

# NEW RIVER CLASS FERRY

## Stability Assessment

Prepared for: North Carolina DOT • Raleigh, NC

Ref: 16101-200-843-5

Rev. -

August 9, 2017

**PREPARED BY**

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**GENERAL NOTES**

- 1. This report is NOT intended for regulatory submittal to the USCG MSC.

**REVISIONS**

REV	DESCRIPTION	DATE	APPROVED
-	Initial issue	8/9/17	PDF 49313

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## 1 PURPOSE

This report details the stability assessment for the New River Class Ferry. The subject vessel is a new design for a 183 feet 7 inch length by 46 feet breadth by 11 feet depth double-ended, passenger and vehicle ferry. The new vessel will be owned and operated by the North Carolina Department of Transportation in the partially protected waters of the Outer Banks and associated rivers. The subject vessel is designed to carry a maximum of 40 cars and 300 passengers.

## 2 PROCEDURE

### 2.1 General

The vessel is a USCG Subchapter H vessel subject to the applicable intact, subdivision, and damaged stability requirements of Subchapter S in Title 46 of the US Code of Federal Regulations [1]. The intact criteria include a wind heel criterion, unusual proportion and form criterion, and passenger heel criterion.

General HydroStatics (GHS) and Excel are used to evaluate all applicable intact and damaged stability criteria and floodable length curves for the vessel. The GHS computer model of the subject vessel [2] includes the hull, tanks, and a sail profile. This model was created from the 3D Rhino hull model [3], and the Profiles and Deck Arrangements [4].

### 2.2 Intact Stability Calculation

The following intact stability criteria are applicable to this vessel:

1. 46 CFR 170.173(e)(1), Unusual proportion and form criterion, Partially Protected Waters
2. 46 CFR 171.050, Passenger heel criterion
3. 46 CFR 170.170, Wind heel criterion

Intact stability is analyzed using maximum allowable keel to vertical center of gravity (VCG) versus displacement curves as shown in the Intact Stability Curves Graph in Section 6.

GHS is used to produce points of maximum allowable VCG versus displacement for criterion 1. Excel worksheets are used to produce points of maximum allowable VCG versus displacement for criteria 2 and 3. Displacements range from light ship to the subdivision draft and trims from even keel to 2.0 feet. The GHS output and Excel worksheets used to create the intact stability curves are provided in Section 8.5. The intended subdivision draft is shown along with the curves given by criteria 1, 2, and 3 on the plot in Section 8.6 for reference.

The intact stability curves are compounded in Section 6 to show the maximum allowable vessel VCG within the range of operational displacements. Displacement and VCG of the normal operating loading conditions are plotted on the Compound Stability Curve to demonstrate compliance with relevant criteria.

### 2.3 Damaged Stability Calculations

Damaged stability calculations are performed for this vessel according to Damaged Stability for Type II Subdivision, 46 CFR 171.080(f). GHS is used to assess the survival of the vessel for all applicable damage cases for each loading condition. The GHS output of the damaged stability calculations for the worst loading condition (Condition 4) is included in Section 8.10.

### 2.4 Floodable Length Calculations

The GHS output of the Type II Subdivision calculations for the loading conditions are found in Section 8.8 and a curve of Floodable Length is included in Section 8.7. Because the subject vessel has a length greater than 150 feet and less than 200 feet, a combination of one-compartment and two-compartment standard of flooding as specified in 46 CFR Table 171.070(b) would apply to this vessel. However, because the vessel is double-ended, the entire vessel is subject to a two-compartment standard of flooding depending on vessel orientation. Permeability's have been assigned in accordance with 46 CFR 171.072. Floodable length calculations are performed for the vessel at the 4.5 foot subdivision draft.

## 3 GIVEN AND ASSUMED PARAMETERS

### 3.1 Vessel Particulars

- Length Overall 183.58 feet
- Beam, Molded 46.0 feet
- Depth at Side 10.5 feet
- Subdivision Draft 4.5 feet
- Displacement @ Sub. Draft 522.8 LT

### 3.2 Reference Origin

Longitudinal locations are referenced from Frame 0 (amidships), positive aft (B End). Transverse locations are measured from centerline, positive to starboard. Vertical locations are referenced from the baseline at the molded bottom of the keel, positive up.

### 3.3 Route

The vessel will operate on partially protected waters. Additionally, the salinity of the water the vessel will operate on varies. A conservatively low specific gravity value of 1.014 is used for these calculations.

### 3.4 Light Ship Weight

A weight estimate [5] was developed to determine the vessel light ship weight and center of gravity. The resulting light ship weight characteristics are:

Light ship weight:	380	LT
VCG:	8.65	feet above baseline
LCG:	0.38	feet fwd of Frame 0
TCG:	1.85	feet to starboard

The vessel transverse center of gravity is offset because of the asymmetric deckhouse. See Section 3.8 for a summary of the vessel heel.

### **3.5 Service Life Margin**

A service life margin (SLM) is included (separate from the light ship weight above) in the stability calculations. The SLM encompasses 3% of the light ship weight (11.4 LT) to account for weight changes over the life of the vessel.

### **3.6 Passengers and Crew**

Per USCG, individual passengers and crew are assumed to weigh an average of 185 lb. Crew effects are assumed to weigh 65 lb per crew member.

The vessel carries a maximum of 300 passengers (24.78 LT) located at amidships and at a height of 14.0 feet above baseline. The maximum capacity of the passenger lounge is assumed to be 30 seated and 30 standing passengers. The remaining passengers are assumed to be distributed amongst the cars.

The vessel is assumed to require 7 crew and their effects (0.78 LT) located at amidships, 17.75 feet off centerline and at a height of 23.0 feet above baseline.

### **3.7 Stores and Outfit**

The vessel is assumed to carry 5 LT of ship stores 18.0 feet above baseline.

### **3.8 Heel and Trim**

The trim is assumed to remain between 0.0 and 2.0 feet to account for passenger and vehicle movement and variations in tank loading. Even trim and heel is beneficial to ensure the margin line will not be submerged in certain damage cases. Ballast tanks are fitted to correct for trim or heel, but loading of the vehicles is likely to be the most effective method to maintain an even heel and trim. However, in light loading cases ballast is likely to be needed to correct for heel, and potentially to keep the cycloidal propellers submerged. With a full load of vehicles these potential issues are less likely, and the vessel may be limited by the intended subdivision draft in the case of a completely full load.

### **3.9 Ballast Tanks**

Ballast tanks are sized such that the vessel can be loaded with a total nominal weight of 200 long tons of water (at 1.014 specific gravity). Ballast tanks are located fore and aft in the thruster rooms, with symmetrical tanks on the port and starboard side. Ballast tanks can be used to ensure VSP submersion for light ship conditions or to correct list or trim. Additionally they can be used to temporarily assist in maintaining trim caused by larger trucks loading or unloading from the vessel, as shown in loading condition number 7.

### **3.10 Free Surface Correction**

The free surface correction for the vessel is calculated based on the most conservative requirements of 46 CFR 170.285 and 170.290. The free surface correction accounts for the

moment of transference of liquid within a tank by artificially raising the vertical center of gravity of the vessel.

The maximum free surface moment for each of the consumable and non-consumable liquid tanks are included. The maximum free surface moment for each tank can be found in the tank list in Section 8.3. The total free surface moment for the vessel is 649.3 LT-feet, as shown in Table 1.

**Table 1 - Free Surface Moment**

TANK	FSM
FW.P	6.4
FUEL_A.P	9.1
FUEL_B.P	9.1
BAL_A.P	156.2
BAL_A.S	156.2
BAL_B.P	156.2
BAL_B.S	156.2
<b>TOTAL</b>	<b>649.3</b>

Further tank details are provided in Section 8.3.

### 3.11 Downflooding Points

Table 2 lists all critical and downflooding points used in this stability assessment.

**Table 2 - Critical Points**

CRITICAL POINTS	TYPE	Longitudinal	Transverse	Vertical
		<i>ft +aft</i>	<i>ft (p/s)</i>	<i>ft +abl</i>
Thruster A Vents	Tight	-65.75	18.17	12.38
Void A Vents	Tight	-33.75	21.00	12.29
E/R Intake A End	Tight	-27.75	21.00	12.12
E/R Intake B End	Tight	27.75	21.00	12.12
Void B Vents	Tight	33.75	21.00	12.29
Thruster B Vents	Tight	65.75	18.17	12.38
Engine Room Exhaust	Flood	0.00	16.00	21.83

The superstructure is assumed to provide neither buoyancy nor righting energy in the calculations, despite the fact that it is fully weathertight. This is a conservative assumption.

### 3.12 Loading Conditions

Nine loading conditions are analyzed as follows:

Condition 0: Light Ship Condition

Condition 1: Operational Light Ship – Crew and Effects, Normal Tanks

Condition 2: Operational Light Ship with Full Ballast – Crew & Eff., Normal Tanks, Ballast

Condition 3: Departure – No SLM, Crew & Eff., Normal Tanks, Passengers, Vehicles

Condition 4: Departure w/SLM –3% SLM, Crew & Eff., Normal Tanks, Passengers, Vehicles

Condition 5: Arrival– No SLM, Crew & Eff., Light Tanks, Passengers, Vehicles

Condition 6: Arrival w/SLM –3% SLM, Crew & Eff., Light Tanks, Passengers, Vehicles

Condition 7: Loading 150kip Truck – Crew & Eff., Normal Tanks, 150kip Truck, Ballast

Condition 8: 150kip Truck – Crew & Eff., Normal Tanks, 150kip Truck, Light Pax/Veh.

The Loading Condition Summaries are included in Section 8.4.

#### 4 CONCLUSIONS

The subject vessel, at the current stage of design, exhibits satisfactory stability characteristics for its proposed service and route. The vessel will be subject to the following operating restrictions:

1. The vessel has a maximum passenger capacity of 300 persons. The vessel has a maximum vehicle capacity of 40 standard autos or a total vehicle load of approximately 90LT.
2. The vessel's intended maximum subdivision draft is 4.5 feet.

The vessel is shown to meet intact stability criteria as shown in the Compound Stability Curve in Section 6. The vessel is shown to meet damaged stability criteria in all loading conditions assessed, although even loading of the vessel is essential to ensure the margin line will not submerge in some damage cases.

Floodable length of the vessel is shown to be adequate at the subdivision draft. Calculations are listed in Sections 8.7 and 8.8.

Additionally, it is worth noting that the subdivision draft of 4.5 feet is a preferred limit set by the operator. Condition 4 exceeds this value by half an inch; however it is not anticipated to be problematic.

#### 5 LOADING CONDITION SUMMARY

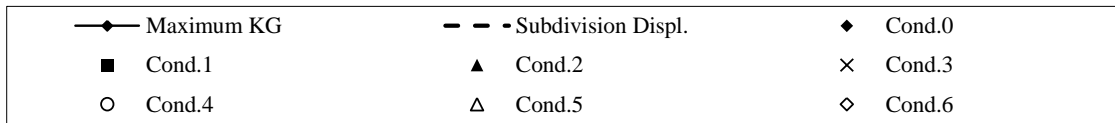
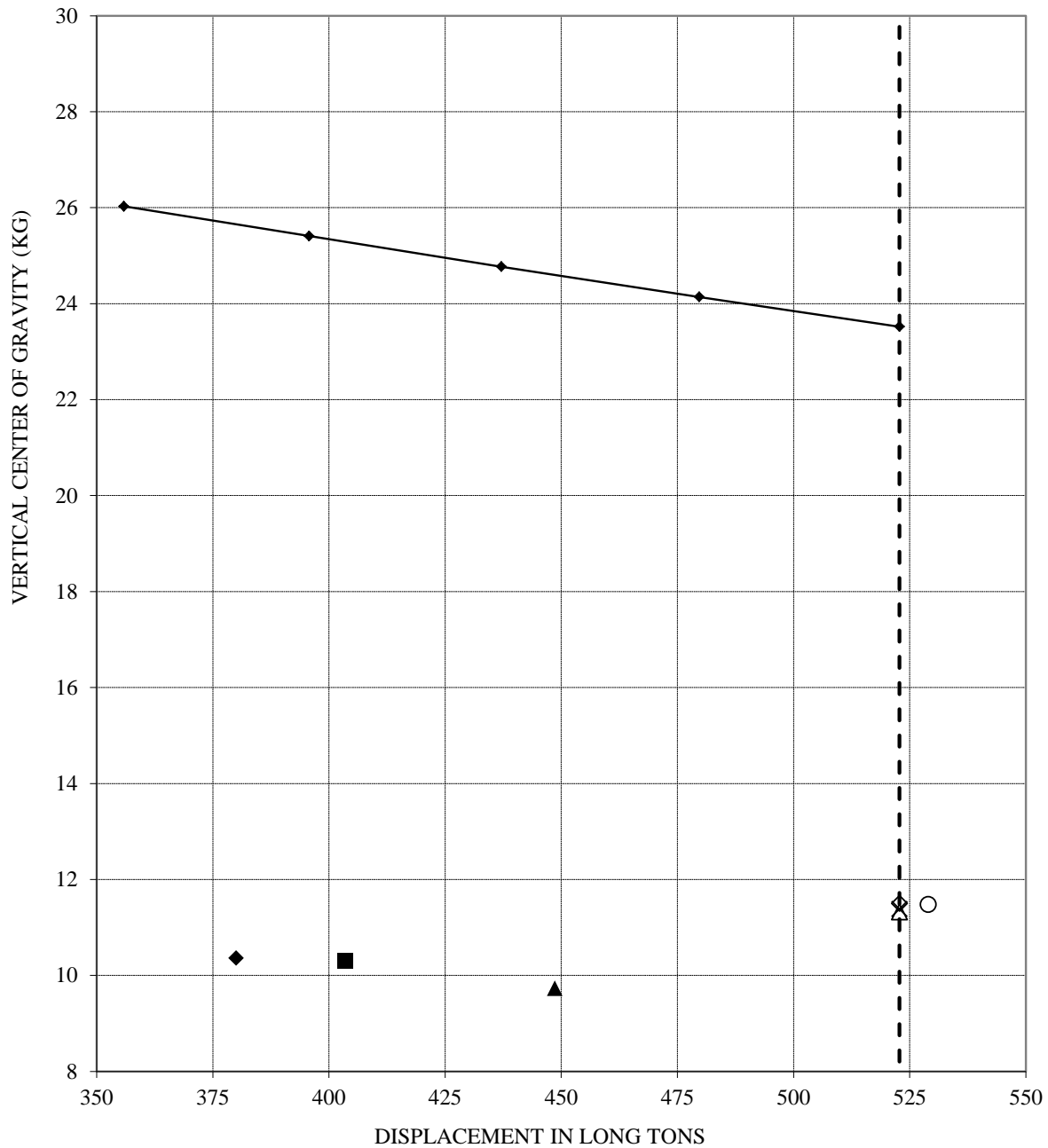
**Table 3 - Loading Condition Summary**

