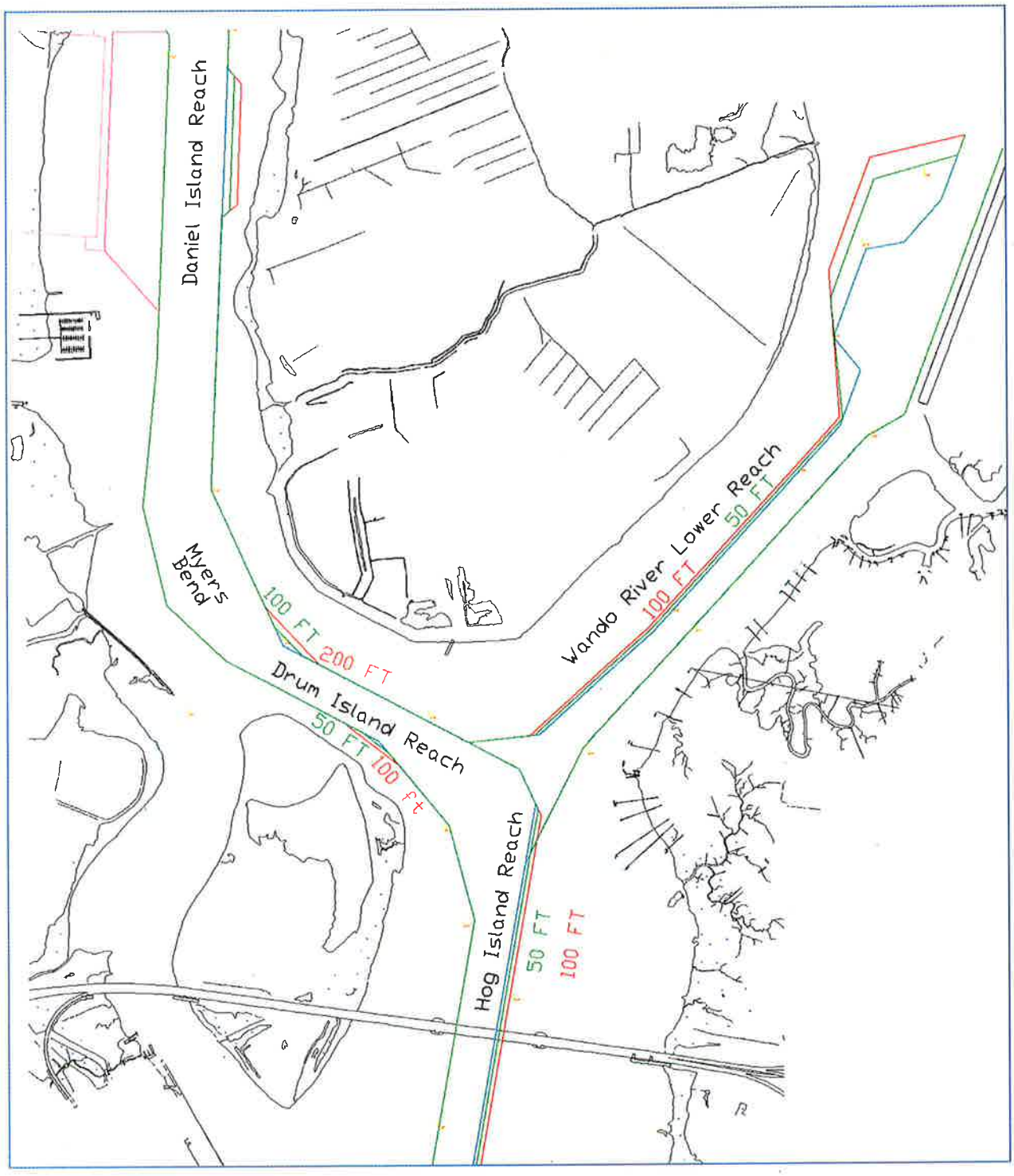


Figure 4 Drum Island Reach

Alt 1: ~~Do~~ Does not allow the large ships to transit

Alt 2: Relatively no help whatsoever

Alt 3: Allows large ships to safely navigate through Drum Island Reach. Allows for two-way traffic of smaller vessels.

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

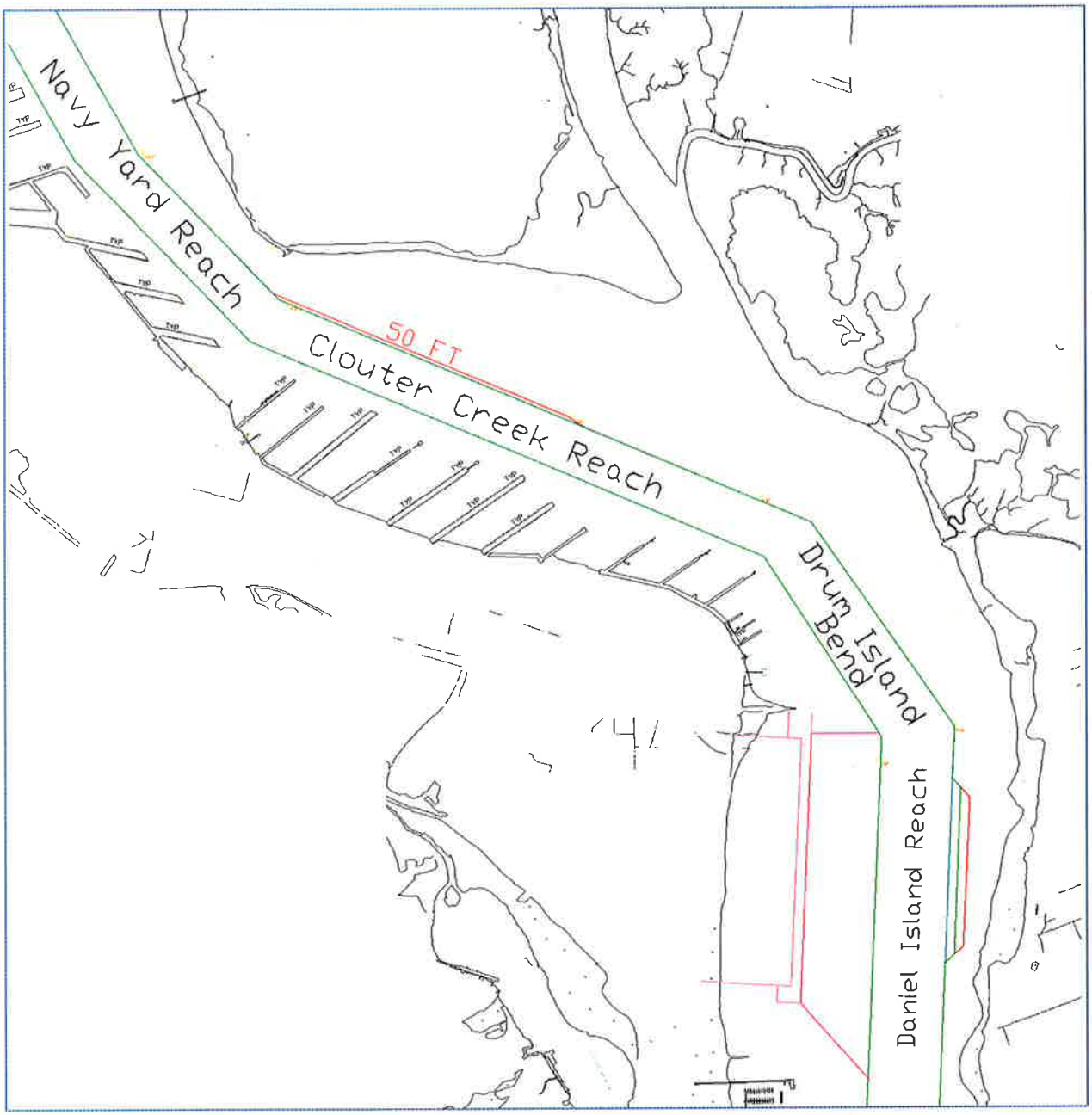


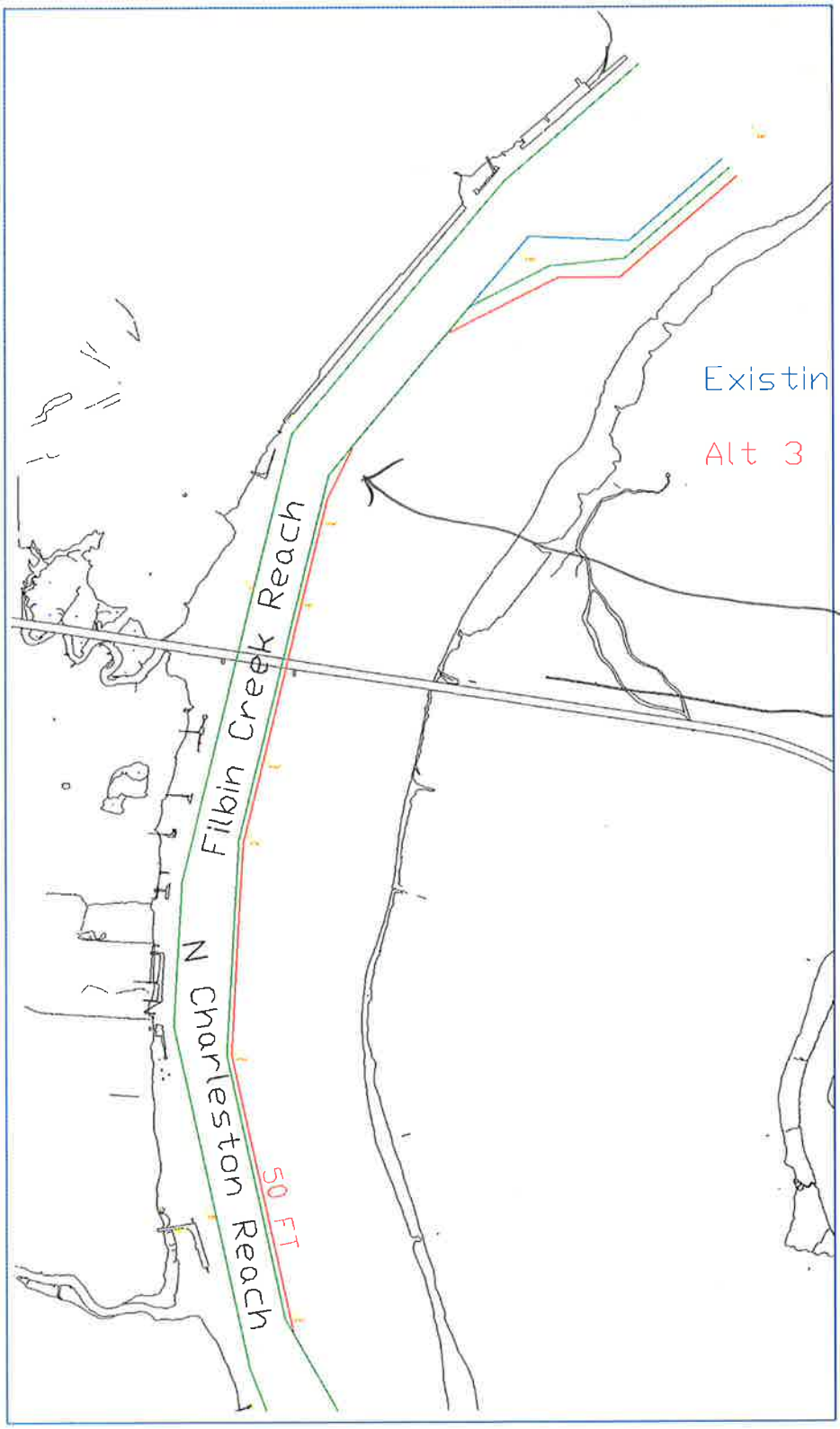
Figure 5 Clouter Reach

Alt 1: Do not want to bring the next generation of ships to the NCT with this option.

Alt 3: The additional room was a large help - especially the corners that had been shaved off. With ships @ the tanker berths this is the only feasible way to bring larger ships up the river. I would like to see an additional 50 ft throughout the entire Clouter Creek Reach. Without it, Timing must be perfect and any error could be disasterous.

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).



Alt 1: Unsafe to handle larger ships

Alt 3: Drastically safer, particularly the shaved corners & additional room ahead of the tanker terminals. Without the room it could be catastrophic to bring a larger ship to the NCT (effect of displacement, swinging of the stern)

The shaved corner above 526 is imperative.

Figure 6 North Charleston and Filbin Creek Reaches

7) Comments in general on the deepening project and the ship simulations you participated in.

The entry to the Nardo River & general widening of the river on Alt 3 help a tremendous amount. Without it, navigation of the new, larger vessels may be impossible.

The same goes for Drum Island Reach as well as Hog Island & Bennis. Without Alt 3 2 way traffic would be impossible with the larger ships anywhere in the Inner Harbor.

Mt. Pleasant Range is a real issue. The bottleneck near the current 24 buoy could be disasterous if timing is not perfect.

Drum Island Reach needs as much room as possible. To realistically & effectively have the large ships at a safe speed on their approach to the Leatherman Terminal, we need as much room as possible.

Due to the incredible size of these larger ships, it is imperative that additional room is added to Customhouse Reach. Without it, passing & meeting is difficult off the city due to the swinging of the stern. With the additional room, passing & meeting is not an issue

Crayton walters e gmail. com

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: Crayton Walters Date: 4/29/16

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

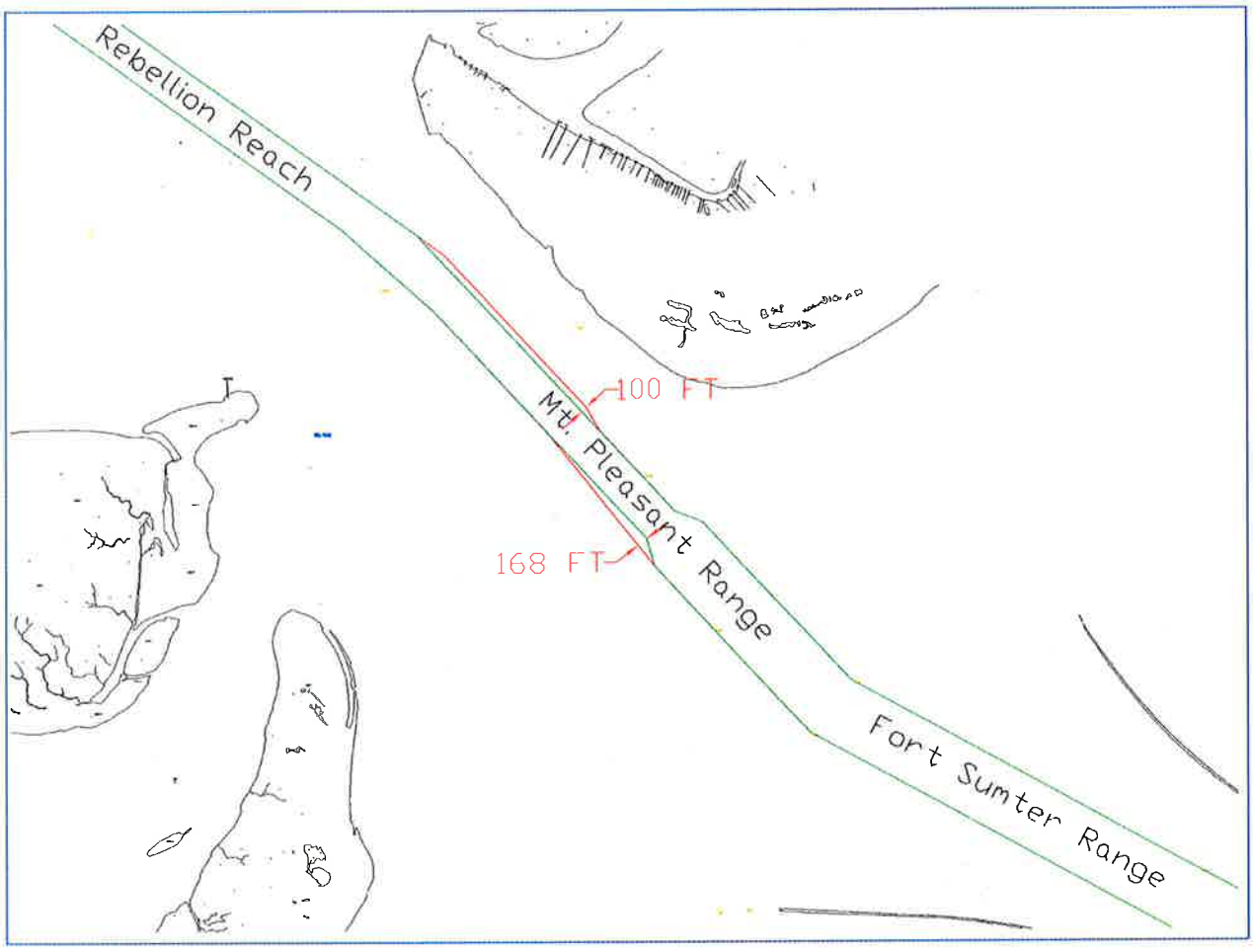


Figure 1 Mount Pleasant Range

Alt 1 - no widening - This scenario is unworkable.

Alt 3 - This is also problematic. There has been no change other than Buoy movement and redrawing of the channel in existing water. The 24 buoy area creates a bottleneck that makes it, in all reality, the same as Alt 1.

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

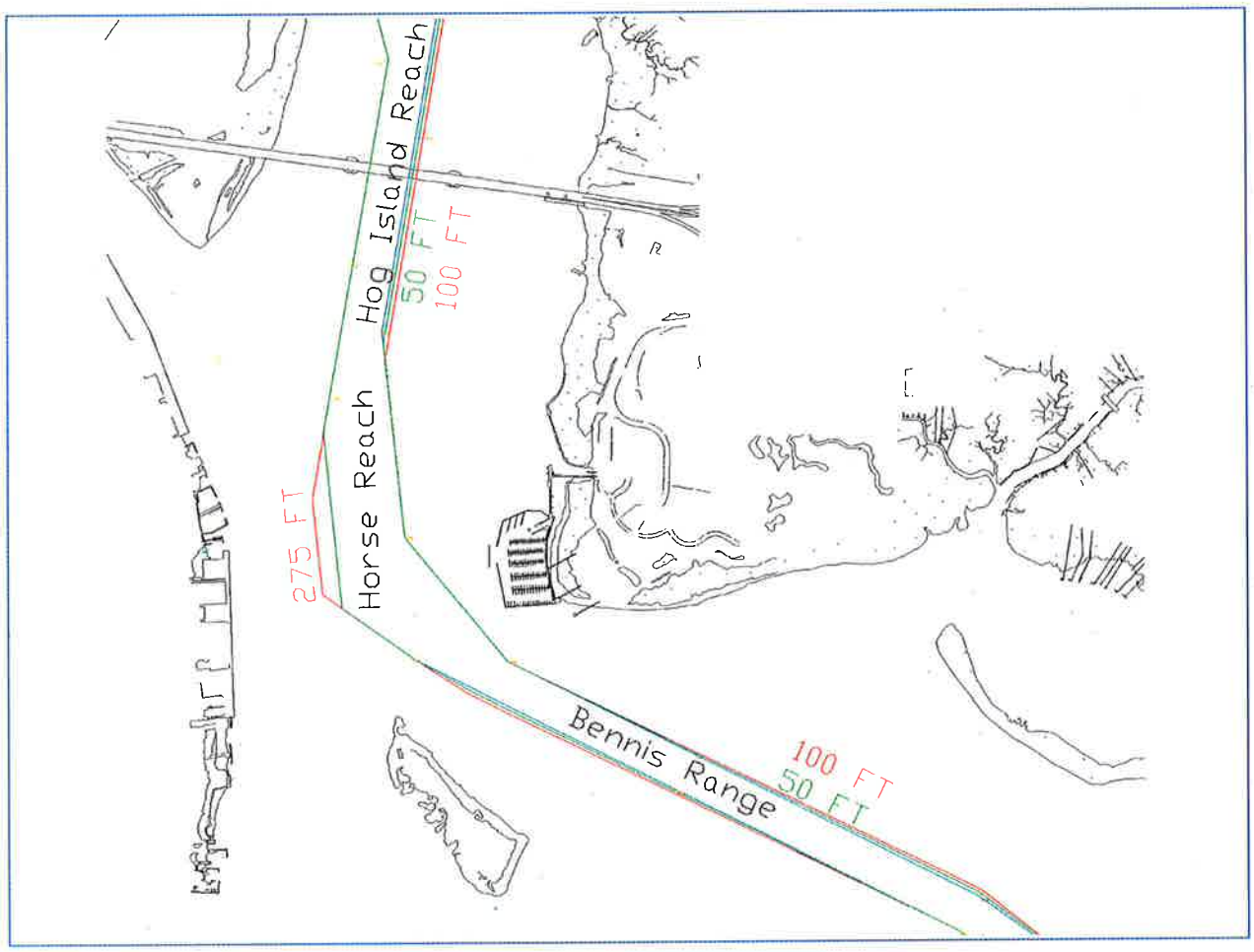


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

Alt 1- Unworkable. There is not enough room to safely maneuver ships in this area

Alt 2- still not enough room. Ships sterns keep swinging out of the channel. one way only!

