

Port of Tacoma Bollard Study for WUT KPFF Job No. 10092300204



Prepared by KPFF Consulting Engineers

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kpff60^{YEARS}

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1. EXECUTIVE SUMMARY

A study of the mooring bollards at Washington United Terminals (WUT) reveals that the existing 125-kip bollards need to be upgraded to moor 14,000 and 20,000 TEU vessels safely. Comparisons with industry guidelines and other berths in the area highlight the undersized capacity of the current bollards. The maximum allowable wind speeds for all berthing arrangements considered in the mooring analysis are lower than the site-specific 25-year return period wind speeds, indicating a potential safety risk. Additionally, a preliminary screening level passing vessel analysis indicates significant forces on the bollards, further affirming the inadequacy of the existing bollards.

Approximately eighteen existing bollards are recommended to be upgraded to accommodate mooring these larger vessels. Further analysis is recommended to determine the final required bollard capacity, quantity, and location, including detailed dynamic passing vessel analysis and an evaluation of the supporting structures.

In the interim, if 14,000 and 20,000 TEU vessels are to berth at WUT before the bollard upgrades are completed, a plan should be implemented to monitor wind speed or bollard loads to ensure the safety of moored vessels.

2. Introduction

The fender system for Washington United Terminals (WUT) was recently upgraded, at least in part, to accommodate berthing larger vessels than the facilities were originally designed for. New ship-to-shore cranes with higher clearance and longer outreach were also recently installed. Additionally, the Port is developing plans to deepen the Blair Waterway to allow for larger vessels. Considering the other efforts recently completed or in progress to facilitate berthing larger vessels, the Port has asked KPFF to prepare a study to evaluate if the existing mooring bollards are adequate for the vessels anticipated to berth at the terminal.

3. Information Reviewed

3.1. Record Drawings

Record drawings of the facility were compiled and reviewed to understand the existing bollard arrangements, capacity, and wharf geometry. The following record drawings were reviewed:

- 1999 Hyundai Merchant Marine Terminal
- 2000 Washington United Terminals Landside Dolphins and Bollards
- 2009 WUT Berth Extension
- 2022 Washington United Terminal Fender System Replacement Completion

3.2. Relevant Codes, Standards, and Guides

The following industry codes, standards, and guidelines were reviewed for relevant mooring recommendations:

- Uniform Facilities Criteria (UFC) 4-159-03, Design: Moorings, 2020.
- Design of Marine Facilities Engineering for Port and Harbor Structures (Third), Gaythwaite J. W., American Society of Civil Engineers, 2016.
- Mooring of Ships to Piers and Wharves, Coasts Oceans Ports and Rivers Institute (American Society of Civil Engineers) & Gaythwaite J.W., American Society of Civil Engineers, 2014.
- Port of Long Beach Wharf Design Criteria, Version 5.0, 2021
- California Building Code Chapter 31F [SLC], Marine Oil Terminals, 2016.
- PIANC MarCom WG 9 – Development of Modern Marine Terminals, 1987

3.3. Other Information

The following documents related to vessels currently berthing at or anticipated to berth at WUT were reviewed:

- Assessment of Ultra Large Container Ships (ULCS) in the Blair Waterway, File No: TSIR 1301, October 2013, Puget Sound Pilots
- Washington United Terminals (WUT) Fender Replacement Study, December 30, 2016, BergerABAM

- Tacoma Harbor Navigation Improvement Study, Final Integrated Feasibility Report and Environmental Assessment, June 2022, US Army Corps of Engineers
- General Guidelines for Vessels Transiting Restricted Waterways or Ports, July 26, 2023, Puget Sound Pilots

4. Existing Bollards

4.1. Bollards at WUT

Table 1 summarizes the stated capacities of the existing bollards indicated in the record drawings listed in Section 3.1. The record drawings indicate that the berth was designed for 8,800 TEU and 14,000 TEU vessels. The existing bollard capacities have not been independently verified.

Table 1: WUT Bollard Capacities

Bollard Location	Stated Capacity kips
Typical Bollard Along Face of Wharf	125
North Mooring Dolphin	400
South Mooring Dolphin	400

Figure 1 and Figure 2 show details of the existing mooring bollards along the face of the wharf and at the mooring dolphin, respectively. Both mooring bollards are pipe bollards filled with concrete.

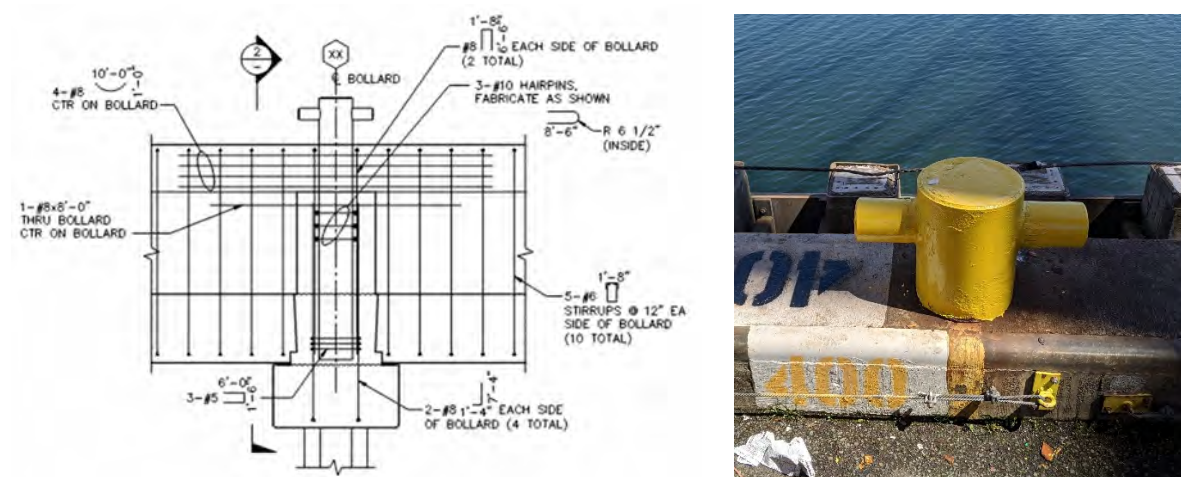


Figure 1 - Typical Bollard Along Face of Wharf Detail and Photo

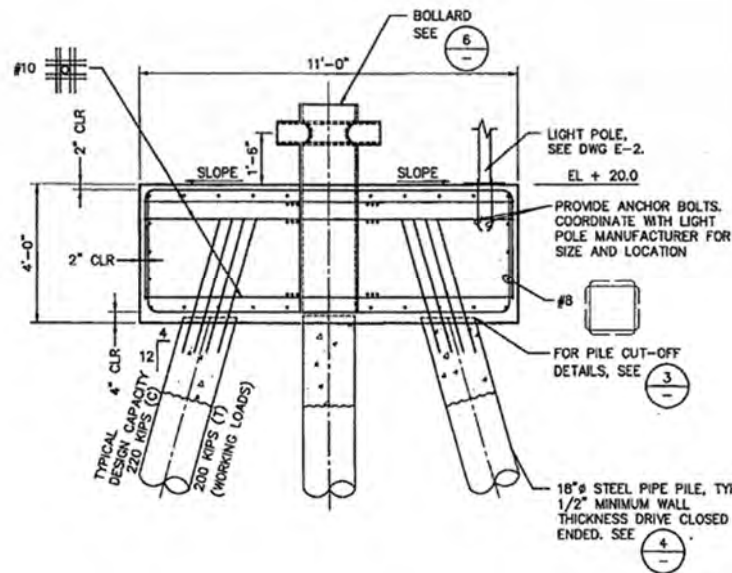


Figure 2 - Typical Mooring Dolphin Bollard Detail

4.2. Bollards at Nearby Terminals

The bollard capacities at other terminals in the area were reviewed and compared to WUT. Table 2 summarizes stated bollard capacities at three other terminals along the Blair Waterway in Tacoma and Terminal 5 (T5) in Seattle. Bollard capacities at Pierce County Terminals (PCT) and East Blair One (EB1) are similar to WUT, while Husky and T5 bollards have higher stated capacities. Record drawings indicate that PCT and EB1 were designed for 8,800 TEU and 14,000 TEU vessels and have typical bollard capacities of 125 kips, whereas Husky and T5 were designed for 14,000 TEU and 18,000 TEU vessels and have typical bollard capacities of 200 kips and 441 kips, with 400 kip bollards at the middle and south end where the ends of larger vessels are anticipated to moor.

Table 2: Stated Bollard Capacities at Other Terminals in the Area

Terminal	Bollard Location	Bollard Capacity
PCT	Typical Wharf	125 kips
	East Dolphin	350 kips
	West Dolphin	150 kips
EB1	Typical Wharf	125 kips
	South Dolphin	350 kips
Husky	Typical Wharf	200 kips
	North End of Wharf	300 kips
	South End and Middle of Wharf	400 kips
T5	Typical Wharf	441 kips

4.3. Bollard Capacity Guidelines

The 20,000 TEU and 14,000 TEU vessels have displacements equal to or greater than 200,000 tons. Design of Marine Facilities Engineering for Port and Harbor Structures provides guidelines for bollard capacities based on vessel displacement based on guidelines from the British Standards Institute (BSI) and the German Society for Harbor and Foundation Engineering (EAU). For displacements greater than or equal to 200,000 tons, a bollard capacity of 2,000 kN, or about 450 kips, is recommended.

PIANC MarCom WG 9 also includes bollard capacity guidelines. Due to the age of the report, the recommendations only include vessels with displacements up to 100,000 tons, for which a bollard capacity of 1,000 kN, or about 225 kips, is recommended.

The existing 125-kip bollards at WUT are undersized compared to these guidelines.

5. Vessel Mooring Analysis

Mooring arrangements were developed, and a detailed mooring analysis was performed for vessels currently moored and anticipated to be moored at the berth. The analysis considered one or two vessels simultaneously berthed for high and low tide elevations. The vessel sizes and arrangements used in the analysis were developed from references researched in Section 3 and were reviewed by WUT terminal operators.

The analysis method consisted of a quasi-static approach using the software program OPTIMOOR by Tension Technology International. OPTIMOOR is recognized as a reliable tool for performing quasi-static mooring analysis by UFC 4-159-03 in sections 3-2.6 and 3-3.1.

5.1. OPTIMOOR Inputs

5.1.1. Design Still Water Levels

The elevations in Table 3 are relative to MLLW and are based on the current tidal data epoch from 1983 to 2001. The mooring analysis considered the vessel moored at both MHHW and MLLW tides.

Table 3: Tidal Data at Tacoma NOAA Station 9446484

Datum	Water Level (feet)
MHHW	11.78
MHW	10.9
MLW	2.84
NAVD88	2.39
MLLW	0
Pier Deck Elevation	21.4
Current Depth of Berth	-51

5.1.2. Vessel Characteristics

Three vessel sizes were evaluated in this study to represent those that currently moor or are anticipated to be moored at WUT. The Port provided information for the following vessels used in the analysis:

1. Thalassa Hellas 13,800 TEU Class Container Carrier
2. Imabari Shipbuilding Co General Arrangement 20,000 TEU Type Container Carrier

An 8,800 TEU vessel was also evaluated using characteristics compiled from references listed in Section 3.2. A summary of the three design vessels is listed below in Table 4.

Table 4: Vessel Characteristics

Vessel Characteristics	Vessel		
	8,800 TEU	14,000 TEU	20,000 TEU
LOA	1050 ft	1209 ft	1312 ft
Breadth	140 ft	167.3 ft	192.9 ft
Design Draft	39.4 ft	47.6 ft	47.6 ft
Windage Area - Transverse	18,924 ft ²	26,599 ft ²	32,915 ft ²
Windage Area - Longitudinal	109,995 ft ²	154,920 ft ²	200,518 ft ²

5.1.3. Berthing Scenarios Considered

Due to the WUT wharf length, it is possible to moor two vessels at once. The vessels' geometry and mooring arrangements were considered to determine potential berthing scenarios. These potential berthing scenarios were reviewed by the terminal operators and are summarized in Appendix B.

5.1.4. Mooring Line Properties

WUT provided properties for mooring lines for a 14,000 TEU vessel, which were used in all analyses and are listed below in Table 5.

Table 5: Assumed Mooring Line Properties

Line Material	HMPE
Line Diameter	1.8 in
Line Circumference	5.7 in
Strength of Line	135 tons
Tail Material	D-Flex
Tail Diameter	3.9 in
Tail Circumference	12.4 in
Strength of Tail	146 tons

5.2. Mooring Line Arrangements

Mooring line arrangements were developed in OPTIMOOR, evaluated, revised, and iterated to maximize the allowable wind speed for each berthing scenario while keeping the loads on the existing bollards

below their listed capacities. A wind rose limit analysis was used to determine the maximum allowable wind speed at which none of the existing bollards exceeded 100% of their listed capacity. Operational limits on vessel displacement were not considered.

The final iteration of the OPTIMOOR analysis for each berthing scenario is attached in Appendix A. Included are the input assumptions described in Section 5.1, the vessel and mooring line arrangements from iterating, the maximum wind speed achieved, and the demand-capacity ratios of the existing bollards. Table 6 summarizes the maximum allowable wind speed for each mooring arrangement considered.

Table 6: Maximum Allowable Wind Speed

Mooring Arrangement	Wind Speed knots
14,000 TEU Vessel	22
20,000 TEU Vessel	22
8,800 & 14,000 TEU Vessels	21
8,800 & 20,000 TEU Vessels	18
14,000 & 14,000 TEU Vessels	15

6. Site-Specific Wind Speed Evaluation

A site-specific wind speed evaluation was conducted using extreme value analysis of historical wind data to determine 25-year return period wind speeds from various compass directions for use in evaluating the adequacy of the existing mooring bollards. Details of this evaluation are included in Appendix C and summarized below.

6.1. Wind Speed Data

Wind speed data used in this evaluation was taken from a National Data Buoy Center database using the anemometer at NOAA station 9446482 at the Port of Tacoma. The available data for this station spans approximately 15 years, commencing from April 2009 and concluding in October 2023, with recordings taken every 6 minutes. This historical data was used to calculate 25-year return period 30-second duration wind speeds in eight sectors.

A 25-year return period for wind speed was selected to be consistent with the recommendations in the ASCE Manual of Practice for mooring transient vessels and with Port of Long Beach Wharf Design Criteria, which references CBC Section 3105 (i.e., MOTEMS).

6.2. Height and Exposure Correction

Coefficients for correction of the height and exposure type were applied to the wind speed data obtained from the recorded data from the NOAA station to translate that information to equivalent wind speeds from different directions at the wharf. The wind speed data was pre-processed into eight

equal sectors of direction, with the northwest and southeast sectors aligned with the face of the berth, as shown in Figure 3. Station data was recorded at 35.7 feet above the water level and 22.3 feet above the land surface. The exposure category for the wind coming from over water is Exposure D, whereas the wind from over the land is Exposure B. The wind speed data was corrected using modification factors from ASCE 7-22 to adjust to Exposure C and a height of 33 feet.

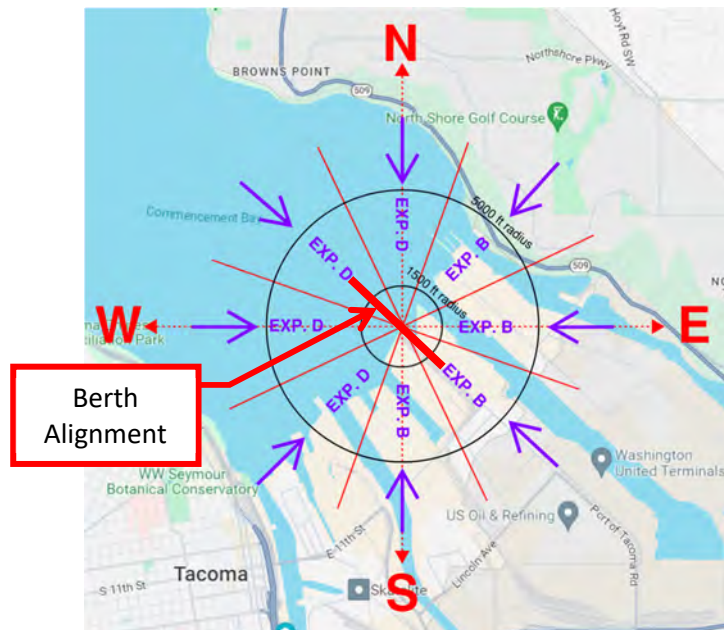


Figure 3 - Exposure of Each Sector at the Anemometer Station

Exposure factors were applied to correct for the actual exposure conditions for each sector at WUT, as shown in Figure 4.

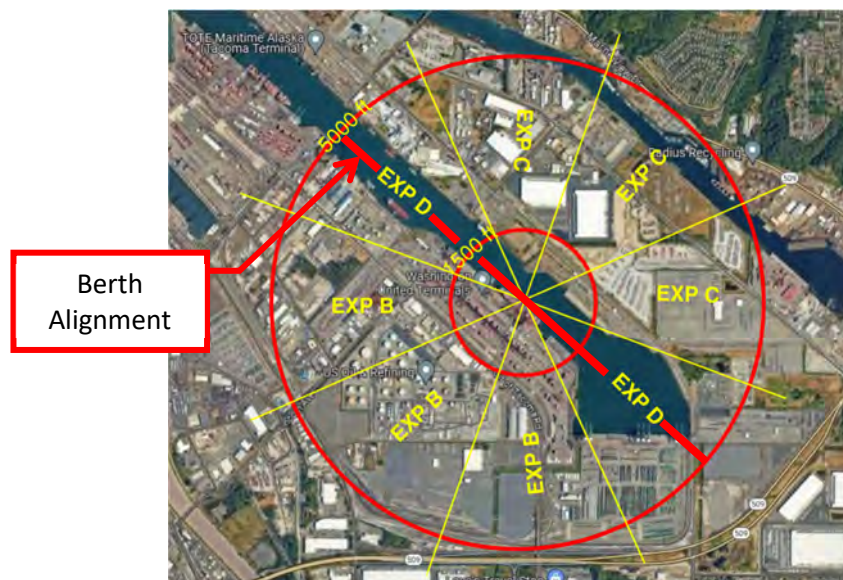


Figure 4 - Exposure Type at Each Sector of WUT

6.3. Results

The wind speed rose included in Figure 5 and tabulated numerically in Table 7 summarizes the 25-year return period (25 YRP) 30-second duration wind speed for each sector.

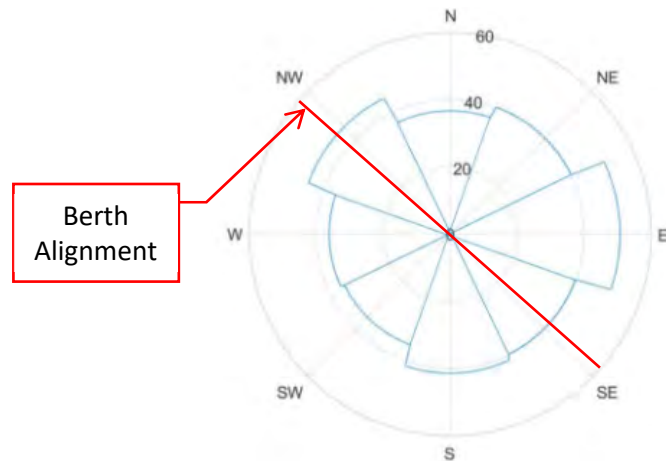


Figure 5: 25-Year Return Period 30-Second Duration Wind Speed Rose (knots)

Table 7: 25 YRP Wind Speed for Each Sector

Sector (Deg)	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335
Exposure	C	C	C	B	B	B	C	D
Z_s	33	33	33	33	33	33	33	33
α	9.8	9.8	9.8	7.5	7.5	7.5	9.8	11.5
Z_g	2460	2460	2460	3280	3280	3280	2460	1935
K_z	1.00	1.00	1.00	0.71	0.71	0.71	1.00	1.19
Modification factor= $(K_{zst})^{0.5}$	1.00	1.00	1.00	0.84	0.84	0.84	1.00	1.09
Design Wind Speed (m/s)	18.87	20.68	26.08	15.76	21.29	17.99	22.10	23.13
Design Wind Speed (mi/hr)	42.21	46.26	58.35	35.26	47.62	40.25	49.45	51.75
Design Wind Speed (knot)	36.68	40.20	50.70	30.64	41.38	34.98	42.97	44.97

K_z : velocity pressure exposure coefficient at station height z ; Z_s : Height for reporting the Design Wind Speed (10m/33ft); α : parameter of calculating K_z (table 26.11-1 ASCE7-22); Z_g : Nominal height of atmospheric boundary layer used in ASCE7-22 (table 26.11-1).

Winds from 155 to 290 degrees blow vessels off the berth and have the most significant impact on bollard loads. Winds from these directions have 25 YRP wind speeds between 35.0 and 41.4 knots.

The maximum allowable wind speed determined for the five berthing scenarios considered in Section 5 is 22 knots, which is less than these 25-YRP wind speeds.

6.4. Operational Wind Limit for Cranes

WUT has indicated that the container cranes have operational limits corresponding to wind speeds measured by anemometers on the cranes. The cranes are set to sound an alarm at 35 mph, or 30.4 knots, and shut down at 40 mph, or 34.8 knots. The mooring analysis discussed in Section 5 indicates

that the existing bollard capacities are exceeded at wind speeds less than those that would cause the cranes to alarm or shut down.

7. Preliminary Passing Vessel Analysis

Moored vessels may be subjected to substantial dynamic forces due to the nearby passage of other vessels, especially in narrow, restricted waterways with large vessel traffic, such as WUT in the Blair Waterway. The 2016 Washington United Terminals Fender Replacement Study documented an incident where the Zim Rotterdam vessel was berthed at WUT and experienced motions caused by a passing vessel departing Pierce County Terminal. One of the bow lines on the Zim Rotterdam broke, and the vessel began to yaw, bow first into the berth, then away. The vessel's starboard gangway was damaged as it was crushed into a container crane. No damage to the fender system or bollards was observed after the incident.

Considering the nature of the waterway and the incident described above, a preliminary screening level analysis was performed to determine if vessels transiting the waterway impart significant forces on vessels berthed at WUT and whether such effects need to be further considered when evaluating the mooring bollards. The screening level passing vessel analysis was performed using the Excel spreadsheet PASS-MOOR.XLS developed by W. Seelig and based on the report by W. Seelig, "Passing Ship Effects on Moored Ships," NFESC TR-6027-OCN, Nov. 2001.

7.1. Assumptions

The Tacoma Harbor Navigation Improvement Study by the US Army Corps of Engineers assumed certain typical and anticipated conditions for vessels transiting in the Blair Waterway. In Appendix B of that study, a ship simulation study was performed to screen proposed deepening and widening modifications to the Blair Waterway. The passing vessel analysis adopted the following assumptions from the ship simulation study:

- Current: zero
- Maximum vessel speed: 2 knots
- Maximum wind speed during vessel passing: 20 knots

Puget Sound Pilot's General Guidelines for Vessels Transiting Restricted Waterways or Ports includes the following recommendations for minimum horizontal clearance between vessels:

"There should be a net horizontal clearance available at all times to a transiting/maneuvering vessel of at least 140 feet or the vessel's beam, whichever is greater (meaning a minimum of 70 feet clearance or half of the vessel's beam, whichever is greater, on each side when the vessel is in the center of the available waterway). Net clearance means open water between vessels, gantry cranes...or other obstructions."

These minimum horizontal clearance recommendations were adopted for the analysis.

7.2. Results

Different combinations of the three vessels described in Section 5.1.2 were evaluated to determine the maximum force on the moored vessel in the direction perpendicular to and away from the wharf (Fy) due to the passing vessel. Table 8 compares the maximum passing vessel forces (PV) to the maximum wind load on the moored vessel in the same direction.

Table 8: Comparison of Preliminary Passing Vessel Forces and Wind Loads on Vessels

Moored Vessel (M)	Passing Vessel (PV)	Fy - Perpendicular to Wharf		
		PV	Wind ¹	PV/Wind
		Kips	Kips	Kips
8,800 TEU	8,800 TEU	27.4	187	14.7%
8,800 TEU	14,000 TEU	62.9	187	33.6%
8,800 TEU	20,000 TEU	56.8	187	30.4%
14,000 TEU	8,800 TEU	68.0	303	22.4%
14,000 TEU	14,000 TEU	85.8	303	28.3%
14,000 TEU	20,000 TEU	81.7	303	27.0%
20,000 TEU	8,800 TEU	68.6	370	18.5%
20,000 TEU	14,000 TEU	87.1	370	23.5%
20,000 TEU	20,000 TEU	86.7	370	23.4%

¹ Load on Vessel Due to Wind at Existing Bollard Capacity

The percentage of passing vessel forces compared to wind forces for the cases considered ranged from 14.7% to 33.6%. Passing vessel effects are found to be significant, and a more thorough passing vessel analysis is recommended to determine required bollard capacities.

8. Preliminary Bollard Upgrade Evaluation

A preliminary analysis was conducted to determine the required bollard capacities and locations considering the 25-year return period wind speeds from Section 6 and the mooring arrangements from Appendix B. The OPTIMOOR results from the initial vessel mooring analysis in Section 5 were used as a starting point to evaluate which bollards need to be upgraded and to what capacity. Bollard capacities and mooring arrangements were iterated to determine preliminary bollard upgrade locations and capacities. A wind rose limit is provided for each case using the final bollard capacities. The wind limit rose indicates the allowable wind speed from every direction as limited by bollard capacity.

For each proposed mooring condition, a wind limit rose from OPTIMOOR was overlaid and compared with the 25-year return period wind speed rose demands. An example of one configuration is included in Figure 6. The teal line indicates allowable wind speeds (in knots) for winds blowing from each direction for the preliminarily proposed bollard capacities. The red lines indicate the 25-year return period wind speeds for each of the eight sectors (in knots). The teal line is outside the red lines in all directions, indicating that the proposed bollard capacities are adequate.

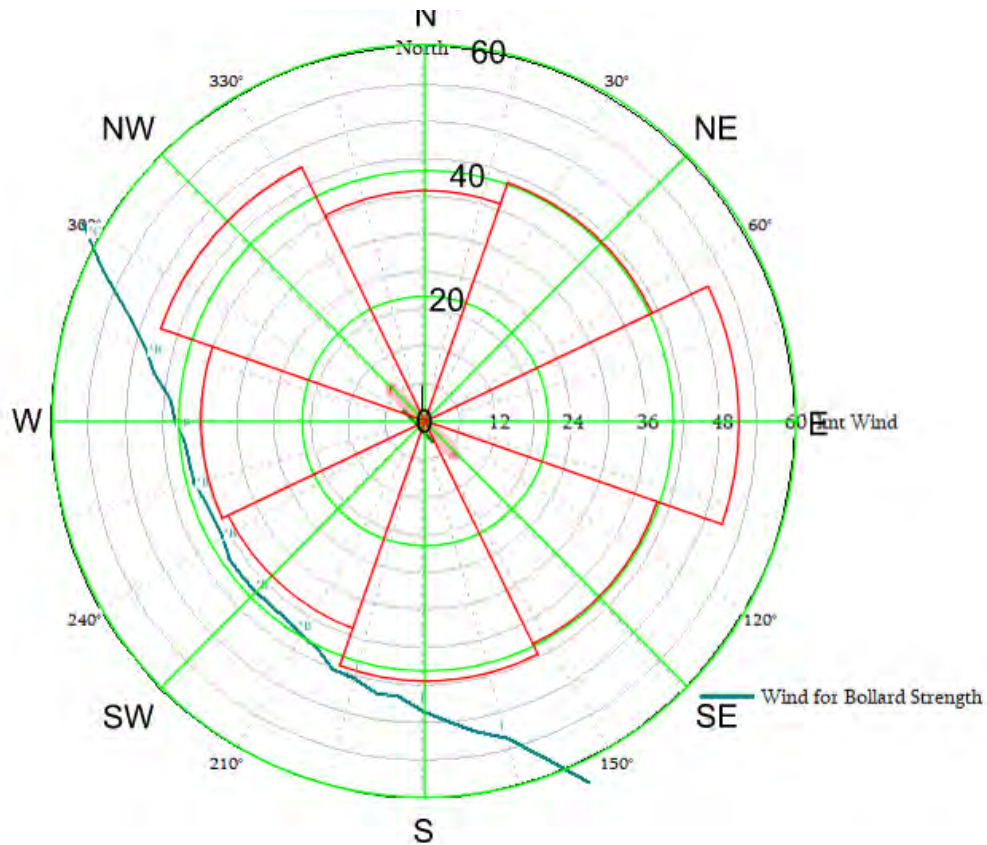


Figure 6 - Wind Rose Demand and Capacity of Bollards

The preliminary analysis found that 12 wharf mooring bollards need to be upgraded to a capacity of 440 kips, and 6 wharf mooring bollards need to be upgraded to a capacity of 551 kips. Examples of bollards having these capacities are shown in Figure 7 and Figure 8.

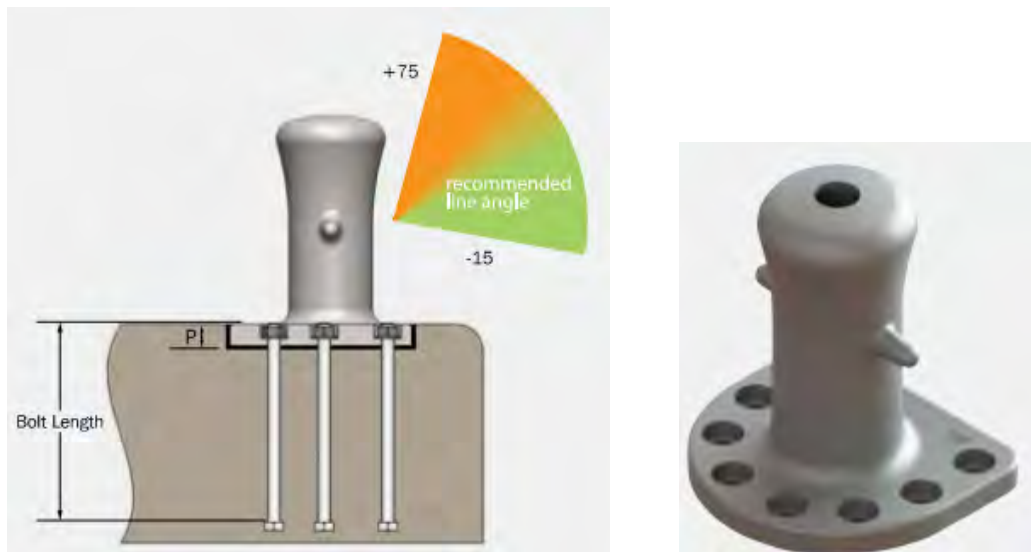


Figure 7 – 440-kip Capacity Single Bitt Bollard

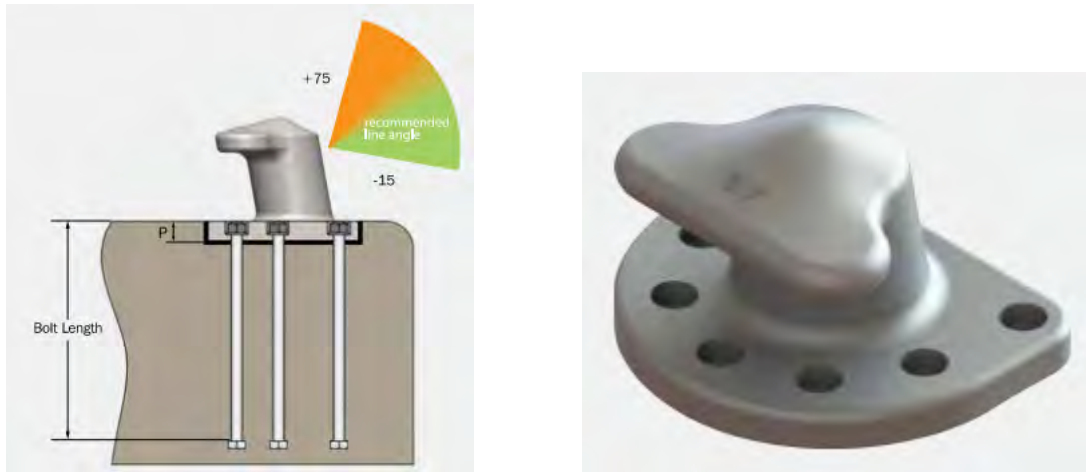


Figure 8 – 551-kip Capacity Tee Bollard

A preliminary rough order of magnitude engineer's cost estimate for upgrading the bollards was prepared. The costs include the demolition of existing bollards and adjacent portions of the wharf, wharf reconstruction and strengthening, furnishing and installing new bollards, and existing fender removal and reinstallation where there are conflicts. It is assumed that the required wharf strengthening is limited to bullrail, deck, and pile cap modifications and that no additional piles are required. Based on our preliminary analysis, a rough order of magnitude engineer's estimate to upgrade these 18 mooring bollards is \$7,386,300. Appendix G has a breakdown for the rough order of magnitude engineer's estimate.

9. Conclusions and Recommendations

9.1. Summary of Analysis

Background information was gathered and reviewed, site-specific design wind speed was evaluated, a screening level passing vessel analysis was performed, and vessel mooring analysis was completed to evaluate the capacity of the existing mooring bollards to safely moor the vessels that are berthing or anticipated to berth at WUT.

A preliminary analysis was then conducted to determine the required bollard capacities and locations considering the 25-year return period wind speeds from Section 6 and the mooring arrangements from Appendix B. For each proposed mooring condition, a wind limit rose from OPTIMOOR was overlaid and compared with the 25-year return period wind speed rose demands.

9.2. Conclusions

Comparisons to other berths in the area and industry guidelines, as well as mooring and preliminary passing vessel analysis, all indicate that the existing 125-kip bollards are undersized for 14,000 and 20,000 TEU vessels.

Other berths in the area serving vessels of similar size have bollard capacities ranging from 200 to 441 kips. Industry guidelines recommend bollard capacities in the range of 450 kips.

The maximum allowable wind speeds for all berthing arrangements considered in the mooring analysis ranged from 15 to 22 knots. From the site-specific wind speed evaluation, the maximum 30-second design wind speed with a 25-year return period was found to range from 35.0 to 41.4 knots, blowing off the berth. In all arrangements, the 25-year return period wind speed is higher than the wind speed at which mooring loads exceed bollard capacities.

Additionally, the passing vessel analysis found that when a vessel is moored at WUT and a vessel passes by in the Blair Waterway, the forces on the bollards due to passing vessel effects are significant enough that they cannot be ignored. Therefore, it is concluded that the existing bollard capacities are not adequate to moor the vessels considered under the conditions evaluated.

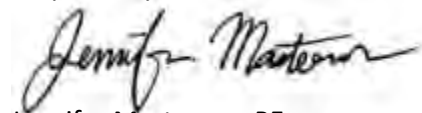
By overlaying and comparing the wind limit roses from OPTIMOOR with the 25-year return period wind speed rose demands for all mooring conditions in the preliminary bollard upgrade evaluation, it was found that 18 of the existing bollards need to be upgraded from their current 125-kip capacity.

9.3. Recommendations

Some of the existing bollards should be upgraded to accommodate mooring 14,000 and 20,000 TEU vessels at WUT. The preliminary analysis found that 12 wharf mooring bollards need to be upgraded to a capacity of 440 kips, and 6 wharf mooring bollards need to be upgraded to a capacity of 551 kips. Based on this preliminary analysis, a rough order of magnitude engineer's estimate to upgrade these 18 mooring bollards is \$7,386,300.

If 14,000 and 20,000 TEU vessels are to berth at WUT before upgrading the bollard capacities, a plan should be implemented to monitor wind speed or bollard loads such that the vessel departs from the berth before existing bollard capacities are exceeded.

Prepared by:



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APPENDIX A: OPTIMOOR ANALYSIS



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 14,000 TEU - MHHW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\1 WUT (14,000 TEU) - MIDDLE\Thalassa Hellas.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -20.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0		571.4
Depth	97.9		97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322

17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPF, Inc\KPF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\1 WUT (14,000 TEU) -
MIDDLE\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.0	84.1	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1581.0	48.9	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)							
aa	-625.0	18.0	6.2	68.3							
bb	-575.0	18.0	6.2	68.3							
cc	-525.0	18.0	6.2	68.3							
dd	-475.0	18.0	6.2	68.3							
ee	-425.0	18.0	6.2	68.3							
ff	-375.0	18.0	6.2	68.3							
gg	-325.0	18.0	6.2	68.3							
hh	-275.0	18.0	6.2	68.3							
ii	-225.0	18.0	6.2	68.3							
jj	-175.0	18.0	6.2	68.3							
kk	-125.0	18.0	6.2	68.3							
ll	-75.0	18.0	6.2	68.3							
mm	-25.0	18.0	6.2	68.3							
nn	25.0	18.0	6.2	68.3							
oo	75.0	18.0	6.2	68.3							
pp	125.0	18.0	6.2	68.3							
qq	175.0	18.0	6.2	68.3							
rr	215.0	18.0	6.2	68.3							
ss	255.0	18.0	6.2	68.3							
tt	300.0	18.0	6.2	68.3							
uu	350.0	18.0	6.2	68.3							
vv	400.0	18.0	6.2	68.3							
ww	450.0	18.0	6.2	68.3							
xx	500.0	18.0	6.2	68.3							
yy	550.0	18.0	6.2	68.3							
zz	600.0	18.0	6.2	68.3							
Fender	Load-Compression Data										
aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\1 WUT (14,000 TEU) - MIDDLE\WUT.opt)

Units in ft & kips

Remarks:

Static Analysis for Time: 1319 Jan 03 2024 (initialised at 1314 Jan 03 2024)
 Water Level: 11.78 above Datum (initialised at this water level)
 Draft: 47.60 (initialised at this draft))
 Trim: 0.00 (initialised at this trim)
 Bottom Clearance: 15.2
 Fwd Offset of Vessel Target: 0.0 from Berth Target
 Vessel Port Target: 40.7 above Pier
 Wind Speed: 22 knots
 Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
 Total Side Windage Area:154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.55 (fwd) 0.05 (inw) 0.2° (port) 0.00 (up)
 at its Port Target -1.48 (aft) -4.05 (out) 0.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
1-*A	1.44	137.4			-70°	245°	63.0	21%
2-*B	2.14	188.1			-100°	215°	44.2	15%
3-*B	1.28	122.5			-70°	245°	81.8	27%

4-*C	1.98	174.3	-90°	225°	49.2	17%
7-*C	2.91	243.2	-70°	245°	43.4	15%
13-I	3.14	252.2	-110°	205°	42.5	14%
14-I	3.34	266.5	-110°	205°	37.8	13%
16-J	2.06	174.5	-110°	205°	50.9	17%
18-J	2.42	200.6	-120°	195°	33.0	11%
19-K	0.94	96.8	-100°	215°	111.2	37%
23-O	3.74	306.7	-100°	215°	30.4	10%
24-W	4.13	323.5	150°	105°	24.1	8%

Fender	Thrust	Compression	Pressure	Flatside	Cover
cc	23	0.07	0.8	100%	
dd	22	0.06	0.7	100%	
ee	22	0.06	0.7	100%	
ff	21	0.06	0.7	100%	
gg	21	0.06	0.7	100%	
hh	20	0.06	0.6	100%	
ii	19	0.05	0.6	100%	
jj	19	0.05	0.6	100%	
kk	18	0.05	0.6	100%	
ll	18	0.05	0.6	100%	
mm	18	0.05	0.6	100%	
nn	17	0.05	0.6	100%	
oo	18	0.05	0.6	100%	
pp	18	0.05	0.6	100%	
qq	19	0.05	0.6	100%	
rr	19	0.05	0.6	100%	
ss	19	0.05	0.6	100%	
tt	20	0.06	0.6	100%	
uu	20	0.06	0.7	100%	
vv	21	0.06	0.7	100%	
ww	22	0.06	0.7	100%	
xx	22	0.06	0.7	100%	
yy	23	0.07	0.7	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	67.0	42.1			80.2	64%	58°	13.1
J	71.0	39.0			83.1	66%	61°	18.7
K	67.7	68.3			111.2	89%	45°	55.9
O	-29.8	0.9			30.4	24%	-88°	6.0
W	23.8	1.5			24.1	19%	87°	3.8
*A	-34.4	35.6			63.0	50%	-44°	39.0
*B	-90.8	66.0			119.7	96%	-54°	41.8
*C	-76.1	48.7			92.2	74%	-57°	18.5

Approximate natural periods
Surge: 113 Sway: 71 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

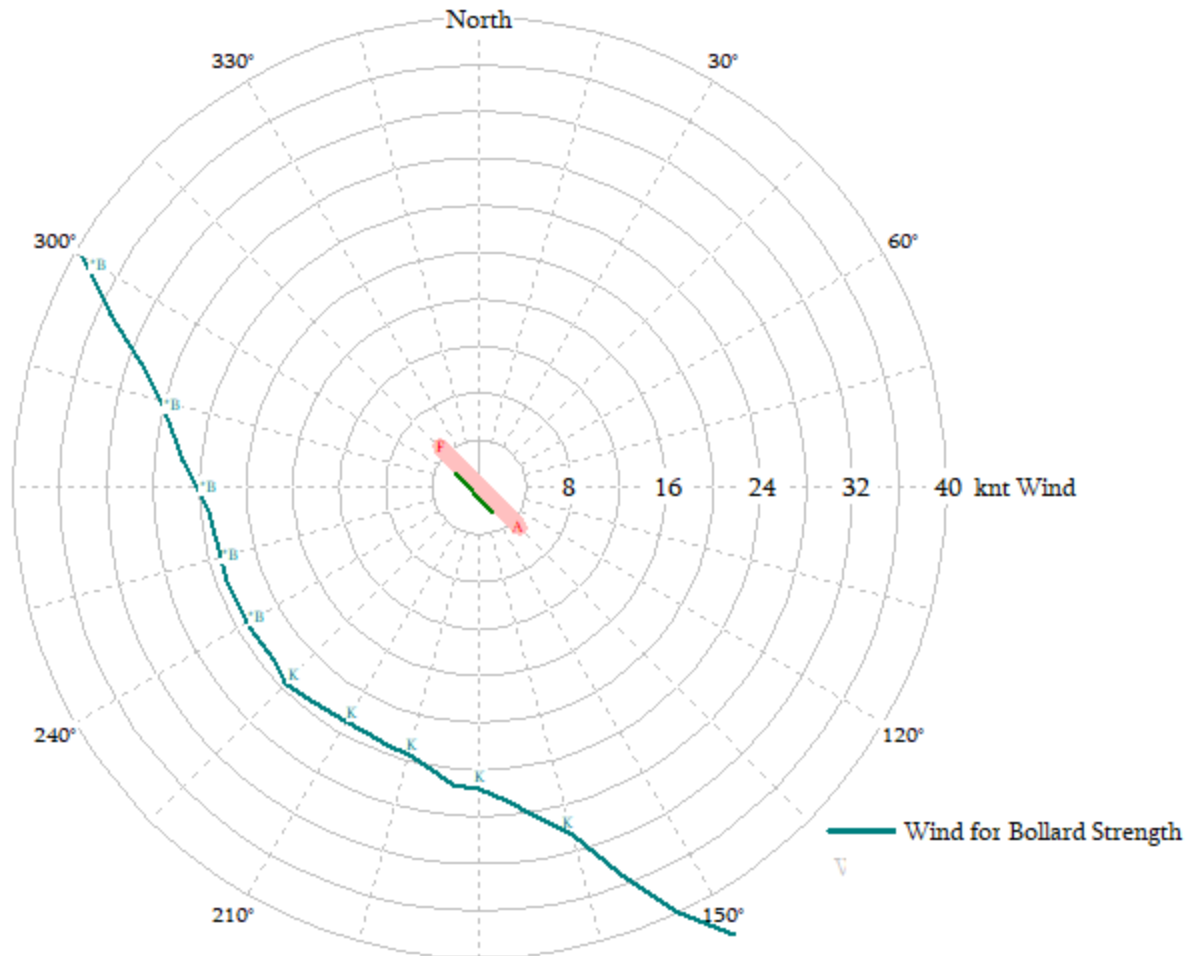
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 14,000 TEU - MLLW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\1 WUT (14,000 TEU) - MIDDLE\Thalassa Hellas.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -20.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship
X-dist	-583.0	571.4
Depth	97.9	97.9

Ship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322

17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPF, Inc\KPF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\1 WUT (14,000 TEU) -
MIDDLE\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.0	84.1	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1581.0	48.9	-1.2	400

Fender	X-Dist to Origin		Ht above Datum		Width Along Side		Face Contact Area (ft ²)			
aa	-625.0		18.0		6.2		68.3			
bb	-575.0		18.0		6.2		68.3			
cc	-525.0		18.0		6.2		68.3			
dd	-475.0		18.0		6.2		68.3			
ee	-425.0		18.0		6.2		68.3			
ff	-375.0		18.0		6.2		68.3			
gg	-325.0		18.0		6.2		68.3			
hh	-275.0		18.0		6.2		68.3			
ii	-225.0		18.0		6.2		68.3			
jj	-175.0		18.0		6.2		68.3			
kk	-125.0		18.0		6.2		68.3			
ll	-75.0		18.0		6.2		68.3			
mm	-25.0		18.0		6.2		68.3			
nn	25.0		18.0		6.2		68.3			
oo	75.0		18.0		6.2		68.3			
pp	125.0		18.0		6.2		68.3			
qq	175.0		18.0		6.2		68.3			
rr	215.0		18.0		6.2		68.3			
ss	255.0		18.0		6.2		68.3			
tt	300.0		18.0		6.2		68.3			
uu	350.0		18.0		6.2		68.3			
vv	400.0		18.0		6.2		68.3			
ww	450.0		18.0		6.2		68.3			
xx	500.0		18.0		6.2		68.3			
yy	550.0		18.0		6.2		68.3			
zz	600.0		18.0		6.2		68.3			
Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\1 WUT (14,000 TEU) - MIDDLE\WUT.opt)

Units in ft & kips

Remarks:

Static Analysis for Time: 1319 Jan 03 2024 (initialised at 1314 Jan 03 2024)
 Water Level: 0.00 above Datum (initialised at this water level)
 Draft: 47.60 (initialised at this draft))
 Trim: 0.00 (initialised at this trim)
 Bottom Clearance: 3.4
 Fwd Offset of Vessel Target: 0.0 from Berth Target
 Vessel Port Target: 28.9 above Pier
 Wind Speed: 24 knots
 Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
 Total Side Windage Area:154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.64 (fwd) 0.06 (inw) 0.2° (port) 0.00 (up)
 at its Port Target -1.46 (aft) -3.79 (out) 0.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	Direction True	Line Tension	Percent Strength
1-*A	1.44	130.7			-70°	245°	71.2	24%
2-*B	2.14	184.7			-95°	220°	45.0	15%
3-*B	1.28	118.9			-70°	245°	83.4	28%

4-*C	1.98	171.9	-90°	225°	48.9	16%
7-*C	2.91	241.5	-70°	245°	42.4	14%
13-I	3.14	250.6	-110°	205°	41.5	14%
14-I	3.34	264.9	-110°	205°	37.0	12%
16-J	2.06	172.3	-110°	205°	50.0	17%
18-J	2.42	198.2	-120°	195°	33.2	11%
19-K	0.94	91.4	-100°	215°	123.7	42%
23-O	3.74	304.7	-100°	215°	30.7	10%
24-W	4.13	322.0	150°	105°	24.9	8%

Fender	Thrust	Compression	Pressure	Flatside	Cover
cc	27	0.08	0.9	100%	
dd	26	0.07	0.9	100%	
ee	26	0.07	0.8	100%	
ff	25	0.07	0.8	100%	
gg	24	0.07	0.8	100%	
hh	23	0.07	0.7	100%	
ii	22	0.06	0.7	100%	
jj	22	0.06	0.7	100%	
kk	21	0.06	0.7	100%	
ll	21	0.06	0.7	100%	
mm	20	0.06	0.7	100%	
nn	20	0.06	0.7	100%	
oo	21	0.06	0.7	100%	
pp	21	0.06	0.7	100%	
qq	22	0.06	0.7	100%	
rr	22	0.06	0.7	100%	
ss	22	0.06	0.7	100%	
tt	23	0.06	0.7	100%	
uu	24	0.07	0.8	100%	
vv	25	0.07	0.8	100%	
ww	25	0.07	0.8	100%	
xx	26	0.07	0.8	100%	
yy	27	0.08	0.9	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	66.0	41.4			78.5	63%	58°	9.0
J	71.6	38.8			82.4	66%	62°	13.1
K	81.1	81.2			123.7	99%	45°	46.5
O	-30.4	0.9			30.7	25%	-88°	4.2
W	24.7	1.4			24.9	20%	87°	2.7
*A	-43.6	44.6			71.2	57%	-44°	34.3
*B	-95.6	69.2			121.9	98%	-54°	30.6
*C	-75.8	48.3			90.8	73%	-57°	12.8

Approximate natural periods
Surge: 108 Sway: 91 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

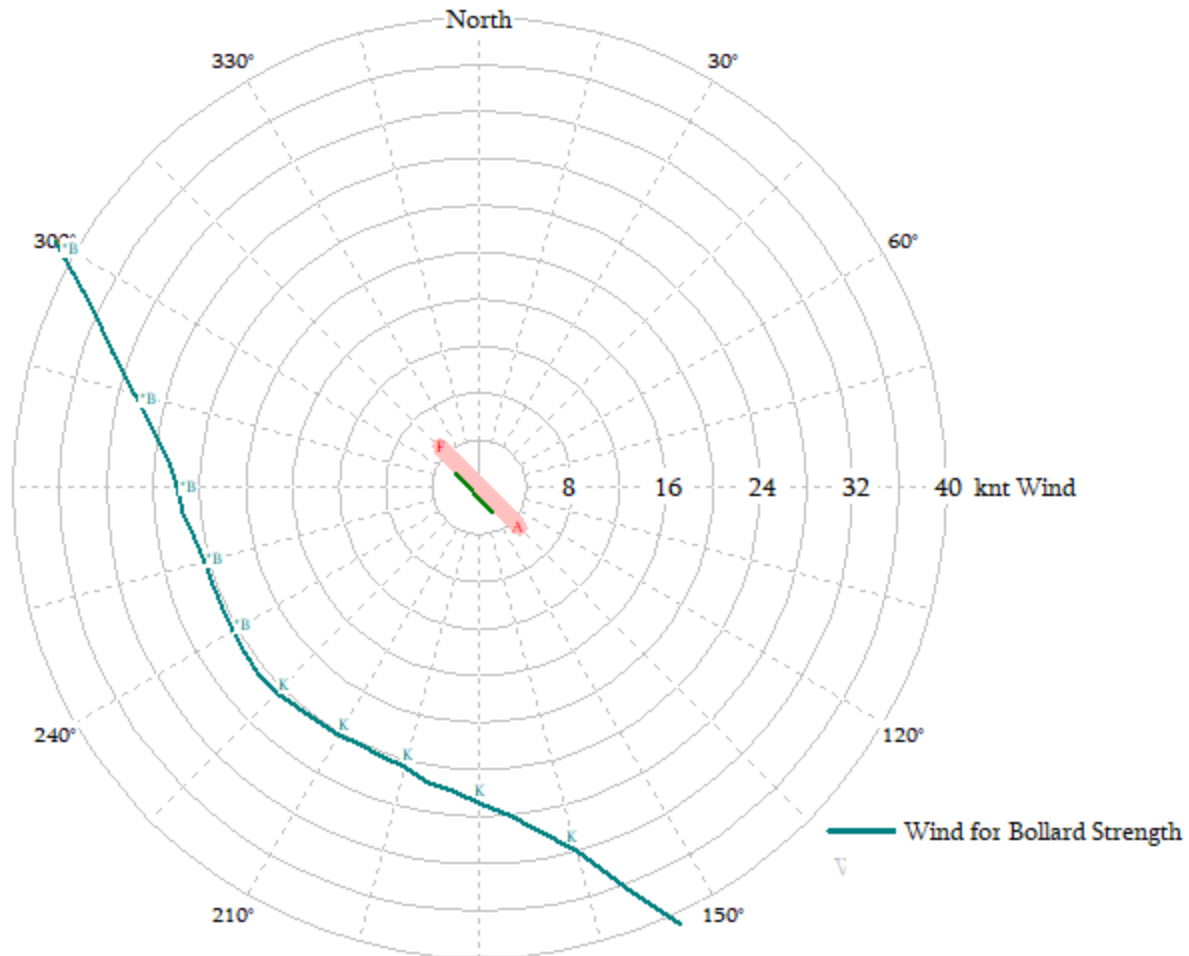
Ref:

Remarks: Remarks:

Water Level: 0.00 above datum

Draft: 47.6

Trim: 0.0

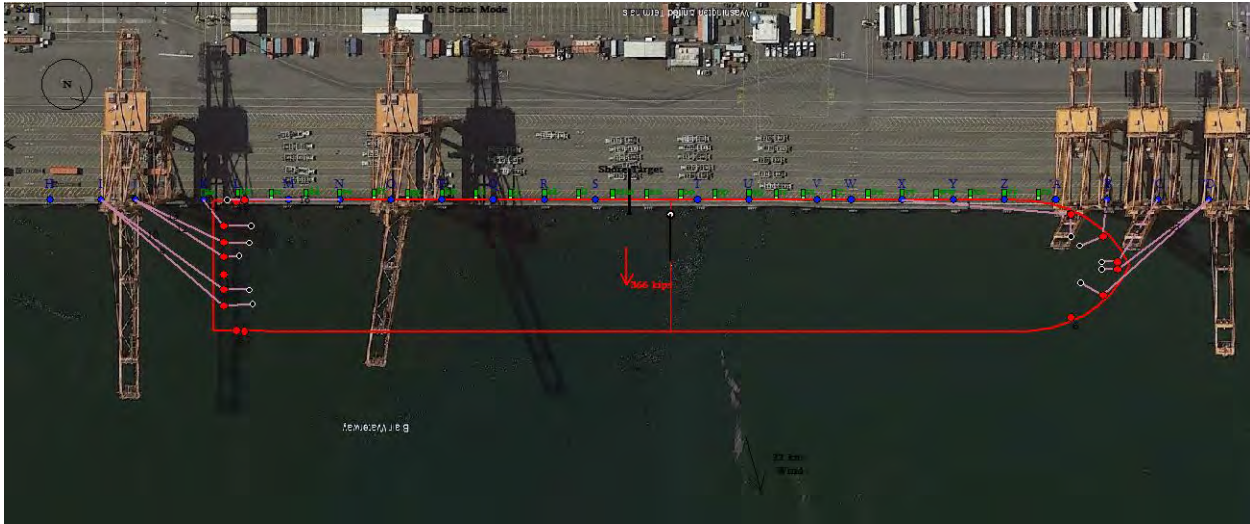




PROJECT	BY	SHEET NO.
LOCATION	DATE	
CLIENT		JOB NO.

