



# NEW RIVER CLASS FERRY

## Weight Estimate

Prepared for: North Carolina DOT • Raleigh, NC

Ref: 16101-200-833-1

Rev. -

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**PREPARED BY**

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## 1 PURPOSE

This report presents the calculated light ship weight of the subject vessel; the New River Class Ferry design for the North Carolina Department of Transportation. The subject vessel is a new design of a 183 feet 7 inch length by 46 feet beam by 11 feet deep passenger and vehicle ferry intended for service within the Outer Banks of North Carolina and associated rivers. The subject vessel is designed to carry a maximum of 40 cars and 300 passengers, and will be regulated under Subchapter H of Title 46 of the U.S. Code of Federal Regulations (CFR) [1].

The calculations and assumptions contained within this document follow the guidelines presented in the SNAME Weight Estimation and Margins Manual [2] and the Design Margin Management and Procedures for US Navy Small Craft [3] for the estimation of the vessel light ship weight and margins.

## 2 PROCEDURE

The weight estimate is created using a Microsoft Excel spreadsheet. The spreadsheet sums the known and calculated structural, equipment, and outfit weights of the vessel. The sources of weights in the spreadsheet are identified as calculated (C), estimated (E), or from vendor (V) documentation. Various margins are applied to the known and calculated weights to account for the varying uncertainty of these weights, and for items not specifically estimated in the spreadsheet such as brackets, minor foundations, etc.

### 2.1 Coordinate System

The coordinate system of this estimate uses a right hand coordinate system with:

- The longitudinal axis originating at amidships and oriented along centerline, positive towards the aft or 'B' end of the vessel.
- The vertical axis originating at baseline and oriented normal to the baseline, positive upward.
- The transverse axis originating at the centerline and oriented normal to centerline, positive to starboard (looking forward to the 'A' end).

### 2.2 Detailed Weights

Structural weights (Group 100) are calculated from a detailed 3D structural model in accordance with the vessel scantlings (Reference [4]). Estimates are included to account for the unknown weights such as brackets, foundations, mill tolerances, and rolling and welding.

For the propulsion system (Group 200) major machinery weights are taken from vendor documentation and are located according to the machinery arrangement (Reference [5]). Weights for the electrical system are based on estimated switchboard and generator weights, with margins for wiring and distribution. The command and control weight (Group 400) are estimated parametrically based on data from a library of similar vessels.

The weight for Group 500 is based on a previous parametric weight estimate. Weights for known items are subtracted from the total parametric value to better define the centers of gravity.

The weights for the outfitting of the vessel (Group 600) are taken from the Profiles and Deck Arrangements (Reference [6]) and the Technical Specification (Reference [7]).

### 2.3 Margins

As shown in Table 1, weight margins are applied according to Reference [3].

*Table 1: Suggested Weight Margins*

Weight Group		Concept/ Feasibility	Preliminary	Contract	Detail	Boat Alt.
100	Alum	15	8	5	2	3
	Steel	15	8	5	2	3
	GRP	20	10	5	2	3
	Wood	20	10	5	2	3
200	Propulsion	15	9	6	2	3
300	Electrical	20	12	8	2	5
400	Command	20	12	8	2	5
500	Auxiliary	20	12	8	2	5
600	Outfit	20	12	8	2	5
700	Other	10	5	3	2	2
F	Loads	15	5	0	0	0

Margins are applied based on the design being at the contract level. However, the Group 300, 400, and 500 sections are still either parametrically based or only partially detailed. Because of this the preliminary design level margin of 12% is used for Group 300, 400, and 500, except for the detailed portion of Group 500 which uses the contract level margin of 8%. Additionally, a slightly lower margin is applied to the engine and propulsion unit weights as these are vendor provided, and likely subject to less variation.

