



NORTH CAROLINA D.O.T. PEDESTRIAN FERRY

Weight Estimate

Prepared for: NCDOT • Raleigh, NC

Ref: 16109-003-833-0

Rev. -

March 3, 2017

PREPARED BY

Elliott Bay Design Group – North Carolina, PLLC
5305 Shilshole Ave. NW, Ste. 100
Seattle, WA 98107

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
-	Initial Release	3/3/17	JAT 36582

CONFIDENTIAL AND PROPRIETARY PROPERTY OF
ELLIOTT BAY DESIGN GROUP – NORTH CAROLINA, PLLC
MAY NOT BE USED FOR CONSTRUCTION OR PROVIDED TO
ANY THIRD PARTIES WITHOUT PRIOR WRITTEN CONSENT.
© 2017 ELLIOTT BAY DESIGN GROUP - NORTH CAROLINA, PLLC.

1 PURPOSE

This report documents the weight estimate for the North Carolina D.O.T. Pedestrian Ferry. The subject vessel is a new design for a 92 ft x 26 ft x 11.5 ft high-speed catamaran which will be owned and operated by the North Carolina Department of Transportation (NCDOT).

2 PROCEDURE

The weight estimate was created using a Microsoft Excel spreadsheet. The spreadsheet sums the known, calculated, and estimated structural, equipment, and outfit weights of the vessel. Weights were confirmed from vendor documentation (V) wherever possible, calculated (C), or estimated (E). A six percent margin was applied to the estimate to account for the uncertainty of weights and for items not specifically estimated in the spreadsheet. An additional three percent margin was applied to the structural weights for welds, brackets, etc.

The origin used in this estimate is located at Frame 0 (stern) on the baseline with positive forward, starboard, and up.

The six categories making up the weight estimate were developed using the Ship Work Breakdown System (SWBS). The six categories are listed in Table 1. Structural weights were determined from the scantling calculations [1]. Major propulsion machinery weights were referenced from vendor documentation and located according to the machinery arrangement [2]. System weights were estimated from system designs and outfit weights estimated from the general arrangements [3] and specified equipment.

Table 1: SWBS Categories

SWBS Number	Description
100	Ship Structure
200	Propulsion Systems
300	Electrical Systems
400	Command, Control, and Communication Systems
500	Auxiliary Systems
600	Outfit

3 CONCLUSIONS

The subject vessel is estimated to have the following light ship and full load weights and centers of gravity. The full load weight includes a full passenger, crew, and bicycle complement, food service supplies, and full fuel and potable water tanks. The weight estimate is shown in Appendix A.

Light Ship Weight: 67.87 LT
 Longitudinal Center of Gravity: 37.23 ft fwd. Frame 0
 Vertical Center of Gravity: 9.34 ft above baseline

Full Load Weight: 88.32 LT
 Longitudinal Center of Gravity: 38.95 ft fwd. Frame 0
 Vertical Center of Gravity: 10.03 ft above baseline

4 REFERENCES

- [1] Elliott Bay Design Group, "Scantling Calculations," 16109-003-061-0, Rev. -, March 3, 2017.
- [2] Elliott Bay Design Group, "Machinery Arrangement," 16109-003-201-1, Rev. -, March 3, 2017.
- [3] Elliott Bay Design Group, "Profiles and Arrangements," 16109-003-101-1, Rev. -, March 3, 2017.

Appendix A

Weight Estimate

VESSEL WEIGHT ESTIMATE							
SWBS No.	Description	Qty.	Total Wt. (lbs)	LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Notes
	<u>SUMMARY</u>						
100	STRUCTURE		71,735	43.63	0.01	9.68	
200	MACHINERY		33,182	20.66	0.00	4.19	
300	ELECTRICAL		8,165	35.06	0.17	9.39	
400	ELECTRONICS & IC		1,722	54.05	0.00	24.13	
500	AUXILIARY SYSTEMS		9,671	34.98	-0.04	12.52	
600	OUTFIT		16,917	39.16	-0.04	14.45	
	VESSEL WEIGHT - SUBTOTAL		141,391 (63.12LT)	36.75	0.01	9.32	
	ROLL AND WELD MARGIN	3%	2,152	43.63	0.01	9.68	
	SWBS MARGINS	6%	8,483	43.63	0.01	9.68	
	DEADWEIGHT		45,811	44.68	-0.31	12.34	
	LIGHTSHIP WITH MARGINS		152,026 (67.87 LT)	37.23	0.01	9.34	
	LOADED VESSEL WITH MARGINS		197,838 (88.32 LT)	38.95	-0.07	10.03	