WUT 20,000 TEU - MHHW

Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\3 WUT (20,000 TEU)\20,000 TEU Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area:123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-641.1		628.3
Depth	107.9		107.9

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	
6	587.6	-75.0	0.0	117.6	350	20	18.1 pp 384	
7	-624.5	-95.8	22.0	26.0	350	20	18.1 pp 384	
8	-636.7	-94.1	22.0	17.0	350	20	18.1 pp 384	
9	-655.1	-58.6	22.0	42.3	350	20	18.1 pp 384	
10	-655.1	-34.1	22.0	37.6	350	20	18.1 pp 384	
11	-655.1	-12.7	22.0	22.5	350	20	18.1 pp 384	
12	-655.1	12.7	22.0	22.5	350	20	18.1 pp 384	
13	-655.1	34.1	22.0	37.6	350	20	18.1 pp 384	
14	-655.1	58.6	22.0	42.3	350	20	18.1 pp 384	
15	-636.7	94.1	22.0	17.0	350	20	18.1 pp 384	
16	-624.5	95.8	22.0	26.0	350	20	18.1 pp 384	

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\3 WUT (20,000 TEU)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
 Width of Channel (for Current): 800
 Pier Height (Fixed) above Datum: 21.4
 Seabed Depth in way of Ship below Datum: 51.0
 Dist of Berth Target to Right of Origin: 0.0
 Wind Speed Specified at Height: 32.8
 Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-625.0	18.0	6.2	68.3
bb	-575.0	18.0	6.2	68.3
cc	-525.0	18.0	6.2	68.3
dd	-475.0	18.0	6.2	68.3
ee	-425.0	18.0	6.2	68.3
ff	-375.0	18.0	6.2	68.3
gg	-325.0	18.0	6.2	68.3
hh	-275.0	18.0	6.2	68.3
ii	-225.0	18.0	6.2	68.3

jj	-175.0	18.0	6.2	68.3
kk	-125.0	18.0	6.2	68.3
ll	-75.0	18.0	6.2	68.3
mm	-25.0	18.0	6.2	68.3
nn	25.0	18.0	6.2	68.3
oo	75.0	18.0	6.2	68.3
pp	125.0	18.0	6.2	68.3
qq	175.0	18.0	6.2	68.3
rr	215.0	18.0	6.2	68.3
ss	255.0	18.0	6.2	68.3
tt	300.0	18.0	6.2	68.3
uu	350.0	18.0	6.2	68.3
vv	400.0	18.0	6.2	68.3
ww	450.0	18.0	6.2	68.3
xx	500.0	18.0	6.2	68.3
yy	550.0	18.0	6.2	68.3
zz	600.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\3 WUT (20,000 TEU)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: 60.0 from Berth Target
Vessel Port Target: 50.7 above Pier
Wind Speed: 22 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.31 (fwd) 0.06 (inw) 0.4° (port) 0.00 (up)
at its Port Target -3.98 (aft) -5.75 (out) 0.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
1-X	3.76	282.0			150°	105°	27.9	7%
2-*B	1.23	108.5			-70°	245°	76.2	20%
3-*C	1.43	141.1			-70°	245°	86.6	23%
4-*D	1.83	197.3			-70°	245°	67.4	18%
5-*D	2.34	249.2			-70°	245°	55.0	14%
9-I	3.68	286.4			-110°	205°	65.7	17%
10-I	3.46	267.4			-110°	205°	59.0	15%
12-J	2.45	190.0			-110°	205°	62.4	16%
13-J	2.54	195.5			-120°	195°	43.3	11%
14-K	1.53	126.3			-100°	215°	112.3	29%
16-N	1.60	180.8			-100°	215°	77.4	20%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	22	0.06	0.7	100%	
cc	22	0.06	0.7	100%	
dd	21	0.06	0.7	100%	
ee	21	0.06	0.7	100%	

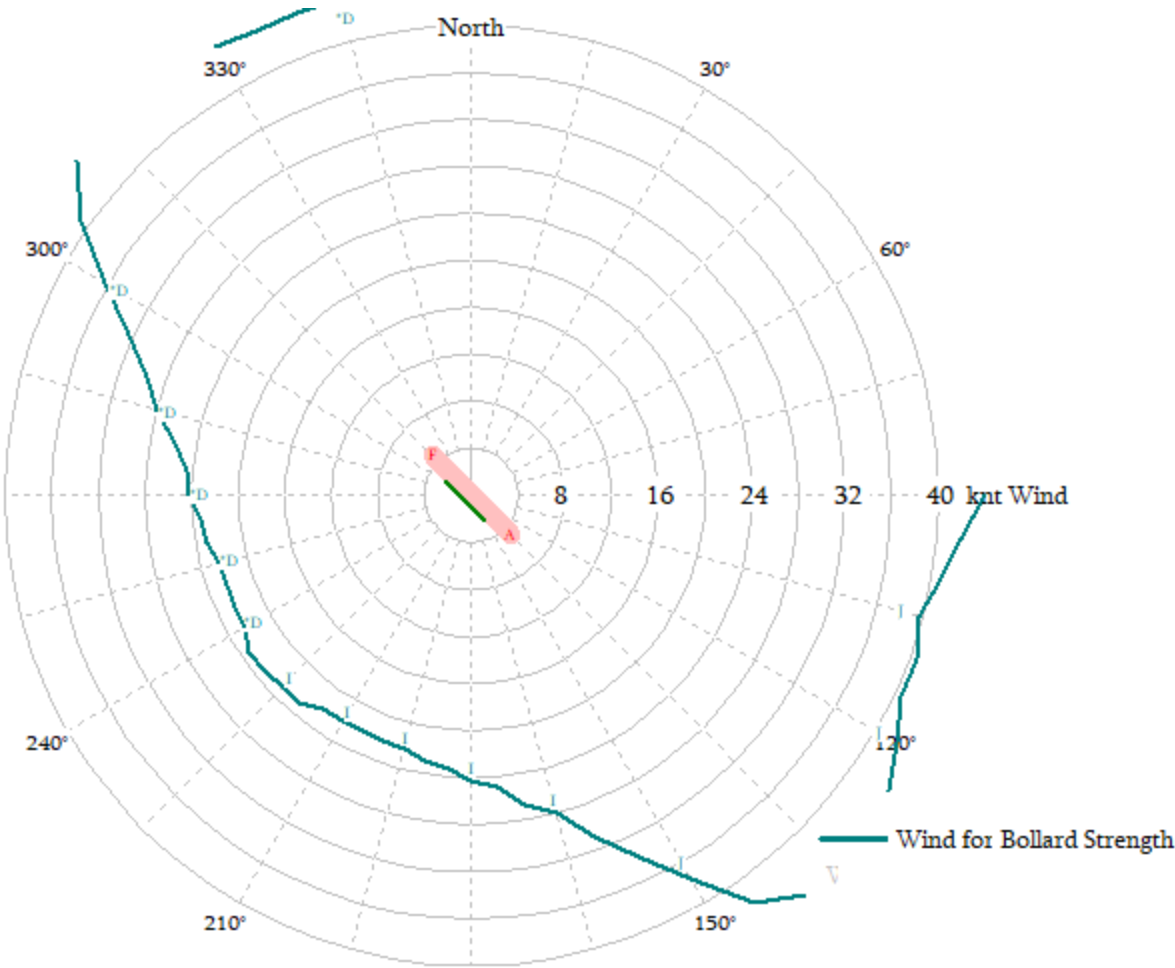
ff	20	0.06	0.7	100%
gg	20	0.06	0.7	100%
hh	20	0.06	0.6	100%
ii	20	0.06	0.6	100%
jj	20	0.06	0.6	100%
kk	20	0.06	0.6	100%
ll	20	0.06	0.6	100%
mm	20	0.06	0.6	100%
nn	20	0.06	0.7	100%
oo	21	0.06	0.7	100%
pp	22	0.06	0.7	100%
qq	23	0.06	0.7	100%
rr	24	0.07	0.8	100%
ss	24	0.07	0.8	100%
tt	25	0.07	0.8	100%
uu	26	0.07	0.9	100%
vv	28	0.08	0.9	100%
ww	29	0.08	0.9	100%
xx	30	0.08	1.0	100%
yy	31	0.09	1.0	100%
zz	33	0.09	1.1	100%

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	90.3	77.9			124.6	100%	49°	36.1
J	79.5	52.7			104.9	84%	57°	44.2
K	32.8	60.1			112.3	90%	29°	89.0
N	-69.3	5.0			77.4	62%	-86°	34.1
X	27.2	2.4			27.9	22%	85°	5.3
*B	-8.8	57.1			76.2	61%	-9°	49.7
*C	-44.1	66.1			86.6	69%	-34°	34.5
*D	-91.5	75.1			122.3	98%	-51°	30.6

Approximate natural periods
Surge: 152 Sway: 74 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 11.78 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

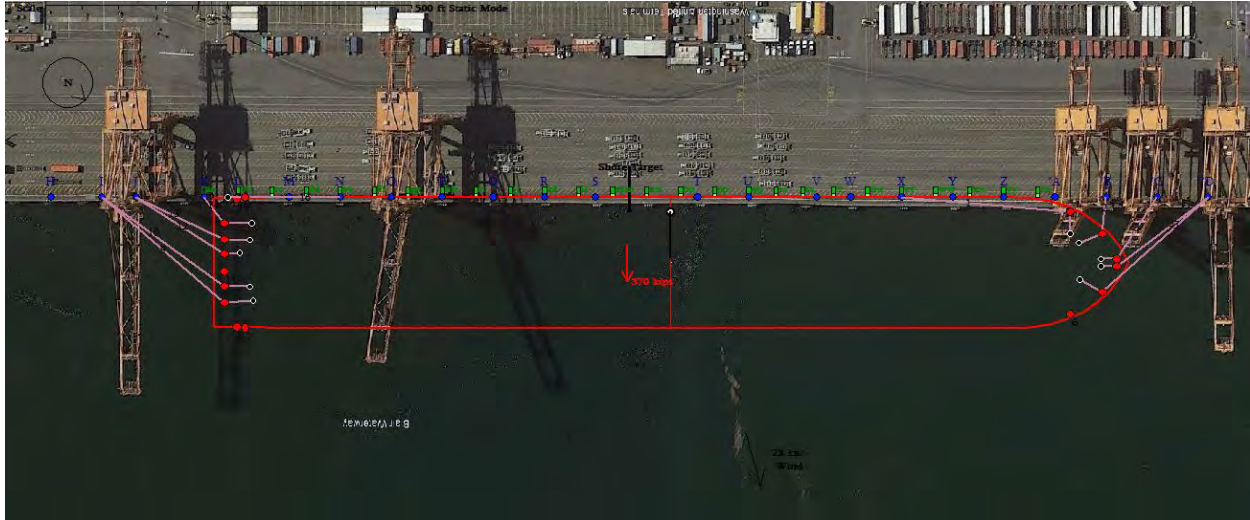
DATE

CLIENT

JOB NO.

WUT 20,000 TEU - MLLW

Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\3 WUT (20,000 TEU)\20,000 TEU Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area:123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-641.1		628.3
Depth	107.9		107.9

Wind Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	
6	587.6	-75.0	0.0	117.6	350	20	18.1 pp 384	
7	-624.5	-95.8	22.0	26.0	350	20	18.1 pp 384	
8	-636.7	-94.1	22.0	17.0	350	20	18.1 pp 384	
9	-655.1	-58.6	22.0	42.3	350	20	18.1 pp 384	
10	-655.1	-34.1	22.0	37.6	350	20	18.1 pp 384	
11	-655.1	-12.7	22.0	22.5	350	20	18.1 pp 384	
12	-655.1	12.7	22.0	22.5	350	20	18.1 pp 384	
13	-655.1	34.1	22.0	37.6	350	20	18.1 pp 384	
14	-655.1	58.6	22.0	42.3	350	20	18.1 pp 384	
15	-636.7	94.1	22.0	17.0	350	20	18.1 pp 384	
16	-624.5	95.8	22.0	26.0	350	20	18.1 pp 384	

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\3 WUT (20,000 TEU)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-625.0	18.0	6.2	68.3
bb	-575.0	18.0	6.2	68.3
cc	-525.0	18.0	6.2	68.3
dd	-475.0	18.0	6.2	68.3
ee	-425.0	18.0	6.2	68.3
ff	-375.0	18.0	6.2	68.3

gg	-325.0	18.0	6.2	68.3
hh	-275.0	18.0	6.2	68.3
ii	-225.0	18.0	6.2	68.3
jj	-175.0	18.0	6.2	68.3
kk	-125.0	18.0	6.2	68.3
ll	-75.0	18.0	6.2	68.3
mm	-25.0	18.0	6.2	68.3
nn	25.0	18.0	6.2	68.3
oo	75.0	18.0	6.2	68.3
pp	125.0	18.0	6.2	68.3
qq	175.0	18.0	6.2	68.3
rr	215.0	18.0	6.2	68.3
ss	255.0	18.0	6.2	68.3
tt	300.0	18.0	6.2	68.3
uu	350.0	18.0	6.2	68.3
vv	400.0	18.0	6.2	68.3
ww	450.0	18.0	6.2	68.3
xx	500.0	18.0	6.2	68.3
yy	550.0	18.0	6.2	68.3
zz	600.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	307 2.53	320 2.60	kips ft
bb	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	307 2.53	320 2.60	kips ft
cc	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
dd	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
ee	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
ff	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
gg	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
hh	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
ii	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
jj	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
kk	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
ll	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
mm	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
nn	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
oo	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
pp	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft
qq	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 2.60	kips ft

rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\3 WUT (20,000 TEU)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft)
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: 60.0 from Berth Target
Vessel Port Target: 38.9 above Pier
Wind Speed: 23 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.38 (fwd) 0.06 (inw) 0.3° (port) 0.00 (up)
at its Port Target -3.82 (aft) -5.16 (out) 0.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
1-X	3.72	280.0			150°	105°	28.5	7%
2-*B	1.14	101.2			-70°	245°	76.5	20%
3-*C	1.38	136.9			-70°	245°	82.8	22%
4-*D	1.80	194.4			-65°	250°	64.3	17%
5-*D	2.32	246.8			-70°	245°	52.1	14%
9-I	3.64	283.4			-110°	205°	61.2	16%
10-I	3.41	264.1			-110°	205°	55.1	14%
12-J	2.40	185.5			-110°	205°	58.3	15%
13-J	2.49	190.8			-120°	195°	40.9	11%
14-K	1.43	117.0			-100°	215°	120.0	31%
16-N	1.55	175.9			-95°	220°	77.5	20%
Fender bb	Thrust 24	Compression 0.07	Pressure 0.8	Flatside 100%	Cover			

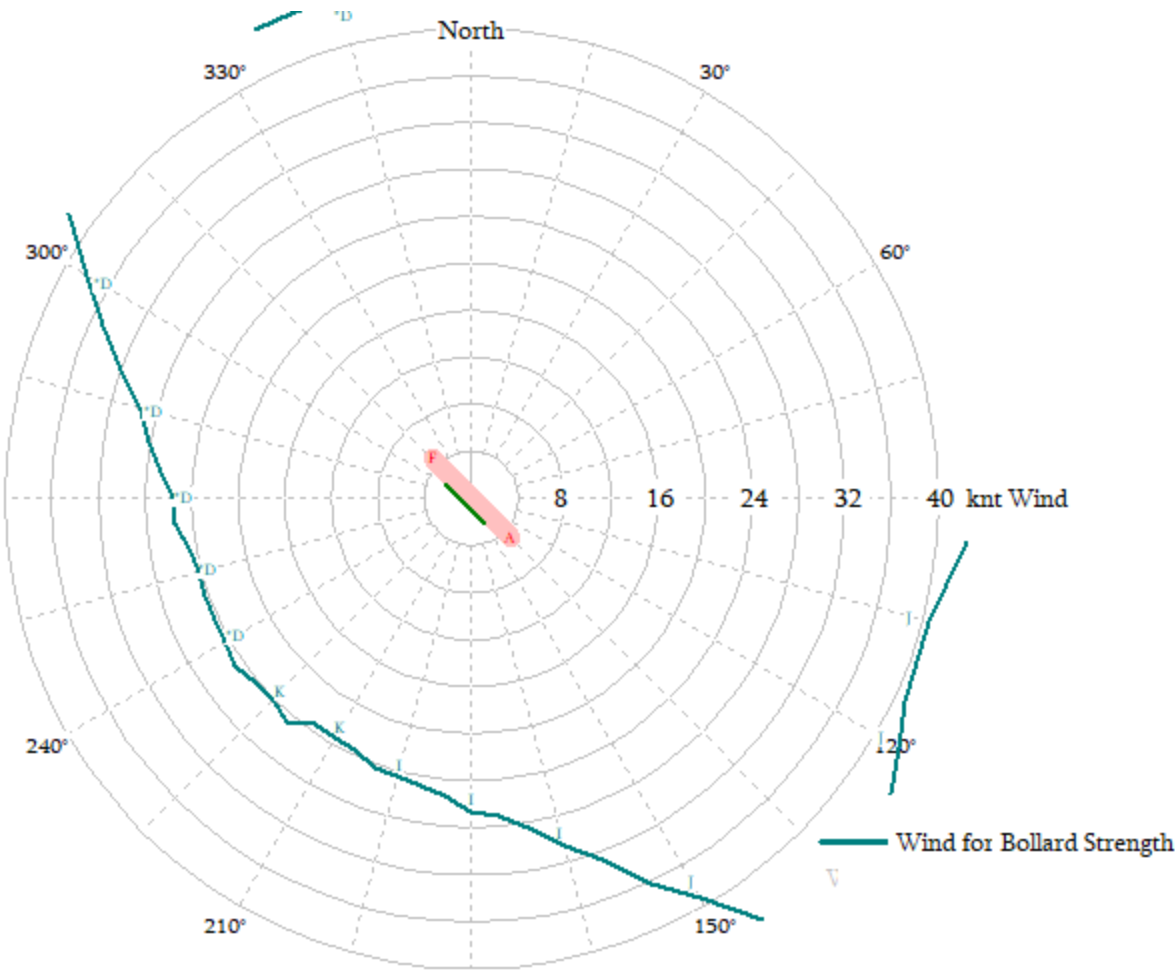
cc	23	0.07	0.8	100%
dd	23	0.06	0.7	100%
ee	22	0.06	0.7	100%
ff	22	0.06	0.7	100%
gg	22	0.06	0.7	100%
hh	22	0.06	0.7	100%
ii	21	0.06	0.7	100%
jj	21	0.06	0.7	100%
kk	21	0.06	0.7	100%
ll	21	0.06	0.7	100%
mm	22	0.06	0.7	100%
nn	22	0.06	0.7	100%
oo	23	0.06	0.7	100%
pp	24	0.07	0.8	100%
qq	25	0.07	0.8	100%
rr	26	0.07	0.8	100%
ss	26	0.07	0.9	100%
tt	27	0.08	0.9	100%
uu	29	0.08	0.9	100%
vv	30	0.08	1.0	100%
ww	31	0.09	1.0	100%
xx	32	0.09	1.0	100%
yy	34	0.10	1.1	100%
zz	35	0.10	1.1	100%

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	85.5	73.3			116.2	93%	49°	28.4
J	77.3	50.3			99.0	79%	57°	35.8
K	39.5	70.6			120.0	96%	29°	88.7
N	-71.6	4.7			77.5	62%	-86°	29.4
X	28.1	2.4			28.5	23%	85°	4.2
*B	-9.7	63.1			76.5	61%	-9°	42.0
*C	-43.7	65.4			82.8	66%	-34°	26.0
*D	-88.4	72.2			116.3	93%	-51°	22.4

Approximate natural periods
Surge: 147 Sway: 96 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

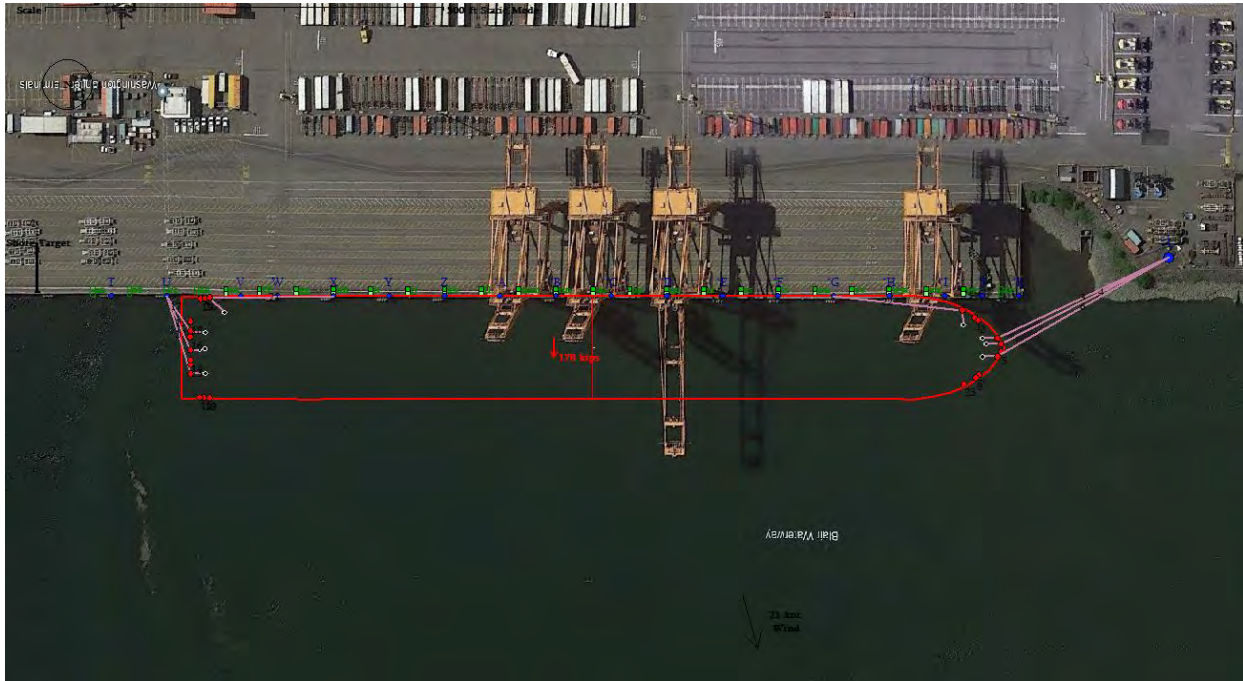
DATE

CLIENT

JOB NO.

WUT 8,800 & 14,000 TEU - MHHW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\8 WUT (8,800 TEU) - EAST SIDE (SHEET 5)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-900.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-530.0		519.5
Depth	73.0		73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	20	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	20	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	20	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	20	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	20	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	20	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	20	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	20	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	20	14.0 pp 232	

10	-524.6	-67.4	0.0	20.0	350	20	14.0	pp	232
11	-530.3	-66.9	0.0	20.0	350	20	14.0	pp	232
12	-542.6	-35.1	0.0	20.0	350	20	14.0	pp	232
13	-542.6	-22.3	0.0	20.0	350	20	14.0	pp	232
14	-542.6	-16.6	0.0	20.0	350	20	14.0	pp	232
15	-542.9	-3.3	0.0	20.0	350	20	14.0	pp	232
16	-543.3	14.5	0.0	20.0	350	20	14.0	pp	232
17	-542.6	22.5	0.0	20.0	350	20	14.0	pp	232
18	-542.6	35.4	0.0	20.0	350	20	14.0	pp	232
19	-529.4	66.5	0.0	20.0	350	20	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	20	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	20	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	20	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	20	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\8 WUT (8,800 TEU) - EAST SIDE
(SHEET 5)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125

*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1527.4	51.6	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)						
aa	75.0	18.0	6.2	68.3						
bb	125.0	18.0	6.2	68.3						
cc	175.0	18.0	6.2	68.3						
dd	215.0	18.0	6.2	68.3						
ee	255.0	18.0	6.2	68.3						
ff	300.0	18.0	6.2	68.3						
gg	350.0	18.0	6.2	68.3						
hh	400.0	18.0	6.2	68.3						
ii	450.0	18.0	6.2	68.3						
jj	500.0	18.0	6.2	68.3						
kk	550.0	18.0	6.2	68.3						
ll	600.0	18.0	6.2	68.3						
mm	650.0	18.0	6.2	68.3						
nn	700.0	18.0	6.2	68.3						
oo	750.0	18.0	6.2	68.3						
pp	800.0	18.0	6.2	68.3						
qq	850.0	18.0	6.2	68.3						
rr	900.0	18.0	6.2	68.3						
ss	950.0	18.0	6.2	68.3						
tt	1000.0	18.0	6.2	68.3						
uu	1050.0	18.0	6.2	68.3						
vv	1100.0	18.0	6.2	68.3						
ww	1150.0	18.0	6.2	68.3						
xx	1200.0	18.0	6.2	68.3						
yy	1250.0	18.0	6.2	68.3						
zz	1300.0	18.0	6.2	68.3						
Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\8 WUT (8,800 TEU) - EAST SIDE (SHEET 5)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 23.4
Fwd Offset of Vessel Target: -150.0 from Berth Target
Vessel Port Target: 24.0 above Pier
Wind Speed: 21 knots
Wind Direction from: All° (solid pier shields wind)
Total End-on Windage Area: 18924
Total Side Windage Area: 109995

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 4.15 (fwd) 5.01 (inw) 0.0° (stbd) 0.00 (up)

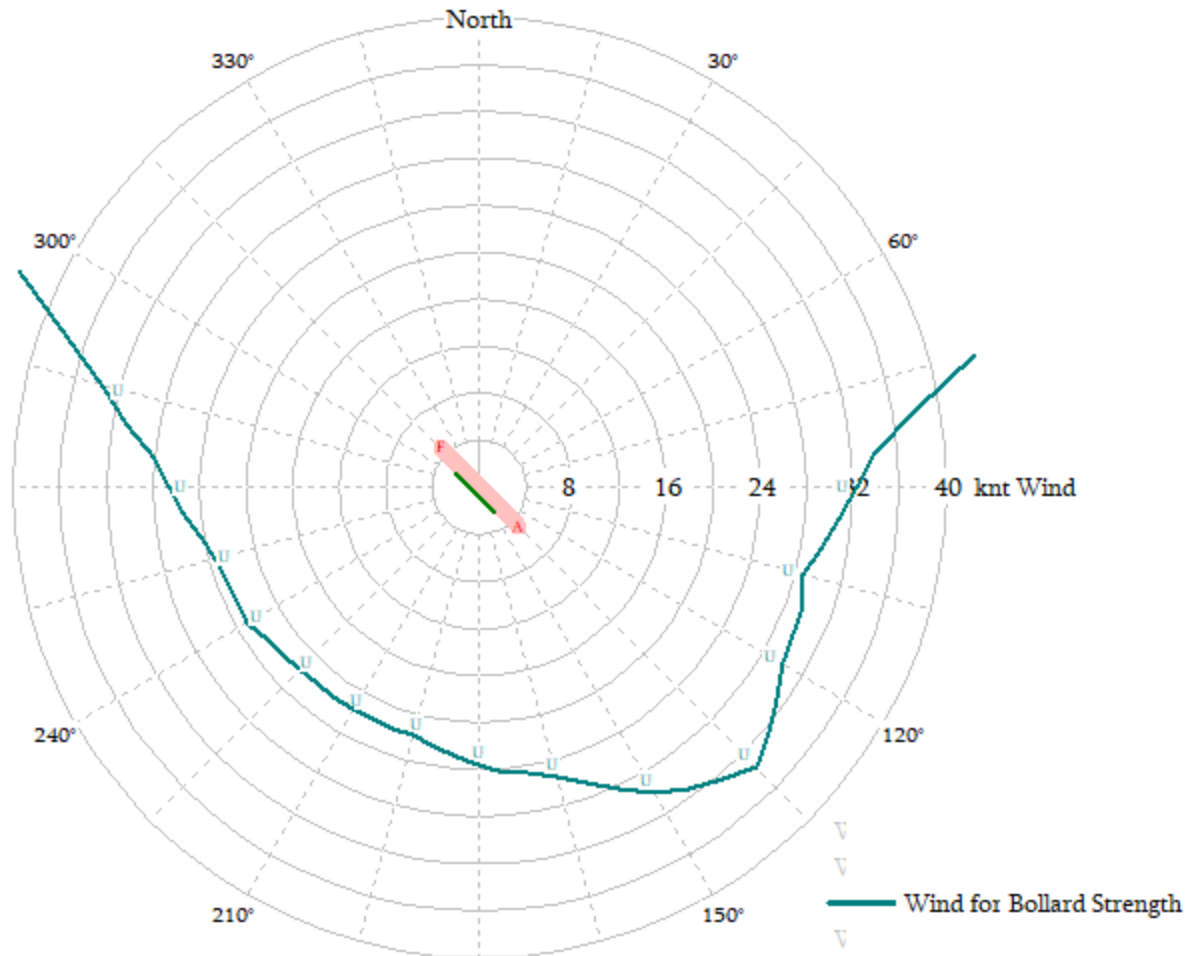
at its Port Target 0.71 (fwd) 0.03 (inw) -0.7° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
3-*L	5.35	271.6			-65°	250°	46.7	20%
4-*L	5.32	270.6			-65°	250°	51.4	22%
6-*L	5.53	282.5			-65°	250°	55.7	24%
12-U	2.00	130.2			-100°	215°	28.0	12%
15-U	1.52	101.5			-100°	215°	37.3	16%
17-U	1.17	80.4			-110°	205°	56.6	24%
21-X	3.69	184.4			25°	340°	19.7	8%
22-*G	2.45	193.9			-70°	245°	68.0	29%

Fender	Thrust	Compression	Pressure	Flatside	Cover
ee	35	0.10	1.1	100%	
ff	23	0.07	0.8	100%	
gg	22	0.06	0.7	100%	
hh	21	0.06	0.7	100%	
ii	20	0.06	0.6	100%	
jj	19	0.05	0.6	100%	
kk	18	0.05	0.6	100%	
ll	17	0.05	0.5	100%	
mm	16	0.04	0.5	100%	
nn	15	0.04	0.5	100%	
oo	14	0.04	0.5	100%	
pp	13	0.04	0.4	100%	
qq	13	0.04	0.4	100%	
rr	13	0.04	0.4	100%	
ss	12	0.04	0.4	100%	
tt	12	0.03	0.4	100%	
uu	12	0.03	0.4	100%	
vv	12	0.03	0.4	100%	
ww	12	0.03	0.4	100%	
xx	12	0.03	0.4	100%	
yy	12	0.03	0.4	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
U	56.0	100.7			120.3	96%	29°	34.8
X	-19.5	0.3			19.7	16%	-89°	2.6
*G	66.4	12.0			68.0	54%	80°	8.2
*L	-131.9	77.6			153.7	38%	-60°	14.7

Approximate natural periods
Surge: 142 Sway: 53 Roll: 70 secs



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\6 WUT (14,000 TEU) - WEST SIDE - sheet 5\Thalassa Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0	571.4	
Depth	97.9	97.9	

Flatside Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322

16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\6 WUT (14,000 TEU) - WEST SIDE - sheet 5\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1399.9	82.0	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\6 WUT (14,000 TEU) - WEST SIDE - sheet 5\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 40.7 above Pier
Wind Speed: 22 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 2.16 (fwd) 0.05 (inw) 0.1° (port) 0.00 (up)
at its Port Target -0.30 (aft) -3.54 (out) -0.1° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	Line True	Line Tension	Percent Strength
1-S	1.58	134.7			-70°	245°	57.1	19%
2-S	1.50	130.4			-70°	245°	67.1	23%

5-T	2.23	176.9		-60°	255°	41.1	14%
6-T	2.47	193.4		-60°	255°	40.6	14%
7-T	3.13	239.0		-70°	245°	38.1	13%
13-A	3.25	275.6		-100°	215°	50.9	17%
14-A	3.38	285.7		-110°	205°	48.5	16%
17-A	2.56	223.7		-110°	205°	56.0	19%
18-A	2.85	247.7		-110°	205°	49.1	16%
23-F	4.45	325.6		25°	340°	24.3	8%
24-P	2.89	256.2		-150°	165°	37.9	13%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	26	0.07	0.8	100%	
cc	25	0.07	0.8	100%	
dd	24	0.07	0.8	100%	
ee	23	0.06	0.7	100%	
ff	22	0.06	0.7	100%	
gg	21	0.06	0.7	100%	
hh	21	0.06	0.7	100%	
ii	20	0.06	0.6	100%	
jj	19	0.05	0.6	100%	
kk	19	0.05	0.6	100%	
ll	18	0.05	0.6	100%	
mm	18	0.05	0.6	100%	
nn	18	0.05	0.6	100%	
oo	19	0.05	0.6	100%	
pp	19	0.05	0.6	100%	
qq	19	0.05	0.6	100%	
rr	20	0.06	0.6	100%	
ss	20	0.06	0.7	100%	
tt	21	0.06	0.7	100%	
uu	22	0.06	0.7	100%	
vv	22	0.06	0.7	100%	
ww	23	0.06	0.7	100%	
xx	24	0.07	0.8	100%	
yy	0			0%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	131.8	151.2			203.8	51%	41°	35.8
F	-23.9	0.4			24.3	19%	-90°	4.4
P	36.8	3.3			37.9	30%	85°	8.1
S	-51.7	78.7			124.0	99%	-33°	80.7
T	-94.9	68.7			119.7	96%	-54°	24.5

Approximate natural periods
Surge: 144 Sway: 69 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

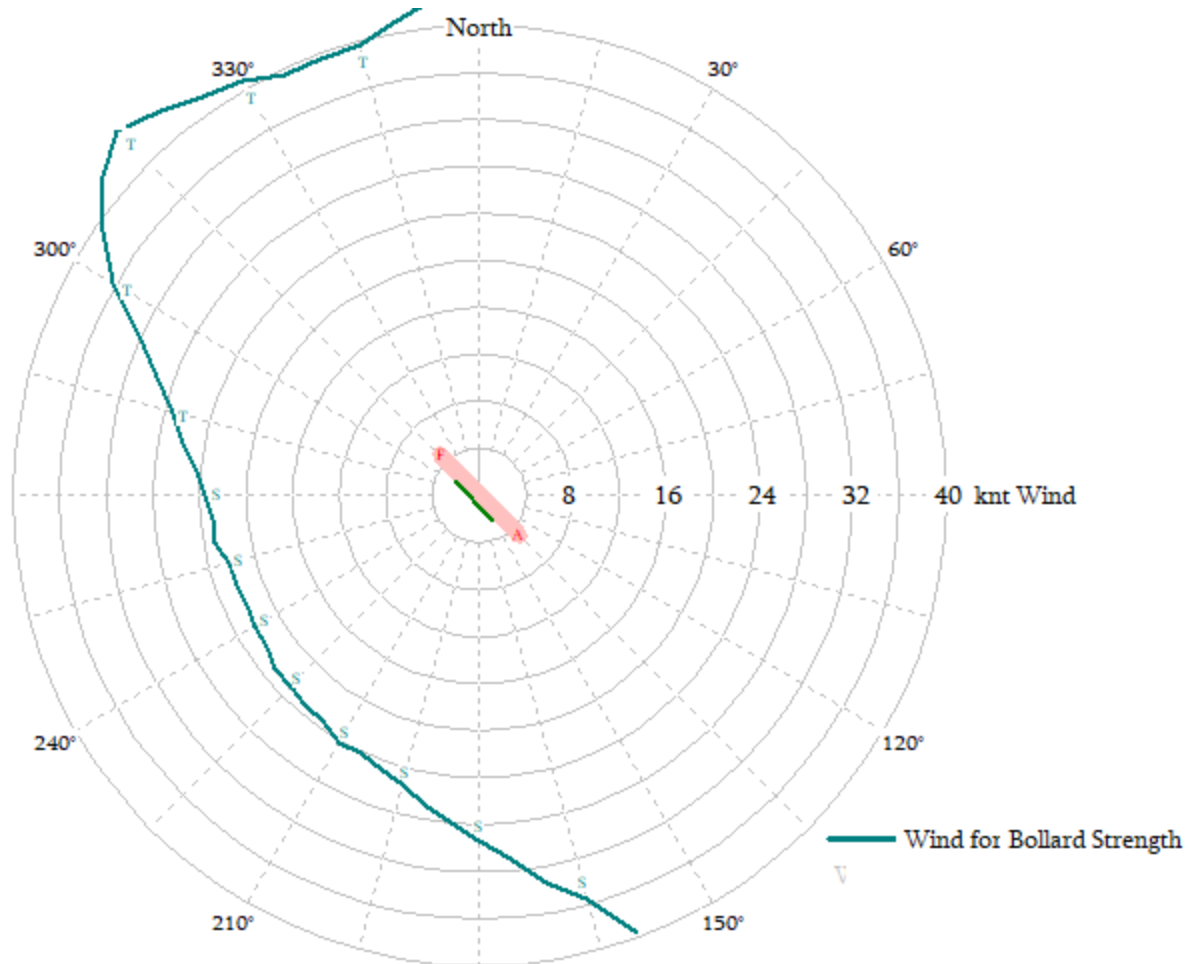
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0

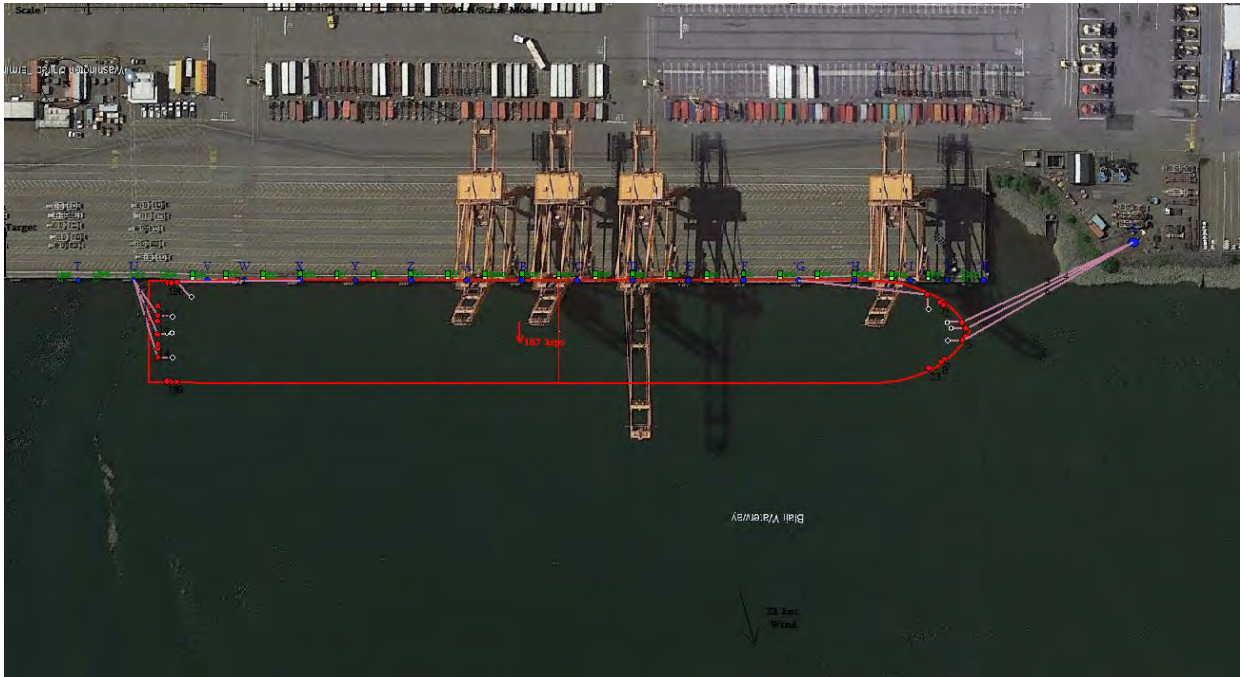




PROJECT	BY	SHEET NO.
LOCATION	DATE	
CLIENT		JOB NO.

WUT 8,800 & 14,000 TEU - MLLW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\8 WUT (8,800 TEU) - EAST SIDE (SHEET 5)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target: -900.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour	Longitudinal datum at Midship
X-dist -530.0	519.5
Depth 73.0	73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	20	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	20	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	20	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	20	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	20	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	20	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	20	14.0 pp 232	

8	517.1	-40.3	0.0	20.0	350	20	14.0	pp	232
9	-517.1	-67.7	0.0	20.0	350	20	14.0	pp	232
10	-524.6	-67.4	0.0	20.0	350	20	14.0	pp	232
11	-530.3	-66.9	0.0	20.0	350	20	14.0	pp	232
12	-542.6	-35.1	0.0	20.0	350	20	14.0	pp	232
13	-542.6	-22.3	0.0	20.0	350	20	14.0	pp	232
14	-542.6	-16.6	0.0	20.0	350	20	14.0	pp	232
15	-542.9	-3.3	0.0	20.0	350	20	14.0	pp	232
16	-543.3	14.5	0.0	20.0	350	20	14.0	pp	232
17	-542.6	22.5	0.0	20.0	350	20	14.0	pp	232
18	-542.6	35.4	0.0	20.0	350	20	14.0	pp	232
19	-529.4	66.5	0.0	20.0	350	20	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	20	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	20	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	20	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	20	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\8 WUT (8,800 TEU) - EAST SIDE (SHEET 5)\WUT.bth)

Units in ft & kips

Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125

*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1527.4	51.6	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender	Load-Compression Data										
aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

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Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 11.6
Fwd Offset of Vessel Target: -150.0 from Berth Target
Vessel Port Target: 12.2 above Pier
Wind Speed: 23 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 18924
Total Side Windage Area: 109995

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-1.7	-186.4		9.5
Total Force:	-1.7	-186.3		9.5

Movement of Vessel at its Port Target 3.69 (fwd) 3.90 (inw) -0.6° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
3-*L	5.31	270.7			3°	42.8	18%
4-*L	5.27	269.8			3°	46.6	20%
6-*L	5.49	281.7			3°	50.4	22%
12-U	1.98	128.5			5°	27.4	12%
15-U	1.49	99.2			7°	37.3	16%
17-U	1.12	77.3			10°	59.0	25%
21-X	3.65	183.3			4°	0.4	0%
22-*G	2.46	192.8			3°	61.6	27%

Fender	Thrust	Compression	Pressure	Flatside	Cover
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
U	59.4	105.8			122.5	98%	29°	17.2
X	-0.4				0.4	0%	-89°	
*G	60.6	10.4			61.6	49%	80°	3.5
*L	-120.7	70.1			139.7	35%	-60°	7.1

Approximate natural periods
Surge: 138 Sway: 59 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

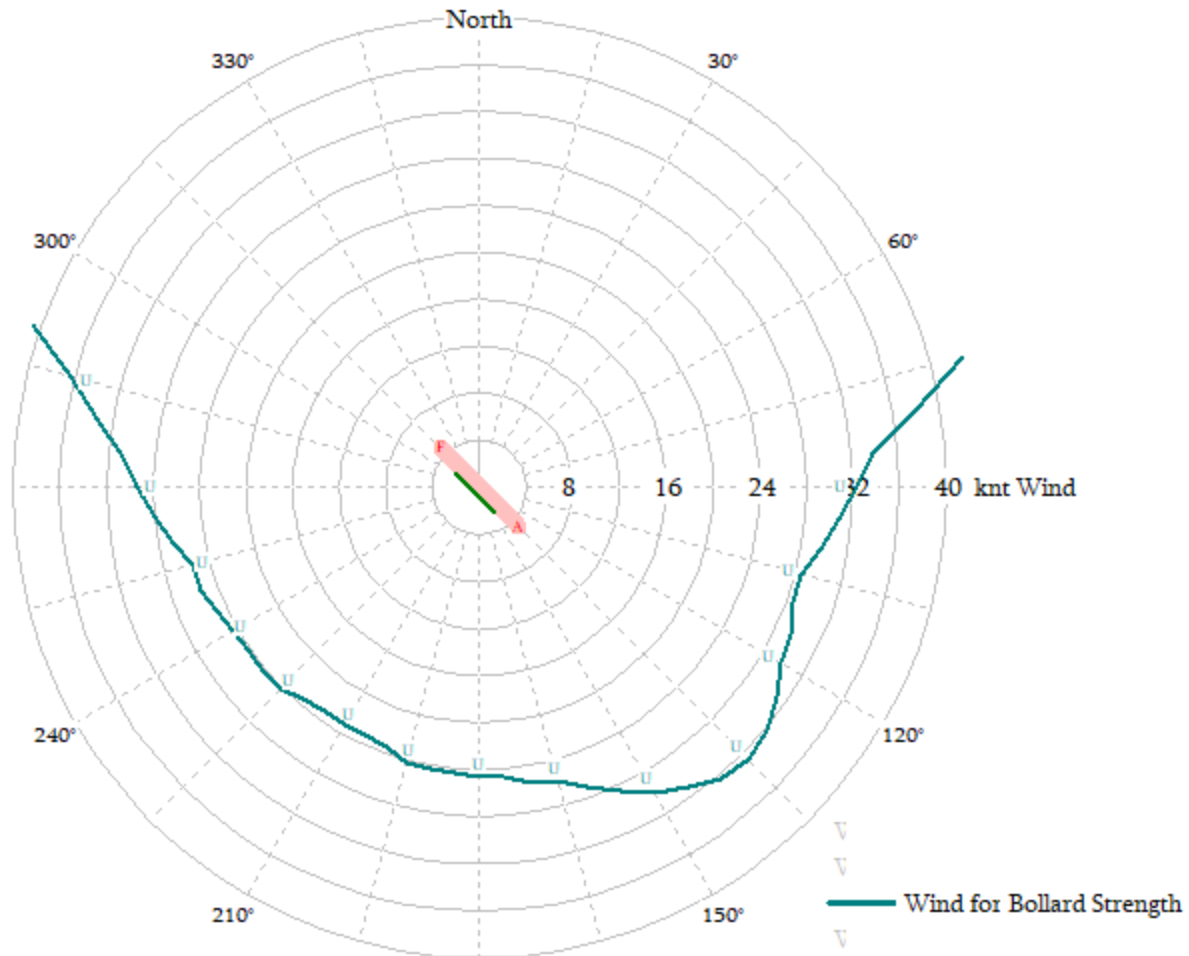
Ref:

Remarks: Remarks:

Water Level: 0.00 above datum

Draft: 39.4

Trim: 0.0



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\6 WUT (14,000 TEU) - WEST SIDE - sheet 5\Thalassa
Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0	571.4	
Depth	97.9	97.9	

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322

16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\6 WUT (14,000 TEU) - WEST SIDE - sheet 5\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1399.9	82.0	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin		Ht above Datum		Width Along Side		Face Contact Area (ft ²)			
aa	-1250.		18.0		6.2		68.3			
bb	-1200.		18.0		6.2		68.3			
cc	-1150.		18.0		6.2		68.3			
dd	-1100.		18.0		6.2		68.3			
ee	-1050.		18.0		6.2		68.3			
ff	-1000.		18.0		6.2		68.3			
gg	-950.0		18.0		6.2		68.3			
hh	-900.0		18.0		6.2		68.3			
ii	-850.0		18.0		6.2		68.3			
jj	-800.0		18.0		6.2		68.3			
kk	-750.0		18.0		6.2		68.3			
ll	-700.0		18.0		6.2		68.3			
mm	-650.0		18.0		6.2		68.3			
nn	-625.0		18.0		6.2		68.3			
oo	-575.0		18.0		6.2		68.3			
pp	-525.0		18.0		6.2		68.3			
qq	-475.0		18.0		6.2		68.3			
rr	-425.0		18.0		6.2		68.3			
ss	-375.0		18.0		6.2		68.3			
tt	-325.0		18.0		6.2		68.3			
uu	-275.0		18.0		6.2		68.3			
vv	-225.0		18.0		6.2		68.3			
ww	-175.0		18.0		6.2		68.3			
xx	-125.0		18.0		6.2		68.3			
yy	-75.0		18.0		6.2		68.3			
zz	-25.0		18.0		6.2		68.3			
Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\6 WUT (14,000 TEU) - WEST SIDE - sheet 5\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 28.9 above Pier
Wind Speed: 23 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 2.32 (fwd) 0.06 (inw) 0.1° (port) 0.00 (up)
at its Port Target -0.27 (aft) -3.15 (out) -0.1° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
1-S	1.49	127.6			-70°	245°	55.3	19%
2-S	1.42	123.4			-70°	245°	65.0	22%

5-T	2.22	174.6	-60°	255°	36.9	12%
6-T	2.46	191.3	-60°	255°	36.4	12%
7-T	3.13	237.3	-60°	255°	34.3	12%
13-A	3.21	274.0	-100°	215°	49.9	17%
14-A	3.33	284.1	-110°	205°	47.4	16%
17-A	2.51	221.8	-110°	205°	54.9	18%
18-A	2.80	245.7	-110°	205°	48.1	16%
23-F	4.47	323.8	25°	340°	24.5	8%
24-P	2.82	254.0	-150°	165°	39.5	13%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	28	0.08	0.9	100%	
cc	27	0.08	0.9	100%	
dd	26	0.07	0.8	100%	
ee	25	0.07	0.8	100%	
ff	24	0.07	0.8	100%	
gg	23	0.06	0.7	100%	
hh	22	0.06	0.7	100%	
ii	21	0.06	0.7	100%	
jj	21	0.06	0.7	100%	
kk	20	0.06	0.6	100%	
ll	20	0.06	0.6	100%	
mm	20	0.06	0.6	100%	
nn	20	0.06	0.6	100%	
oo	20	0.06	0.7	100%	
pp	21	0.06	0.7	100%	
qq	21	0.06	0.7	100%	
rr	22	0.06	0.7	100%	
ss	22	0.06	0.7	100%	
tt	23	0.06	0.7	100%	
uu	24	0.07	0.8	100%	
vv	24	0.07	0.8	100%	
ww	25	0.07	0.8	100%	
xx	26	0.07	0.8	100%	
yy	0			0%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	130.2	149.1			199.6	50%	41°	25.4
F	-24.3	0.4			24.5	20%	-90°	3.1
P	38.9	3.5			39.5	32%	85°	6.0
S	-57.4	85.2			120.0	96%	-34°	62.0
T	-86.5	62.1			107.6	86%	-54°	15.5

Approximate natural periods
Surge: 139 Sway: 88 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

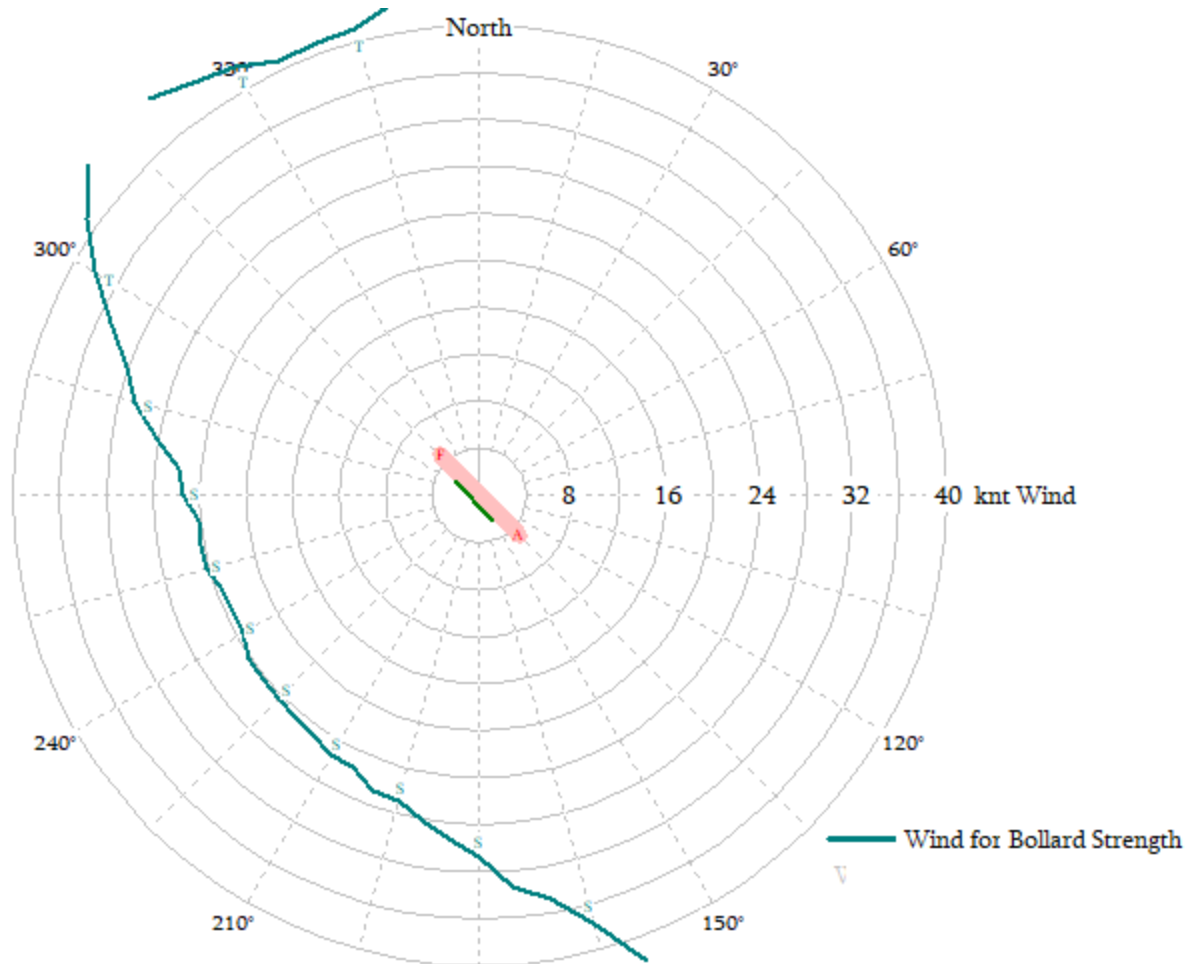
Ref:

Remarks: Remarks:

Water Level: 0.00 above datum

Draft: 47.6

Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 8,800 & 20,000 TEU - MHHW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-930.0 fwd from midship -70.0 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 70.0 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Pamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -530.0 519.5
Depth 73.0 73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	1.2	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	1.2	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	1.2	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	1.2	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	1.2	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	1.2	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	1.2	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	1.2	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	1.2	14.0 pp 232	
10	-524.6	-67.4	0.0	20.0	350	1.2	14.0 pp 232	
11	-530.3	-66.9	0.0	20.0	350	1.2	14.0 pp 232	
12	-542.6	-35.1	0.0	20.0	350	1.2	14.0 pp 232	
13	-542.6	-22.3	0.0	20.0	350	1.2	14.0 pp 232	
14	-542.6	-16.6	0.0	20.0	350	1.2	14.0 pp 232	
15	-542.9	-3.3	0.0	20.0	350	1.2	14.0 pp 232	
16	-543.3	14.5	0.0	20.0	350	1.2	14.0 pp 232	
17	-542.6	22.5	0.0	20.0	350	1.2	14.0 pp 232	
18	-542.6	35.4	0.0	20.0	350	1.2	14.0 pp 232	

19	-529.4	66.5	0.0	20.0	350	1.2	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	1.2	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	1.2	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	1.2	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	1.2	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\9 WUT (8,800 TEU) - WEST END -
(SHEET 6)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.6	84.1	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 23.4
Fwd Offset of Vessel Target:1650.0 from Berth Target
Vessel Port Target: 24.0 above Pier
Wind Speed: 19 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 18924
Total Side Windage Area:109995

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 2.59 (fwd) 1.57 (inw) 0.1° (port) 0.00 (up)
at its Port Target -1.28 (aft) -9.60 (out) -0.2° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
5-S	0.19	162.5			-70°	245°	43.3	19%
6-S	0.20	169.8			-70°	245°	42.8	18%
7-S	0.24	203.6			-70°	245°	36.6	16%
12-A	0.30	275.3			-100°	215°	38.9	17%

15-A	0.28	252.6		-110°	205°	39.2	17%
17-A	0.26	236.2		-110°	205°	37.9	16%
21-E	0.22	182.9		-5°	310°	8.7	4%
22-N	0.25	225.8		-165°	150°	16.2	7%