Alt 3- This is the only scenario that allows ships to move safely and also allows the movement of 2 or more ships in meeting situations.

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

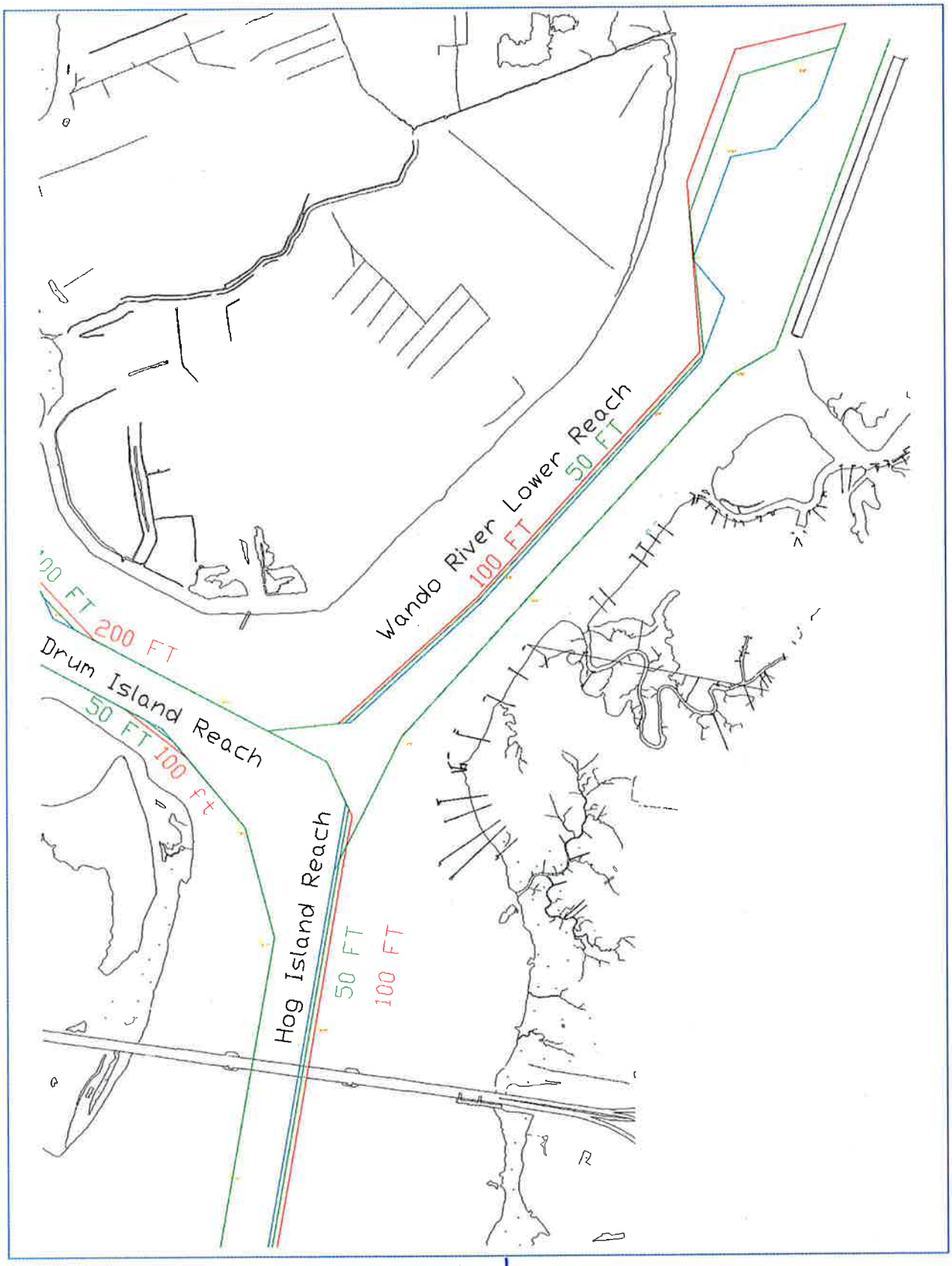


Figure 3 Wando River

Alt 1 - not realistic. No room
Alt 2 - still not enough to handle these size ships
Alt 3 - The scenario allows ships to move in weather event at all times.

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

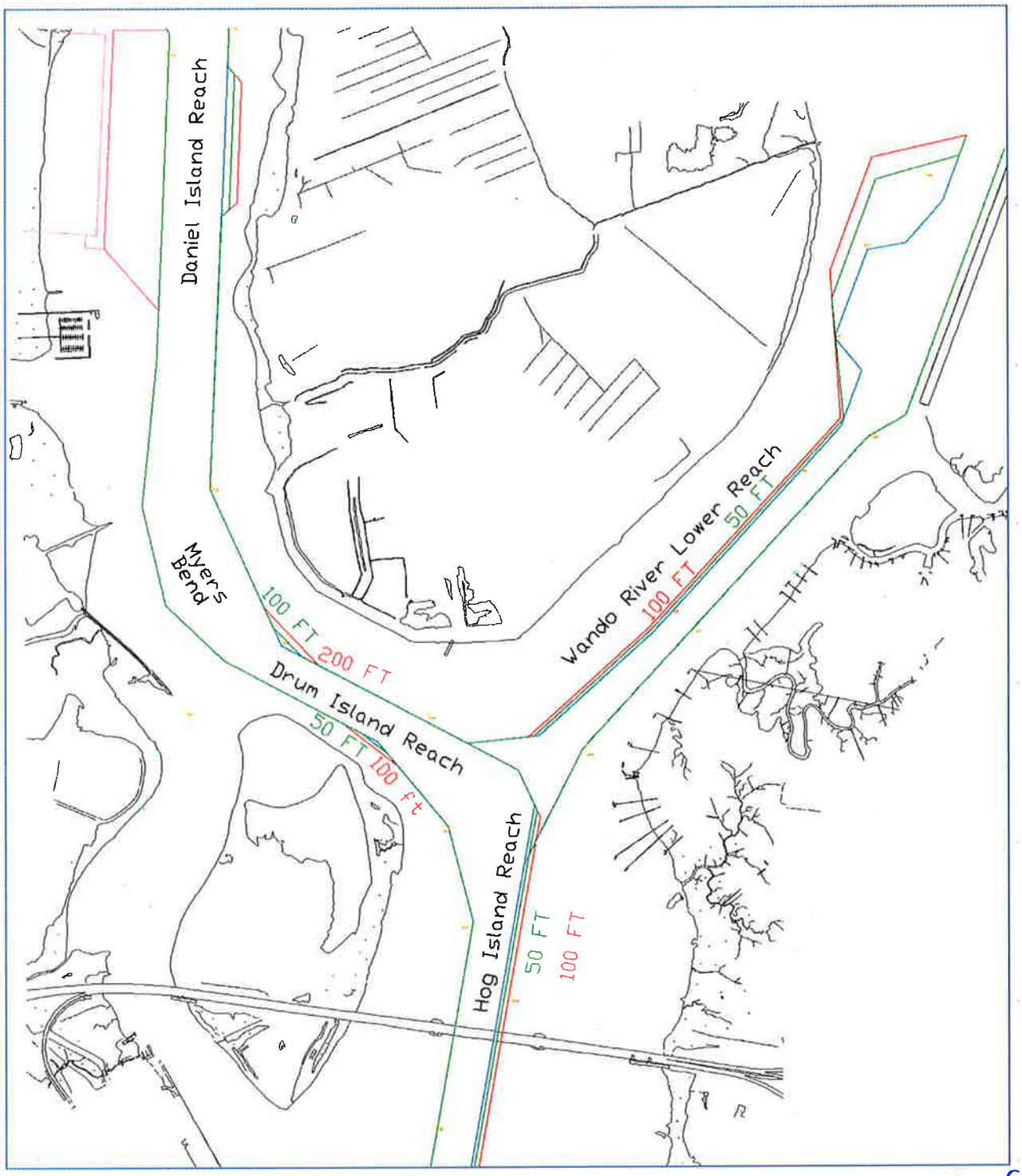


Figure 4 Drum Island Reach

Alt 1 - Drum Island will require widening - No traffic will be able to move through on a regular basis with nothing done.

Alt 2 - Better, but this scenario will cause delays with tugboats and tides and currents. No a solution

Alt 3 - This is a must. Traffic will be slow and will need
Alt 4 - the maximum amount of room to maneuver. The approaches on both ends need space to meet ships. must be max width !!

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

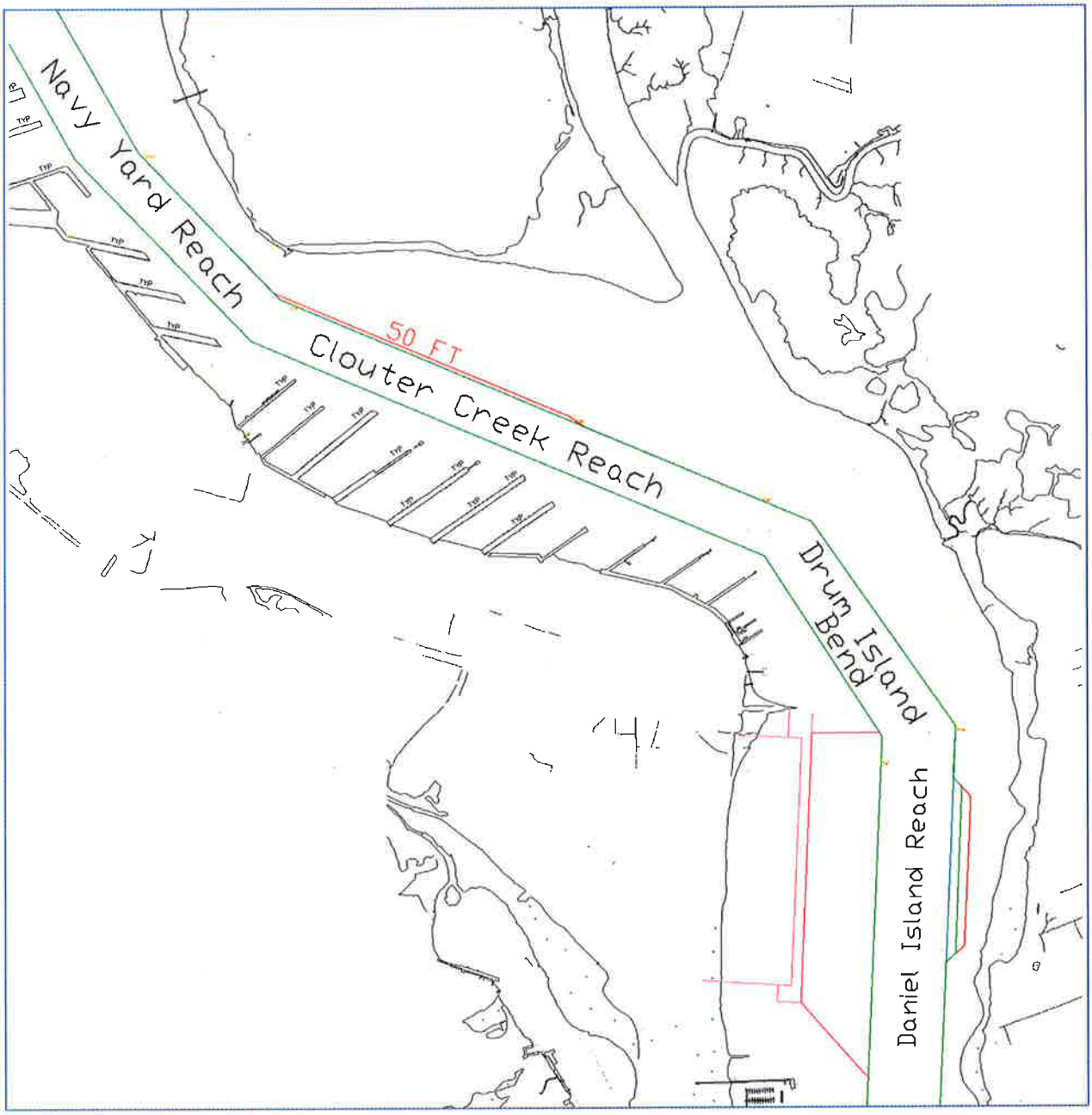


Figure 5 Clouter Reach

Alt 1 - This will not allow traffic to move two way.

Alt 3 - This is a great widener. However, it really should be extended all the way down Clouter Reach. It allows for 2 way traffic but limits it to a small area right before a turn. The length of reach should be considered for max widening

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

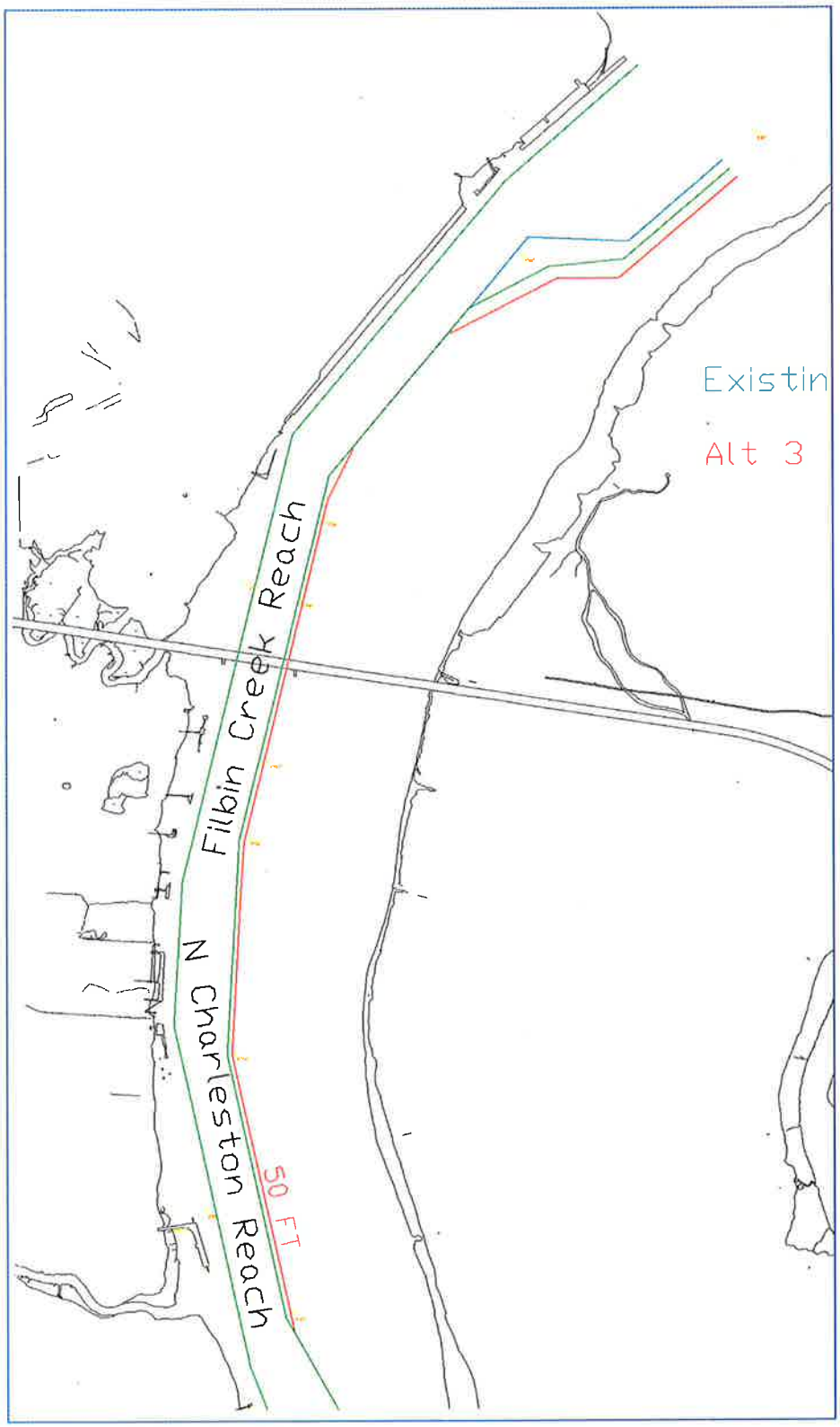


Figure 6 North Charleston and Filbin Creek Reaches

Alt 1- no sustainable for shipping with large ships and docks.

Alt 3- This will allow large ships to transit this area while there are other ships at the tanker and bulk docks.

This is the only solution for this area

7) Comments in general on the deepening project and the ship simulations you participated in.

This has been productive and informative.

It is clear to me that the size of the ships we will be experiencing will need as much room as possible. When these ships turn, the sterns will move closer to the sides of the Channels, we will need the room. The Mt. Pleasant Reach needs to be closely looked at. It is problematic. There are decent solutions to this area.

The Dennis / Hog Island Reaches next to Custom House reach will need as much room as possible for the turns and meeting ships.

The Cando is great with Alt 3.

Drum Island will be a major artery for all of the northern terminals. It does not need to be a stop gap. Ships will be slow there and need all the room that can be available.

Great study. thanks

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: ANDREW MCINTIRE Date: 5/6/2016

ANDREW MCINTIRE
armcintire@gmail.com

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

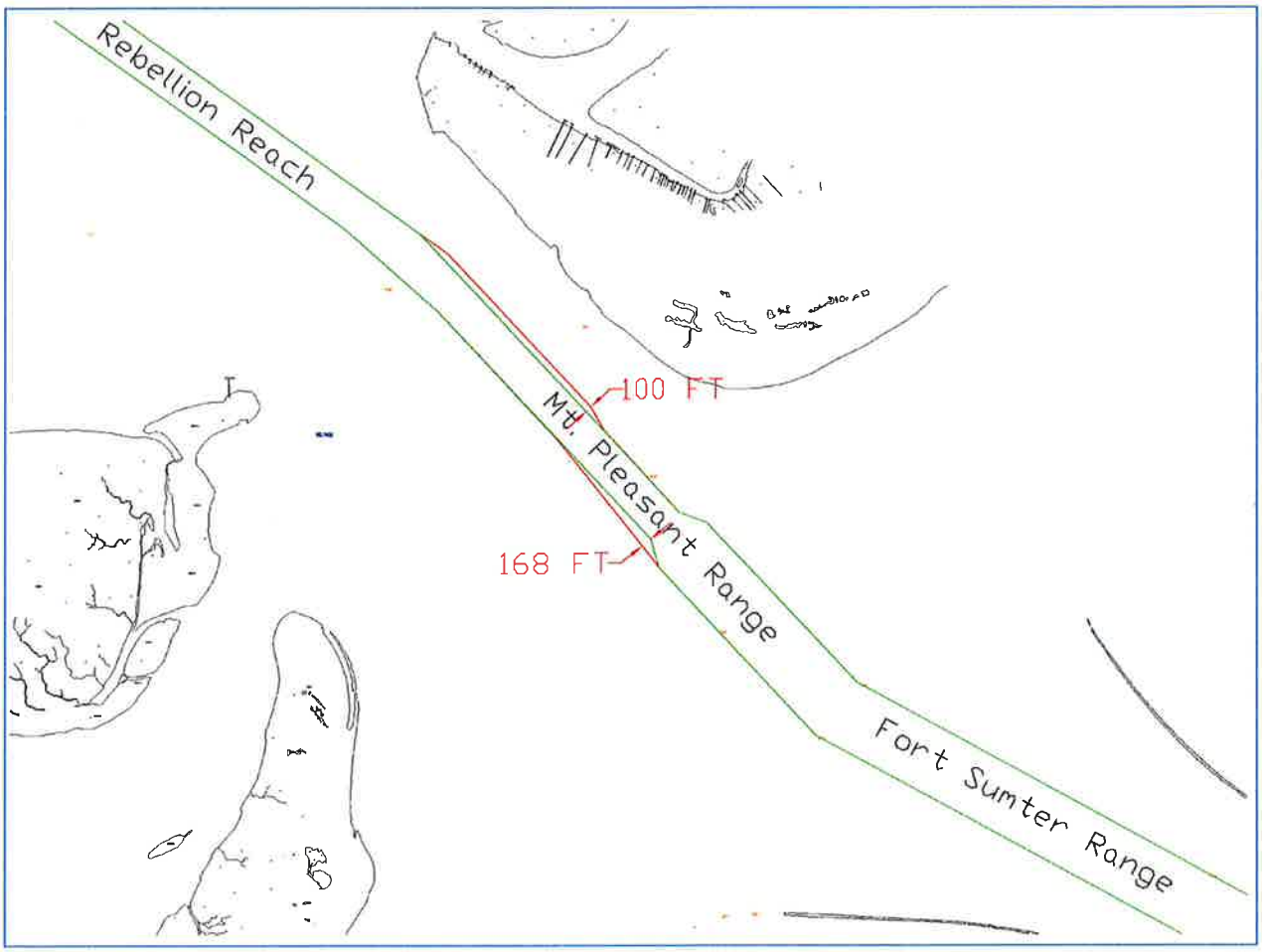


Figure 1 Mount Pleasant Range

ALT 1 RESTRICTS LARGE SHIPS TO ONE WAY TRAFFIC.
ALT 3 PROVIDES OPPORTUNITY FOR SUCCESSFUL 2WAY TRAFFIC SPECIFICALLY ABOVE BUOY 24.