SWBS No.	100 STRUCTURE Description	Unit Wt. Total Wt.		LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)					
	Hull							
	Bottom plate 5/16"	1617	4.39	7,094	50.03	0.00	1.74	
	Bottom long'l stiff's aft FB 4x5/16"	448	1.46	655	18.00	0.00	1.50	
	Btm Xvrs Aft 6x1/2 w/5x1/2 (FR 2-8)	107	6.44	686	18.00	0.00	1.75	
	Bottom long'l stiff's Mid FB 4.5x5/16"	560	1.65	921	46.00	0.00	1.09	
	Btm Xvrs Mid 9x3/8 w/5x1/2 (FR 9-15)	102	6.90	704	46.00	0.00	1.35	
	Bottom long'l stiff's Fwd FB 3x3/8"	560	1.32	737	72.00	0.00	2.58	
	Btm Xvrs Fwd 10x1/4 w/4x1/4 (FR 16-22)	102	4.10	418	72.00	0.00	2.70	
	Outbd side plate 1/4"	1382	3.51	4,850	43.58	0.00	6.71	
	Outbd guard plate 1/4"	132	3.51	464	48.03	0.00	11.13	
	Outbd guard plate extrusion	193	8.19	1,581	48.03	0.00	11.13	plate 1/2"
	Outbd side long'ls Aft T 2x2x1/4"	728	1.26	917	18.00	0.00	6.71	
	Outbd Xvrs Aft 9x3/8 w/5x1/2	141	6.88	972	18.00	0.00	6.71	
	Outbd side long'ls Mid T2.5x2x1/4	672	1.31	880	44.00	0.00	6.71	
	Outbd Xvrs Mid 10x3/8 w/6x1/2	120	7.90	949	44.00	0.00	6.71	
	Outbd side long'ls Fwd FB 3x3/8"	560	1.32	740	72.00	0.00	6.71	
	Outbd Xvrs Fwd 9x1/4 w/4x1/4	79	3.80	301	72.00	0.00	6.71	
	Inbd side plate 1/4"	1251	3.51	4,391	43.43	0.00	6.28	
	Haunch insert 3/8"	343	1.76	602	48.00	0.00	9.01	
	Inbd side long'ls Aft T 2x2x1/4"	616	1.26	776	18.00	0.00	6.28	
	Inbd Xvrs Aft 7x3/8 w/5x1/2	120	6.00	720	18.00	0.00	6.28	
	Inbd side long'ls Mid T2.5x2x1/4	616	1.31	807	44.00	0.00	6.28	
	Inbd Xvrs Mid 10x3/8 w/5x1/2	105	7.31	768	44.00	0.00	6.28	
	Inbd side long'ls Fwd FB 3x3/8"	448	1.32	590	72.00	0.00	6.28	
	Inbd Xvrs Fwd 9x1/4 w/4x1/4"	66	3.80	251	72.00	0.00	6.28	
	Wet dk plate 1/4"	628	3.87	2,429	53.40	0.00	9.69	
	Wet dk long'ls Aft T 2x2x1/4	168	1.26	212	18.00	0.00	9.69	
	Wet dk Xvrs Aft bhd pl 3/8 (FR 2-8)	80	7.02	562	18.00	0.00	9.69	
	Wet dk long'ls Mid T2.5x2x1/4	168	1.31	220	44.00	0.00	9.69	
	Wet dk Xvrs Mid bhd pl 3/8 (FR 9-15)	70	7.02	491	44.00	0.00	9.69	
	Wet dk long'ls Fwd FB 3x3/8	224	1.32	295	72.00	0.00	9.69	
	Wet dk Xvrs Fwd bhd pl 1/4 (FR 16-22)	84	4.68	393	72.00	0.00	9.69	
	CL bhd pl 3/16"	176	2.63	463	50.50	0.00	9.69	
	Main dk plate 3/16	2221	2.63	5,848	46.79	0.00	11.50	
	Main dk long'ls T1.5x1.5x3/16	2640	0.71	1,866	46.79	0.00	11.30	
	Main dk outbd Xvrs Aft 14x3/8 w/5x1/2	84	9.07	762	18.00	0.00	11.00	
	Main dk outbd Xvrs Mid 13x3/8 w/5x1/2	112	8.63	967	44.00	0.00	11.00	
	Main dk outbd Xvrs Fwd 12x1/4 w/4x1/4	128	4.68	599	72.00	0.00	11.00	
	Stem CL bhd pl 3/16	45	2.63	118	90.00	0.00	6.50	
	Stem breasthooks pl 3/16	58	2.63	152	90.00	0.00	5.50	
	Floors FR 20-22 pl 1/4"	12	2.63	32	84.00	0.00	2.00	
	Transom pl 5/16 + 50% for framing	171	6.58	1,125	4.00	0.00	6.50	
	WT bhds 3/16" corrugated							
	FR 3.5	128.8	2.63	339	14.00	0.00	6.50	
	FR 9	125.0	2.63	329	36.00	0.00	6.50	
	FR 16 - tonnage frame	77.0	2.63	203	64.00	0.00	7.50	
	FR 17	70.0	2.63	184	68.00	0.00	7.50	
	FR 18 - tonnage frame	63.7	2.63	168	72.00	0.00	7.50	
	FR 20	43.8	2.63	115	80.00	0.00	7.50	
	FR 22 - tonnage frame	38.4	2.63	101	88.00	0.00	7.50	
	Engine Girders plate 1/2"	96	7.02	674	24.00	0.00	3.00	
	CVK 6x5/16 w/ 4x3/8"	211	3.95	835	48.00	0.00	1.00	
	Fuel tanks pl 1/4	510	3.51	1,790	54.00	0.00	5.00	
	Swim Step	68	2.60	176	2.00	0.00	6.00	
	Supporting Structure	2	125	250	2.00	0.00	6.00	