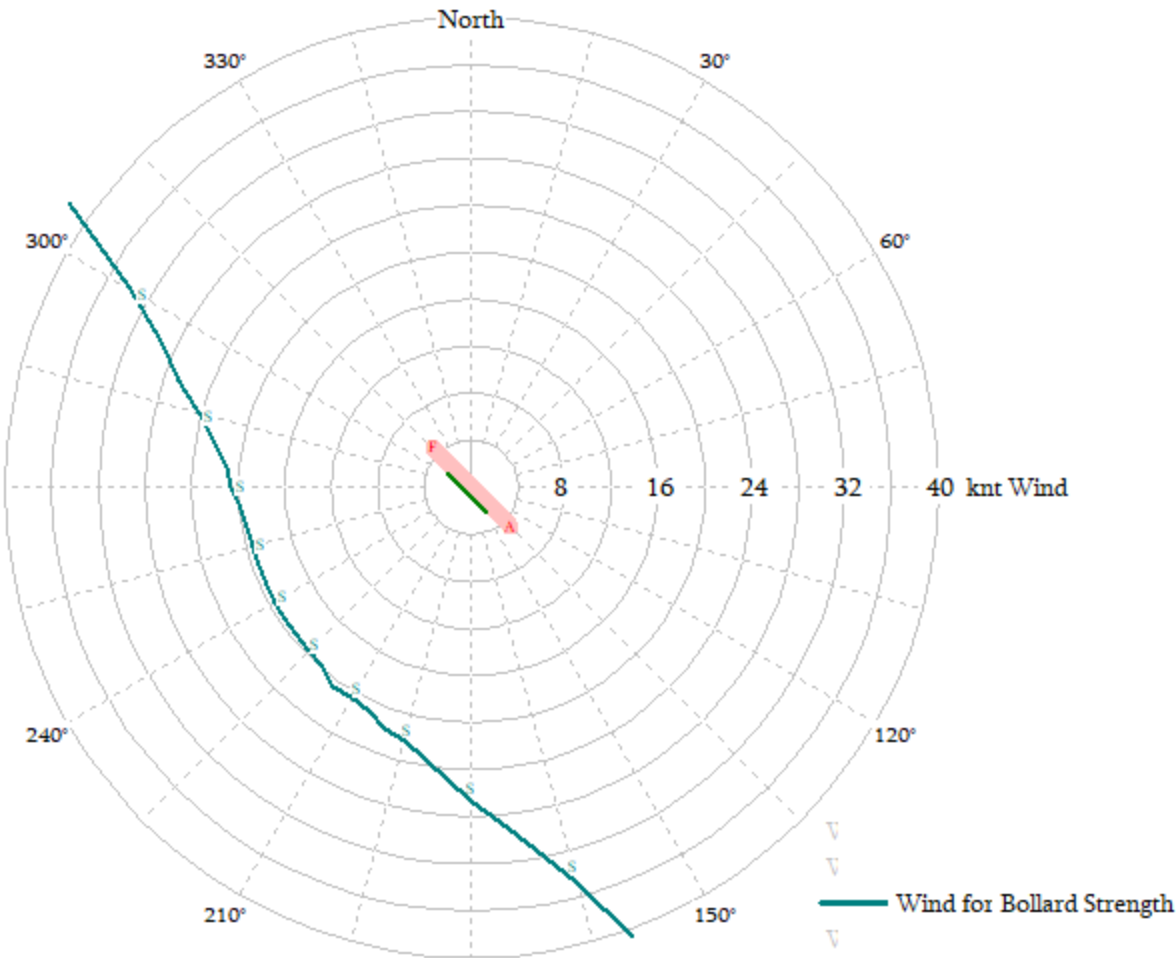
Fender	Thrust	Compression	Pressure	Flatside	Cover
aa	10	0.03	0.6	51%	
bb	12	0.03	0.4	100%	
cc	12	0.03	0.4	100%	
dd	11	0.03	0.4	100%	
ee	11	0.03	0.3	100%	
ff	10	0.03	0.3	100%	
gg	10	0.03	0.3	100%	
hh	9	0.03	0.3	100%	
ii	9	0.02	0.3	100%	
jj	8	0.02	0.3	100%	
kk	8	0.02	0.3	100%	
ll	8	0.02	0.2	100%	
mm	8	0.02	0.3	100%	
nn	8	0.02	0.3	100%	
oo	8	0.02	0.3	100%	
pp	9	0.02	0.3	100%	
qq	9	0.03	0.3	100%	
rr	9	0.03	0.3	100%	
ss	10	0.03	0.3	100%	
tt	10	0.03	0.3	100%	
uu	10	0.03	0.3	100%	
vv	11	0.03	0.3	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	82.1	80.5			115.6	29%	46°	12.1
E	-8.6	0.2			8.7	7%	-89°	1.2
N	16.0	1.9			16.2	13%	83°	1.7
S	-97.0	73.1			122.6	98%	-53°	16.8

Approximate natural periods
Surge: 153 Sway: 52 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 11.78 above datum
Draft: 39.4
Trim: 0.0



Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\20,000 TEU
Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target:-582.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area:123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -641.1 628.3
Depth 107.9 107.9

Flatside Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	

6	587.6	-75.0	0.0	117.6	350	20	18.1	pp	384
7	-624.5	-95.8	22.0	26.0	350	20	18.1	pp	384
8	-636.7	-94.1	22.0	17.0	350	20	18.1	pp	384
9	-655.1	-58.6	22.0	42.3	350	20	18.1	pp	384
10	-655.1	-34.1	22.0	37.6	350	20	18.1	pp	384
11	-655.1	-12.7	22.0	22.5	350	20	18.1	pp	384
12	-655.1	12.7	22.0	22.5	350	20	18.1	pp	384
13	-655.1	34.1	22.0	37.6	350	20	18.1	pp	384
14	-655.1	58.6	22.0	42.3	350	20	18.1	pp	384
15	-636.7	94.1	22.0	17.0	350	20	18.1	pp	384
16	-624.5	95.8	22.0	26.0	350	20	18.1	pp	384

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\5 WUT (20,000 TEU) - EAST SIDE -
(SHEET 6)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125

*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)							
aa	-25.0	18.0	6.2	68.3							
bb	25.0	18.0	6.2	68.3							
cc	75.0	18.0	6.2	68.3							
dd	125.0	18.0	6.2	68.3							
ee	175.0	18.0	6.2	68.3							
ff	215.0	18.0	6.2	68.3							
gg	255.0	18.0	6.2	68.3							
hh	300.0	18.0	6.2	68.3							
ii	350.0	18.0	6.2	68.3							
jj	400.0	18.0	6.2	68.3							
kk	450.0	18.0	6.2	68.3							
ll	500.0	18.0	6.2	68.3							
mm	550.0	18.0	6.2	68.3							
nn	600.0	18.0	6.2	68.3							
oo	650.0	18.0	6.2	68.3							
pp	700.0	18.0	6.2	68.3							
qq	750.0	18.0	6.2	68.3							
rr	800.0	18.0	6.2	68.3							
ss	850.0	18.0	6.2	68.3							
tt	900.0	18.0	6.2	68.3							
uu	950.0	18.0	6.2	68.3							
vv	1000.0	18.0	6.2	68.3							
ww	1050.0	18.0	6.2	68.3							
xx	1100.0	18.0	6.2	68.3							
yy	1150.0	18.0	6.2	68.3							
zz	1200.0	18.0	6.2	68.3							
Fender	Load-Compression Data										
aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft)
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: 40.0 from Berth Target
Vessel Port Target: 50.7 above Pier
Wind Speed: 18 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 3.01 (fwd) 0.05 (inw) 0.0° (port) 0.00 (up)
at its Port Target 0.83 (fwd) -4.69 (out) -0.2° (stbd) 0.00 (up)

Line to	Pull	Tot.Line	In-Line	Winch	Worst Direction	Line	Percent
---------	------	----------	---------	-------	-----------------	------	---------

Bollard	-in	Length	±Motion	Slip	to Screen	True	Tension	Strength
1-*F	1.98	246.8			-50°	265°	52.1	14%
2-*K	1.76	134.9			-70°	245°	80.4	21%
3-*L	4.29	317.6			-70°	245°	35.1	9%
4-*L	4.35	322.6			-70°	245°	37.3	10%
5-*L	4.99	372.1			-70°	245°	39.9	10%
6-*L	6.79	507.0			-70°	245°	36.0	9%
9-Q	2.51	278.3			-110°	205°	57.0	15%
10-Q	2.29	258.7			-110°	205°	58.1	15%
11-R	1.71	180.0			-100°	215°	85.7	22%
16-V	4.22	308.1			25°	340°	19.3	5%

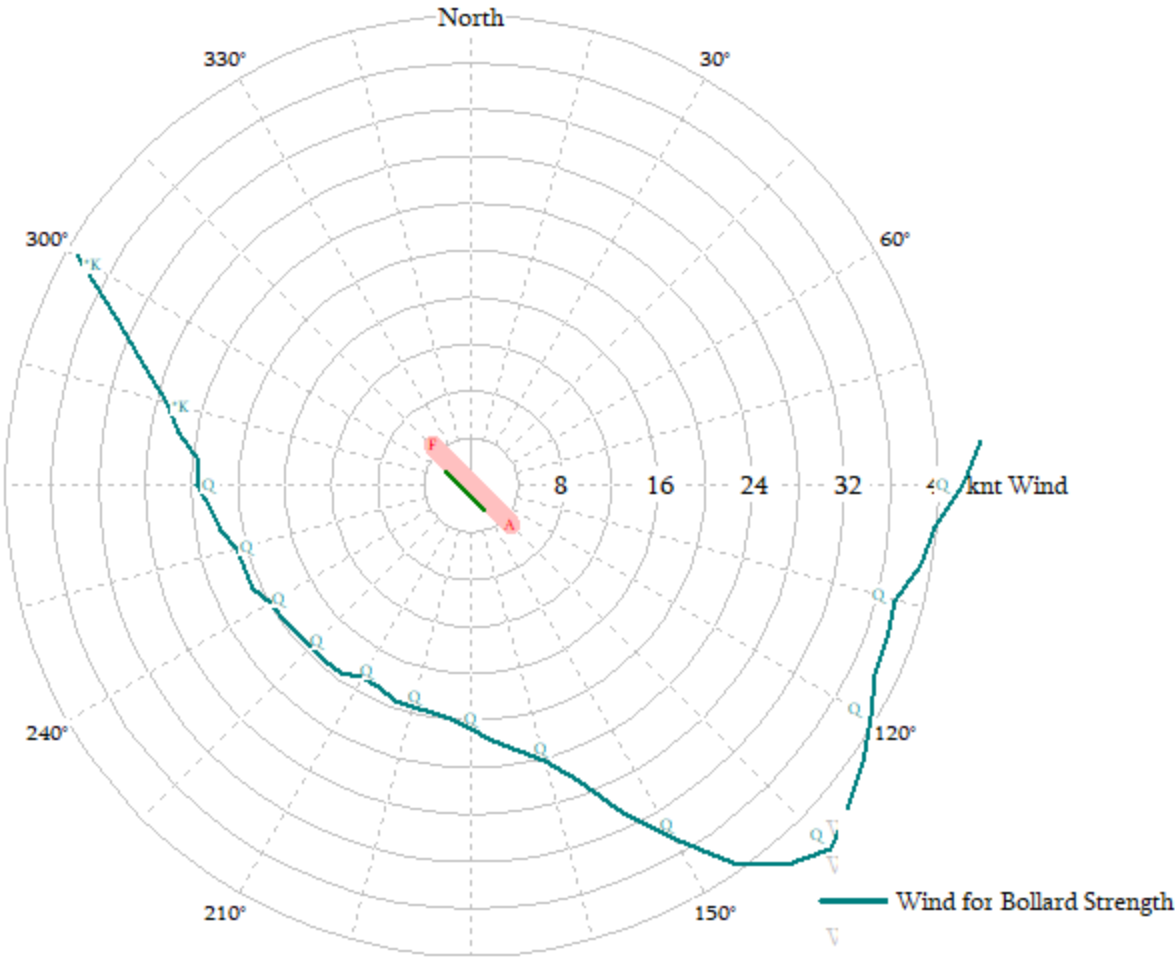
Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	19	0.05	0.6	100%	
cc	19	0.05	0.6	100%	
dd	18	0.05	0.6	100%	
ee	18	0.05	0.6	100%	
ff	17	0.05	0.6	100%	
gg	17	0.05	0.5	100%	
hh	16	0.05	0.5	100%	
ii	16	0.04	0.5	100%	
jj	15	0.04	0.5	100%	
kk	15	0.04	0.5	100%	
ll	15	0.04	0.5	100%	
mm	14	0.04	0.5	100%	
nn	14	0.04	0.5	100%	
oo	14	0.04	0.5	100%	
pp	15	0.04	0.5	100%	
qq	15	0.04	0.5	100%	
rr	15	0.04	0.5	100%	
ss	15	0.04	0.5	100%	
tt	16	0.04	0.5	100%	
uu	16	0.05	0.5	100%	
vv	16	0.05	0.5	100%	
ww	17	0.05	0.5	100%	
xx	17	0.05	0.6	100%	
yy	18	0.05	0.6	100%	
zz	18	0.05	0.6	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
Q	82.7	71.9			114.9	92%	49°	34.6
R	49.3	59.6			85.7	69%	40°	37.0
V	-18.7	0.2			19.3	15%	-90°	4.8
*F	50.4	6.8			52.1	42%	82°	11.5
*K	-51.6	48.2			80.4	64%	-47°	38.4
*L	-125.0	75.8			148.0	37%	-59°	23.2

Approximate natural periods
Surge: 158 Sway: 76 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 11.78 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 8,800 & 20,000 TEU - MLLW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-930.0 fwd from midship -70.0 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 70.0 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -530.0 519.5
Depth 73.0 73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	1.2	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	1.2	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	1.2	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	1.2	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	1.2	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	1.2	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	1.2	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	1.2	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	1.2	14.0 pp 232	
10	-524.6	-67.4	0.0	20.0	350	1.2	14.0 pp 232	
11	-530.3	-66.9	0.0	20.0	350	1.2	14.0 pp 232	
12	-542.6	-35.1	0.0	20.0	350	1.2	14.0 pp 232	
13	-542.6	-22.3	0.0	20.0	350	1.2	14.0 pp 232	
14	-542.6	-16.6	0.0	20.0	350	1.2	14.0 pp 232	
15	-542.9	-3.3	0.0	20.0	350	1.2	14.0 pp 232	
16	-543.3	14.5	0.0	20.0	350	1.2	14.0 pp 232	
17	-542.6	22.5	0.0	20.0	350	1.2	14.0 pp 232	

18	-542.6	35.4	0.0	20.0	350	1.2	14.0	pp	232
19	-529.4	66.5	0.0	20.0	350	1.2	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	1.2	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	1.2	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	1.2	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	1.2	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\9 WUT (8,800 TEU) - WEST END -
(SHEET 6)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points:	315°
Width of Channel (for Current):	800
Pier Height (Fixed) above Datum:	21.4
Seabed Depth in way of Ship below Datum:	51.0
Permissible Surge Excursion Fwd/Aft:	± 10.00
Permissible Sway Excursion Port/Stbd:	± 10.00
Permissible Vertical Movement:	± 10.00
Dist of Berth Target to Right of Origin:	0.0
Wind Speed Specified at Height:	32.8
Current Specified at Depth:	0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.6	84.1	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 11.6
Fwd Offset of Vessel Target: 1650.0 from Berth Target
Vessel Port Target: 12.2 above Pier
Wind Speed: 20 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 18924
Total Side Windage Area: 109995

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 2.90 (fwd) 1.63 (inw) 0.1° (port) 0.00 (up)
at its Port Target -1.39 (aft) -9.33 (out) -0.2° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	Direction True	Line Tension	Percent Strength
5-S	0.19	161.2			-70°	245°	42.1	18%
6-S	0.20	168.5			-70°	245°	41.5	18%
7-S	0.24	202.6			-70°	245°	35.2	15%

12-A	0.30	274.5	-100°	215°	37.7	16%
15-A	0.28	251.6	-110°	205°	38.0	16%
17-A	0.26	235.2	-110°	205°	36.8	16%
21-E	0.22	181.7	-10°	305°	9.5	4%
22-N	0.24	224.8	-165°	150°	18.6	8%

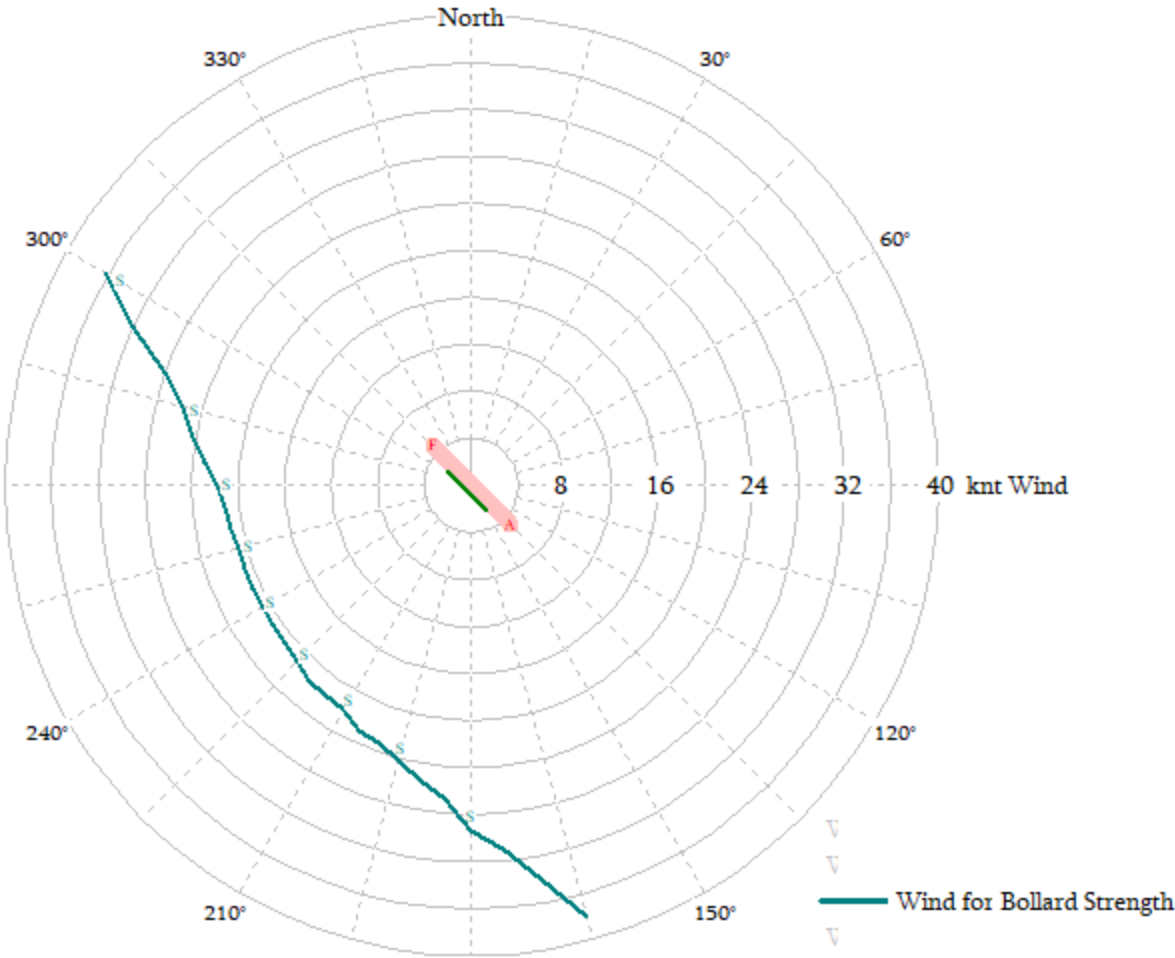
Fender	Thrust	Compression	Pressure	Flatside	Cover
aa	11	0.03	0.7	51%	
bb	14	0.04	0.4	100%	
cc	13	0.04	0.4	100%	
dd	12	0.04	0.4	100%	
ee	12	0.03	0.4	100%	
ff	11	0.03	0.4	100%	
gg	11	0.03	0.3	100%	
hh	10	0.03	0.3	100%	
ii	10	0.03	0.3	100%	
jj	9	0.03	0.3	100%	
kk	9	0.02	0.3	100%	
ll	9	0.02	0.3	100%	
mm	9	0.02	0.3	100%	
nn	9	0.03	0.3	100%	
oo	9	0.03	0.3	100%	
pp	10	0.03	0.3	100%	
qq	10	0.03	0.3	100%	
rr	10	0.03	0.3	100%	
ss	11	0.03	0.3	100%	
tt	11	0.03	0.4	100%	
uu	12	0.03	0.4	100%	
vv	12	0.03	0.4	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	79.9	78.2			112.0	28%	46°	6.3
E	-9.5	0.3			9.5	8%	-88°	0.6
N	18.5	2.2			18.6	15%	83°	0.9
S	-94.8	71.0			118.7	95%	-53°	7.6

Approximate natural periods
Surge: 151 Sway: 59 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 39.4
Trim: 0.0



Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\20,000 TEU Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target:-582.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area:123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -641.1 628.3
Depth 107.9 107.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	

6	587.6	-75.0	0.0	117.6	350	20	18.1	pp	384
7	-624.5	-95.8	22.0	26.0	350	20	18.1	pp	384
8	-636.7	-94.1	22.0	17.0	350	20	18.1	pp	384
9	-655.1	-58.6	22.0	42.3	350	20	18.1	pp	384
10	-655.1	-34.1	22.0	37.6	350	20	18.1	pp	384
11	-655.1	-12.7	22.0	22.5	350	20	18.1	pp	384
12	-655.1	12.7	22.0	22.5	350	20	18.1	pp	384
13	-655.1	34.1	22.0	37.6	350	20	18.1	pp	384
14	-655.1	58.6	22.0	42.3	350	20	18.1	pp	384
15	-636.7	94.1	22.0	17.0	350	20	18.1	pp	384
16	-624.5	95.8	22.0	26.0	350	20	18.1	pp	384

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\5 WUT (20,000 TEU) - EAST SIDE -
(SHEET 6)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125

*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)							
aa	-25.0	18.0	6.2	68.3							
bb	25.0	18.0	6.2	68.3							
cc	75.0	18.0	6.2	68.3							
dd	125.0	18.0	6.2	68.3							
ee	175.0	18.0	6.2	68.3							
ff	215.0	18.0	6.2	68.3							
gg	255.0	18.0	6.2	68.3							
hh	300.0	18.0	6.2	68.3							
ii	350.0	18.0	6.2	68.3							
jj	400.0	18.0	6.2	68.3							
kk	450.0	18.0	6.2	68.3							
ll	500.0	18.0	6.2	68.3							
mm	550.0	18.0	6.2	68.3							
nn	600.0	18.0	6.2	68.3							
oo	650.0	18.0	6.2	68.3							
pp	700.0	18.0	6.2	68.3							
qq	750.0	18.0	6.2	68.3							
rr	800.0	18.0	6.2	68.3							
ss	850.0	18.0	6.2	68.3							
tt	900.0	18.0	6.2	68.3							
uu	950.0	18.0	6.2	68.3							
vv	1000.0	18.0	6.2	68.3							
ww	1050.0	18.0	6.2	68.3							
xx	1100.0	18.0	6.2	68.3							
yy	1150.0	18.0	6.2	68.3							
zz	1200.0	18.0	6.2	68.3							
Fender	Load-Compression Data										
aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft)
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: 40.0 from Berth Target
Vessel Port Target: 38.9 above Pier
Wind Speed: 20 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 3.14 (fwd) 0.06 (inw) 0.0° (port) 0.00 (up)
at its Port Target 0.65 (fwd) -5.19 (out) -0.2° (stbd) 0.00 (up)

Line to	Pull	Tot.Line	In-Line	Winch	Worst Direction	Line	Percent
---------	------	----------	---------	-------	-----------------	------	---------

Bollard	-in	Length	±Motion	Slip	to Screen	True	Tension	Strength
1-*F	1.97	244.4			-70°	245°	53.9	14%
2-*K	1.70	129.7			-70°	245°	96.8	25%
3-*L	4.26	315.8			-70°	245°	37.3	10%
4-*L	4.32	320.8			-70°	245°	39.8	10%
5-*L	4.96	370.5			-70°	245°	42.5	11%
6-*L	6.76	505.7			-70°	245°	37.7	10%
9-Q	2.48	275.1			-110°	205°	62.2	16%
10-Q	2.26	255.3			-110°	205°	63.6	17%
11-R	1.66	175.2			-100°	215°	97.6	25%
16-V	4.18	305.5			25°	340°	20.6	5%

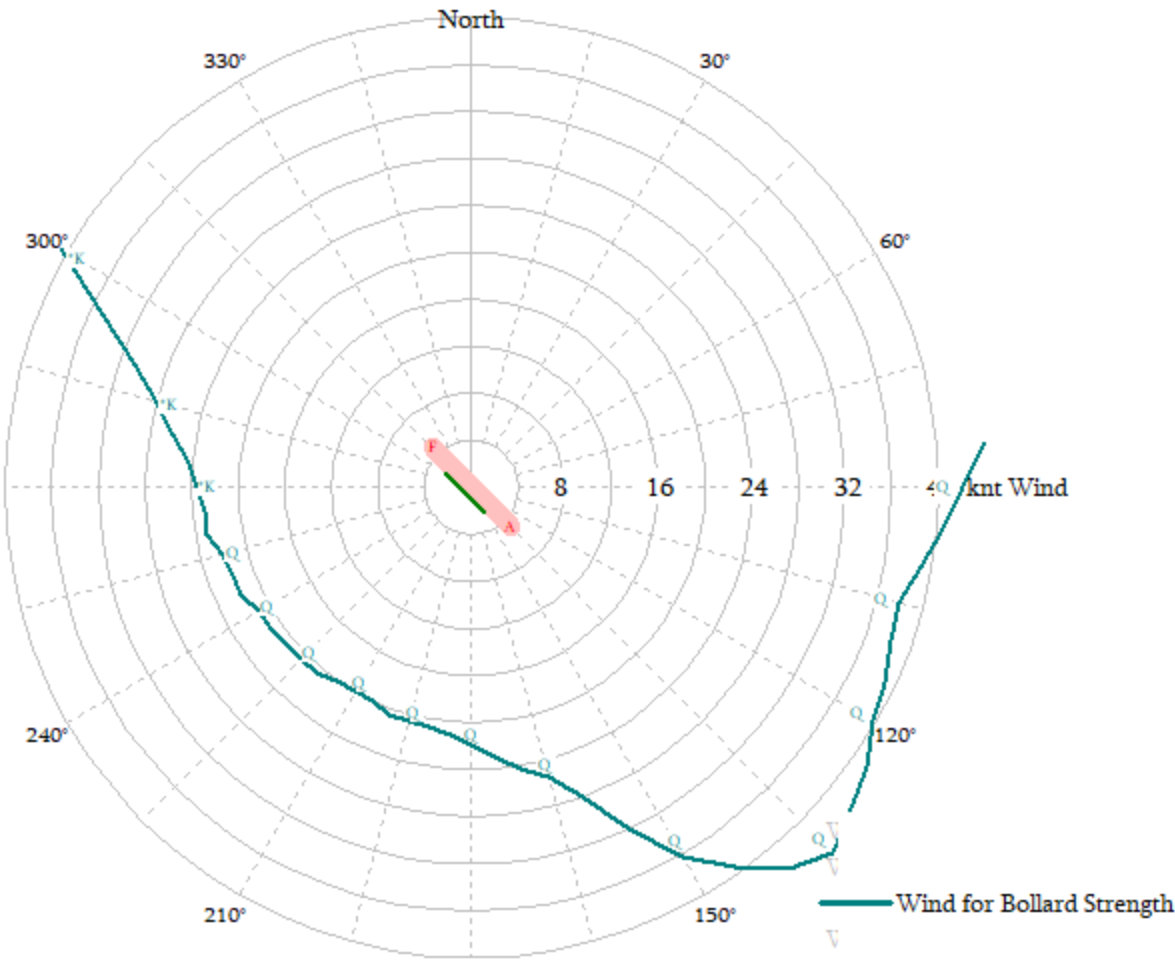
Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	23	0.06	0.7	100%	
cc	22	0.06	0.7	100%	
dd	21	0.06	0.7	100%	
ee	21	0.06	0.7	100%	
ff	20	0.06	0.7	100%	
gg	20	0.06	0.6	100%	
hh	19	0.05	0.6	100%	
ii	19	0.05	0.6	100%	
jj	18	0.05	0.6	100%	
kk	18	0.05	0.6	100%	
ll	17	0.05	0.6	100%	
mm	17	0.05	0.5	100%	
nn	17	0.05	0.5	100%	
oo	17	0.05	0.5	100%	
pp	17	0.05	0.6	100%	
qq	17	0.05	0.6	100%	
rr	18	0.05	0.6	100%	
ss	18	0.05	0.6	100%	
tt	19	0.05	0.6	100%	
uu	19	0.05	0.6	100%	
vv	19	0.05	0.6	100%	
ww	20	0.06	0.6	100%	
xx	21	0.06	0.7	100%	
yy	21	0.06	0.7	100%	
zz	22	0.06	0.7	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
Q	91.6	79.8			125.6	100%	49°	31.9
R	57.7	70.1			97.6	78%	39°	36.1
V	-20.2	0.3			20.6	16%	-90°	4.3
*F	52.6	7.3			53.9	43%	82°	9.1
*K	-65.2	61.5			96.8	77%	-47°	36.7
*L	-133.4	81.1			157.3	39%	-59°	19.1

Approximate natural periods
Surge: 154 Sway: 98 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 14,000 & 14,000 TEU - MHHW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\7 WUT (14,000 TEU) - EAST SIDE (SHEET 7)\Thalassa Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -90.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0	571.4	
Depth	97.9	97.9	

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322

17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\7 WUT (14,000 TEU) - EAST SIDE
(SHEET 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1542.7	47.3	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\7 WUT (14,000 TEU) - EAST SIDE (SHEET 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: 600.0 from Berth Target
Vessel Port Target: 40.7 above Pier
Wind Speed: 19 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.67 (fwd) 0.04 (inw) 0.5° (port) 0.00 (up)
at its Port Target -2.92 (aft) -6.01 (out) 0.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
2-*K	1.75	151.1			-95°	220°	56.2	19%
3-*K	1.02	98.3			-70°	245°	52.9	18%
4-*L	3.52	279.9			-95°	220°	36.1	12%

5-*L	3.61	286.6		-90°	225°	34.2	11%
6-*L	3.84	302.9		-90°	225°	32.8	11%
13-R	3.30	269.0		-110°	205°	55.8	19%
16-R	2.84	235.5		-110°	205°	42.4	14%
17-S	1.92	166.4		-110°	205°	77.0	26%
18-S	2.31	196.2		-110°	205°	45.1	15%
23-V	3.29	263.3		-100°	215°	50.5	17%
24-*F	3.95	318.8		150°	105°	24.2	8%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	14	0.04	0.5	100%	
cc	14	0.04	0.5	100%	
dd	14	0.04	0.4	100%	
ee	14	0.04	0.4	100%	
ff	14	0.04	0.4	100%	
gg	13	0.04	0.4	100%	
hh	13	0.04	0.4	100%	
ii	13	0.04	0.4	100%	
jj	13	0.04	0.4	100%	
kk	13	0.04	0.4	100%	
ll	13	0.04	0.4	100%	
mm	13	0.04	0.4	100%	
nn	13	0.04	0.4	100%	
oo	14	0.04	0.4	100%	
pp	14	0.04	0.5	100%	
qq	15	0.04	0.5	100%	
rr	15	0.04	0.5	100%	
ss	16	0.04	0.5	100%	
tt	16	0.05	0.5	100%	
uu	17	0.05	0.5	100%	
vv	18	0.05	0.6	100%	
ww	18	0.05	0.6	100%	
xx	19	0.05	0.6	100%	
yy	19	0.05	0.6	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
R	84.9	46.7			98.0	78%	61°	15.2
S	103.0	58.8			121.9	98%	60°	28.2
V	-48.8	3.4			50.5	40%	-86°	12.6
*F	23.8	1.4			24.2	19%	87°	3.9
*K	-59.7	66.9			102.6	82%	-42°	49.9
*L	-89.3	49.1			103.1	26%	-61°	15.2

Approximate natural periods
Surge: 126 Sway: 69 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

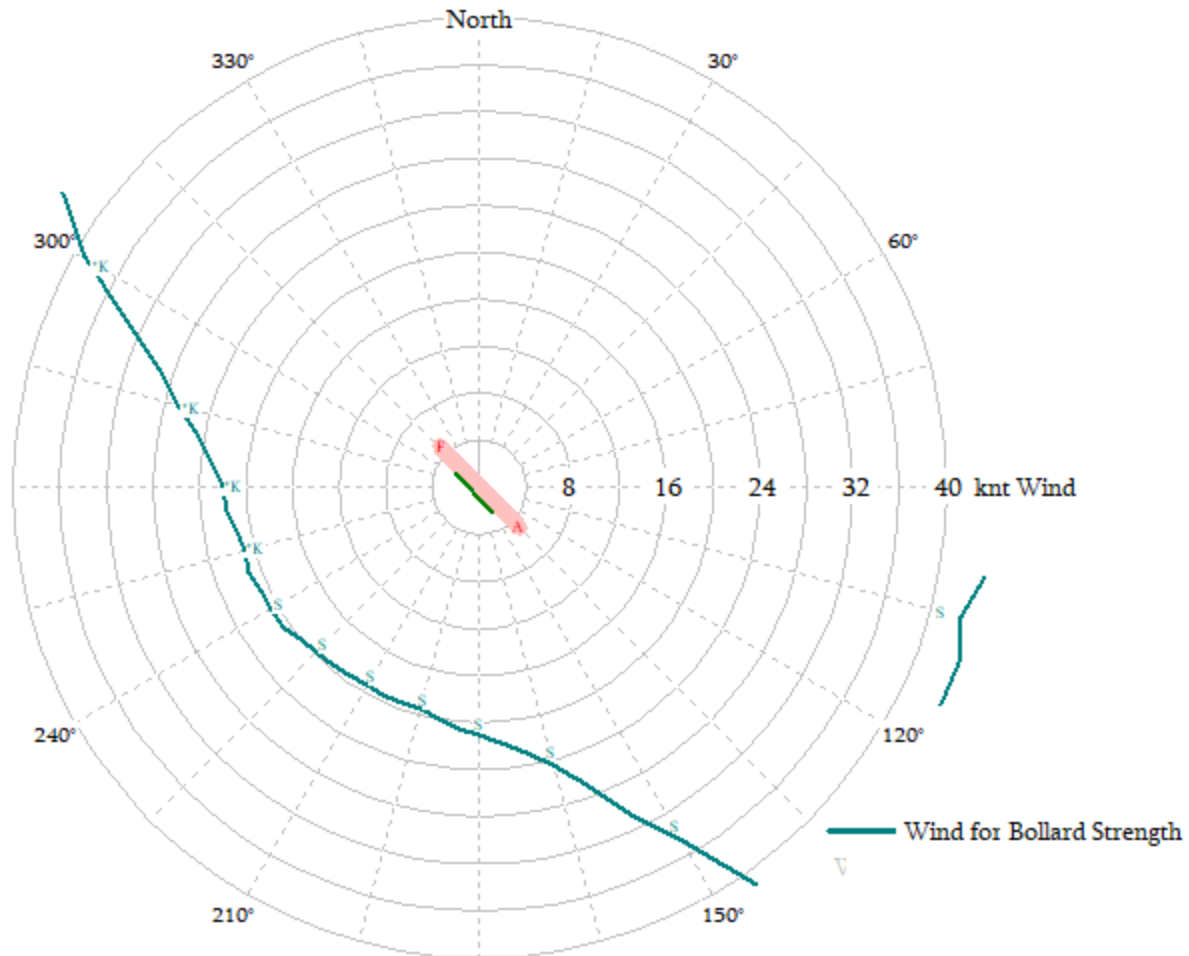
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0