No.	Description	Disp. <i>LT</i>	Draft Fr. 44-A <i>ft</i>	Draft Fr. 00 <i>ft</i>	Draft Fr. 44-B <i>ft</i>	VCG <i>ft</i>	GMT <i>ft</i>	Trim <i>ft +aft</i>	Heel <i>deg +stbd</i>
0	Light Ship Condition	380.00	3.69	3.64	3.59	10.36	45.79	-0.10	2.20
1	Operational Light Ship	403.58	3.76	3.79	3.82	10.30	43.94	0.06	1.55
2	Operational Light Ship with Ballast	448.64	4.07	4.07	4.07	9.73	40.78	0.00	0.00
3	Departure	522.79	4.50	4.50	4.50	11.38	33.63	0.00	0.32
4	Departure with SLM	529.03	4.51	4.54	4.56	11.48	33.13	0.05	0.49
5	Arrival	522.80	4.50	4.50	4.50	11.32	33.69	0.00	0.67
6	Arrival with SLM	522.80	4.50	4.50	4.50	11.50	33.50	0.00	1.06
7	Loading 150 kip Truck with Ballast	607.76	5.07	4.99	4.90	10.66	29.64	-0.17	1.57
8	Maximum Truck Load (25 Pax, 10 C	522.81	4.50	4.50	4.50	11.24	33.77	0.00	0.43



## 6 COMPOUND STABILITY CURVE

**MAXIMUM VCG vs DISPLACEMENT**  
Trim Range 0.0' to 2.0'



## 7 REFERENCES

- [1] U.S. Government Publishing Office, Code of Federal Regulations; Title 46 - Shipping, Subchapter H, October 1, 2015.
- [2] Elliott Bay Design Group, "GHS Geometry," File: 14079-.GFT, August 9, 2017.
- [3] Elliott Bay Design Group, *Rhino 3D Hull Model*, 16101-200-100-0, Rev. -, July 19, 2017.
- [4] Elliott Bay Design Group, *Profiles and Deck Arrangements*, 16101-200-101-1, Rev. -, July 28, 2017.
- [5] Elliott Bay Design Group, "Weight Estimate," 16101-200-833-1, Rev. -, August 9, 2017.

## 8 CALCULATIONS

### 8.1 Hydrostatic Properties

08/07/17 18:49:48 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

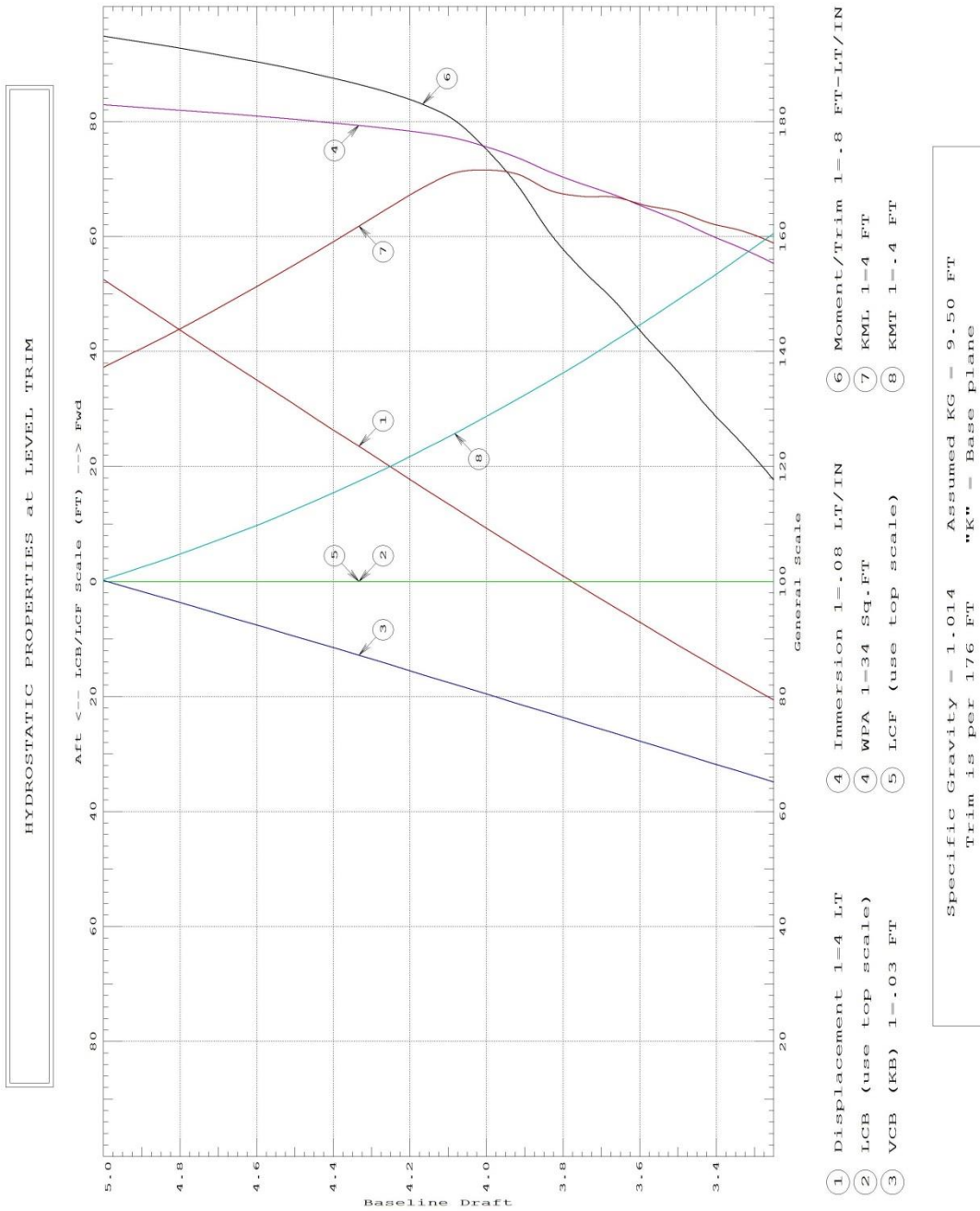
HYDROSTATIC PROPERTIES  
 No Trim, No Heel, Fixed VCG = 9.50

LCF Draft	Displacement Weight (LT)	Buoyancy-Ctr.		Weight/ Inch	Moment/			
		LCB	VCB		LCF	In trim	KML	KMT
3.250	317.67	0.00	1.95	12.43	0.00	115.06	635.4	64.21
3.333	330.20	0.00	2.01	12.64	0.00	121.22	643.9	62.65
3.417	342.93	0.00	2.06	12.82	0.00	126.98	649.4	61.06
3.500	355.86	0.00	2.11	13.02	0.00	133.42	657.4	59.59
3.583	368.97	0.00	2.16	13.20	0.00	139.25	661.6	58.12
3.667	382.27	0.00	2.21	13.38	0.00	145.54	667.4	56.72
3.750	395.72	0.00	2.26	13.53	0.00	150.79	667.9	55.31
3.833	409.34	0.00	2.31	13.70	0.00	156.93	672.0	54.01
3.917	423.13	0.00	2.36	13.90	0.00	164.96	683.2	52.73
4.000	437.10	0.00	2.41	14.05	0.00	171.24	686.4	51.49
4.083	451.21	0.00	2.46	14.17	0.00	176.21	684.3	50.29
4.167	465.42	0.00	2.51	14.24	0.00	178.93	673.8	49.14
4.250	479.70	0.00	2.57	14.30	0.00	180.79	660.8	48.04
4.333	494.02	0.00	2.62	14.35	0.00	182.32	647.2	46.98
4.417	508.39	0.00	2.67	14.39	0.00	183.65	633.7	45.96
4.500	522.80	0.00	2.71	14.43	0.00	184.85	620.5	45.00
4.583	537.25	0.00	2.76	14.47	0.00	185.96	607.6	44.09
4.667	551.74	0.00	2.81	14.50	0.00	186.98	595.1	43.22
4.750	566.26	0.00	2.86	14.54	0.00	187.93	583.0	42.39
4.833	580.82	0.00	2.91	14.57	0.00	188.83	571.3	41.61
4.917	595.40	0.00	2.96	14.60	0.00	189.70	560.0	40.86
5.000	610.02	0.00	3.01	14.63	0.00	190.52	549.2	40.14

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 144.00Ft

Draft is from Baseline.

08/07/17 19:30:28 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY



08/09/17 14:07:44 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

CROSS CURVES OF STABILITY

Showing righting arms in heel at VCG = 9.50

Trim: zero at zero heel (trim righting arm held at zero)

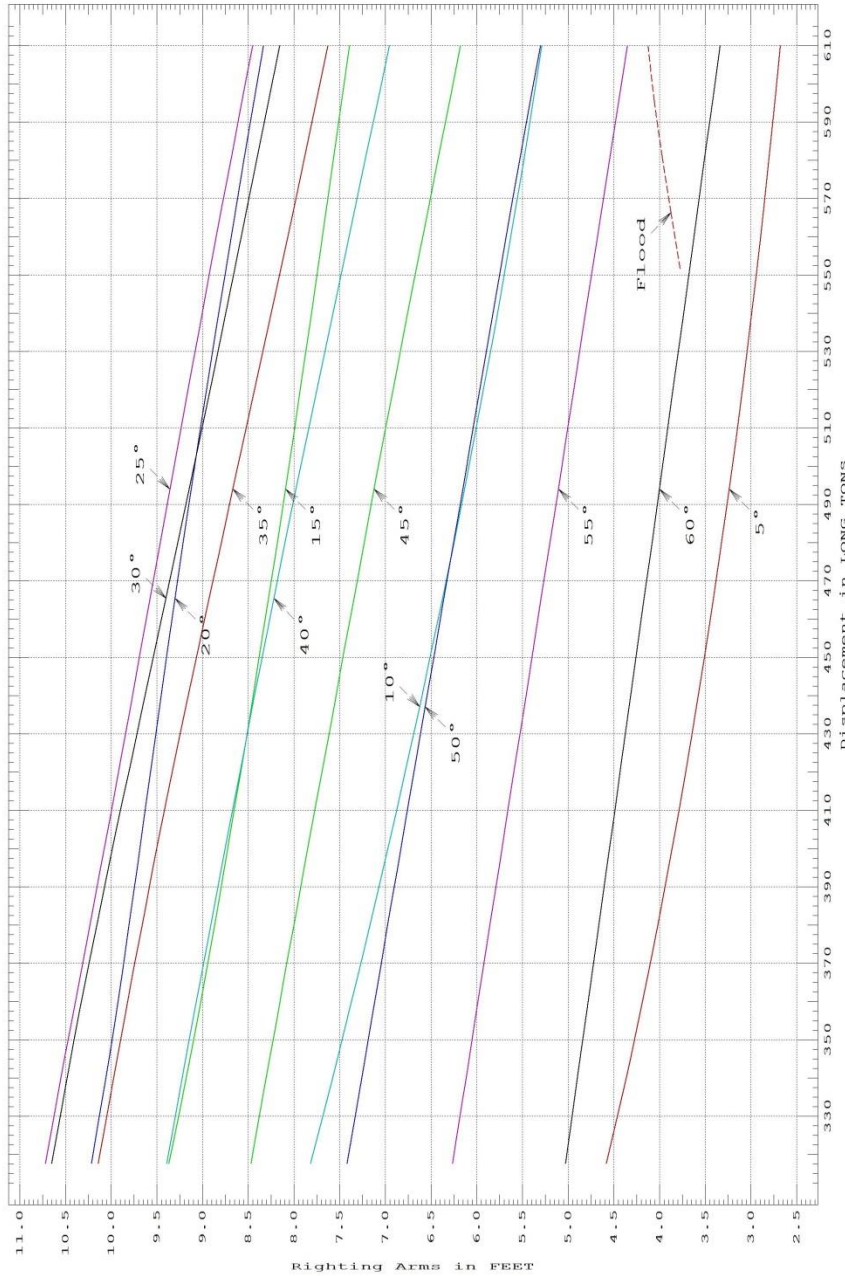
Displacement LONG TONS	Heel Angles in Degrees						
	5.00s	10.00s	15.00s	20.00s	25.00s	30.00s	35.00s
317.67	4.58s	7.82s	9.36s	10.21s	10.72s	10.65s	10.14s
330.20	4.46s	7.68s	9.26s	10.12s	10.62s	10.55s	10.04s
342.93	4.34s	7.55s	9.15s	10.04s	10.52s	10.46s	9.95s
355.86	4.22s	7.41s	9.05s	9.95s	10.42s	10.35s	9.85s
368.97	4.11s	7.28s	8.95s	9.87s	10.32s	10.25s	9.75s
382.27	4.00s	7.15s	8.85s	9.79s	10.21s	10.14s	9.64s
395.72	3.90s	7.01s	8.75s	9.71s	10.10s	10.02s	9.53s
409.34	3.79s	6.88s	8.66s	9.63s	10.00s	9.90s	9.42s
423.13	3.69s	6.75s	8.56s	9.55s	9.89s	9.78s	9.30s
437.10	3.60s	6.62s	8.46s	9.47s	9.79s	9.65s	9.18s
451.21	3.50s	6.50s	8.37s	9.38s	9.68s	9.53s	9.05s
465.42	3.41s	6.37s	8.28s	9.30s	9.57s	9.40s	8.93s
479.70	3.32s	6.25s	8.18s	9.21s	9.46s	9.27s	8.80s
494.02	3.24s	6.13s	8.09s	9.12s	9.35s	9.14s	8.67s
508.39	3.16s	6.02s	8.00s	9.03s	9.24s	9.02s	8.53s
522.80	3.08s	5.90s	7.91s	8.94s	9.13s	8.89s	8.40s
537.25	3.01s	5.79s	7.82s	8.84s	9.02s	8.77s	8.27s
551.74	2.93s	5.68s	7.73s	8.74s	8.91s	8.64s	8.14s
566.26	2.87s	5.58s	7.65s	8.64s	8.80s	8.52s	8.01s
580.82	2.80s	5.48s	7.56s	8.54s	8.68s	8.40s	7.88s
595.40	2.74s	5.38s	7.48s	8.44s	8.57s	8.28s	7.75s
610.02	2.68s	5.28s	7.39s	8.33s	8.45s	8.15s	7.63s