SWBS No.	100 STRUCTURE CONT'D Description	Unit Wt.		Total Wt. (lbs)	LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
	House								
	House side pl 3/16	400	2.63	1,053	44.00	0.00	16.25		no plate IWO windows
	House side long's L2x1.5x3/16	320	0.77	246	52.00	0.00	16.25		
	House side pillars sqtb 4x4x1/4	162	4.20	680	50.00	0.00	16.25		
	House top plate 3/16	1584	2.63	4,170	41.67	0.00	19.50		
	House top long's T 1.5x1.5x3/16"	1560	0.71	1,103	41.67	0.00	19.50		
	House top xvrs 5x3/16" w/ 3x1/4"	294	2.70	795	41.67	0.00	19.25		
	Hse top long'l grdr xvrs 7x5/16" w/ 3x3/8"	80	3.88	311	52.00	0.00	19.25		
	House stanchions (FR 10, 13, 16) 3" sch40	54	2.61	141	52.00	0.00	16.00		
	House stanchions (FR 3.5) 3" sch40	18	2.61	47	14.00	0.00	16.00		
	House aft bhd (composite of sides)	123	4.60	566	32.00	0.00	15.00		no bhd IWO doors
	House fwd bhd pl 3/16"	142	2.63	372	68.00	0.00	15.00		no plate IWO windows
	House fwd bhd stiff FB 3x1/4"	296	0.88	260	68.00	0.00	15.00		
	House fwd bhdVert sqtb 5x4x1/4"	72	4.79	345	68.00	0.00	15.00		
	Bar, heads, vents bhds (composite of sides)	760	4.60	3,499	22.00	0.00	15.00		
	Bulwarks fwd (comp of sides)	140	4.60	645	80.00	0.00	14.00		
	Bulwarks aft (comp of sides)	165	4.60	760	24.00	0.00	14.00		
	Bridge								
	Bridge front PL 3/16"	85	2.63	225	62.00	0.00	24.50		no plate IWO windows
	Bridge front stiff's T1.5x1.5x3/16	60	0.71	42	62.00	0.00	24.50		
	Bridge front grdr 4x1/4 w/2x5/16"	50	1.91	95	62.00	0.00	24.50		
	Bridge sides (composite of house sides)	170	4.60	783	49.75	0.00	24.50		no plate IWO windows
	Bridge aft bhd (composite of house sides)	60	4.60	276	44.00	0.00	24.50		
	Fashion plates (use .125 panels w/50%stiffs)	324	2.63	854	38.33	0.00	22.00		
	Bridge top plate 3/16"	230	2.63	605	45.17	0.00	28.00		
	Bridge top stiff's T1.5x1.5x3/16	160	0.71	113	45.17	1.00	28.00		
	Bridge top grdr 5x3/16" w/3x1/4"	36	2.70	97	45.17	2.00	28.00		
	Bridge top visor pl 3/16"	67	2.63	176	45.17	2.00	28.00		
	STRUCTURE - SUBTOTAL			71735 32.02	43.63	0.01	9.68		

SWBS No.	200 MACHINERY Description	Unit Wt.		Total Wt. (lbs)	LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
230	Propulsion Units								
	Main Engines - CAT C18	4	4677	18,710	24.92	0.00	4.45	C	
	Reduction Gears - MGX-5146	4	760	3,040	21.36	0.00	3.48	C	
	Resilient Mounts	16	20	317	24.08	0.00	3.33	E	
	Isolator Plate	16	12	186	24.08	0.00	3.33	E	
240	Transmission and Propulsor Systems								
	Waterjets - Thrustmaster	4	1124	4,496	4.54	0.00	2.50	V	
	Entrained Water	4	308	1,232	4.54	0.00	2.50	V	
	Hydraulic Pump and Hose	4	24	97	4.54	0.00	2.50	V	
	Hydraulic Tank	4	30	119	4.54	0.00	2.50	V	
	Hydraulic Fluid	4	40	158	4.54	0.00	2.50	V	
	Jet Control Box	4	31	124	4.54	0.00	2.50	V	
	Shafting System	1	1160	1,160	14.58	0.00	2.92	V	
259.1	Exhaust System								
	Generator Muffler - Thinline 40	2	55	110	35.00	0.00	6.50	E	
	Entrained Liquid	1	64	68	35.00	0.00	6.50	E	
	ME - Thinline 40 Wet Exhaust	4	120	480	18.00	0.00	5.50	E	
	Entrained Water	10	64	664	18.00	0.00	5.50	E	
	Steel Exhaust Pipe	24	22	528	25.00	0.00	7.74	E	
	Fiberglass Exhaust Pipe	36	7	254	25.00	0.00	10.00	E	
	Flex Hose	18	5	88	25.00	0.00	10.00	E	
	Flanges	18	20	360	25.00	0.00	10.00	E	
261.1	Fuel Service								
	Pipe, 1-1/2" SS 316 Tubing	90	1.01	90	36.00	0.00	6.00	E	
	Entrained Liquid	0.92	61.20	56	36.00	0.00	6.00	E	
	Pipe, 1" SS 316 Tubing	64	0.66	42	23.00	0.00	6.00	E	
	Entrained Liquid	0.26	61.20	16	23.00	0.00	6.00	E	
	Pipe, 1/2" SS 316 Tubing	40	0.31	12	33.00	0.00	6.00	E	
	Entrained Liquid	0.03	61.20	2	33.00	0.00	6.00	E	
	15% Joints	15%	145	22	32.34	0.00	6.00	E	
	20% Hangars	20%	145	29	32.34	0.00	6.00	E	
	Vent Pipe, 2-1/2" Al 6061	90	1.99	179	46.00	0.00	6.00	E	
	Fill Pipe, 2" Al 6061	90	1.24	111	46.00	0.00	6.00	E	
	15% Joints	15%	290	44	46.00	0.00	6.00	E	
	20% Hangars	20%	290	58	46.00	0.00	6.00	E	
	Valves and Fittings								
	Hydraulic Valve	2	5	10	50.00	0.00	11.50	E	
	Fuel Tank Return - 1-1/2" Ball Check Valve	2	3.81	8	50.00	0.00	11.50	V	
	ME Return - 1" Ball Check Valve	4	1.45	6	32.00	0.00	11.50	V	
	SSDG Return - 1/2" Ball Check Valve	2	0.38	1	32.00	0.00	11.50	V	
	Stripping Valve - 1" Ball Valve	2	2.35	5	50.00	0.00	11.50	V	
	Fuel Tank Fill - 1-1/2" Ball Valve	2	4.79	10	50.00	0.00	11.50	V	
	ME Fill - 1" Ball Valve	4	2.35	9	32.00	0.00	11.50	V	
	SSDG Fill - 1/2" Ball Valve	2	1.31	3	32.00	0.00	11.50	V	
	Tank Sound - 1/4" Ball Valve	6	0.60	4	32.00	0.00	11.50	V	
	Wager Vent Check Valve	2	10	20	72.00	0.00	13.00	V	
	Fill Camlock	2	10	20	72.00	0.00	13.00	V	
	ME Racor Filters	4	53	212	32.00	0.00	3.50	V	Racor 79/1000 MAVM
	SSDG Filters	2	12	24	32.00	0.00	3.50	E	Racor 1000 MAM
MACHINERY - SUBTOTAL				33182	20.66	0.00	4.19		
				14.81					