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

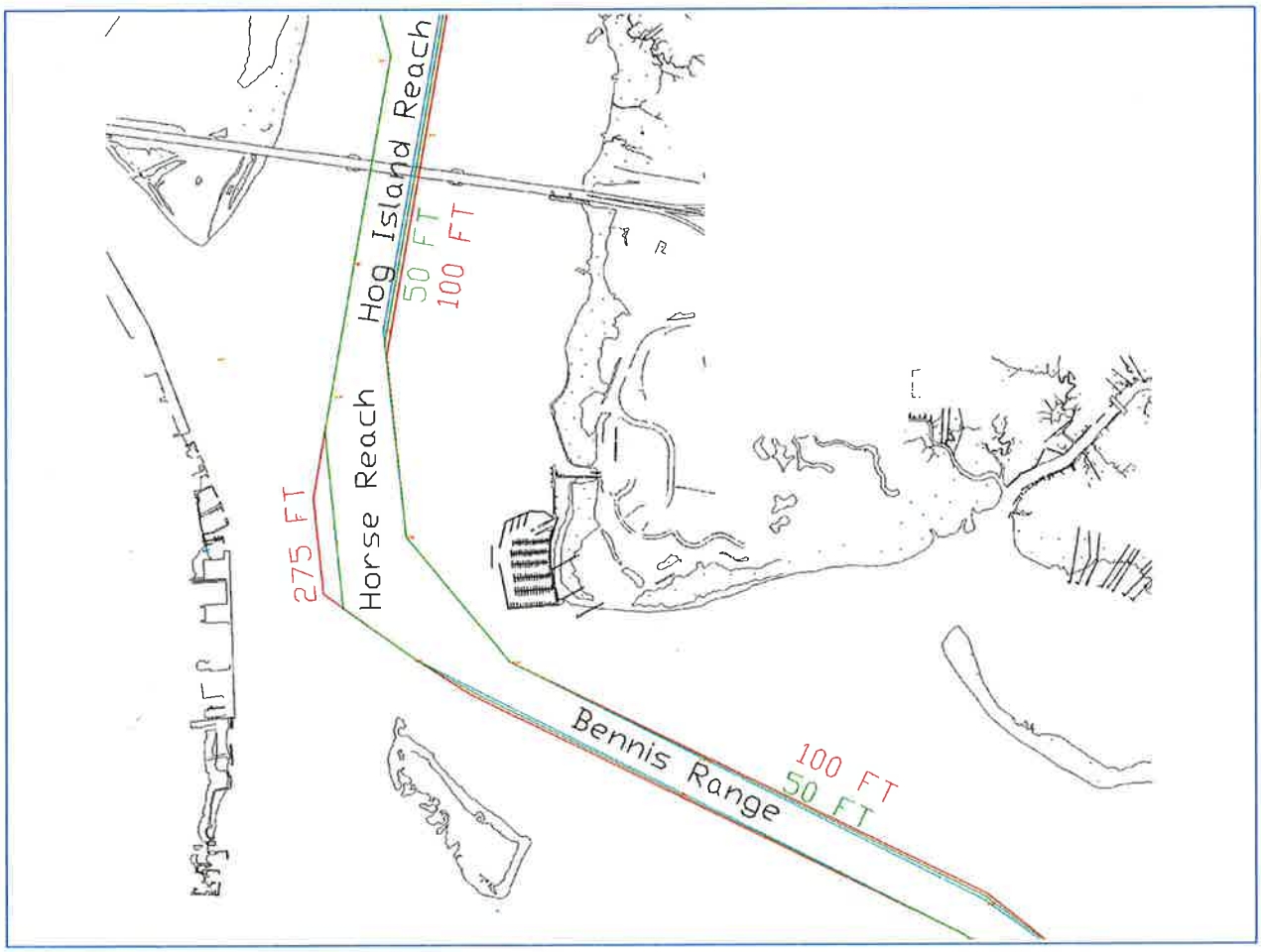


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

ALT 1 LIMITS AREAS OF TWO WAY TRAFFIC AND MEETING SITUATIONS.

ALT 2 CREATES SOME BENEFIT ON HOG ISLAND REACH IN VACINITY OF THE BRIDGE, BUT THE IDEA OF MEETING NEAR THE BRIDGE WITH ONLY 50' MORE ROOM KEEPS RISK LEVEL HIGH.

ALT 3 CREATES NUMEROUS OPPORTUNITIES FOR SAFE PASSING/MEETING OF TWO LARGE VESSEL. 100 FEET IN HOG ISLAND REACH CREATES A RELATIVELY ROUTINE SITUATION. THE EXTRA ROOM ON HORSE REACH ALLOWS FOR ADEQUATE PASSAGE IN HORSE REACH, AND THE EXTRA ROOM ON BENNIS REACH WILL CREATE OPPORTUNITY TO MEET LARGER VESSELS WHERE NONE EXISTED BEFORE.

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

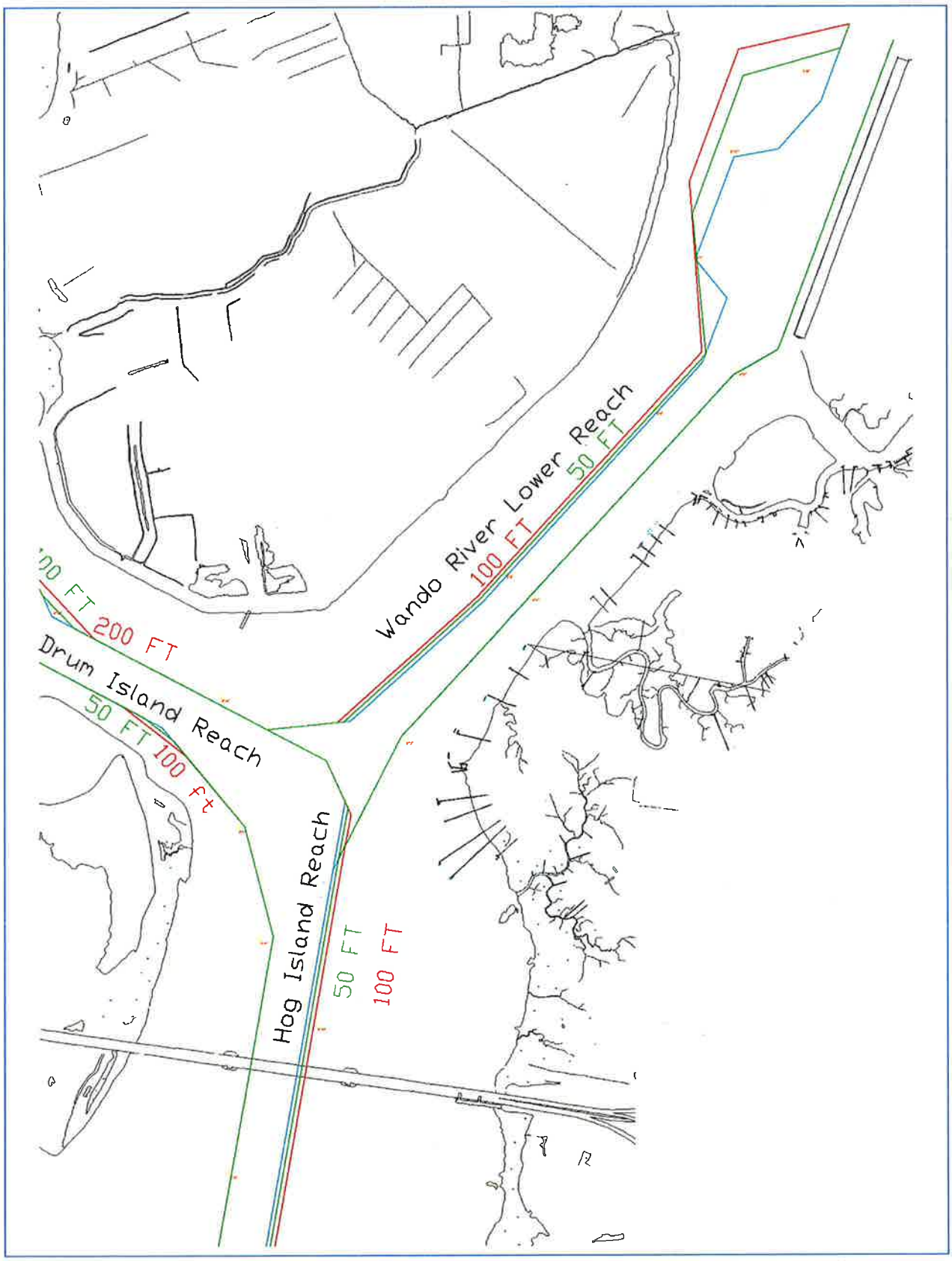


Figure 3 Wando River TO MAXIMIZE THE UTILITY OF THE PORT WE MOST OPERATE IN ALL WEATHER CONDITIONS AND DURING ALL STAGES OF TIDE. ALT 3 IS THE ONLY ACCEPTABLE SCENERIO FOR SAFE NAVIGATION OF DANIELLA CLASS VESSELS IN THE WANDO CHANNEL

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening), Alt 3 (Max Widening), and Alt 4.

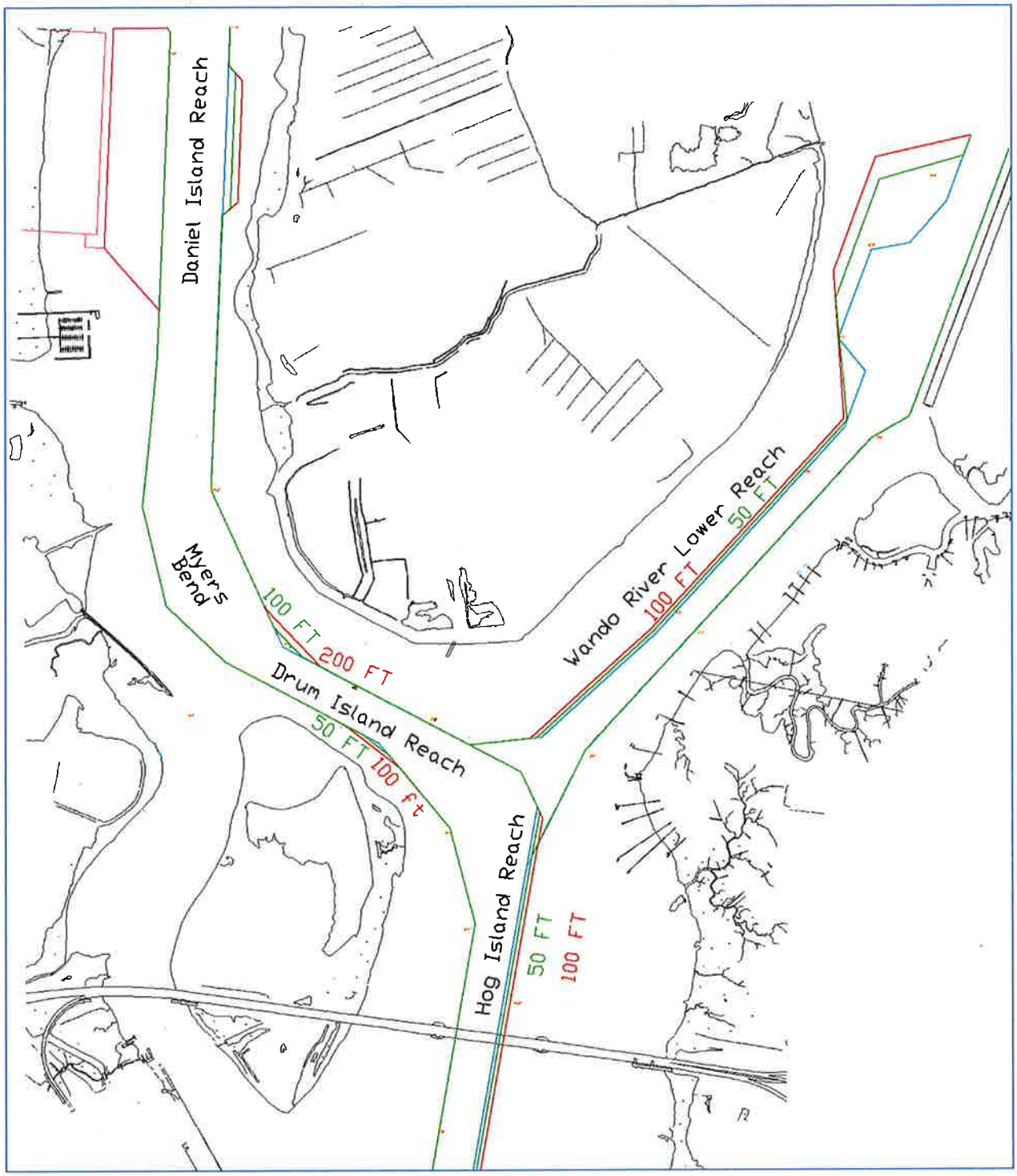


Figure 4 Drum Island Reach

UNDER BASIC CONDITIONS OF COMBINED WIND AND TIDE IN THE SAME DIRECTION (SW BREEZE & FLOOD TIDE) IT BECOMES REMARKABLY DIFFICULT TO MANEUVER THE LARGEST OF VESSELS INTO DRUM ISLAND REACH ON AN INBOUND RUN WITHOUT FREQUENTLY GROUNDING. THE MODIFICATIONS OF THE SOUTH SIDE OF DRUM ISLAND REACH NEVER COME INTO PLAY, SO I SUGGEST -

- CONTINUE -

CONCENTRATING ALL EFFORTS ON THE NORTH SIDE OF THE CHANNEL. ALT 4 CREATES THE BEST OPPORTUNITY. BUT I SUGGEST AN ALT 5 SCENARIO WHERE DREDGING ON DRUM ISLAND REACH BE CONCENTRATED ON THE NORTH SIDE OF THE CHANNEL TO INCREASE THE WITH OF THE CHANNEL 200'. IF UNACCEPTABLE, ~~ALT~~ THEN ALT 4 PROVIDES THE MOST BENEFIT WHILE EFFECTIVELY CHANGING THE HEADING OF THE CHANNEL BY ALMOST 10°.

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

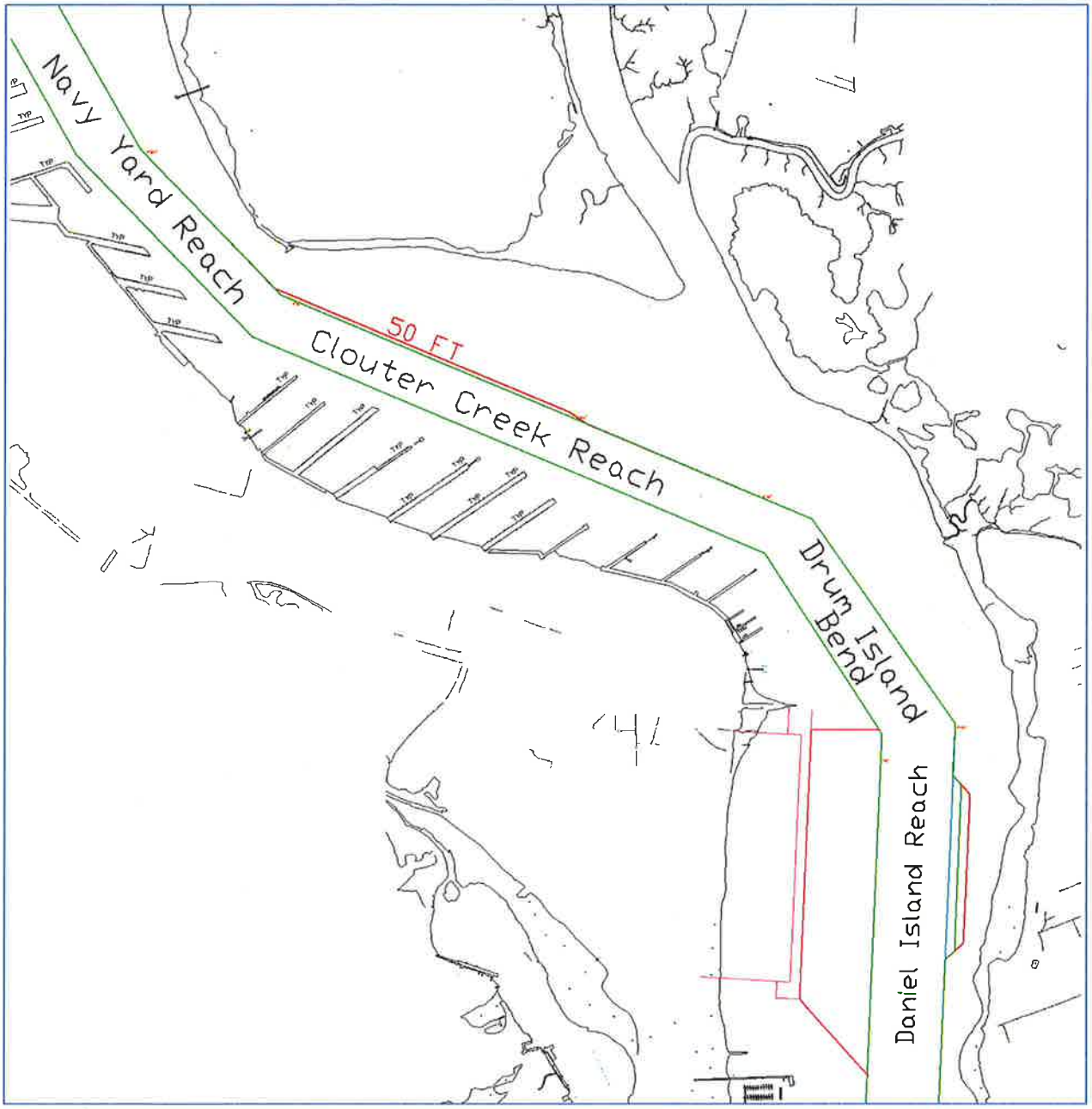


Figure 5 Clouter Reach

ALT 1 RESTRICTS ENTIRE REACH TO ONE WAY TRAFFIC FOR LARGE (KONWAY CLASS) VESSELS. ALT 3 PROVIDES MEETING PLACE FOR LARGE VESSELS UNDER PROPER CONDITIONS