Displacement LONG TONS	Heel Angles in Degrees					@ Flooding	
	40.00s	45.00s	50.00s	55.00s	60.00s	Arm	Angle
317.67	9.39s	8.47s	7.42s	6.26s	5.03s		
330.20	9.30s	8.38s	7.33s	6.18s	4.96s		
342.93	9.20s	8.28s	7.24s	6.10s	4.88s		
355.86	9.10s	8.18s	7.14s	6.01s	4.81s		
368.97	8.99s	8.08s	7.05s	5.93s	4.73s		
382.27	8.89s	7.98s	6.96s	5.84s	4.65s		
395.72	8.78s	7.88s	6.86s	5.75s	4.57s		
409.34	8.67s	7.77s	6.76s	5.66s	4.49s		
423.13	8.56s	7.67s	6.66s	5.57s	4.41s		
437.10	8.45s	7.56s	6.56s	5.48s	4.33s		
451.21	8.34s	7.45s	6.46s	5.39s	4.25s		
465.42	8.22s	7.34s	6.36s	5.29s	4.17s		
479.70	8.10s	7.23s	6.25s	5.20s	4.08s		
494.02	7.97s	7.12s	6.15s	5.11s	4.00s		
508.39	7.85s	7.01s	6.05s	5.01s	3.92s		
522.80	7.72s	6.89s	5.95s	4.92s	3.84s		
537.25	7.60s	6.78s	5.84s	4.83s	3.75s		
551.74	7.47s	6.66s	5.74s	4.73s	3.67s	3.77s	59.52s
566.26	7.34s	6.54s	5.63s	4.64s	3.59s	3.88s	58.65s
580.82	7.21s	6.42s	5.52s	4.54s	3.50s	3.97s	57.78s
595.40	7.08s	6.30s	5.41s	4.45s	3.42s	4.06s	56.94s
610.02	6.96s	6.18s	5.30s	4.35s	3.34s	4.13s	56.13s

Distances in FEET.---Specific Gravity = 1.014.-----

08/09/17 14:07:44 Elliott Bay Design Group New Orleans  
GHS 15.00 NEW RIVER CLASS FERRY

CROSS CURVES OF STABILITY - Stbd Heel  
at LEVEL TRIM (initial)



Specific Gravity = 1.014 Assumed KG = 9.50 FT  
"K" = Base Plane

### 8.2 Wind Profile Areas

08/07/17 19:30:28 Elliott Bay Design Group New Orleans  
GHS 15.00 NEW RIVER CLASS FERRY

----- WIND AREAS -----

LATERAL PLANE STATUS

Baseline draft: 3.250

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	433.6	0.00	-1.59	1398.4	0.00	3.92
SAIL				2407.9	0.39a	18.84
Total Lateral Plane->	433.6	0.00	-1.59	3806.3	0.25a	13.36

LATERAL PLANE STATUS

Baseline draft: 3.500

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	472.1	0.00	-1.70	1359.9	0.00	3.78
SAIL				2407.9	0.39a	18.59
Total Lateral Plane->	472.1	0.00	-1.70	3767.8	0.25a	13.25

LATERAL PLANE STATUS

Baseline draft: 3.750

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	513.1	0.00	-1.80	1319.0	0.00	3.64
SAIL				2407.9	0.39a	18.34
Total Lateral Plane->	513.1	0.00	-1.80	3726.8	0.25a	13.14

LATERAL PLANE STATUS

Baseline draft: 4.000

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	556.8	0.00	-1.90	1275.2	0.00	3.51
SAIL				2407.9	0.39a	18.09
Total Lateral Plane->	556.8	0.00	-1.90	3683.1	0.26a	13.04

LATERAL PLANE STATUS

Baseline draft: 4.250

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	602.0	0.00	-2.00	1230.0	0.00	3.39
SAIL				2407.9	0.39a	17.84
Total Lateral Plane->	602.0	0.00	-2.00	3637.8	0.26a	12.95

LATERAL PLANE STATUS

Baseline draft: 4.500

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	647.1	0.00	-2.10	1184.9	0.00	3.26
SAIL				2407.9	0.39a	17.59
Total Lateral Plane->	647.1	0.00	-2.10	3592.8	0.26a	12.87

LATERAL PLANE STATUS

Baseline draft: 4.750

Trim: zero, Heel: zero

Part	LPA	LCP	HCP	LPA	LCP	HCP
HULL	692.3	0.00	-2.21	1139.7	0.00	3.13
SAIL				2407.9	0.39a	17.34
Total Lateral Plane->	692.3	0.00	-2.21	3547.6	0.27a	12.78

**8.3 Tank List**

08/07/17 19:30:28 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

-----TANK LIST-----  
 -----Capacities at 100%-----

TANK STATUS  
 Trim: zero, Heel: zero

Part	Gals.	SpGr	Weight (LT)	LCG	TCG	VCG	FSM
FW.P	1573.7	1.000	5.86	44.00a	12.75p	6.25	6.4*
FUEL_A.P	1851.4	0.870	6.00	36.00f	13.00p	5.75	9.1*
FUEL_B.P	1851.4	0.870	6.00	36.00a	13.00p	5.75	9.1*
BAL_A.P	13374	1.014	50.52	55.55f	11.87p	6.92	156.2*
BAL_A.S	13374	1.014	50.52	55.55f	11.87s	6.92	156.2*
BAL_B.P	13374	1.014	50.52	55.55a	11.87p	6.92	156.2*
BAL_B.S	13374	1.014	50.52	55.55a	11.87s	6.92	156.2*
Total Tanks	----->		219.96	1.17a	1.05p	6.84	649.3

Distances in FEET.-----Moments in Ft-LT.

+

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

+

08/07/17 19:30:28 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

-----TANK LIST-----  
 -----Capacities at 95%-----

TANK STATUS  
 Trim: zero, Heel: zero

Part	Gals.	SpGr	Weight (LT)	LCG	TCG	VCG	FSM
FW.P	1495.0	1.000	5.57	44.00a	12.75p	6.11	6.4
FUEL_A.P	1758.9	0.870	5.70	36.00f	13.00p	5.61	9.1
FUEL_B.P	1758.9	0.870	5.70	36.00a	13.00p	5.61	9.1
BAL_A.P	12705	1.014	48.00	55.53f	11.90p	6.73	156.2
BAL_A.S	12705	1.014	48.00	55.53f	11.90s	6.73	156.2
BAL_B.P	12705	1.014	48.00	55.53a	11.90p	6.73	156.2
BAL_B.S	12705	1.014	48.00	55.53a	11.90s	6.73	156.2
Total Tanks	----->		208.96	1.17a	1.05p	6.65	649.3

Distances in FEET.-----Moments in Ft-LT.



### 8.4 Loading Condition Output

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 0 \*\*\*\*\*  
 Light Ship

WEIGHT STATUS  
 Baseline draft: 3.694 @ 88.00f, 3.642 @ 0.00, 3.590 @ 88.00a  
 Trim: Fwd 0.10/176.00, Heel: Stbd 2.20 deg.

Part-----	Weight (LT)	---LCG---	---TCG---	---VCG---	---FSM---
WEIGHT	380.00	0.38f	1.85s	8.65	
Load-----	SpGr-----	Weight (LT)	---LCG---	---TCG---	---VCG---
Total Tanks----->		--- Included in Fixed Weight ---			649.3*
Total Weight----->		380.00	0.38f	1.85s	8.65
Free Surface Adjustment----->				1.71	
Adjusted CG----->		0.38f	1.78s	10.36	

Distances in FEET.-----Moments in Ft-LT.

+  
 Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS  
 Baseline draft: 3.694 @ 88.00f, 3.642 @ 0.00, 3.590 @ 88.00a  
 Trim: Fwd 0.10/176.00, Heel: Stbd 2.20 deg.  
 Least freeboard is 5.95 Ft located at 21.42f  
 Least extra freeboard (to margin line) is 5.22 Ft located at 6.12f

HYDROSTATIC PROPERTIES  
 Trim: Fwd 0.10/176.00, Heel: Stbd 2.20 deg., VCG = 8.65

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft---	Weight (LT)	---LCB---	---VCB---	---Inch---	---LCF---	---In trim---	---GML---	---GMT---
3.642	380.01	0.38f	2.24	13.21	0.47f	115.45	641.6	45.79

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 176.00Ft  
 Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 1 \*\*\*\*\*  
Operational Light Ship

WEIGHT STATUS

Baseline draft: 3.763 @ 88.00f, 3.794 @ 0.00, 3.824 @ 88.00a  
Trim: Aft 0.06/176.00, Heel: Stbd 1.55 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 100	0.37	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
Total Fixed	386.31	0.43f	1.87s	8.82			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM
FW.P	1.000	1.000	5.86	44.00a	12.75p	6.25	0.0
FUEL A.P	0.950	0.870	5.70	36.00f	12.96p	5.61	9.1
FUEL B.P	0.950	0.870	5.70	36.00a	12.96p	5.61	9.1
Total Tanks			17.27	14.94a	12.89p	5.83	649.3*
Total Weight			403.58	0.23a	1.24s	8.70	
Free Surface Adjustment							1.61
Adjusted CG				0.23a	1.20s	10.30	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 3.763 @ 88.00f, 3.794 @ 0.00, 3.824 @ 88.00a  
Trim: Aft 0.06/176.00, Heel: Stbd 1.55 deg.  
Least freeboard is 6.07 Ft located at 21.42a  
Least extra freeboard (to margin line) is 5.33 Ft located at 3.06a

HYDROSTATIC PROPERTIES

Trim: Aft 0.06/176.00, Heel: Stbd 1.55 deg., VCG = 8.70

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
3.794	403.59	0.23a	2.31	13.57	0.27a	125.10	654.7	43.94

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.

Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 2 \*\*\*\*\*  
Operational Light Ship w/Ballast

WEIGHT STATUS

Baseline draft: 4.069 @ 88.00f, 4.068 @ 0.00, 4.067 @ 88.00a  
Trim: 0.00/176.00, Heel: zero

Part	Weight (LT)	LCG	TCG	VCG	FSM		
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 100	0.37	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
Total Fixed	386.31	0.43f	1.87s	8.82			
Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM	
FW.P	1.000	1.000	5.86	44.00a	12.75p	6.25	0.0
FUEL A.P	0.950	0.870	5.70	36.00f	13.00p	5.61	9.1
FUEL B.P	0.950	0.870	5.70	36.00a	13.00p	5.61	9.1
BAL A.P	0.463	1.014	23.39	55.27f	11.14p	4.69	93.1
BAL B.P	0.429	1.014	21.67	55.23a	11.10p	4.53	90.2
Total Tanks			62.33	2.60a	11.62p	4.95	649.3*
Total Weight			448.64	0.01f	0.00	8.29	
Free Surface Adjustment						1.45	
Adjusted CG				0.01f	0.00	9.73	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 4.069 @ 88.00f, 4.068 @ 0.00, 4.067 @ 88.00a  
Trim: 0.00/176.00, Heel: zero  
Least freeboard is 6.43 Ft located at 21.42f  
Least extra freeboard (to margin line) is 5.68 Ft located at 0.03f

HYDROSTATIC PROPERTIES

Trim: 0.00/176.00, No Heel, VCG = 8.29

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.068	448.64	0.01f	2.46	14.15	0.00f	143.74	676.7	40.78

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 3 \*\*\*\*\*  
 Departure Condition

WEIGHT STATUS

Baseline draft: 4.502 @ 88.00f, 4.500 @ 0.00, 4.498 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 0.32 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 100	0.37	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
60 PAX @ 185lb - LOUNGE	4.96	0.00	18.00s	14.00			
240 PAX @ 185lb - CARS	19.82	0.00	4.00p	14.00			
40 VEHICLES @5,000lb	89.27	0.00	4.00p	16.00			
Total Fixed	500.36	0.33f	0.75s	10.36			
Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM	
FW.P	1.000	1.000	5.86	44.00a	12.75p	6.25	0.0
FUEL A.P	0.950	0.870	5.70	36.00f	12.99p	5.61	9.1
FUEL B.P	0.950	0.870	5.70	36.00a	12.99p	5.61	9.1
BAL A.P	0.069	1.014	3.49	53.49f	10.25p	2.74	53.3
BAL B.P	0.033	1.014	1.67	51.94a	10.07p	2.47	39.1
Total Tanks			22.43	7.05a	12.28p	5.10	649.3*
Total Weight			522.79	0.02f	0.19s	10.13	
Free Surface Adjustment						1.24	
Adjusted CG				0.02f	0.19s	11.38	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 4.502 @ 88.00f, 4.500 @ 0.00, 4.498 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 0.32 deg.  
 Least freeboard is 5.87 Ft located at 21.42f  
 Least extra freeboard (to margin line) is 5.12 Ft located at 0.03f

HYDROSTATIC PROPERTIES

Trim: 0.00/176.00, Heel: Stbd 0.32 deg., VCG = 10.13

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.500	522.79	0.01f	2.72	14.43	0.00	151.00	610.0	33.63

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 4 \*\*\*\*\*  
Departure Condition w/SIM

WEIGHT STATUS

Baseline draft: 4.511 @ 88.00f, 4.536 @ 0.00, 4.561 @ 88.00a  
Trim: Aft 0.05/176.00, Heel: Stbd 0.49 deg.

Part	Weight (LT)	LCG	TCG	VCG			
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 100	0.37	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
60 PAX @ 185lb - LOUNGE	4.96	0.00	18.00s	14.00			
240 PAX @ 185lb - CARS	19.82	0.00	4.00p	14.00			
40 VEHICLES @5,000lb	89.27	0.00	4.00p	16.00			
3% SERVICE LIFE MARGIN	11.40	0.00	0.00	12.00			
Total Fixed	511.76	0.33f	0.74s	10.40			
Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM	
FW.P	1.000	1.000	5.86	44.00a	12.75p	6.25	0.0
FUEL_A.P	0.950	0.870	5.70	36.00f	12.99p	5.61	9.1
FUEL_B.P	0.950	0.870	5.70	36.00a	12.99p	5.61	9.1
Total Tanks			17.27	14.94a	12.91p	5.83	649.3*
Total Weight			529.03	0.17a	0.29s	10.25	
Free Surface Adjustment						1.23	
Adjusted CG				0.17a	0.28s	11.48	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 4.511 @ 88.00f, 4.536 @ 0.00, 4.561 @ 88.00a  
Trim: Aft 0.05/176.00, Heel: Stbd 0.49 deg.  
Least freeboard is 5.76 Ft located at 21.42a  
Least extra freeboard (to margin line) is 5.02 Ft located at 3.06a

HYDROSTATIC PROPERTIES

Trim: Aft 0.05/176.00, Heel: Stbd 0.49 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.536	529.03	0.17a	2.74	14.45	0.04a	151.43	604.5	33.13

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 5 \*\*\*\*\*  
 Arrival Condition

WEIGHT STATUS

Baseline draft: 4.498 @ 88.00f, 4.500 @ 0.00, 4.501 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 0.67 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 1000	3.73	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
60 PAX @ 185lb - LOUNGE	4.96	0.00	18.00s	14.00			
240 PAX @ 185lb - CARS	19.82	0.00	4.00p	14.00			
40 VEHICLES @5,000lb	89.27	0.00	4.00p	16.00			
Total Fixed	503.72	0.60f	0.83s	10.33			
Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM	
FW.P	0.100	1.000	0.59	44.00a	12.62p	3.78	6.4
FUEL A.P	0.100	0.870	0.60	36.00f	12.82p	3.28	9.1
FUEL B.P	0.100	0.870	0.60	36.00a	12.82p	3.28	9.1
BAL A.P	0.121	1.014	6.12	54.34f	10.40p	3.04	61.6
BAL B.P	0.221	1.014	11.18	54.89a	10.69p	3.55	72.0
Total Tanks			19.08	16.06a	10.79p	3.38	649.3*
Total Weight			522.80	0.01a	0.41s	10.08	
Free Surface Adjustment						1.24	
Adjusted CG				0.01a	0.39s	11.32	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 4.498 @ 88.00f, 4.500 @ 0.00, 4.501 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 0.67 deg.  
 Least freeboard is 5.73 Ft located at 21.42a  
 Least extra freeboard (to margin line) is 4.98 Ft located at 0.03f

HYDROSTATIC PROPERTIES

Trim: 0.00/176.00, Heel: Stbd 0.67 deg., VCG = 10.08

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.500	522.80	0.01a	2.72	14.43	0.00	150.95	609.8	33.69

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 6 \*\*\*\*\*  
 Arrival Condition w/SIM

WEIGHT STATUS

Baseline draft: 4.497 @ 88.00f, 4.499 @ 0.00, 4.501 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 1.06 deg.

Part	Weight (LT)	LCG	TCG	VCG			
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 1000	3.73	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
60 PAX @ 185lb - LOUNGE	4.96	0.00	18.00s	14.00			
240 PAX @ 185lb - CARS	19.82	0.00	4.00p	14.00			
40 VEHICLES @5,000lb	89.27	0.00	4.00p	16.00			
3% SERVICE LIFE MARGIN	11.40	0.00	0.00	12.00			
Total Fixed	515.12	0.58f	0.81s	10.37			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM
FW.P	0.100	1.000	0.59	44.00a	12.55p	3.78	6.4
FUEL_A.P	0.100	0.870	0.60	36.00f	12.72p	3.28	9.1
FUEL_B.P	0.100	0.870	0.60	36.00a	12.72p	3.28	9.1
BAL_A.P	0.007	1.014	0.37	50.06f	8.90p	2.15	13.6
BAL_B.P	0.109	1.014	5.52	54.24a	10.27p	2.97	59.3
Total Tanks			7.68	39.96a	10.76p	3.04	649.3*
Total Weight			522.80	0.01a	0.64s	10.26	
Free Surface Adjustment							1.24
Adjusted CG				0.01a	0.62s	11.50	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 4.497 @ 88.00f, 4.499 @ 0.00, 4.501 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 1.06 deg.  
 Least freeboard is 5.57 Ft located at 21.42a  
 Least extra freeboard (to margin line) is 4.83 Ft located at 0.03f

HYDROSTATIC PROPERTIES

Trim: 0.00/176.00, Heel: Stbd 1.06 deg., VCG = 10.26

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.499	522.80	0.01a	2.72	14.43	0.00a	150.88	609.5	33.50

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 7 \*\*\*\*\*

Departure w/SIM - Loading 150kip Truck At End A

WEIGHT STATUS

Baseline draft: 5.071 @ 88.00f, 4.985 @ 0.00, 4.899 @ 88.00a

Trim: Fwd 0.17/176.00, Heel: Stbd 1.57 deg.

Part	Weight (LT)	LCG	TCG	VCG			
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 100	0.37	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
60 PAX @ 185lb - LOUNGE	4.96	0.00	18.00s	14.00			
240 PAX @ 185lb - CARS	19.82	0.00	4.00p	14.00			
150kip Truck	66.96	90.00f	0.00	17.00			
3% SERVICE LIFE MARGIN	11.40	0.00	0.00	12.00			
Total Fixed----->	489.45	12.65f	1.50s	10.28			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM
FW.P	1.000	1.000	5.86	44.00a	12.75p	6.25	0.0
FUEL A.P	0.950	0.870	5.70	36.00f	12.96p	5.61	9.1
FUEL B.P	0.950	0.870	5.70	36.00a	12.96p	5.61	9.1
BAL B.P	1.000	1.014	50.52	55.55a	11.87p	6.92	0.0
BAL B.S	1.000	1.014	50.52	55.55a	11.87s	6.92	0.0
Total Tanks----->			118.31	49.63a	1.88p	6.76	649.3*
Total Weight----->			607.76	0.53f	0.84s	9.59	
Free Surface Adjustment----->							1.07
Adjusted CG----->				0.53f	0.81s	10.66	

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 5.071 @ 88.00f, 4.985 @ 0.00, 4.899 @ 88.00a

Trim: Fwd 0.17/176.00, Heel: Stbd 1.57 deg.

Least freeboard is 4.86 Ft located at 21.42f

Least extra freeboard (to margin line) is 4.13 Ft located at 9.18f

HYDROSTATIC PROPERTIES

Trim: Fwd 0.17/176.00, Heel: Stbd 1.57 deg., VCG = 9.59

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.985	607.77	0.54f	3.01	14.63	0.10f	155.72	541.1	29.64

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT



08/09/17 15:04:08 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 8 \*\*\*\*\*  
 Max Truck Load, 25 Pax, 10 Autos, w/ SIM

WEIGHT STATUS

Baseline draft: 4.501 @ 88.00f, 4.500 @ 0.00, 4.499 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 0.43 deg.

Part	Weight (LT)	LCG	TCG	VCG			
LIGHT SHIP	380.00	0.38f	1.85s	8.65			
7 CREW&EFF. @250lb	0.78	0.00	17.75s	23.00			
STORES & SPARES	5.00	0.00	0.00	20.00			
ZERO DISCHARGE TKS @ 100	0.37	40.00f	12.33s	6.00			
E-GEN DIESEL OIL @ 50 GAL	0.16	46.00f	18.00s	11.00			
150kip Truck	66.96	0.00	0.00	17.00			
10 VEHICLES @5,000lb	22.32	0.00	8.50p	16.00			
25 PAX @ 185lb	2.06	0.00	0.00	14.00			
3% SERVICE LIFE MARGIN	11.40	0.00	0.00	12.00			
Total Fixed----->	489.05	0.34f	1.09s	10.37			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	FSM
FW.P	1.000	1.000	5.86	44.00a	12.75p	6.25	0.0
FUEL A.P	0.950	0.870	5.70	36.00f	12.99p	5.61	9.1
FUEL B.P	0.950	0.870	5.70	36.00a	12.99p	5.61	9.1
BAL A.P	0.180	1.014	9.10	54.73f	10.62p	3.35	68.6
BAL B.P	0.146	1.014	7.39	54.54a	10.52p	3.17	65.1
Total Tanks----->			33.76	4.82a	11.77p	4.58	649.3*
Total Weight----->			522.81	0.01f	0.26s	9.99	
Free Surface Adjustment----->						1.24	
Adjusted CG----->				0.01f	0.25s	11.24	
Distances in FEET.----->							Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 4.501 @ 88.00f, 4.500 @ 0.00, 4.499 @ 88.00a  
 Trim: 0.00/176.00, Heel: Stbd 0.43 deg.  
 Least freeboard is 5.82 Ft located at 21.42f  
 Least extra freeboard (to margin line) is 5.08 Ft located at 0.03f

HYDROSTATIC PROPERTIES

Trim: 0.00/176.00, Heel: Stbd 0.43 deg., VCG = 9.99

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/					
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT	
4.500	522.81	0.01f	2.72	14.43	0.00	151.00	610.0	33.77	
Distances in FEET.----->				Specific Gravity = 1.014.----->				Moment in Ft-LT.	
				Trim is per 176.00Ft					

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

### 8.5 Intact Stability Max VCG Calculations

08/09/17 14:07:44 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

MAXIMUM VCG vs. DISPLACEMENT with ROLL  
 Trim = zero at zero heel (trim righting arm held at zero)

Displacement	Margins					
LONG TONS	Max VCG	LIM1	LIM2	LIM3	LIM4	LIM5
317.67	21.39	10d	56d	355%	0%	1125%
355.86	21.71	9d	53d	337%	0%	1016%
395.72	22.00	7d	50d	314%	0%	909%
437.10	22.25	6d	47d	292%	0%	805%
479.70	22.45	4d	44d	263%	0%	706%
522.80	22.58	3d	41d	231%	0%	611%
566.26	22.65	2d	39d	198%	0%	525%