SWBS No.	300 ELECTRICAL Description	Unit Wt. Total Wt.		LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)					
300	Power Distribution System							
	Stbd Generator - Northern Lights 40kW	1	1380	1,380	33.75	0.00	4.20	V
	Port Generator - Northern Lights 40kW	1	1380	1,380	34.00	0.00	4.20	V
	Water Lift	2	60	120	33.75	0.00	4.62	E
	Switchboard	1	75	75	25.00	-11.00	16.00	E
	Panel P201	1	40	40	24.00	0.00	7.00	E
	Panel P202	1	40	40	24.00	0.00	7.00	E
	Panel L201	1	40	40	28.00	0.00	16.00	E
	Panel L202	1	40	40	28.00	0.00	16.00	E
	Panel L203	1	40	40	48.00	0.00	25.00	E
	Panel 24DC1	1	40	40	14.00	0.00	25.00	E
	Panel 24DC2	1	40	40	14.00	0.00	25.00	E
	Panel 24DC3	1	40	40	48.00	0.00	25.00	E
	Panel 12DC1	1	40	40	52.00	0.00	25.00	E
	Wiring/Cabling	3500	0.2	700	56.00	0.00	20.00	E
	Gen 1 to SWBD	20	2.81	56	28.00	-11.00	9.00	C F-168
	Gen 2 to SWBD	50	2.81	141	28.00	0.00	9.00	C F-168
	Shore Power to Transformer	30	0.56	17	22.00	6.00	11.50	C F-26
	Transformer to SWBD	30	0.56	17	24.00	0.00	11.50	C F-26
	SWBD to P201	50	1	42	24.00	-11.00	9.00	C F-41
	SWBD to P202	15	1	18	24.00	0.00	9.00	C F-66
	Shore Power Connection	1	150	150	80.00	6.67	12.00	E
	Isolation Transformer - 25kVA	1	250	250	25.00	11.08	12.50	V
	Gen/ME Starting Batteries - 8D	10	161	1,610	28.00	0.00	4.00	V
	Battery Boxes/Framework	6	35	210	28.00	0.00	4.00	E
	Battery Chargers	6	10	60	28.00	0.00	4.00	E
	24DC1/2 Batteries - JR	4	66	264	14.00	0.00	5.00	V
	Battery Boxes/Framework	2	35	70	14.00	0.00	5.00	E
	Battery Chargers	2	15	30	14.00	0.00	5.00	E
	24DC3 Batteries - PH	2	66	132	58.00	-7.92	22.00	V
	Battery Boxes/Framework	1	35	35	58.00	-7.92	22.00	E
	Battery Chargers	1	15	15	58.00	-7.92	22.00	E
	12DC1 Battery - PH	1	66	66	56.30	7.60	22.00	V
	Battery Boxes/Framework	1	35	35	56.30	7.60	22.00	E
	Battery Chargers	1	15	15	56.30	7.60	22.00	E
331	Lighting							
	Main Deck Interior Lighting	31	7	217	44.00	0.00	19.00	E
	Main Deck Exterior Lighting	15	2	30	26.00	0.00	19.00	E
	Pilothouse Interior Lighting	6	7	42	50.00	0.00	28.50	E
	Pilothouse Exterior Lighting	15	2	30	38.00	0.00	28.50	V
	Machinery Space Lighting	16	15	240	24.00	0.00	10.00	E
	Searchlight	1	185	185	54.00	0.00	30.50	V
	Nav Lights	5	3	15	44.17	0.00	32.00	V
	Lifeboat Lights	2	10	20	16.25	0.00	23.33	V
	Fwd Deck Floodlights	2	23	46	72.00	0.00	19.17	V
	Aft Deck Floodlights	4	23	92	22.00	0.00	25.83	V
ELECTRICAL - SUBTOTAL				8165	35.06	0.17	9.39	
				3.64				