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

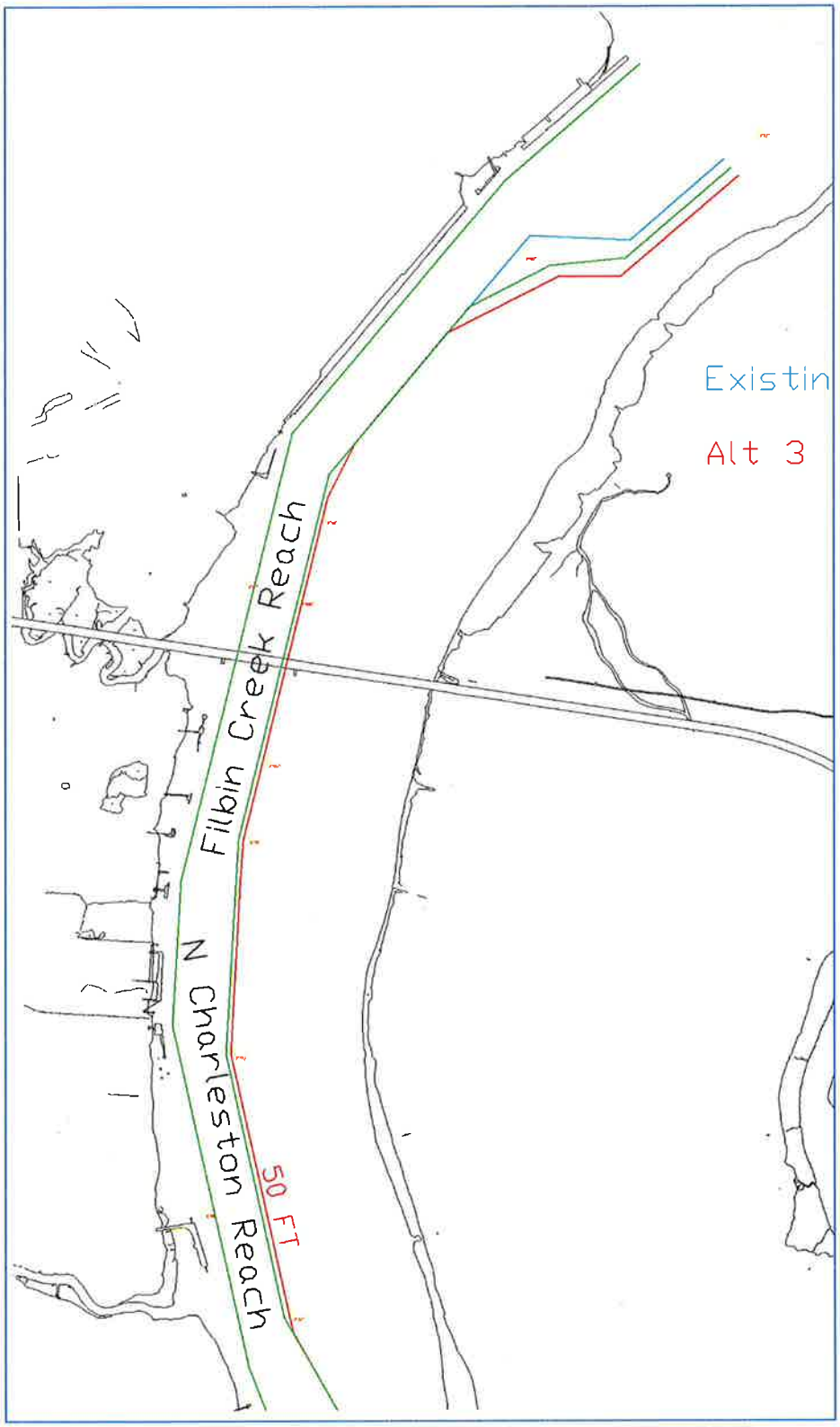


Figure 6 North Charleston and Filbin Creek Reaches

ALT 3 ALLOWS FOR SAFE PASSAGE OF LARGE VESSELS. MORE ROOM MEANS SAFER, SLOWER NAVIGATION AND LESS HYDRO DYNAMIC EFFECT ON SHIPS DOCKED AT VARIOUS TERMINALS.

7) Comments in general on the deepening project and the ship simulations you participated in.

THE DEEPENING PROJECT IS WELL THOUGHT OUT AND PROVIDES MANY OPPORTUNITIES FOR TWO WAY TRAFFIC OF THE LARGEST OF VESSELS. IT BRINGS CHARLESTON HARBOR INTO THE 21ST CENTURY, AND ALLOWS CHARLESTON TO SAFELY AND EFFICIENTLY ACCOMODATE THE LARGEST OF VESSELS PLANNED FOR THE EAST COAST.

SHIP SIMULATION PROVIDED AN EXCELLENT OPPORTUNITY TO OBSERVE VESSEL INTERACTION UNDER PROPOSED CONDITIONS. THE SIMULATION IS REALISTIC AND EFFECTIVE. EVERYTHING FROM TIDE, CURRENT, WIND AND MANEUVERING CHARACTERISTICS ARE EXTREMELY ACCURATE. THE GRAFFICS AND ENGINEERING EFFECTIVELY PORTRAY THE SIMULATED SCENARIOS AS EFFECTIVELY AS LARGER, MORE ELABORATE SYSTEMS THAT UTILIZE A THEATER AND PROJECTORS.

OVERALL, THIS HAS BEEN AN EXCELLENT OPPORTUNITY FOR ME. I HOPE THE FEEDBACK YOU RECEIVE IS BENEFICIAL.

Bryan Sanders EBSanders843@comcast.net

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: Date: 5.6.16.

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

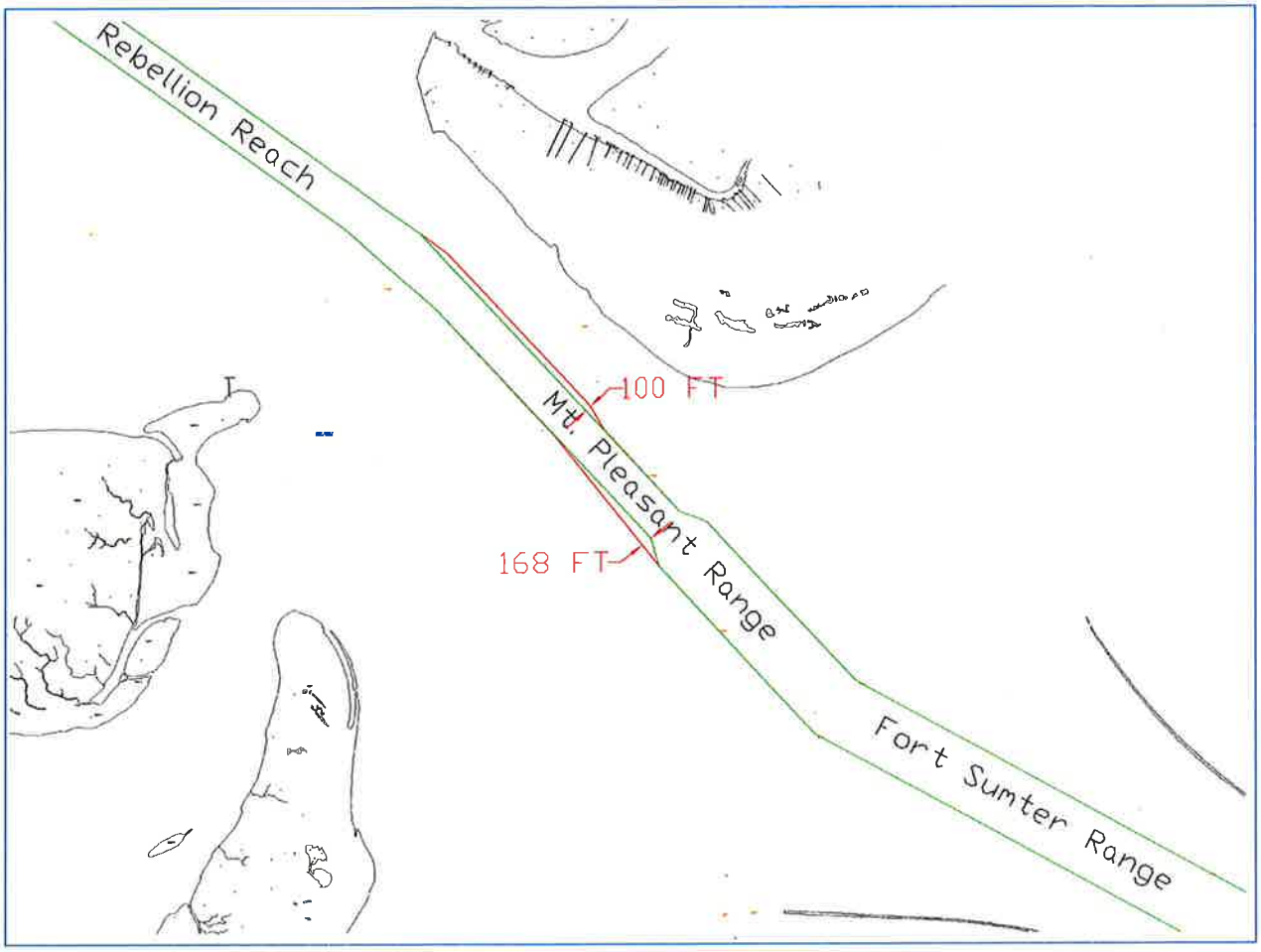


Figure 1 Mount Pleasant Range

Alt 1 provides no safety margin to mitigate the forces of bank cushion/suction, tide + wind, as well as ship interactions when meeting inbd/outbd traffic.

Alt 3 "opens up" the channel such that vessels are interacting appropriately within the widened channel based on the MSC DAMIella model simulated.

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

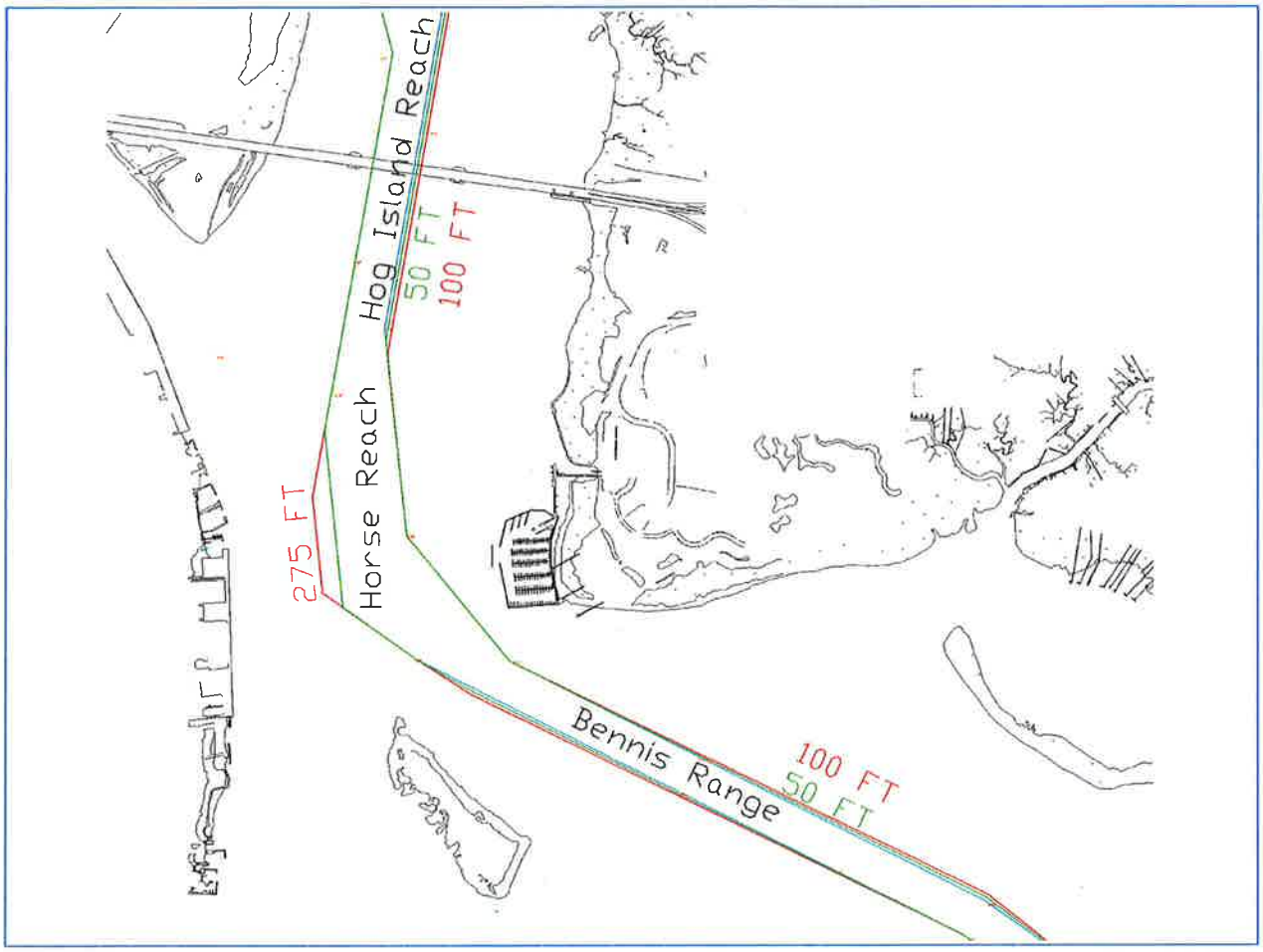


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

Alt 1 as the horse in exists now I would not consider meeting 2 MSC Daniella class vessels.

Alt 2, in general, provides more room to safely navigate, however when meeting vessels in 2 way traffic scenarios, there are narrowed pieces of the channel which provide no safety margin. ie vessels are forced to use up the entire channel in crossing channel interactions.

Alt 3 provides sufficient room to consider 2 way traffic under certain tide/wind conditions. (cont)

The proposed extension into West side of customhouse is an "operational" ship handling technique we use currently. Outbound vessels' stbd. quarters typically swing into this as a function of turning to port to meet inbound vessels. I don't ~~always~~ see how I could get the bow of an outbound MSC Danielle model into the extensions; however the stbd. quarter certainly would.

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

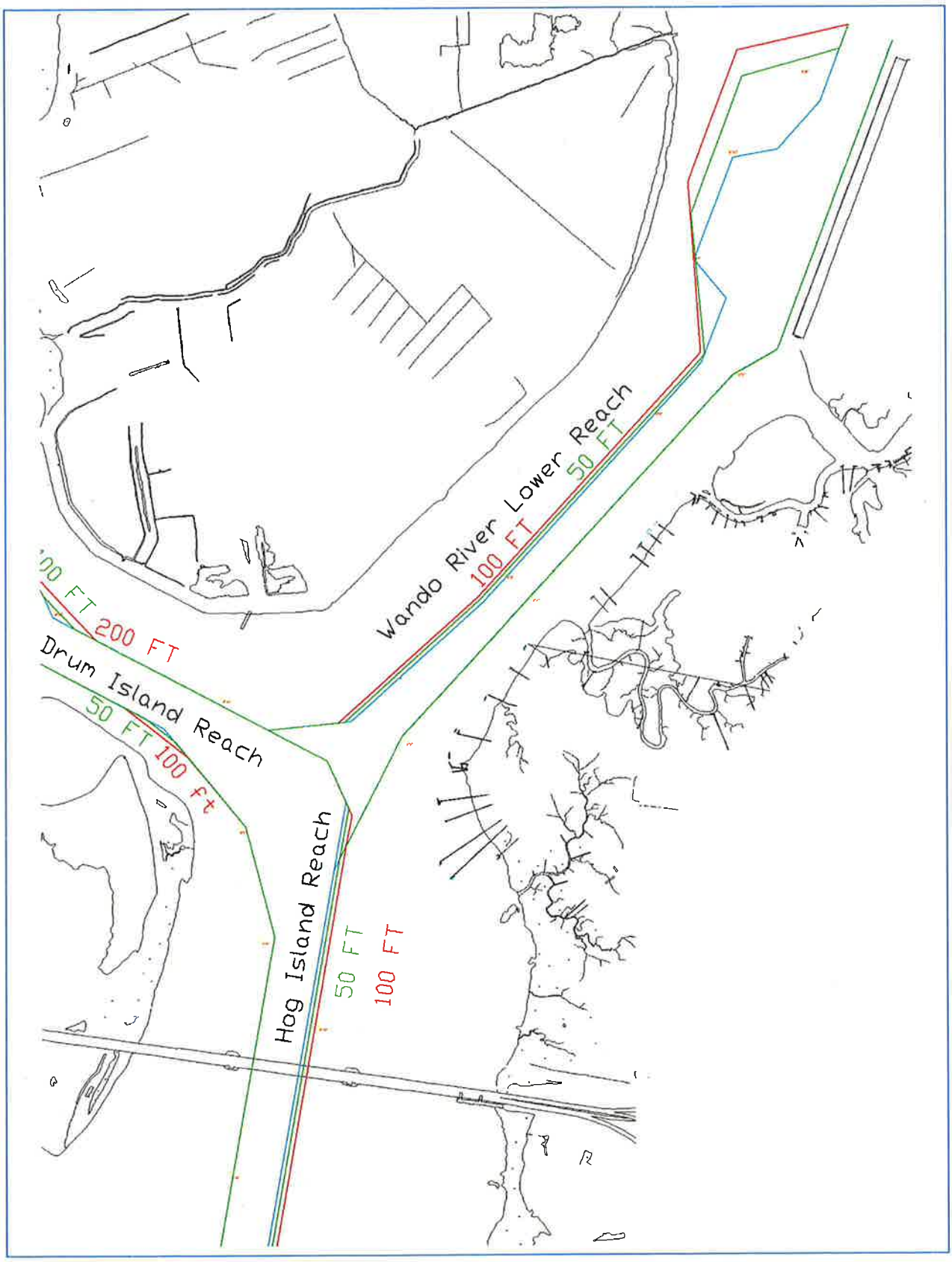


Figure 3 Wando River

Alt 1 As it is provides no safety margin at the 5 buoy particularly when outbound. *the area is problematic as exists now much less with increased size of a modeled MSC Daniella class.

Alt 2 is good, though it provides less room for increased "crab angles" in high wind and tidal conditions. *better buoy 5 and contour.

Alt 3 ** best buoy 5 and contour placement.** and channel extensions for safe passage of modeled vessels.

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening), Alt 3 (Max Widening), and Alt 4.

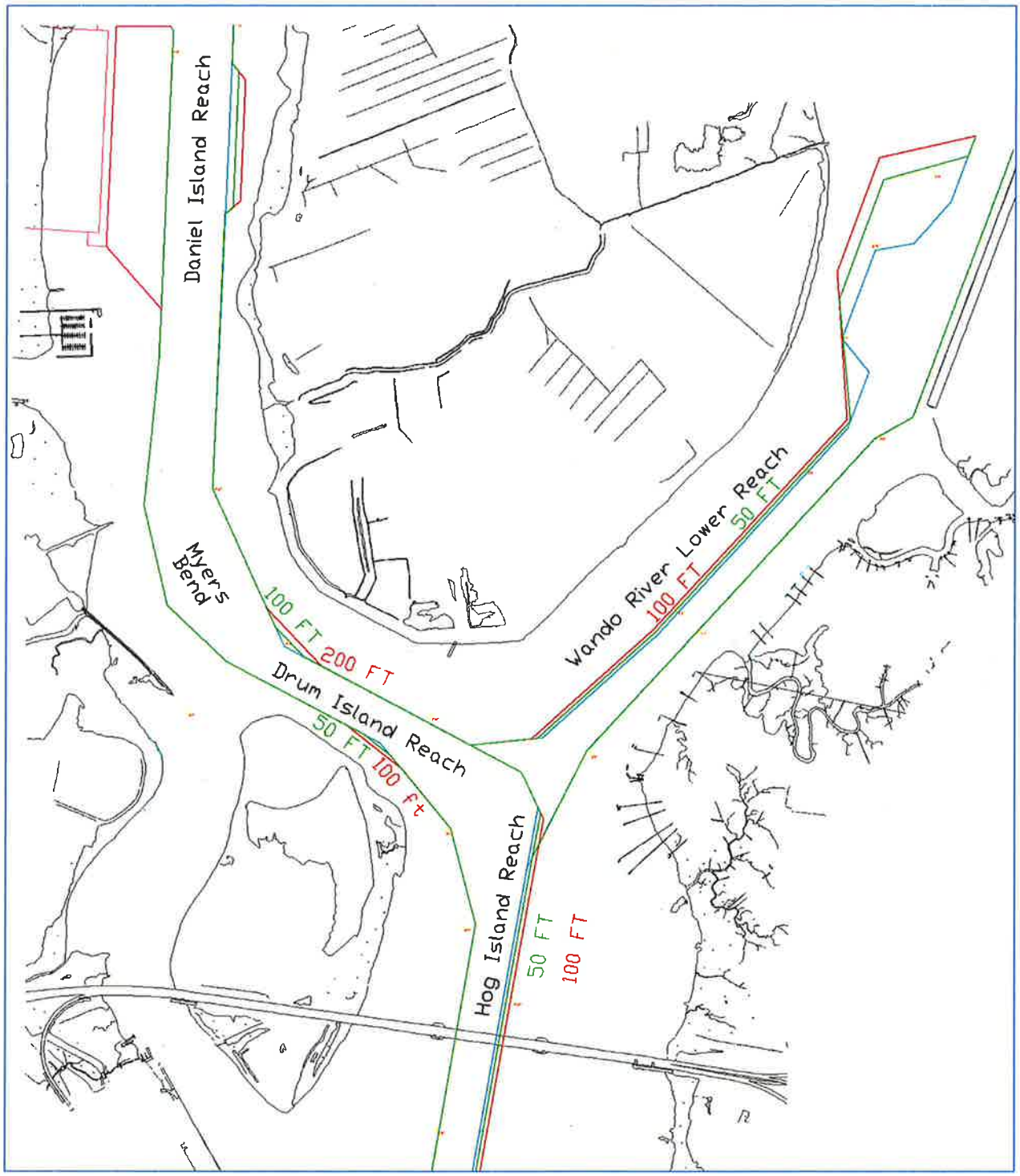


Figure 4 Drum Island Reach

Alt 1 one way restrictions, w tide slack + wind. I would assume. ★ NOT A BIBBLE. 10-12kts. Alt ★

Alt 2. dont believe I simulated this.