Trim = Aft 1.00/176.00 at zero heel (trim righting arm held at zero)

Displacement	Margins					
LONG TONS	Max VCG	LIM1	LIM2	LIM3	LIM4	LIM5
317.67	21.35	10d	57d	362%	0%	1124%
355.86	21.67	9d	53d	341%	0%	1015%
395.72	21.95	7d	50d	319%	0%	909%
437.10	22.20	6d	47d	294%	0%	805%
479.70	22.39	4d	44d	263%	0%	705%
522.80	22.52	3d	41d	230%	0%	611%
566.26	22.60	2d	39d	197%	0%	525%

Trim = Aft 2.00/176.00 at zero heel (trim righting arm held at zero)

Displacement	Margins					
LONG TONS	Max VCG	LIM1	LIM2	LIM3	LIM4	LIM5
317.67	21.24	10d	57d	382%	0%	1122%
355.86	21.55	9d	54d	355%	0%	1013%
395.72	21.81	7d	50d	328%	0%	907%
437.10	22.05	6d	47d	296%	0%	804%
479.70	22.23	4d	44d	261%	0%	704%
522.80	22.37	3d	42d	227%	0%	612%
566.26	22.44	2d	39d	194%	0%	528%

Distances in FEET.---Specific Gravity = 1.014.---d = degrees.  
 +

LIM-----170.173E1 RIGHTING ENERGY CRITERION-----Min/Max

(1) Angle from 0 deg to RAzero	>	35.00 deg
(2) Angle from 0 deg to Flood	>	20.00 deg
(3) Area from 0 deg to MaxRA	>	15.00 Ft-deg
(4) Area from 0 deg to Flood	>	15.00 Ft-deg
(5) Area from 0 deg to 40	>	15.00 Ft-deg

**WEATHER CRITERION MAXIMUM KG CALCULATION**  
 from 46 CFR 170.170  
 for service on partially protected waters

$$GM_{reqd} = \frac{PAH}{W \tan(T)}$$

$$P = 0.0033 + (L/14200)^2 = 0.0034616 \text{ Long tons / Ft}^2$$

A = lateral area above waterline

H = vertical distance from centroid of A to 1/2 draft point

W = displacement in long tons

T = 14 degrees or angle of heel where 1/2 freeboard is submerged,  
 whichever is less.

Length on max waterline:	180.50	ft			
Depth to freeboard deck: (low point, at edge)	10.50	ft			
Beam:	46.00	ft			
Superstructure Height:	28.75	ft		Full breadth of vessel, full length	
Draft, T:	3.50	3.75	4.00	4.25	4.50
Displacement to T:	356	396	437	480	523
Area above waterline:	3768	3727	3683	3638	3593
h of area above waterline:	13.25	13.14	13.04	12.95	12.87
h of area to baseline:	16.75	16.89	17.04	17.20	17.37
Vertical distance, H:	15.00	15.02	15.04	15.08	15.12
Freeboard, f:	7.00	6.75	6.50	6.25	6.00
Tangent to 1/2 freeboard:	0.152	0.147	0.141	0.136	0.130
Tangent 14 deg:	0.249	0.249	0.249	0.249	0.249
GM required:	3.61	3.34	3.10	2.91	2.76
KMt at draft T:	59.59	55.31	51.49	48.04	45.00
Max KG incl. free surface:	55.98	51.97	48.39	45.13	42.24

SUMMARY TABLE

DRAFT	DISP	MAX KG	MIN GMt
-----	-----	-----	-----
3.50	355.86	55.98	3.61
3.75	395.72	51.97	3.34
4.00	437.10	48.39	3.10
4.25	479.70	45.13	2.91
4.50	522.80	42.24	2.76

**PASSENGER CRITERION MAXIMUM KG CALCULATION**

from 46 CFR 171.050(a), effective March 14, 2011

$$GM_{reqd} = \frac{W}{\Delta} * \frac{2}{3} * \frac{b}{\tan(T)}$$

W = total weight of persons other than required crew, including effects, in long tons

b = distance off centerline to centroid of passenger deck on one side  
(beam/4 used to be conservative)

Δ = displacement in long tons

T = 14 degrees or angle of heel where freeboard is submerged,  
whichever is less.

Number of passengers: 300  
 Depth to freeboard deck: 10.50 ft  
 (low point, at edge)  
 Beam: 46.00 ft  
 b: 18.00 ft  
 W: 24.78 LT

Draft, T:	3.50	3.75	4.00	4.25	4.50
Displacement to T:	355.86	395.72	437.10	479.70	522.80
Freeboard:	7.00	6.75	6.50	6.25	6.00
Tangent to freeboard:	0.304	0.293	0.283	0.272	0.261
Tangent 14 deg:	0.249	0.249	0.249	0.249	0.249
GM required:	3.35	3.01	2.73	2.49	2.28
KMt at draft T:	59.59	55.31	51.49	48.04	45.00
Max KG incl. free surface:	56.24	52.30	48.76	45.55	42.72

**PASSENGER CRITERION VALIDITY CALCULATION**

from 46 CFR 171.050(b), effective March 14, 2011

The calculation of 46 CFR 171.050(a) is valid when the Righting Arm (GZ) at heel angle T is not less than the minimum Metacentric Height (GM) calculated in paragraph (a) multiplied by sin(T).

Heel Angle, T, degrees:	14.00	14.00	14.00	14.00	14.00
sin(T) :	0.24	0.24	0.24	0.24	0.24
GM required (ft):	3.35	3.01	2.73	2.49	2.28
GZ required @ angle T (ft):	0.81	0.73	0.66	0.60	0.55

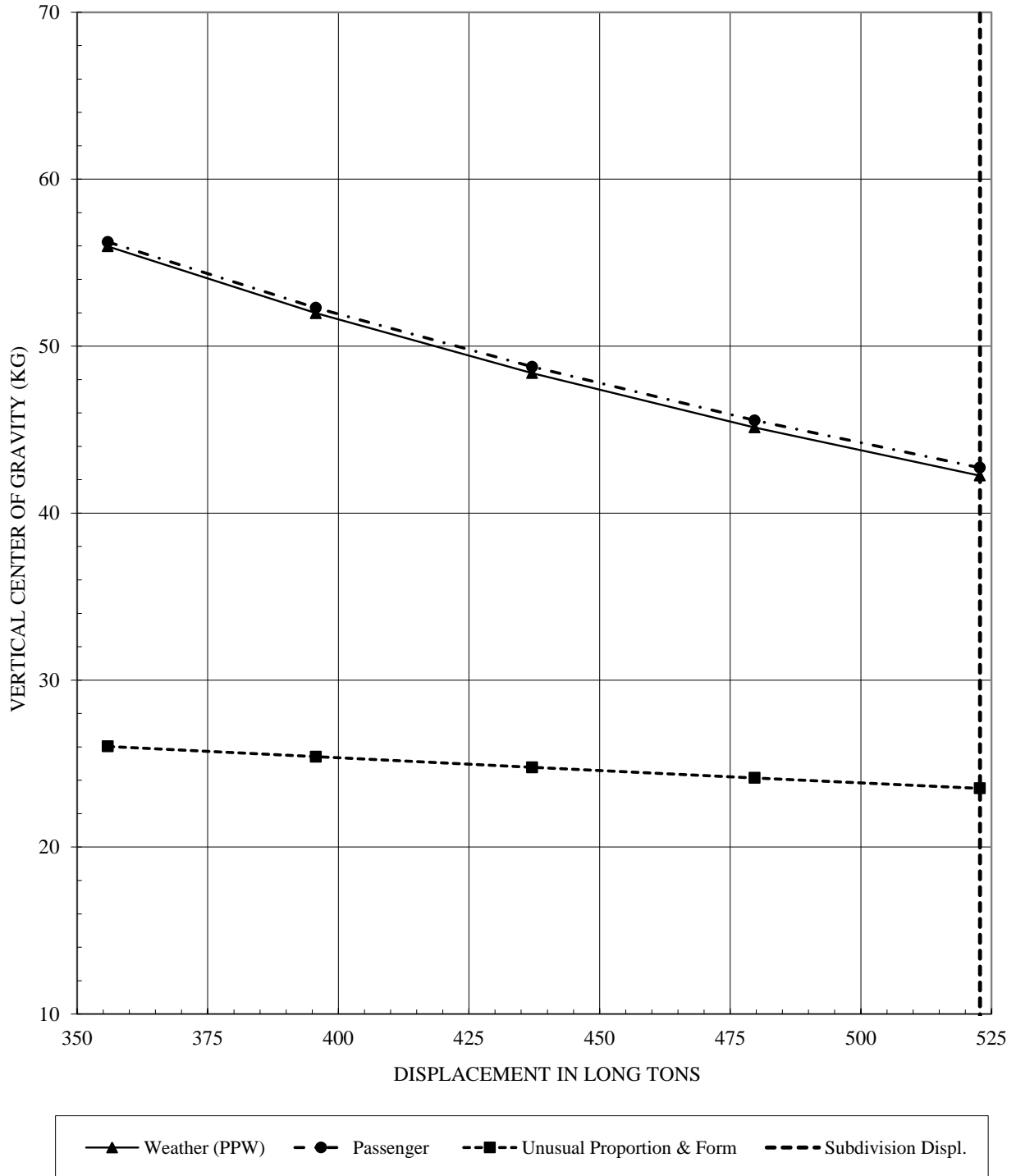
Compare required GZ to actual GZ from GHS output

SUMMARY TABLE

DRAFT	DISP	MAX KG	MIN GMt
-----	-----	-----	-----
3.50	356	56.24	3.35
3.75	396	52.30	3.01
4.00	437	48.76	2.73
4.25	480	45.55	2.49
4.50	523	42.72	2.28

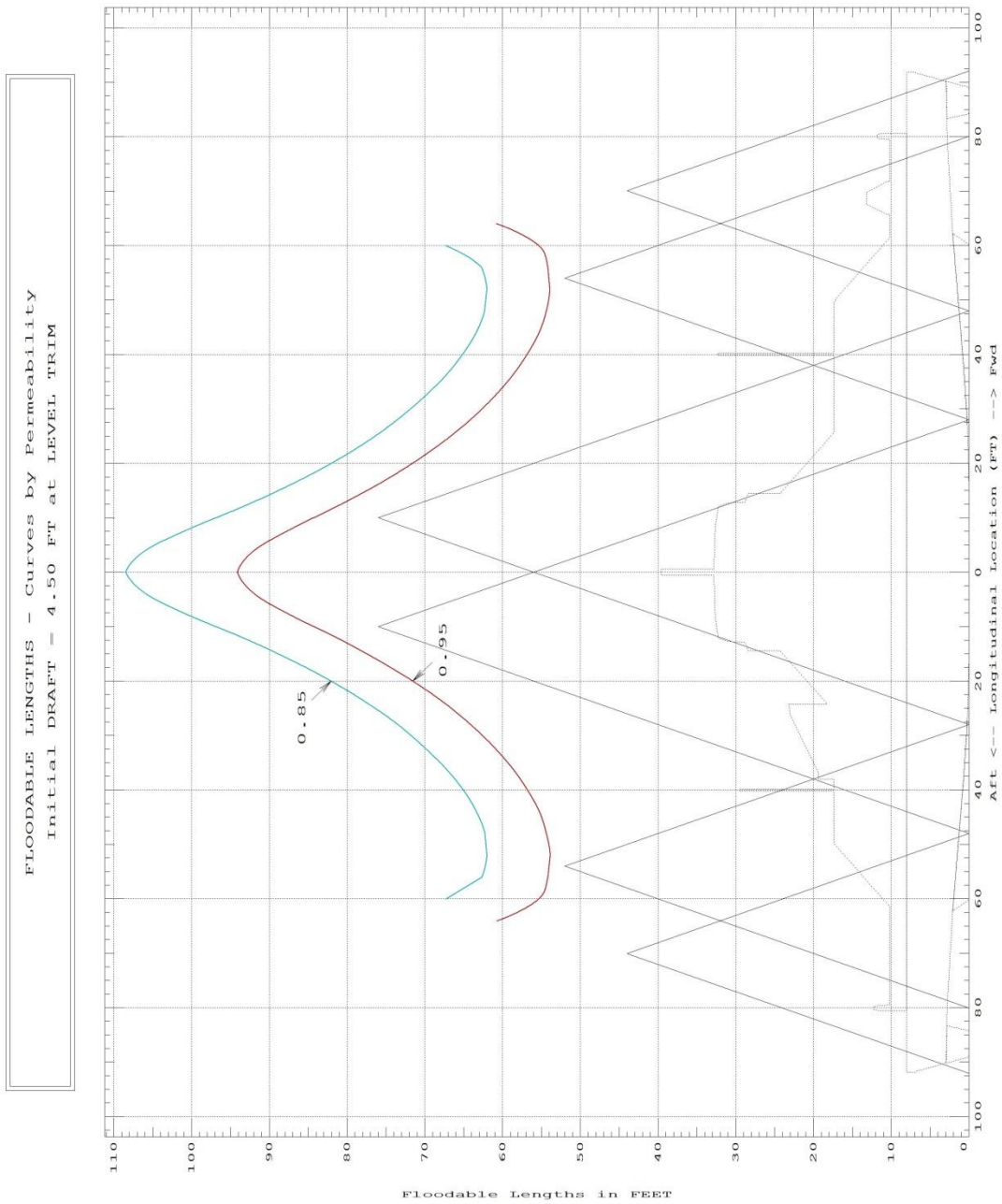
### 8.6 Maximum Allowable VCG Curves

**STABILITY CURVE - ALL CRITERIA**  
Trim 0.0' to 2.0'



### 8.7 Floodable Length Plot

08/09/17 14:28:57 Elliott Bay Design Group New Orleans  
GHS 15.00 NEW RIVER CLASS FERRY