SWBS No.	400 ELECTRONICS & IC Description	Unit Wt.		Total Wt. (lbs)	LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
400	Electronics (Inc. Consoles)	1	1200	1,200	56.00	0.00	25.00	E	
	Whistle	1	33	33	56.00	0.00	25.00	V	
	Clock	1	2	2	56.00	0.00	25.00	V	
	Barometer	1	2	2	56.00	0.00	25.00	V	
	Fog Bell	1	10	10	56.00	0.00	25.00	V	
	Radar	1	12	12	56.00	0.00	25.00	V	
	NavNet	1	35	12	56.00	0.00	25.00	V	
	Antenna	1	59	59	56.00	0.00	25.00	V	
	GPS	1	3	3	56.00	0.00	25.00	V	
	Depth Sounder and Transducer	1	10	10	56.00	0.00	25.00	V	
	VHF Radio System								
	<i>Radio</i>	2	5	10	56.00	0.00	25.00	V	
	<i>Antenna</i>	2	5	10	56.00	0.00	25.00	V	
	<i>Loudhailer Speaker</i>	2	5	10	56.00	0.00	25.00	V	
	PA/GA system								
	<i>ADA Visual Messaging System</i>	2	15	30	56.00	0.00	25.00	E	
	<i>Loudspeakers/Beacons</i>	5	10	50	56.00	0.00	25.00	E	
	Fire Detection	1	40	40	56.00	0.00	25.00	E	
	CCTV System								
	<i>Cameras</i>	12	3	36	56.00	0.00	25.00	E	
	<i>Control Station</i>	1	20	20	56.00	0.00	25.00	E	
	Waterjet Controls	1	172	172	56.00	0.00	25.00	E	
ELECTRONICS & IC - SUBTOTAL				1722	54.05	0.00	24.13		
				0.77					

SWBS No.	500 AUXILIARY SYSTEMS Description	Unit Wt. Total Wt.		LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)					
514	HVAC System							
	Outdoor Heat Pumps	6	165	990	19.83	0.00	22.75	V
	Pilothouse Heat Pump - Indoor	2	51	102	50.00	0.00	29.00	V
	Passenger Space Heat Pump - Indoor	4	55	220	50.00	0.00	20.50	V
	Piping - 1/2" Copper	500	0.34	172	34.00	0.00	24.00	C
	Engine Room Supply Fan	2	117	234	30.50	0.00	11.50	V
	Engine Room Demister	2	30	60	30.50	0.00	11.50	E
	Passenger Space Exhaust Fan	1	30	30	48.00	0.00	20.50	V
	Jet Room Fan	2	20	40	14.00	0.00	11.50	E
	Joiner Ducts	2	8	16	36.00	0.00	20.50	E
	Ductwork and Inlet Grill	104	1	83	14.00	0.00	22.00	E
	Fire Louvers - Inlet	2	137	273	26.00	0.00	16.00	E
	Fire Louvers - Outlet	2	62	123	26.00	0.00	16.00	E
520	Sea Water Cooling							
	Pipe, 3" Cu-Ni	40	4.0	160	26.00	0.00	6.00	E
	<i>Entrained Liquid</i>	2.39	64.00	153	26.00	0.00	6.00	E
	Pipe, 1" Cu-Ni	30	1.1	33	26.00	0.00	6.00	E
	<i>Entrained Liquid</i>	0.23	64.00	15	26.00	0.00	6.00	E
	<i>Joints</i>	20%	193	39	26.00	0.00	6.00	E
	<i>Hangars</i>	20%	193	39	26.00	0.00	6.00	E
	Valves							
	<i>Swing Check - 3"</i>	4	15	60	26.00	0.00	6.00	V
	<i>Swing Check - 1"</i>	2	2	3	26.00	0.00	6.00	V
	<i>Ball - 1"</i>	4	2	8	26.00	0.00	6.00	V
	<i>Gate - 3"</i>	4	18	71	0.00	0.00	6.00	V
	<i>Butterfly - 3"</i>	4	11	44	26.00	0.00	6.00	V
	Propulsion & Generator Strainer (wet weight)	4	60	240	26.00	0.00	3.50	V
	Sea Chests (Aluminum)	5	50	250	32.00	0.00	2.00	E
	<i>Entrained Liquid - ~1.5 cu ft</i>	8	64	480	32.00	0.00	2.00	E
521	Fire Main							
	Fire Pump (7.5 hp)	1	152	152	41.00	6.67	5.00	V
	Sea Water Strainer	1	32	32	39.00	6.67	5.00	E
	Pipe, 2" CuNi	65	2.6	169	34.00	0.00	11.50	E
	<i>Entrained Liquid</i>	1.73	62.40	108	34.00	0.00	11.50	E
	Pipe, 1-1/2" CuNi	76	1.8	134	44.00	0.00	15.00	E
	<i>Entrained Liquid</i>	1.28	62.40	80	44.00	0.00	15.00	E
	<i>Hangars</i>	20%	303	61	46.00	0.00	15.00	E
	Fire Stations	4	80	320	40.00	4.08	18.00	E
528	Sewage System							
	Tank - Cylindrical, 200 gallons	1	82	82	42.00	8.50	5.00	V
	Tank Cradle	1	85	85	42.00	8.50	4.00	E
	Tank Vent	1	5	5	42.00	8.50	5.00	E
	Discharge Pump (2 hp)	1	95	95	46.00	0.00	5.00	E
	Pipe, 1" CPVC	2	0.45	1	72.00	4.00		
	Pipe, 1-1/4" CPVC	10	0.65	7	18.00	4.00		
	Pipe, 1-1/2" CPVC	35	0.80	28	42.00	4.00		
	Pipe, 2" CPVC	5	1.10	6	32.00	4.00		
	Pipe, 2" Al 6061	170	1.24	210	33.33	0.00	11.50	E
	<i>Hangars</i>	20%	210	42	33.33	0.00	11.50	E
529.1	Bilge System							
	Bilge Pump	11	8	88	34.00	0.00	1.00	E
	Hand Pump	2	5	10	80.00	0.00	1.00	E
	Flex Hoses	120	1.02	122	34.00	0.00	4.50	V
	Pipe, 1-1/2" Al 5086	10	1.26	13	33.33	0.00	9.00	E
	<i>Joints/Valves/Fittings</i>	15%	135	20	33.33	0.00	9.00	E
	<i>Hangars</i>	15%	135	20	33.33	0.00	9.00	E