Alt 3 had difficulty maneuvering vessel as to safely consider limited two way traffic of MSC Danielle class and panamax vessels.

Alt 4 opens up the portions of drum isle. Range and changes the [illegible] wheel over point when inbound to myers bend, which is good. This allows outbounds to access the majority of myers bend when negotiating an outbound turn. Alt 4 on the south side of facilitates more considerations of 2 way scenarios closer to the Arthur Ravenel Bridge.

If possible to combined Alt 4 south side with MAX Alt 4 on the north side facilitates the best options for the MAX utilization of the port's operations.

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

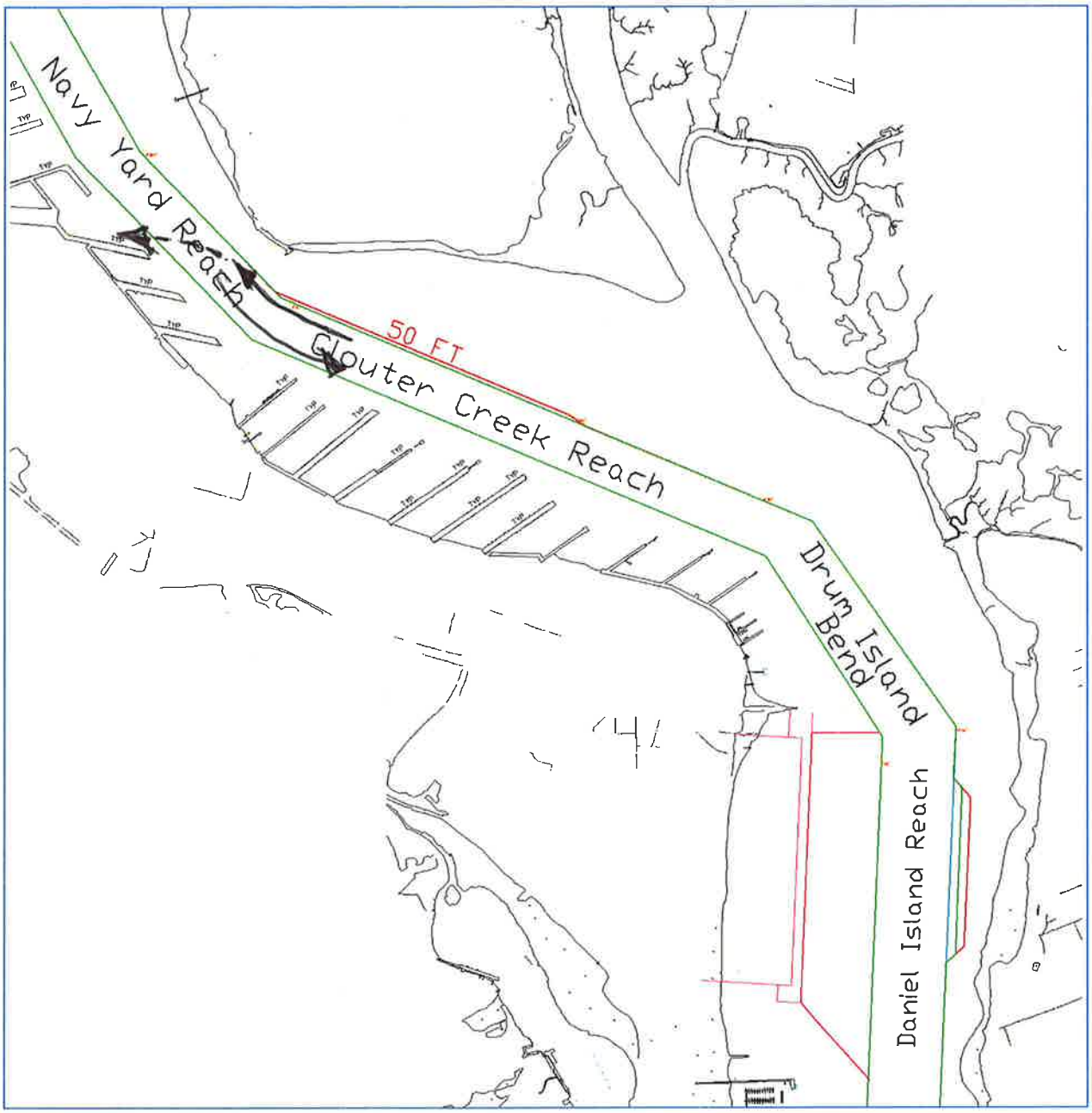
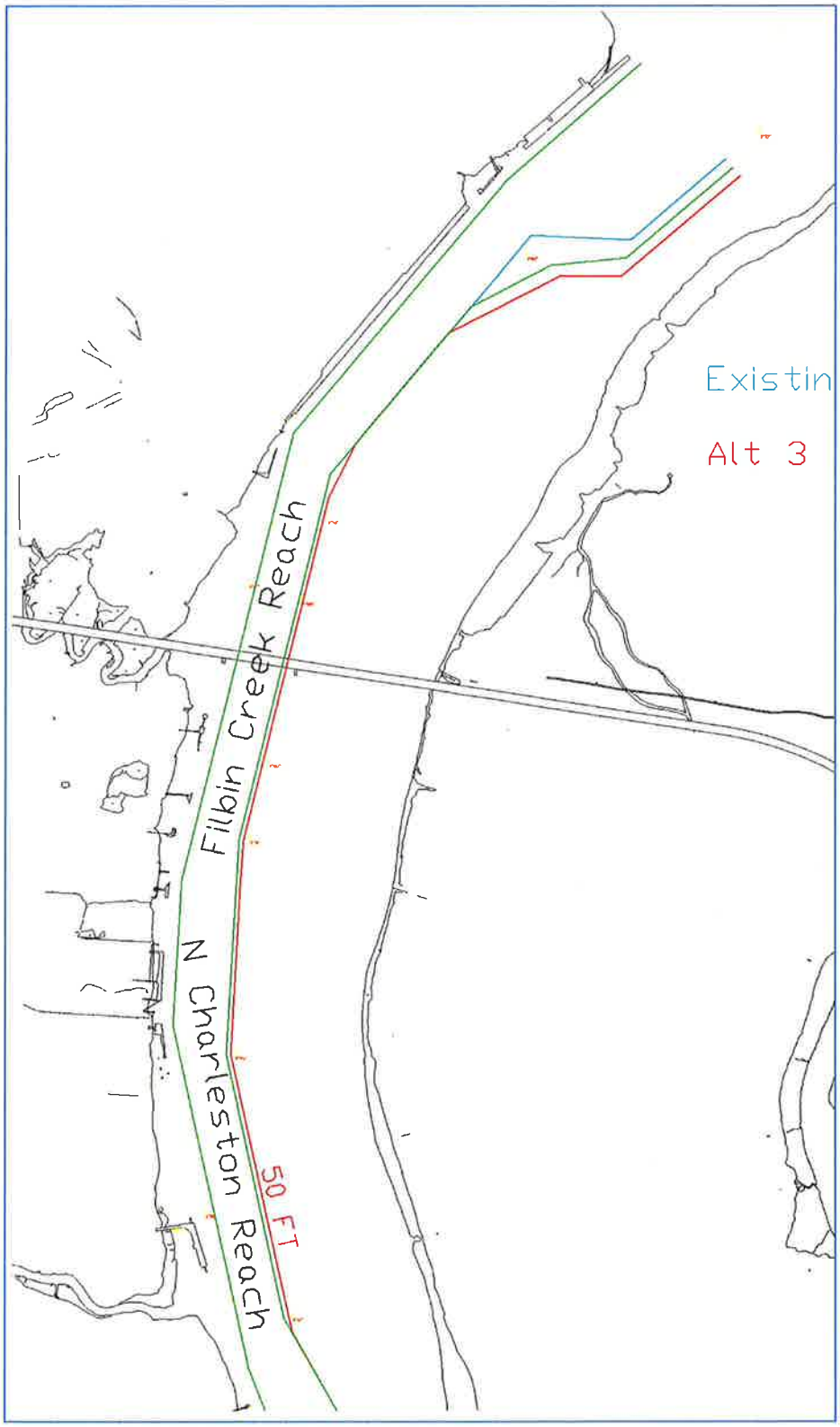


Figure 5 Clouter Reach

Alt 1 as it exists... It's problematic that I avoid meeting here. Ship interaction of passing outbound vessels combined with the bank cushion at the western end of clouter is exasberated when trying to turn to starboard to remain along the intended Route. Vessels routinely will do this. Inbound vessels particularly Alt 2 lessens the effects described above...

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).



Alt 1 vessels transiting these reaches at deep drafts and tidal conditions must slow spds to lessen impacts of hydraulic forces along banker row + Navy yard.

Alt 3 provides more room to be utilized along the red side of the channel to lessen the above described forces. proposed Alt 3 modifications North of Don Holt Bridge are fantastic as our NELy winds and EBB tide. Initiation of turns can be made in sufficient time to increase safety. Esp of the modeled Konway class.

Figure 6 North Charleston and Filbin Creek Reaches

7) Comments in general on the deepening project and the ship simulations you participated in.

Fort Sumter Range meeting scenarios w/ restricted and unrestricted runs adequately illustrate the difficulty of doing vessels bound by spd restrictions.

When considering the MSC DANIELLA modeling in simulated scenarios... Alt 3 in all cases increased safe vessel movements. The forces of ship interactions combined with the bank effects is the balance.

Consideration to the Alt 4 drawn ISA should be considered as Ebb/Flood tide conditions make this the most dynamic portion of Charleston Harbor.

When considering the KONWAY modeling in Clouter + upper Cooper River reaches... Alt 3 mitigates the effects of increased vessel sizes/drafts such that the infrastructure in place on the west side of the Cooper River is protected.

☆ Incredible simulation / models of Charleston Harbor. The simulation/model team has put in alot of effort and it shows. Most realistic simulations work I've (cont)

participated in. [redacted] Thank you!

Bryan Sanders
ebsanders843@comcast.net

pdf of meeting below bridge.

Thank you!

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: Henry Lockwood hlockwood1@gmail.com Date: 22 Apr

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

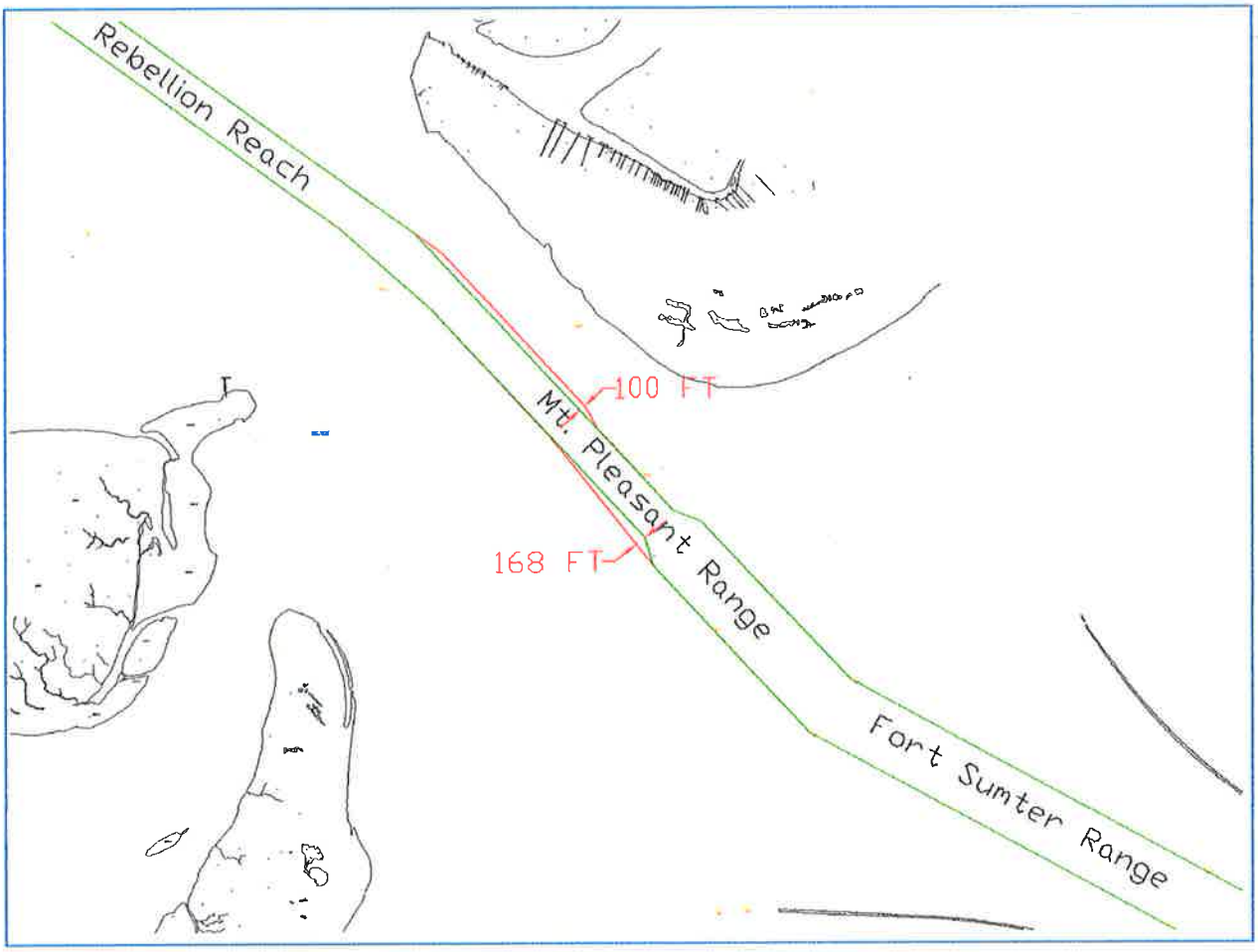


Figure 1 Mount Pleasant Range

These are areas currently used by us. It's just a matter of moving channel edges on chart

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

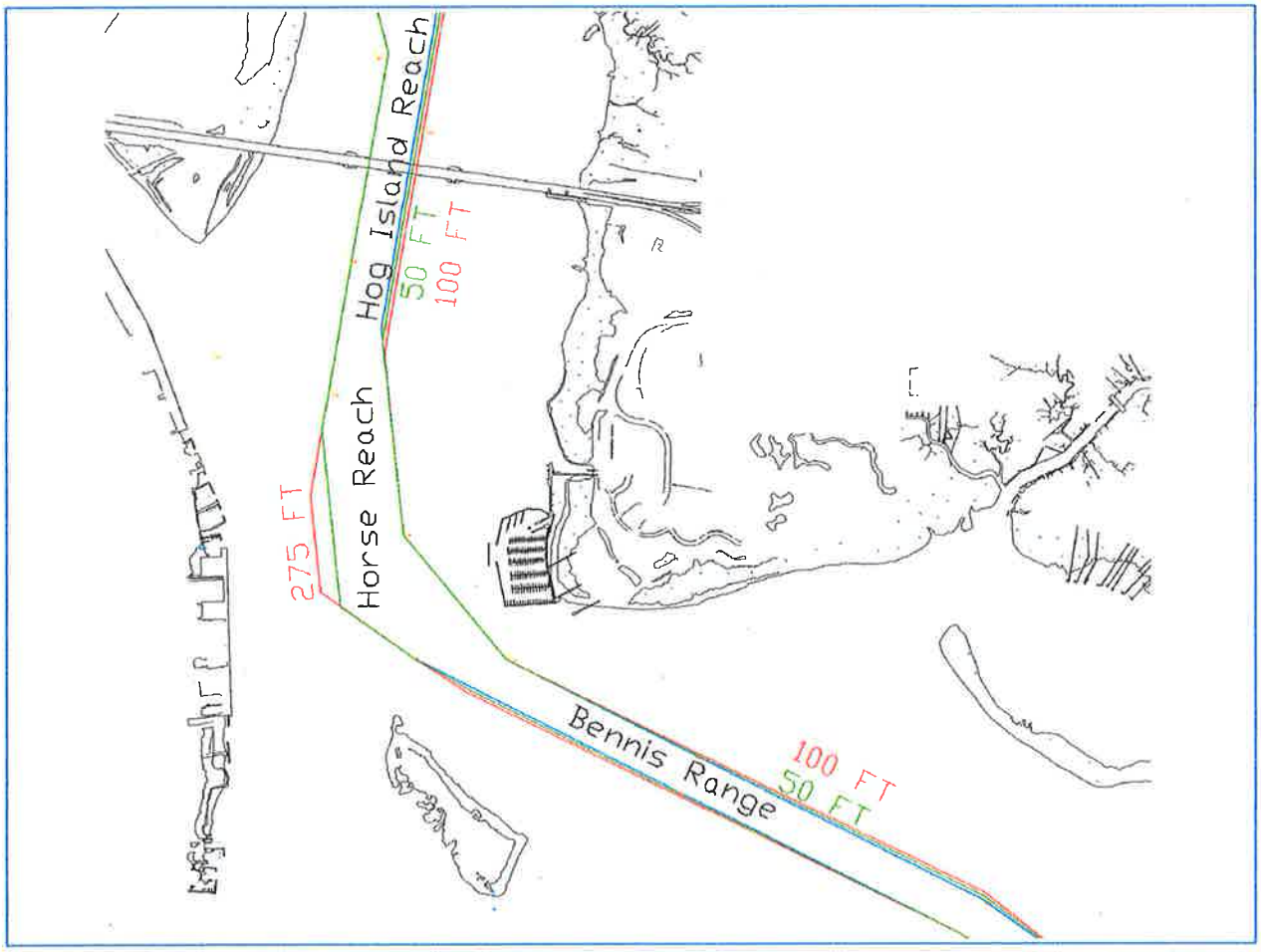


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

Alt 1 is an extreme level of difficulty which is the reason that we are all here. Possible maybe on simulator. Never in real life

Alt 2 I never thought 50 could mean so much.