### 8.8 Floodable Length GHS Output

08/09/17 14:28:57 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

FLOODABLE LENGTHS  
 Baseline draft: 4.500 Trim: zero  
 Vertical CG: 12.00 Permeability: 0.950

Origin	Degrees	F L O O D E D			
Depth	Trim	Center	Length	Margin	GMt
5.95	2.94f	64.00f	60.80	0.28	24.94
6.00	2.91f	60.00f	55.41	0.28	24.81
6.10	2.85f	56.00f	54.14	0.28	24.54
6.23	2.76f	52.00f	53.88	0.28	24.34
6.37	2.67f	48.00f	54.35	0.28	24.04
6.53	2.57f	44.00f	55.30	0.28	23.64
6.70	2.46f	40.00f	56.84	0.29	23.15
6.89	2.34f	36.00f	58.81	0.29	22.55
7.09	2.21f	32.00f	61.22	0.30	21.84
7.32	2.06f	28.00f	64.13	0.30	20.99
7.57	1.89f	24.00f	67.60	0.31	20.01
7.88	1.69f	20.00f	71.61	0.31	18.94
8.23	1.45f	16.00f	76.20	0.32	17.83
8.66	1.16f	12.00f	81.43	0.34	16.89
9.15	0.81f	8.00f	87.15	0.40	17.05
9.57	0.41f	4.00f	91.95	0.64	18.60
9.75	0.00	0.00	94.07	0.75	18.48
9.57	0.41a	4.00a	91.88	0.64	18.59
9.15	0.81a	8.00a	87.11	0.40	17.04
8.65	1.16a	12.00a	81.36	0.34	16.90
8.23	1.45a	16.00a	76.18	0.32	17.83
7.87	1.69a	20.00a	71.56	0.31	18.94
7.57	1.89a	24.00a	67.51	0.31	20.01
7.32	2.06a	28.00a	64.08	0.30	20.99
7.09	2.21a	32.00a	61.17	0.30	21.84
6.89	2.34a	36.00a	58.74	0.29	22.55
6.70	2.46a	40.00a	56.79	0.29	23.16
6.52	2.57a	44.00a	55.27	0.28	23.62
6.37	2.67a	48.00a	54.32	0.28	24.04
6.22	2.76a	52.00a	53.84	0.28	24.35
6.10	2.84a	56.00a	54.14	0.28	24.54
5.99	2.91a	60.00a	55.41	0.28	24.81
5.95	2.94a	64.00a	60.73	0.28	24.92

Distances in FEET.-----



08/09/17 14:28:57 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

FLOODABLE LENGTHS

Baseline draft: 4.500 Trim: zero  
 Vertical CG: 12.00 Permeability: 0.850

Origin	Degrees	F L O O D E D			
Depth	Trim	Center	Length	Margin	GMt
6.09	2.85f	60.00f	67.38	0.28	24.66
6.15	2.82f	56.00f	62.71	0.28	24.47
6.27	2.74f	52.00f	62.01	0.28	24.21
6.40	2.65f	48.00f	62.27	0.28	23.91
6.56	2.55f	44.00f	63.38	0.28	23.49
6.73	2.44f	40.00f	65.16	0.29	22.96
6.91	2.32f	36.00f	67.41	0.29	22.31
7.12	2.19f	32.00f	70.22	0.30	21.56
7.34	2.04f	28.00f	73.53	0.30	20.69
7.60	1.87f	24.00f	77.47	0.31	19.71
7.90	1.67f	20.00f	82.04	0.31	18.64
8.26	1.43f	16.00f	87.41	0.32	17.52
8.68	1.14f	12.00f	93.51	0.34	16.56
9.17	0.79f	8.00f	100.24	0.40	16.64
9.58	0.40f	4.00f	105.92	0.64	18.05
9.75	0.00	0.00	108.42	0.75	17.90
9.57	0.41a	4.00a	105.83	0.64	18.05
9.17	0.80a	8.00a	100.19	0.40	16.64
8.68	1.14a	12.00a	93.43	0.34	16.57
8.26	1.43a	16.00a	87.37	0.32	17.53
7.90	1.67a	20.00a	82.02	0.31	18.65
7.60	1.87a	24.00a	77.43	0.31	19.71
7.34	2.04a	28.00a	73.46	0.30	20.69
7.12	2.19a	32.00a	70.18	0.30	21.56
6.91	2.32a	36.00a	67.34	0.29	22.32
6.73	2.44a	40.00a	65.05	0.29	22.96
6.56	2.55a	44.00a	63.36	0.28	23.49
6.40	2.65a	48.00a	62.26	0.28	23.90
6.26	2.74a	52.00a	62.00	0.28	24.21
6.15	2.82a	56.00a	62.65	0.28	24.47
6.09	2.85a	60.00a	67.36	0.28	24.65

Distances in FEET.-----

**8.9 Frame Table**

<u>Frame Number</u>	<u>Feet Aft Frame 0</u>	<u>Frame Number</u>	<u>Feet Aft Frame 0</u>	<u>Frame Number</u>	<u>Feet Aft Frame 0</u>
46-A	-92	15-A	-30	16-B	32
45-A	-90	14-A WT	-28	17-B	34
44-A	-88	13-A	-26	18-B	36
43-A	-86	12-A	-24	19-B	38
42-A	-84	11-A	-22	20-B	40
41-A	-82	10-A	-20	21-B	42
40-A WT	-80	09-A	-18	22-B	44
39-A	-78	08-A	-16	23-B	46
38-A	-76	07-A	-14	24-B WT	48
37-A	-74	06-A	-12	25-B	50
36-A	-72	05-A	-10	26-B	52
35-A	-70	04-A	-8	27-B	54
34-A	-68	03-A	-6	28-B	56
33-A	-66	02-A	-4	29-B	58
32-A	-64	01-A	-2	30-B	60
31-A	-62	00	0	31-B	62
30-A	-60	01-B	2	32-B	64
29-A	-58	02-B	4	33-B	66
28-A	-56	03-B	6	34-B	68
27-A	-54	04-B	8	35-B	70
26-A	-52	05-B	10	36-B	72
25-A	-50	06-B	12	37-B	74
24-A WT	-48	07-B	14	38-B	76
23-A	-46	08-B	16	39-B	78
22-A	-44	09-B	18	40-B WT	80
21-A	-42	10-B	20	41-B	82
20-A	-40	11-B	22	42-B	84
19-A	-38	12-B	24	43-B	86
18-A	-36	13-B	26	44-B	88
17-A	-34	14-B WT	28	45-B	90
16-A	-32	15-B	30	46-B	92

Frame spacing is 24 inches throughout

### 8.10 Sample Damaged Stability Output

08/09/17 19:53:04 Elliott Bay Design Group New Orleans  
 GHS 15.00 NEW RIVER CLASS FERRY

\*\*\*\*\* Condition 4 \*\*\*\*\*

Departure Condition w/SIM

Damage Case 1: LAZARETTE A & THRUSTER ROOM A FLOODED

WEIGHT and DISPLACEMENT STATUS

Baseline draft: 5.764 @ 88.00f, 4.842 @ 0.00, 3.921 @ 88.00a

Trim: Fwd 1.84/176.00, Heel: Stbd 1.11 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
WEIGHT	529.03	0.17a	0.29s	10.25			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	
FW.P	0.000	1.000	0.00			6.4*	
FUEL_A.P	0.000	0.870	0.00			9.1*	
FUEL_B.P	0.000	0.870	0.00			9.1*	
BAL_A.P	0.000	1.014	0.00			156.2*	
BAL_B.P	0.000	1.014	0.00			156.2*	
BAL_B.S	0.000	1.014	0.00			156.2*	
Total Tanks	----->				0.00	649.3*	
Total Weight	----->				529.03	0.17a 0.29s 10.25	
			Displ (LT)	LCB	TCB	VCB	RefHt
HULL	1.014		583.79	5.88f	0.75s	2.96	-4.84
BAL_A.S	Flooded	1.014	-16.21	55.18f	11.04s	4.09	-4.84
LAZ_A.C	Flooded	1.014	-4.13	83.62f	0.17s	4.90	-4.84
THRUST_A.C	Flooded	1.014	-34.41	65.03f	0.37s	4.30	-4.84
Total Displacement	-->		1.014	529.04	0.08a	0.46s	2.82

DISPLACEMENT EXCESS: 0.01

Distances in FEET.-----Moments in Ft-LT.

+

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

+

FREEBOARD STATUS

Baseline draft: 5.764 @ 88.00f, 4.842 @ 0.00, 3.921 @ 88.00a

Trim: Fwd 1.84/176.00, Heel: Stbd 1.11 deg.

Least freeboard is 4.63 Ft located at 79.55f

Least extra freeboard (to margin line) is 4.14 Ft located at 52.01f

HYDROSTATIC PROPERTIES with FLOODING

Trim: Fwd 1.84/176.00, Heel: Stbd 1.11 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.755	529.04	0.08a	2.82	12.50	8.34a	95.24	380.2	30.91
Distances in FEET.		-----Specific Gravity = 1.014.-----Moment in Ft-LT.						
		Trim is per 176.00Ft						

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

08/09/17 19:53:04 Elliott Bay Design Group New Orleans  
GHS 15.00

\*\*\*\* Condition 4 \*\*\*\*

Departure Condition w/SIM

Damage Case 1: LAZARETTE A & THRUSTER ROOM A FLOODED

46 CFR 171.080(f) Damage Stability Criterion - Partially Protected

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Total CG: LCG = 0.17a TCG = 0.29s VCG = 10.25

Free Surface Adjustment: 1.23

Adjusted CG: LCG = 0.17a TCG = 0.29s VCG = 11.48

Origin	Degrees of	Displacement	Righting Arms	Flood Pt
Depth	Trim	Heel	Weight (LT)	Area
			in Trim	Height
			in Heel	
4.841	0.60f	1.11s	529.05	0.00
4.824	0.73f	6.11s	529.07	0.00
4.660	0.94f	11.11s	529.10	0.00
4.659	0.94f	11.15s	529.12	0.00
4.280	1.24f	16.11s	529.09	0.00
4.051	1.44f	18.55s	529.12	0.00
3.796	1.66f	21.11s	529.03	0.00
3.747	1.70f	21.61s	529.19	0.00
3.277	2.11f	26.11s	529.18	0.00
2.733	2.55f	31.11s	529.03	0.00
2.172	3.00f	36.11s	529.16	0.00
1.582	3.46f	41.11s	529.03	0.00
0.976	3.91f	46.11s	529.03	0.00
0.362	4.35f	51.11s	529.03	0.00
0.047	4.56f	53.67s	529.03	0.00
-0.255	4.76f	56.11s	529.03	0.00
-0.871	5.13f	61.11s	529.02	0.00
-1.295	5.37f	64.59s	529.03	0.00
-1.479	5.47f	66.11s	529.03	0.00

Distances in FEET.-----Specific Gravity = 1.014.-----Area in Ft-Deg.

Note: No tank loads are present.