(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\10 WUT (14,000 TEU) - WEST SIDE - (Sheet 7)\Thalassa Hellas.vsl)

```

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

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Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	568.4	50.7	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	572.7	45.0	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322

16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\10 WUT (14,000 TEU) - WEST SIDE
- (Sheet 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\10 WUT (14,000 TEU) - WEST SIDE - (Sheet 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1319 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 40.7 above Pier
Wind Speed: 15 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.85 (fwd) 0.03 (inw) 0.0° (port) 0.00 (up)
at its Port Target -0.59 (aft) -1.78 (out) -0.2° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
4-T	1.91	170.0			-65°	250°	37.8	13%
6-T	2.23	193.7			-70°	245°	40.7	14%

7-T	2.83	239.3		-70°	245°	37.7	13%
13-A	3.42	268.2		-120°	195°	22.3	7%
15-A	3.65	284.1		-120°	195°	22.7	8%
16-A	2.80	222.9		-120°	195°	23.7	8%
18-B	1.25	113.5		-120°	195°	23.9	8%
19-B	0.88	86.7		-120°	195°	27.8	9%
23-F	3.92	326.2		25°	340°	22.6	8%
24-P	3.29	255.8		-70°	245°	31.2	10%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	31	0.09	1.0	100%	
cc	17	0.05	0.6	100%	
dd	17	0.05	0.5	100%	
ee	16	0.04	0.5	100%	
ff	15	0.04	0.5	100%	
gg	14	0.04	0.5	100%	
hh	14	0.04	0.4	100%	
ii	13	0.04	0.4	100%	
jj	12	0.03	0.4	100%	
kk	12	0.03	0.4	100%	
ll	11	0.03	0.4	100%	
mm	11	0.03	0.3	100%	
nn	10	0.03	0.3	100%	
oo	10	0.03	0.3	100%	
pp	10	0.03	0.3	100%	
qq	10	0.03	0.3	100%	
rr	10	0.03	0.3	100%	
ss	10	0.03	0.3	100%	
tt	10	0.03	0.3	100%	
uu	10	0.03	0.3	100%	
vv	10	0.03	0.3	100%	
ww	10	0.03	0.3	100%	
xx	10	0.03	0.3	100%	
yy	0			0%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	44.3	51.0			68.6	17%	41°	12.1
B	23.1	35.8			51.6	41%	33°	29.0
F	-22.3				22.6	18%	-90°	4.0
P	30.3	3.1			31.2	25%	84°	6.8
T	-93.4	64.3			115.9	93%	-55°	24.0

Approximate natural periods
Surge: 144 Sway: 68 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

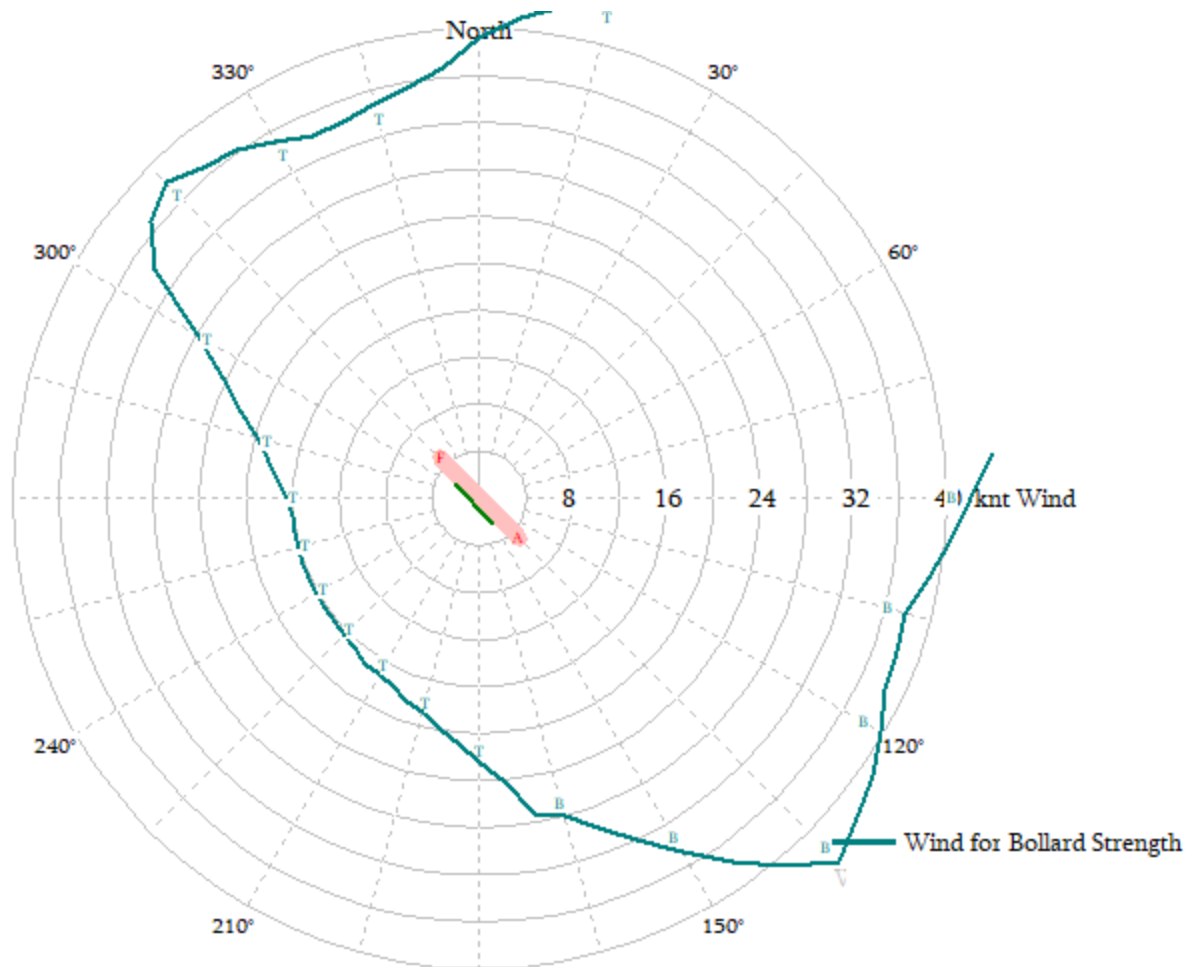
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 14,000 & 14,000 TEU - MLLW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\7 WUT (14,000 TEU) - EAST SIDE (SHEET 7)\Thalassa Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -90.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0		571.4
Depth	97.9		97.9

Flatside Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322

16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\7 WUT (14,000 TEU) - EAST SIDE
(SHEET 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1542.7	47.3	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\7 WUT (14,000 TEU) - EAST SIDE (SHEET 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: 600.0 from Berth Target
Vessel Port Target: 28.9 above Pier
Wind Speed: 20 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
Total Side Windage Area:154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.74 (fwd) 0.04 (inw) 0.5° (port) 0.00 (up)
at its Port Target -2.77 (aft) -5.77 (out) 0.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	Line True	Line Tension	Percent Strength
2-*K	1.69	146.1			-95°	220°	57.7	19%
3-*K	0.96	93.6			-70°	245°	49.8	17%

4-*L	3.52	278.4		-95°	220°	35.2	12%
5-*L	3.61	285.1		-90°	225°	33.2	11%
6-*L	3.83	301.5		-90°	225°	31.8	11%
13-R	3.26	267.5		-110°	205°	55.1	19%
16-R	2.81	233.9		-110°	205°	42.3	14%
17-S	1.88	164.1		-110°	205°	77.2	26%
18-S	2.27	193.8		-110°	205°	45.4	15%
23-V	3.27	260.8		-100°	215°	49.9	17%
24-*F	3.91	317.2		150°	105°	24.5	8%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	16	0.04	0.5	100%	
cc	15	0.04	0.5	100%	
dd	15	0.04	0.5	100%	
ee	15	0.04	0.5	100%	
ff	15	0.04	0.5	100%	
gg	15	0.04	0.5	100%	
hh	14	0.04	0.5	100%	
ii	14	0.04	0.5	100%	
jj	14	0.04	0.5	100%	
kk	14	0.04	0.5	100%	
ll	14	0.04	0.5	100%	
mm	14	0.04	0.5	100%	
nn	14	0.04	0.5	100%	
oo	15	0.04	0.5	100%	
pp	15	0.04	0.5	100%	
qq	16	0.04	0.5	100%	
rr	16	0.05	0.5	100%	
ss	17	0.05	0.5	100%	
tt	18	0.05	0.6	100%	
uu	18	0.05	0.6	100%	
vv	19	0.05	0.6	100%	
ww	20	0.06	0.6	100%	
xx	20	0.06	0.7	100%	
yy	21	0.06	0.7	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
R	84.8	46.4			97.2	78%	61°	10.5
S	105.0	59.6			122.4	98%	60°	20.0
V	-49.0	3.2			49.9	40%	-86°	8.8
*F	24.3	1.5			24.5	20%	87°	2.7
*K	-63.2	68.8			100.3	80%	-43°	36.3
*L	-87.2	47.9			100.1	25%	-61°	10.6

Approximate natural periods
Surge: 123 Sway: 89 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

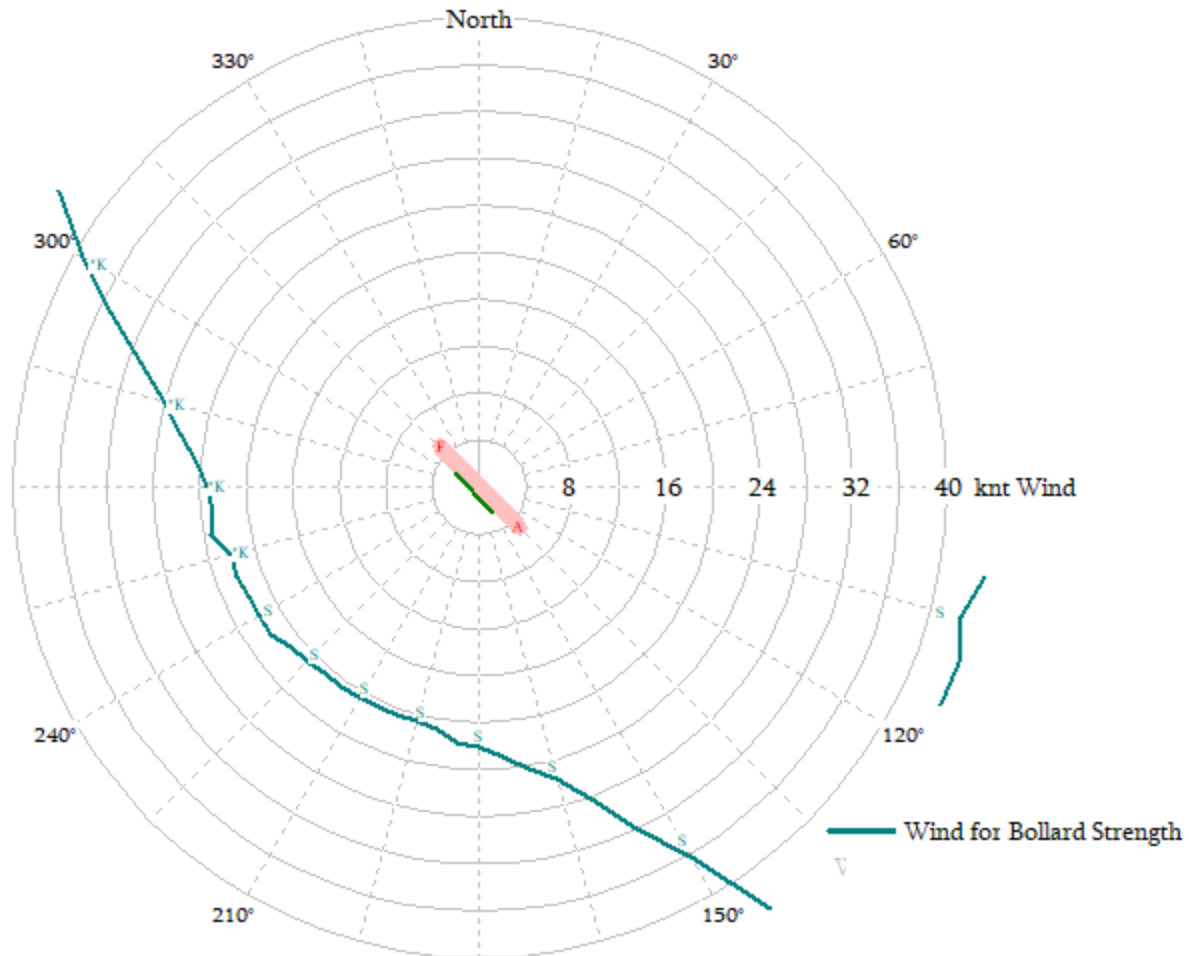
Ref:

Remarks: Remarks:

Water Level: 0.00 above datum

Draft: 47.6

Trim: 0.0



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\10 WUT (14,000 TEU) - WEST SIDE - (Sheet 7)\Thalassa Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Pamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -583.0 571.4
Depth 97.9 97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	568.4	50.7	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	572.7	45.0	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322

15	-596.8	-19.8	0.0	50.6	350	20	5.7	pe	298	433	12.4	pp	322
16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\10 WUT (14,000 TEU) - WEST SIDE
- (Sheet 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	125
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	125
J	-725.0	0.0	2.0	125
K	-625.0	0.0	2.0	125
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	125
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	125
R	-125.0	0.0	2.0	125
S	-50.0	0.0	2.0	125
T	100.0	0.0	2.0	125
U	175.0	0.0	2.0	125
V	275.0	0.0	2.0	125
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	125
*B	700.0	0.0	2.0	125
*C	775.0	0.0	2.0	125
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125

*L 1485.0 50.0 -1.2 400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)						
aa	-1250.	18.0	6.2	68.3						
bb	-1200.	18.0	6.2	68.3						
cc	-1150.	18.0	6.2	68.3						
dd	-1100.	18.0	6.2	68.3						
ee	-1050.	18.0	6.2	68.3						
ff	-1000.	18.0	6.2	68.3						
gg	-950.0	18.0	6.2	68.3						
hh	-900.0	18.0	6.2	68.3						
ii	-850.0	18.0	6.2	68.3						
jj	-800.0	18.0	6.2	68.3						
kk	-750.0	18.0	6.2	68.3						
ll	-700.0	18.0	6.2	68.3						
mm	-650.0	18.0	6.2	68.3						
nn	-625.0	18.0	6.2	68.3						
oo	-575.0	18.0	6.2	68.3						
pp	-525.0	18.0	6.2	68.3						
qq	-475.0	18.0	6.2	68.3						
rr	-425.0	18.0	6.2	68.3						
ss	-375.0	18.0	6.2	68.3						
tt	-325.0	18.0	6.2	68.3						
uu	-275.0	18.0	6.2	68.3						
vv	-225.0	18.0	6.2	68.3						
ww	-175.0	18.0	6.2	68.3						
xx	-125.0	18.0	6.2	68.3						
yy	-75.0	18.0	6.2	68.3						
zz	-25.0	18.0	6.2	68.3						
Fender	Load-Compression Data									
aa	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	307 2.53	320 kips 2.60 ft
bb	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	307 2.53	320 kips 2.60 ft
cc	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
dd	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
ee	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
ff	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
gg	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
hh	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
ii	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
jj	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
kk	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
ll	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft
mm	64 0.18	186 0.54	288 0.90	320 1.26	301 1.62	282 1.98	282 2.17	288 2.35	253 2.53	263 kips 2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\10 WUT (14,000 TEU) - WEST SIDE - (Sheet 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1319 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 28.9 above Pier
Wind Speed: 16 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 0.73 (fwd) 0.03 (inw) 0.0° (port) 0.00 (up)
at its Port Target -0.64 (aft) -1.70 (out) -0.2° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	True	Line Tension	Percent Strength
4-T	1.91	167.7			-65°	250°	39.2	13%

6-T	2.23	191.5	-70°	245°	41.6	14%
7-T	2.83	237.6	-70°	245°	38.2	13%
13-A	3.42	266.5	-130°	185°	22.2	7%
15-A	3.65	282.3	-120°	195°	22.5	8%
16-A	2.80	221.1	-120°	195°	23.5	8%
18-B	1.25	108.1	-120°	195°	25.3	8%
19-B	0.88	80.4	-120°	195°	31.3	10%
23-F	3.92	324.4	25°	340°	23.2	8%
24-P	3.29	253.6	-70°	245°	30.5	10%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	33	0.09	1.1	100%	
cc	19	0.05	0.6	100%	
dd	18	0.05	0.6	100%	
ee	18	0.05	0.6	100%	
ff	17	0.05	0.5	100%	
gg	16	0.04	0.5	100%	
hh	15	0.04	0.5	100%	
ii	14	0.04	0.5	100%	
jj	13	0.04	0.4	100%	
kk	13	0.04	0.4	100%	
ll	12	0.03	0.4	100%	
mm	12	0.03	0.4	100%	
nn	11	0.03	0.4	100%	
oo	11	0.03	0.4	100%	
pp	11	0.03	0.4	100%	
qq	11	0.03	0.4	100%	
rr	11	0.03	0.3	100%	
ss	11	0.03	0.3	100%	
tt	11	0.03	0.3	100%	
uu	11	0.03	0.3	100%	
vv	11	0.03	0.3	100%	
ww	11	0.03	0.3	100%	
xx	11	0.03	0.3	100%	
yy	0			0%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	44.3	51.0			68.2	17%	41°	8.7
B	27.7	42.7			56.4	45%	33°	24.2
F	-23.0				23.2	19%	-90°	2.9
P	30.0	3.1			30.5	24%	84°	4.6
T	-96.9	66.5			118.8	95%	-56°	17.3

Approximate natural periods
Surge: 138 Sway: 88 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

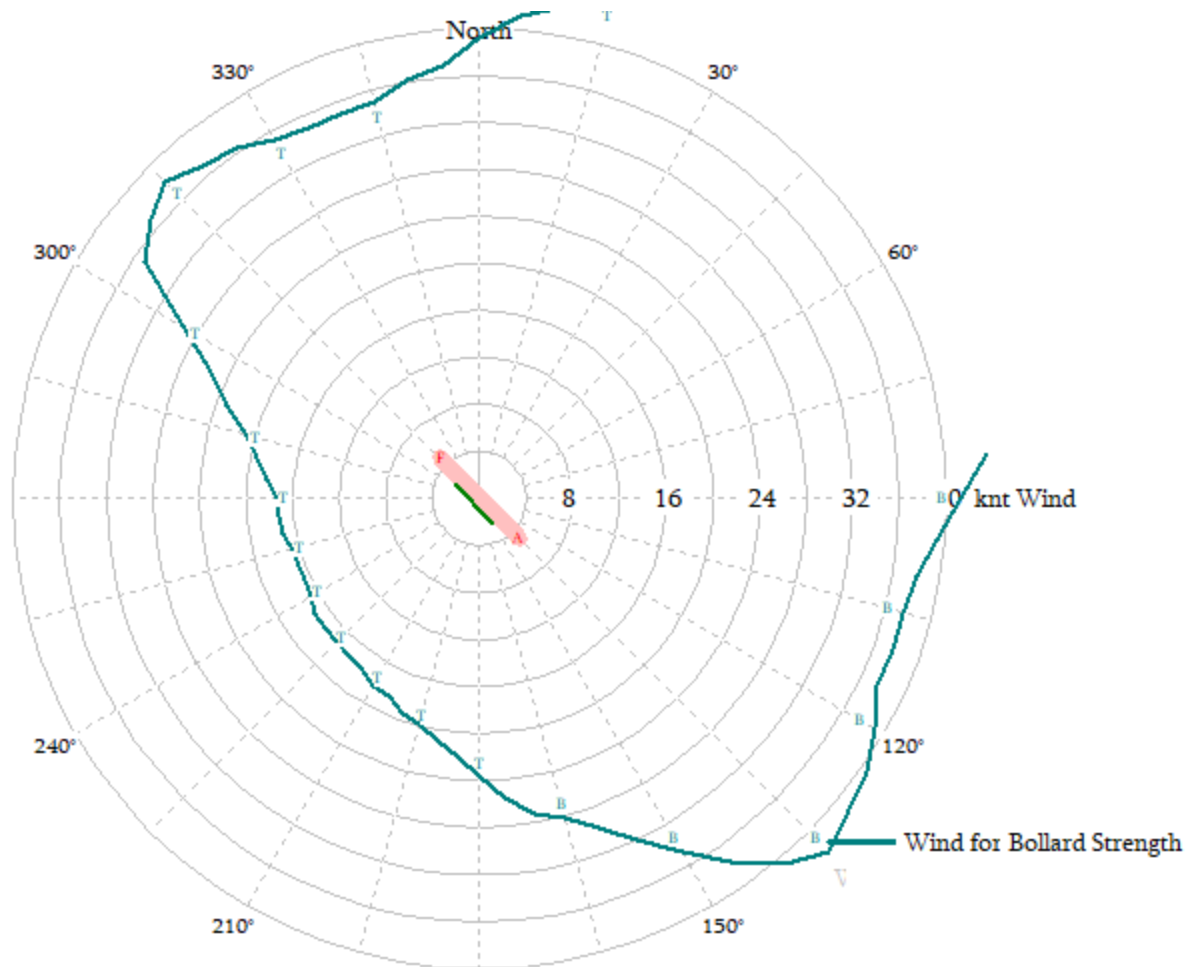
Ref:

Remarks: Remarks:

Water Level: 0.00 above datum

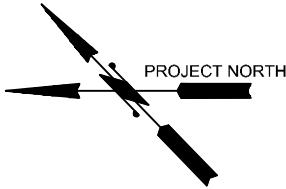
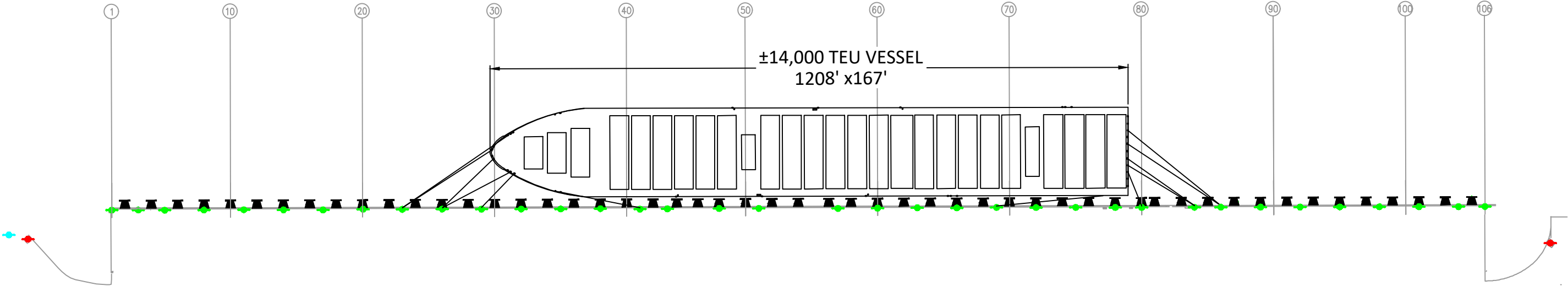
Draft: 47.6

Trim: 0.0



APPENDIX B: MOORING ARRANGEMENTS EVALUATED

NOTE:
1. EXISTING BOLLARD CAPACITY IS EXCEEDED FOR WIND SPEEDS ABOVE 22 KNOTS.

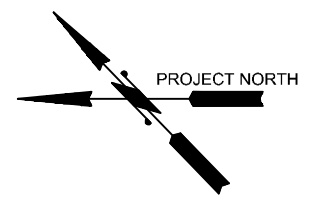
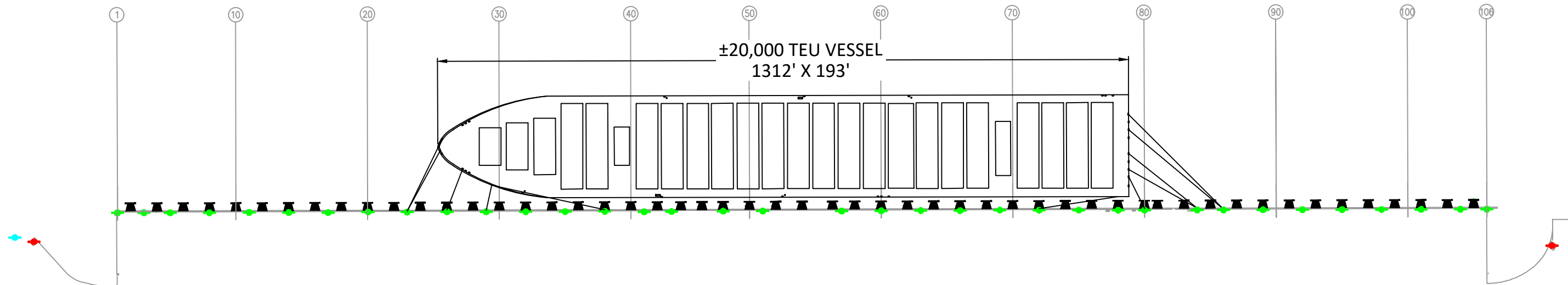


WUT - 14,000 TEU MOORING PLAN
SCALE: 1 : 200

- LEGEND:**
- CONE FENDER
 - EXISTING 125 KIP WHARF BOLLARD
 - EXISTING 400 KIP LANDSIDE DOLPHIN BOLLARD
 - APPROXIMATE LOCATION OF WEST BOLLARD (GOOGLE EARTH)

 2407 North 31st Street, Suite 100 Tacoma, Washington 984087 (253) 386-0150 Fax (253) 396-0162	WUT - 14,000 MOORING PLAN	
	DATE: 05/01/2024	SCALE: AS SHOWN
	DRAWN BY: GM	SHT 1 OF 5

NOTE:
1. EXISTING BOLLARD CAPACITY IS EXCEEDED FOR WIND SPEEDS ABOVE 22 KNOTS.

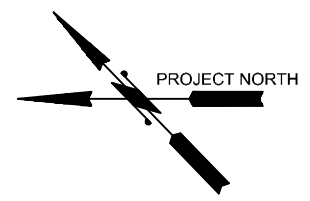
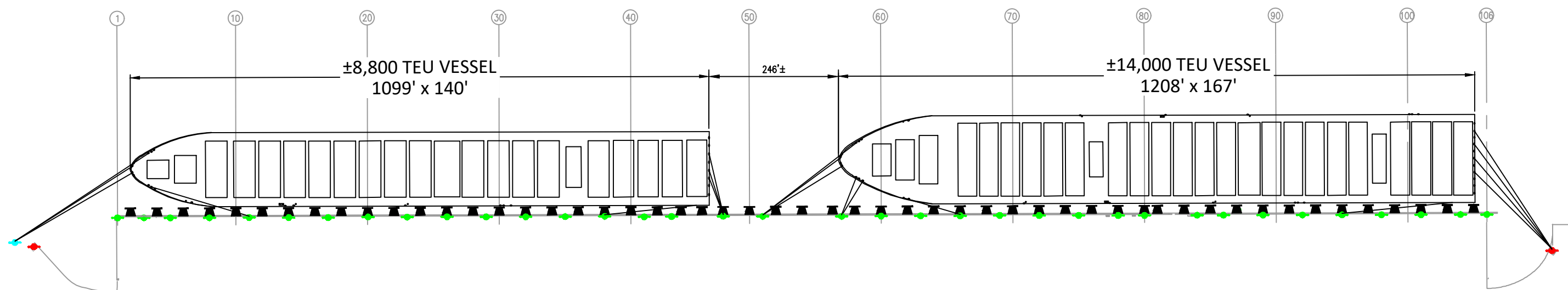


WUT - 20,000 TEU MOORING PLAN
SCALE: 1 : 200

- LEGEND:**
- CONE FENDER
 - EXISTING 125 KIP WHARF BOLLARD
 - EXISTING 400 KIP LANDSIDE DOLPHIN BOLLARD
 - APPROXIMATE LOCATION OF WEST BOLLARD (GOOGLE EARTH)

 2407 North 31st Street, Suite 100 Tacoma, Washington 984087 (253) 386-0150 Fax (253) 396-0162	WUT - 20,000 TEU MOORING PLAN	
	DATE: 05/01/2024	SCALE: AS SHOWN
	DRAWN BY: GM	SHT 2 OF 5

NOTE:
1. EXISTING BOLLARD CAPACITY IS EXCEEDED FOR WIND SPEEDS ABOVE 21 KNOTS.

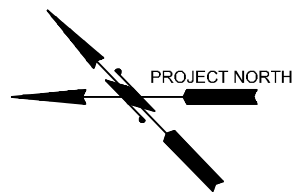
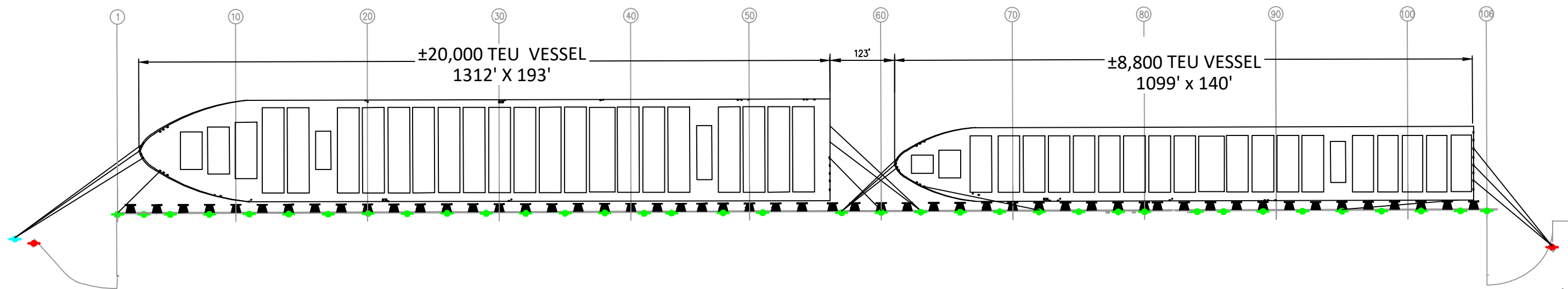


WUT - 8,800 & 14,000 TEU MOORING PLAN
SCALE: 1: 200

- LEGEND:**
- CONE FENDER
 - EXISTING 125 KIP WHARF BOLLARD
 - EXISTING 400 KIP LANDSIDE DOLPHIN BOLLARD
 - APPROXIMATE LOCATION OF WEST BOLLARD (GOOGLE EARTH)

 2407 North 31st Street, Suite 100 Tacoma, Washington 984087 (253) 386-0150 Fax (253) 396-0162	WUT - 8,800 & 14,000 TEU MOORING PLAN	
	DATE: 05/01/2024	SCALE: AS SHOWN
	DRAWN BY: GM	SHT 3 OF 5

NOTE:
1. EXISTING BOLLARD CAPACITY IS EXCEEDED FOR WIND SPEEDS ABOVE 18 KNOTS.

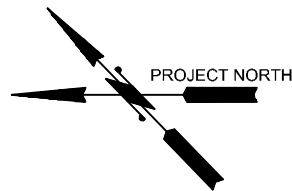
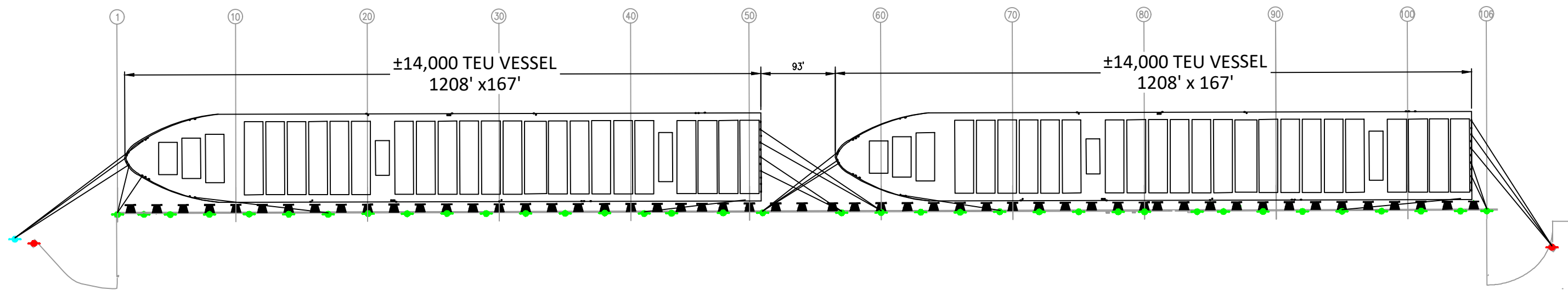


WUT - 20,000 & 8,800 TEU MOORING PLAN
SCALE: 1 : 200

- LEGEND:**
- CONE FENDER
 - EXISTING 125 KIP WHARF BOLLARD
 - EXISTING 400 KIP LANDSIDE DOLPHIN BOLLARD
 - APPROXIMATE LOCATION OF WEST BOLLARD (GOOGLE EARTH)

kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 984087 (253) 386-0150 Fax (253) 396-0162		WUT - 20,000 & 8,800 TEU MOORING PLAN	
DATE: 05/01/2024		SCALE: AS SHOWN	
DRAWN BY: GM		SHT 4 OF 5	

NOTE:
1. EXISTING BOLLARD CAPACITY IS EXCEEDED FOR WIND SPEEDS ABOVE 15 KNOTS.



WUT - 14,000 & 14,000 TEU MOORING PLAN
SCALE: 1 : 200

- LEGEND:**
- CONE FENDER
 - EXISTING 125 KIP WHARF BOLLARD
 - EXISTING 400 KIP LANDSIDE DOLPHIN BOLLARD
 - APPROXIMATE LOCATION OF WEST BOLLARD (GOOGLE EARTH)

kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 984087 (253) 386-0150 Fax (253) 396-0162	WUT - 14,000 & 14,000 TEU MOORING PLAN	
	DATE: 05/01/2024	SCALE: AS SHOWN
	DRAWN BY: GM	SHT 5 OF 5

APPENDIX C: WIND STUDY

Wind Study for Washington United and Pierce County Terminals at Port of Tacoma

Date: July 03, 2024



Project: Bollard Study for
WUT & PCT
Location: Port of Tacoma
Client: Port of Tacoma

By: AKH
Date: 7/3/2024

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Project: Bollard Study for
WUT & PCT
Location: Port of Tacoma
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By: AKH
Date: 7/3/2024

1. Introduction

The purpose of this study was to determine site-specific 30-second duration design wind speeds from various directions at the Port of Tacoma for use in evaluating mooring loads on bollards at Washington United and Pierce County Terminals. The calculations discussed herein generally conform to the procedures of ASCE7-22. Fifteen years of wind speed data from the anemometer station located at the Port of Tacoma and owned by NOAA were processed and evaluated by developing codes in the MATLAB programming language. A thresholding approach based on the sampling time windows was used for filtering data and removing very low-intensity levels of wind. As part of the analysis, envelope design wind speeds were calculated using two sets of available data, including 5-second gust and 120-second average wind speeds. Height and exposure correction factors were considered, and the 30-second design wind speeds corresponding to a 25-year return period are reported for eight distinct sectors. Wind Rose plots are also provided.

2. Anemometer Station and Database

The wind records utilized in this study were sourced from the comprehensive online database of the National Data Buoy Center. The specific station used for this study is situated on the northern side of the General Central Peninsula at the Port of Tacoma. The station, identified by the serial number 9446482 and the station ID TCMW1, is owned and maintained by the NOAA's National Ocean Service. The available data for this station spans approximately 15 years, commencing from April 2009 and concluding in October 2023, with recordings taken every 6 minutes. Figure 1.

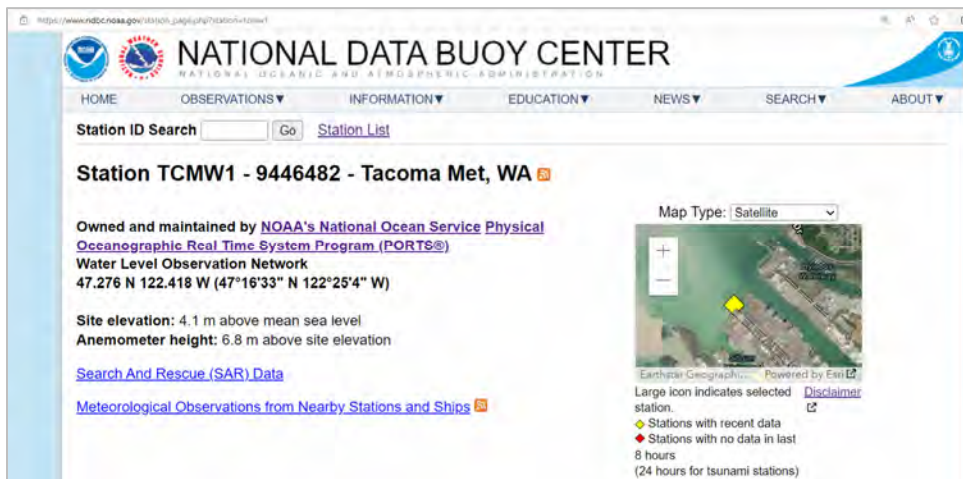


Figure 1. TCMW1 anemometer station website from National Data Buoy Center.

Each record includes the date, time, wind direction, 2-minute average wind speed, and 5-second gust wind speed. The source data was accessed from the following link: https://www.ndbc.noaa.gov/station_history.php?station=tcmw1

3. Statistical Evaluation of the Dataset

As a first step in understanding the historical data, histograms of winds from all directions. Two sets of wind speed data were processed and evaluated, the first set being wind speed averaged over a 120-second duration, and the second set averaged over a 5-second duration. Results for both sets are included in subsequent sections.

3-1- Histograms of Winds from All Directions

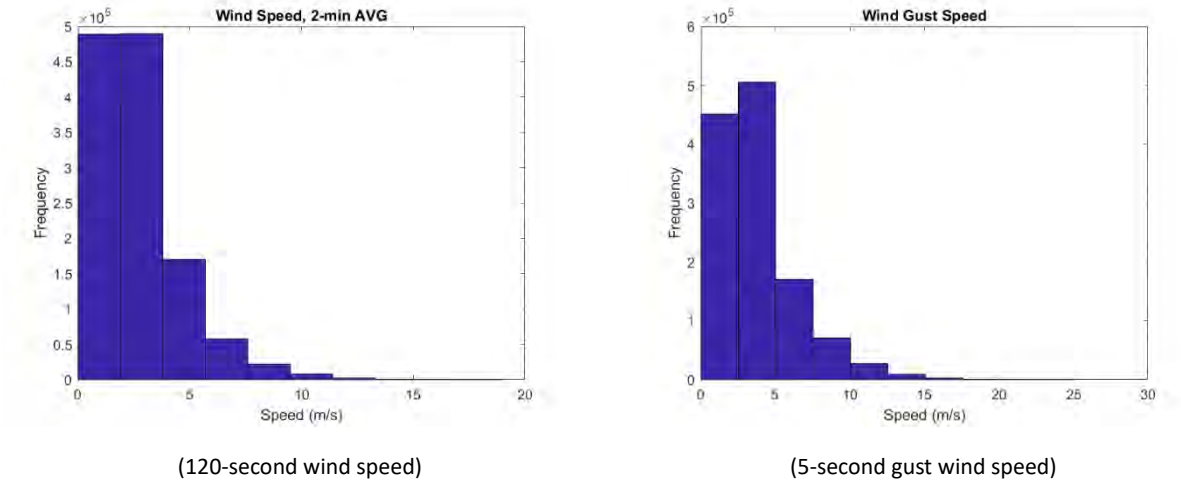


Figure 2. Histogram of the wind speeds (all directions).

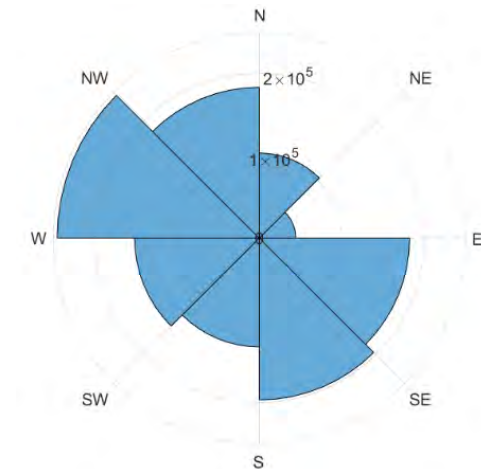


Figure 3. Histogram of the wind direction (all directions).

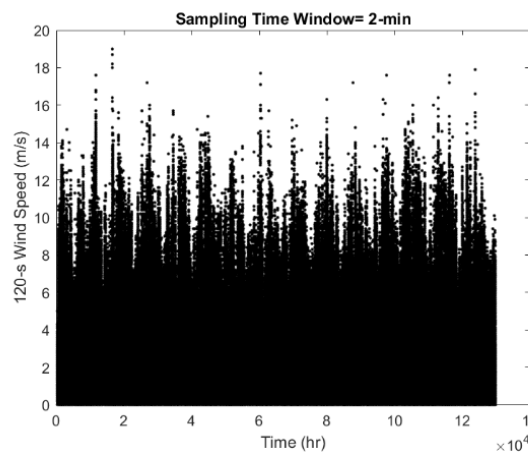


Figure 4. Wind speeds vs time (in hours) for 120-second average wind. Time zero is April 2009.

3-2- Filtering, Binning, and Representing Data

For evaluating extreme wind events with a high wind speed and low probability of occurrence, using wind data recorded every 6 minutes would result in a poor fit to the probability density functions. Different approaches are discussed in the literature (Pintar et al. 2015), such as considering monthly maximum wind speed data or using a thresholding approach to eliminate the low-speed wind data below specific values. In this study, an approach similar to the second one is used. However, a time window threshold is used instead of a wind speed threshold. Several sampling time windows starting from 6 hours to a month were considered. Below a threshold of 6 hours, there is a high probability of correlations between recorded wind speeds (Pintar et al. 2015) leading to the wrong estimation. Finally, among all the sampling time windows, the ones that lead to the best-fitted model (highest accuracy) were selected. The following presents histograms of all data for four different sampling time window thresholds of 24, 96, 336, and 722 hours.

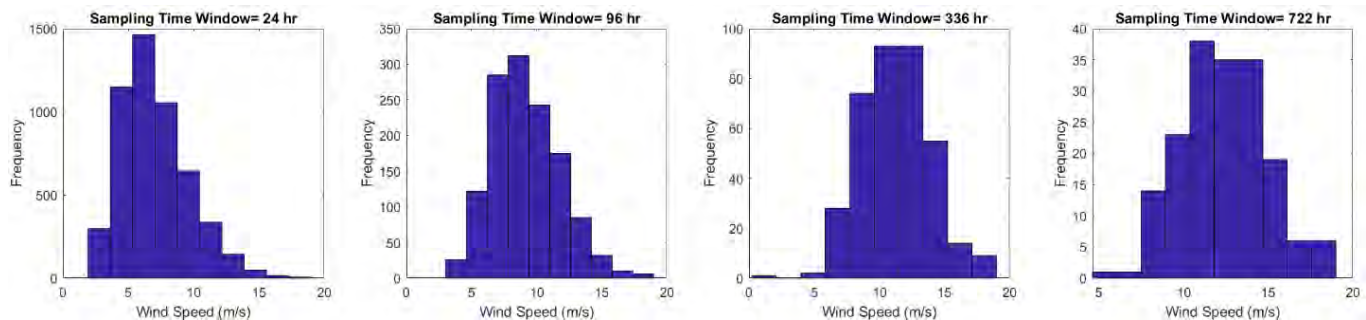


Figure 5. Histograms of maximum wind speeds for different sampling time window thresholds (for 120s average wind speed data).

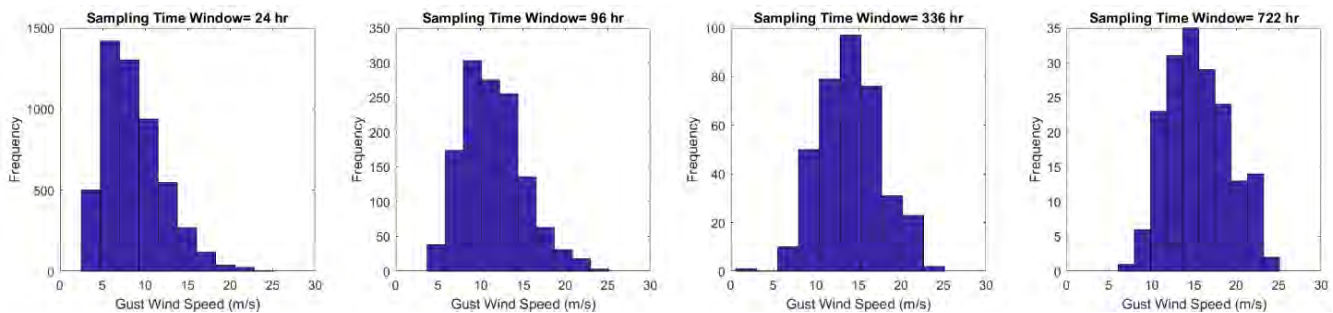


Figure 6. Histograms of maximum wind speeds for different sampling time window thresholds (for 5s gust wind speed data).

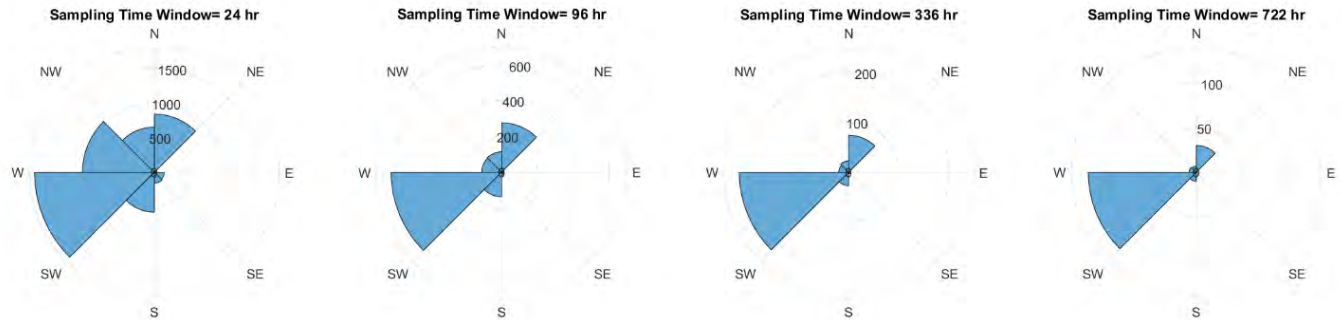


Figure 7. Histograms of wind direction for different sampling time window thresholds.

In addition to the histograms above for different sampling time windows, the data was evaluated for eight sectors of direction, with the angles shown in the figure and table below. The angles for these sectors were selected to evaluate the wind speed in directions parallel and perpendicular to vessels at each terminal.

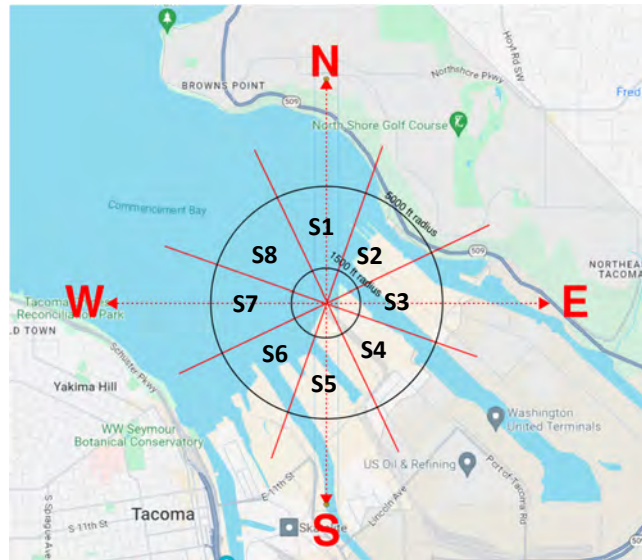


Figure 8. Defined sectors for the station site.

Table 1. Sector angles (from north clockwise).

Sector	S1	S2	S3	S4	S5	S6	S7	S8
Angles (degree)	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335

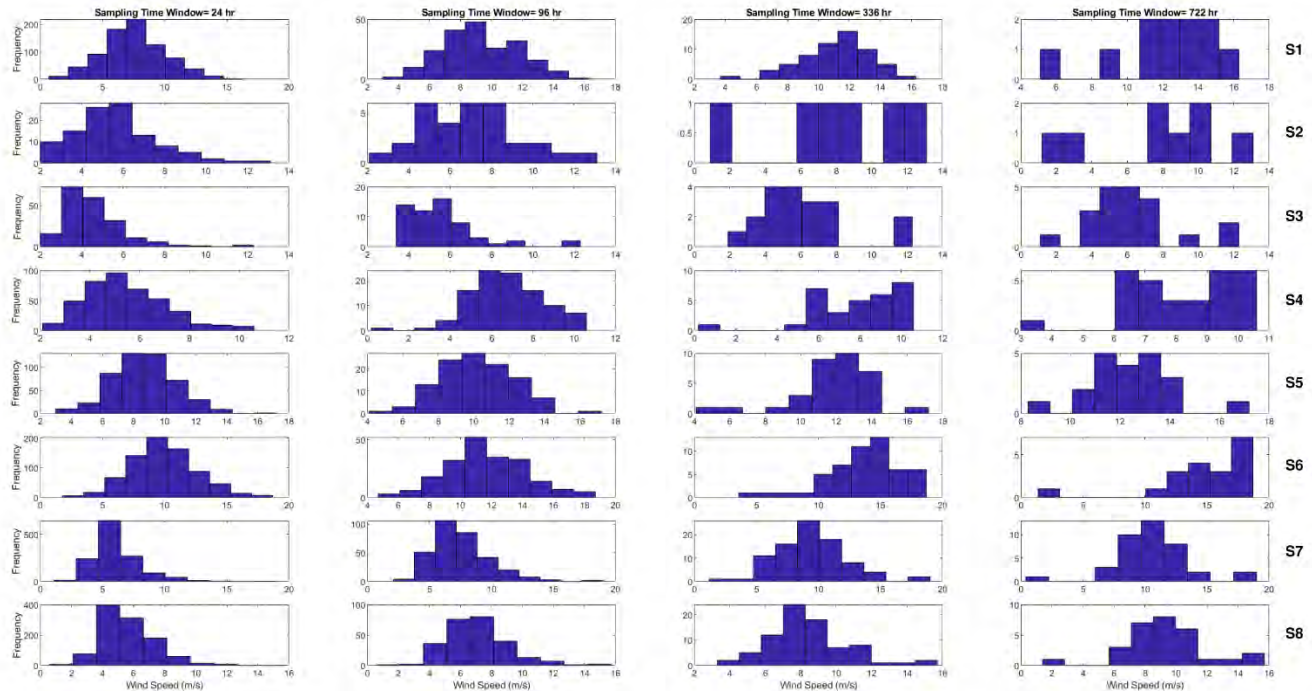


Figure 9. Histograms of the wind speed for different sectors and sampling time window thresholds for 120s wind speed data.

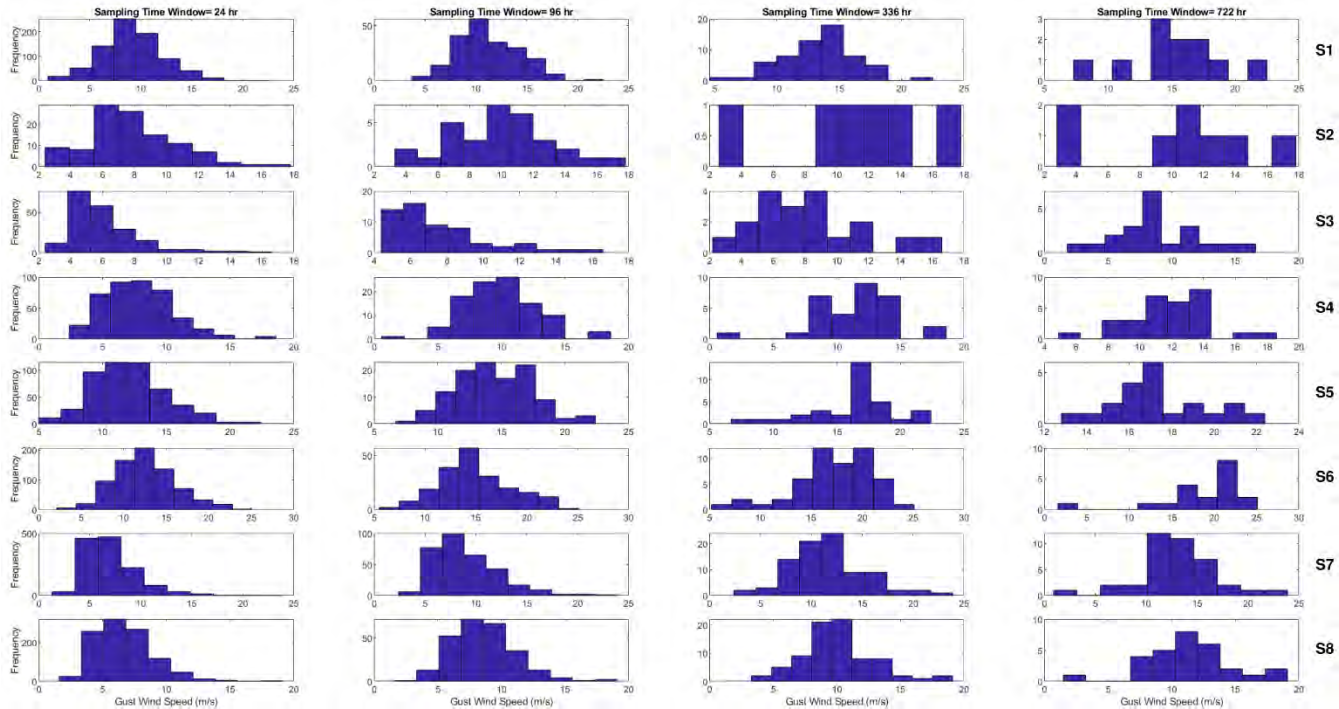


Figure 10. Histograms of the wind speed for different sectors and sampling time window thresholds for 5s gust wind speed data.

4. Design Wind Speed Calculation

This section estimates the 25-year return period 30-second duration design wind speed at the project site. For this purpose, after defining eight sectors, four well-known probability distribution functions were adopted for the extreme value analysis (Goda 2010), including *Lognormal (LN)*, *Weibull (WB)*, *Extreme Value (EV)*, and *Generalized Extreme Value (GE)*, to develop probabilistic models to estimate the design wind speed. It is important to note that among different sampling time window thresholds in the previous section, results from 2-week and 1-month time windows were used for the design wind speed calculation due to the higher accuracy of fitted models. The two sets of data, including wind speeds for the 5-second gust wind speed and 120-second wind speed, were analyzed, the results of both sets were converted to the 30-second duration wind speeds, and the maximum of two sets was selected. The accuracy of fitted models was evaluated, and the correction factors for station height and exposure were applied to the calculated wind speed to convert it to Exposure C at the standard height of 33>.

4-1- Fitting Probability Density Functions and Results

There are pre-defined functions in MATLAB programming language to fit the probability density functions by performing a maximum negative likelihood approach (Abramowitz et al. 2013; Evans et al. 1993; Johnson et al. 1993 and 1994). All probability models are fitted to the data for all sectors and two sampling time windows of two weeks and one month.

Table 2. Functions of the adopted probability distributions and their main parameter.

Probability Distribution	Function	Parameter 1*	Parameter 2*	Parameter 3*
Lognormal	$y = f(x \mu, \sigma) = \frac{1}{x\sigma\sqrt{2\pi}} \exp\left\{-\frac{(\log x - \mu)^2}{2\sigma^2}\right\}, \text{ for } x > 0.$	μ	σ	—
Extreme Value	$y = f(x \mu, \sigma) = \sigma^{-1} \exp\left(\frac{x-\mu}{\sigma}\right) \exp\left(-\exp\left(\frac{x-\mu}{\sigma}\right)\right)$	μ	σ	—
Weibull	$y = abx^{b-1}e^{-ax^b}$	a	b	—
Generalized Extreme Value	$y = f(x k, \mu, \sigma) = \left(\frac{1}{\sigma}\right) \exp\left(-\left(1 + k\frac{(x-\mu)}{\sigma}\right)^{\frac{1}{k}}\right) \left(1 + k\frac{(x-\mu)}{\sigma}\right)^{-1-\frac{1}{k}}$	μ	σ	k

* Parameters 1 to 3 are mathematical input parameters of each of probability distribution functions.



Project: Bollard Study for
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Date: 7/3/2024

Table 3. Value of parameters of all fitted probability distribution models for all eight sectors and sampling time windows of 2-week and 1-month for 120s wind speed data.

Lognormal				
Sector	μ		σ	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	2.29	2.45	0.27	0.28
S2	2.38	2.08	0.16	0.94
S3	1.91	1.81	0.52	0.63
S4	2.03	1.97	0.22	0.30
S5	2.17	2.24	0.66	0.26
S6	2.65	2.68	0.13	0.20
S7	2.41	2.49	0.28	0.38
S8	1.95	1.97	0.30	0.57

Extreme Value				
Sector	μ		σ	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	11.47	13.37	2.45	2.24
S2	11.72	11.67	1.61	2.52
S3	9.04	8.64	2.92	3.05
S4	8.62	8.40	1.51	1.72
S5	10.48	10.48	1.62	1.65
S6	15.20	16.00	1.67	1.92
S7	13.16	14.44	3.04	3.04
S8	8.20	8.77	1.83	1.84

Weibull				
Sector	A		B	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	11.18	13.13	4.49	5.26
S2	11.61	10.99	7.33	2.43
S3	8.44	7.92	2.68	2.33
S4	8.47	8.18	5.35	4.40
S5	10.20	10.32	4.85	6.08
S6	15.10	15.85	8.98	7.59
S7	12.77	14.01	4.17	4.19
S8	7.97	8.46	4.41	3.95

Generalized Extreme Value				
Sector	μ		σ	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	9.31	11.54	2.51	3.15
S2	10.37	11.19	1.59	3.28
S3	6.47	5.94	3.03	3.19
S4	7.34	6.99	1.73	2.12
S5	9.11	9.10	2.33	2.04
S6	13.75	14.97	1.82	3.10
S7	10.48	11.86	2.98	3.78
S8	6.68	7.20	1.78	2.30
Sector	k			
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month		
S1	-0.28	-0.63		
S2	-0.28	-1.17		
S3	-0.30	-0.30		
S4	-0.43	-0.52		
S5	-0.54	-0.44		
S6	-0.35	-1.02		
S7	-0.25	-0.47		
S8	-0.26	-0.44		



Project: Bollard Study for
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Location: Port of Tacoma
Client: Port of Tacoma

By: AKH
Date: 7/3/2024

Table 4. Value of parameters of all fitted probability distribution models for all eight sectors and sampling time windows of 2-week and 1-month for 5s wind speed data.

Lognormal				
Sector	μ		σ	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	2.46	2.64	0.28	0.27
S2	2.04	2.40	1.63	0.68
S3	2.21	2.10	0.56	0.62
S4	2.36	2.34	0.23	0.27
S5	2.54	2.60	0.55	0.26
S6	2.93	2.95	0.12	0.17
S7	2.63	2.72	0.31	0.39
S8	2.12	2.16	0.28	0.49

Extreme Value				
Sector	μ		σ	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	13.78	16.25	3.40	3.46
S2	13.64	14.58	2.71	2.76
S3	12.30	11.71	3.92	4.16
S4	12.00	11.99	2.10	2.16
S5	15.22	15.38	2.99	2.94
S6	19.95	20.66	2.44	2.03
S7	16.62	18.31	4.10	3.85
S8	9.84	10.69	2.52	2.63

Weibull				
Sector	A		B	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	13.37	15.85	4.14	4.56
S2	12.54	14.02	1.74	3.22
S3	11.47	10.71	2.62	2.28
S4	11.78	11.74	5.25	4.99
S5	14.75	15.08	4.34	5.15
S6	19.80	20.53	8.38	9.26
S7	16.04	17.75	3.82	4.06
S8	9.51	10.26	3.96	3.63

Generalized Extreme Value				
Sector	μ		σ	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	10.92	13.23	2.99	3.62
S2	12.37	14.49	4.51	2.36
S3	8.88	8.01	4.33	4.45
S4	10.42	10.46	2.76	3.04
S5	12.66	12.91	3.75	3.15
S6	17.86	19.06	2.14	3.18
S7	12.98	15.04	4.07	5.04
S8	7.74	8.46	2.13	2.95

Sector	k	
	Sampling Time Window: 2-Week	Sampling Time Window: 1-Month
S1	-0.18	-0.29
S2	-1.04	-1.07
S3	-0.36	-0.32
S4	-0.65	-0.75
S5	-0.41	-0.32
S6	-0.17	-0.77
S7	-0.26	-0.52
S8	-0.17	-0.37

4-2- Accuracy of Fitted Models

To evaluate the accuracy of each fitted model, the coefficient of determination (R^2) between the observed data and simulated values is calculated and compared. For example, the simulated-observed curves for sector 1 of 5-second gust wind speed with a 2-week sampling time window are shown. It is seen that for the larger wind speed range, except the Lognormal distribution, all other distributions work well.

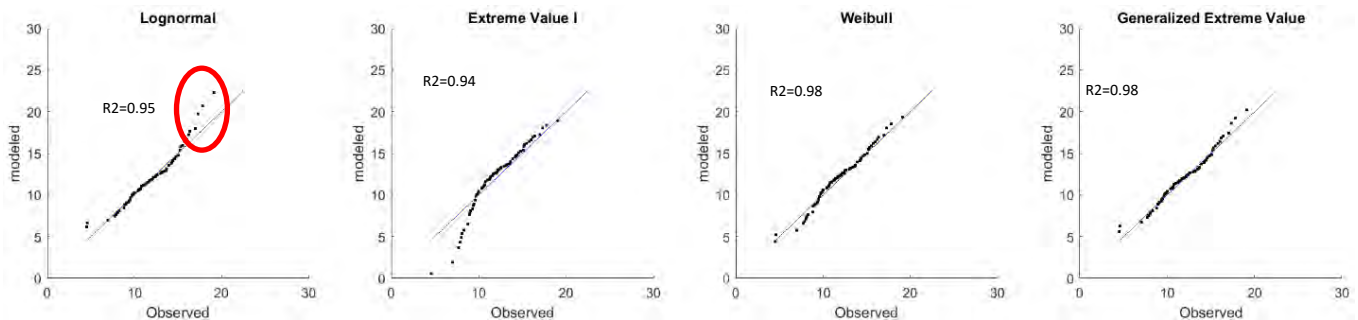


Figure 11. Simulated values versus observed values for the wind speed at sector Q1 of 5-second gust wind speed with the 2-week sampling window.

In Figure 12 and Figure 13, the parameter R^2 of each model is shown for all sectors with respect to the wide range of sampling time windows. Figure 12 shows the results for the 120-second wind speed data while Figure 13 presents the R^2 for 5-second gust wind speed models. The values corresponding to Figure 12 and Figure 13 are shown in

Table 5 and Table 6. It was determined that, in many sectors and for many time sampling time windows, the Lognormal probability of distribution has lower R2 values, primarily due to its failure to estimate larger wind speeds. Therefore, this probability function was eliminated from the list of models and not used in subsequent analysis.

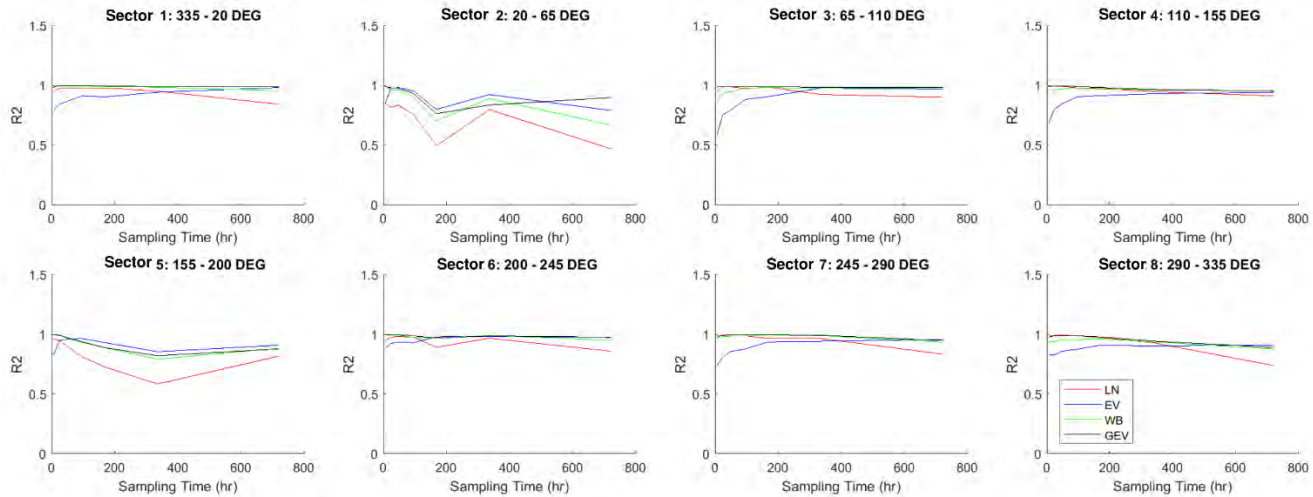


Figure 12. R2 of different fitted models for different sectors versus the sampling time windows for the 120-second wind data.

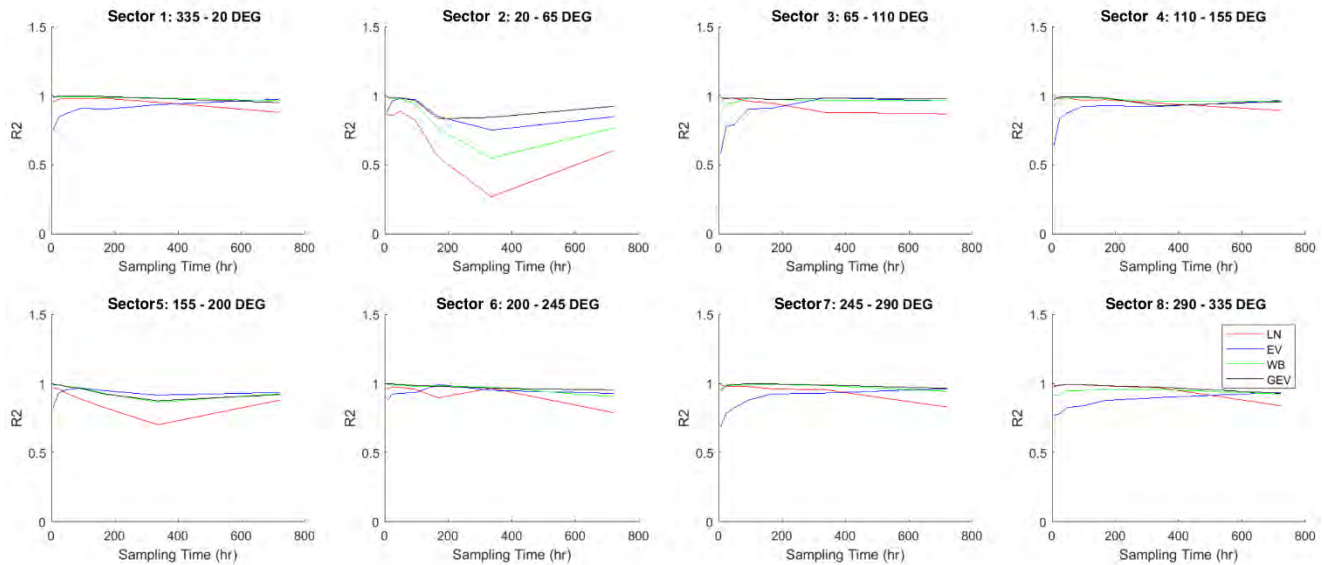


Figure 13. R2 of different fitted models for different sectors versus the sampling time windows for the 5-second wind data.



Table 5. R2 coefficient for the fitted model to 120-second wind speed.

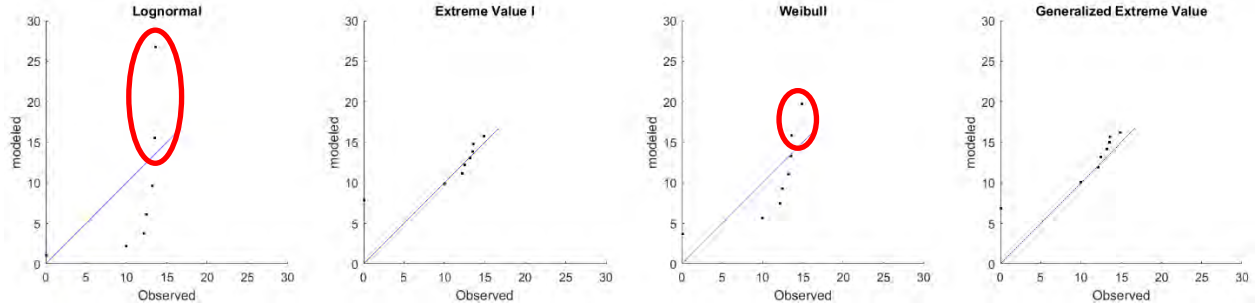
Sampling Time Window	Distribution	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335	Average
1-Month	LN	0.84	0.47	0.90	0.91	0.82	0.86	0.83	0.74	0.80
	EV	0.98	0.79	0.97	0.94	0.91	0.98	0.96	0.91	0.93
	WB	0.95	0.67	0.98	0.96	0.89	0.96	0.93	0.88	0.90
	GE	0.99	0.90	0.99	0.96	0.88	0.98	0.95	0.89	0.94
2-Weeks	LN	0.95	0.8	0.92	0.95	0.58	0.96	0.96	0.93	0.88
	EV	0.94	0.92	0.98	0.93	0.86	0.98	0.94	0.9	0.93
	WB	0.99	0.89	0.98	0.96	0.79	0.99	0.98	0.94	0.94
	GE	0.99	0.84	0.98	0.96	0.82	0.99	0.99	0.95	0.94

Table 6. R2 coefficient for the fitted model to 5-second gust wind speed.

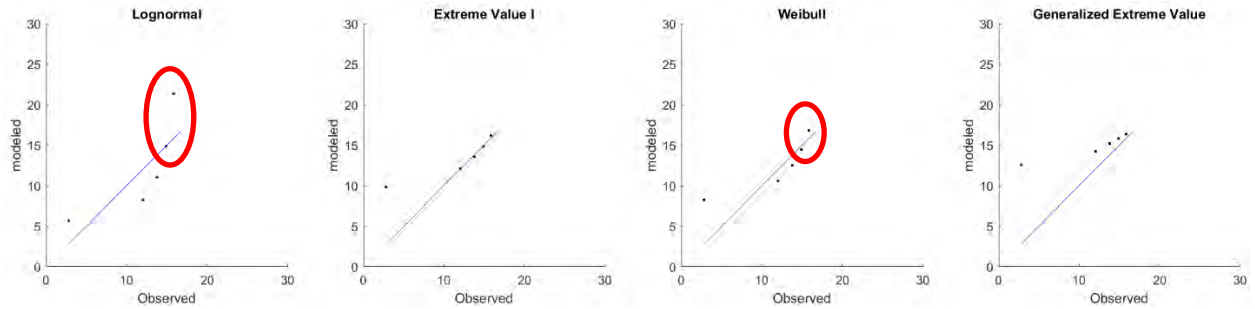
Sampling Time Window	Distribution	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335	Average
1-Month	LN	0.88	0.60	0.87	0.90	0.88	0.79	0.83	0.84	0.82
	EV	0.98	0.84	0.96	0.97	0.94	0.93	0.96	0.94	0.94
	WB	0.96	0.77	0.96	0.97	0.93	0.90	0.95	0.93	0.92
	GE	0.95	0.92	0.98	0.96	0.92	0.95	0.96	0.92	0.95
2-Weeks	LN	0.95	0.27	0.87	0.95	0.70	0.97	0.96	0.98	0.97
	EV	0.94	0.75	0.98	0.92	0.92	0.95	0.93	0.92	0.90
	WB	0.98	0.54	0.97	0.96	0.86	0.97	0.98	0.98	0.96
	GE	0.98	0.84	0.98	0.93	0.88	0.97	0.99	0.99	0.97

In addition to the Lognormal distribution, the Weibull distribution was found to not work well in some cases (see highlighted cells in the above tables), and larger values were estimated compared with other models. For a more accurate investigation, in Figure 14, the simulated versus observed data is depicted for all probability models. It was evident that the accuracy of Lognormal and Weibull is not high, so their results were excluded from the rest of the analysis only for sector Q2.

2-Week Sampling Time Window, 5-secondGust Wind Speed



1-Month Sampling Time Window, 5-secondGust Wind Speed



1-Month Sampling Time Window, 120-secondWind Speed

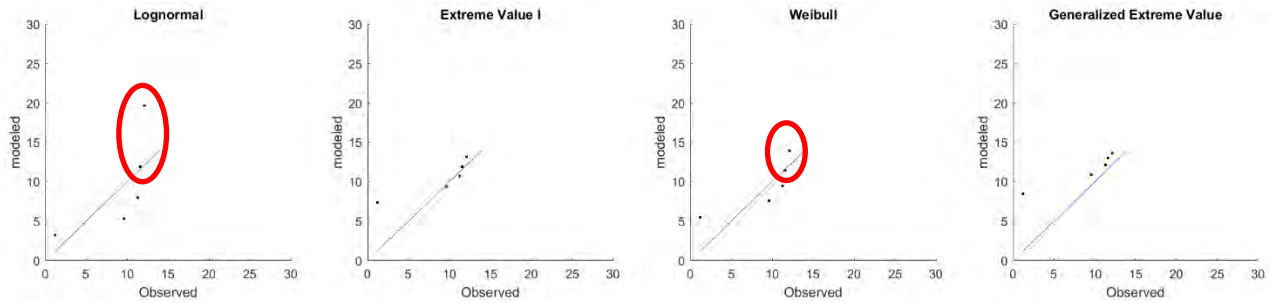


Figure 14. Simulated vs observed wind speed for sector Q2.

4-3- 25-yr Return Period Wind Speed Calculation

After fitting the probability density functions to the wind data of each sector, the 25-year return period wind speed can be calculated using the following equation given by Goda (2010), where WSP_{RT} is the estimated design wind speed at RT years return period, and λ is the occurrence rate of the events per year, which is 12, and 26 for the 1-month and 2-week sampling time windows, respectively.

$$WSP_{RT} = F^{-1}\left(1 - \frac{1}{\lambda \cdot RT}\right) \quad (1)$$

After calculating the wind speed from the above equation, it is necessary to correct it for recorded wind duration, the height of the station, and site exposure condition of the recorded data to be able to report the final 30-second design wind speed for the Type C exposure at the height of 33-feet according to the ASCE7-22.

4-3-1- Wind Speed Averaging Time Correction

To consider the effect of recorded wind speed duration, coefficients for converting the 120-second wind speed and 5-second wind speed to the target 30-second wind speed were applied based on figure C26.5-1 of ASCE7-22 (Figure 15 of this report) by using the Synoptic wind curve. In this figure V_t , and V_{3600} are the t -second gust and 3600 second gust wind speeds, respectively.

Modification Factor 5-s to 30-s	0.89
Modification Factor 120-s to 30-s	1.16

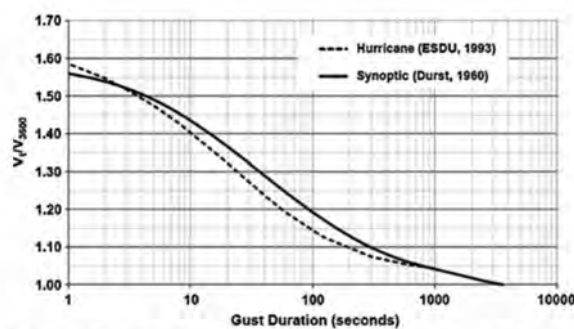


Figure C26.5-1. Maximum speed averaged over t (s) to hourly mean speed.

Figure 15. Relationship between wind speed with different averaging periods according to ASCE7-22, C26.5-1.

4-3-2- Height and Exposure Correction

A coefficient for correction of the height and exposure of the station was applied to the wind speed obtained from recorded data for each sector. In Table 7, the height and

exposure of each sector of the station are identified based on the information from the National Data Buoy Center database website, the topography of the surrounding area, and the definition of ASCE7-22 in Chapter 26. The difference in the height of the station is due to its location. It is situated on the edge of the port, and its height from the sea water level is 35.7>, while its height from the land is 22.3>. By using the equation given in the notes of table 26.10-1 of ASCE7-22, coefficient K_z (velocity pressure exposure coefficient at height z) is calculated for each sector and used to adjust the speeds to the standard exposure Type C.

It is important to note that the exposure type for some sectors falls between the distinct classes defined by the ASCE7-22. In these cases, the exposures with the highest correction factor were used.

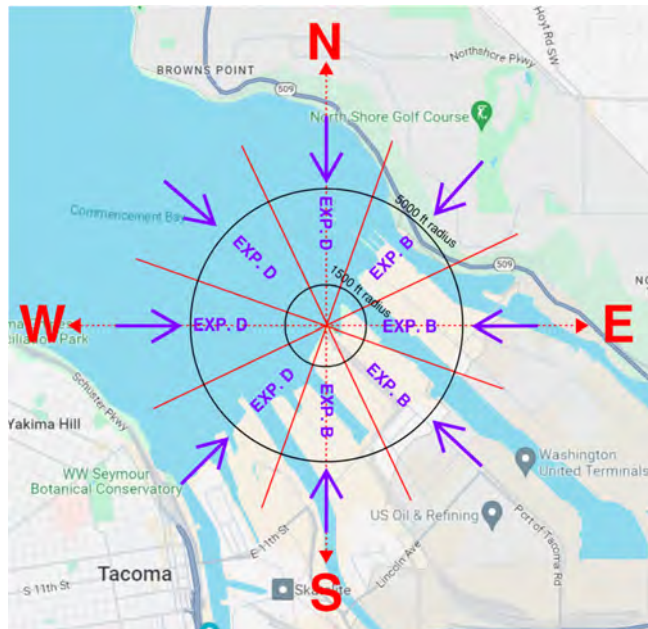


Figure 16. Exposure of each sector at the anemometer station.

Table 7. Height and exposure correction factor for the recorded wind speed at the selected station.



Sector (Deg)	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335
Exposure	D	B	B	B	B	D	D	D
Z_{st}	35.7	35.7	22.3	22.3	22.3	35.7	35.7	35.7
Z_0	33	33	33	33	33	33	33	33
α	11.5	7.5	7.5	7.5	7.5	11.5	11.5	11.5
Z_g	1935	3280	3280	3280	3280	1935	1935	1935
K_{zst}	1.20	0.72	0.64	0.64	0.64	1.20	1.20	1.20
Modification factor= $1/(K_{zst})^{0.5}$	0.91	1.18	1.25	1.25	1.25	0.91	0.91	0.91

K_{zst} : velocity pressure exposure coefficient at station height Z_{st} ; Z_{st} : Station height; Z_0 : Height for reporting the Design Wind Speed (10m/33>); α : parameter of calculating K_{zst} (table 26.11-1 of ASCE7-22); Z_g : Nominal height of atmospheric boundary layer used in ASCE7-22 (table 26.11-1).

4-3-3- Design Wind Speed at the Anemometer Station

The performance of the three previously mentioned fitted probability models was found to be similar. Therefore, the 25-year return period wind speed was conservatively taken as the maximum of all three models (WB, EV, GE). Correction factors for wind recording duration, station height, and site exposure were then applied to calculate the final design wind speeds. Table 8 and Table 9 show the details of calculations and Table 10 depicts the summary of design wind speeds for each sector before and after applying correction factors. The results are also depicted graphically in Figure 17.

Table 8. Estimated 25-year return period wind speed using the fitted model to 120-second wind speed data for 2-week and 1-month sampling time windows.

Sampling Time Window	Distribution	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335	Average
1-Month	EV	17.27	16.07	13.96	11.40	13.34	19.34	19.73	11.98	15.39
	WB	18.28	22.53	16.75	12.15	13.74	19.94	21.22	13.15	17.22
	GE	16.41	13.96	14.56	10.85	13.37	17.99	19.35	12.01	14.81
	Max of All PDF	18.28	16.07	16.75	12.15	13.74	19.94	21.22	13.15	16.41
	30s Wind Speed (1.16*Max)	21.20	18.64	19.43	14.09	15.94	23.13	24.62	15.25	19.04
	Modification factor= $1/(K_{zst})^{0.5}$	0.91	1.18	1.25	1.25	1.25	0.91	0.91	0.91	---
	Final Wind Speed (m/s)	16.66	18.91	20.99	15.23	17.22	18.18	19.34	11.99	17.31
2-Weeks	EV	16.05	14.73	14.50	11.42	13.51	18.32	18.84	11.62	14.87
	WB	16.95	14.97	16.97	12.01	15.00	18.60	20.00	12.17	15.83
	GE	16.78	15.15	15.04	11.09	13.31	18.45	20.07	12.17	15.26
	Max of All PDF	16.95	15.15	16.97	12.01	15.00	18.60	20.07	12.21	15.87
	30s Wind Speed (1.16*Max)	19.66	17.57	19.69	13.93	17.40	21.58	23.28	14.16	18.41
	Modification factor= $1/(K_{zst})^{0.5}$	0.91	1.18	1.25	1.25	1.25	0.91	0.91	0.91	---
	Final Wind Speed (m/s)	17.92	20.68	24.67	17.46	21.80	19.67	21.22	12.91	19.54

Table 9. Estimated 25-year return period wind speed using the fitted model to 5-second gust wind speed data for 2-week and 1-month sampling time windows.



Project: Bollard Study for
WUT & PCT
Location: Port of Tacoma
Client: Port of Tacoma

By: AKH
Date: 7/3/2024

Sampling Time Window	Distribution	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335	Average
1-Month	EV	22.28	19.39	18.95	15.75	20.52	24.19	25.02	15.27	20.17
	WB	23.23	24.10	23.00	16.66	21.15	24.79	27.25	16.60	22.10
	GE	23.26	16.70	19.59	14.46	21.22	23.15	24.17	15.52	19.76
	Max of All PDF	23.26	19.39	23.00	16.66	21.22	24.79	27.25	16.60	21.52
	30s Wind Speed (0.89*Max)	20.70	17.26	20.47	14.83	18.89	22.06	24.25	14.77	19.15
	Modification factor= $1/(K_{zst})^{0.5}$	0.91	1.18	1.25	1.25	1.25	0.91	0.91	0.91	—
	Final Wind Speed (m/s)	18.87	20.31	25.65	18.58	23.67	20.11	22.11	13.47	20.35
2-Weeks	EV	20.13	18.70	19.63	15.93	20.82	26.38	24.50	24.27	14.45
	WB	20.99	36.74	23.39	16.81	22.70	25.09	24.74	26.17	15.25
	GE	22.23	16.70	19.75	14.60	21.21	25.23	26.14	25.71	16.09
	Max of All PDF	22.23	18.70	23.39	16.81	22.70	26.38	26.14	26.17	22.82
	30s Wind Speed (0.89*Max)	19.78	16.64	20.82	14.96	20.20	23.48	23.26	23.29	20.31
	Modification factor= $1/(K_{zst})^{0.5}$	0.91	1.18	1.25	1.25	1.25	0.91	0.91	0.91	—
	Final Wind Speed (m/s)	18.03	19.59	26.09	18.75	25.32	21.40	21.21	21.23	21.45

Table 10. Final 30-second design wind speed before and after height and exposure corrections.

	Unit	Sector								Average
		335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335	
Before Height and Exposure Correction	m/s	21.20	18.64	20.82	14.96	20.20	23.48	24.62	23.29	22.82
	mi/hr	47.4	41.7	46.6	33.5	45.2	52.5	55.1	52.1	51.0
	Knot	41.2	36.2	40.5	29.1	39.3	45.6	47.8	45.3	44.3
After Height and Exposure Correction (Exposure C, and 33' Height)	m/s	18.87	20.68	26.09	18.75	25.32	21.40	22.11	21.23	21.45
	mi/hr	42.2	46.3	58.4	41.9	56.6	47.9	49.5	47.5	48.0
	Knot	36.7	40.2	50.7	36.4	49.2	41.6	43.0	41.3	41.7

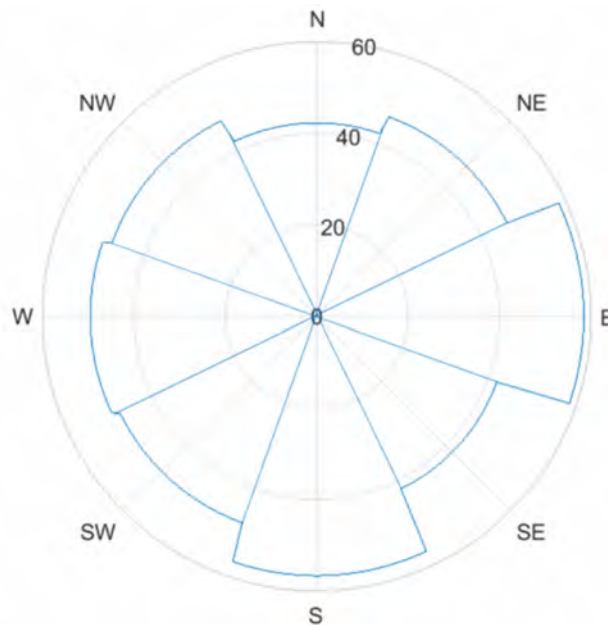
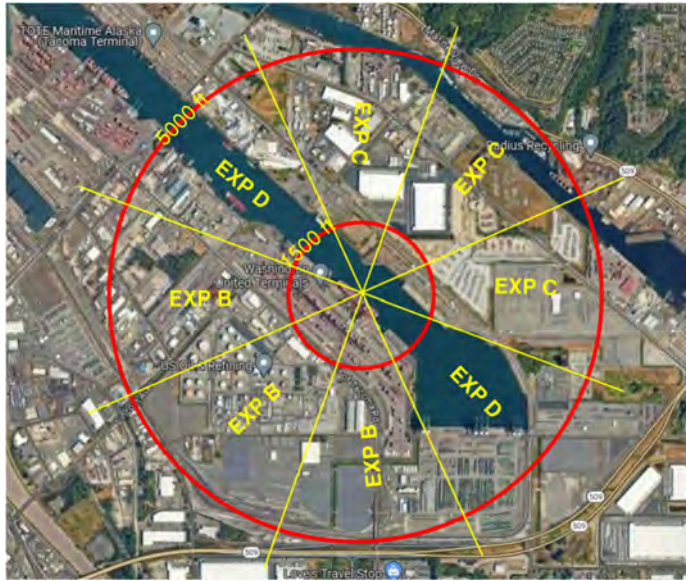


Figure 17. Final 30-second design wind speed (mi/hr) for 10' height and exposure type C.

4-3-4- Design Wind Speed at WUT and PCT terminals

In this section, the 30-second design wind speed at two project sites, namely, Washington United Terminal and Pierce County Terminal, are given according to their exposure category for the height of 33 feet in Figure 18. Final design wind speeds are given in Table 11 and

Table 12 as well as Figure 19.



Washington United Terminal



Pierce County Terminal

Figure 18. Exposure type at each sector of Washington United Terminal and Pierce County Terminal.

Table 11. Design wind speed at each sector of Washington United Terminal based on the exposure type.

Sector (Deg)	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335
Exposure	C	C	C	D	B	B	B	D
Z_s	33	33	33	33	33	33	33	33
α	9.8	9.8	9.8	11.5	7.5	7.5	7.5	11.5
Z_g	2460	2460	2460	1935	3280	3280	3280	1935
K_z	1.00	1.00	1.00	1.19	0.71	0.71	0.71	1.19
Modification factor= $(K_{zst})^{0.5}$	1.00	1.00	1.00	1.09	0.84	0.84	0.84	1.09
Design Wind Speed (m/s)	18.87	20.68	26.08	20.43	21.29	17.99	18.59	23.13
Design Wind Speed (mi/hr)	42.21	46.26	58.35	45.69	47.62	40.25	41.58	51.75
Design Wind Speed (knot)	36.68	40.20	50.70	39.71	41.38	34.98	36.13	44.97

K_z : velocity pressure exposure coefficient at station height z ; Z_s : Height for reporting the Design Wind Speed (10m/33>); α : parameter of calculating K_z (table 26.11-1 ASCE7-22); Z_g : Nominal height of atmospheric boundary layer used in ASCE7-22 (table 26.11-1).

Table 12. Design wind speed at each sector of Pierce County Terminal based on the exposure type.

Sector (Deg)	335-20	20-65	65-110	110-155	155-200	200-245	245-290	290-335
Exposure	C	C	C	B	B	B	C	D
Z_s	33	33	33	33	33	33	33	33
α	9.8	9.8	9.8	7.5	7.5	7.5	9.8	11.5
Z_g	2460	2460	2460	3280	3280	3280	2460	1935
K_z	1.00	1.00	1.00	0.71	0.71	0.71	1.00	1.19
Modification factor= $(K_{zst})^{0.5}$	1.00	1.00	1.00	0.84	0.84	0.84	1.00	1.09
Design Wind Speed (m/s)	18.87	20.68	26.08	15.76	21.29	17.99	22.10	23.13
Design Wind Speed (mi/hr)	42.21	46.26	58.35	35.26	47.62	40.25	49.45	51.75
Design Wind Speed (knot)	36.68	40.20	50.70	30.64	41.38	34.98	42.97	44.97

K_z : velocity pressure exposure coefficient at station height z ; Z_s : Height for reporting the Design Wind Speed (10m/33>); α : parameter of calculating K_z (table 26.11-1 ASCE7-22); Z_g : Nominal height of atmospheric boundary layer used in ASCE7-22 (table 26.11-1).

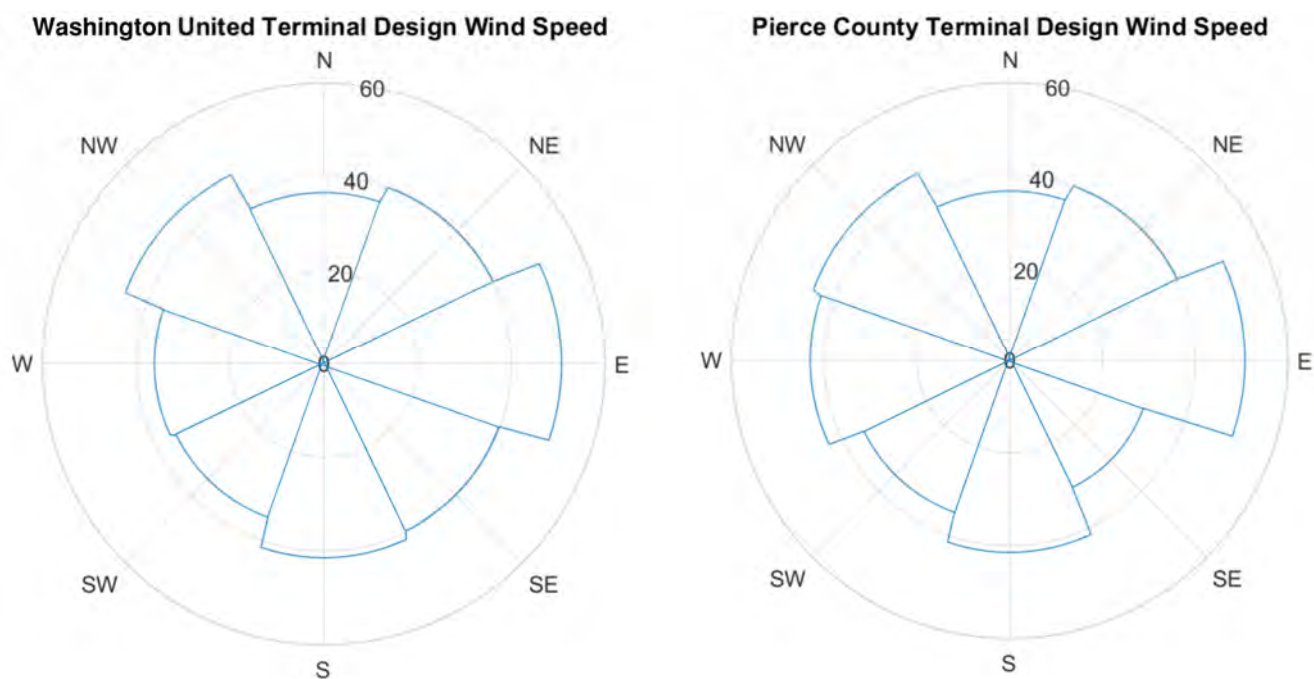


Figure 19. Final 30-second design wind speed (in knots) at each sector of Washington United Terminal and Pierce County Terminal accounting for exposure categories.

5. Wind Rose

Wind Rose diagrams were developed for 120-second and 5-second wind speeds using programs published in MATLAB programming language by Periera (2024). The codes are available in the link provided in the references. These diagrams show that most winds blow from the NW and SE; however, more intense winds are observed from the SW and E.

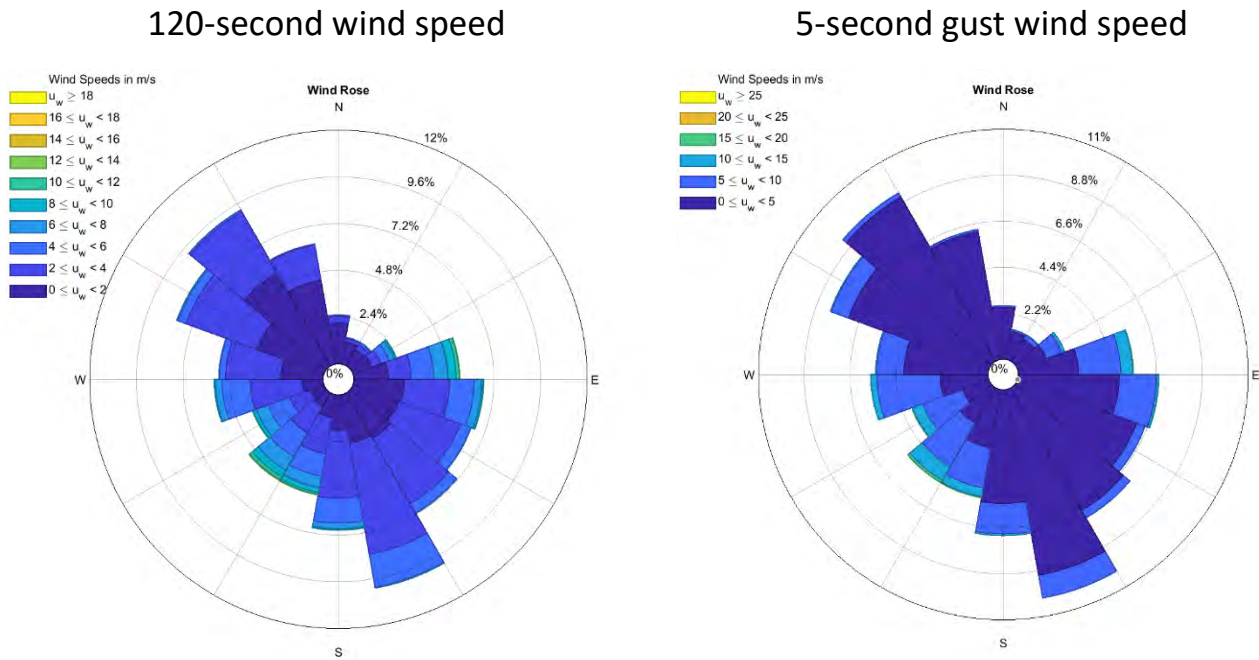


Figure 20. Wind Rose diagrams for all recorded station data for both 120-second and 5-second gust wind speeds.



Project: Bollard Study for
WUT & PCT
Location: Port of Tacoma
Client: Port of Tacoma

By: AKH
Date: 7/3/2024

6. References

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- Pintar, A., E. Simiu, F. Lombardo, and M. Levitan. 2015. Maps of non-hurricane, non-tornadic wind speeds with specified mean recurrence intervals for the contiguous United States using a two-dimensional Poisson process extreme value model and local regression. Special Publication 500-301. Gaithersburg, MD: National Institute of Standards and Technology.



7. Appendix: Code

This is the main code written in MATLAB language to fit the probability functions to the dataset and calculate the design wind speed.