Alt 3 Ship handlers the way it's supposed to be. We all pray that all numbers work for this plan

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

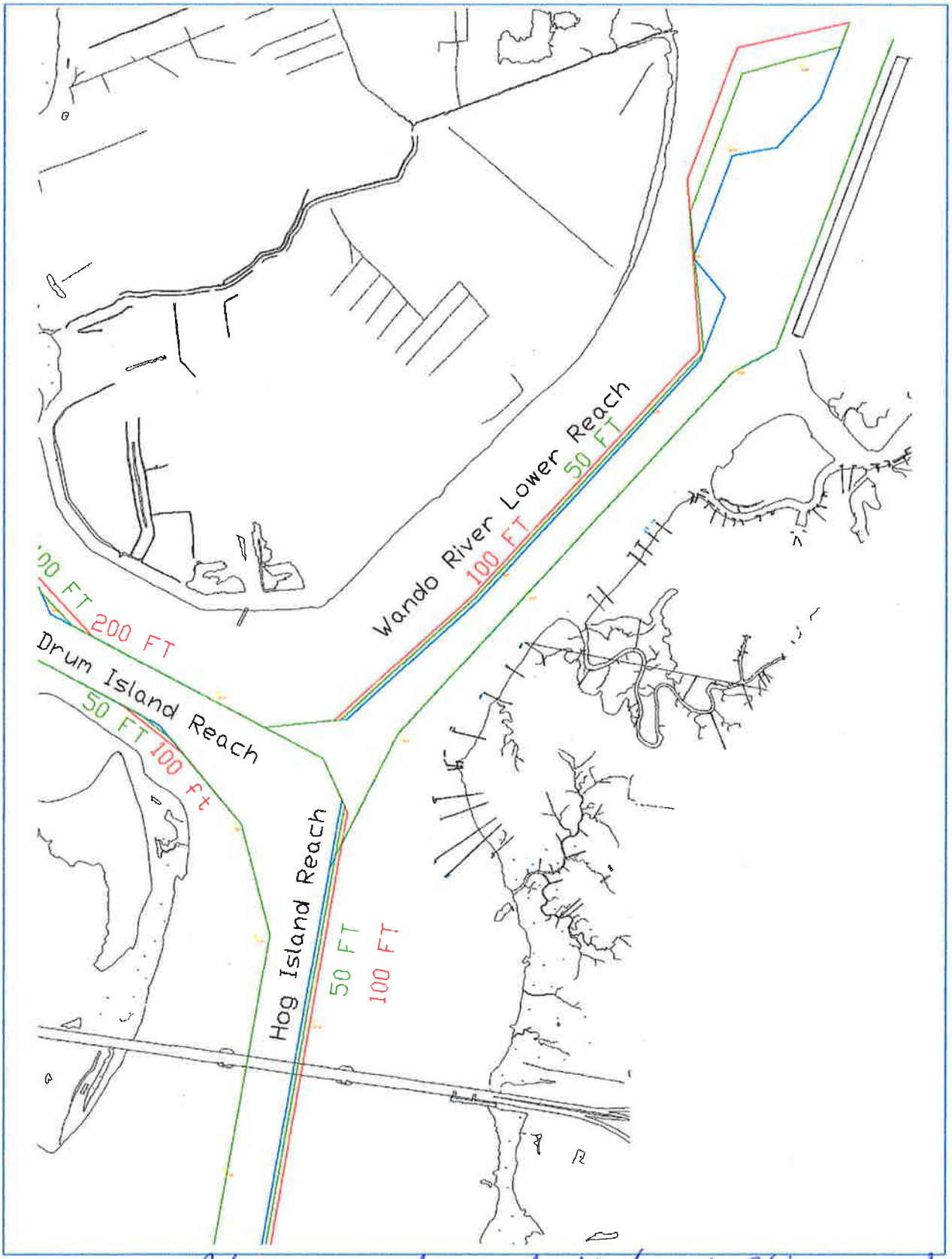


Figure 3 Wando River

Alt 3 is Mandatory for Wando. The Ships currently using Wando can eat up all of the channel w/ moderate NE & NW wind

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

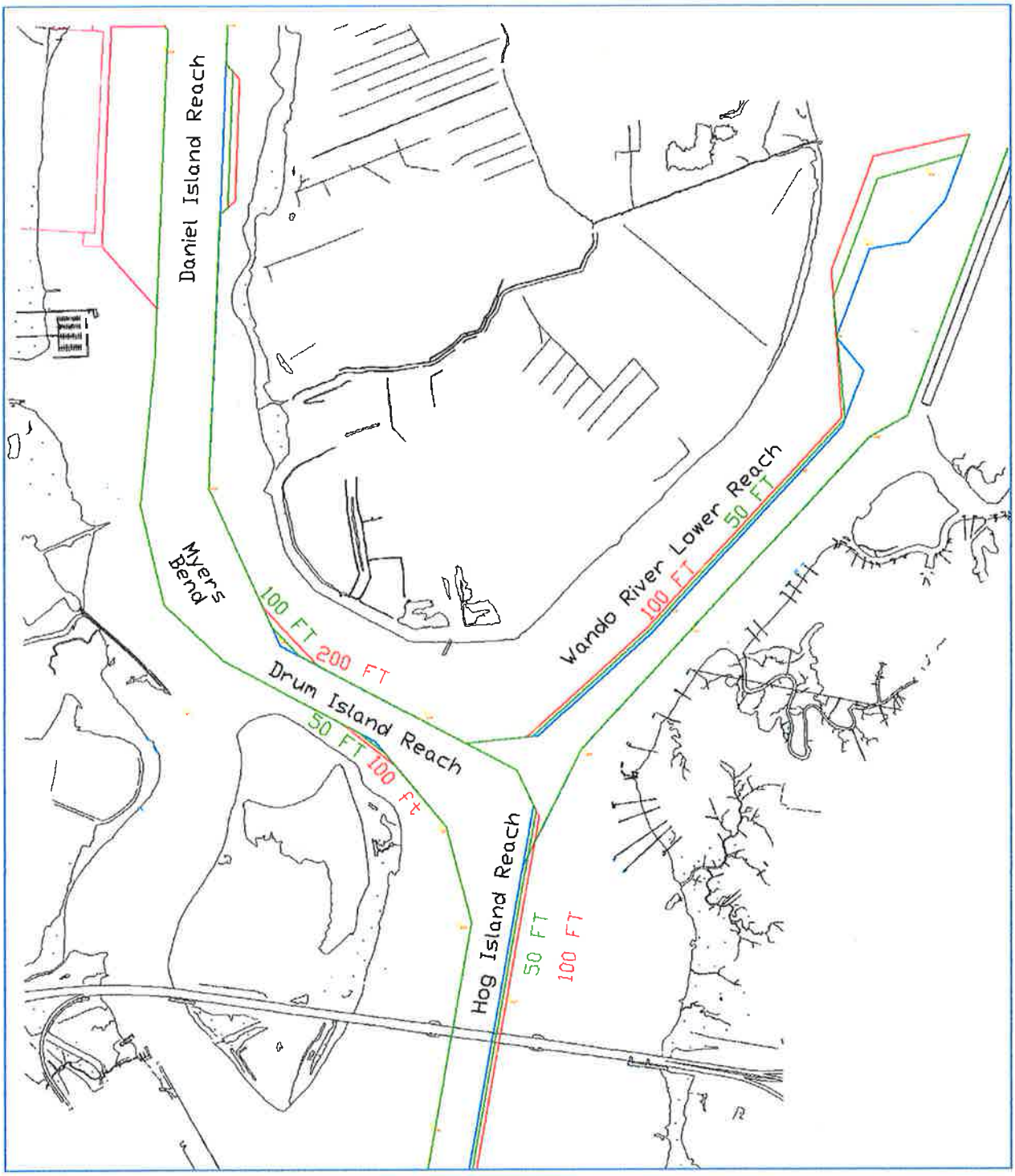


Figure 4 Drum Island Reach

Alt 1 Im not sure if I was ever successful on Simulator.
Alt 2 Forces on ship were not as severe (Bank cushion).
Alt 3 I believe this worked best as Bank forces were reduced the most. Again we pray the numbers work for Alt 3.

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

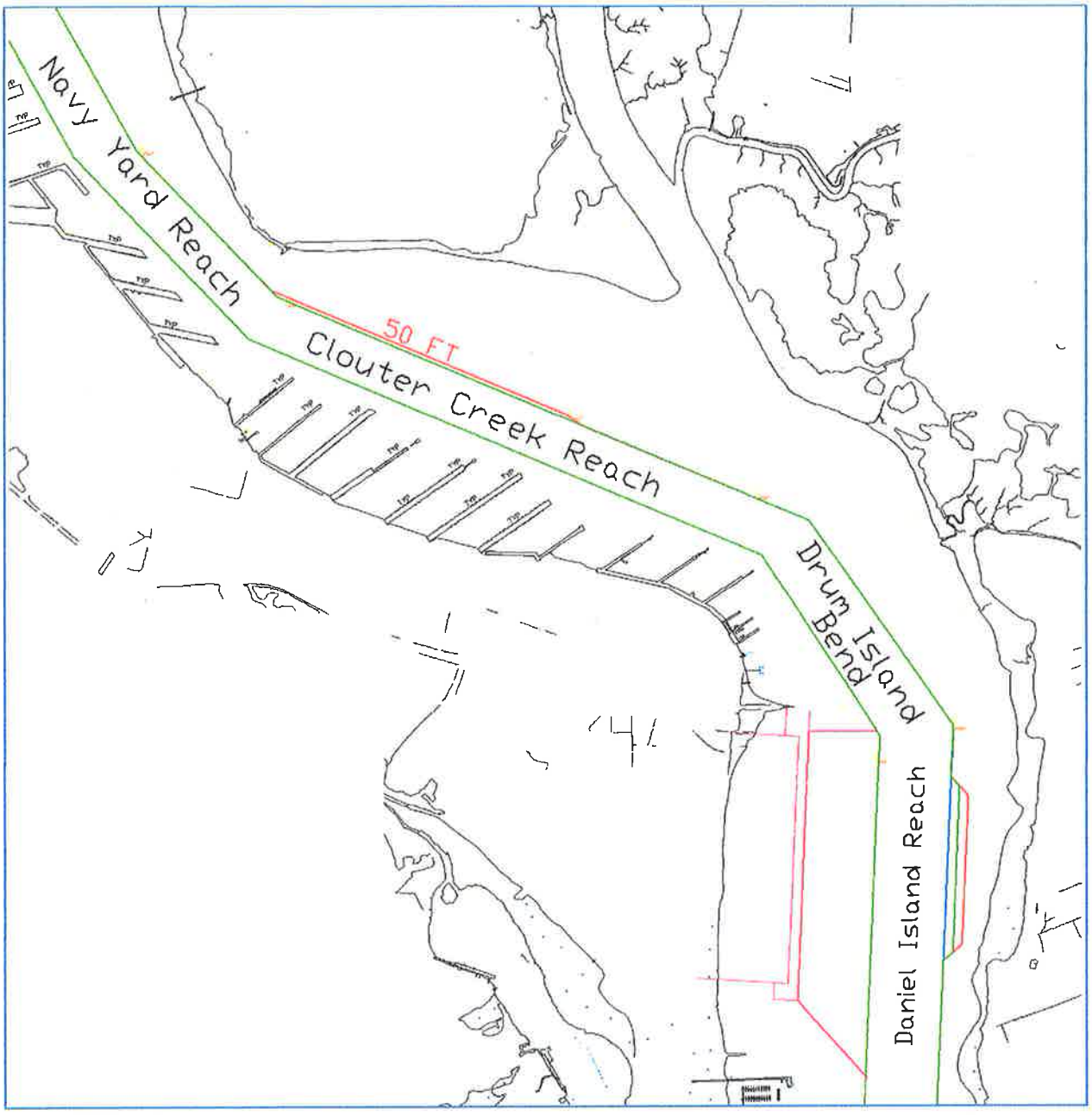


Figure 5 Clouter Reach

All I have to say is that I never thought DD could be so helpful.

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

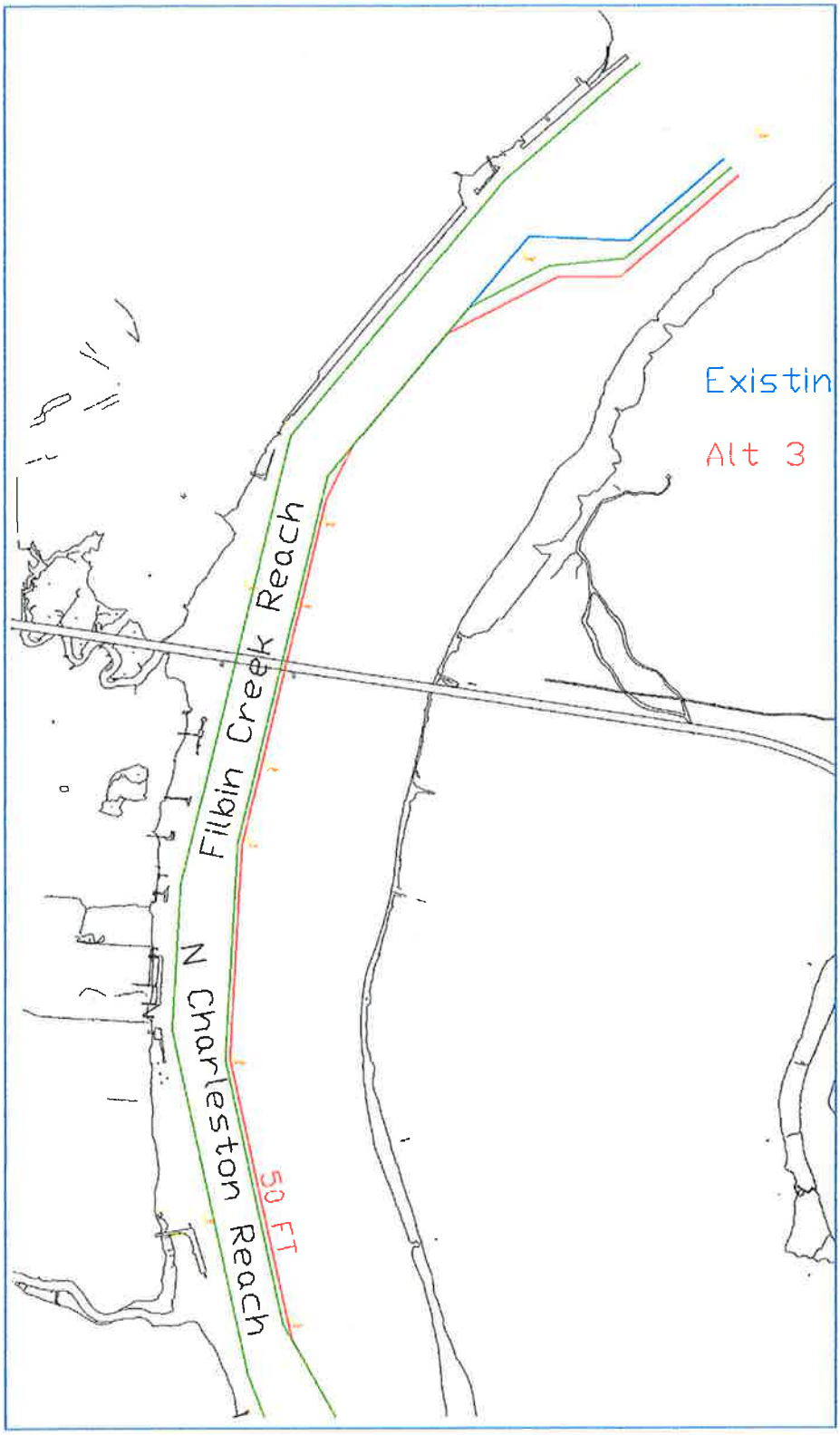


Figure 6 North Charleston and Filbin Creek Reaches

7) Comments in general on the deepening project and the ship simulations you participated in.

Charleston Harbor Pilots – Final Questionnaire (Please base your responses upon your simulator runs.)

Name: Robert Weil Date: 22 Apr 16

rweil4@comcast.net

1) Two-way traffic in the Mount Pleasant Range:

Please comment on both Alt 1 (no widening) and Alt 3 (Max Widening).

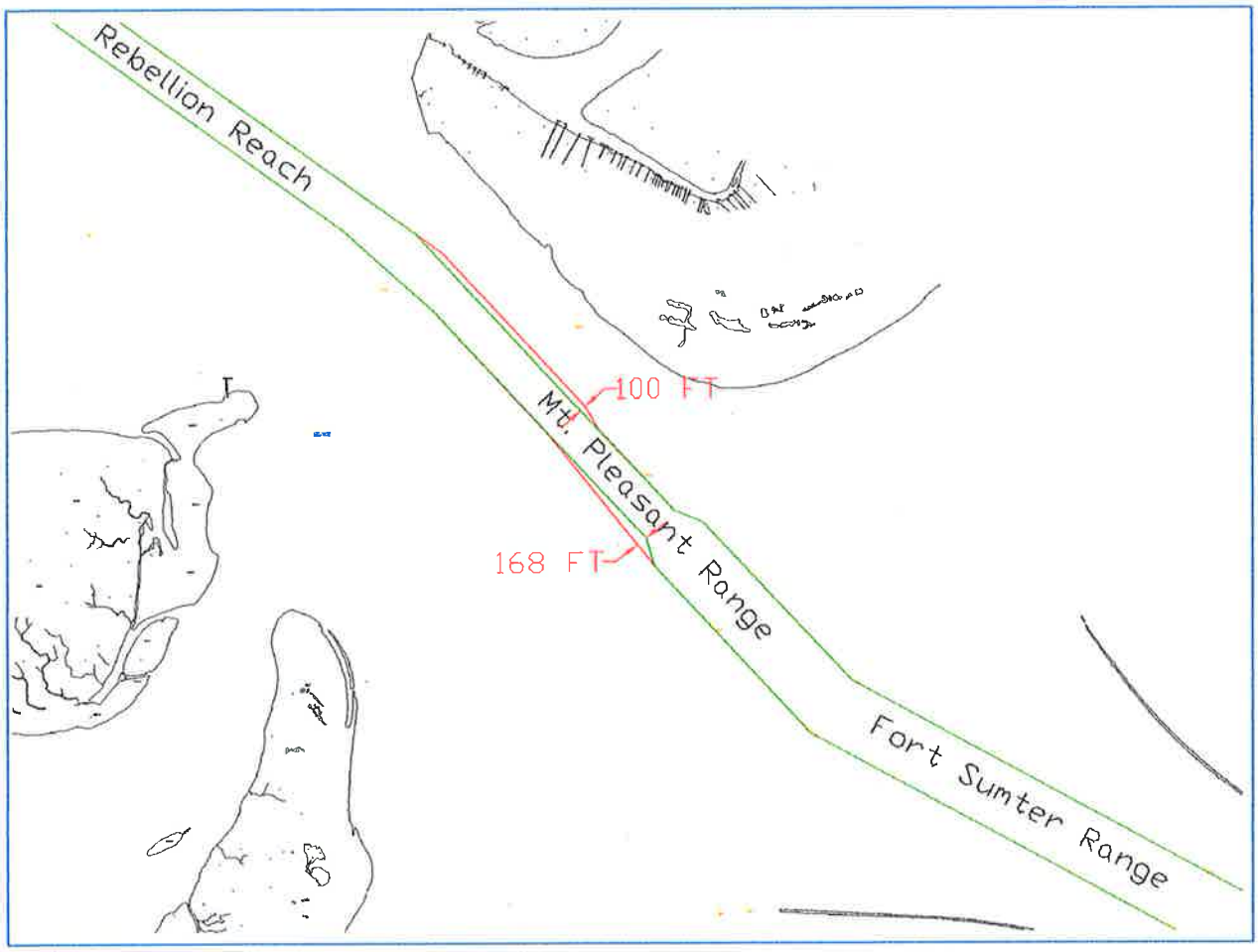


Figure 1 Mount Pleasant Range

ALT 1 - 2 big ships passing in close proximity could be very dangerous due to all the hydrodynamic activity occurring. We use this area to meet 2 ships all the time and make good use of the natural deep water available. Alt 3 is ~~only~~ going to make it easier for us to position the ships for passing.

2) Two-way traffic in the Mount Pleasant Range, Bennis Range, and Hog Island Range:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening). Note there was no widening at Horse Reach for Alt 2. Also, the widening for Bennis Range was tapered from the east side of the south end to the west side of the north end.