Critical Points-----LCP-----TCP-----VCP

(3) E/R Intake A End TIGHT 27.75f 21.18 12.12

(7) Engine Room Exhaust FLOOD 0.00 16.00 21.83

LIM-----46 CFR 171.080(F) DAMAGE CRITERION-----Min/Max-----Attained

(1) Angle from Equilibrium to RZero	>	10.00 deg	63.48 P
(2) Angle from Equilibrium to Flood	>	10.00 deg	52.56 P
(3) Area from Equilibrium to Flood or RZero	>	2.82 Ft-deg	263.84 P
(4) Righting Arm at MaxRA	>	1.06 Ft	7.17 P
(6) Absolute Angle at Equilibrium	<	12.00 deg	1.11 P
(7) Angle from Equilibrium to Dk/margin Immersion	>	0.00 deg	10.04 P

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\*\*\*\*\* Condition 4 \*\*\*\*\*  
 Departure Condition w/SIM  
 Damage Case 2: THRUSTER ROOM A & VOID A FLOODED

WEIGHT and DISPLACEMENT STATUS

Baseline draft: 9.384 @ 88.00f, 5.988 @ 0.00, 2.592 @ 88.00a  
 Trim: Fwd 6.79/176.00, Heel: Stbd 2.37 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
WEIGHT	529.03	0.17a	0.29s	10.25			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	
FW.P	0.000	1.000	0.00			6.4*	
FUEL_A.P	0.000	0.870	0.00			9.1*	
FUEL_B.P	0.000	0.870	0.00			9.1*	
BAL_A.P	0.000	1.014	0.00			156.2*	
BAL_B.P	0.000	1.014	0.00			156.2*	
BAL_B.S	0.000	1.014	0.00			156.2*	
Total Tanks					0.00	649.3*	
Total Weight					529.03	0.17a 0.29s 10.25	
			Displ (LT)	LCB	TCB	VCB	RefHt
HULL		1.014	809.28	16.56f	1.28s	3.98	-5.98
BAL_A.S	Flooded	1.014	-34.26	55.58f	11.66s	5.74	-5.98
THRUST_A.C	Flooded	1.014	-85.33	66.86f	0.81s	6.03	-5.98
VOID_A.C	Flooded	1.014	-160.67	35.61f	1.49s	4.29	-5.98
Total Displacement	1.014		529.03	0.14f	0.62s	3.44	

WEIGHT EXCESS: 0.00

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 9.384 @ 88.00f, 5.988 @ 0.00, 2.592 @ 88.00a  
 Trim: Fwd 6.79/176.00, Heel: Stbd 2.37 deg.  
 Least freeboard is 0.79 Ft located at 84.65f  
 Least extra freeboard (to margin line) is 0.46 Ft located at 82.61f

HYDROSTATIC PROPERTIES with FLOODING

Trim: Fwd 6.79/176.00, Heel: Stbd 2.37 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
5.722	529.03	0.14f	3.44	10.50	6.87a	89.97	359.2	25.82
Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.								
Trim is per 176.00Ft								

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

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\*\*\*\* Condition 4 \*\*\*\*

Departure Condition w/SIM

Damage Case 2: THRUSTER ROOM A & VOID A FLOODED

46 CFR 171.080(f) Damage Stability Criterion - Partially Protected

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Total CG: LCG = 0.17a TCG = 0.29s VCG = 10.25

Free Surface Adjustment: 1.23

Adjusted CG: LCG = 0.17a TCG = 0.29s VCG = 11.48

Origin	Degrees of	Displacement	Righting Arms	Flood Pt
Depth	Trim	Heel	Weight (LT)	Area
			in Trim	Height
			in Heel	
5.978	2.21f	2.37s	529.03	4.17 (3)
5.978	2.24f	3.73s	529.07	0.41 Marg Imm.
5.940	2.38f	7.37s	529.10	5.48 13.64 (7)
5.827	2.78f	12.37s	528.95	20.89 12.05 (7)
5.820	2.81f	12.64s	528.98	21.97 -0.00 (3)
5.703	3.45f	17.37s	529.08	43.08 10.33 (7)
5.605	3.98f	20.69s	528.88	59.24 9.13 (7)
5.553	4.26f	22.37s	529.09	67.48 8.51 (7)
5.370	5.09f	27.37s	529.18	91.29 6.62 (7)
5.144	5.92f	32.37s	529.03	112.86 4.68 (7)
4.876	6.73f	37.37s	529.03	131.41 2.71 (7)
4.569	7.51f	42.37s	529.14	146.38 0.73 (7)
4.442	7.79f	44.23s	529.03	150.96 0.00 (7)
4.221	8.25f	47.37s	529.03	157.42 -1.24 (7)
3.843	8.94f	52.37s	528.97	164.32 -3.19 (7)
3.438	9.58f	57.37s	528.97	166.94 -5.12 (7)
3.396	9.64f	57.90s	529.03	166.96 -5.32 (7)
3.010	10.13f	62.37s	529.03	165.23 -7.00 (7)

Distances in FEET.-----Specific Gravity = 1.014.-----Area in Ft-Deg.

Note: No tank loads are present.

Critical Points	LCP	TCP	VCP
(3) E/R Intake A End	TIGHT 27.75f	21.18	12.12
(7) Engine Room Exhaust	FLOOD 0.00	16.00	21.83

LIM	46 CFR 171.080 (F) DAMAGE CRITERION	Min/Max	Attained
(1) Angle from Equilibrium to RZero	>	10.00 deg	55.53 P
(2) Angle from Equilibrium to Flood	>	10.00 deg	41.86 P
(3) Area from Equilibrium to Flood or RZero	>	2.82 Ft-deg	150.96 P
(4) Righting Arm at MaxRA	>	1.06 Ft	4.91 P
(6) Absolute Angle at Equilibrium	<	12.00 deg	2.37 P
(7) Angle from Equilibrium to Dk/margin Immersion	>	0.00 deg	1.36 P

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\*\*\*\*\* Condition 4 \*\*\*\*\*  
Departure Condition w/SIM  
Damage Case 3: VOID A & ENGINE ROOM FLOODED

WEIGHT and DISPLACEMENT STATUS

Baseline draft: 9.021 @ 88.00f, 7.534 @ 0.00, 6.047 @ 88.00a  
Trim: Fwd 2.97/176.00, Heel: Stbd 1.32 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
WEIGHT	529.03	0.17a	0.29s	10.25			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	
FW.P	0.000	1.000	0.00			6.4*	
FUEL_A.P	0.000	0.870	0.00			9.1*	
FUEL_B.P	0.000	0.870	0.00			9.1*	
BAL_A.P	0.000	1.014	0.00			156.2*	
BAL_A.S	0.000	1.014	0.00			156.2*	
BAL_B.P	0.000	1.014	0.00			156.2*	
BAL_B.S	0.000	1.014	0.00			156.2*	
Total Tanks	----->				0.00	649.3	
Total Weight	----->				529.03	0.17a 0.29s 10.25	
			Displ (LT)	LCB	TCB	VCB	RefHt
HULL		1.014	1,074.28	6.10f	0.58s	4.49	-7.53
VOID_A.C	Flooded	1.014	-180.84	35.47f	1.00s	4.66	-7.53
ER.C	Flooded	1.014	-364.42	0.46f	0.57s	3.99	-7.53
Total Displacement	-->		1.014	529.03	0.06a	0.45s	4.77

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WEIGHT EXCESS: 0.00

Distances in FEET.-----Moments in Ft-LT.

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Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

+

FREEBOARD STATUS

Baseline draft: 9.021 @ 88.00f, 7.534 @ 0.00, 6.047 @ 88.00a  
Trim: Fwd 2.97/176.00, Heel: Stbd 1.32 deg.  
Least freeboard is 1.36 Ft located at 82.61f  
Least extra freeboard (to margin line) is 0.98 Ft located at 73.43f

HYDROSTATIC PROPERTIES with FLOODING

Trim: Fwd 2.97/176.00, Heel: Stbd 1.32 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
7.509	529.03	0.06a	4.77	9.48	1.48a	172.91	690.3	19.38

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

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NEW RIVER CLASS FERRY

\*\*\*\* Condition 4 \*\*\*\*

Departure Condition w/SIM

Damage Case 3: VOID A & ENGINE ROOM FLOODED

46 CFR 171.080(f) Damage Stability Criterion - Partially Protected

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Total CG: LCG = 0.17a TCG = 0.29s VCG = 10.25

Free Surface Adjustment: 1.23

Adjusted CG: LCG = 0.17a TCG = 0.29s VCG = 11.48

Origin	Degrees of	Displacement	Righting Arms	Flood Pt
Depth	Trim	Heel	Weight (LT)	Area
			in Trim	Height
			in Heel	
7.531	0.97f	1.32s	529.03	0.00
7.474	0.94f	4.24s	529.04	0.00
7.404	0.92f	6.32s	529.03	0.00
7.249	0.98f	11.32s	529.02	0.00
7.240	1.00f	11.86s	529.17	0.00
7.189	1.15f	16.32s	529.02	0.00
7.167	1.30f	19.94s	528.96	0.00
7.158	1.36f	21.32s	529.03	0.00
7.099	1.59f	26.32s	529.03	0.00
6.995	1.82f	31.32s	529.04	0.00
6.841	2.04f	36.32s	529.04	0.00
6.635	2.25f	41.32s	529.04	0.00
6.380	2.45f	46.32s	529.02	0.00
6.078	2.63f	51.32s	529.03	0.00
5.796	2.76f	55.43s	529.04	0.00
5.726	2.78f	56.32s	528.87	0.00
5.341	2.92f	61.32s	529.02	0.00
4.914	3.03f	66.32s	529.03	0.00
4.454	3.10f	71.32s	529.03	0.00
3.967	3.16f	76.32s	529.03	0.00
3.448	3.18f	81.32s	528.87	0.00
2.921	3.18f	86.32s	529.19	0.00
2.353	3.15f	91.32s	529.03	0.00
1.772	3.10f	96.32s	529.03	0.00
1.176	3.02f	101.32s	529.03	0.00
0.569	2.93f	106.32s	529.03	0.00
-0.047	2.82f	111.32s	529.02	0.00
-0.664	2.70f	116.32s	529.02	0.00
-1.269	2.56f	121.32s	529.02	0.00

Distances in FEET.-----Specific Gravity = 1.014.-----Area in Ft-Deg.

Note: No tank loads are present.

Critical Point	LCP	TCP	VCP
(1) Thruster A Vents	TIGHT	65.75f	18.17
		12.38	
LIM-----46 CFR 171.080(F) DAMAGE CRITERION-----Min/Max-----Attained			
(1) Angle from Equilibrium to RAZero	>	10.00 deg	54.11 P
(2) Angle from Equilibrium to Flood	>	10.00 deg	LARGE
(3) Area from Equilibrium to Flood or RAZero	>	2.82 Ft-deg	127.78 P
(4) Righting Arm at MaxRA	>	1.06 Ft	3.86 P
(6) Absolute Angle at Equilibrium	<	12.00 deg	1.32 P
(7) Angle from Equilibrium to Dk/margin Immersion	>	0.00 deg	2.93 P



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\*\*\*\*\* Condition 4 \*\*\*\*\*  
 Departure Condition w/SIM  
 Damage Case 4: ENGINE ROOM & VOID B FLOODED

WEIGHT and DISPLACEMENT STATUS

Baseline draft: 6.014 @ 88.00f, 7.492 @ 0.00, 8.970 @ 88.00a  
 Trim: Aft 2.95/176.00, Heel: Stbd 1.65 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
WEIGHT	529.03	0.17a	0.29s	10.25			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	
FW.P	0.000	1.000	0.00			6.4*	
FUEL_A.P	0.000	0.870	0.00			9.1*	
FUEL_B.P	0.000	0.870	0.00			9.1*	
BAL_A.P	0.000	1.014	0.00			156.2*	
BAL_A.S	0.000	1.014	0.00			156.2*	
BAL_B.P	0.000	1.014	0.00			156.2*	
BAL_B.S	0.000	1.014	0.00			156.2*	
Total Tanks	----->				0.00	649.3	
Total Weight	----->				529.03	0.17a 0.29s 10.25	
			Displ (LT)	LCB	TCB	VCB	RefHt
HULL	1.014		1,066.54	6.09a	0.73s	4.47	-7.49
ER.C	Flooded	1.014	-362.24	0.46a	0.71s	3.97	-7.49
VOID_B.C	Flooded	1.014	-175.27	35.25a	1.50s	4.61	-7.49
Total Displacement	-->		1.014	529.03	0.29a	0.49s	4.76

WEIGHT EXCESS: 0.00

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 6.014 @ 88.00f, 7.492 @ 0.00, 8.970 @ 88.00a  
 Trim: Aft 2.95/176.00, Heel: Stbd 1.65 deg.  
 Least freeboard is 1.31 Ft located at 82.61a  
 Least extra freeboard (to margin line) is 0.92 Ft located at 67.31a

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 2.95/176.00, Heel: Stbd 1.65 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
7.468	529.03	0.29a	4.76	9.52	1.41f	172.23	687.6	19.50

Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.  
 Trim is per 176.00Ft

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

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\*\*\*\* Condition 4 \*\*\*\*

Departure Condition w/SIM

Damage Case 4: ENGINE ROOM & VOID B FLOODED

46 CFR 171.080(f) Damage Stability Criterion - Partially Protected

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Total CG: LCG = 0.17a TCG = 0.29s VCG = 10.25

Free Surface Adjustment: 1.23

Adjusted CG: LCG = 0.17a TCG = 0.29s VCG = 11.48

Origin Depth	Degrees of Trim	Displacement Heel	Weight (LT)	Righting Arms in Trim	Righting Arms in Heel	Flood Pt Area	Flood Pt Height
7.488	0.96a	1.65s	529.03	0.00	0.000	0.00	3.26(6)
7.438	0.94a	4.34s	529.04	0.00	0.903	1.21	Marg Imm.
7.363	0.92a	6.65s	529.03	0.00	1.684	4.20	1.78(6)
7.225	1.00a	11.65s	529.13	0.00	3.060	16.19	0.08(6)
7.220	1.01a	11.87s	529.06	0.00	3.106	16.88	-0.00(6)
7.178	1.19a	16.65s	529.03	0.00	3.728	33.45	-1.89(6)
7.164	1.34a	20.05s	529.01	0.00	3.830	46.40	-3.30(6)
7.154	1.41a	21.65s	529.02	0.00	3.808	52.49	-3.97(6)
7.099	1.65a	26.65s	529.03	0.00	3.544	71.05	-6.08(6)
6.996	1.90a	31.65s	529.03	0.00	3.093	87.72	-8.16(6)
6.843	2.13a	36.65s	529.05	0.00	2.533	101.83	-10.20(6)
6.637	2.35a	41.65s	529.04	0.00	1.905	112.96	-12.15(6)
6.380	2.55a	46.65s	529.02	0.00	1.232	120.82	-14.02(6)
6.076	2.74a	51.65s	529.02	0.00	0.531	125.24	-15.77(6)
5.822	2.86a	55.36s	529.01	0.00	0.000	126.22	-17.00(6)
5.728	2.90a	56.65s	529.03	0.00	-0.187	126.10	-17.41(6)
5.338	3.04a	61.65s	529.03	0.00	-0.911	123.36	-18.91(6)
4.909	3.15a	66.65s	529.03	0.00	-1.633	117.00	-20.27(6)
4.449	3.23a	71.65s	529.03	0.00	-2.346	107.05	-21.48(6)
3.961	3.28a	76.65s	529.03	0.00	-3.042	93.57	-22.52(6)
3.442	3.30a	81.65s	528.87	0.00	-3.715	76.67	-23.38(6)
2.907	3.30a	86.65s	529.02	0.00	-4.362	56.47	-24.08(6)
2.343	3.27a	91.65s	529.02	0.00	-4.977	33.10	-24.58(6)
1.761	3.22a	96.65s	529.03	0.00	-5.555	6.76	-24.90(6)
1.163	3.14a	101.65s	529.03	0.00	-6.091	-22.38	-25.02(6)
0.554	3.04a	106.65s	529.02	0.00	-6.580	-54.07	-24.96(6)
-0.065	2.92a	111.65s	529.02	0.00	-7.018	-88.09	-24.72(6)
-0.685	2.80a	116.65s	529.02	0.00	-7.400	-124.16	-24.29(6)
-1.290	2.66a	121.65s	529.03	0.00	-7.718	-161.98	-23.70(6)

Distances in FEET.-----Specific Gravity = 1.014.-----Area in Ft-Deg.