SWBS No.	500 AUXILIARY SYSTEMS CONT'D Description	Unit Wt. Total Wt.		LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)					
529.2	Deck Drains							
	Deck Drains	10	6	60	40.00	0.00	25.00	E
	Pipe, 1-1/2" A1 6061	80	0.97	78	48.00	0.00	25.00	E
	Pipe, 2" A1 6061	65	1.24	80	36.00	0.00	16.00	E
533	Potable Water System							
	Tank - Cylindrical, 200 gallons	1	82	82	42.00	-8.50	5.00	V
	Tank Cradle	1	85	85	42.00	-8.50	4.00	V
	Tank Vent	1	2	2	42.00	-8.50	5.00	E
	Pipe, 2" A1 6061 - Vent	30	1.24	37	64.00	-4.00	11.50	E
	Pipe, 1-1/2" A1 6061 - Fill	30	0.97	29	64.00	-4.00	11.50	E
	Pipe, 1-1/2" Copper	75	1.36	102	40.00	-4.00	11.50	E
	Pipe, 1-1/2" PEX	40	0.35	14	24.00	0.00	20.00	E
	<i>Entrained Liquid</i>	0.49	62.40	31	24.00	0.00	20.00	E
	Pipe, 1" PEX	24	0.17	4	24.00	0.00	20.00	E
	<i>Entrained Liquid</i>	0.13	62.40	8	24.00	0.00	20.00	E
	Pipe, 3/4" PEX	18	0.11	2	24.00	0.00	20.00	E
	<i>Entrained Liquid</i>	0.06	62.40	3	24.00	0.00	20.00	E
	Pipe, 1/2" PEX	85	0.06	5	24.00	0.00	20.00	E
	<i>Entrained Liquid</i>	0.12	62.40	7	24.00	0.00	20.00	E
	<i>Joints/Valves/Fittings</i>	25%	193	48	24.00	0.00	15.00	E
	<i>Hangars</i>	20%	193	39	24.00	0.00	15.00	E
	Pump	2	40	80	46.00	-8.50	5.00	E
	Pressure Tank	1	77	77	46.00	-8.50	5.00	V
	<i>Entrained Liquid</i>	2.40	62.40	150	46.00	0.00	5.00	C
	Tankless Water Heater	1	155	155	26.00	0.00	15.00	V
	Strainer	1	32	32	46.00	-8.50	5.00	V
	Hose Bib	3	20	60	36.00	0.00	16.50	E
555	Fixed Fire Suppression							
	Novec Tanks	2	380	760	48.00	0.00	4.00	V
	Piping/Nozzles	2	40	80	96.00	0.00	11.50	V
	Remote Shutoff and Piping	1	30	30	52.00	0.00	11.50	E
	Fire Extinguishers and Safety Equipment	2	30	60	38.00	0.00	20.50	E
580	Anchor, Mooring and Towing							
	Anchor	1	69	69	80.00	-11.00	12.00	V
	Chain	25	2.63	66	80.00	-11.00	12.00	V
	Synthetic Line	100	0.30	30	80.00	-11.00	12.00	V
	Cleats - 24" Aluminum	6	12	72	53.00	0.00	12.00	E
	Chocks - Fwd Drop In	2	21	42	64.00	0.00	13.00	C
	Chocks - Aft Drop In	2	27	54	5.00	0.00	13.00	C
	Chocks - Keyhole	2	9	18	20.50	0.00	13.00	C
583	Boats, Boat Handling and Stowage Systems							
	Life Jackets	124	2	248	60.00	0.00	11.50	E
	Viking IBA 50 man	2	395	790	15.17	0.00	21.25	V
	Cradle	2	50	100	15.17	0.00	21.25	E
	Life Rings	6	10	60	46.67	0.00	13.00	E
	Jason's Cradle	1	97	97	72.00	10.00	11.50	V
AUXILIARY SYSTEMS - SUBTOTAL				9671	34.98	-0.04	12.52	
				4.32				