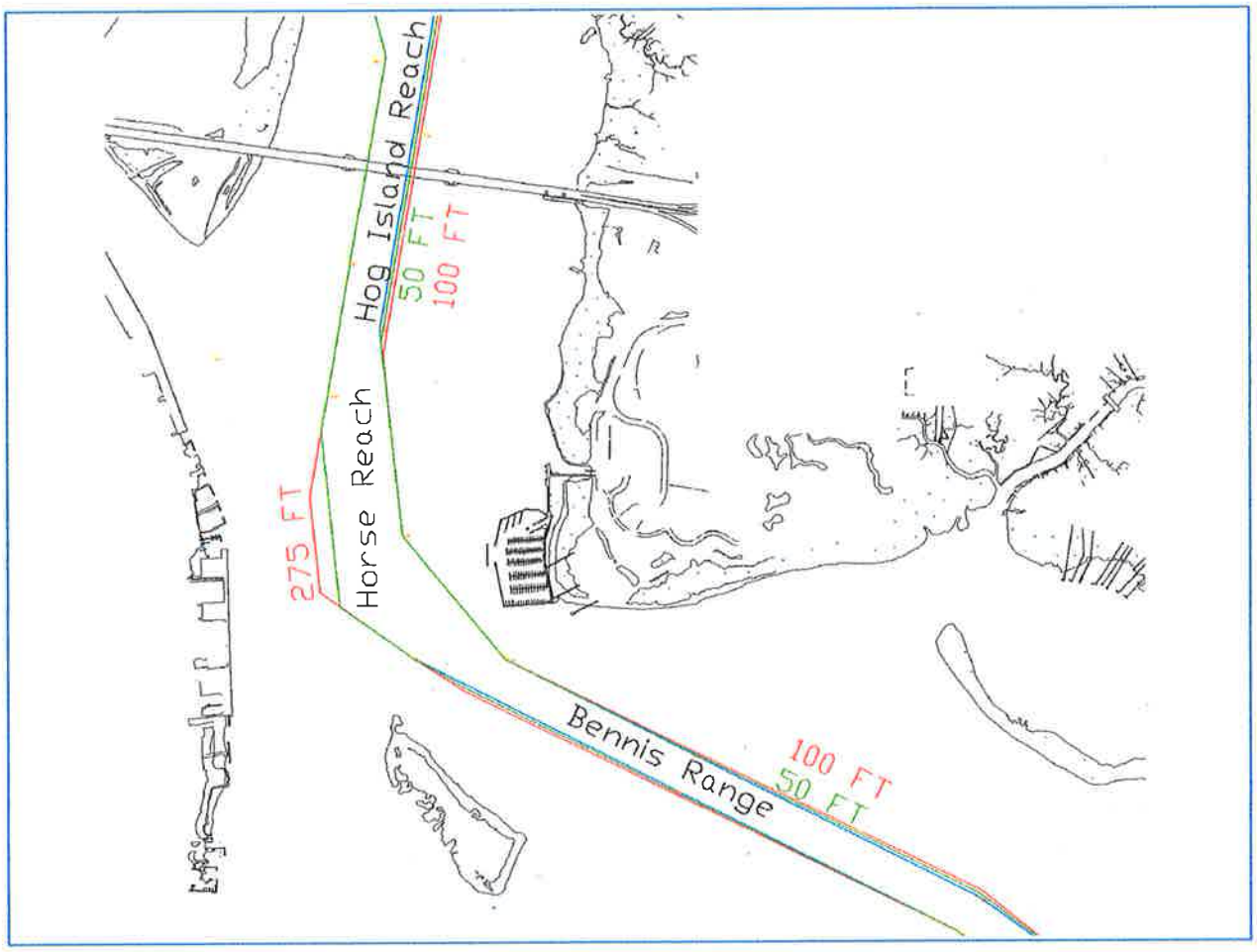


Figure 2 Mount Pleasant Range, Bennis Range, and Hog Island Range

ALT 1 w/ 2 big ships passing on Bennis Reach is going to be very tricky and very dangerous. No safety margin to react to all the hydro forces that we've seen occur before during and after the ships meet. ALT 3 for Bennis Reach provides so much more "wiggle room" during meeting. We will take all you can give us here!

- The Horse Reach widener will help the outbound ship especially on the flood.
- Same sentiments regarding the Hog Island Reach. ALT 3 gives us a much ~~wider~~ greater margin for safety. Inbound ships are having to slow for tugs and the Wando entrance channel.

3) One-way traffic in and out of the Wando River:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

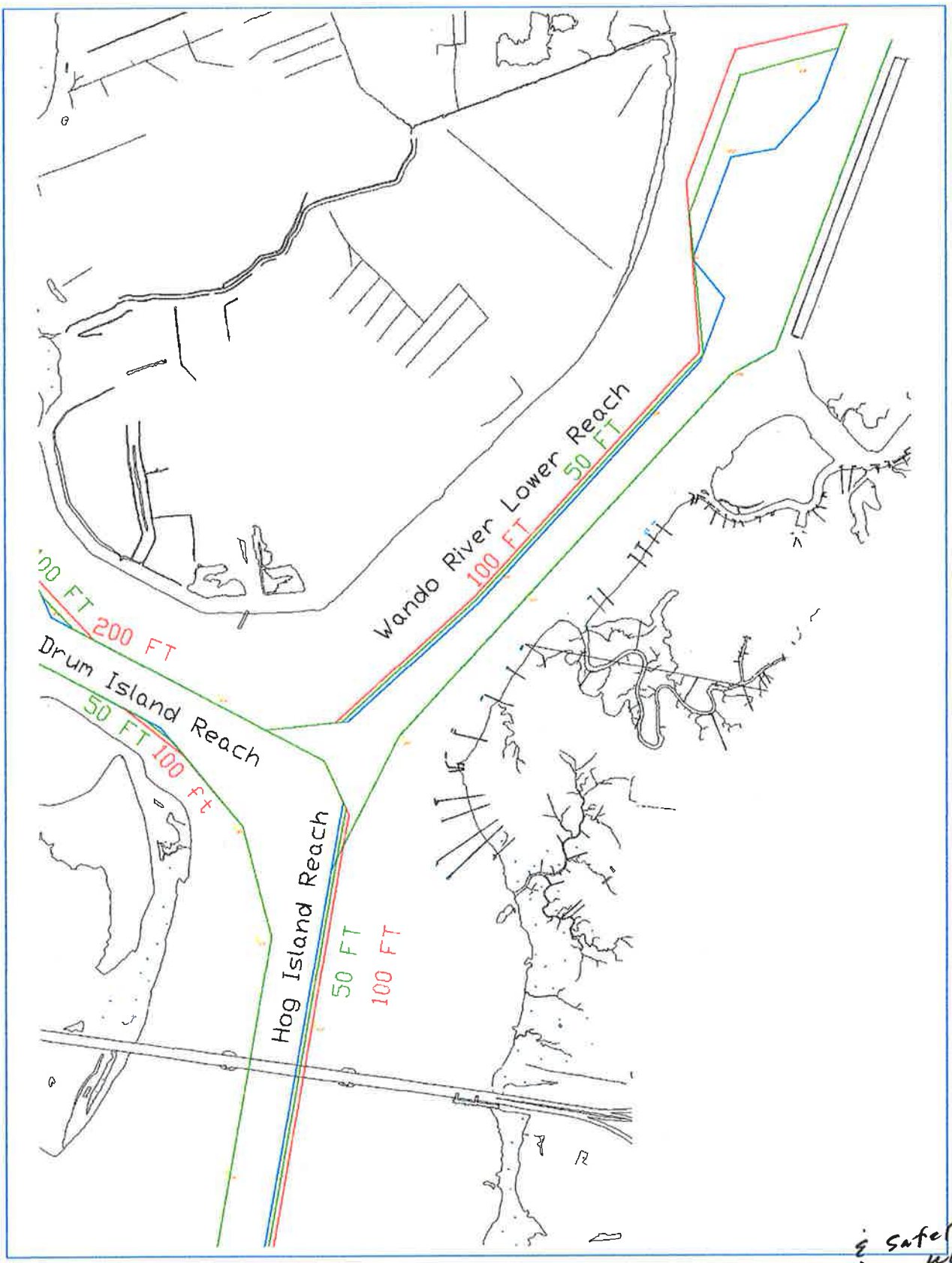


Figure 3 Wando River Max widening here to make it easier & safer while dealing ~~to deal~~ w/ hydro & meteorological forces.

4) One-way and two-way traffic Thru the Drum Island Reach and the north and south approaches to that reach:

Please comment on Alt 1 (no widening), Alt 2 (Medium Widening) and Alt 3 (Max Widening).

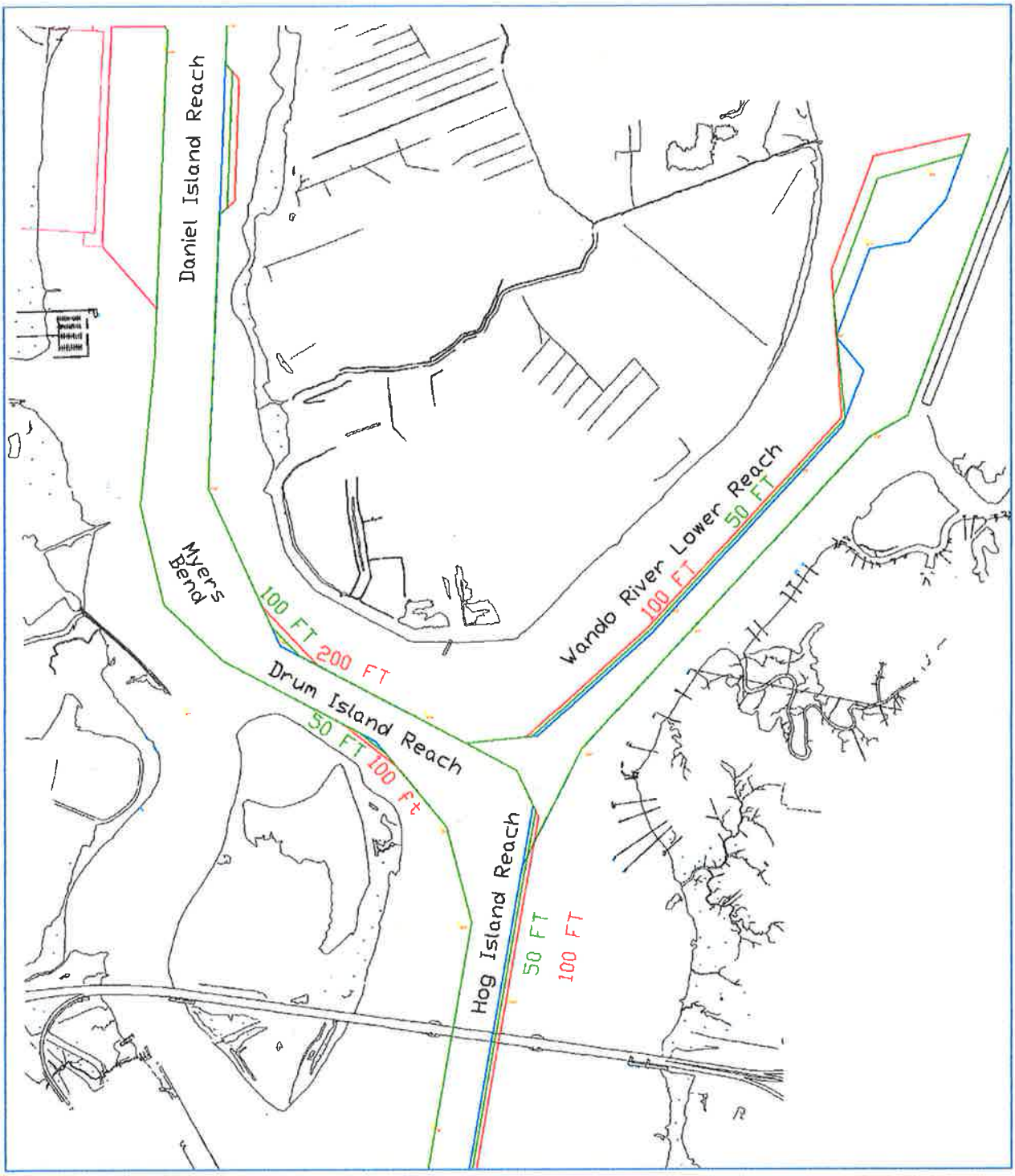


Figure 4 Drum Island Reach

Simulator shows how much of the wideners are being used as a 1200' transit thru Drum Island Reach. North side especially when turning into Myers Bend. Crucial that we get all we can here for safety sake. Max widening.

Alt 1 is going to be very tricky and external forces could make for every dangerous maneuver.

5) Two-way traffic Thru the Clouter Reach:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

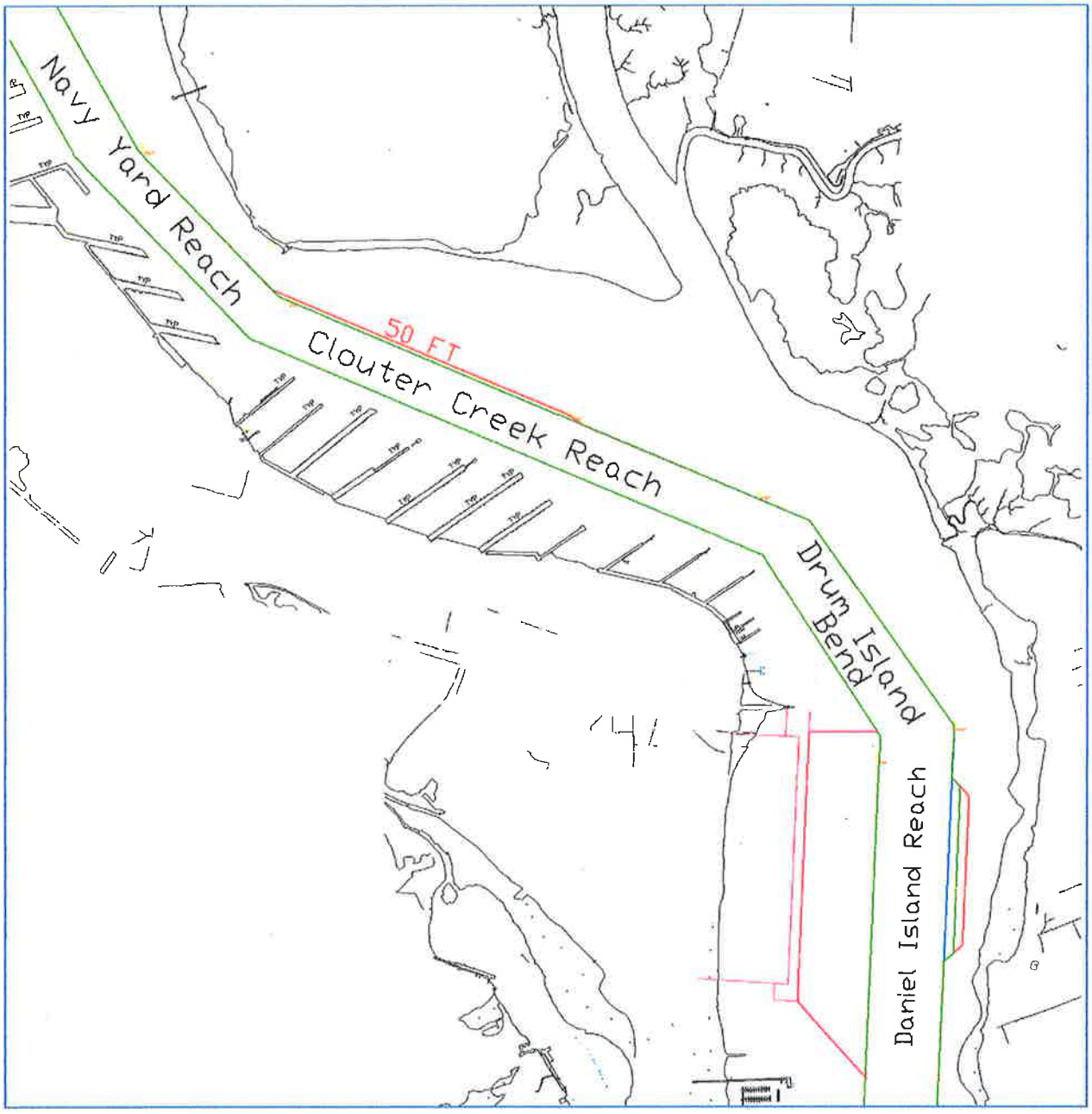


Figure 5 Clouter Reach

ALT 1 leaves very little "wiggle Room" for 2 ships to pass in an area we use frequently to meet. ALT 3 increased the safety margin immensely. It gives the outbound pilot the ability get away from the docks while holding more speed flexibly giving more control.

6) One-way traffic Thru the North Charleston and Filbin Creek Reaches:

Please comment on Alt 1 (no widening)) and Alt 3 (Max Widening).

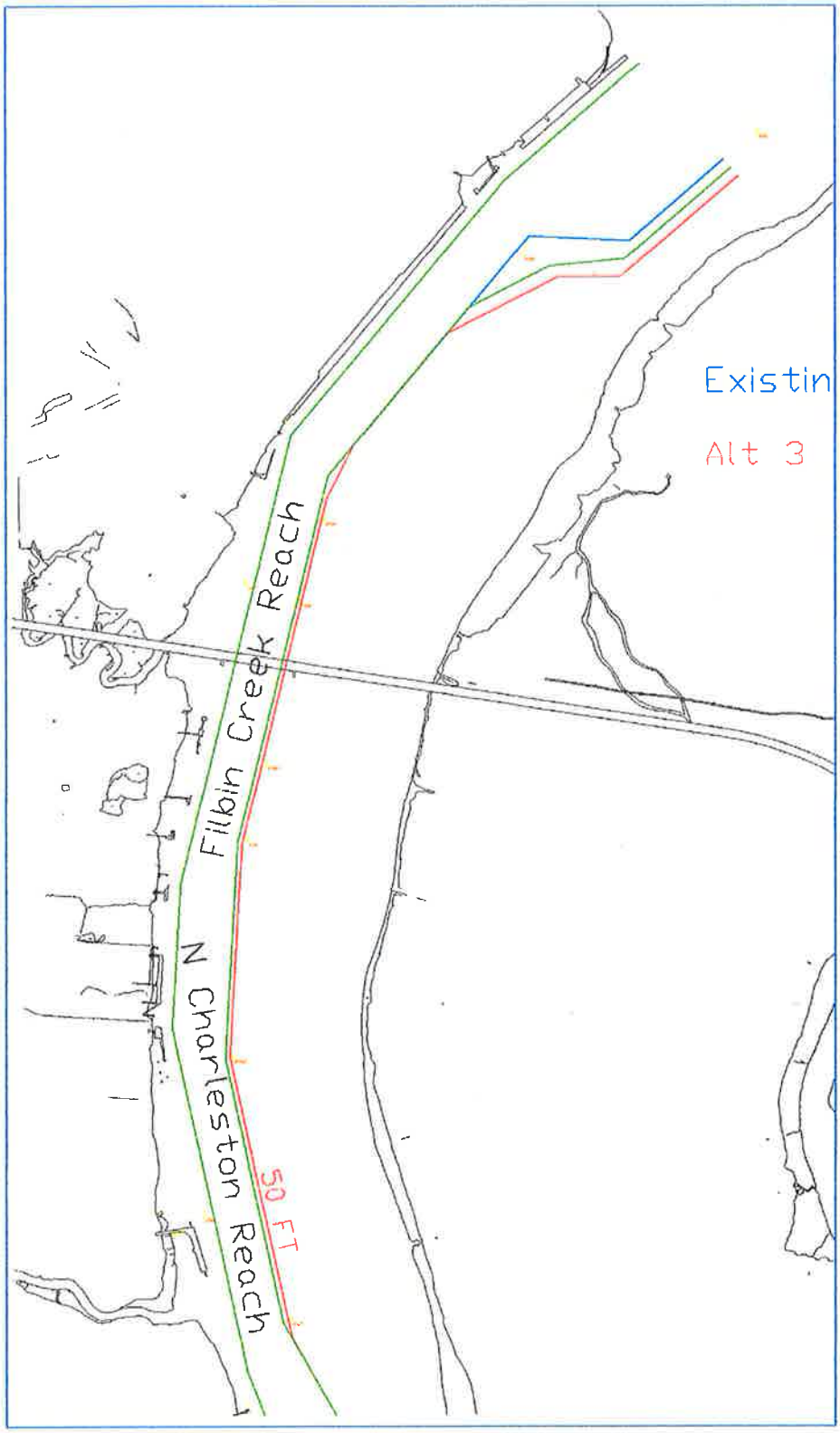


Figure 6 North Charleston and Filbin Creek Reaches

Big ships passing ships moored along Tasker Row currently have to creep past them so as not to ~~suck~~ surge them up/down their dock. ALT 3 enables inbounds to move further away using the extra 50'. They can then make more speed and be less susceptible(?) to external forces.

7) Comments in general on the deepening project and the ship simulations you participated in.

Yall are doing a great job. I have learned a lot about handling the next generation of cont. ships and was surprised at what I observed passing thru all the reaches of our harbor. Keep up the great work!