Note: No tank loads are present.

Critical Point	LCP	TCP	VCP
(6) Thruster B Vents	TIGHT 65.75a	18.17	12.38
LIM-----46 CFR 171.080(F) DAMAGE CRITERION-----Min/Max-----Attained			
(1) Angle from Equilibrium to RZero	>	10.00 deg	53.71 P
(2) Angle from Equilibrium to Flood	>	10.00 deg	LARGE
(3) Area from Equilibrium to Flood or RZero	>	2.82 Ft-deg	126.22 P
(4) Righting Arm at MaxRA	>	1.06 Ft	3.83 P
(6) Absolute Angle at Equilibrium	<	12.00 deg	1.65 P
(7) Angle from Equilibrium to Dk/margin Immersion	>	0.00 deg	2.69 P

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\*\*\*\*\* Condition 4 \*\*\*\*\*  
 Departure Condition w/SIM  
 Damage Case 5: VOID B & THRUSTER ROOM B FLOODED

WEIGHT and DISPLACEMENT STATUS

Baseline draft: 2.558 @ 88.00f, 5.959 @ 0.00, 9.361 @ 88.00a  
 Trim: Aft 6.80/176.00, Heel: Stbd 2.56 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
WEIGHT	529.03	0.17a	0.29s	10.25			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	
FW.P	0.000	1.000	0.00			6.4*	
FUEL_A.P	0.000	0.870	0.00			9.1*	
FUEL_B.P	0.000	0.870	0.00			9.1*	
BAL_A.P	0.000	1.014	0.00			156.2*	
BAL_A.S	0.000	1.014	0.00			156.2*	
BAL_B.P	0.000	1.014	0.00			156.2*	
Total Tanks	----->			0.00		649.3*	
Total Weight	----->			529.03	0.17a 0.29s 10.25		
			Displ (LT)	LCB	TCB	VCB	RefHt
HULL		1.014	804.74	16.63a	1.39s	3.97	-5.95
BAL_B.S	Flooded	1.014	-34.39	55.58a	11.68s	5.75	-5.95
VOID_B.C	Flooded	1.014	-156.38	35.41a	1.91s	4.25	-5.95
THRUST_B.C	Flooded	1.014	-84.95	66.86a	0.87s	6.02	-5.95
Total Displacement	-->		1.014	529.02	0.48a 0.65s 3.44		

WEIGHT EXCESS: 0.00

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 2.558 @ 88.00f, 5.959 @ 0.00, 9.361 @ 88.00a  
 Trim: Aft 6.80/176.00, Heel: Stbd 2.56 deg.  
 Least freeboard is 0.76 Ft located at 84.65a  
 Least extra freeboard (to margin line) is 0.43 Ft located at 82.61a

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 6.80/176.00, Heel: Stbd 2.56 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
5.710	529.02	0.48a	3.44	10.54	6.45f	90.06	359.5	26.02
Distances in FEET.		Specific Gravity = 1.014.						
		Trim is per 176.00Ft						

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

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\*\*\*\* Condition 4 \*\*\*\*

Departure Condition w/SIM

Damage Case 5: VOID B & THRUSTER ROOM B FLOODED

46 CFR 171.080(f) Damage Stability Criterion - Partially Protected

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Total CG: LCG = 0.17a TCG = 0.29s VCG = 10.25

Free Surface Adjustment: 1.23

Adjusted CG: LCG = 0.17a TCG = 0.29s VCG = 11.48

Origin	Degrees of	Displacement	Righting Arms	Flood Pt
Depth	Trim	Heel	Weight (LT)	Area
	in	in	in	Height
5.950	2.21a	2.56s	529.15	4.13(4)
5.951	2.25a	3.80s	529.09	0.34 Marg Imm.
5.916	2.41a	7.56s	529.08	5.47 13.60(7)
5.810	2.84a	12.56s	529.01	20.89 12.00(7)
5.809	2.84a	12.62s	529.04	21.12 0.00(4)
5.692	3.54a	17.56s	529.08	42.91 10.26(7)
5.601	4.07a	20.78s	528.93	58.42 9.10(7)
5.547	4.37a	22.56s	529.11	67.01 8.43(7)
5.363	5.22a	27.56s	529.02	90.45 6.54(7)
5.140	6.06a	32.56s	529.02	111.64 4.59(7)
4.872	6.89a	37.56s	529.02	129.77 2.63(7)
4.563	7.68a	42.56s	529.02	144.32 0.65(7)
4.453	7.93a	44.21s	529.03	148.25 -0.00(7)
4.218	8.43a	47.56s	529.03	154.94 -1.33(7)
3.840	9.14a	52.56s	528.96	161.43 -3.28(7)
3.437	9.78a	57.56s	528.99	163.67 -5.20(7)
3.430	9.79a	57.66s	529.04	163.67 -5.24(7)
3.008	10.34a	62.56s	529.04	161.60 -7.08(7)

Distances in FEET.-----Specific Gravity = 1.014.-----Area in Ft-Deg.

Note: No tank loads are present.

Critical Points	LCP	TCP	VCP
(4) E/R Intake B End	TIGHT 27.75a	21.18	12.12
(7) Engine Room Exhaust	FLOOD 0.00	16.00	21.83

LIM	46 CFR 171.080(F) DAMAGE CRITERION	Min/Max	Attained
(1) Angle from Equilibrium to RZero	>	10.00 deg	55.09 P
(2) Angle from Equilibrium to Flood	>	10.00 deg	41.64 P
(3) Area from Equilibrium to Flood or RZero	>	2.82 Ft-deg	148.25 P
(4) Righting Arm at MaxRA	>	1.06 Ft	4.84 P
(6) Absolute Angle at Equilibrium	<	12.00 deg	2.56 P
(7) Angle from Equilibrium to Dk/margin Immersion	>	0.00 deg	1.23 P

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\*\*\*\*\* Condition 4 \*\*\*\*\*  
 Departure Condition w/SIM  
 Damage Case 6: THRUSTER ROOM B & LAZARETTE B FLOODED

WEIGHT and DISPLACEMENT STATUS

Baseline draft: 3.847 @ 88.00f, 4.850 @ 0.00, 5.852 @ 88.00a  
 Trim: Aft 2.00/176.00, Heel: Stbd 1.12 deg.

Part	Weight (LT)	LCG	TCG	VCG	FSM		
WEIGHT	529.03	0.17a	0.29s	10.25			
	Load	SpGr	Weight (LT)	LCG	TCG	VCG	
FW.P	0.000	1.000	0.00			6.4*	
FUEL_A.P	0.000	0.870	0.00			9.1*	
FUEL_B.P	0.000	0.870	0.00			9.1*	
BAL_A.P	0.000	1.014	0.00			156.2*	
BAL_A.S	0.000	1.014	0.00			156.2*	
BAL_B.P	0.000	1.014	0.00			156.2*	
Total Tanks	----->			0.00		649.3*	
Total Weight	----->			529.03	0.17a 0.29s 10.25		
			Displ (LT)	LCB	TCB	VCB	RefHt
HULL		1.014	585.36	6.37a	0.75s	2.97	-4.85
BAL_B.S	Flooded	1.014	-16.55	55.19a	11.05s	4.12	-4.85
THRUST_B.C	Flooded	1.014	-35.46	65.11a	0.37s	4.34	-4.85
LAZ_B.C	Flooded	1.014	-4.35	83.63a	0.16s	4.94	-4.85
Total Displacement	--> 1.014		529.00	0.27a	0.46s	2.82	

WEIGHT EXCESS: 0.02

Distances in FEET.-----Moments in Ft-LT.

Note: FSM values marked with an asterisk (\*) are formal values which are not the same as the true values in the present condition.

FREEBOARD STATUS

Baseline draft: 3.847 @ 88.00f, 4.850 @ 0.00, 5.852 @ 88.00a  
 Trim: Aft 2.00/176.00, Heel: Stbd 1.12 deg.  
 Least freeboard is 4.55 Ft located at 79.55a  
 Least extra freeboard (to margin line) is 4.08 Ft located at 55.08a

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 2.00/176.00, Heel: Stbd 1.12 deg., VCG = 10.25

LCF	Displacement	Buoyancy-Ctr.	Weight/	Moment/				
Draft	Weight (LT)	LCB	VCB	Inch	LCF	In trim	GML	GMT
4.758	529.00	0.27a	2.82	12.45	8.00f	93.66	373.9	30.88
Distances in FEET.-----Specific Gravity = 1.014.-----Moment in Ft-LT.								
Trim is per 176.00Ft								

Draft is from Baseline. Formal Free Surface included.

Note: GMT includes the formal free surface moment 649.3 Ft-LT

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\*\*\*\* Condition 4 \*\*\*\*

Departure Condition w/SIM

Damage Case 6: THRUSTER ROOM B & LAZARETTE B FLOODED

46 CFR 171.080(f) Damage Stability Criterion - Partially Protected

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Total CG: LCG = 0.17a TCG = 0.29s VCG = 10.25

Free Surface Adjustment: 1.23

Adjusted CG: LCG = 0.17a TCG = 0.29s VCG = 11.48

Origin	Degrees of	Displacement	Righting Arms	Flood Pt
Depth	Trim	Heel	Weight (LT)	Area
			in Trim	Height
			in Heel	
4.848	0.65a	1.12s	529.00	6.53(4)
4.830	0.79a	6.12s	529.03	15.17(7)
4.670	1.00a	11.03s	529.07	25.55 Marg Imm.
4.664	1.00a	11.12s	528.98	13.67(7)
4.286	1.32a	16.12s	529.02	12.24(7)
4.075	1.51a	18.41s	529.11	0.00(4)
3.807	1.75a	21.12s	529.03	10.79(7)
3.773	1.78a	21.46s	529.03	10.68(7)
3.293	2.22a	26.12s	529.11	9.26(7)
2.755	2.68a	31.12s	529.02	7.65(7)
2.198	3.15a	36.12s	529.17	5.99(7)
1.610	3.63a	41.12s	528.97	4.30(7)
1.010	4.10a	46.12s	529.03	2.58(7)
0.398	4.56a	51.12s	529.03	0.84(7)
0.100	4.77a	53.55s	529.02	-0.00(7)
-0.216	4.98a	56.12s	529.02	-0.89(7)
-0.829	5.36a	61.12s	529.01	-2.62(7)
-1.237	5.60a	64.49s	529.03	-3.78(7)
-1.435	5.71a	66.12s	529.03	-4.33(7)

Distances in FEET.-----Specific Gravity = 1.014.-----Area in Ft-Deg.

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Note: No tank loads are present.

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Critical Points-----LCP-----TCP-----VCP

(4) E/R Intake B End TIGHT 27.75a 21.18 12.12

(7) Engine Room Exhaust FLOOD 0.00 16.00 21.83

LIM-----46 CFR 171.080(F) DAMAGE CRITERION-----Min/Max-----Attained

(1) Angle from Equilibrium to RZero	>	10.00 deg	63.36 P
(2) Angle from Equilibrium to Flood	>	10.00 deg	52.43 P
(3) Area from Equilibrium to Flood or RZero	>	2.82 Ft-deg	262.20 P
(4) Righting Arm at MaxRA	>	1.06 Ft	7.14 P
(6) Absolute Angle at Equilibrium	<	12.00 deg	1.12 P
(7) Angle from Equilibrium to Dk/margin Immersion	>	0.00 deg	9.91 P