```
function [DS,Dist,R2] = WindFit(WindData,T,Lambda)
% =====
% This program fits the probability distribution functions to the database,
% and then obtain the design wind speed for the desired T-yr return period.
%
% Inputs:
%     WindData: WindData
%     T: return period
%     Lambda: Recurrence rate of the wind for wind speed calculation
% Outputs:
%     DS: Estimated wind speed at T-yr return period from all
%         distributions.
%     Dist: parameters of fitted probability distribution functions
%     R2: Determination Coefficient of Simulated versus Observed data for
%         all probability models.
%=====

s=8; % parameter for the selection of 120s wind speed or 5/8 sec wind speed from data base. 7: use 2-min wind speed,
8: use 5 sec wind speed

close all

%% Fitting Model and Estimating the RT-year Return Period
% Fitting the probability distributions to data with maximum likelihood method
[LN]=fitdist(WindData(WindData(:,s)>0 & WindData(:,s)<80,s),'Lognormal'); % lognormal
[EV]=fitdist(WindData(WindData(:,s)>0 & WindData(:,s)<80,s),'Extreme Value'); % Gumble (extreme value type)
[WB]=fitdist(WindData(WindData(:,s)>0 & WindData(:,s)<80,s),'Weibull'); % Weibull
[GE]=fitdist(WindData(WindData(:,s)>0 & WindData(:,s)<80,s),'gev'); % Frechet (generalized extreme value
type)

% Obtaining the wind speed for the return period
WSPT_LN = logninv(1-1/(Lambda*T),LN.mu,LN.sigma);
WSPT_EV = evinv(1-1/(Lambda*T),EV.mu,EV.sigma);
WSPT_WB = wblinv(1-1/(Lambda*T),WB.A,WB.B);
WSPT_GE = gevinv(1-1/(Lambda*T),GE.k,GE.sigma,GE.mu);

Dist=struct('LN',LN,'EV',EV,'WB',WB,'GE',GE);
DS=struct('LN',WSPT_LN,'EV',WSPT_EV,'WB',WSPT_WB,'GE',WSPT_GE);

%% Modeled vs Observed Wind Speed, Correlation Coefficient test for the accuracy

[ECDF,x]=ecdf(sort(WindData(WindData(:,s)>0,s)));

WSPT_LN_INV = logninv(ECDF(2:end-1),LN.mu,LN.sigma);
LN_R2=corr(x(2:end-1),WSPT_LN_INV)^2;

WSPT_EV_INV = evinv(ECDF(2:end-1),EV.mu,EV.sigma);
EV_R2=corr(x(2:end-1),WSPT_EV_INV)^2;

WSPT_WB_INV = wblinv(ECDF(2:end-1),WB.A,WB.B);
WB_R2=corr(x(2:end-1),WSPT_WB_INV)^2;

WSPT_GE_INV = gevinv(ECDF(2:end-1),GE.k,GE.sigma,GE.mu);
GE_R2=corr(x(2:end-1),WSPT_GE_INV)^2;

R2=struct('LN',LN_R2,'EV',EV_R2,'WB',WB_R2,'GE',GE_R2);