SWBS No.	600 OUTFIT Description	Unit Wt. Total Wt.		LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)					
612	Hatches							
	15 x 24 Oval	8	32	256	48.00	0.00	11.50	V
	24 x 24 Square	2	62	124	46.00	0.00	11.50	V
612	Rails							
	Personnel Access System - PH	35	1.26	44	58.00	0.00	24.00	C
	Personnel Access System - Main Deck	80	1.26	101	43.00	0.00	15.00	C
	<i>Cars/Harnesses</i>	1	15	15	58.00	0.00	24.00	E
	Main Deck - FR 22.5	70	4.85	339	82.00	0.00	13.50	C
	Upper Deck - FR 6	47	5.00	233		0.00	23.50	C
	Aft Upper Deck	48	4.28	203	16.00	0.00	23.50	C
	Upper Deck - FR 12	23	4.28	100	48.00	0.00	23.50	C
622	Flooring							
	Jet Room Grating	73	1.9	139	11.67	0.00	2.50	E
	Engine Room Grating	100	1.9	190	24.00	0.00	2.50	E
	Tank Room Grating	90	1.9	171	54.00	0.00	2.50	E
623	Ladders/Stairs							
	Passenger Stairs	2	200	400	21.67	0.00	15.00	E
	Vertical Ladders	12	20	240	46.25	0.00	4.75	V
624	Nonstructural Closures							
	Main Deck							
	<i>Fwd Passenger Cabin (36 x 77)</i>	2	150	300	70.00	0.00	15.00	E
	<i>Aft Passenger Cabin (36 x 77)</i>	2	150	300	32.00	0.00	15.00	E
	<i>Engine Room Access (P/S) (28 x 65)</i>	2	100	200	28.00	0.00	14.50	E
	<i>ADA Head (36 x 77)</i>	1	150	150	22.00	-3.75	15.00	E
	<i>Head (32 x 77)</i>	1	125	125	12.00	1.33	15.00	E
	Upper Deck							
<i>Pilot House Access (30 x 74)</i>	2	100	200	49.00	0.00	24.00	E	
625	Windows							
	Pilot House Fwd	1	197.50	198	58.33	0.00	25.50	C
	Pilot House Fwd	2	172.07	344	58.33	0.00	25.50	C
	Pilot House Sides	2	45.17	90	55.67	0.00	25.50	C
	Pilot House Sides	2	25.10	50	52.25	0.00	25.50	C
	Pilot House Sides - Double - 36 x 36 x 1/4	2	36.23	72	49.17	0.00	25.50	C
	Pilot House Aft - 36 x 24 x 1/4	2	24.15	48	44.00	0.00	25.50	C
	<i>Shades</i>	2	10	20	44.00	0.00	25.50	E
	Main Deck Side - 354 x 48 x 1/4	2	395.79	792	47.33	0.00	16.00	C
	Main Deck Fwd - 30 x 48 x 1/4	2	33.54	67	71.75	0.00	16.00	C
	Main Deck Fwd - 52 x 48 x 1/4	2	58.14	116	63.67	0.00	16.00	C
	Main Deck Fwd - 24 x 48 x 1/4	2	26.83	54	66.58	0.00	16.00	C
	631	Coating Systems						
Hull - 1st F/C		2400	0.051	123	48.00	0.00	3.00	V
Hull - 2nd F/C		2400	0.067	160	48.00	0.00	3.00	V
Hull - 3rd F/C		2400	0.041	99	48.00	0.00	3.00	V
Hull - 4th F/C		2400	0.052	124	48.00	0.00	3.00	V
Deck - 1st F/C - Main Deck		1046	0.044	46	46.00	0.00	11.50	V
Deck - 2nd F/C - Main Deck		1046	0.044	46	46.00	0.00	11.50	V
Deck - 3rd F/C - Main Deck		1046	0.500	523	46.00	0.00	11.50	C
Deck - 4th F/C - Main Deck		1046	0.025	27	46.00	0.00	11.50	C
Deck - 1st F/C - Main Deck		546	0.044	24	48.00	0.00	20.50	V
Deck - 2nd F/C - Main Deck		546	0.044	24	48.00	0.00	20.50	V
Deck - 3rd F/C - Main Deck		546	0.500	273	48.00	0.00	20.50	C
Deck - 4th F/C - Main Deck		546	0.025	14	48.00	0.00	20.50	C
Superstructure - 1st F/C - House Top		106	0.044	5	50.00	0.00	29.00	V
Superstructure - 2nd F/C - House Top		106	0.044	5	48.00	0.00	29.00	V
Superstructure - 3rd F/C - House Top		106	0.025	3	48.00	0.00	29.00	C
Vinyl Coating - Main Deck and Above		3124	0.045	141	41.83	0.00	18.08	V