Rob Weir

Appendix D: Vessel Pilot Cards

PILOT CARD

CNTNR40
Version 0

Ship's name MSC Daniella 2 **Date**

Call Sign XXAT3 **Deadweight** 140637 tonnes **Year built** 2011

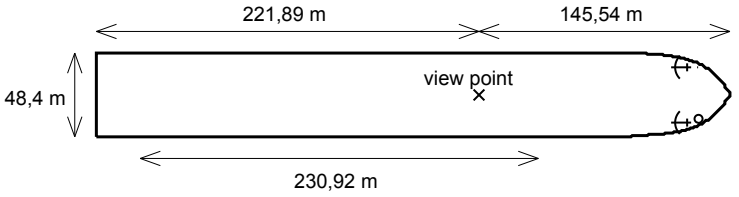
Draught aft 15.2 m / 49 ft 10 in **Forward** 15.2 m / 49 ft 10 in **Displacement** 179494 tonnes

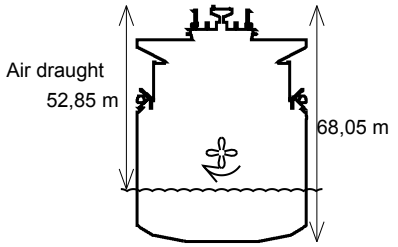
SHIP'S PARTICULARS

Length overall 366.1 m **Anchor chain:** **Port** 28.0 shackles **Starboard** 28.0 shackles

Breadth 48.4 m **Stern** shackles

Bulbous bow Yes **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 67699 kW (92045 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Ballast
Full sea speed	**1**	102.0		24.6	
Full Ahead	**0.8**	67.0		16.7	
Half Ahead	**0.5**	51.0		12.7	
Slow Ahead	**0.25**	41.0		10.1	
Dead Slow Ahead	**0.125**	31.0		7.6	
Dead Slow Astern	**-0.125**	-31.0			
Slow Astern	**-0.25**	-41.0			
Half Astern	**-0.5**	-51.0			
Full Astern	**-1**	-67.0			

Time limit astern min:sec

Full ahead to full astern min:sec

Max. No. of consecutive starts

Minimum RPM knots

Astern power % ahead

STEERING PARTICULARS

Type of rudder Normal **Maximum angle** 35 °

Hard-over to hard-over 13.2 s

Rudder angle for neutral effect 0 °

Thruster: **Bow** 3600 kW (4895 hp) **Stern** _____ kW (_____ hp)

CHECKED IF ABOARD AND READY

Anchors			**Indicators:**		
Whistle			**Rudder**		
Radar		3 cm		10 cm	**Rpm/pitch**		
ARPA			**Rate of turn**		
Speed log		**Doppler:** Yes / No	**Compass system**		
Water speed			**Constant gyro error ±** _____ °	
Ground speed			**VHF**		
Dual-axis			**Elec. pos. fix. system**		
Engine telegraphs			**Type** _____	
Steering gear				
Number of power units operating				

OTHER INFORMATION:

PILOT CARD

CNTNR41
Version 0

Ship's name Konway 1 **Date**

Call Sign XXUJ2 **Deadweight** 103691 tonnes **Year built** 2006

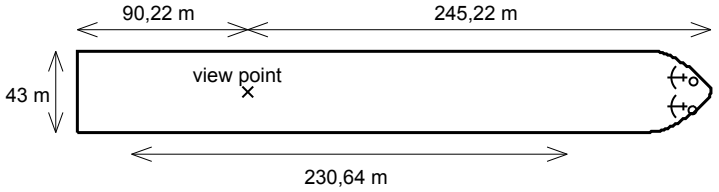
Draught aft 14 m / 45 ft 11 in **Forward** 14 m / 45 ft 11 in **Displacement** 135296 tonnes

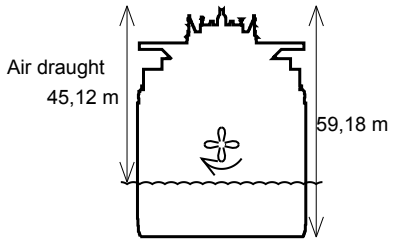
SHIP'S PARTICULARS

Length overall 336 m **Anchor chain:** **Port** 25.8 shackles **Starboard** 25.8 shackles

Breadth 43 m **Stern** shackles

Bulbous bow Yes **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 68632 kW (93313 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Ballast
Full sea speed	**1**	104.0		25.2	
Full Ahead	**0.8**	68.0		17.3	
Half Ahead	**0.5**	52.0		13.2	
Slow Ahead	**0.25**	42.0		10.6	
Dead Slow Ahead	**0.125**	32.0		8.0	
Dead Slow Astern	**-0.125**	-32.0			
Slow Astern	**-0.25**	-42.0			
Half Astern	**-0.5**	-52.0			
Full Astern	**-1**	-68.0			

Time limit astern min:sec

Full ahead to full astern min:sec

Max. No. of consecutive starts

Minimum RPM knots

Astern power % ahead

STEERING PARTICULARS

Type of rudder Normal **Maximum angle** 35 °

Hard-over to hard-over 12.7 s

Rudder angle for neutral effect 0 °

Thruster: **Bow** 2500 kW (3399 hp) **Stern** _____ kW (_____ hp)

CHECKED IF ABOARD AND READY

Anchors ☐

Whistle ☐

Radar ☐ 3 cm ☐ 10 cm

ARPA ☐

Speed log ☐ **Doppler:** Yes / No

- **Water speed** ☐
- **Ground speed** ☐
- **Dual-axis** ☐

Engine telegraphs ☐

Steering gear ☐

- **Number of power units operating** ☐

Indicators: ☐

- **Rudder** ☐
- **Rpm/pitch** ☐
- **Rate of turn** ☐

Compass system ☐

Constant gyro error ± _____ °

VHF ☐

Elec. pos. fix. system ☐

- **Type** _____

OTHER INFORMATION:

PILOT CARD

TANK10L
Version 4

Ship's name M/T Danita II **Date** _____

Call Sign _____ **Deadweight** 0 tonnes **Year built** _____

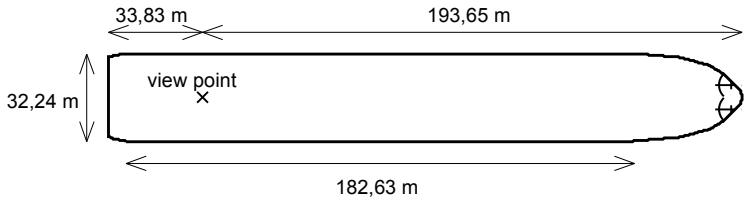
Draught aft 14 m / 45 ft 11 in **Forward** 14 m / 45 ft 11 in **Displacement** 82970 tonnes

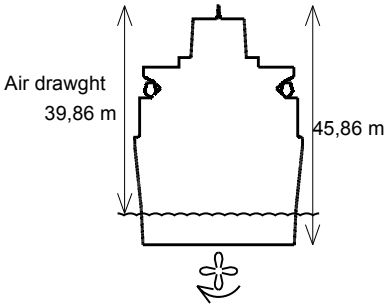
SHIP'S PARTICULARS

Length overall 228,6 m **Anchor chain:** **Port** 26,1 shackles **Starboard** 26,1 shackles

Breadth 32,24 m **Stern** _____ shackles

Bulbous bow No **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 7000 kW (9388 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Ballast
Full sea speed	**1**	84,0		14,0	
Full Ahead	**0,8**	72,0		12,0	
Half Ahead	**0,5**	54,0		9,0	
Slow Ahead	**0,25**	39,1		6,5	
Dead Slow Ahead	**0,125**	27,1		4,5	
Dead Slow Astern	**-0,125**	-27,1			
Slow Astern	**-0,25**	-36,0			
Half Astern	**-0,5**	-47,0			
Full Astern	**-1**	-58,8			

Time limit astern _____ min:sec

Full ahead to full astern _____ min:sec

Max. No. of consecutive starts _____

Minimum RPM _____ _____ knots

Astern power _____ % ahead

STEERING PARTICULARS

Type of rudder Normal **Maximum angle** 35 °

Hard-over to hard-over 15,6 s

Rudder angle for neutral effect -0,2 °

Thruster: **Bow** _____ kW (_____ hp) **Stern** _____ kW (_____ hp)

CHECKED IF ABOARD AND READY

Anchors			**Indicators:**		
Whistle			**Rudder**		
Radar		3 cm		10 cm	**Rpm/pitch**		
ARPA			**Rate of turn**		
Speed log		**Doppler:** Yes / No	**Compass system**		
Water speed			**Constant gyro error ±** _____ °	
Ground speed			**VHF**		
Dual-axis			**Elec. pos. fix. system**		
Engine telegraphs			**Type** _____	
Steering gear				
Number of power units operating				

OTHER INFORMATION:

PILOT CARD

TUG10N
Version 1

Ship's name Cocle/Colon **Date** _____

Call Sign _____ **Deadweight** 230 tonnes **Year built** _____

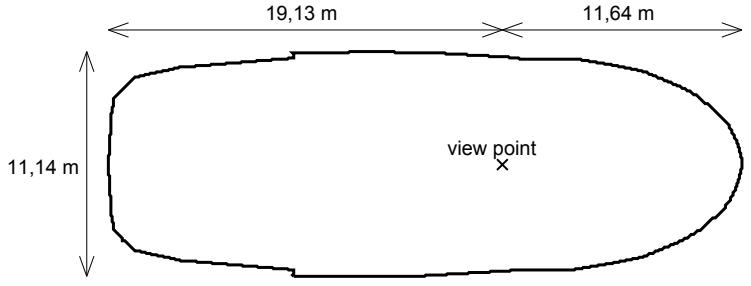
Draught aft 3.581 m / 11 ft 9 in **Forward** 3.581 m / 11 ft 9 in **Displacement** 615 tonnes

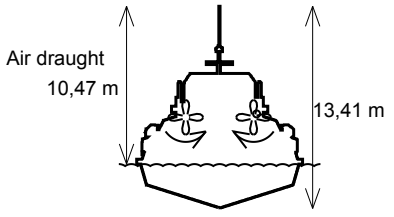
SHIP'S PARTICULARS

Length overall 30.8 m **Anchor chain:** **Port** _____ shackles **Starboard** _____ shackles

Breadth 11.14 m **Stern** _____ shackles

Bulbous bow No **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 4489 kW (6104 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Speed (knots) Ballast
Full sea speed	**1**	279.2			13.0
Full Ahead	**0.8**	251.3			11.9
Half Ahead	**0.5**	209.4			10.0
Slow Ahead	**0.25**	153.6			7.4
Dead Slow Ahead	**0.125**	78.1			3.8
Dead Slow Astern	**-0.125**	78.1			3.8
Slow Astern	**-0.25**	153.6			
Half Astern	**-0.5**	209.4			
Full Astern	**-1**	279.2			

Time limit astern _____ min:sec

Full ahead to full astern _____ min:sec

Max. No. of consecutive starts _____

Minimum RPM _____ _____ knots

Astern power _____ % ahead

STEERING PARTICULARS

Type of rudder Propeller **Maximum angle** 180 °

Hard-over to hard-over 6 s

Rudder angle for neutral effect 0 °

Thruster: **Bow** _____ kW (_____ hp) **Stern** _____ kW (_____ hp)

CHECKED IF ABOARD AND READY

Anchors			**Indicators:**		
Whistle			**Rudder**		
Radar		3 cm		10 cm	**Rpm/pitch**		
ARPA			**Rate of turn**		
Speed log		**Doppler:** Yes / No	**Compass system**		
Water speed			**Constant gyro error ±** _____ °	
Ground speed			**VHF**		
Dual-axis			**Elec. pos. fix. system**		
Engine telegraphs			**Type** _____	
Steering gear				
Number of power units operating				

OTHER INFORMATION:

PILOT CARD

TUG12
Version 7

Ship's name Smit Panama [6] **Date** _____

Call Sign _____ **Deadweight** 380 tonnes **Year built** _____

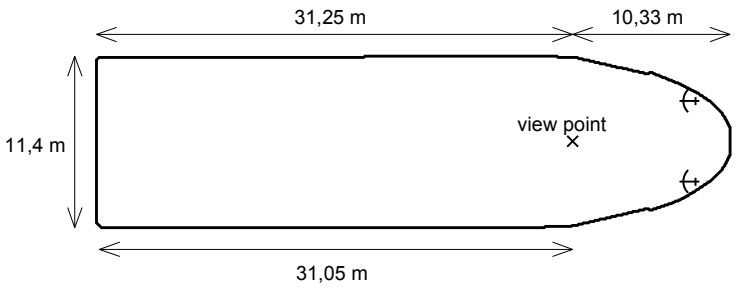
Draught aft 4,217 m / 13 ft 10 in **Forward** 3,673 m / 12 ft 1 in **Displacement** 1036 tonnes

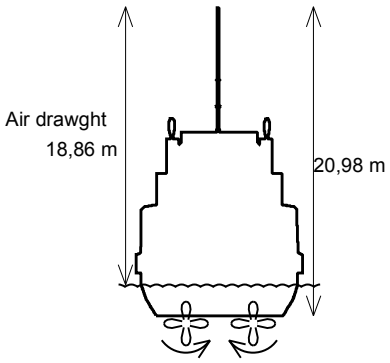
SHIP'S PARTICULARS

Length overall 41,8 m **Anchor chain:** **Port** 11,0 shackles **Starboard** 11,0 shackles

Breadth 11,4 m **Stern** _____ shackles

Bulbous bow No **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 2939 kW (3941 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Speed (knots) Ballast
Full sea speed	**1**	180,0			13,6
Full Ahead	**0,8**	170,3			13,0
Half Ahead	**0,5**	144,0			11,3
Slow Ahead	**0,25**	100,0			8,2
Dead Slow Ahead	**0,125**	67,5			5,6
Dead Slow Astern	**-0,125**	-56,8			
Slow Astern	**-0,25**	-84,0			
Half Astern	**-0,5**	-121,1			
Full Astern	**-1**	-151,4			

Time limit astern _____ min:sec

Full ahead to full astern _____ min:sec

Max. No. of consecutive starts _____

Minimum RPM _____ _____ knots

Astern power _____ % ahead

STEERING PARTICULARS

Type of rudder Normal **Maximum angle** 35 °

Hard-over to hard-over 9,3 s

Rudder angle for neutral effect -0,1 °

Thruster: **Bow** 100 kW (134 hp) **Stern** _____ kW (_____ hp)

CHECKED IF ABOARD AND READY

Anchors		**Indicators:**	
Whistle		**Rudder**	
Radar	3 cm / 10 cm	**Rpm/pitch**	
ARPA		**Rate of turn**	
Speed log	**Doppler:** Yes / No	**Compass system**	
Water speed		**Constant gyro error ±**	°
Ground speed		**VHF**	
Dual-axis		**Elec. pos. fix. system**	
Engine telegraphs		**Type**	
Steering gear			
Number of power units operating			

OTHER INFORMATION:

PILOT CARD

TUG16
Version 12

Ship's name Atlantic Oak **Date** _____

Call Sign _____ **Deadweight** 230 tonnes **Year built** _____

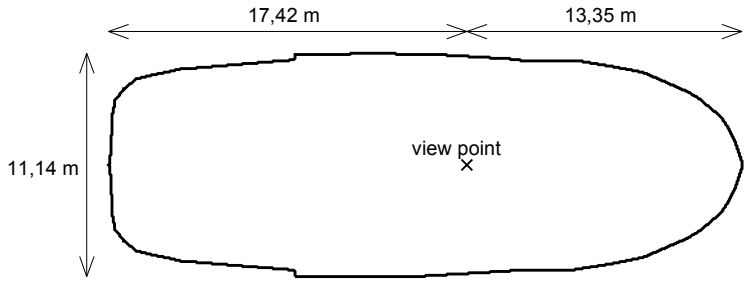
Draught aft 5 m / 16 ft 5 in **Forward** 5 m / 16 ft 5 in **Displacement** 615 tonnes

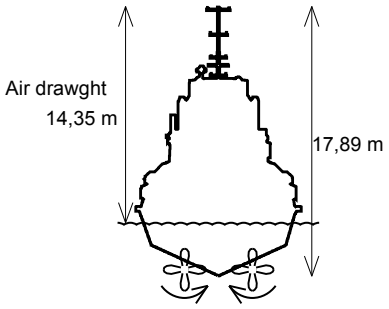
SHIP'S PARTICULARS

Length overall 30,8 m **Anchor chain:** **Port** _____ shackles **Starboard** _____ shackles

Breadth 11,14 m **Stern** _____ shackles

Bulbous bow No **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 3676 kW (4929 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Speed (knots) Ballast
Full sea speed	**1**	219,9			12,5
Full Ahead	**0,8**	188,8			11,1
Half Ahead	**0,5**	142,7			9,2
Slow Ahead	**0,25**	104,2			7,3
Dead Slow Ahead	**0,125**	85,0			6,0
Dead Slow Astern	**-0,125**	0,0			
Slow Astern	**-0,25**	0,0			
Half Astern	**-0,5**	0,0			
Full Astern	**-1**	0,0			

Time limit astern _____ min:sec

Full ahead to full astern _____ min:sec

Max. No. of consecutive starts _____

Minimum RPM _____ _____ knots

Astern power _____ % ahead

STEERING PARTICULARS

Type of rudder Propeller **Maximum angle** 180 °

Hard-over to hard-over 24 s

Rudder angle for neutral effect 0 °

Thruster: **Bow** _____ kW (_____ hp) **Stern** _____ kW (_____ hp)

CHECKED IF ABOARD AND READY

Anchors ☐

Whistle ☐

Radar ☐ 3 cm ☐ 10 cm

ARPA ☐

Speed log ☐ **Doppler:** Yes / No

- **Water speed** ☐
- **Ground speed** ☐
- **Dual-axis** ☐

Engine telegraphs ☐

Steering gear ☐

- **Number of power units operating** ☐

Indicators: ☐

- **Rudder** ☐
- **Rpm/pitch** ☐
- **Rate of turn** ☐

Compass system ☐

Constant gyro error ± _____ °

VHF ☐

Elec. pos. fix. system ☐

- **Type** _____

OTHER INFORMATION:

Appendix E: John Cameron Letter

CHARLESTON BRANCH PILOTS' ASSOCIATION

P.O. BOX 179
CHARLESTON, SOUTH CAROLINA 29402
PHONE (843) 577-6695
FAX (843) 577-0632

September 15, 2016

Commander, U.S. Army Corps of Engineers
Charleston District
Attn: Holly Carpenter, PE, Project Manager
69A Hagood Avenue
Charleston, SC 29403

Dear Ms. Carpenter,

We greatly appreciate the opportunity to participate in your design analysis of the Charleston Post-45 Project. As previously noted, the extent of widening for the Wando River Reaches is a significant concern. These are the narrowest reaches in the harbor, yet they serve the largest terminal and the largest ships trading in Charleston.

We have thoroughly reviewed the revised report and appendices provided, and have studied all of the simulation runs. We are satisfied this report accurately evaluates the simulations we participated in, and we respectfully recommend that the full-width widener of 100 feet would be a much better solution for the Post-45 Wando River Reaches. Wideners of lesser dimension would not allow sufficient margins-of-safety for ships of the expected size, frequency, and load conditions projected for the Port of Charleston.

We are very pleased with the change in recommendation for the Upper & Lower Wando River to incorporate the full width widener, as was an option reviewed in previous phases of the permitting process. Thank you, again, for the opportunity to comment on this critical navigational safety issue.

Sincerely,

John E. Cameron
Captain, U.S. Coast Guard (Ret.)
Executive Director

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED *(From - To)*
May 2019	Final Report	

4. TITLE AND SUBTITLE

Charleston, South Carolina, Navigation Study
Charleston Harbor Deepening and Widening Ship Simulation Results

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Dennis W. Webb, Keith Martin, and Gary C. Lynch

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

137921

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
3909 Halls Ferry Road

8. PERFORMING ORGANIZATION REPORT NUMBER

ERDC/CHL TR-19-5

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Corps of Engineers, Charleston District
69 Hagood Ave,
Charleston, SC 29412

10. SPONSOR/MONITOR'S ACRONYM(S)

USACE SAC

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT In 2016, the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (CHL), Ship-Tow Simulator (STS) is used to perform a navigation study assisting the Charleston District in evaluating different channel widening alternatives for larger containerships calling at the Port of Charleston. The widening proposals are associated with the proposed Charleston Harbor Deepening and Widening Project, known as Post 45. The Feasibility Study for the Post 45 project is completed. The CHL STS is a real-time simulator. Real-time refers to the fact that model time is a 1:1 ratio to prototype time. Also, real-world environmental forces are simulated and act upon the modeled ships during the study. These forces include currents, wind, waves, bathymetry, bank effects, and ship-to-ship interaction. Simulations for the project's alternatives are conducted at CHL over a 6-week period from March through May 2016. More than 20 mariners including harbor pilots, docking pilots, and tractor tug captains participate in the testing and validation exercises. Most of the simulations involve containerships of either Post Panamax Generation 3 class or Post Panamax Generation 2 class. Results, in the form of track plots and pilot questionnaires, are reviewed to develop final conclusions and recommendations.

15. SUBJECT TERMS

Channels (Hydraulic Engineering)—Effect of dredging on, Charleston Harbor (S.C.), Inland navigation—Computer simulation, Ships—Maneuverability—Safety measures

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Keith Martin
Unclassified	Unclassified	Unclassified	SAR	542	19b. TELEPHONE NUMBER *(Include area code)* 601-634-3019