end
```

APPENDIX D: PRELIMINARY PASSING VESSEL ANALYSIS



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 8800 TEU
Passing Vessel: 8800 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Ship Length at Waterline, L (ft) =	1050	1050		Must be a positive value	FALSE
Ship Width, B (ft) =	140	140		Must be a positive value	
Ship Draft, T (ft) =	39.4	39.4		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		210		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V _R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V _R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1050			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.773	0.773		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.773			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	70			Must be a positive value	
Relative Gap Size, G/B =	0.500			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.281				
Ship Cross-Sectional Areas, S (ft ²) =	4137.00	4137.00		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.200			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	1.000			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	352.57			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.320				
Dimensionless Peak Deepwater Sway Force =	9.250				
Dimensionless Peak Deepwater Moment =	1.980				
Peak Deepwater Surge Force (pounds) =	818			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	3261			From Wang's (1975) method	

[illegible]

	341.930	1.1	-9.6	2146.8	341.930	-6.84	-2.75
	357.473	0.7	-11.0	2169.7	357.473	-7.59	-3.45
	373.015	0.1	-12.1	1941.2	373.015	-7.89	-4.19
	388.557	-0.7	-12.7	1404.6	388.557	-7.68	-5.01
	404.100	-1.6	-12.6	685.1	404.100	-6.94	-5.64
	419.642	-2.4	-11.7	-399.6	419.642	-5.45	-6.21
	435.184	-3.2	-10.2	-1712.9	435.184	-3.45	-6.71
	450.726	-4.0	-8.5	-2957.6	450.726	-1.44	-7.08
	466.269	-4.7	-6.0	-3928.3	466.269	0.72	-6.76
	481.811	-5.3	-2.7	-4796.1	481.811	3.21	-5.92
	497.353	-5.6	1.2	-5481.3	497.353	5.85	-4.60
	512.896	-5.7	5.5	-5938.0	512.896	8.38	-2.93
	528.438	-5.6	9.6	-6086.5	528.438	10.59	-1.01
	543.980	-5.3	14.2	-5801.0	543.980	12.61	1.56
	559.523	-4.7	18.3	-5252.9	559.523	14.17	4.16
	575.065	-3.9	22.4	-3882.6	575.065	14.88	7.49
	590.607	-2.7	25.1	-2615.0	590.607	15.05	10.07
	606.149	-1.1	26.9	-1256.1	606.149	14.64	12.25
	621.692	0.2	27.4	0.0	621.692	13.72	13.72
	637.234	1.5	27.1	1393.2	637.234	12.20	14.86
	652.776	2.6	25.2	3174.5	652.776	9.59	15.64
	668.319	3.8	22.3	4430.7	668.319	6.93	15.36
	683.861	4.7	18.2	5344.2	683.861	4.02	14.20
	699.403	5.4	13.9	5858.1	699.403	1.37	12.53
	714.945	5.7	9.4	6166.4	714.945	-1.19	10.56
	730.488	5.7	5.1	6052.2	730.488	-3.20	8.33
	746.030	5.6	1.5	5481.3	746.030	-4.49	5.95
	761.572	5.3	-2.7	4739.0	761.572	-5.85	3.18
	777.115	4.8	-5.8	3768.4	777.115	-6.48	0.69
	792.657	4.1	-8.3	2752.1	792.657	-6.79	-1.55
	808.199	3.4	-10.8	1621.5	808.199	-6.96	-3.87
	823.742	2.4	-12.1	411.1	823.742	-6.43	-5.65
	839.284	1.6	-12.9	-605.2	839.284	-5.88	-7.03
	854.826	0.7	-12.7	-1347.5	854.826	-5.07	-7.64
	870.368	0.0	-11.7	-1952.7	870.368	-3.97	-7.69
	885.911	-0.6	-10.5	-2101.1	885.911	-3.24	-7.24
	901.453	-1.1	-8.9	-2021.2	901.453	-2.53	-6.38
	916.995	-1.3	-7.3	-1712.9	916.995	-2.01	-5.28
	932.538	-1.4	-5.8	-1484.5	932.538	-1.48	-4.31
	948.080	-1.4	-5.0	-1233.3	948.080	-1.33	-3.67
	963.622	-1.2	-3.7	-947.8	963.622	-0.97	-2.78
	979.164	-1.1	-2.7	-787.9	979.164	-0.60	-2.10
	994.707	-0.9	-2.1	-570.9	994.707	-0.50	-1.59
	1010.249	-0.8	-1.5	-376.8	1010.249	-0.37	-1.09
	1025.791	-0.7	-1.1	-274.0	1025.791	-0.29	-0.81
	1041.334	-0.6	-0.6	-205.5	1041.334	-0.12	-0.51
	1056.876	-0.5	-0.4	-91.3	1056.876	-0.13	-0.31
	1072.418	-0.4	-0.4	-68.5	1072.418	-0.14	-0.27
	1087.960	-0.2	-0.4	-45.7	1087.960	-0.14	-0.23

	1103.503	-0.2	-0.2	-22.8	1103.503	-0.08	-0.13
	1119.045	-0.2	-0.2	0.0	1119.045	-0.08	-0.08
	1134.587	-0.2	-0.1	0.0	1134.587	-0.06	-0.06
	1150.130	-0.2	-0.1	0.0	1150.130	-0.04	-0.04
	1165.672	-0.2	0.0	0.0	1165.672	-0.02	-0.02
	1181.214	-0.2	0.0	0.0	1181.214	0.00	0.00
	1196.757	-0.1	0.0	0.0	1196.757	0.00	0.00
	1212.299	-0.1	0.0	0.0	1212.299	0.00	0.00
	1227.841	-0.1	0.0	0.0	1227.841	0.00	0.00
	1243.383	-0.1	0.0	0.0	1243.383	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	15.05	15.64



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 8800 TEU
Passing Vessel: 14000 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG		
INPUT PARAMETERS				NOTES	
Ship Length at Waterline, L (ft) =	1050	1209		Must be a positive value	FALSE
Ship Width, B (ft) =	140	167.3		Must be a positive value	
Ship Draft, T (ft) =	39.4	47.6		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		237.3		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V_R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG		
PEAK FORCE/MOMENT OUTPUT				NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V_R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1129.5			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.773	0.933		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	83.65			Must be a positive value	
Relative Gap Size, G/B =	0.544			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.281				
Ship Cross-Sectional Areas, S (ft ²) =	4137.00	5972.61		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.226			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	1.151			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	383.93			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.494				
Dimensionless Peak Deepwater Sway Force =	9.580				
Dimensionless Peak Deepwater Moment =	1.851				
Peak Deepwater Surge Force (pounds) =	958			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	3678			From Wang's (1975) method	

[illegible]

	367.819	1.6	-22.0	4443.9		367.819	-15.22	-6.76
	384.539	0.9	-25.3	4491.1		384.539	-16.94	-8.38
	401.258	0.1	-27.7	4018.3		401.258	-17.68	-10.03
	417.977	-1.0	-29.1	2907.4		417.977	-17.32	-11.78
	434.696	-2.2	-28.9	1418.2		434.696	-15.78	-13.08
	451.415	-3.3	-26.8	-827.3		451.415	-12.59	-14.16
	468.134	-4.4	-23.3	-3545.7		468.134	-8.28	-15.03
	484.853	-5.6	-19.5	-6122.1		484.853	-3.94	-15.60
	501.572	-6.6	-13.9	-8131.4		501.572	0.82	-14.67
	518.291	-7.5	-6.2	-9927.8		518.291	6.35	-12.56
	535.010	-7.9	2.9	-11346.0		535.010	12.24	-9.37
	551.729	-8.0	12.5	-12291.5		551.729	17.96	-5.45
	568.448	-7.9	22.0	-12598.9		568.448	22.99	-1.01
	585.167	-7.5	32.5	-12007.9		585.167	27.68	4.81
	601.886	-6.6	42.0	-10873.3		601.886	31.38	10.66
	618.605	-5.5	51.3	-8036.8		618.605	33.31	18.00
	635.325	-3.7	57.6	-5412.9		635.325	33.96	23.65
	652.044	-1.5	61.7	-2600.1		652.044	33.31	28.36
	668.763	0.3	62.9	0.0		668.763	31.46	31.46
	685.482	2.1	62.1	2883.8		685.482	28.28	33.77
	702.201	3.7	57.9	6571.2		702.201	22.67	35.18
	718.920	5.4	51.1	9171.4		718.920	16.82	34.29
	735.639	6.6	41.8	11062.4		735.639	10.36	31.44
	752.358	7.5	31.9	12126.1		752.358	4.38	27.48
	769.077	8.0	21.5	12764.3		769.077	-1.41	22.91
	785.796	8.1	11.8	12527.9		785.796	-6.06	17.81
	802.515	7.9	3.3	11346.0		802.515	-9.13	12.48
	819.234	7.4	-6.1	9809.6		819.234	-12.40	6.29
	835.953	6.7	-13.3	7800.4		835.953	-14.07	0.79
	852.672	5.8	-19.1	5696.7		852.672	-14.98	-4.13
	869.391	4.8	-24.8	3356.5		869.391	-15.62	-9.22
	886.111	3.4	-27.7	851.0		886.111	-14.66	-13.04
	902.830	2.3	-29.6	-1252.8		902.830	-13.62	-16.00
	919.549	1.0	-29.1	-2789.3		919.549	-11.91	-17.23
	936.268	0.0	-26.8	-4042.1		936.268	-9.53	-17.23
	952.987	-0.9	-24.0	-4349.3		952.987	-7.87	-16.16
	969.706	-1.5	-20.4	-4183.9		969.706	-6.24	-14.21
	986.425	-1.8	-16.7	-3545.7		986.425	-4.98	-11.74
	1003.144	-1.9	-13.3	-3072.9		1003.144	-3.71	-9.57
	1019.863	-1.9	-11.5	-2552.9		1019.863	-3.30	-8.16
	1036.582	-1.7	-8.6	-1961.9		1036.582	-2.43	-6.17
	1053.301	-1.5	-6.2	-1631.0		1053.301	-1.55	-4.66
	1070.020	-1.3	-4.8	-1181.8		1070.020	-1.26	-3.51
	1086.739	-1.1	-3.3	-780.0		1086.739	-0.93	-2.41
	1103.458	-0.9	-2.5	-567.2		1103.458	-0.73	-1.81
	1120.177	-0.8	-1.4	-425.4		1120.177	-0.31	-1.12
	1136.897	-0.7	-1.0	-189.0		1136.897	-0.32	-0.68
	1153.616	-0.5	-1.0	-141.8		1153.616	-0.34	-0.61
	1170.335	-0.3	-0.9	-94.6		1170.335	-0.34	-0.52

	1187.054	-0.3	-0.5	-47.2	1187.054	-0.19	-0.28
	1203.773	-0.3	-0.4	0.0	1203.773	-0.19	-0.19
	1220.492	-0.3	-0.3	0.0	1220.492	-0.14	-0.14
	1237.211	-0.2	-0.2	0.0	1237.211	-0.10	-0.10
	1253.930	-0.2	-0.1	0.0	1253.930	-0.05	-0.05
	1270.649	-0.2	0.0	0.0	1270.649	0.00	0.00
	1287.368	-0.2	0.0	0.0	1287.368	0.00	0.00
	1304.087	-0.1	0.0	0.0	1304.087	0.00	0.00
	1320.806	-0.1	0.0	0.0	1320.806	0.00	0.00
	1337.525	-0.1	0.0	0.0	1337.525	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	33.96	35.18



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 8800 TEU
Passing Vessel: 20000 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Ship Length at Waterline, L (ft) =	1050	1312		Must be a positive value	FALSE
Ship Width, B (ft) =	140	192.9		Must be a positive value	
Ship Draft, T (ft) =	39.4	47.6		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		262.9		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V _R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V _R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1181			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.773	0.933		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	96.45			Must be a positive value	
Relative Gap Size, G/B =	0.579			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.281				
Ship Cross-Sectional Areas, S (ft ²) =	4137.00	6886.53		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.250			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	1.250			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	375.90			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.388				
Dimensionless Peak Deepwater Sway Force =	8.705				
Dimensionless Peak Deepwater Moment =	1.563				
Peak Deepwater Surge Force (pounds) =	898			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	3272			From Wang's (1975) method	

Peak Deepwater Moment (foot*pounds) =	616903			From Wang's (1975) method		
Surge Finite Depth Correction Factor, CF _X =	8.548			From Seelig (2001) Fig. 2.2-3		
Sway Finite Depth Correction Factor, CF _Y =	17.355			From Seelig (2001) Fig. 2.2-4		
Moment Finite Depth Correction Factor, CF _M =	17.355			From Seelig (2001) Fig. 2.2-4		
Peak Finite Depth Surge Force (pounds) =	7673			Deepwater value * Finite depth correction factor		
Peak Finite Depth Sway Force (pounds) =	56790			Deepwater value * Finite depth correction factor		
Peak Finite Depth Moment (foot*pounds) =	10706536			Deepwater value * Finite depth correction factor		
MOORING EFFICIENCY OUTPUT	MOORED SHIP (SHIP 1)			NOTES		
Mooring Line Break Strength (kips) =	298			Repeated from Input Section		
Required Mooring Line Factor of Safety =	2.50			Repeated from Input Section		
Vertical Breasting Line Angle, Θ _V (deg) =	20.00			Repeated from Input Section		
F* (kips) =	77.03			Total Line Strength for Optimum Ideal Mooring		
Mooring Efficiency, e =	0.594			Predicted using Seelig (1998 Rev B)		
Req'd Sum of Line Break Strengths (kips) =	323.97			Estimated from Optimum Ideal and mooring efficiency		
Req'd Sum of Breasting Line Break Strengths (kips)	259.43			For Breasting Lines		
Total Number of Mooring Lines*	4			Total		
Number of Breasting Lines*	4			Estimated (round up to the next highest even number)		
Number of Spring Lines*	0			Estimated (round up to the next highest even number)		
* For passing ship event; does not include wind and current forces on the ship						
FORCE/MOMENT TIME HISTORY OUTPUT					OPTIMUM IDEAL MOORING	
Time (sec)	Fx (kips)	Fy (kips)	Mz (ft*kips)	Time (sec)	T2 (kips)	T3 (kips)
0.000	0.0	0.0	0.0	0.000	0.00	0.00
17.481	0.1	0.0	0.0	17.481	0.00	0.00
34.963	0.1	0.0	0.0	34.963	0.00	0.00
52.444	0.1	-0.1	0.0	52.444	-0.04	-0.04
69.926	0.2	-0.2	0.0	69.926	-0.11	-0.11
87.407	0.2	-0.3	0.0	87.407	-0.17	-0.17
104.888	0.3	-0.4	0.0	104.888	-0.22	-0.22
122.370	0.3	-0.5	0.0	122.370	-0.25	-0.25
139.851	0.4	-0.5	0.0	139.851	-0.26	-0.26
157.332	0.4	-0.6	0.0	157.332	-0.28	-0.28
174.814	0.5	-1.0	0.0	174.814	-0.52	-0.52
192.295	0.6	-1.3	59.5	192.295	-0.70	-0.59
209.777	0.7	-1.4	138.8	209.777	-0.84	-0.58
227.258	0.8	-2.0	257.7	227.258	-1.26	-0.77
244.739	1.0	-2.7	515.5	244.739	-1.83	-0.85
262.221	1.1	-3.4	713.8	262.221	-2.40	-1.04
279.702	1.2	-4.7	991.3	279.702	-3.29	-1.41
297.183	1.4	-5.9	1348.3	297.183	-4.24	-1.67
314.665	1.6	-7.5	1724.9	314.665	-5.42	-2.13
332.146	1.7	-10.1	2180.9	332.146	-7.12	-2.97
349.628	1.9	-12.8	2775.8	349.628	-9.03	-3.74
367.109	1.8	-16.4	3231.8	367.109	-11.27	-5.11

	384.590	1.5	-19.8	3727.5		384.590	-13.47	-6.37
	402.072	0.9	-22.9	3767.1		402.072	-15.01	-7.84
	419.553	0.1	-25.0	3370.5		419.553	-15.71	-9.29
	437.034	-1.0	-26.3	2438.7		437.034	-15.45	-10.81
	454.516	-2.1	-26.0	1189.6		454.516	-14.16	-11.89
	471.997	-3.1	-24.1	-693.9		471.997	-11.41	-12.73
	489.479	-4.2	-21.0	-2974.1		489.479	-7.69	-13.35
	506.960	-5.3	-17.6	-5135.2		506.960	-3.93	-13.71
	524.441	-6.3	-12.5	-6820.5		524.441	0.24	-12.75
	541.923	-7.1	-5.6	-8327.3		541.923	5.13	-10.73
	559.404	-7.5	2.6	-9516.9		559.404	10.36	-7.77
	576.886	-7.6	11.3	-10310.0		576.886	15.47	-4.17
	594.367	-7.5	19.8	-10567.8		594.367	19.98	-0.15
	611.848	-7.1	29.3	-10072.1		611.848	24.25	5.07
	629.330	-6.3	37.9	-9120.4		629.330	27.66	10.29
	646.811	-5.2	46.3	-6741.2		646.811	29.58	16.74
	664.292	-3.6	52.0	-4540.3		664.292	30.33	21.68
	681.774	-1.4	55.7	-2180.9		681.774	29.91	25.76
	699.255	0.3	56.8	0.0		699.255	28.39	28.39
	716.737	2.0	56.0	2418.9		716.737	25.70	30.31
	734.218	3.5	52.2	5511.8		734.218	20.86	31.36
	751.699	5.1	46.1	7692.9		751.699	15.74	30.40
	769.181	6.3	37.7	9279.0		769.181	10.03	27.70
	786.662	7.2	28.8	10171.2		786.662	4.69	24.07
	804.143	7.6	19.4	10706.5		804.143	-0.49	19.90
	821.625	7.7	10.6	10508.3		821.625	-4.70	15.31
	839.106	7.5	3.0	9516.9		839.106	-7.55	10.57
	856.588	7.0	-5.5	8228.2		856.588	-10.60	5.08
	874.069	6.4	-12.0	6542.9		874.069	-12.23	0.24
	891.550	5.5	-17.2	4778.3		891.550	-13.17	-4.07
	909.032	4.6	-22.4	2815.4		909.032	-13.89	-8.53
	926.513	3.3	-25.0	713.8		926.513	-13.18	-11.82
	943.994	2.2	-26.7	-1050.8		943.994	-12.37	-14.37
	961.476	1.0	-26.3	-2339.6		961.476	-10.92	-15.38
	978.957	0.0	-24.1	-3390.4		978.957	-8.84	-15.30
	996.439	-0.9	-21.7	-3648.1		996.439	-7.37	-14.32
	1013.920	-1.4	-18.5	-3509.4		1013.920	-5.89	-12.57
	1031.401	-1.7	-15.1	-2974.1		1031.401	-4.71	-10.38
	1048.883	-1.8	-12.0	-2577.5		1048.883	-3.54	-8.45
	1066.364	-1.8	-10.3	-2141.3		1066.364	-3.14	-7.21
	1083.845	-1.6	-7.8	-1645.6		1083.845	-2.31	-5.45
	1101.327	-1.4	-5.6	-1368.1		1101.327	-1.50	-4.11
	1118.808	-1.2	-4.3	-991.3		1118.808	-1.21	-3.10
	1136.290	-1.1	-3.0	-654.3		1136.290	-0.89	-2.13
	1153.771	-0.9	-2.3	-475.8		1153.771	-0.69	-1.60
	1171.252	-0.8	-1.3	-356.8		1171.252	-0.31	-0.99
	1188.734	-0.6	-0.9	-158.6		1188.734	-0.30	-0.60
	1206.215	-0.5	-0.9	-118.9		1206.215	-0.32	-0.54
	1223.697	-0.3	-0.8	-79.3		1223.697	-0.31	-0.46

	1241.178	-0.3	-0.4	-39.6	1241.178	-0.18	-0.25
	1258.659	-0.3	-0.3	0.0	1258.659	-0.17	-0.17
	1276.141	-0.3	-0.3	0.0	1276.141	-0.13	-0.13
	1293.622	-0.2	-0.2	0.0	1293.622	-0.09	-0.09
	1311.103	-0.2	-0.1	0.0	1311.103	-0.04	-0.04
	1328.585	-0.2	0.0	0.0	1328.585	0.00	0.00
	1346.066	-0.2	0.0	0.0	1346.066	0.00	0.00
	1363.548	-0.1	0.0	0.0	1363.548	0.00	0.00
	1381.029	-0.1	0.0	0.0	1381.029	0.00	0.00
	1398.510	-0.1	0.0	0.0	1398.510	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	30.33	31.36



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 14000 TEU
Passing Vessel: 8800 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Ship Length at Waterline, L (ft) =	1209	1050		Must be a positive value	FALSE
Ship Width, B (ft) =	167.3	140		Must be a positive value	
Ship Draft, T (ft) =	47.6	39.4		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		223.7		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V_R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V_R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1129.5			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.933	0.773		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	70.05			Must be a positive value	
Relative Gap Size, G/B =	0.456			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.285				
Ship Cross-Sectional Areas, S (ft ²) =	5972.61	4137.00		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.185			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	0.868			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	509.00			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.064				
Dimensionless Peak Deepwater Sway Force =	8.130				
Dimensionless Peak Deepwater Moment =	1.936				
Peak Deepwater Surge Force (pounds) =	1051			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	4138			From Wang's (1975) method	

	367.819	1.7	-23.7	6811.1	367.819	-17.50	-6.23
	384.539	1.0	-27.3	6883.5	384.539	-19.37	-7.98
	401.258	0.1	-29.9	6158.9	401.258	-20.06	-9.87
	417.977	-1.1	-31.4	4456.2	417.977	-19.40	-12.03
	434.696	-2.3	-31.2	2173.7	434.696	-17.38	-13.78
	451.415	-3.5	-28.9	-1267.9	451.415	-13.40	-15.50
	468.134	-4.7	-25.2	-5434.4	468.134	-8.09	-17.08
	484.853	-5.9	-21.1	-9383.4	484.853	-2.79	-18.31
	501.572	-7.0	-15.0	-12462.9	501.572	2.83	-17.79
	518.291	-7.9	-6.7	-15216.3	518.291	9.23	-15.94
	535.010	-8.4	3.1	-17390.0	535.010	15.93	-12.84
	551.729	-8.5	13.5	-18839.1	551.729	22.34	-8.82
	568.448	-8.3	23.7	-19310.2	568.448	27.84	-4.10
	585.167	-7.9	35.1	-18404.4	585.167	32.77	2.32
	601.886	-6.9	45.4	-16665.4	601.886	36.49	8.92
	618.605	-5.8	55.4	-12317.9	618.605	37.90	17.52
	635.325	-4.0	62.2	-8296.4	635.325	37.98	24.25
	652.044	-1.6	66.6	-3985.1	652.044	36.60	30.01
	668.763	0.4	68.0	0.0	668.763	33.98	33.98
	685.482	2.2	67.0	4420.0	685.482	29.86	37.17
	702.201	3.9	62.5	10071.6	702.201	22.91	39.57
	718.920	5.7	55.2	14057.0	718.920	15.98	39.23
	735.639	7.0	45.1	16955.3	735.639	8.55	36.60
	752.358	8.0	34.4	18585.6	752.358	1.83	32.58
	769.077	8.4	23.2	19563.8	769.077	-4.57	27.79
	785.796	8.5	12.7	19201.5	785.796	-9.54	22.23
	802.515	8.4	3.6	17390.0	802.515	-12.58	16.19
	819.234	7.8	-6.6	15035.2	819.234	-15.74	9.13
	835.953	7.1	-14.3	11955.6	835.953	-17.06	2.72
	852.672	6.1	-20.6	8731.3	852.672	-17.54	-3.10
	869.391	5.1	-26.8	5144.5	869.391	-17.67	-9.16
	886.111	3.6	-29.9	1304.3	886.111	-16.04	-13.88
	902.830	2.4	-32.0	-1920.2	902.830	-14.41	-17.58
	919.549	1.1	-31.5	-4275.1	919.549	-12.20	-19.27
	936.268	0.0	-28.9	-6195.3	936.268	-9.32	-19.57
	952.987	-1.0	-26.0	-6666.2	952.987	-7.46	-18.49
	969.706	-1.6	-22.1	-6412.6	969.706	-5.74	-16.35
	986.425	-1.9	-18.1	-5434.4	986.425	-4.53	-13.52
	1003.144	-2.0	-14.3	-4709.8	1003.144	-3.28	-11.07
	1019.863	-2.0	-12.4	-3912.8	1019.863	-2.96	-9.43
	1036.582	-1.8	-9.3	-3007.0	1036.582	-2.16	-7.13
	1053.301	-1.6	-6.7	-2499.9	1053.301	-1.29	-5.42
	1070.020	-1.3	-5.2	-1811.4	1070.020	-1.08	-4.08
	1086.739	-1.2	-3.6	-1195.5	1086.739	-0.82	-2.79
	1103.458	-1.0	-2.7	-869.4	1103.458	-0.65	-2.09
	1120.177	-0.9	-1.5	-652.1	1120.177	-0.23	-1.31
	1136.897	-0.7	-1.1	-289.7	1136.897	-0.30	-0.78
	1153.616	-0.6	-1.0	-217.4	1153.616	-0.34	-0.70
	1170.335	-0.4	-0.9	-145.0	1170.335	-0.34	-0.58

	1187.054	-0.3	-0.5	-72.4	1187.054	-0.20	-0.32
	1203.773	-0.3	-0.4	0.0	1203.773	-0.21	-0.21
	1220.492	-0.3	-0.3	0.0	1220.492	-0.15	-0.15
	1237.211	-0.3	-0.2	0.0	1237.211	-0.10	-0.10
	1253.930	-0.2	-0.1	0.0	1253.930	-0.05	-0.05
	1270.649	-0.2	0.0	0.0	1270.649	0.00	0.00
	1287.368	-0.2	0.0	0.0	1287.368	0.00	0.00
	1304.087	-0.2	0.0	0.0	1304.087	0.00	0.00
	1320.806	-0.1	0.0	0.0	1320.806	0.00	0.00
	1337.525	-0.1	0.0	0.0	1337.525	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	37.98	39.57



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 14000 TEU
Passing Vessel: 14000 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Ship Length at Waterline, L (ft) =	1209	1209		Must be a positive value	FALSE
Ship Width, B (ft) =	167.3	167.3		Must be a positive value	
Ship Draft, T (ft) =	47.6	47.6		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		250.95		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V_R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V_R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1209			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.933	0.933		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	83.65			Must be a positive value	
Relative Gap Size, G/B =	0.500			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.285				
Ship Cross-Sectional Areas, S (ft ²) =	5972.61	5972.61		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.208			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	1.000			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	554.28			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.320				
Dimensionless Peak Deepwater Sway Force =	9.250				
Dimensionless Peak Deepwater Moment =	1.980				
Peak Deepwater Surge Force (pounds) =	1286			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	5127			From Wang's (1975) method	

Peak Deepwater Moment (foot*pounds) =	1326838			From Wang's (1975) method		
Surge Finite Depth Correction Factor, CF _X =	8.269			From Seelig (2001) Fig. 2.2-3		
Sway Finite Depth Correction Factor, CF _Y =	16.731			From Seelig (2001) Fig. 2.2-4		
Moment Finite Depth Correction Factor, CF _M =	16.731			From Seelig (2001) Fig. 2.2-4		
Peak Finite Depth Surge Force (pounds) =	10633			Deepwater value * Finite depth correction factor		
Peak Finite Depth Sway Force (pounds) =	85781			Deepwater value * Finite depth correction factor		
Peak Finite Depth Moment (foot*pounds) =	22199439			Deepwater value * Finite depth correction factor		
MOORING EFFICIENCY OUTPUT	MOORED SHIP (SHIP 1)			NOTES		
Mooring Line Break Strength (kips) =	298			Repeated from Input Section		
Required Mooring Line Factor of Safety =	2.50			Repeated from Input Section		
Vertical Breasting Line Angle, θ _V (deg) =	20.00			Repeated from Input Section		
F* (kips) =	117.22			Total Line Strength for Optimum Ideal Mooring		
Mooring Efficiency, e =	0.594			Predicted using Seelig (1998 Rev B)		
Req'd Sum of Line Break Strengths (kips) =	493.00			Estimated from Optimum Ideal and mooring efficiency		
Req'd Sum of Breasting Line Break Strengths (kips)	403.56			For Breasting Lines		
Total Number of Mooring Lines*	4			Total		
Number of Breasting Lines*	4			Estimated (round up to the next highest even number)		
Number of Spring Lines*	0			Estimated (round up to the next highest even number)		
* For passing ship event; does not include wind and current forces on the ship						
FORCE/MOMENT TIME HISTORY OUTPUT					OPTIMUM IDEAL MOORING	
Time (sec)	Fx (kips)	Fy (kips)	Mz (ft*kips)	Time (sec)	T2 (kips)	T3 (kips)
0.000	0.0	0.0	0.0	0.000	0.00	0.00
17.896	0.1	0.0	0.0	17.896	0.00	0.00
35.792	0.1	0.0	0.0	35.792	0.00	0.00
53.688	0.2	-0.1	0.0	53.688	-0.07	-0.07
71.583	0.2	-0.3	0.0	71.583	-0.16	-0.16
89.479	0.2	-0.5	0.0	89.479	-0.26	-0.26
107.375	0.4	-0.7	0.0	107.375	-0.33	-0.33
125.271	0.4	-0.7	0.0	125.271	-0.37	-0.37
143.167	0.5	-0.8	0.0	143.167	-0.39	-0.39
161.063	0.6	-0.8	0.0	161.063	-0.42	-0.42
178.958	0.7	-1.6	0.0	178.958	-0.78	-0.78
196.854	0.8	-2.0	123.4	196.854	-1.08	-0.87
214.750	0.9	-2.1	287.7	214.750	-1.31	-0.84
232.646	1.1	-3.1	534.3	232.646	-1.97	-1.09
250.542	1.3	-4.0	1068.9	250.542	-2.90	-1.14
268.438	1.5	-5.2	1480.0	268.438	-3.83	-1.38
286.333	1.7	-7.1	2055.4	286.333	-5.25	-1.85
304.229	2.0	-8.9	2795.6	304.229	-6.77	-2.15
322.125	2.2	-11.4	3576.6	322.125	-8.66	-2.74
340.021	2.4	-15.2	4522.0	340.021	-11.36	-3.88
357.917	2.6	-19.3	5755.4	357.917	-14.40	-4.88
375.813	2.4	-24.8	6700.9	375.813	-17.92	-6.83

	393.708	2.1	-30.0	7728.7		393.708	-21.37	-8.59
	411.604	1.2	-34.5	7810.9		411.604	-23.72	-10.80
	429.500	0.2	-37.8	6988.6		429.500	-24.67	-13.11
	447.396	-1.4	-39.7	5056.6		447.396	-24.02	-15.65
	465.292	-2.9	-39.3	2466.6		465.292	-21.71	-17.63
	483.188	-4.4	-36.5	-1438.7		483.188	-17.05	-19.43
	501.084	-5.9	-31.8	-6166.6		501.084	-10.79	-20.99
	518.979	-7.4	-26.6	-10647.5		518.979	-4.51	-22.13
	536.875	-8.7	-18.9	-14141.9		536.875	2.25	-21.14
	554.771	-9.8	-8.5	-17266.3		554.771	10.05	-18.52
	572.667	-10.5	3.9	-19732.9		572.667	18.28	-14.37
	590.563	-10.6	17.1	-21377.2		590.563	26.21	-9.15
	608.459	-10.4	30.0	-21911.7		608.459	33.10	-3.14
	626.354	-9.9	44.3	-20883.9		626.354	39.42	4.87
	644.250	-8.7	57.3	-18910.6		644.250	44.30	13.02
	662.146	-7.2	70.0	-13977.4		662.146	46.54	23.42
	680.042	-4.9	78.6	-9414.1		680.042	47.06	31.49
	697.938	-2.0	84.1	-4522.0		697.938	45.78	38.30
	715.834	0.5	85.8	0.0		715.834	42.89	42.89
	733.729	2.7	84.6	5015.5		733.729	38.16	46.45
	751.625	4.9	78.9	11428.5		751.625	29.99	48.89
	769.521	7.1	69.7	15950.7		769.521	21.65	48.04
	787.417	8.8	57.0	19239.6		787.417	12.58	44.41
	805.313	9.9	43.4	21089.5		805.313	4.28	39.17
	823.209	10.5	29.3	22199.4		823.209	-3.71	33.02
	841.104	10.6	16.0	21788.3		841.104	-10.01	26.03
	859.000	10.5	4.6	19732.9		859.000	-14.04	18.60
	876.896	9.8	-8.3	17060.7		876.896	-18.28	9.94
	894.792	8.9	-18.1	13566.3		894.792	-20.27	2.17
	912.688	7.6	-26.1	9907.6		912.688	-21.22	-4.83
	930.584	6.3	-33.9	5837.6		930.584	-21.76	-12.11
	948.480	4.5	-37.8	1480.0		948.480	-20.11	-17.66
	966.375	3.0	-40.4	-2178.9		966.375	-18.39	-21.99
	984.271	1.4	-39.7	-4851.0		984.271	-15.85	-23.88
	1002.167	0.0	-36.5	-7029.9		1002.167	-12.42	-24.05
	1020.063	-1.2	-32.8	-7564.2		1020.063	-10.12	-22.64
	1037.959	-2.0	-27.9	-7276.5		1037.959	-7.92	-19.96
	1055.855	-2.3	-22.8	-6166.6		1055.855	-6.30	-16.50
	1073.750	-2.6	-18.1	-5344.3		1073.750	-4.63	-13.47
	1091.646	-2.5	-15.6	-4439.9		1091.646	-4.14	-11.49
	1109.542	-2.3	-11.7	-3412.1		1109.542	-3.04	-8.68
	1127.438	-2.0	-8.5	-2836.6		1127.438	-1.89	-6.58
	1145.334	-1.7	-6.5	-2055.4		1145.334	-1.56	-4.96
	1163.230	-1.5	-4.6	-1356.6		1163.230	-1.16	-3.40
	1181.125	-1.2	-3.5	-986.5		1181.125	-0.91	-2.54
	1199.021	-1.1	-2.0	-739.9		1199.021	-0.37	-1.59
	1216.917	-0.9	-1.4	-328.8		1216.917	-0.41	-0.96
	1234.813	-0.7	-1.3	-246.6		1234.813	-0.45	-0.86
	1252.709	-0.5	-1.2	-164.5		1252.709	-0.45	-0.72

	1270.605	-0.4	-0.7	-82.1	1270.605	-0.26	-0.39
	1288.500	-0.4	-0.5	0.0	1288.500	-0.26	-0.26
	1306.396	-0.4	-0.4	0.0	1306.396	-0.20	-0.20
	1324.292	-0.3	-0.3	0.0	1324.292	-0.13	-0.13
	1342.188	-0.3	-0.1	0.0	1342.188	-0.07	-0.07
	1360.084	-0.3	0.0	0.0	1360.084	0.00	0.00
	1377.980	-0.2	0.0	0.0	1377.980	0.00	0.00
	1395.876	-0.2	0.0	0.0	1395.876	0.00	0.00
	1413.771	-0.2	0.0	0.0	1413.771	0.00	0.00
	1431.667	-0.1	0.0	0.0	1431.667	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	47.06	48.89



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 14000 TEU
Passing Vessel: 20000 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Ship Length at Waterline, L (ft) =	1209	1312		Must be a positive value	FALSE
Ship Width, B (ft) =	167.3	192.9		Must be a positive value	
Ship Draft, T (ft) =	47.6	47.6		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		276.6		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V_R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V_R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1260.5			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.933	0.933		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	96.5			Must be a positive value	
Relative Gap Size, G/B =	0.536			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.285				
Ship Cross-Sectional Areas, S (ft ²) =	5972.61	6886.53		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.229			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	1.085			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	542.68			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.308				
Dimensionless Peak Deepwater Sway Force =	8.860				
Dimensionless Peak Deepwater Moment =	1.782				
Peak Deepwater Surge Force (pounds) =	1253			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	4808			From Wang's (1975) method	

	410.479	2.1	-28.5	6913.3	410.479	-19.98	-8.54
	429.138	1.2	-32.9	6986.8	429.138	-22.21	-10.65
	447.796	0.2	-36.0	6251.3	447.796	-23.15	-12.81
	466.454	-1.4	-37.8	4523.1	466.454	-22.62	-15.14
	485.112	-2.9	-37.5	2206.3	485.112	-20.55	-16.90
	503.770	-4.3	-34.7	-1286.9	503.770	-16.30	-18.43
	522.428	-5.8	-30.3	-5515.9	522.428	-10.57	-19.69
	541.086	-7.3	-25.4	-9524.1	541.086	-4.80	-20.56
	559.745	-8.6	-18.0	-12649.8	559.745	1.47	-19.45
	578.403	-9.7	-8.1	-15444.5	578.403	8.74	-16.81
	597.061	-10.3	3.7	-17650.9	597.061	16.46	-12.74
	615.719	-10.4	16.2	-19121.7	615.719	23.94	-7.69
	634.377	-10.3	28.5	-19599.9	634.377	30.47	-1.95
	653.035	-9.8	42.2	-18680.5	653.035	36.53	5.63
	671.693	-8.6	54.6	-16915.4	671.693	41.27	13.29
	690.352	-7.1	66.6	-12502.7	690.352	43.64	22.96
	709.010	-4.9	74.8	-8420.9	709.010	44.35	30.42
	727.668	-1.9	80.0	-4044.9	727.668	43.37	36.68
	746.326	0.4	81.7	0.0	746.326	40.83	40.83
	764.984	2.7	80.5	4486.3	764.984	36.56	43.98
	783.642	4.8	75.1	10222.7	783.642	29.09	46.00
	802.301	7.0	66.3	14267.8	802.301	21.37	44.97
	820.959	8.7	54.3	17209.7	820.959	12.89	41.36
	839.617	9.8	41.4	18864.4	839.617	5.08	36.28
	858.275	10.4	27.9	19857.2	858.275	-2.47	30.38
	876.933	10.5	15.3	19489.5	876.933	-8.49	23.75
	895.591	10.3	4.3	17650.9	895.591	-12.43	16.77
	914.249	9.7	-7.9	15260.7	914.249	-16.59	8.65
	932.908	8.8	-17.2	12134.9	932.908	-18.66	1.42
	951.566	7.5	-24.8	8862.3	951.566	-19.73	-5.07
	970.224	6.2	-32.2	5221.7	970.224	-20.44	-11.80
	988.882	4.5	-36.0	1323.9	988.882	-19.08	-16.89
	1007.540	3.0	-38.4	-1949.0	1007.540	-17.61	-20.83
	1026.198	1.4	-37.8	-4339.2	1026.198	-15.32	-22.50
	1044.857	0.0	-34.7	-6288.2	1044.857	-12.16	-22.56
	1063.515	-1.2	-31.2	-6766.1	1063.515	-10.00	-21.19
	1082.173	-1.9	-26.5	-6508.8	1082.173	-7.89	-18.65
	1100.831	-2.3	-21.7	-5515.9	1100.831	-6.29	-15.41
	1119.489	-2.5	-17.2	-4780.4	1119.489	-4.66	-12.57
	1138.147	-2.5	-14.9	-3971.4	1138.147	-4.16	-10.73
	1156.805	-2.2	-11.2	-3052.1	1156.805	-3.06	-8.10
	1175.464	-1.9	-8.1	-2537.4	1175.464	-1.93	-6.13
	1194.122	-1.6	-6.2	-1838.6	1194.122	-1.58	-4.62
	1212.780	-1.5	-4.3	-1213.5	1212.780	-1.17	-3.17
	1231.438	-1.2	-3.3	-882.5	1231.438	-0.91	-2.37
	1250.096	-1.1	-1.9	-661.8	1250.096	-0.38	-1.48
	1268.754	-0.9	-1.3	-294.1	1268.754	-0.41	-0.89
	1287.413	-0.7	-1.2	-220.6	1287.413	-0.44	-0.80
	1306.071	-0.4	-1.1	-147.1	1306.071	-0.44	-0.68

	1324.729	-0.4	-0.6	-73.5	1324.729	-0.25	-0.37
	1343.387	-0.4	-0.5	0.0	1343.387	-0.25	-0.25
	1362.045	-0.4	-0.4	0.0	1362.045	-0.19	-0.19
	1380.703	-0.3	-0.2	0.0	1380.703	-0.12	-0.12
	1399.361	-0.3	-0.1	0.0	1399.361	-0.06	-0.06
	1418.020	-0.3	0.0	0.0	1418.020	0.00	0.00
	1436.678	-0.2	0.0	0.0	1436.678	0.00	0.00
	1455.336	-0.2	0.0	0.0	1455.336	0.00	0.00
	1473.994	-0.2	0.0	0.0	1473.994	0.00	0.00
	1492.652	-0.1	0.0	0.0	1492.652	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	44.35	46.00



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 20000 TEU
Passing Vessel: 8800 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG		
INPUT PARAMETERS				NOTES	
Ship Length at Waterline, L (ft) =	1312	1050		Must be a positive value	FALSE
Ship Width, B (ft) =	192.9	140		Must be a positive value	
Ship Draft, T (ft) =	47.6	39.4		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		236.5		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V_R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG		
PEAK FORCE/MOMENT OUTPUT				NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V_R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1181			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.933	0.773		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	70.05			Must be a positive value	
Relative Gap Size, G/B =	0.421			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.247				
Ship Cross-Sectional Areas, S (ft ²) =	6886.53	4137.00		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.180			The value of (η / L_1) > 0.1 to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	0.800			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	586.89			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	1.800				
Dimensionless Peak Deepwater Sway Force =	6.900				
Dimensionless Peak Deepwater Moment =	1.750				
Peak Deepwater Surge Force (pounds) =	1056			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	4050			From Wang's (1975) method	

	384.590	1.7	-24.0	7952.2	384.590	-18.05	-5.93
	402.072	1.0	-27.6	8036.7	402.072	-19.94	-7.69
	419.553	0.1	-30.2	7190.7	419.553	-20.60	-9.63
	437.034	-1.1	-31.7	5202.8	437.034	-19.84	-11.91
	454.516	-2.3	-31.5	2537.9	454.516	-17.67	-13.81
	471.997	-3.5	-29.2	-1480.3	471.997	-13.47	-15.72
	489.479	-4.7	-25.4	-6344.9	489.479	-7.88	-17.55
	506.960	-5.8	-21.3	-10955.4	506.960	-2.31	-19.01
	524.441	-6.9	-15.1	-14550.8	524.441	3.53	-18.65
	541.923	-7.8	-6.8	-17765.5	541.923	10.15	-16.93
	559.404	-8.3	3.1	-20303.4	559.404	17.04	-13.91
	576.886	-8.4	13.7	-21995.3	576.886	23.59	-9.94
	594.367	-8.3	24.0	-22545.3	594.367	29.17	-5.20
	611.848	-7.9	35.4	-21487.7	611.848	34.10	1.34
	629.330	-6.9	45.9	-19457.4	629.330	37.76	8.10
	646.811	-5.7	56.0	-14381.6	646.811	38.95	17.03
	664.292	-3.9	62.9	-9686.3	664.292	38.81	24.05
	681.774	-1.6	67.3	-4652.8	681.774	37.19	30.10
	699.255	0.4	68.6	0.0	699.255	34.32	34.32
	716.737	2.1	67.7	5160.5	716.737	29.92	37.79
	734.218	3.9	63.1	11758.9	734.218	22.60	40.52
	751.699	5.6	55.8	16411.9	751.699	15.38	40.39
	769.181	7.0	45.6	19795.9	769.181	7.71	37.89
	786.662	7.9	34.8	21699.2	786.662	0.84	33.92
	804.143	8.3	23.5	22841.3	804.143	-5.68	29.14
	821.625	8.4	12.8	22418.3	821.625	-10.68	23.50
	839.106	8.3	3.6	20303.4	839.106	-13.65	17.30
	856.588	7.8	-6.7	17554.0	856.588	-16.72	10.04
	874.069	7.0	-14.5	13958.6	874.069	-17.88	3.39
	891.550	6.1	-20.8	10194.1	891.550	-18.19	-2.65
	909.032	5.0	-27.1	6006.4	909.032	-18.13	-8.97
	926.513	3.6	-30.2	1522.8	926.513	-16.28	-13.95
	943.994	2.4	-32.3	-2241.9	943.994	-14.45	-17.87
	961.476	1.1	-31.8	-4991.3	961.476	-12.09	-19.70
	978.957	0.0	-29.2	-7233.2	978.957	-9.08	-20.11
	996.439	-1.0	-26.2	-7782.9	996.439	-7.18	-19.04
	1013.920	-1.6	-22.3	-7486.9	1013.920	-5.45	-16.86
	1031.401	-1.9	-18.2	-6344.9	1031.401	-4.29	-13.96
	1048.883	-2.0	-14.5	-5498.8	1048.883	-3.05	-11.44
	1066.364	-2.0	-12.5	-4568.3	1066.364	-2.77	-9.74
	1083.845	-1.8	-9.4	-3510.7	1083.845	-2.01	-7.37
	1101.327	-1.6	-6.8	-2918.7	1101.327	-1.16	-5.61
	1118.808	-1.3	-5.2	-2114.9	1118.808	-0.99	-4.22
	1136.290	-1.2	-3.6	-1395.8	1136.290	-0.76	-2.89
	1153.771	-1.0	-2.8	-1015.1	1153.771	-0.61	-2.15
	1171.252	-0.8	-1.6	-761.3	1171.252	-0.20	-1.36
	1188.734	-0.7	-1.1	-338.3	1188.734	-0.29	-0.81
	1206.215	-0.6	-1.0	-253.8	1206.215	-0.33	-0.71
	1223.697	-0.4	-0.9	-169.3	1223.697	-0.34	-0.60

	1241.178	-0.3	-0.5	-84.5	1241.178	-0.20	-0.32
	1258.659	-0.3	-0.4	0.0	1258.659	-0.21	-0.21
	1276.141	-0.3	-0.3	0.0	1276.141	-0.16	-0.16
	1293.622	-0.3	-0.2	0.0	1293.622	-0.10	-0.10
	1311.103	-0.2	-0.1	0.0	1311.103	-0.05	-0.05
	1328.585	-0.2	0.0	0.0	1328.585	0.00	0.00
	1346.066	-0.2	0.0	0.0	1346.066	0.00	0.00
	1363.548	-0.2	0.0	0.0	1363.548	0.00	0.00
	1381.029	-0.1	0.0	0.0	1381.029	0.00	0.00
	1398.510	-0.1	0.0	0.0	1398.510	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	38.95	40.52



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 20000 TEU
Passing Vessel: 14000 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Ship Length at Waterline, L (ft) =	1312	1209		Must be a positive value	FALSE
Ship Width, B (ft) =	192.9	167.3		Must be a positive value	
Ship Draft, T (ft) =	47.6	47.6		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		263.8		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V_R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG	NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V_R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1260.5			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.933	0.933		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	83.7			Must be a positive value	
Relative Gap Size, G/B =	0.465			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.247				