SWBS No.	600 OUTFIT CONT'D Description	Unit Wt. Total Wt.		LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)					
633.2	Anodes							
	Transom Anodes	6	10	60	0.00	0.00	0.50	V
	Sea Chest Anodes	4	10	40	24.00	0.00	1.00	V
634	Deck Coverings							
	Marine Grade Carpet - PH	210	0.25	52	55.50	0.00	16.00	C Cove Sheet Flooring
	Marine Grade Carpet - Passenger Space	942	0.25	235	50.50	0.00	11.50	C Flotex Carpet
	Underlayment	1151	0.13	144	51.41	0.00	12.32	E
	Linoleum - Food Services, Heads	170	0.66	111	23.00	0.00	11.50	C Forbo Linoleum
635	Insulation, Linings, and Joiner Bulkheads							
	Main Deck - Thermal Insulation w/ Foil	1329	0.30	399	44.00	0.00	11.50	C 3" Insulation w/ Mylar
	Main Deck Bulkheads - Thermal Insulation w/ Foil	146	0.30	44	44.00	0.00	11.50	C 3" Insulation w/ Mylar
	Main Deck Bulkheads - Joiner Panel	112	1.00	112	44.00	0.00	11.50	C .065 Al 6063
	Upper Deck - Thermal Insulation w/ Foil	1065	0.30	320	38.00	0.00	20.50	C 3" Insulation w/ Mylar
	Upper Deck Bulkheads - Thermal Insulation w/ Foil	81	0.30	24	38.00	0.00	20.50	C 3" Insulation w/ Mylar
	Upper Deck Bulkheads - Joiner Panel	63	1.00	63	44.00	0.00	11.50	C .065 Al 6063
	Pilot House Top - Thermal Insulation w/ Foil	130	0.30	39	50.00	0.00	29.00	C 3" Insulation w/ Mylar
	Main Deck/ER - Acoustic Insulation	535	3.00	1,605	25.00	0.00	11.50	C 3 lb/sq ft
	Engine Room - Acoustic Insulation	114	3.00	343	25.00	0.00	10.50	C 3 lb/sq ft
	Upper Engine Room - Acoustic Insulation	507	3.00	1,521	28.00	0.00	15.00	C 3 lb/sq ft
	Ceiling Tiles - Passenger Space	1033	0.50	517	44.00	0.00	20.00	C Dampa
	Ceiling Tiles - PH	106	0.50	53	50.00	0.00	29.00	C Dampa
641.2	Interior Furnishings							
	Pilot House Seats - Stidd Type	2	83	165	54.75	0.00	22.00	E
	Food Services							
	Refrigerator	1	150	150	27.83	0.00	15.00	E
	Hand wash sink	1	15	15	27.83	0.00	15.00	E
	Coffee Maker	1	20	20	27.83	0.00	15.00	E
	Cash Register	1	10	10	27.83	0.00	15.00	E
	Microwave	1	20	20	27.83	0.00	15.00	E
	Countertop Display Case	1	20	20	27.83	0.00	15.00	E
	Hot Dog Steamer	1	30	30	27.83	0.00	15.00	E
	Counter	2	41	82	27.83	0.00	15.00	E
	Storage	1	50	50	27.83	0.00	15.00	E
644	Sanitary Spaces and Fixtures							
	Head							
	Sink	1	7	7	14.00	0.00	14.50	V
	Faucet	1	2	2	14.00	0.00	14.50	V
	Paper Towel Dispenser	1	6	6	14.00	0.00	14.50	V
	Hand Dryer	1	20	20	14.00	0.00	14.50	V
	Mirror	1	30	30	14.00	0.00	14.50	V
	Toilet	1	30	30	14.00	0.00	14.50	E
	Toilet Seat Cover Holder	1	6	6	14.00	0.00	14.50	V
	Toilet Paper Holder	1	6	6	14.00	0.00	14.50	V
	Soap Dispenser	1	8	8	14.00	0.00	14.50	V
	ADA Head							
	Sink	1	7	7	20.00	0.00	14.50	V
	Faucet	1	2	2	20.00	0.00	14.50	V
	Paper Towel Dispenser	1	5	5	20.00	0.00	14.50	V
	Hand Dryer	1	20	20	20.00	0.00	14.50	V
	Mirror	1	30	30	20.00	0.00	14.50	V
	Toilet	1	35	35	20.00	0.00	14.50	E
	Toilet Seat Cover Holder	1	6	6	20.00	0.00	14.50	V
	Toilet Paper Holder	1	6	6	20.00	0.00	14.50	V
	Soap Dispenser	1	8	8	20.00	0.00	14.50	V
	Baby Changing Station	1	27	27	20.00	0.00	14.50	V
	Wheelchair Restraints	1	10	10	20.00	0.00	14.50	V
	Grab Rails	1	20	20	20.00	0.00	14.50	V

SWBS No.	600 OUTFIT CONT'D Description	Unit Wt.		Total Wt. (lbs)	LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
645	Passenger Seats								
	Main Deck Passenger Seating - 2 seats	2	35	70	37.81	0.00	12.50	V	Beurteaux Ocean Traveller
	Main Deck Passenger Seating - 3 seats	16	49	778	50.24	0.00	12.50	V	Beurteaux Ocean Traveller
	Main Deck Passenger Seating - 4 seats	11	62	687	52.00	0.00	12.50	V	Beurteaux Ocean Traveller
	Upper Deck Passenger Seating - 3 seats	10	55	553	37.50	0.00	21.50	V	Beurteaux Café
	Fastening	0.02	2088	42	47.03	0.00	14.88	E	
660	Working Spaces								
	Tools	1	250	250	36.00	0.00	5.00	E	
671	Lockers and Special Stowages								
	Life Jacket Locker - Upper Deck	1	125	125	25.33	2.83	13.50	E	
	Life Jacket Locker - Main Deck	1	125	125	74.00	-5.50	13.50	E	
	Life Jackets - Under Seat	1	60	60	50.50	0.00	13.00	E	
	Bike Rack	1	175	175	3.17	0.00	13.00	E	
	Luggage Rack	2	100	200	22.83	0.00	14.00	E	
OUTFIT - SUBTOTAL				16917	39.16	-0.04	14.45		
				7.55					

SWBS No.	DEADWEIGHT Description	Unit Wt.		Total Wt. (lbs)	LCG (+ fwd)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
	Passengers - Mn Dk	98	210	20,580	50.50	0.00	15.00	E	Includes personal effects
	Passengers - Upper Dk	29	210	6,090	37.00	0.00	24.00	E	Includes personal effects
	Crew	4	210	840	50.50	0.00	24.00	E	Includes personal effects
	Bikes	12	40	480	4.00	0.00	13.00	E	
	Fuel	2200	7,260	15,972	41.50	0.00	4.67	E	
	Sewage	0	8,345	0	42.00	8.50	4.00	E	
	Potable Water	200	8,345	1,669	42.00	-8.50	4.00	E	
	Food Services Supplies	1	180	180	27.83	0.00	15.00		
DEADWEIGHT - SUBTOTAL				45811	44.68	-0.31	12.34		
				20.45					