Ship Cross-Sectional Areas, S (ft ²) =	6886.53	5972.61		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.201			The value of $(\eta / L_1) > 0.1$ to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	0.921			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	639.09			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.040				
Dimensionless Peak Deepwater Sway Force =	7.890				
Dimensionless Peak Deepwater Moment =	1.756				
Peak Deepwater Surge Force (pounds) =	1304			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	5042			From Wang's (1975) method	

	410.479	2.1	-30.4	8854.9	410.479	-21.96	-8.46
	429.138	1.2	-35.1	8949.0	429.138	-24.35	-10.71
	447.796	0.2	-38.4	8006.9	447.796	-25.28	-13.08
	466.454	-1.4	-40.3	5793.4	466.454	-24.55	-15.72
	485.112	-2.9	-39.9	2826.0	485.112	-22.13	-17.82
	503.770	-4.4	-37.0	-1648.4	503.770	-17.26	-19.78
	522.428	-5.9	-32.3	-7065.1	522.428	-10.75	-21.52
	541.086	-7.4	-27.1	-12199.0	541.086	-4.23	-22.82
	559.745	-8.7	-19.2	-16202.6	559.745	2.76	-21.94
	578.403	-9.8	-8.6	-19782.2	578.403	10.78	-19.38
	597.061	-10.4	4.0	-22608.2	597.061	19.22	-15.25
	615.719	-10.5	17.3	-24492.1	615.719	27.33	-10.00
	634.377	-10.4	30.4	-25104.5	634.377	34.35	-3.92
	653.035	-9.9	45.0	-23926.9	653.035	40.72	4.25
	671.693	-8.7	58.2	-21666.1	671.693	45.61	12.59
	690.352	-7.2	71.0	-16014.1	690.352	47.72	23.31
	709.010	-4.9	79.8	-10785.9	709.010	48.10	31.66
	727.668	-2.0	85.4	-5180.9	727.668	46.64	38.74
	746.326	0.4	87.1	0.0	746.326	43.55	43.55
	764.984	2.7	85.9	5746.3	764.984	38.58	47.34
	783.642	4.9	80.1	13093.8	783.642	30.07	50.03
	802.301	7.1	70.8	18275.0	802.301	21.45	49.31
	820.959	8.7	57.9	22043.0	820.959	12.13	45.74
	839.617	9.9	44.1	24162.5	839.617	3.64	40.47
	858.275	10.5	29.8	25434.2	858.275	-4.50	34.27
	876.933	10.6	16.3	24963.1	876.933	-10.89	27.16
	895.591	10.4	4.6	22608.2	895.591	-14.92	19.55
	914.249	9.8	-8.5	19546.7	914.249	-19.13	10.67
	932.908	8.9	-18.4	15543.1	932.908	-21.04	2.65
	951.566	7.6	-26.5	11351.3	951.566	-21.88	-4.58
	970.224	6.3	-34.4	6688.2	970.224	-22.29	-12.10
	988.882	4.5	-38.4	1695.7	988.882	-20.47	-17.89
	1007.540	3.0	-41.0	-2496.4	1007.540	-18.60	-22.41
	1026.198	1.4	-40.3	-5557.9	1026.198	-15.94	-24.41
	1044.857	0.0	-37.0	-8054.2	1044.857	-12.38	-24.66
	1063.515	-1.2	-33.3	-8666.4	1063.515	-10.03	-23.24
	1082.173	-2.0	-28.3	-8336.8	1082.173	-7.80	-20.51
	1100.831	-2.3	-23.1	-7065.1	1100.831	-6.19	-16.96
	1119.489	-2.6	-18.4	-6123.0	1119.489	-4.53	-13.86
	1138.147	-2.5	-15.9	-5086.8	1138.147	-4.06	-11.81
	1156.805	-2.3	-11.9	-3909.2	1156.805	-2.97	-8.93
	1175.464	-2.0	-8.6	-3250.0	1175.464	-1.82	-6.78
	1194.122	-1.7	-6.6	-2355.0	1194.122	-1.51	-5.10
	1212.780	-1.5	-4.6	-1554.3	1212.780	-1.13	-3.50
	1231.438	-1.2	-3.5	-1130.3	1231.438	-0.89	-2.61
	1250.096	-1.1	-2.0	-847.7	1250.096	-0.35	-1.64
	1268.754	-0.9	-1.4	-376.7	1268.754	-0.41	-0.98
	1287.413	-0.7	-1.3	-282.6	1287.413	-0.45	-0.88
	1306.071	-0.4	-1.2	-188.5	1306.071	-0.45	-0.74

	1324.729	-0.4	-0.7	-94.1	1324.729	-0.26	-0.40
	1343.387	-0.4	-0.5	0.0	1343.387	-0.26	-0.26
	1362.045	-0.4	-0.4	0.0	1362.045	-0.20	-0.20
	1380.703	-0.3	-0.3	0.0	1380.703	-0.13	-0.13
	1399.361	-0.3	-0.1	0.0	1399.361	-0.07	-0.07
	1418.020	-0.3	0.0	0.0	1418.020	0.00	0.00
	1436.678	-0.2	0.0	0.0	1436.678	0.00	0.00
	1455.336	-0.2	0.0	0.0	1455.336	0.00	0.00
	1473.994	-0.2	0.0	0.0	1473.994	0.00	0.00
	1492.652	-0.1	0.0	0.0	1492.652	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	48.10	50.03



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

Moored Vessel: 20000 TEU
Passing Vessel: 20000 TEU
Elevation: MLLW

PASS-MOOR.XLS	W. SEELIG	4/26/2024			
	202-433-2396	SeeligWN@nfesc.navy.mil			
SPREAD SHEET TO ESTIMATE PASSING SHIP EFFECTS ON MOORED SHIPS					
See Seelig, W., "Passing Ship Effects on Moored Ships", NFESC TR-6027-OCN, Nov. 2001					
Notation:					
Cell Requiring Input =					
Cell Providing Output and/or Protected =					
Blank Cell =					
Flag Indicating an Error =	Error !!!				
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG		
INPUT PARAMETERS				NOTES	
Ship Length at Waterline, L (ft) =	1312	1312		Must be a positive value	FALSE
Ship Width, B (ft) =	192.9	192.9		Must be a positive value	
Ship Draft, T (ft) =	47.6	47.6		Must be a positive value	
Ship Midships Coefficient, Cm =	0.75	0.75		Must be a positive value	
Water Depth, d (ft) =	51	51		Must be a positive value	
Distance Between Ship Centerlines, η (ft) =		289.4		Must be a positive value	
Passing Ship Speed in World Coords., V (knots) =		2		Must be a positive value	
Current Speed, Vc (knots) =		0		+ is upstream	
Mooring Line Break Strength (pounds force) =	298000			Must be a positive value	
Required Mooring Line Factor of Safety =	2.5			Should be greater than 1.0	
Vertical Breasting Line Angle, Θ_v (deg) =	20			Must be $0 < \Theta_v < 90$ deg	
Density of water, ρ (slug/ft ³) =		1.9905		Given value	
Relative Passing Ship Speed, V _R (knots) =		2		Must be a positive value	
	MOORED SHIP	PASSING SHIP	ERROR		
	(SHIP 1)	(SHIP 2)	FLAG		
PEAK FORCE/MOMENT OUTPUT				NOTES	
Passing Ship Speed, V (ft/sec) =		3.378		Must be a positive value	
Relative Passing Ship Speed, V _R (ft/sec) =		3.378		Must be a positive value	
Mean of Ship Lengths, L (ft) =	1312			Mean of passing and mooring ship lengths	
Ratio of Ship Draft to Water Depth, T/d =	0.933	0.933		Must be in the range $0 < T/d < 1$	
Larger Value of T/d =	0.933			Largest T/d value of the two ships	
Gap Between Ships, G (ft) =	96.5			Must be a positive value	
Relative Gap Size, G/B =	0.500			Clear distance between the ships / mean ship width	
Relative Ship Draft, T/B =	0.247				
Ship Cross-Sectional Areas, S (ft ²) =	6886.53	6886.53		Ship end-on submerged areas of the ships	
Dimensionless Distance, η / L_1 =	0.221			The value of (η / L_1) > 0.1 to use this method	
Ratio of Passing To Moored Ship Length, L_2 / L_1 =	1.000			Must be in the range $0.5 < (L_2/L_1) < 2$ to use this method	
Denominator, Q (slug*ft/sec ²) =	625.73			Factor for use in Wang's (1975) deepwater method	
Dimensionless Peak Deepwater Surge Force =	2.060				
Dimensionless Peak Deepwater Sway Force =	7.900				
Dimensionless Peak Deepwater Moment =	1.690				
Peak Deepwater Surge Force (pounds) =	1289			From Wang's (1975) method	
Peak Deepwater Sway Force (pounds) =	4943			From Wang's (1975) method	

	427.250	2.1	-30.3	8470.7	427.250	-21.60	-8.68
	446.671	1.2	-34.9	8560.8	446.671	-23.97	-10.92
	466.091	0.2	-38.2	7659.6	466.091	-24.93	-13.25
	485.512	-1.4	-40.1	5542.1	485.512	-24.27	-15.82
	504.932	-2.9	-39.8	2703.4	504.932	-21.94	-17.82
	524.353	-4.4	-36.9	-1576.9	524.353	-17.23	-19.63
	543.773	-5.9	-32.1	-6758.6	543.773	-10.91	-21.21
	563.193	-7.4	-26.9	-11669.7	563.193	-4.57	-22.36
	582.614	-8.7	-19.1	-15499.6	582.614	2.27	-21.36
	602.034	-9.9	-8.6	-18924.0	602.034	10.15	-18.70
	621.455	-10.5	3.9	-21627.3	621.455	18.46	-14.51
	640.875	-10.6	17.2	-23429.5	640.875	26.48	-9.23
	660.296	-10.4	30.3	-24015.4	660.296	33.44	-3.17
	679.716	-9.9	44.8	-22888.9	679.716	39.83	4.93
	699.137	-8.7	57.9	-20726.1	699.137	44.76	13.16
	718.557	-7.2	70.7	-15319.4	718.557	47.02	23.67
	737.978	-5.0	79.4	-10317.9	737.978	47.56	31.83
	757.398	-2.0	85.0	-4956.2	757.398	46.27	38.71
	776.819	0.5	86.7	0.0	776.819	43.34	43.34
	796.239	2.7	85.5	5497.0	796.239	38.56	46.94
	815.660	4.9	79.7	12525.7	815.660	30.31	49.40
	835.080	7.1	70.4	17482.1	835.080	21.89	48.54
	854.500	8.8	57.6	21086.7	854.500	12.73	44.87
	873.921	10.0	43.9	23114.2	873.921	4.33	39.57
	893.341	10.5	29.6	24330.7	893.341	-3.73	33.36
	912.762	10.7	16.2	23880.1	912.762	-10.11	26.30
	932.182	10.5	4.6	21627.3	932.182	-14.18	18.79
	951.603	9.8	-8.4	18698.7	951.603	-18.46	10.04
	971.023	8.9	-18.3	14868.8	971.023	-20.48	2.18
	990.444	7.6	-26.3	10858.8	990.444	-21.44	-4.89
	1009.864	6.3	-34.2	6398.0	1009.864	-21.99	-12.24
	1029.285	4.5	-38.2	1622.1	1029.285	-20.32	-17.85
	1048.705	3.0	-40.8	-2388.1	1048.705	-18.59	-22.23
	1068.126	1.4	-40.2	-5316.8	1068.126	-16.02	-24.13
	1087.546	0.0	-36.9	-7704.8	1087.546	-12.56	-24.30
	1106.966	-1.2	-33.1	-8290.5	1106.966	-10.24	-22.87
	1126.387	-2.0	-28.2	-7975.1	1126.387	-8.01	-20.16
	1145.807	-2.3	-23.0	-6758.6	1145.807	-6.37	-16.67
	1165.228	-2.6	-18.3	-5857.4	1165.228	-4.69	-13.61
	1184.648	-2.5	-15.8	-4866.1	1184.648	-4.19	-11.61
	1204.069	-2.3	-11.8	-3739.6	1204.069	-3.07	-8.77
	1223.489	-2.0	-8.6	-3109.0	1223.489	-1.91	-6.65
	1242.910	-1.7	-6.6	-2252.8	1242.910	-1.57	-5.01
	1262.330	-1.5	-4.6	-1486.9	1262.330	-1.17	-3.44
	1281.751	-1.2	-3.5	-1081.3	1281.751	-0.92	-2.57
	1301.171	-1.1	-2.0	-810.9	1301.171	-0.37	-1.61
	1320.592	-0.9	-1.4	-360.3	1320.592	-0.42	-0.97
	1340.012	-0.7	-1.3	-270.3	1340.012	-0.45	-0.86
	1359.433	-0.5	-1.2	-180.3	1359.433	-0.46	-0.73

	1378.853	-0.4	-0.7	-90.0	1378.853	-0.26	-0.40
	1398.273	-0.4	-0.5	0.0	1398.273	-0.26	-0.26
	1417.694	-0.4	-0.4	0.0	1417.694	-0.20	-0.20
	1437.114	-0.3	-0.3	0.0	1437.114	-0.13	-0.13
	1456.535	-0.3	-0.1	0.0	1456.535	-0.07	-0.07
	1475.955	-0.3	0.0	0.0	1475.955	0.00	0.00
	1495.376	-0.2	0.0	0.0	1495.376	0.00	0.00
	1514.796	-0.2	0.0	0.0	1514.796	0.00	0.00
	1534.217	-0.2	0.0	0.0	1534.217	0.00	0.00
	1553.637	-0.1	0.0	0.0	1553.637	0.00	0.00
					MAX. OPTIMUM IDEAL BREASTING LIINE TENSIONS=	47.56	49.40

APPENDIX E: OPTIMOOR PRELIMINARY BOLLARD UPGRADES ANALYSIS



PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 14,000 TEU - MHHW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\1 WUT (14,000 TEU)
- MIDDLE (sheet 3)\Thalassa Hellas.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -20.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0	571.4	
Depth	97.9	97.9	

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322

13	-596.8	-42.0	0.0	17.5	350	20	5.7	pe	298	433	12.4	pp	322
14	-596.8	-26.6	0.0	39.8	350	20	5.7	pe	298	433	12.4	pp	322
15	-596.8	-19.8	0.0	50.6	350	20	5.7	pe	298	433	12.4	pp	322
16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\1
WUT (14,000 TEU) - MIDDLE (sheet 3)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.0	84.1	-1.2	400
B	-1277.0	0.0	2.0	275
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-774.8	0.1	2.0	495
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	275
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	495
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	495
T	100.0	0.0	2.0	495
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	220
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	220
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	330
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125

*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1581.0	48.9	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)							
aa	-625.0	18.0	6.2	68.3							
bb	-575.0	18.0	6.2	68.3							
cc	-525.0	18.0	6.2	68.3							
dd	-475.0	18.0	6.2	68.3							
ee	-425.0	18.0	6.2	68.3							
ff	-375.0	18.0	6.2	68.3							
gg	-325.0	18.0	6.2	68.3							
hh	-275.0	18.0	6.2	68.3							
ii	-225.0	18.0	6.2	68.3							
jj	-175.0	18.0	6.2	68.3							
kk	-125.0	18.0	6.2	68.3							
ll	-75.0	18.0	6.2	68.3							
mm	-25.0	18.0	6.2	68.3							
nn	25.0	18.0	6.2	68.3							
oo	75.0	18.0	6.2	68.3							
pp	125.0	18.0	6.2	68.3							
qq	175.0	18.0	6.2	68.3							
rr	215.0	18.0	6.2	68.3							
ss	255.0	18.0	6.2	68.3							
tt	300.0	18.0	6.2	68.3							
uu	350.0	18.0	6.2	68.3							
vv	400.0	18.0	6.2	68.3							
ww	450.0	18.0	6.2	68.3							
xx	500.0	18.0	6.2	68.3							
yy	550.0	18.0	6.2	68.3							
zz	600.0	18.0	6.2	68.3							
Fender	Load-Compression Data										
aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\1 WUT (14,000 TEU) - MIDDLE (sheet 3)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 16.41 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 46.4
Fwd Offset of Vessel Target: 0.0 from Berth Target
Vessel Port Target: 71.9 above Pier
Wind Speed: 25 knots
Wind Direction from: 0° True 45° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 31819
Total Side Windage Area:190947

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	55.6	390.6		30.9
Total Force:	55.6	390.6		30.9
Movement of Vessel	-1.04 (aft)	0.06 (inw)	0.0° (port)	0.00 (up)

at its Port Target

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
1-*A	1.83	160.6			56°	25.3	8%
2-*B	2.33	201.7			32°	28.1	9%
3-*B	1.50	137.0			35°	29.7	10%
4-*C	2.10	183.9			23°	29.2	10%
7-*C	2.98	250.5			17°	25.7	9%
13-I	3.31	259.0			17°	14.2	5%
14-I	3.52	273.5			17°	14.3	5%
16-J	2.25	183.6			22°	12.0	4%
18-J	2.63	210.5			24°	12.6	4%
19-K	1.29	116.5			48°	11.0	4%
23-O	3.79	315.1			20°	25.6	9%
24-W	4.34	330.1			16°	14.7	5%

Fender	Thrust	Compression	Pressure	Flatside	Cover
cc	9	0.02	0.3	100%	
dd	10	0.03	0.3	100%	
ee	11	0.03	0.4	100%	
ff	12	0.03	0.4	100%	
gg	13	0.04	0.4	100%	
hh	14	0.04	0.5	100%	
ii	16	0.04	0.5	100%	
jj	17	0.05	0.5	100%	
kk	18	0.05	0.6	100%	
ll	19	0.05	0.6	100%	
mm	20	0.06	0.6	100%	
nn	21	0.06	0.7	100%	
oo	22	0.06	0.7	100%	
pp	23	0.07	0.8	100%	
qq	24	0.07	0.8	100%	
rr	25	0.07	0.8	100%	
ss	26	0.07	0.8	100%	
tt	27	0.08	0.9	100%	
uu	28	0.08	0.9	100%	
vv	29	0.08	0.9	100%	
ww	31	0.09	1.0	100%	
xx	32	0.09	1.0	100%	
yy	33	0.09	1.1	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	23.4	14.0			28.5	6%	59°	8.3
J	20.3	9.8			24.5	6%	64°	9.6
K	5.5	4.8			11.0	3%	49°	8.2
O	-24.1				25.6	20%	-90°	8.7
W	14.1	0.8			14.7	12%	87°	4.1
*A	-10.4	9.5			25.3	12%	-48°	21.0
*B	-40.7	24.0			57.1	13%	-60°	31.9
*C	-43.6	26.9			54.7	17%	-58°	19.1

Approximate natural periods
 Surge: 75 Sway: 28 Roll: 120 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:

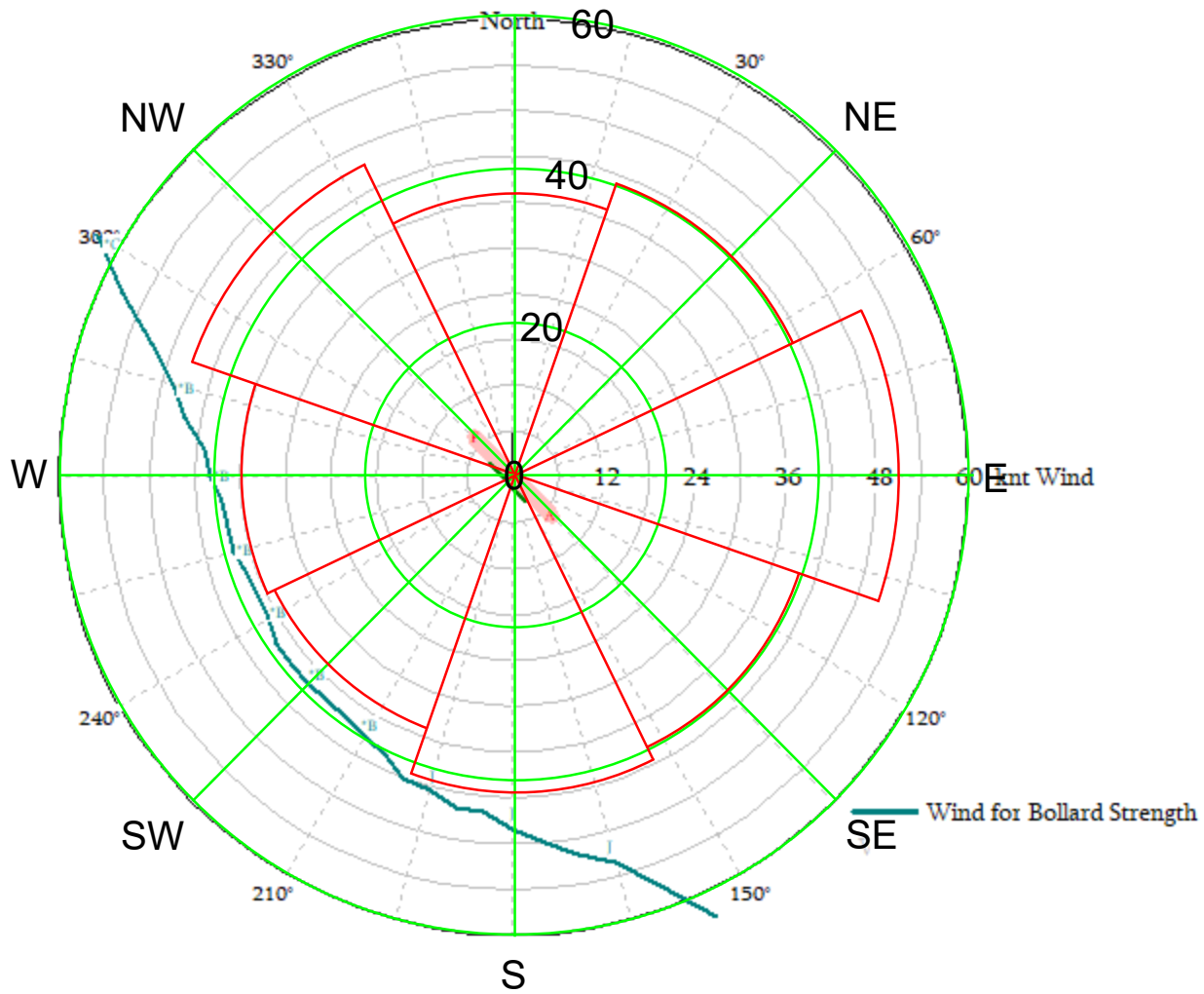
Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 16.4

Trim: 0.0

N





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 14,000 TEU - MLLW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\1 WUT (14,000 TEU)
- MIDDLE (sheet 3)\Thalassa Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -20.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -583.0 571.4
Depth 97.9 97.9

Help Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322

13	-596.8	-42.0	0.0	17.5	350	20	5.7	pe	298	433	12.4	pp	322
14	-596.8	-26.6	0.0	39.8	350	20	5.7	pe	298	433	12.4	pp	322
15	-596.8	-19.8	0.0	50.6	350	20	5.7	pe	298	433	12.4	pp	322
16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\1
WUT (14,000 TEU) - MIDDLE (sheet 3)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.0	84.1	-1.2	400
B	-1277.0	0.0	2.0	275
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-774.8	0.1	2.0	495
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	275
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	495
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	495
T	100.0	0.0	2.0	495
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	220
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	220
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	330
*D	850.0	0.0	2.0	125
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	125
*G	1075.0	0.0	2.0	125
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125

*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	125
*L	1581.0	48.9	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)							
aa	-625.0	18.0	6.2	68.3							
bb	-575.0	18.0	6.2	68.3							
cc	-525.0	18.0	6.2	68.3							
dd	-475.0	18.0	6.2	68.3							
ee	-425.0	18.0	6.2	68.3							
ff	-375.0	18.0	6.2	68.3							
gg	-325.0	18.0	6.2	68.3							
hh	-275.0	18.0	6.2	68.3							
ii	-225.0	18.0	6.2	68.3							
jj	-175.0	18.0	6.2	68.3							
kk	-125.0	18.0	6.2	68.3							
ll	-75.0	18.0	6.2	68.3							
mm	-25.0	18.0	6.2	68.3							
nn	25.0	18.0	6.2	68.3							
oo	75.0	18.0	6.2	68.3							
pp	125.0	18.0	6.2	68.3							
qq	175.0	18.0	6.2	68.3							
rr	215.0	18.0	6.2	68.3							
ss	255.0	18.0	6.2	68.3							
tt	300.0	18.0	6.2	68.3							
uu	350.0	18.0	6.2	68.3							
vv	400.0	18.0	6.2	68.3							
ww	450.0	18.0	6.2	68.3							
xx	500.0	18.0	6.2	68.3							
yy	550.0	18.0	6.2	68.3							
zz	600.0	18.0	6.2	68.3							
Fender	Load-Compression Data										
aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\1 WUT (14,000 TEU) - MIDDLE (sheet 3)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 16.41 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 34.6
Fwd Offset of Vessel Target: 0.0 from Berth Target
Vessel Port Target: 60.1 above Pier
Wind Speed: 25 knots
Wind Direction from: 0° True 45° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 31819
Total Side Windage Area:190947

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	55.6	390.6		30.9
Total Force:	55.6	390.6		30.9
Movement of Vessel	-0.91 (aft)	0.06 (inw)	0.0° (port)	0.00 (up)

at its Port Target

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
1-*A	1.70	151.1			51°	25.6	9%
2-*B	2.26	195.8			28°	27.8	9%
3-*B	1.42	130.8			30°	29.5	10%
4-*C	2.05	179.6			19°	28.5	10%
7-*C	2.95	247.3			15°	25.1	8%
13-I	3.25	255.9			14°	14.5	5%
14-I	3.46	270.4			14°	14.7	5%
16-J	2.18	179.6			19°	12.4	4%
18-J	2.56	206.1			20°	13.0	4%
19-K	1.17	108.3			43°	10.5	4%
23-O	3.76	311.4			17°	25.2	8%
24-W	4.27	327.2			13°	15.1	5%

Fender	Thrust	Compression	Pressure	Flatside	Cover
cc	9	0.03	0.3	100%	
dd	10	0.03	0.3	100%	
ee	11	0.03	0.4	100%	
ff	12	0.03	0.4	100%	
gg	13	0.04	0.4	100%	
hh	14	0.04	0.5	100%	
ii	16	0.04	0.5	100%	
jj	17	0.05	0.5	100%	
kk	18	0.05	0.6	100%	
ll	19	0.05	0.6	100%	
mm	20	0.06	0.6	100%	
nn	21	0.06	0.7	100%	
oo	22	0.06	0.7	100%	
pp	23	0.07	0.8	100%	
qq	25	0.07	0.8	100%	
rr	25	0.07	0.8	100%	
ss	26	0.07	0.9	100%	
tt	27	0.08	0.9	100%	
uu	29	0.08	0.9	100%	
vv	30	0.08	1.0	100%	
ww	31	0.09	1.0	100%	
xx	32	0.09	1.0	100%	
yy	33	0.09	1.1	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	24.3	14.5			29.2	6%	59°	7.2
J	21.5	10.4			25.3	6%	64°	8.5
K	5.8	5.1			10.5	2%	49°	7.1
O	-24.1				25.2	20%	-90°	7.2
W	14.6	0.9			15.1	12%	87°	3.5
*A	-11.8	10.9			25.6	12%	-47°	19.9
*B	-42.3	25.0			56.4	13%	-59°	27.6
*C	-43.4	26.8			53.4	16%	-58°	15.8

Approximate natural periods
Surge: 72 Sway: 29 Roll: 120 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

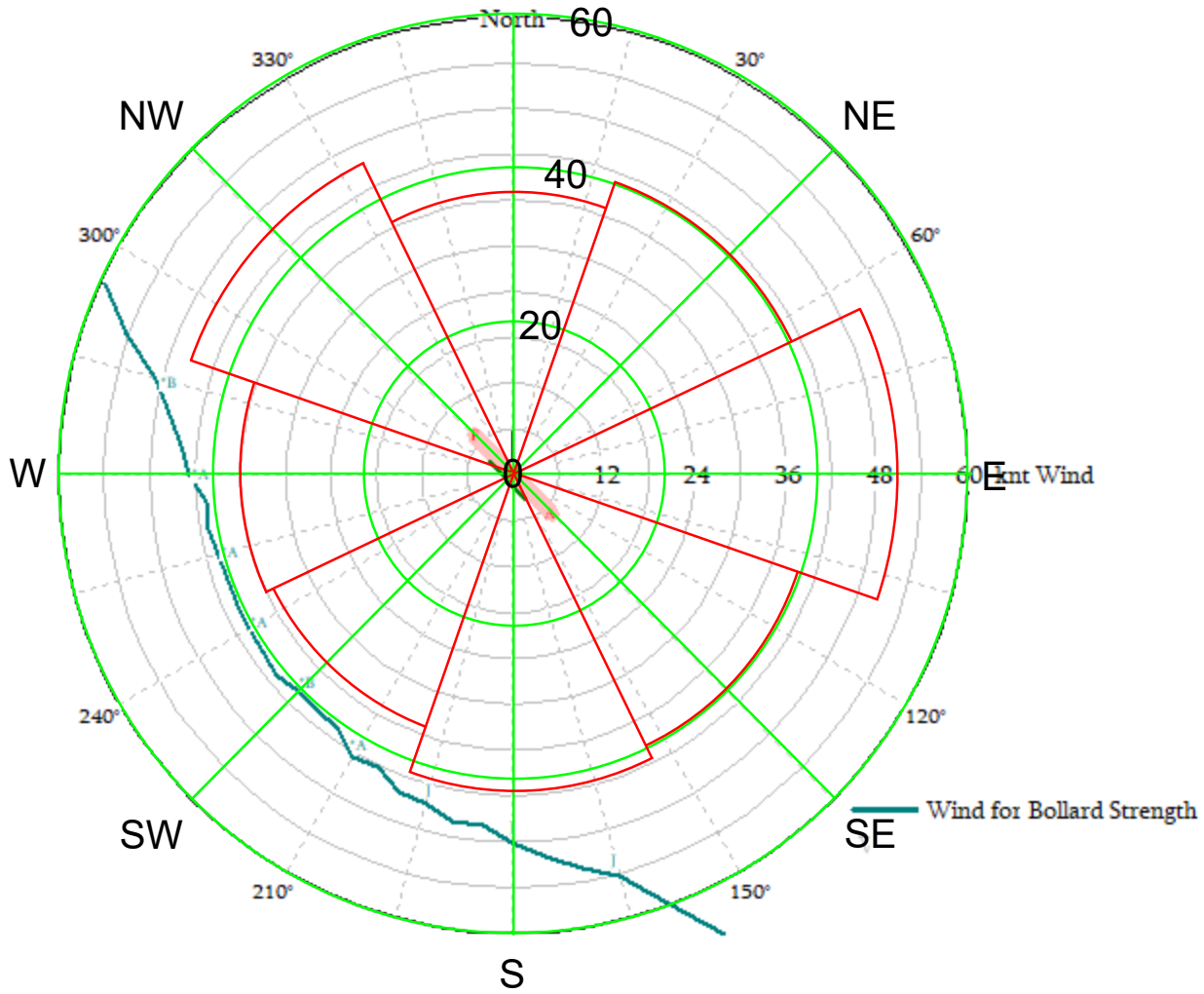
Ref:

Remarks: Remarks:

Water Level: 0.00 above datum

Draft: 16.4

Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

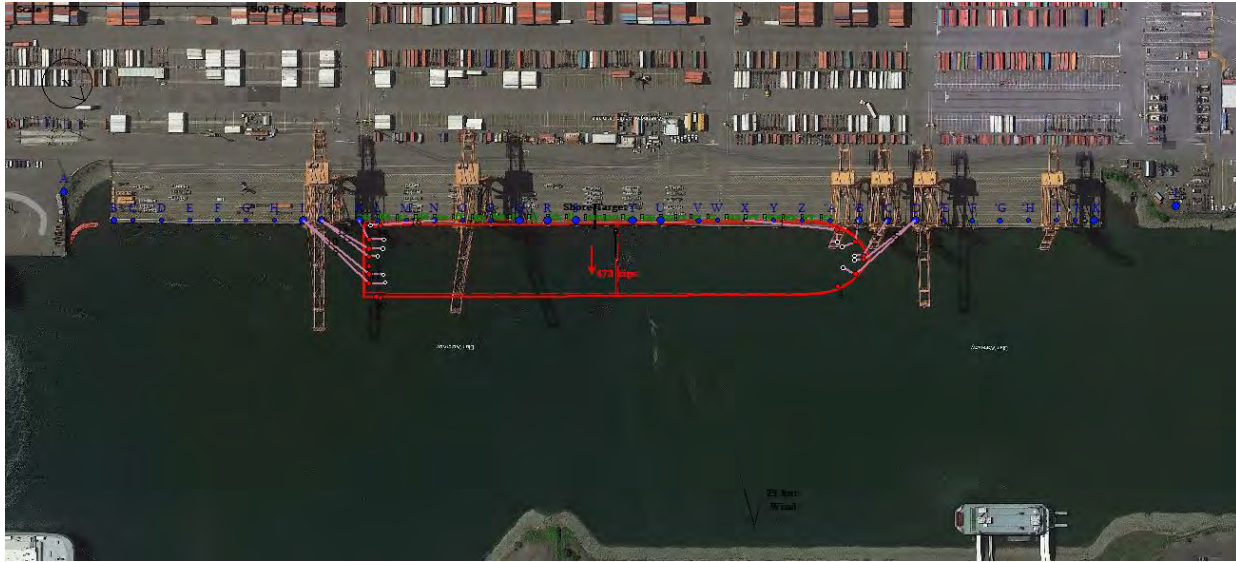
DATE

CLIENT

JOB NO.

WUT 20,000 TEU - MHHW

Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR\3 WUT (20,000 TEU) - MIDDLE (sheet 4)\20,000 TEU
Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area: 123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-641.1		628.3
Depth	107.9		107.9

Big Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	
6	587.6	-75.0	0.0	117.6	350	20	18.1 pp 384	
7	-624.5	-95.8	22.0	26.0	350	20	18.1 pp 384	
8	-636.7	-94.1	22.0	17.0	350	20	18.1 pp 384	
9	-655.1	-58.6	22.0	42.3	350	20	18.1 pp 384	
10	-655.1	-34.1	22.0	37.6	350	20	18.1 pp 384	
11	-655.1	-12.7	22.0	22.5	350	20	18.1 pp 384	
12	-655.1	12.7	22.0	22.5	350	20	18.1 pp 384	
13	-655.1	34.1	22.0	37.6	350	20	18.1 pp 384	

14	-655.1	58.6	22.0	42.3	350	20	18.1	pp	384
15	-636.7	94.1	22.0	17.0	350	20	18.1	pp	384
16	-624.5	95.8	22.0	26.0	350	20	18.1	pp	384

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\3 WUT (20,000 TEU) - MIDDLE (sheet 4)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	275
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	495
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	275
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	495
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	495
T	100.0	0.0	2.0	495
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	220
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	220
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	330
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	220
*G	1075.0	0.0	2.0	220
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	495
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-625.0	18.0	6.2	68.3
bb	-575.0	18.0	6.2	68.3

cc	-525.0	18.0	6.2	68.3
dd	-475.0	18.0	6.2	68.3
ee	-425.0	18.0	6.2	68.3
ff	-375.0	18.0	6.2	68.3
gg	-325.0	18.0	6.2	68.3
hh	-275.0	18.0	6.2	68.3
ii	-225.0	18.0	6.2	68.3
jj	-175.0	18.0	6.2	68.3
kk	-125.0	18.0	6.2	68.3
ll	-75.0	18.0	6.2	68.3
mm	-25.0	18.0	6.2	68.3
nn	25.0	18.0	6.2	68.3
oo	75.0	18.0	6.2	68.3
pp	125.0	18.0	6.2	68.3
qq	175.0	18.0	6.2	68.3
rr	215.0	18.0	6.2	68.3
ss	255.0	18.0	6.2	68.3
tt	300.0	18.0	6.2	68.3
uu	350.0	18.0	6.2	68.3
vv	400.0	18.0	6.2	68.3
ww	450.0	18.0	6.2	68.3
xx	500.0	18.0	6.2	68.3
yy	550.0	18.0	6.2	68.3
zz	600.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\3 WUT (20,000 TEU) - MIDDLE (sheet 4)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: 60.0 from Berth Target
Vessel Port Target: 50.7 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-0.6	-475.4		23.3
Total Force:	-0.5	-473.8		23.3
Movement of Vessel at its Port Target	-4.38 (aft)	-7.29 (out)	0.4° (port)	0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
1-X	3.76	282.0			11°	slack	
2-*B	1.23	108.5			41°	82.4	21%
3-*C	1.43	141.1			23°	97.5	25%
4-*D	1.83	197.3			16°	77.3	20%
5-*D	2.34	249.2			13°	61.8	16%
9-I	3.68	286.4			16°	80.4	21%

10-I	3.46	267.4		17°	72.1	19%
12-J	2.45	190.0		24°	78.2	20%
13-J	2.54	195.5		26°	52.0	14%
14-K	1.53	126.3		51°	146.7	38%
16-N	1.60	180.8		26°	87.6	23%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			100%	
zz	0			100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	109.5	96.4			152.4	31%	49°	43.9
J	97.1	67.1			130.0	30%	55°	54.5
K	41.7	81.3			146.7	33%	27°	114.8
N	-78.4	6.9			87.6	32%	-85°	38.5
X								
*B	-10.4	61.7			82.4	19%	-10°	53.7
*C	-50.0	74.2			97.5	30%	-34°	38.7
*D	-104.2	85.1			138.9	32%	-51°	34.7

Approximate natural periods
Surge: 162 Sway: 74 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:

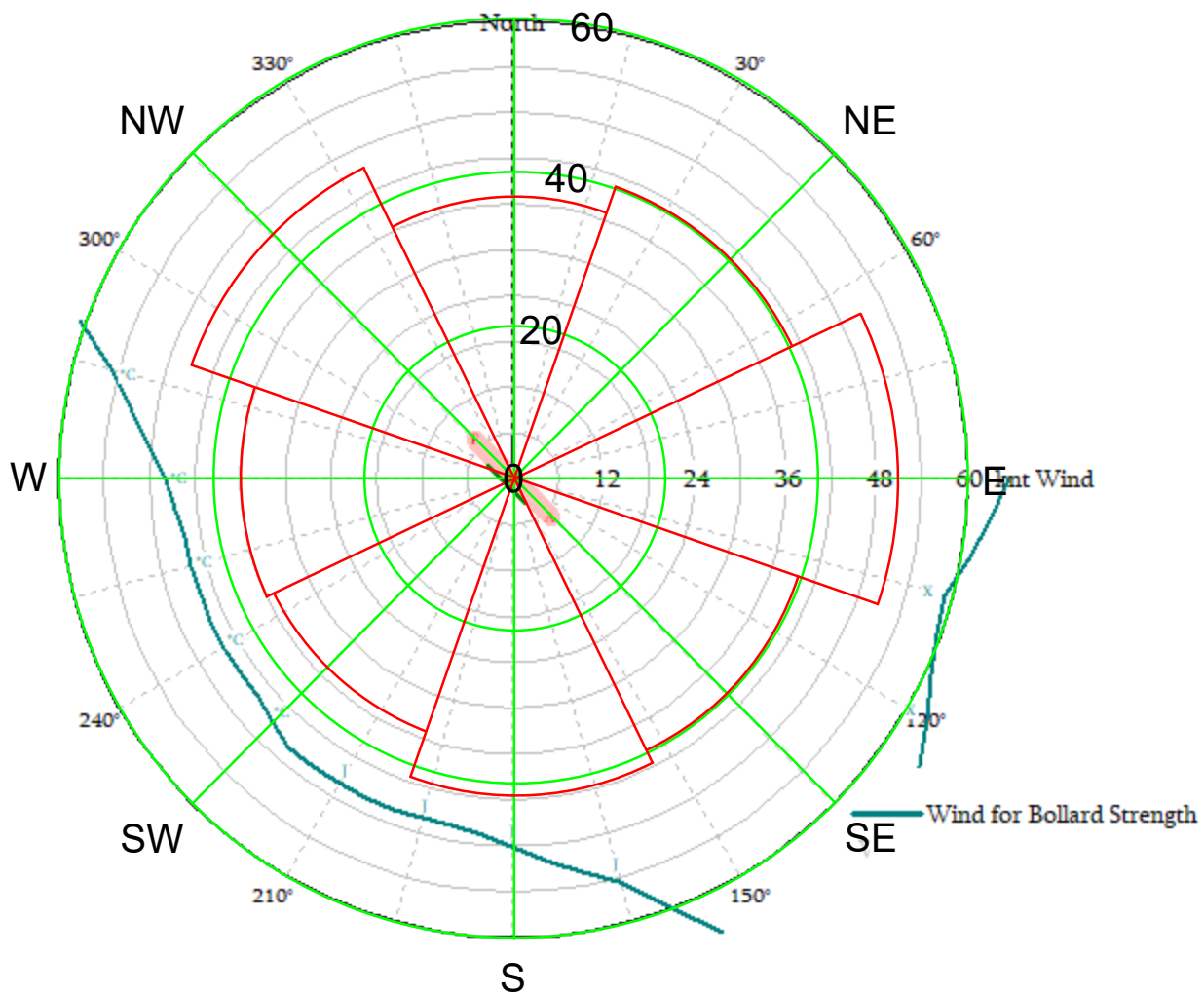
Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0

N





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 20,000 TEU - MLLW

Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR\3 WUT (20,000 TEU) - MIDDLE (sheet 4)\20,000 TEU Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area: 123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-641.1	628.3	
Depth	107.9	107.9	

Map Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	
6	587.6	-75.0	0.0	117.6	350	20	18.1 pp 384	
7	-624.5	-95.8	22.0	26.0	350	20	18.1 pp 384	
8	-636.7	-94.1	22.0	17.0	350	20	18.1 pp 384	
9	-655.1	-58.6	22.0	42.3	350	20	18.1 pp 384	
10	-655.1	-34.1	22.0	37.6	350	20	18.1 pp 384	
11	-655.1	-12.7	22.0	22.5	350	20	18.1 pp 384	
12	-655.1	12.7	22.0	22.5	350	20	18.1 pp 384	
13	-655.1	34.1	22.0	37.6	350	20	18.1 pp 384	
14	-655.1	58.6	22.0	42.3	350	20	18.1 pp 384	

15	-636.7	94.1	22.0	17.0	350	20	18.1	pp	384
16	-624.5	95.8	22.0	26.0	350	20	18.1	pp	384

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R\3 WUT (20,000 TEU) - MIDDLE (sheet 4)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	275
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	495
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	275
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	495
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	495
T	100.0	0.0	2.0	495
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	220
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	220
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	330
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	220
*G	1075.0	0.0	2.0	220
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	495
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-625.0	18.0	6.2	68.3
bb	-575.0	18.0	6.2	68.3
cc	-525.0	18.0	6.2	68.3

dd	-475.0	18.0	6.2	68.3
ee	-425.0	18.0	6.2	68.3
ff	-375.0	18.0	6.2	68.3
gg	-325.0	18.0	6.2	68.3
hh	-275.0	18.0	6.2	68.3
ii	-225.0	18.0	6.2	68.3
jj	-175.0	18.0	6.2	68.3
kk	-125.0	18.0	6.2	68.3
ll	-75.0	18.0	6.2	68.3
mm	-25.0	18.0	6.2	68.3
nn	25.0	18.0	6.2	68.3
oo	75.0	18.0	6.2	68.3
pp	125.0	18.0	6.2	68.3
qq	175.0	18.0	6.2	68.3
rr	215.0	18.0	6.2	68.3
ss	255.0	18.0	6.2	68.3
tt	300.0	18.0	6.2	68.3
uu	350.0	18.0	6.2	68.3
vv	400.0	18.0	6.2	68.3
ww	450.0	18.0	6.2	68.3
xx	500.0	18.0	6.2	68.3
yy	550.0	18.0	6.2	68.3
zz	600.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\3 WUT (20,000 TEU) - MIDDLE (sheet 4)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: 60.0 from Berth Target
Vessel Port Target: 38.9 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-0.7	-437.6		21.5
Total Force:	-0.7	-437.6		21.5

Movement of Vessel at its Port Target -3.97 (aft) -6.00 (out) 0.4° (port) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
1-X	3.72	280.0			9°	slack	
2-*B	1.14	101.2			33°	74.8	19%
3-*C	1.38	136.9			18°	85.5	22%
4-*D	1.80	194.4			12°	68.4	18%
5-*D	2.32	246.8			10°	54.3	14%
9-I	3.64	283.4			14°	69.4	18%
10-I	3.41	264.1			15°	62.1	16%

12-J	2.40	185.5		21°	67.1	17%
13-J	2.49	190.8		22°	44.4	12%
14-K	1.43	117.0		47°	142.8	37%
16-N	1.55	175.9		22°	82.3	21%

	Fender	Thrust	Compression	Pressure	Flatside	Cover
	bb	0			100%	
	cc	0			100%	
	dd	0			100%	
	ee	0			100%	
	ff	0			100%	
	gg	0			100%	
	hh	0			100%	
	ii	0			100%	
	jj	0			100%	
	kk	0			100%	
	ll	0			100%	
	mm	0			100%	
	nn	0			100%	
	oo	0			100%	
	pp	0			100%	
	qq	0			100%	
	rr	0			100%	
	ss	0			100%	
	tt	0			100%	
	uu	0			100%	
	vv	0			100%	
	ww	0			100%	
	xx	0			100%	
	yy	0			100%	
	zz	0			100%	

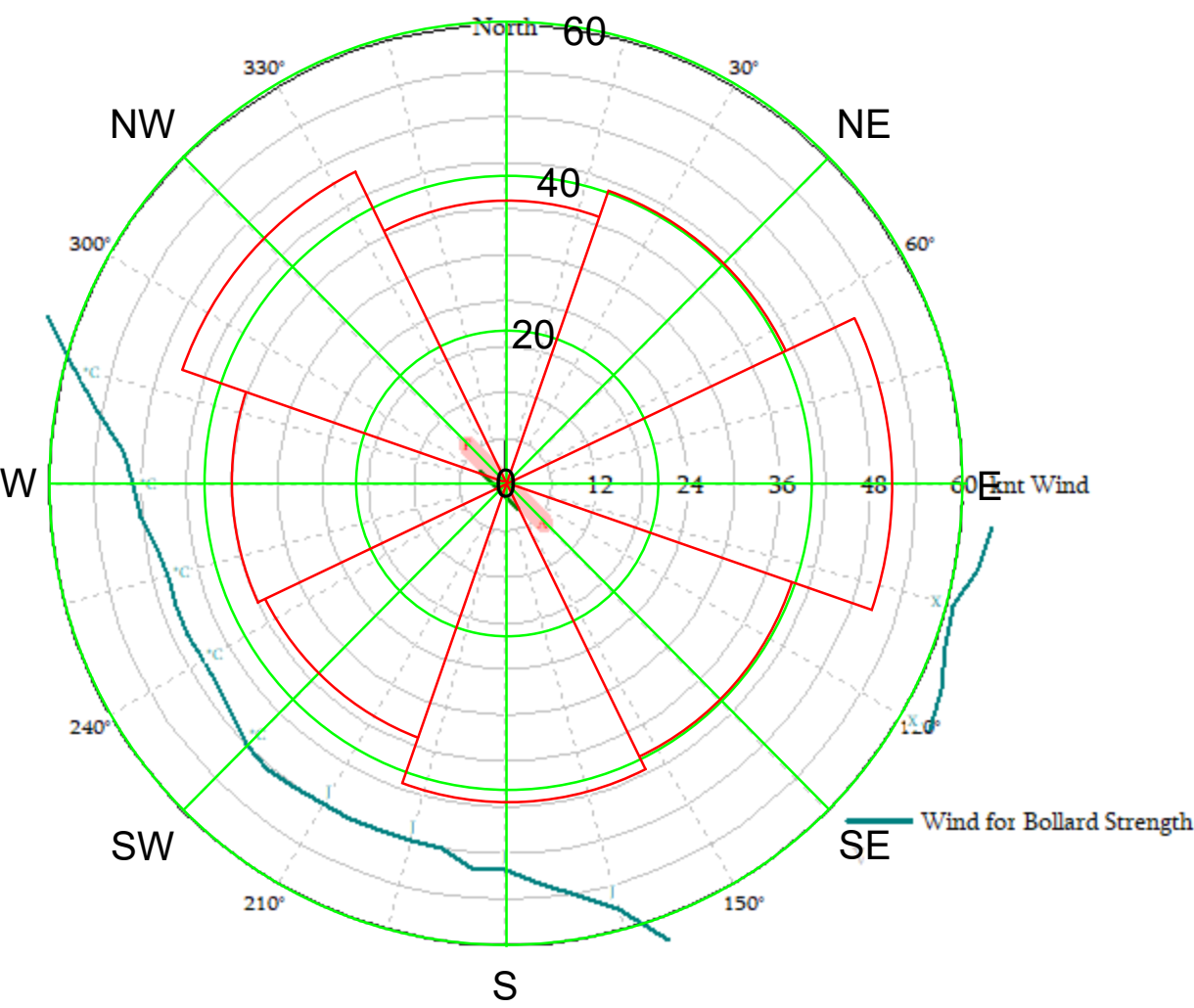
Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
I	96.3	83.5			131.4	27%	49°	32.1
J	86.1	58.1			111.3	25%	56°	40.1
K	46.3	85.5			142.8	32%	28°	104.6
N	-76.0	5.7			82.3	30%	-86°	31.2
X								
*B	-10.1	61.7			74.8	17%	-9°	41.2
*C	-45.5	67.3			85.5	26%	-34°	26.8
*D	-93.3	75.9			122.6	28%	-51°	23.6

Approximate natural periods
Surge: 155 Sway: 96 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 8,800 & 14,000 TEU - MHHW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\8 WUT (8,800 TEU)
- EAST SIDE (SHEET 5)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-900.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship
X-dist	-530.0	519.5
Depth	73.0	73.0

Midship Area

Line No.	Fair- Lead X	Fair- Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	20	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	20	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	20	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	20	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	20	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	20	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	20	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	20	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	20	14.0 pp 232	
10	-524.6	-67.4	0.0	20.0	350	20	14.0 pp 232	
11	-530.3	-66.9	0.0	20.0	350	20	14.0 pp 232	
12	-542.6	-35.1	0.0	20.0	350	20	14.0 pp 232	
13	-542.6	-22.3	0.0	20.0	350	20	14.0 pp 232	
14	-542.6	-16.6	0.0	20.0	350	20	14.0 pp 232	
15	-542.9	-3.3	0.0	20.0	350	20	14.0 pp 232	
16	-543.3	14.5	0.0	20.0	350	20	14.0 pp 232	
17	-542.6	22.5	0.0	20.0	350	20	14.0 pp 232	

18	-542.6	35.4	0.0	20.0	350	20	14.0	pp	232
19	-529.4	66.5	0.0	20.0	350	20	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	20	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	20	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	20	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	20	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\8
WUT (8,800 TEU) - EAST SIDE (SHEET 5)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1527.4	51.6	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\8 WUT (8,800 TEU) - EAST SIDE (SHEET 5)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 23.4
Fwd Offset of Vessel Target: -150.0 from Berth Target
Vessel Port Target: 24.0 above Pier
Wind Speed: 25 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 18924
Total Side Windage Area: 109995

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 4.97 (fwd) 6.18 (inw) 0.0° (port) 0.00 (up)
at its Port Target 0.39 (fwd) 0.02 (inw) -1.0° (stbd) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Worst Direction to Screen	Direction True	Line Tension	Percent Strength
3-*L	5.35	271.6			-65°	250°	63.6	27%
4-*L	5.32	270.6			-65°	250°	70.4	30%
6-*L	5.53	282.5			-65°	250°	76.3	33%

12-U	2.00	130.2		-100°	215°	39.2	17%
15-U	1.52	101.5		-100°	215°	53.5	23%
17-U	1.17	80.4		-110°	205°	80.5	35%
21-X	3.69	184.4		25°	340°	22.3	10%
22-*G	2.45	193.9		-70°	245°	86.9	37%

Fender	Thrust	Compression	Pressure	Flatside	Cover
ee	38	0.11	1.2	100%	
ff	29	0.08	0.9	100%	
gg	28	0.08	0.9	100%	
hh	26	0.07	0.8	100%	
ii	25	0.07	0.8	100%	
jj	24	0.07	0.8	100%	
kk	22	0.06	0.7	100%	
ll	21	0.06	0.7	100%	
mm	20	0.06	0.6	100%	
nn	19	0.05	0.6	100%	
oo	18	0.05	0.6	100%	
pp	17	0.05	0.6	100%	
qq	17	0.05	0.6	100%	
rr	17	0.05	0.5	100%	
ss	17	0.05	0.5	100%	
tt	17	0.05	0.5	100%	
uu	16	0.05	0.5	100%	
vv	17	0.05	0.5	100%	
ww	17	0.05	0.5	100%	
xx	17	0.05	0.5	100%	
yy	17	0.05	0.5	100%	

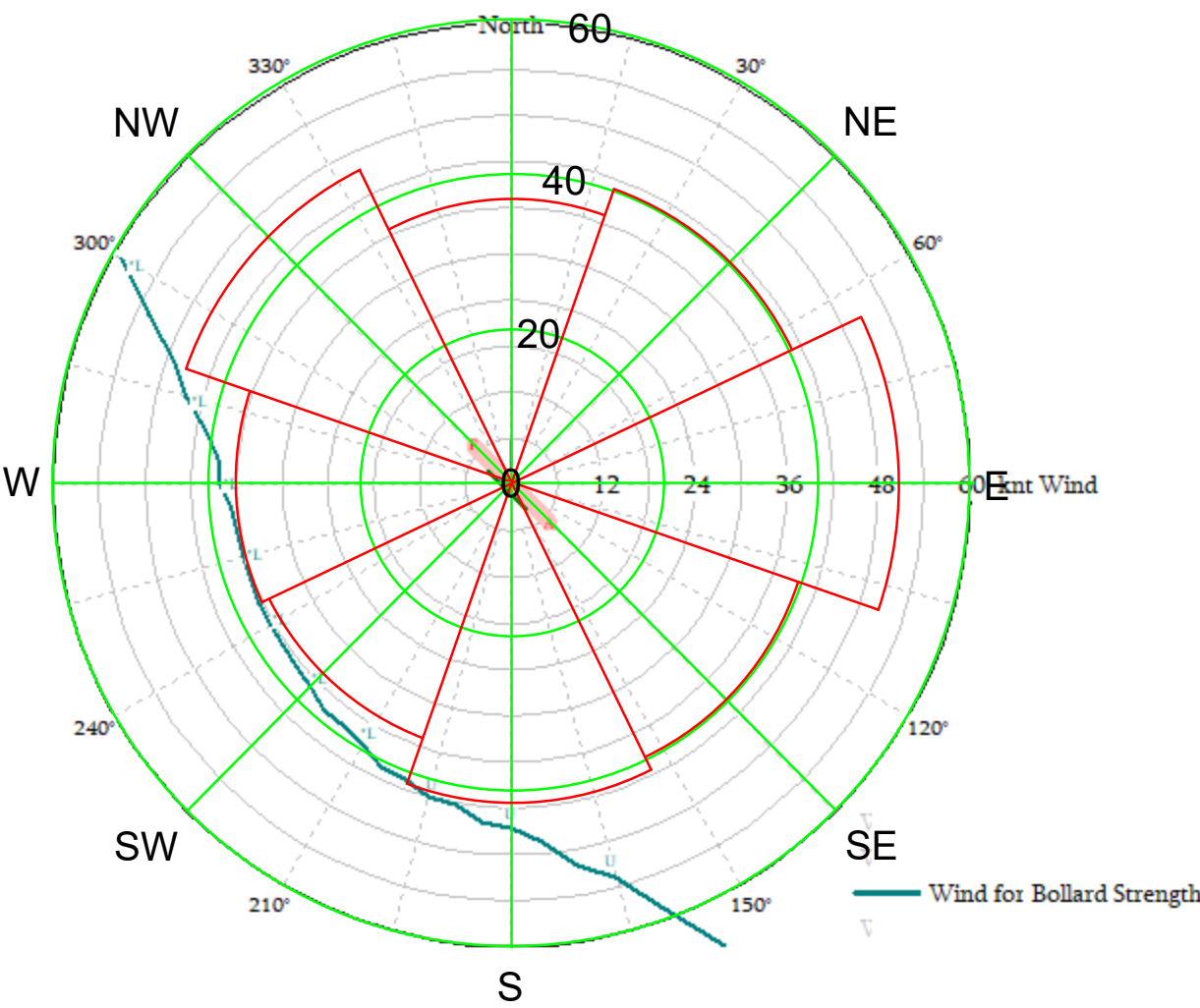
Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
U	79.8	142.9			170.6	39%	29°	48.8
X	-22.1	0.4			22.3	18%	-89°	2.9
*G	84.5	17.7			86.9	20%	78°	10.4
*L	-178.4	109.4			210.2	53%	-58°	19.9

Approximate natural periods
Surge: 142 Sway: 53 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:
Remarks: Remarks:
Water Level: 11.78 above datum
Draft: 39.4
Trim: 0.0



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\6 WUT (14,000 TEU)
- WEST SIDE - (SHEET 5)\Thalassa Hellas.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour	Longitudinal datum at Midship
X-dist -583.0	571.4
Depth 97.9	97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322

16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\6 WUT (14,000 TEU) - WEST SIDE - (SHEET 5)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1399.9	82.0	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\6 WUT (14,000 TEU) - WEST SIDE - (SHEET 5)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 40.7 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-1.6	-362.5		18.1
Total Force:	-1.6	-362.4		18.1

Movement of Vessel 1.50 (fwd) -3.95 (out) -0.1° (stbd) 0.00 (up)
at its Port Target

Line to	Pull	Tot.Line	In-Line	Winch	Inclin.	Line	Percent
---------	------	----------	---------	-------	---------	------	---------

Bollard	-in	Length	±Motion	Slip	Down	Tension	Strength
1-S	1.61	134.6			40°	63.1	21%
2-S	1.53	130.4			40°	76.1	26%
5-T	2.31	176.8			13°	42.3	14%
6-T	2.56	193.3			12°	42.2	14%
7-T	3.24	238.9			10°	40.1	13%
13-A	3.16	275.7			9°	48.1	16%
14-A	3.27	285.8			10°	46.3	16%
17-A	2.47	223.7			10°	55.2	19%
18-B	1.16	113.6			30°	108.0	36%
23-F	4.64	325.5			10°	14.2	5%
24-P	2.74	256.3			12°	33.0	11%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			16%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	93.7	113.7			149.4	37%	39°	25.3
B	43.7	83.0			108.0	20%	28°	53.5
F	-14.0	0.2			14.2	11%	-89°	2.6
P	32.1	3.5			33.0	26%	84°	7.1
S	-56.3	89.7			139.0	25%	-32°	90.0
T	-98.2	72.0			124.4	23%	-54°	25.4

Approximate natural periods
 Surge: 148 Sway: 68 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

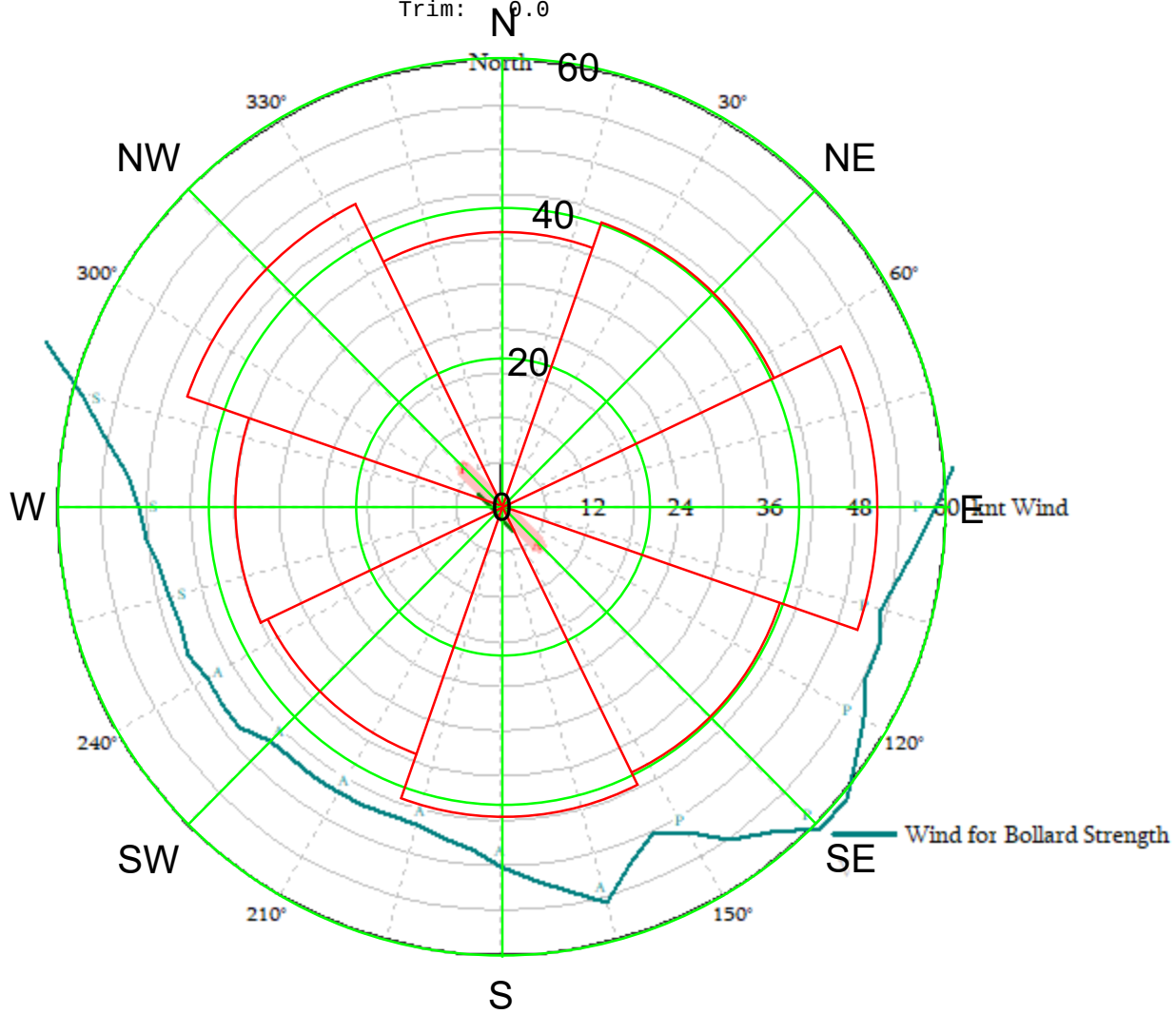
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

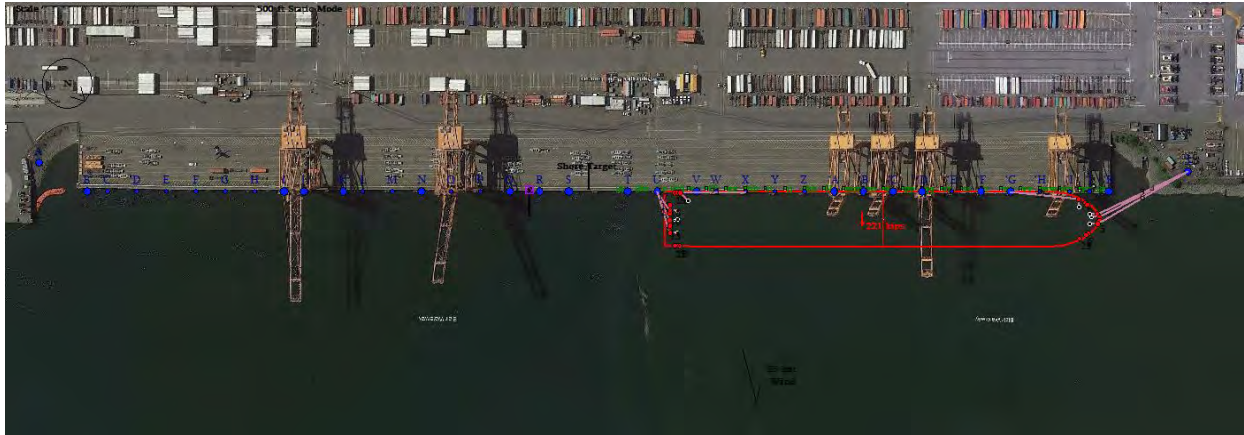
DATE

CLIENT

JOB NO.

WUT 8,800 & 14,000 TEU - MLLW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\8 WUT (8,800 TEU)
- EAST SIDE (SHEET 5)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-900.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -530.0 519.5
Depth 73.0 73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	20	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	20	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	20	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	20	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	20	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	20	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	20	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	20	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	20	14.0 pp 232	
10	-524.6	-67.4	0.0	20.0	350	20	14.0 pp 232	
11	-530.3	-66.9	0.0	20.0	350	20	14.0 pp 232	
12	-542.6	-35.1	0.0	20.0	350	20	14.0 pp 232	
13	-542.6	-22.3	0.0	20.0	350	20	14.0 pp 232	
14	-542.6	-16.6	0.0	20.0	350	20	14.0 pp 232	
15	-542.9	-3.3	0.0	20.0	350	20	14.0 pp 232	
16	-543.3	14.5	0.0	20.0	350	20	14.0 pp 232	
17	-542.6	22.5	0.0	20.0	350	20	14.0 pp 232	

18	-542.6	35.4	0.0	20.0	350	20	14.0	pp	232
19	-529.4	66.5	0.0	20.0	350	20	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	20	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	20	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	20	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	20	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\8
WUT (8,800 TEU) - EAST SIDE (SHEET 5)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1527.4	51.6	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\8 WUT (8,800 TEU) - EAST SIDE (SHEET 5)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 11.6
Fwd Offset of Vessel Target: -150.0 from Berth Target
Vessel Port Target: 12.2 above Pier
Wind Speed: 25 knots
Wind Direction from: All° (solid pier shields wind)

Total End-on Windage Area: 18924
Total Side Windage Area: 109995

Longitudinal Transverse Yaw Moment/LBP

Movement of Vessel 4.60 (fwd) 5.73 (inw) 0.0° (port) 0.00 (up)
at its Port Target

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
3-*L	5.31	270.7			3°	22.4	10%
4-*L	5.27	269.8			3°	22.3	10%
6-*L	5.49	281.7			3°	22.4	10%

12-U	1.98	128.5	5°	19.8	9%
15-U	1.49	99.2	7°	20.4	9%
17-U	1.12	77.3	10°	21.8	9%
21-X	3.65	183.3	4°	21.4	9%
22-*G	2.46	192.8	3°	18.1	8%

Fender	Thrust	Compression	Pressure	Flatside	Cover
ee	44	0.03	1.4	100%	
ff	30	0.03	1.0	100%	
gg	28	0.04	0.9	100%	
hh	27	0.04	0.9	100%	
ii	25	0.04	0.8	100%	
jj	24	0.04	0.8	100%	
kk	23	0.04	0.7	100%	
ll	21	0.04	0.7	100%	
mm	20	0.04	0.6	100%	
nn	19	0.04	0.6	100%	
oo	18	0.04	0.6	100%	
pp	17	0.04	0.6	100%	
qq	17	0.04	0.6	100%	
rr	17	0.04	0.5	100%	
ss	17	0.04	0.5	100%	
tt	17	0.04	0.5	100%	
uu	16	0.04	0.5	100%	
vv	17	0.04	0.5	100%	
ww	17	0.04	0.5	100%	
xx	17	0.04	0.5	100%	
yy	17	0.04	0.5	100%	

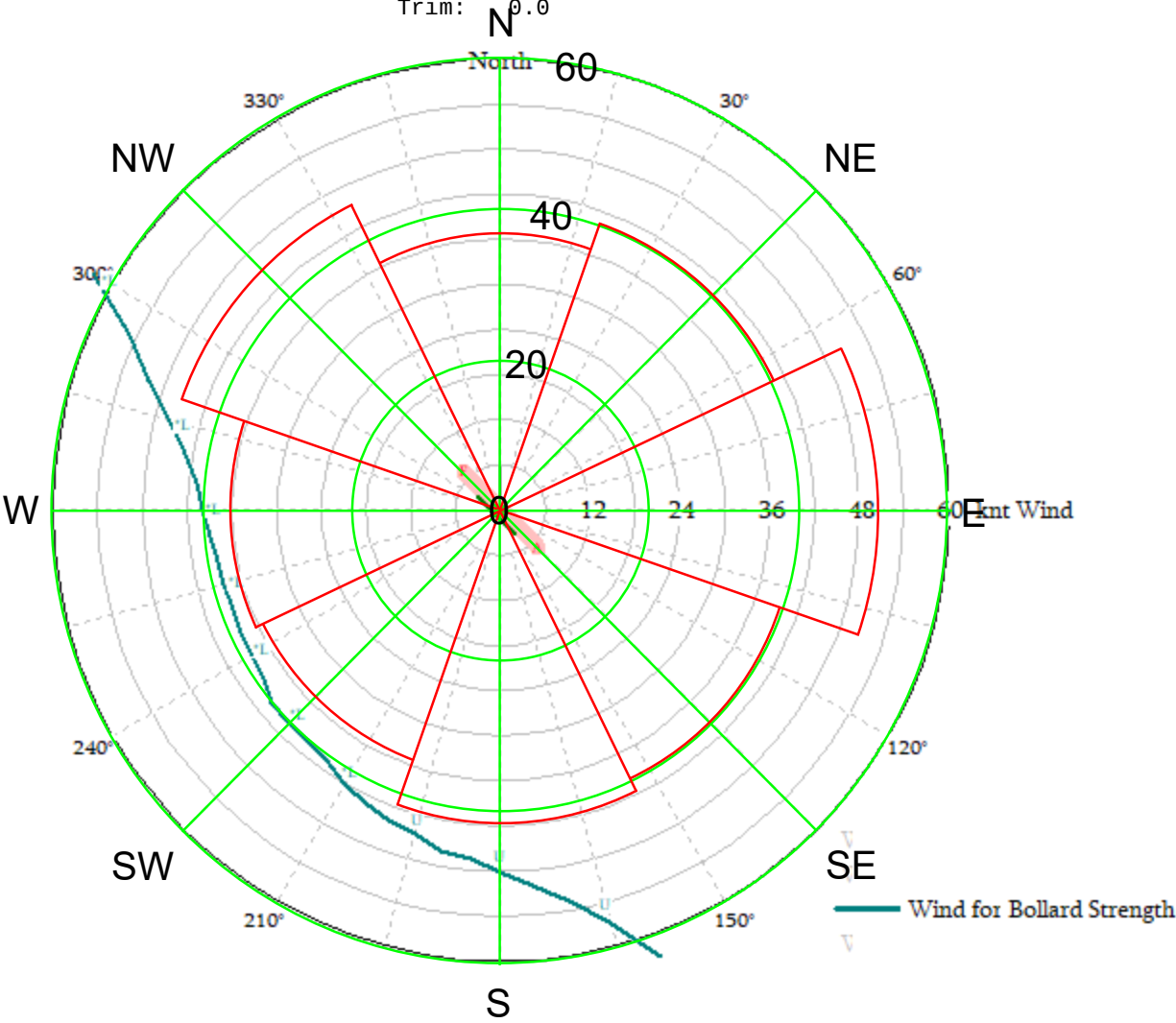
Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
U	71.0	125.3			145.2	33%	30°	20.3
X	-22.5	0.4			22.5	18%	-89°	1.4
*G	75.7	14.9			77.3	18%	79°	4.3
*L	-160.5	96.5			187.5	47%	-59°	9.5

Approximate natural periods
Surge: 139 Sway: 59 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 39.4
Trim: 0.0



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\6 WUT (14,000 TEU)
- WEST SIDE - (SHEET 5)\Thalassa Hellas.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship
X-dist	-583.0	571.4
Depth	97.9	97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322

16	-596.8	-4.1	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\6 WUT (14,000 TEU) - WEST SIDE - (SHEET 5)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1399.9	82.0	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\6 WUT (14,000 TEU) - WEST SIDE - (SHEET 5)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 28.9 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-1.6	-328.2		16.4
Total Force:	-1.6	-328.2		16.4
Movement of Vessel at its Port Target	1.41 (fwd)	-2.96 (out)	0.0° (stbd)	0.00 (up)

Line to	Pull	Tot.Line	In-Line	Winch	Inclin.	Line	Percent
---------	------	----------	---------	-------	---------	------	---------

Bollard	-in	Length	±Motion	Slip	Down	Tension	Strength
1-S	1.53	127.6			31°	55.0	18%
2-S	1.45	123.3			31°	67.1	23%
5-T	2.29	174.5			9°	34.2	11%
6-T	2.54	191.2			9°	34.5	12%
7-T	3.23	237.2			7°	33.5	11%
13-A	3.12	274.1			7°	41.5	14%
14-A	3.23	284.2			7°	40.2	14%
17-A	2.44	221.9			8°	47.4	16%
18-B	1.09	108.3			22°	96.5	32%
23-F	4.65	323.7			7°	14.7	5%
24-P	2.69	254.2			9°	31.1	10%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			14%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	81.5	98.6			128.9	32%	40°	15.8
B	42.1	79.0			96.5	18%	28°	35.9
F	-14.5	0.2			14.7	12%	-89°	1.9
P	30.6	3.1			31.1	25%	84°	4.7
S	-56.8	87.6			121.9	22%	-33°	63.0
T	-81.7	59.3			102.1	19%	-54°	14.7

Approximate natural periods
Surge: 142 Sway: 87 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:

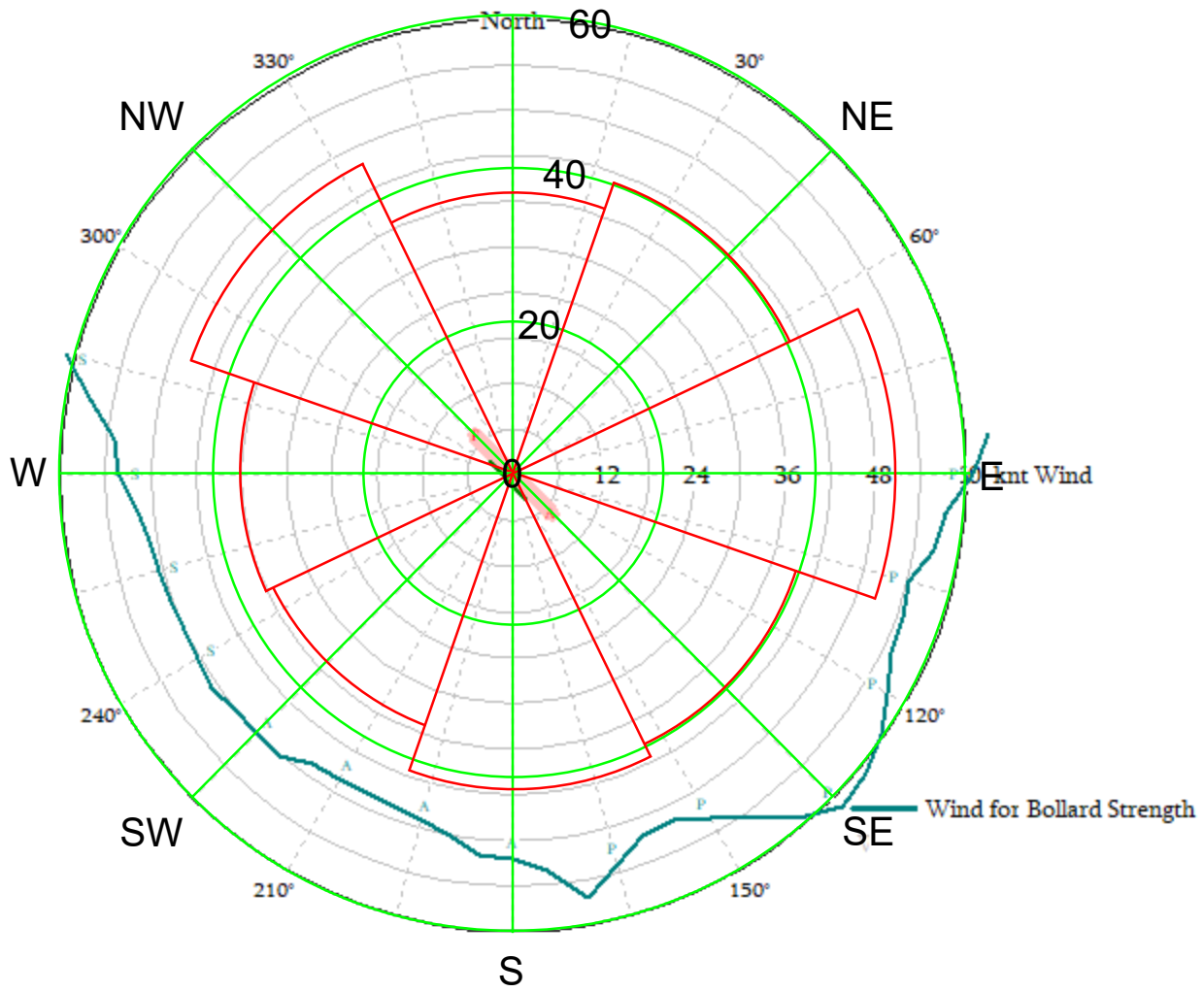
Remarks: Remarks:

Water Level: 0.00 above datum

Draft: 47.6

Trim: 0.0

N





PROJECT

BY

SHEET NO.

LOCATION

DATE

CLIENT

JOB NO.

WUT 8,800 & 20,000 TEU - MHHW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\9 WUT (8,800 TEU)
- WEST END - (SHEET 6)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-930.0 fwd from midship -70.0 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 70.0 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship
X-dist	-530.0	519.5
Depth	73.0	73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	1.2	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	1.2	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	1.2	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	1.2	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	1.2	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	1.2	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	1.2	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	1.2	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	1.2	14.0 pp 232	
10	-524.6	-67.4	0.0	20.0	350	1.2	14.0 pp 232	
11	-530.3	-66.9	0.0	20.0	350	1.2	14.0 pp 232	
12	-542.6	-35.1	0.0	20.0	350	1.2	14.0 pp 232	
13	-542.6	-22.3	0.0	20.0	350	1.2	14.0 pp 232	
14	-542.6	-16.6	0.0	20.0	350	1.2	14.0 pp 232	
15	-542.9	-3.3	0.0	20.0	350	1.2	14.0 pp 232	
16	-543.3	14.5	0.0	20.0	350	1.2	14.0 pp 232	
17	-542.6	22.5	0.0	20.0	350	1.2	14.0 pp 232	
18	-542.6	35.4	0.0	20.0	350	1.2	14.0 pp 232	

19	-529.4	66.5	0.0	20.0	350	1.2	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	1.2	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	1.2	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	1.2	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	1.2	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\9
WUT (8,800 TEU) - WEST END - (SHEET 6)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points:	315°
Width of Channel (for Current):	800
Pier Height (Fixed) above Datum:	21.4
Seabed Depth in way of Ship below Datum:	51.0
Permissible Surge Excursion Fwd/Aft:	± 10.00
Permissible Sway Excursion Port/Stbd:	± 10.00
Permissible Vertical Movement:	± 10.00
Dist of Berth Target to Right of Origin:	0.0
Wind Speed Specified at Height:	32.8
Current Specified at Depth:	0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.6	84.1	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
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bb	-1200.	18.0	6.2	68.3
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pp	-525.0	18.0	6.2	68.3
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xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

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jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 23.4
Fwd Offset of Vessel Target:1650.0 from Berth Target
Vessel Port Target: 24.0 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields wind)

Total End-on Windage Area: 18924
Total Side Windage Area:109995

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-2.2	-251.2		12.9
Total Force:	-2.2	-251.2		12.9
Movement of Vessel at its Port Target	4.35 (fwd)	2.97 (inw)	-0.7° (stbd)	0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
5-S	0.18	162.5			9°	57.2	25%

6-S	0.19	169.8	8°	57.2	25%
7-S	0.22	203.6	7°	49.6	21%
12-A	0.33	275.3	6°	14.7	6%
15-A	0.30	252.6	6°	18.6	8%
16-A	0.29	240.6	6°	21.2	9%
17-B	0.09	74.2	23°	55.7	24%
18-B	0.07	63.4	28°	75.5	33%
21-E	0.20	182.9	8°	slack	
22-N	0.27	225.7	6°	38.2	16%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	

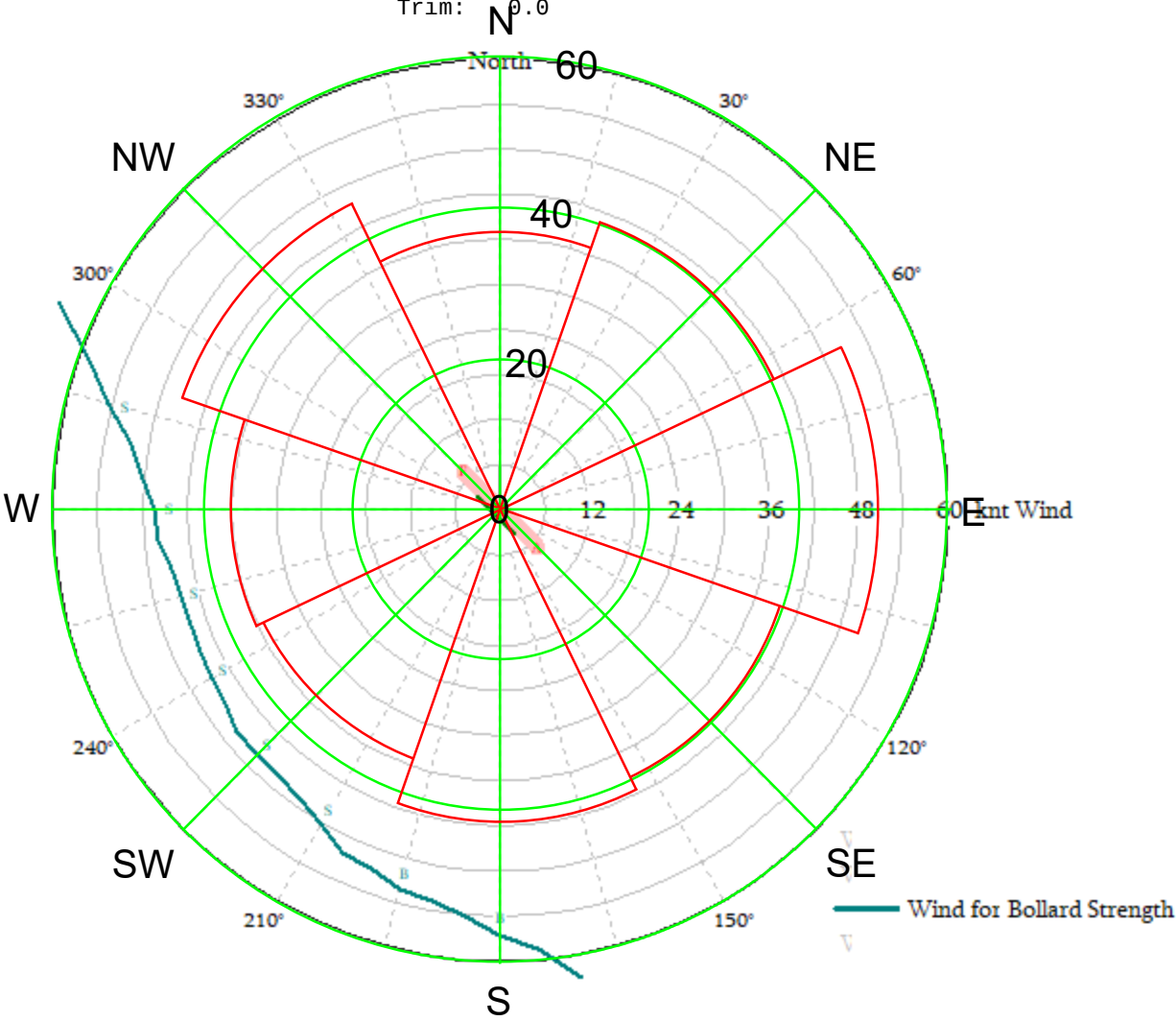
Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	39.7	36.6			54.4	14%	47°	5.8
B	47.7	107.4			130.8	24%	24°	57.5
E								
N	37.5	6.0			38.2	9%	81°	4.0
S	-126.7	101.7			164.0	30%	-51°	22.3

Approximate natural periods
Surge: 136 Sway: 52 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:
Remarks: Remarks:
Water Level: 11.78 above datum
Draft: 39.4
Trim: 0.0



Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\5 WUT (20,000 TEU)
- EAST SIDE - (SHEET 6)\20,000 TEU Vessel.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target:-600.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area:123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship
X-dist	-641.1	628.3
Depth	107.9	107.9

Adip Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	
6	587.6	-75.0	0.0	117.6	350	20	18.1 pp 384	
7	-624.5	-95.8	22.0	26.0	350	20	18.1 pp 384	
8	-636.7	-94.1	22.0	17.0	350	20	18.1 pp 384	
9	-655.1	-58.6	22.0	42.3	350	20	18.1 pp 384	
10	-655.1	-34.1	22.0	37.6	350	20	18.1 pp 384	
11	-655.1	-12.7	22.0	22.5	350	20	18.1 pp 384	
12	-655.1	12.7	22.0	22.5	350	20	18.1 pp 384	
13	-655.1	34.1	22.0	37.6	350	20	18.1 pp 384	
14	-655.1	58.6	22.0	42.3	350	20	18.1 pp 384	

15	-636.7	94.1	22.0	17.0	350	20	18.1	pp	384
16	-624.5	95.8	22.0	26.0	350	20	18.1	pp	384

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
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aa	-25.0	18.0	6.2	68.3
bb	25.0	18.0	6.2	68.3
cc	75.0	18.0	6.2	68.3
dd	125.0	18.0	6.2	68.3
ee	175.0	18.0	6.2	68.3
ff	215.0	18.0	6.2	68.3
gg	255.0	18.0	6.2	68.3
hh	300.0	18.0	6.2	68.3
ii	350.0	18.0	6.2	68.3
jj	400.0	18.0	6.2	68.3
kk	450.0	18.0	6.2	68.3
ll	500.0	18.0	6.2	68.3
mm	550.0	18.0	6.2	68.3
nn	600.0	18.0	6.2	68.3
oo	650.0	18.0	6.2	68.3
pp	700.0	18.0	6.2	68.3
qq	750.0	18.0	6.2	68.3
rr	800.0	18.0	6.2	68.3
ss	850.0	18.0	6.2	68.3
tt	900.0	18.0	6.2	68.3
uu	950.0	18.0	6.2	68.3
vv	1000.0	18.0	6.2	68.3
ww	1050.0	18.0	6.2	68.3
xx	1100.0	18.0	6.2	68.3
yy	1150.0	18.0	6.2	68.3
zz	1200.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: 22.0 from Berth Target
Vessel Port Target: 50.7 above Pier
Wind Speed: 25 knots
Wind Direction from: 45° True 90° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	25.5	509.9		-10.2
Total Force:	25.6	511.5		-10.1
Movement of Vessel at its Port Target	3.47 (fwd)	0.10 (inw)	0.1° (port)	0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
1-*F	2.20	246.5			13°	14.3	4%
2-*K	1.71	135.0			29°	24.5	6%
3-*K	1.65	135.4			25°	21.9	6%
4-*L	4.17	322.8			10°	24.8	6%

5-*L	4.79	372.3		9°	24.5	6%
6-*L	6.53	507.3		8°	24.3	6%
9-Q	2.69	278.1		17°	16.0	4%
10-Q	2.47	258.5		18°	15.7	4%
11-R	1.80	179.9		26°	16.4	4%
14-S	1.35	122.9		60°	18.5	5%
16-V	4.04	308.3		14°	25.9	7%

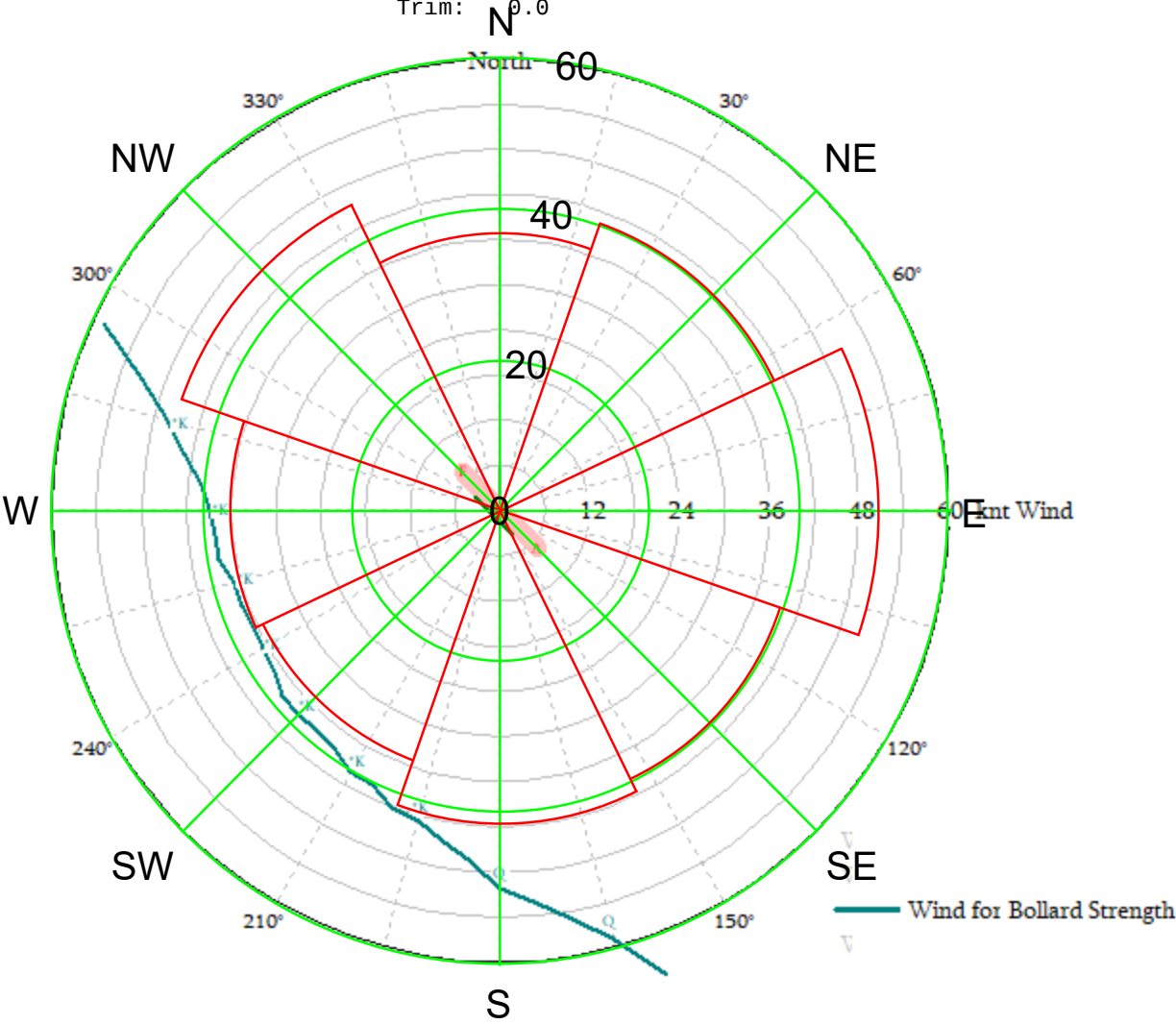
Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	34	0.02	1.1	100%	
cc	33	0.02	1.1	100%	
dd	32	0.03	1.0	100%	
ee	31	0.03	1.0	100%	
ff	30	0.03	1.0	100%	
gg	29	0.03	0.9	100%	
hh	28	0.04	0.9	100%	
ii	27	0.04	0.9	100%	
jj	27	0.04	0.9	100%	
kk	26	0.05	0.8	100%	
ll	25	0.05	0.8	100%	
mm	25	0.05	0.8	100%	
nn	25	0.05	0.8	100%	
oo	25	0.06	0.8	100%	
pp	26	0.06	0.8	100%	
qq	26	0.06	0.8	100%	
rr	27	0.07	0.9	100%	
ss	27	0.07	0.9	100%	
tt	28	0.07	0.9	100%	
uu	29	0.08	0.9	100%	
vv	30	0.08	1.0	100%	
ww	31	0.08	1.0	100%	
xx	32	0.09	1.0	100%	
yy	33	0.09	1.1	100%	
zz	34	0.09	1.1	100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
Q	109.6	98.3			154.3	28%	48°	
R	69.7	88.0			124.2	28%	38°	
S	26.2	69.0			129.0	23%	21°	
V	-26.4	0.7			27.2	6%	-90°	
*F	50.9	5.5			52.5	12%	84°	
*K	-122.4	183.1			245.5	45%	-34°	
*L	-107.3	66.9			127.9	32%	-58°	

Approximate natural periods
Surge: 161 Sway: 75 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Ref:
Remarks: Remarks:
Water Level: 11.78 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

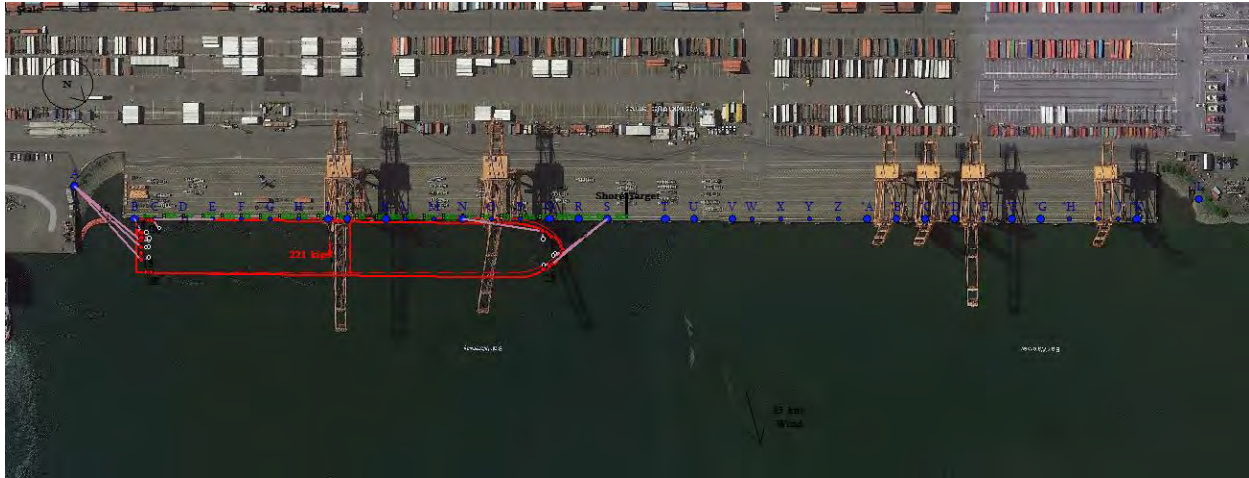
DATE

CLIENT

JOB NO.

WUT 8,800 & 20,000 TEU - MLLW

Arrangement for 8,800 TEU at POT-WUT



Vessel Data for 8,800 TEU

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\9 WUT (8,800 TEU)
- WEST END - (SHEET 6)\8,800 TEU.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1050.0
Breadth: 140.0
Depth: 73.0
Port Target:-930.0 fwd from midship -70.0 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 70.0 from CL and 0.0 above deck
End-on projected windage area: 14220 above deck level
Side projected windage area: 74715 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-530.0		519.5
Depth	73.0		73.0

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	515.4	40.4	0.0	20.0	350	1.2	14.0 pp 232	
2	520.5	36.6	0.0	20.0	350	1.2	14.0 pp 232	
3	545.9	13.0	0.0	20.0	350	1.2	14.0 pp 232	
4	551.0	4.9	0.0	20.0	350	1.2	14.0 pp 232	
5	551.0	-5.6	0.0	20.0	350	1.2	14.0 pp 232	
6	546.3	-12.0	0.0	20.0	350	1.2	14.0 pp 232	
7	521.7	-36.5	0.0	20.0	350	1.2	14.0 pp 232	
8	517.1	-40.3	0.0	20.0	350	1.2	14.0 pp 232	
9	-517.1	-67.7	0.0	20.0	350	1.2	14.0 pp 232	
10	-524.6	-67.4	0.0	20.0	350	1.2	14.0 pp 232	
11	-530.3	-66.9	0.0	20.0	350	1.2	14.0 pp 232	
12	-542.6	-35.1	0.0	20.0	350	1.2	14.0 pp 232	
13	-542.6	-22.3	0.0	20.0	350	1.2	14.0 pp 232	
14	-542.6	-16.6	0.0	20.0	350	1.2	14.0 pp 232	
15	-542.9	-3.3	0.0	20.0	350	1.2	14.0 pp 232	

16	-543.3	14.5	0.0	20.0	350	1.2	14.0	pp	232
17	-542.6	22.5	0.0	20.0	350	1.2	14.0	pp	232
18	-542.6	35.4	0.0	20.0	350	1.2	14.0	pp	232
19	-529.4	66.5	0.0	20.0	350	1.2	14.0	pp	232
20	-523.6	66.7	0.0	20.0	350	1.2	14.0	pp	232
21	-516.6	67.3	0.0	20.0	350	1.2	14.0	pp	232
22	498.9	50.6	0.0	20.0	350	1.2	14.0	pp	232
23	500.6	-48.7	0.0	20.0	350	1.2	14.0	pp	232

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1432.6	84.1	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft

nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 8,800 TEU at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\9 WUT (8,800 TEU) - WEST END - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 39.40 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 11.6
Fwd Offset of Vessel Target: 1650.0 from Berth Target
Vessel Port Target: 12.2 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 18924
Total Side Windage Area: 109995

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	-2.1	-220.1		11.3
Total Force:	-2.1	-220.1		11.3

Movement of Vessel 4.12 (fwd) 3.49 (inw) -0.7° (stbd) 0.00 (up)
at its Port Target

Line to	Pull	Tot.Line	In-Line	Winch	Inclin.	Line	Percent
---------	------	----------	---------	-------	---------	------	---------

Bollard	-in	Length	±Motion	Slip	Down	Tension	Strength
5-S	0.18	161.2			4°	49.9	21%
6-S	0.18	168.5			4°	50.0	22%
7-S	0.22	202.6			3°	43.3	19%
12-A	0.33	274.4			3°	11.3	5%
15-A	0.30	251.6			3°	14.9	6%
16-A	0.29	239.6			3°	17.4	8%
17-B	0.08	70.6			11°	42.8	18%
18-B	0.07	58.8			14°	67.0	29%
21-E	0.20	181.7			4°	slack	
22-N	0.27	224.8			3°	35.1	15%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	

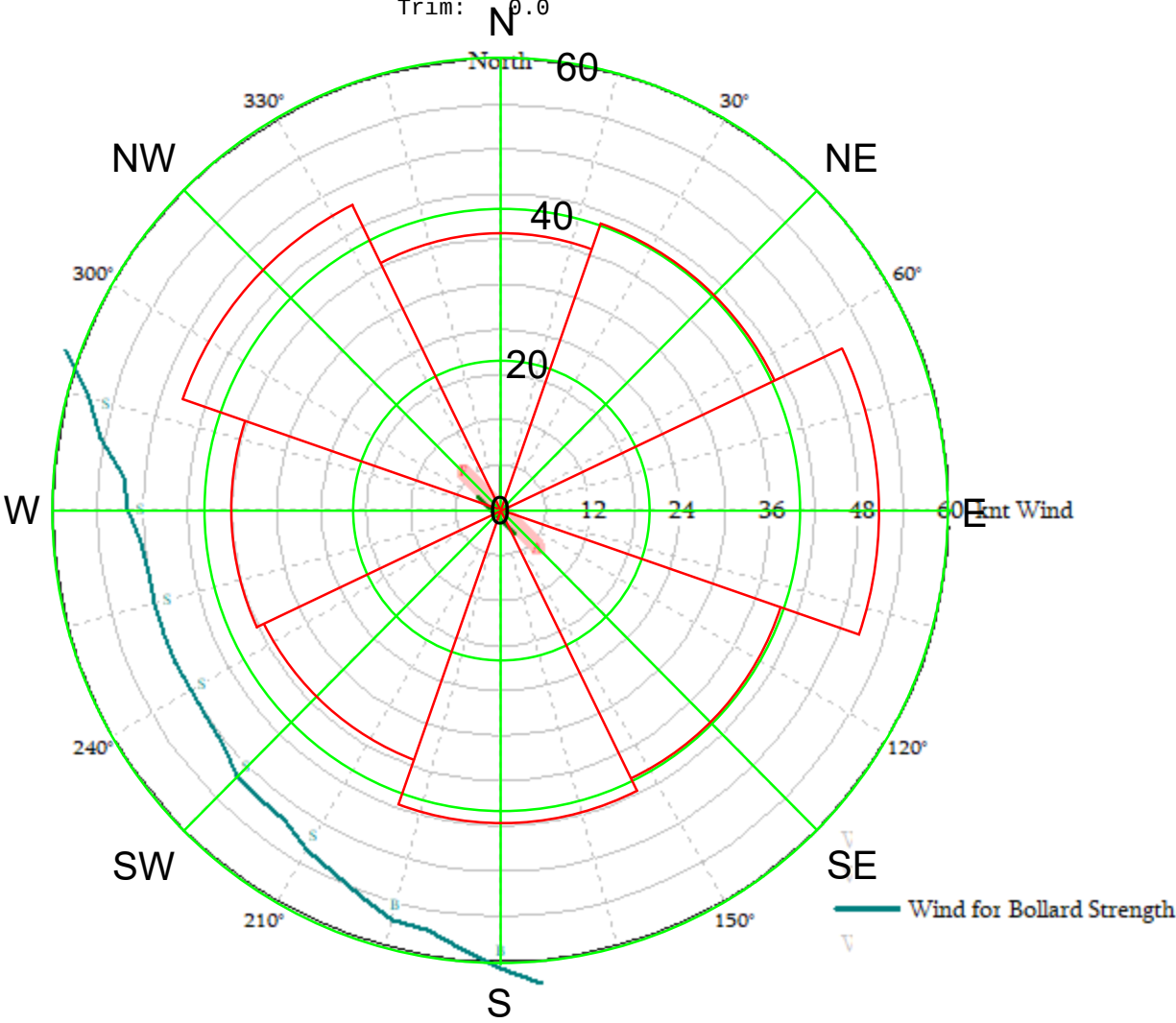
Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	32.0	29.3			43.5	11%	48°	2.5
B	44.1	97.2			109.6	20%	24°	24.9
E								
N	34.6	5.4			35.1	8%	81°	1.7
S	-112.1	88.7			143.3	26%	-52°	9.1

Approximate natural periods
Surge: 132 Sway: 58 Roll: 70 secs

Wind Capability Rose for 8,800 TEU at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 39.4
Trim: 0.0



Arrangement for 20,000 TEU vessel at POT-WUT



Vessel Data for 20,000 TEU vessel

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\5 WUT (20,000 TEU)
- EAST SIDE - (SHEET 6)\20,000 TEU Vessel.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1270.0
Breadth: 192.9
Depth: 107.9
Port Target:-600.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 21283 above deck level
Side projected windage area:123937 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
X-dist -641.1 628.3
Depth 107.9 107.9

Maple Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	587.6	75.0	0.0	32.5	350	20	18.1 pp 384	
2	634.7	43.0	0.0	37.2	350	20	18.1 pp 384	
3	656.0	5.6	0.0	23.8	350	20	18.1 pp 384	
4	656.0	-5.6	0.0	23.8	350	20	18.1 pp 384	
5	634.7	-43.0	0.0	37.2	350	20	18.1 pp 384	
6	587.6	-75.0	0.0	117.6	350	20	18.1 pp 384	
7	-624.5	-95.8	22.0	26.0	350	20	18.1 pp 384	
8	-636.7	-94.1	22.0	17.0	350	20	18.1 pp 384	
9	-655.1	-58.6	22.0	42.3	350	20	18.1 pp 384	
10	-655.1	-34.1	22.0	37.6	350	20	18.1 pp 384	
11	-655.1	-12.7	22.0	22.5	350	20	18.1 pp 384	
12	-655.1	12.7	22.0	22.5	350	20	18.1 pp 384	
13	-655.1	34.1	22.0	37.6	350	20	18.1 pp 384	
14	-655.1	58.6	22.0	42.3	350	20	18.1 pp 384	

15	-636.7	94.1	22.0	17.0	350	20	18.1	pp	384
16	-624.5	95.8	22.0	26.0	350	20	18.1	pp	384

Codes for Types of Line:
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Permissible Surge Excursion Fwd/Aft: ± 10.00
Permissible Sway Excursion Port/Stbd: ± 10.00
Permissible Vertical Movement: ± 10.00
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1408.3	76.9	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1541.2	39.1	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
--------	---------------------	-------------------	---------------------	---

aa	-25.0	18.0	6.2	68.3
bb	25.0	18.0	6.2	68.3
cc	75.0	18.0	6.2	68.3
dd	125.0	18.0	6.2	68.3
ee	175.0	18.0	6.2	68.3
ff	215.0	18.0	6.2	68.3
gg	255.0	18.0	6.2	68.3
hh	300.0	18.0	6.2	68.3
ii	350.0	18.0	6.2	68.3
jj	400.0	18.0	6.2	68.3
kk	450.0	18.0	6.2	68.3
ll	500.0	18.0	6.2	68.3
mm	550.0	18.0	6.2	68.3
nn	600.0	18.0	6.2	68.3
oo	650.0	18.0	6.2	68.3
pp	700.0	18.0	6.2	68.3
qq	750.0	18.0	6.2	68.3
rr	800.0	18.0	6.2	68.3
ss	850.0	18.0	6.2	68.3
tt	900.0	18.0	6.2	68.3
uu	950.0	18.0	6.2	68.3
vv	1000.0	18.0	6.2	68.3
ww	1050.0	18.0	6.2	68.3
xx	1100.0	18.0	6.2	68.3
yy	1150.0	18.0	6.2	68.3
zz	1200.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for 20,000 TEU vessel at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\5 WUT (20,000 TEU) - EAST SIDE - (SHEET 6)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: 22.0 from Berth Target
Vessel Port Target: 38.9 above Pier
Wind Speed: 25 knots
Wind Direction from: 45° True 90° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 32915
Total Side Windage Area: 200518

	Longitudinal	Transverse	Yaw Moment/LBP
Wind Drag Force:	25.5	509.9	-10.2
Total Force:	25.5	509.9	-10.2
Movement of Vessel at its Port Target	0.56 (fwd)	0.07 (inw)	0.0° (port) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
1-*F	2.20	244.2			10°	19.6	5%
2-*K	1.65	129.8			23°	16.1	4%
3-*K	1.60	130.9			20°	17.2	4%
4-*L	4.14	321.0			8°	19.8	5%

5-*L	4.76	370.7		7°	20.3	5%
6-*L	6.49	505.9		6°	21.2	6%
9-Q	2.67	274.9		14°	19.1	5%
10-Q	2.45	255.1		16°	19.3	5%
11-R	1.76	175.1		22°	20.8	5%
14-S	1.24	113.1		55°	21.2	6%
16-V	3.99	305.7		12°	19.8	5%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	24	0.07	0.8	100%	
cc	24	0.07	0.8	100%	
dd	24	0.07	0.8	100%	
ee	24	0.07	0.8	100%	
ff	24	0.07	0.8	100%	
gg	24	0.07	0.8	100%	
hh	25	0.07	0.8	100%	
ii	25	0.07	0.8	100%	
jj	25	0.07	0.8	100%	
kk	25	0.07	0.8	100%	
ll	25	0.07	0.8	100%	
mm	25	0.07	0.8	100%	
nn	25	0.07	0.8	100%	
oo	25	0.07	0.8	100%	
pp	25	0.07	0.8	100%	
qq	25	0.07	0.8	100%	
rr	25	0.07	0.8	100%	
ss	25	0.07	0.8	100%	
tt	25	0.07	0.8	100%	
uu	25	0.07	0.8	100%	
vv	25	0.07	0.8	100%	
ww	25	0.07	0.8	100%	
xx	25	0.07	0.8	100%	
yy	25	0.07	0.8	100%	
zz	25	0.07	0.8	100%	

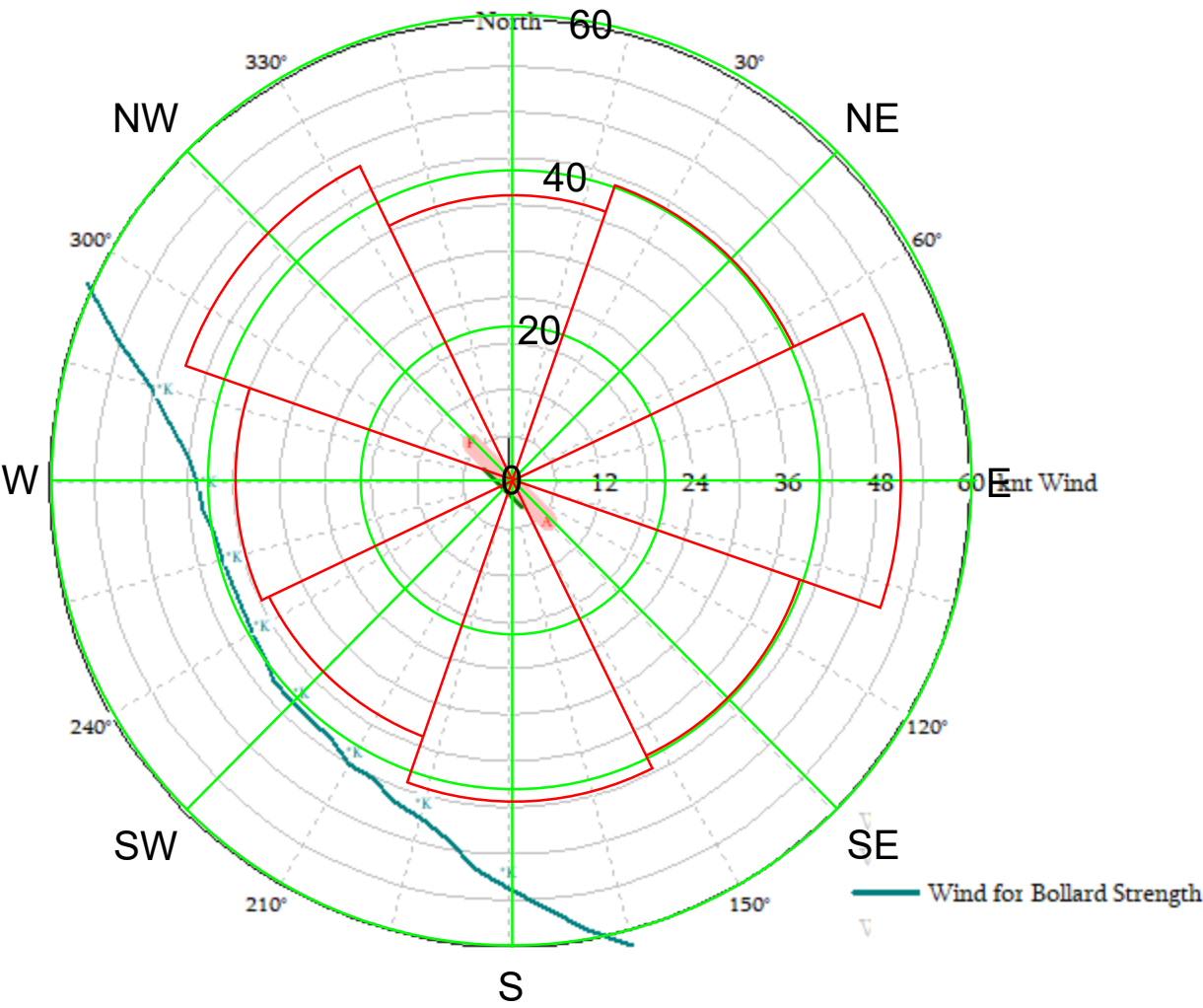
Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
Q	28.2	24.0			38.3	7%	50°	9.9
R	12.4	14.6			20.8	5%	40°	7.9
S	5.1	11.1			21.2	4%	25°	17.3
V	-19.3				19.8	5%	-90°	4.1
*F	19.2	2.0			19.6	4%	84°	3.4
*K	-19.0	23.5			32.6	6%	-39°	12.2
*L	-52.1	31.3			61.2	15%	-59°	7.2

Approximate natural periods
Surge: 156 Sway: 97 Roll: 91 secs

Wind Capability Rose for 20,000 TEU vessel at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:
Remarks: Remarks:
Water Level: 0.00 above datum
Draft: 47.6
Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

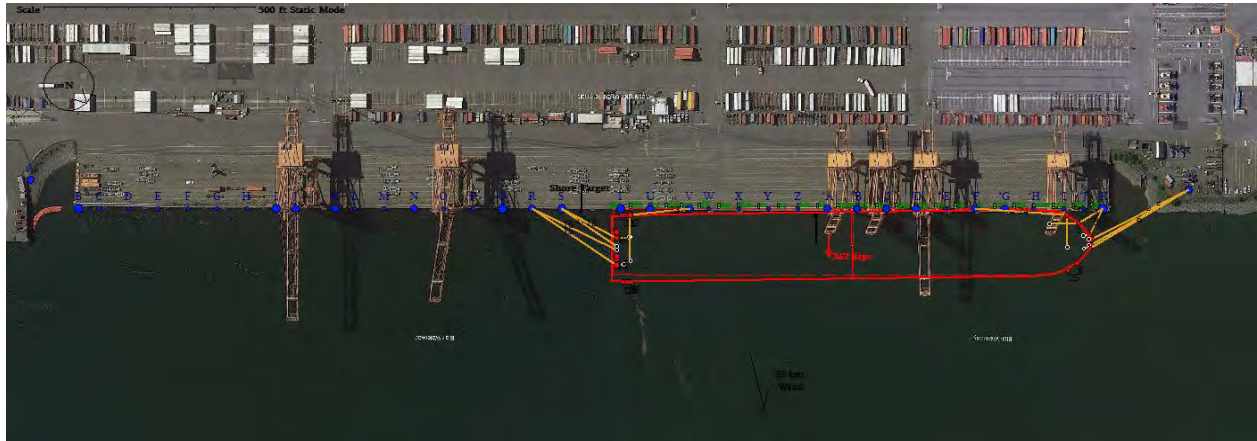
DATE

CLIENT

JOB NO.

WUT 14,000 & 14,000 TEU - MHHW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
 Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\7 WUT (14,000 TEU)
 - EAST SIDE (SHEET 7)\Thalassa Hellas.vsl)
 Units in ft, inches, & kips
 Longitudinal datum at Midship

LBP:1154.9
 Breadth: 167.3
 Depth: 97.9
 Port Target: -90.0 fwd from midship -75.3 from CL and 0.0 above deck
 Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
 End-on projected windage area: 18183 above deck level
 Side projected windage area: 96828 above deck level
 Fendering possible from: 0.505 LBP aft of midship
 to: 0.495 LBP fwd of midship
 Current drag data based on: OPTIMOOR (Generic Data)
 Wind drag data based on: Post-Panamax Container Ship
 Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0		571.4
Depth	97.9		97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322

17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\7
WUT (14,000 TEU) - EAST SIDE (SHEET 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1542.7	47.3	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\7 WUT (14,000 TEU) - EAST SIDE (SHEET 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: 600.0 from Berth Target
Vessel Port Target: 40.7 above Pier
Wind Speed: 25 knots
Wind Direction from: 210° True 255° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 26599
Total Side Windage Area:154920

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	0.3	-363.5		17.5
Total Force:	0.3	-363.5		17.5
Movement of Vessel at its Port Target	-4.29 (aft)	-10.2 (out)	0.8° (port)	0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
-----------------	----------	-----------------	-----------------	------------	--------------	--------------	------------------

2-*K	1.75	151.1		28°	88.6	30%
3-*K	1.02	98.3		27°	84.1	28%
4-*L	3.52	279.9		9°	49.5	17%
5-*L	3.61	286.6		8°	46.6	16%
6-*L	3.84	302.9		8°	44.0	15%
13-R	3.30	269.0		9°	86.7	29%
16-R	2.84	235.5		9°	63.7	21%
17-S	1.92	166.4		13°	132.2	44%
18-S	2.31	196.2		14°	72.2	24%
23-V	3.29	263.3		14°	71.1	24%
24-*F	3.95	318.8		9°	slack	

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
R	128.0	74.9			150.1	34%	60°	23.0
S	168.3	105.5			204.0	37%	58°	46.5
V	-68.5	7.5			71.1	16%	-84°	17.5
*F								
*K	-99.9	107.4			167.0	30%	-43°	79.9
*L	-121.3	66.7			140.0	35%	-61°	20.5

Approximate natural periods
Surge: 131 Sway: 69 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

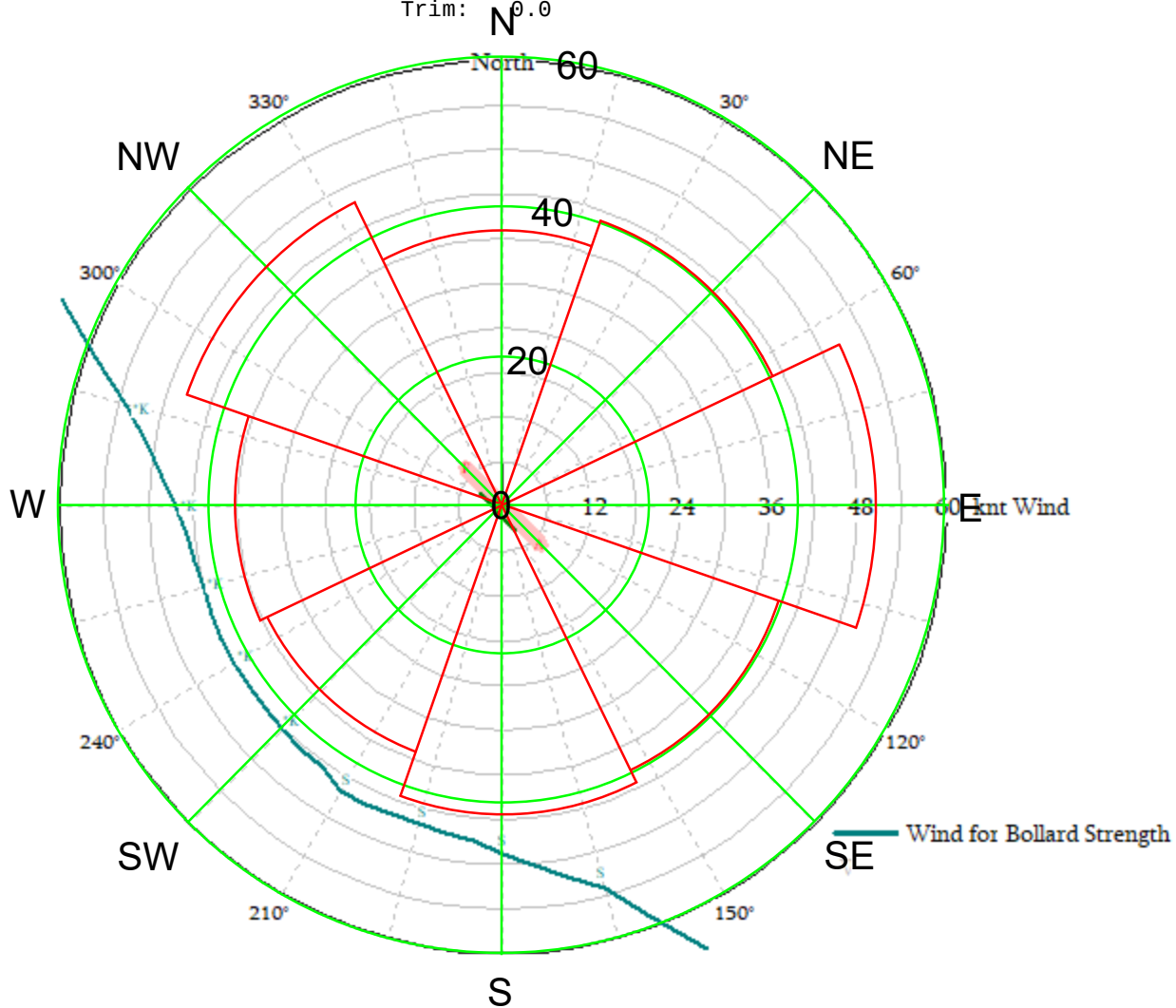
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\10 WUT (14,000 TEU) - WEST SIDE - (SHEET 7)\Thalassa Hellas.vsl)
 Units in ft, inches, & kips
 Longitudinal datum at Midship

LBP:1154.9
 Breadth: 167.3
 Depth: 97.9
 Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
 Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
 End-on projected windage area: 18183 above deck level
 Side projected windage area: 96828 above deck level
 Fendering possible from: 0.505 LBP aft of midship
 to: 0.495 LBP fwd of midship
 Current drag data based on: OPTIMOOR (Generic Data)
 Wind drag data based on: Post-Panamax Container Ship
 Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour Longitudinal datum at Midship
 X-dist -583.0 571.4
 Depth 97.9 97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	568.4	50.7	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	572.7	45.0	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322

17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\10
WUT (14,000 TEU) - WEST SIDE - (SHEET 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\10 WUT (14,000 TEU) - WEST SIDE - (SHEET 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 11.78 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 15.2
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 40.7 above Pier
Wind Speed: 25 knots
Wind Direction from: 240° True -75° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	22.0	-364.4		-6.6
Total Force:	22.0	-364.4		-6.6
Movement of Vessel at its Port Target	4.60 (fwd)	-9.74 (out)	-1.0° (stbd)	0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
-----------------	----------	-----------------	-----------------	------------	--------------	--------------	------------------

2-T	3.09	256.8		12°	30.3	10%
3-T	2.06	178.2		13°	126.0	42%
7-T	2.88	239.3		10°	150.0	50%
13-A	3.37	268.2		9°	32.5	11%
15-A	3.60	284.2		10°	35.0	12%
16-A	2.75	223.0		11°	43.3	15%
18-B	1.23	113.5		30°	57.0	19%
19-B	0.87	86.7		36°	95.4	32%
23-F	4.01	326.1		11°	slack	
24-O	4.23	328.4		9°	68.1	23%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			47%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	72.5	81.3			110.7	28%	42°	19.4
B	75.0	101.4			151.9	28%	36°	84.7
F								
O	66.7	8.8			68.1	54%	83°	10.2
T	-243.2	172.0			304	55%	-55°	60.0

Approximate natural periods
Surge: 149 Sway: 69 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

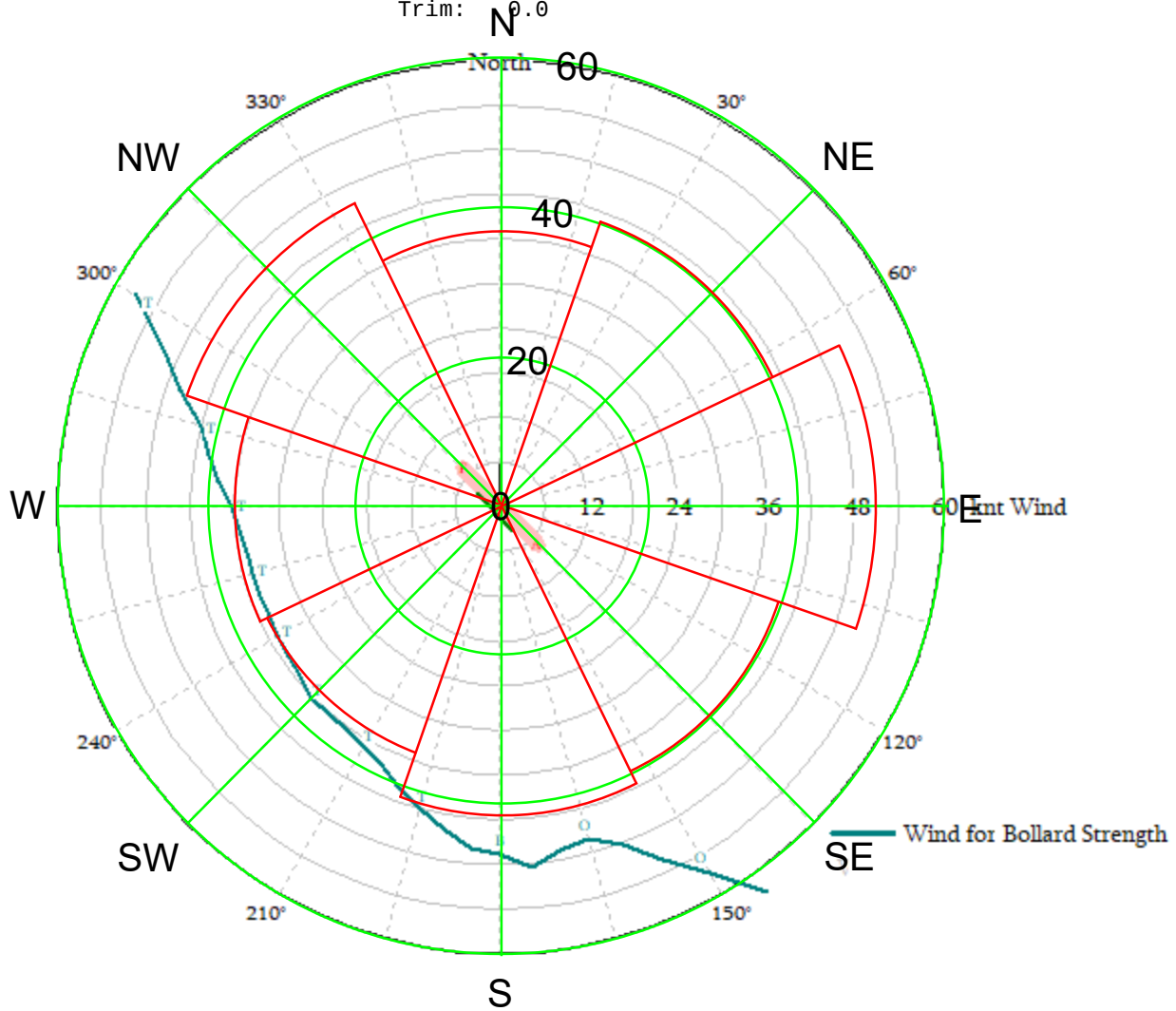
Ref:

Remarks: Remarks:

Water Level: 11.78 above datum

Draft: 47.6

Trim: 0.0





PROJECT

BY

SHEET NO.

LOCATION

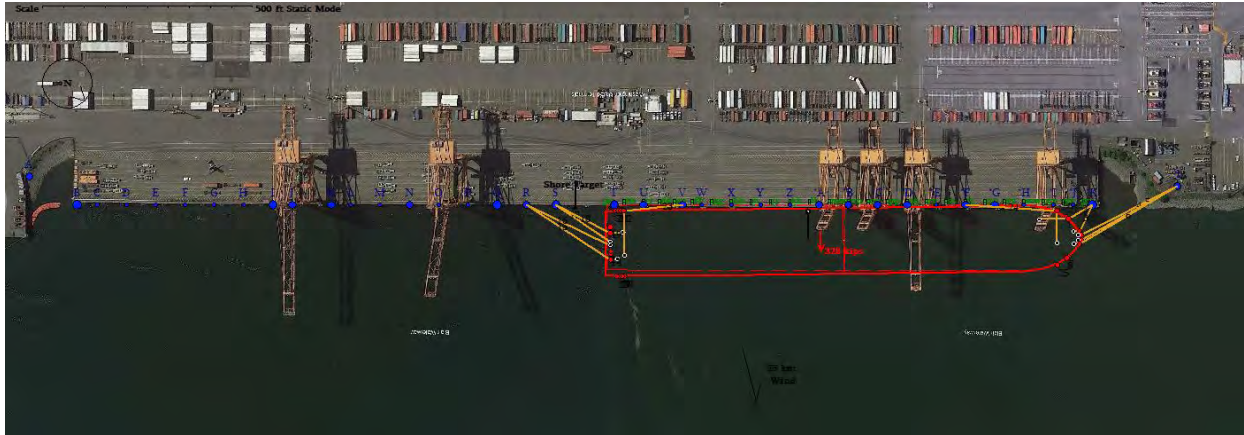
DATE

CLIENT

JOB NO.

WUT 14,000 & 14,000 TEU - MLLW

Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\7 WUT (14,000 TEU)
- EAST SIDE (SHEET 7)\Thalassa Hellas.vsl)
Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: -90.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship	
X-dist	-583.0		571.4
Depth	97.9		97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	571.4	51.9	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	576.8	47.8	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322
17	-596.4	4.9	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322
18	-596.8	26.9	0.0	39.7	350	20	5.7 pe 298	433 12.4 pp 322
19	-596.8	42.3	0.0	23.4	350	20	5.7 pe 298	433 12.4 pp 322

20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\7
WUT (14,000 TEU) - EAST SIDE (SHEET 7)\WUT.bth)

Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1542.7	47.3	-1.2	400

Fender	X-Dist	Ht above	Width	Face Contact
--------	--------	----------	-------	--------------

	to Origin	Datum	Along Side	Area (ft ²)
aa	75.0	18.0	6.2	68.3
bb	125.0	18.0	6.2	68.3
cc	175.0	18.0	6.2	68.3
dd	215.0	18.0	6.2	68.3
ee	255.0	18.0	6.2	68.3
ff	300.0	18.0	6.2	68.3
gg	350.0	18.0	6.2	68.3
hh	400.0	18.0	6.2	68.3
ii	450.0	18.0	6.2	68.3
jj	500.0	18.0	6.2	68.3
kk	550.0	18.0	6.2	68.3
ll	600.0	18.0	6.2	68.3
mm	650.0	18.0	6.2	68.3
nn	700.0	18.0	6.2	68.3
oo	750.0	18.0	6.2	68.3
pp	800.0	18.0	6.2	68.3
qq	850.0	18.0	6.2	68.3
rr	900.0	18.0	6.2	68.3
ss	950.0	18.0	6.2	68.3
tt	1000.0	18.0	6.2	68.3
uu	1050.0	18.0	6.2	68.3
vv	1100.0	18.0	6.2	68.3
ww	1150.0	18.0	6.2	68.3
xx	1200.0	18.0	6.2	68.3
yy	1250.0	18.0	6.2	68.3
zz	1300.0	18.0	6.2	68.3

Fender Load-Compression Data

aa	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
bb	64	186	288	320	301	282	282	288	307	320	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
cc	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
dd	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ee	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ff	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
gg	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
hh	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ii	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
jj	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
kk	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ll	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
mm	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
nn	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\7 WUT (14,000 TEU) - EAST SIDE (SHEET 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
 Water Level: 0.00 above Datum (initialised at this water level)
 Draft: 47.60 (initialised at this draft)
 Trim: 0.00 (initialised at this trim)
 Bottom Clearance: 3.4
 Fwd Offset of Vessel Target: 600.0 from Berth Target
 Vessel Port Target: 28.9 above Pier
 Wind Speed: 25 knots
 Wind Direction from: 210° True 255° Screen Right (solid pier shields wind)

Total End-on Windage Area: 26599
 Total Side Windage Area: 154920

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	0.2	-329.1		15.9
Total Force:	0.2	-329.1		15.9

Movement of Vessel at its Port Target -3.85 (aft) -8.94 (out) 0.7° (port) 0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
2-*K	1.69	146.1			21°	83.2	28%
3-*K	0.96	93.6			20°	69.1	23%
4-*L	3.52	278.4			6°	44.3	15%

5-*L	3.61	285.1		6°	41.8	14%
6-*L	3.83	301.5		6°	39.6	13%
13-R	3.26	267.5		6°	78.9	26%
16-R	2.81	233.9		6°	58.3	20%
17-S	1.88	164.1		9°	119.9	40%
18-S	2.27	193.8		10°	65.9	22%
23-V	3.27	260.8		10°	65.9	22%
24-*F	3.91	317.2		7°	0.8	0%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	0			100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			100%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
R	118.0	68.0			137.0	31%	60°	14.7
S	156.3	95.6			185.6	34%	59°	29.9
V	-64.6	6.4			65.9	15%	-84°	11.5
*F	0.8				0.8	0%	86°	
*K	-95.4	98.1			146.5	27%	-44°	52.5
*L	-109.6	60.1			125.7	31%	-61°	13.3

Approximate natural periods
Surge: 124 Sway: 89 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

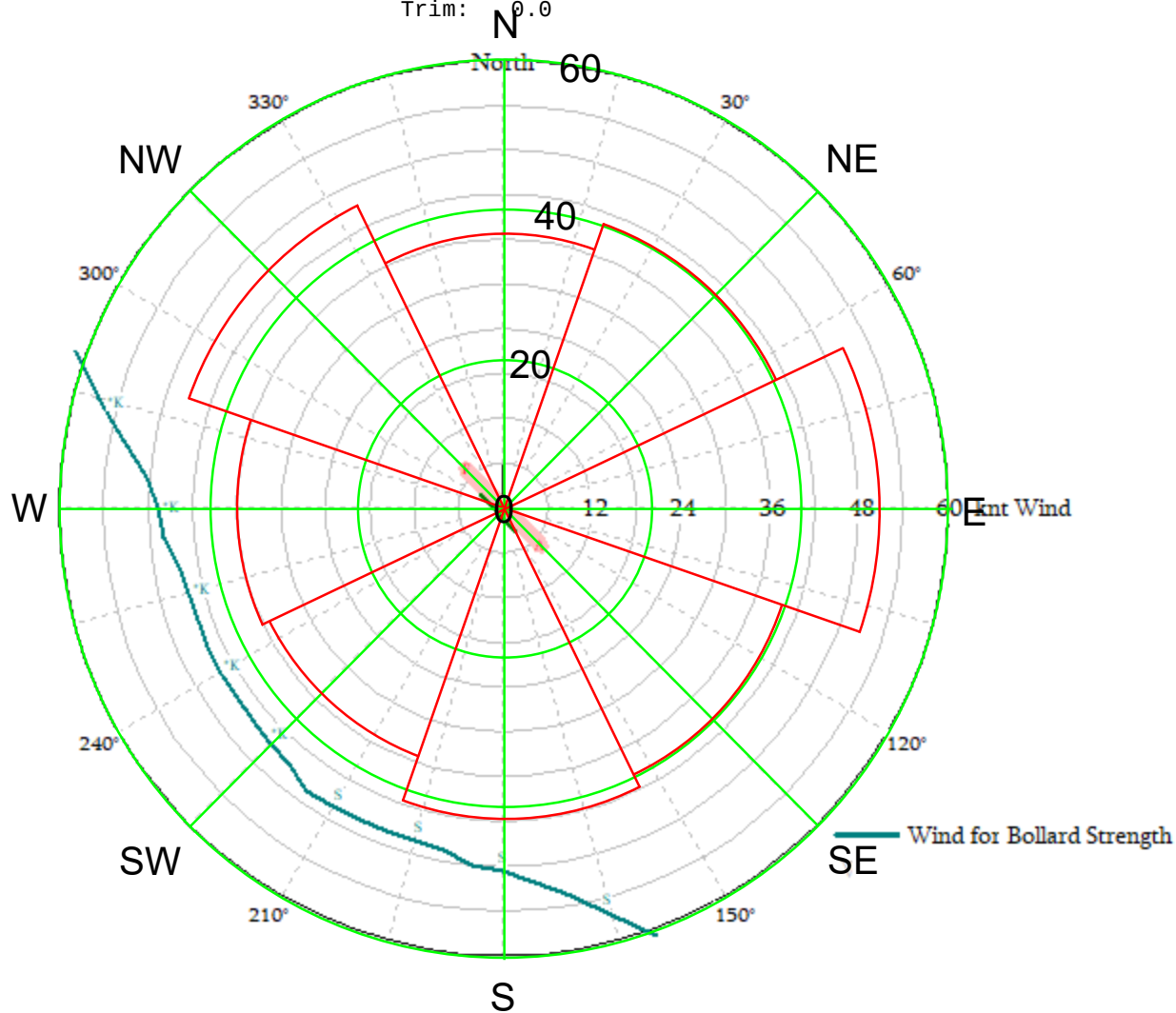
Ref:

Remarks: Remarks:

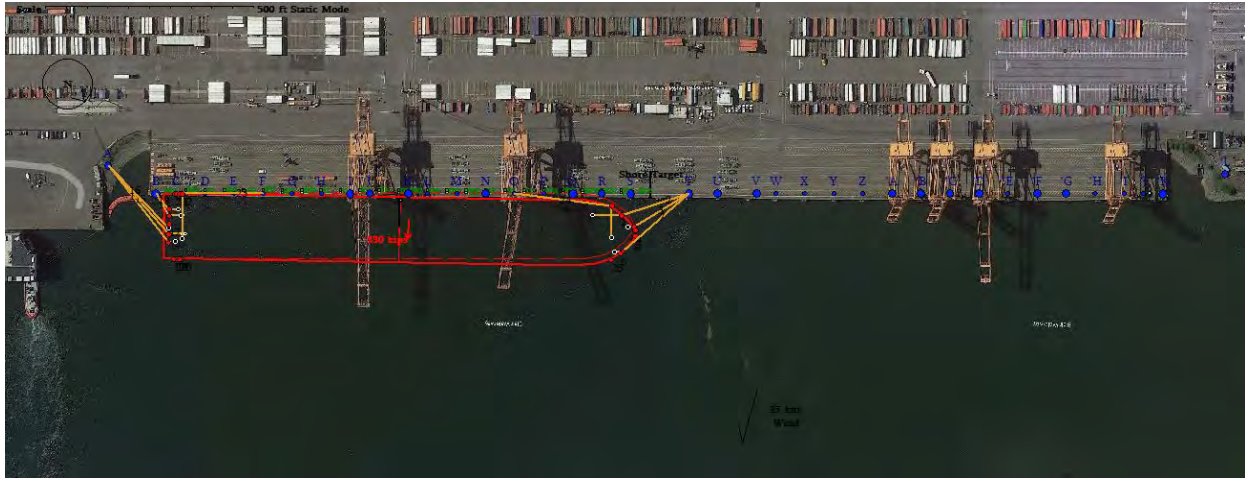
Water Level: 0.00 above datum

Draft: 47.6

Trim: 0.0



Arrangement for Thalassa Hellas at POT-WUT



Vessel Data for Thalassa Hellas

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT
Bollard-Berthing Study\5.05 Structural\OPTIMOOR - Phase 2 - for bollard capacity\10 WUT (14,000 TEU)
- WEST SIDE - (SHEET 7)\Thalassa Hellas.vsl)

Units in ft, inches, & kips
Longitudinal datum at Midship

LBP:1154.9
Breadth: 167.3
Depth: 97.9
Port Target: 0.0 fwd from midship -75.3 from CL and 0.0 above deck
Stbd Target: 0.0 fwd from midship 75.3 from CL and 0.0 above deck
End-on projected windage area: 18183 above deck level
Side projected windage area: 96828 above deck level
Fendering possible from: 0.505 LBP aft of midship
to: 0.495 LBP fwd of midship
Current drag data based on: OPTIMOOR (Generic Data)
Wind drag data based on: Post-Panamax Container Ship
Hull Pressure Limit (kips/ft²): 3.1

Flatside Contour		Longitudinal datum at Midship
X-dist	-583.0	571.4
Depth	97.9	97.9

Midship Area

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size-Type-BL	Tail Segment-1 Lgth-Size-Type-BL
1	568.4	50.7	0.0	78.6	350	20	5.7 pe 298	433 12.4 pp 322
2	572.7	45.0	0.0	74.3	350	20	5.7 pe 298	433 12.4 pp 322
3	605.4	16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
4	609.3	7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
5	609.3	-7.2	0.0	7.2	350	20	5.7 pe 298	433 12.4 pp 322
6	605.4	-16.1	0.0	16.0	350	20	5.7 pe 298	433 12.4 pp 322
7	576.8	-47.8	0.0	21.3	350	20	5.7 pe 298	433 12.4 pp 322
8	571.4	-51.9	0.0	24.5	350	20	5.7 pe 298	433 12.4 pp 322
9	-562.2	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
10	-568.7	-83.7	0.0	52.8	350	20	5.7 pe 298	433 12.4 pp 322
11	-576.6	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
12	-583.0	-83.7	0.0	27.7	350	20	5.7 pe 298	433 12.4 pp 322
13	-596.8	-42.0	0.0	17.5	350	20	5.7 pe 298	433 12.4 pp 322
14	-596.8	-26.6	0.0	39.8	350	20	5.7 pe 298	433 12.4 pp 322
15	-596.8	-19.8	0.0	50.6	350	20	5.7 pe 298	433 12.4 pp 322
16	-596.8	-4.1	0.0	0.0	350	20	5.7 pe 298	433 12.4 pp 322

17	-596.4	4.9	0.0	0.0	350	20	5.7	pe	298	433	12.4	pp	322
18	-596.8	26.9	0.0	39.7	350	20	5.7	pe	298	433	12.4	pp	322
19	-596.8	42.3	0.0	23.4	350	20	5.7	pe	298	433	12.4	pp	322
20	-583.0	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
21	-576.6	83.7	0.0	27.4	350	20	5.7	pe	298	433	12.4	pp	322
22	-568.7	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
23	-562.2	83.7	0.0	114.4	350	20	5.7	pe	298	433	12.4	pp	322
24	547.7	69.4	0.0	81.5	350	20	5.7	pe	298	433	12.4	pp	322
25	547.7	-69.4	0.0	51.1	350	20	5.7	pe	298	433	12.4	pp	322

Codes for Types of Line:
pe: polyester (broken-in)
pp: polypropylene dry (broken-in)

Berth Data for POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT
WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\10
WUT (14,000 TEU) - WEST SIDE - (SHEET 7)\WUT.bth)
Units in ft & kips
Solid Pier Shields Wind

Left to Right of Screen Site Plan Points: 315°
Width of Channel (for Current): 800
Pier Height (Fixed) above Datum: 21.4
Seabed Depth in way of Ship below Datum: 51.0
Dist of Berth Target to Right of Origin: 0.0
Wind Speed Specified at Height: 32.8
Current Specified at Depth: 0.0

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
A	-1400.1	72.6	-1.2	400
B	-1277.0	0.0	2.0	551
C	-1225.0	0.0	2.0	125
D	-1150.0	0.0	2.0	125
E	-1075.0	0.0	2.0	125
F	-1000.0	0.0	2.0	125
G	-925.0	0.0	2.0	125
H	-850.0	0.0	2.0	125
I	-775.0	0.0	2.0	551
J	-725.0	0.0	2.0	440
K	-625.0	0.0	2.0	440
L	-575.0	0.0	2.0	125
M	-500.0	0.0	2.0	125
N	-425.0	0.0	2.0	440
O	-350.0	0.0	2.0	125
P	-275.0	0.0	2.0	125
Q	-200.0	0.0	2.0	551
R	-125.0	0.0	2.0	440
S	-50.0	0.0	2.0	551
T	100.0	0.0	2.0	551
U	175.0	0.0	2.0	440
V	275.0	0.0	2.0	440
W	325.0	0.0	2.0	125
X	400.0	0.0	2.0	125
Y	475.0	0.0	2.0	125
Z	550.0	0.0	2.0	125
*A	625.0	0.0	2.0	440
*B	700.0	0.0	2.0	440
*C	775.0	0.0	2.0	440
*D	850.0	0.0	2.0	440
*E	925.0	0.0	2.0	125
*F	1000.0	0.0	2.0	440
*G	1075.0	0.0	2.0	440
*H	1150.0	0.0	2.0	125
*I	1225.0	0.0	2.0	125
*J	1275.0	0.0	2.0	125
*K	1325.0	0.0	2.0	551
*L	1485.0	50.0	-1.2	400

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (ft ²)
aa	-1250.	18.0	6.2	68.3
bb	-1200.	18.0	6.2	68.3
cc	-1150.	18.0	6.2	68.3
dd	-1100.	18.0	6.2	68.3
ee	-1050.	18.0	6.2	68.3
ff	-1000.	18.0	6.2	68.3
gg	-950.0	18.0	6.2	68.3
hh	-900.0	18.0	6.2	68.3
ii	-850.0	18.0	6.2	68.3
jj	-800.0	18.0	6.2	68.3
kk	-750.0	18.0	6.2	68.3
ll	-700.0	18.0	6.2	68.3
mm	-650.0	18.0	6.2	68.3
nn	-625.0	18.0	6.2	68.3
oo	-575.0	18.0	6.2	68.3
pp	-525.0	18.0	6.2	68.3
qq	-475.0	18.0	6.2	68.3
rr	-425.0	18.0	6.2	68.3
ss	-375.0	18.0	6.2	68.3
tt	-325.0	18.0	6.2	68.3
uu	-275.0	18.0	6.2	68.3
vv	-225.0	18.0	6.2	68.3
ww	-175.0	18.0	6.2	68.3
xx	-125.0	18.0	6.2	68.3
yy	-75.0	18.0	6.2	68.3
zz	-25.0	18.0	6.2	68.3

Fender	Load-Compression Data									
aa	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
bb	64	186	288	320	301	282	282	288	307	320 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
cc	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
dd	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ee	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ff	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
gg	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
hh	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ii	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
jj	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
kk	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
ll	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
mm	64	186	288	320	301	282	282	288	253	263 kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60 ft
nn	64	186	288	320	301	282	282	288	253	263 kips

	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
oo	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
pp	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
qq	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
rr	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ss	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
tt	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
uu	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
vv	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
ww	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
xx	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
yy	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft
zz	64	186	288	320	301	282	282	288	253	263	kips
	0.18	0.54	0.90	1.26	1.62	1.98	2.17	2.35	2.53	2.60	ft

Static Mooring Response for Thalassa Hellas at POT-WUT

(file C:\Users\njohal\KPFF, Inc\KPFF SPRC 2023 Projects - Documents\10092300204 POT WUT-PCT Bollard-Berthing Study\5.05 Structural\OPTIM00R - Phase 2 - for bollard capacity\10 WUT (14,000 TEU) - WEST SIDE - (SHEET 7)\WUT.opt)
Units in ft & kips

Remarks:

Static Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)
Water Level: 0.00 above Datum (initialised at this water level)
Draft: 47.60 (initialised at this draft))
Trim: 0.00 (initialised at this trim)
Bottom Clearance: 3.4
Fwd Offset of Vessel Target: -650.0 from Berth Target
Vessel Port Target: 28.9 above Pier
Wind Speed: 25 knots
Wind Direction from: 240° True -75° Screen Right (solid pier shields
wind)

Total End-on Windage Area: 26599
Total Side Windage Area: 154920

	Longitudinal	Transverse	Yaw	Moment/LBP
Wind Drag Force:	22.1	-329.9		-6.0
Total Force:	22.1	-329.9		-6.0
Movement of Vessel at its Port Target	4.10 (fwd)	-8.52 (out)	-0.9° (stbd)	0.00 (up)

Line to Bollard	Pull -in	Tot.Line Length	In-Line ±Motion	Winch Slip	Inclin. Down	Line Tension	Percent Strength
-----------------	----------	-----------------	-----------------	------------	--------------	--------------	------------------

2-T	3.05	254.7		8°	28.5	10%
3-T	2.01	175.8		9°	114.7	38%
7-T	2.84	237.6		7°	135.7	46%
13-A	3.36	266.5		7°	28.1	9%
15-A	3.59	282.4		7°	30.5	10%
16-A	2.74	221.1		8°	37.4	13%
18-B	1.17	108.2		22°	47.1	16%
19-B	0.79	80.5		27°	87.8	29%
23-F	3.96	324.3		7°	slack	
24-O	4.24	326.8		6°	62.6	21%

Fender	Thrust	Compression	Pressure	Flatside	Cover
bb	3	0.01	0.1	100%	
cc	0			100%	
dd	0			100%	
ee	0			100%	
ff	0			100%	
gg	0			100%	
hh	0			100%	
ii	0			100%	
jj	0			100%	
kk	0			100%	
ll	0			100%	
mm	0			100%	
nn	0			100%	
oo	0			100%	
pp	0			100%	
qq	0			100%	
rr	0			100%	
ss	0			100%	
tt	0			100%	
uu	0			100%	
vv	0			100%	
ww	0			100%	
xx	0			100%	
yy	0			40%	

Hook/ Bollard	X- Force	Y- Force	Other X-Load	Other Y-Load	Total Force	%Bollard Strength	Direction in Plan	Bollard Uplift
A	63.3	71.0			95.9	24%	42°	12.2
B	72.5	97.5			134.5	24%	37°	57.7
F								
O	61.8	7.7			62.6	50%	83°	6.6
T	-225.4	155.6			276.6	50%	-55°	38.6

Approximate natural periods
Surge: 142 Sway: 88 Roll: 80 secs

Wind Capability Rose for Thalassa Hellas at POT-WUT

Analysis for Time: 1314 Jan 03 2024 (initialised at 1314 Jan 03 2024)

Ref:

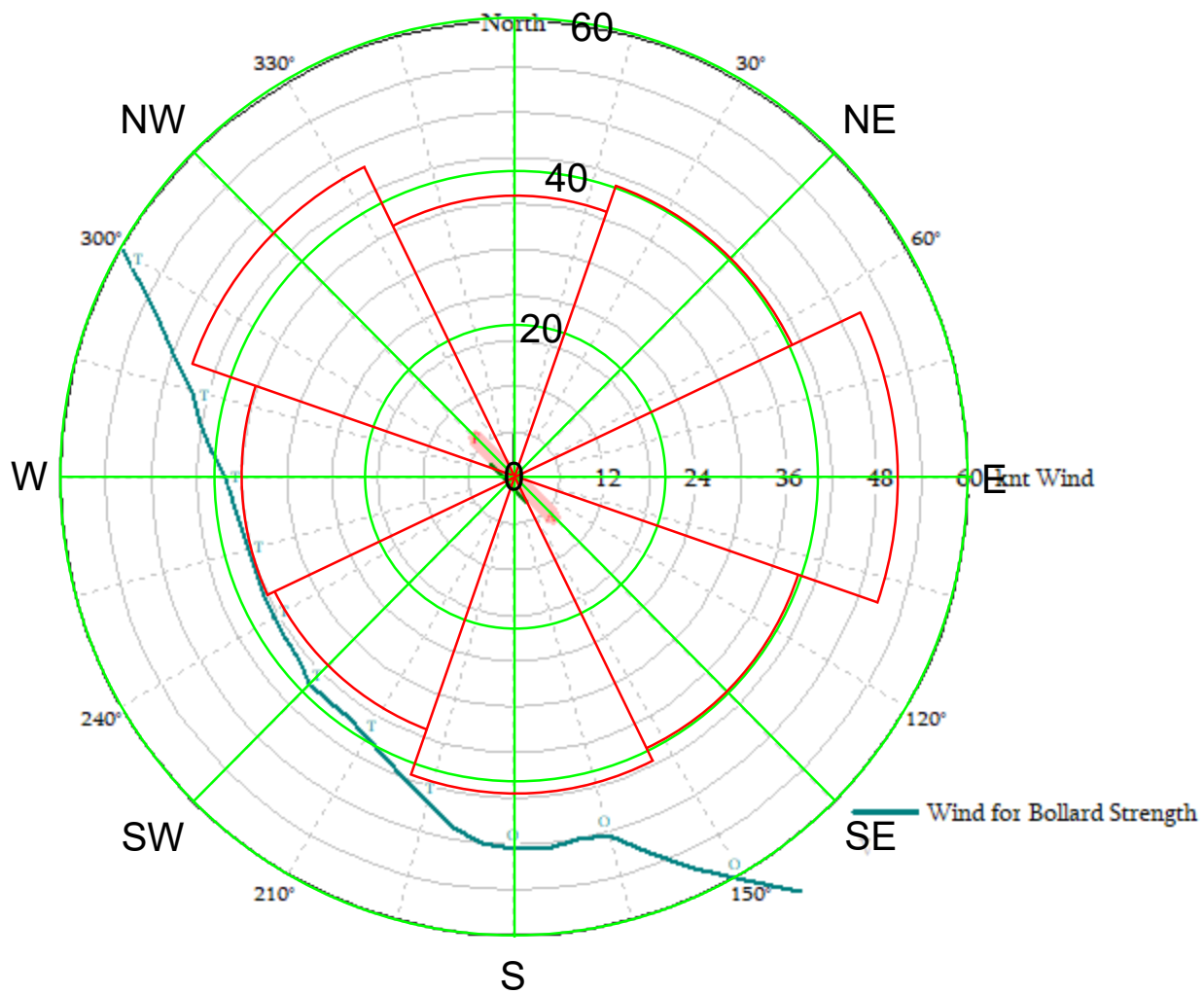
Remarks: Remarks:

Water Level: 0.00 above datum

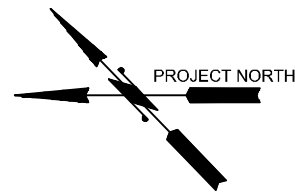
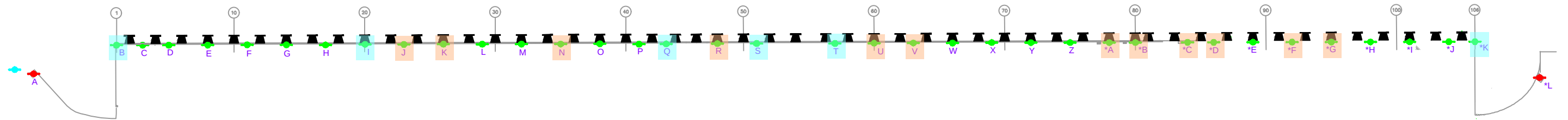
Draft: 47.6

Trim: 0.0

N



APPENDIX F: SUMMARY OF BOLLARD UPGRADES



WHARF PLAN

SCALE: 1/16" = 1'-0"

UPGRADED BOLLARD - 551 KIP

UPGRADED BOLLARD - 440 KIP

LEGEND:

- CONE FENDER
- EXISTING 125 KIPS WHARF BOLLARD
- EXISTING 400 KIPS LANDSIDE DOLPHIN BOLLARD
- APPROXIMATE LOCATION OF WEST BOLLARD (GOOGLE EARTH)

kpff

2407 North 31st Street, Suite 100
Tacoma, Washington 984087
(253) 386-0150 Fax (253) 396-0162

WUT

DATE: 2024-07-03

SCALE: AS SHOWN

DRAWN BY: GM

SHT 1 OF 1

APPENDIX G: PRLIMINARY BOLLARD UPGRADES COST ESTIMATE

POT WUT Bollard Study
Preliminary Bollard Upgrade Concept
Rough Order of Magnitude Engineer's Opinion of Probable Cost



July 5, 2024

Item	Quantity	Unit	Unit Cost	Amount
Section A - Mobilization and Demobilization				
1 Mobilization & Demobilization (22.5% of total)	1	LS	\$860,423	\$860,500
Subtotal - Section A - Mobilization and Demobilization				\$860,500
Section B - Removal and Demolition				
2 Existing bollard removal	1	LS	\$5,800	\$5,800
3 Concrete and paving demo	1	LS	\$950,500	\$950,500
Subtotal - Section B - Removal and Demolition				\$956,300
Section C - Bollard Installation				
4 Furnish and install (12) 200-ton and (6) 250-ton bollards	18	EA	\$8,567	\$154,200
Subtotal - Section C - Bollard Installation				\$154,200
Section D - Wharf Strengthening				
5 CIP concrete placement	599	CY	\$3,500	\$2,096,800
6 CDF placement	273	CY	\$100	\$27,300
7 6" pavement placement	5950	SF	\$10	\$59,500
8 Furnish (34) 6' wide prestress haunched panels	34	EA	\$11,000	\$374,000
9 Install (34) 6' wide prestress haunched panels	1	LS	\$60,000	\$60,000
Subtotal - Section D - Wharf Strengthening				\$2,617,600
Section E - Existing Fender Removal and Reinstallation				
10 Existing fender removal and reinstallation	8	EA	\$12,000	\$96,000
Subtotal - Section E - Existing Fender Removal and Reinstallation				\$96,000

Subtotal Construction Cost	\$4,684,600
Design & Construction Contingency 40%	\$1,873,840
Sales Tax 10.2%	\$477,829
Consultant Design Fees	\$350,000
Total Rough Order of Magnitude Engineer's Opinion of Probable Cost (2024\$)	\$7,386,300

Notes:

- 1 All amounts are rounded.
- 2 Contingency is intended to account for the concept level of the design
- 3 Assumes no additional piles are needed.