### 3 CONCLUSIONS

The final estimated light ship weight and center of gravity for the design are as follows:

Light Ship Weight: 380 LT

Longitudinal Center of Gravity: 0.38 ft (forward)

Transverse Center of Gravity: 1.85 ft (starboard)

Vertical Center of Gravity: 8.65 ft (ABL)

#### 4 REFERENCES

- [1] U.S. Government Publishing Office, Code of Federal Regulations; Title 46 - Shipping, Subchapter H, October 1, 2015.
- [2] Society of Naval Architects and Marine Engineers, Weight Estimating and Margins Manual, T&R Bulletin 7-8, 2002.
- [3] Naval Sea Combat Systems Engineering, Design Margin Management and Procedures for US Navy Small Craft, Norfolk, VA, May 1988.
- [4] Elliott Bay Design Group, "Scantling Calculations," 16101-200-061-1, Rev. -, August 7, 2017.
- [5] Elliott Bay Design Group, *Machinery Arrangement*, 16101-200-201-1, Rev. -, July 28, 2017.
- [6] Elliott Bay Design Group, *Profiles and Deck Arrangements*, 16101-200-101-1, Rev. -, July 28, 2017.
- [7] Elliott Bay Design Group, "Technical Specification," 16101-200-832-1, Rev. A, July 27, 2017.

# **Appendix A**

## Weight Estimate Calculations

VESSEL WEIGHT ESTIMATE							
SWBS No.	Description	Qty.	Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Notes
	<b><u>SUMMARY</u></b>						
100	STRUCTURE		604,076	-0.08	1.43	8.45	
200	MACHINERY		61,885	0.00	1.67	6.40	
300	ELECTRICAL		14,035	-5.94	-2.77	6.70	
400	ELECTRONICS & IC		1,560	0.00	12.00	35.00	
500	AUXILIARY SYSTEMS		40,500	-3.57	5.42	12.12	
600	OUTFIT		61,797	-0.29	4.64	10.31	
	<b>VESSEL WEIGHT - SUBTOTAL</b>		<b>783,853 (349.93LT)</b>	<b>-0.38</b>	<b>1.85</b>	<b>8.64</b>	
	Add Margin to Structure for Roll & Weld	3%	18,122	-0.08	1.43	8.45	
	Margin to Structure for Brackets & Clips	1%	6,041	-0.08	1.43	8.45	
	STRUCTURE	5%	30,204	-0.08	1.43	8.45	
	MACHINERY - GENERAL	6%	1,404	0.00	1.67	6.40	
	MACHINERY - VSP/ENGINE	3%	1,154	0.00	1.67	6.40	
	ELECTRICAL	12%	1,684	-5.94	-2.77	6.70	
	ELECTRONICS & IC	12%	187	0.00	12.00	35.00	
	AUX. SYSTEMS - PARAMETRIC	12%	1,239	-3.57	5.42	12.12	
	AUX. SYSTEMS - DETAILED	8%	2,414	-3.57	5.42	12.12	
	OUTFIT	8%	4,944	-0.29	4.64	10.31	
	<b>VESSEL WEIGHT WITH MARGINS</b>		<b>851,247 (380.02 LT)</b>	<b>-0.38</b>	<b>1.85</b>	<b>8.65</b>	

SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
<b>110.0</b>	<b>Hull</b>								
	Keel Plate - 3/4" PL	445	31	13,623	0.00	0.00	0.00	C	
	Bottom Shell - 3/8" PL	5784	15	88,492	0.00	0.00	1.75	C	
	VSP Plate - 1/2" PL	173	20	3,525	0.00	0.00	3.50	C	
	Side Shell - 5/16" PL	2524	13	32,185	0.00	0.00	7.27	C	
	Guard - 3/4" PL	621	31	18,996	0.00	0.00	9.85	C	
<b>110.1</b>	<b>Skegs</b>								
	Keel Plate - 3/4" PL	241	31	7,362	0.00	0.00	0.00	C	
	Side Shell - 3/8" PL	308	15	4,717	0.00	0.00	1.32	C	
	Stem Bar - 2"x4"	15	27	408	0.00	0.00	1.72	C	
	Frames - 3/8" PL	167	15	2,551	0.00	0.00	1.00	C	
<b>120.0</b>	<b>Framing</b>								
	Stem Bar - 2"x8"	45	54	2,421	0.00	0.00	4.91	C	
	Bottom Stiffeners - 5"x3.5"x1/4" L	1049	7	7,579	-0.37	-0.18	0.97	C	
	Side Stiffeners - 4"x3"x1/4" L	336	6	2,000	0.00	-0.18	6.23	C	
	Bottom Tonnage Stiffeners - 5"x1/4" FB	900	4	3,825	0.00	0.00	2.29	C	
	Side Tonnage Stiffeners - 4"x1/4" FB	742	3	2,523	0.00	0.00	6.82	C	
	Bilge Brackets - 1/4" PL w/ 3" flg	474	10	4,832	-0.11	0.13	2.88	C	
	Deck Edge Brackets - 1/4" PL	366	10	3,733	-0.02	-0.12	9.77	C	
	Bow Framing - 1/4" PL & 1/4" Ls	178	10	1,815	0.00	0.00	6.88	C	
	Tonnage Frames - 1/4" PL	2023	10	20,635	0.00	0.00	6.54	C/E	assume cutouts = stiffeners
	Tonnage Half-Frames - 1/4" PL w/ 2" flg	671	10	6,840	0.00	0.00	5.41	C	no cutouts
	Bottom E/R Web Frames - 5/16" PL w/ 3" flg	478	13	6,095	0.00	0.13	1.35	C	
	Bottom CL Web Frames - 5/16" PL w/ 6"x3/8 FB	60	22	1,328	0.00	0.13	2.15	C	
	Side Web Frames - 12"x3"x1/4" FP	77	10	785	0.00	0.00	6.23	C	
	Web Frame Deck Brackets - 5/16" PL w/ 3" flg	79	13	1,007	0.00	0.00	9.40	C	
	Bow Void Web FR 43 - 1/4" PL	140	10	1,425	0.00	0.00	8.30	C	
	5'OCL Bottom Girders - 5/16" PL w/ 3" flg	256	18	4,624	0.00	0.00	1.92	C	
	12'OCL Bottom Girders - 5/16" PL w/ 3" flg	317	18	5,729	-0.61	-0.30	2.35	C	
	Bow End Girder Plates - 5/16" PL	140	13	1,780	0.00	0.00	9.80	C	
	Stanchions - 4" SCH 40	210	11	2,268	0.00	0.00	5.54	C	
	Stanchion Sole Plates - 1/2" PL	13	20	265	0.00	0.00	5.54	C	
<b>120.0</b>	<b>Bulkheads</b>								
	Main Transv. WT Bulkheads - 1/4" PL	1925	10	19,635	0.00	0.00	6.42	C	
	WT BHD Stiffeners (4"x3"x1/4" L)	595	6	3,540	0.00	0.00	6.06	C/E	
	Coll. BHD Stiffeners (3"x2"x1/4" L)	98	4	417	0.00	0.00	7.60	E	
	Girders (6"x3.5"x5/16" L)	192	10	1,938	-2.13	-0.92	6.15	C	
	EOS/SWBD Bulkheads - 1/4" PL	530	10	5,406	14.20	10.76	5.60	C	
	Stiffeners (25%)	5406	25%	1,352	14.20	10.76	5.60	E	
	Ballast Tank Bhds -1/4" PL	927	10.20	9,452	0.00	0.00	6.94	C	
	Stiffeners (4"x3"x1/4" L)	350	6	2,083	0.00	0.00	6.94	C	
	Girders (6"x3.5"x5/16" L)	22	10	217	0.00	0.00	6.89	C	
<b>130.0</b>	<b>Decks</b>								
	Car Deck - Center - 1/2" PL	1588	20	32,395	0.00	0.00	11.00	C	
	Car Deck - Sides - 5/16" PL	5600	13	71,400	-0.10	-0.09	10.77	C	
	Car Deck Stiffs - 140x8 Bulb Flat	6237	7.3	45,533	0.00	0.00	10.50	C	
	5'OCL Girders 14"x3"x5/16" FP	256	18.06	4,624	0.00	0.00	10.31	C	
	12'OCL Girders 14"x3"x5/16" FP	312	18.06	5,636	0.00	0.00	10.12	C	
	Car Deck Webs 14"x3"x5/16" FP	413	18.06	7,460	0.00	0.00	10.19	C	
<b>131.0</b>	<b>Equipment Access Hatches</b>								
	Center PL (VSP, main eng.) - 1/2" PL	204	20	4,168	0.00	0.00	11.00	C	
	Side PL (genset, misc) - 5/16" PL	63	13	798	2.29	-4.29	10.92	C	
	Large Fdns - 4"x1" FB	139	14	1,894	0.71	-1.33	10.95	C	
	Small Fdns - 4"x3/4" FB	29	10	300	0.00	0.00	10.88	C	
	Large Border - 14"x3"x5/16" flg pl	184	13	2,350	0.70	-1.32	10.30	C	
	Stiffeners - HP 140x8 Bulb Flat	246	7.3	1,796	0.47	-0.88	10.75	C	



SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
<b>150.0</b>	<b>Superstructure</b>								
	Side/Bulwarks - 5/16" PL	1450	13	18,488	0.00	4.00	14.00	C/E	
	Window Mullions (WT 6"x15#)	86	15.00	1,283	0.00	21.00	14.00	C	
	Window Headers (6"x3"x3/16" FP)	152	5.74	872	0.00	21.00	14.00	C	
	Side Stiffeners (4"x3"x1/4" L)	160	5.95	952	0.00	19.00	14.00	E	
	Window T&B Stiffeners (2.5"x3/16" FB)	135	1.59	215	0.00	21.00	14.00	E	
	Bulwark Stiffeners (5/16" PL)	87	12.75	1,105	0.00	-11.67	14.00	E	
	Bulwark Intakes/Vents (1/4" PL)	50	10.20	510	0.00	-11.67	14.00	E	
	Bulwark Cap	188	5.95	1,119	0.00	21.00	14.00	C	
	Main Dk Bulkheads - 1/4" PL	1775	10	18,105	-2.35	14.40	15.73	C	
	Main Dk BHD Stiffeners (3"x3"x1/4" L)	500	5.10	2,550	-2.35	14.40	15.73	C	
	01 Deck Plating - 1/4" PL	1143	10	11,661	0.00	16.02	20.50	C	
	01 Deck Stiffeners (3"x2"x3/16" L)	525	3.19	1,673	0.00	16.02	20.25	E	
	01 Deck Bulkheads - 1/4" PL	948	10	9,667	0.00	11.17	25.50	C	
	01 Deck BHD Stiffeners (3"x2"x3/16" L)	732	3.19	2,332	0.00	11.17	25.50	E	
	Pilothouse Deck - 1/4" PL	393	10	4,006	0.00	9.00	30.00	C	
	Pilothouse Deck Stiffeners (2"x3/16" FB))	178	1.28	228	0.00	9.00	29.75	E	
	Pilothouse Bulkheads - 3/16" PL	433	8	3,312	0.00	9.00	35.18	C	
	Pilothouse BHD Stiffeners (2"x3/16" FB)	35	1.28	45	0.00	9.00	35.18	E	
	Coamings/Tops/Misc - 3/16" PL	450	8	3,443	0.00	8.99	39.08	C	
<b>160.0</b>	<b>Special Structures</b>								
	Masts	3	600	1,800	0.00	9.00	38.00	E	
	Radar Mast	2	75	150	0.00	9.00	44.83	E	
	Spotlight	4	75	300	0.00	9.00	44.83	E	
	Keel Cooler Recesses - 3/8" PL	168	15	2,577	0.78	-10.23	1.19	C	
	Fuel Tanks (1,750 gal)	2	3392	6,783	0.00	-13.00	5.75	E	
	Potable Water Tank (1,500 gal)	1	2985	2,985	44.00	-12.75	6.25	E	
<b>180.0</b>	<b>Foundations</b>								
	Engine Girder - 1/2" PL w/ 3"x1/2" flg	154	20	3,142	0.00	0.00	1.29	C	
	Engine Girder - 3/4" PL girder	131	31	4,009	0.00	0.00	1.50	C	
	Engine Girder - 1"x10" flanges	51	34	1,748	0.00	0.00	2.96	C	
	Engine Girder - 3/8" PL w/ 3" flg frames	193	15	2,953	0.00	0.00	1.23	C	
	VSP Foundations - 5/16" PL	58	13	740	0.00	0.00	3.82	C	
	VSP Foundations - 3/8" PL	144	15	2,203	0.00	0.00	4.03	C	
	VSP Foundations - 1/2" PL	58	20	1,189	0.00	0.00	4.64	C	
	VSP Foundation Rings - 10mm PL	51	16	814	0.00	0.00	4.16	C	
	VSP Foundation Mounting Faces	2	362	725	0.00	0.00	4.80	C	
	Anchor Rest - 1/2" PL	157	20	3,199	-68.50	16.67	14.00	E	
	Misc Foundations +2% of total	1	11438	11,438	0.00	0.00	6.00	E	ME and VSP fdns excluded
<b>STRUCTURE - SUBTOTAL</b>				604076	-0.08	1.43	8.446		
				269.68					

SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
233	<b>Main Engines</b>								
	<i>CAT C-18, Min Dry Wt 4klbs</i>	2	4500	9,000	0.00	0.00	4.00	V	
	<i>Main Engine Jacket Water Keel Cooler</i>	4	137	548	0.00	0.00	0.17	V	
236	<b>Propulsion Units</b>								
	<i>VSP Units 16R5 EC/100-1</i>	2	14740	29,480	0.00	0.00	4.50	V	Wt w/o oil
	<i>VSP LO, 200GAL</i>	2	1800	3,600	0.00	6.00	8.00	E	
240	<b>Transmission &amp; Propulor Systems</b>								
	<i>Reduction Gears</i>	2	1300	2,600	0.00	0.00	3.50	E	
243	<b>Propulsion Shafting</b>								
	<i>Voith Turbo Coupling</i>	2	1543	3,086	0.00	0.00	6.42	V	
	<i>Shaft Bearing</i>	12	84	1,008	0.00	0.00	3.25	V	4" dia Craft Bearing
	<i>4" Diameter Steel Shafts</i>	106	43	4,529	0.00	0.00	4.67	C	
	<i>Line Shaft Coupling</i>	4	70.00	280	0.00	0.00	3.17	E	
	<i>Stuffing Boxes</i>	4	90	360	0.00	0.00	5.58	E	
	<i>Main Engine Silencer</i>	2	500	1,000	0.00	14.33	12.92	E	
	<i>ME Exhaust Piping</i>	127	29	3,626	0.00	12.40	20.00	E	
	<i>Generator Silencer</i>	2	350	700	0.00	14.33	22.33	E	
	<i>Gen. Exhaust Piping</i>	142	15	2,067	0.00	6.00	20.00	E	
<b>MACHINERY - SUBTOTAL</b>				61885	0.00	1.67	6.402		
				27.63					

SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
310	<b>Ship's Service Generator</b>								
	Northern Light 150kW MC15-043	2.00	3550	7,100	0.00	-15.50	4.00	V	
	Genset Jacket Water Keel Cooler	4.00	140	560	0.00	-19.50	0.00	V	Fernstrum-J13098
311	<b>Emergency Generator</b>								
	<i>Emergency Generator</i>	1.00	2372	2,372	-46.00	18.00	15.75	V	Cat C-4.4 for now
320	<b>Switchboard</b>								
	Switchboard	1.00	2000	2,000	7.83	17.75	6.00	V	
	Electrical Panels	3.00	200	600	16.79	7.75	6.00	V	
321	<b>Distribution</b>								
	<i>Wiring</i>	10%	12032	1,203	0.00	0.00	10.00	E	
	Engine Start Batteries	4.00	50	200	0.00	-4.00	3.00	E	
<b>ELECTRICAL - SUBTOTAL</b>				14035	-5.94	-2.77	6.697		
				6.27					

SWBS No.	Description	Unit Wt. Total Wt.			LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)	(lbs)					
400	Parametric Weight Estimate	1.00	1560	1,560	0.00	12.00	35.00		
<b>ELECTRONICS &amp; IC - SUBTOTAL</b>				1560 0.70	0.00	12.00	35.00		

SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes	
		Qty.	(lbs)							
500	Parametric Weight Estimate (remaining piping)	1.00	10323	10,323	0.00	6.00	15.00			
	Ventilation Plenums	6.00	500	3,000	0.00	-22.00	8.00	E		
	Ventilation Fans	6.00	150	900	0.00	-20.00	8.00	E		
	Ventilation Ducting - E/R	2.00	200	400	0.00	-10.00	8.00	E		
	Ventilation Ducting - Other	4.00	150	600	0.00	-10.00	8.00	E		
	<i>Air Compressor</i>	2.00	700	1,400	-20.00	-12.17	5.75	E		
	<i>Air Receiver</i>	2.00	735	1,470	-18.00	-18.67	5.75	E		
	<i>Fire Pump</i>	2.00	760	1,520	10.00	8.00	4.75	E		
	<i>Waste Oil Pump</i>	1.00	117	117	19.00	-17.50	3.75	E		
	<i>Waste Oil Tank</i>	1.00	200	200	19.00	-17.50	2.00	E		
	<i>Bilge Pump</i>	1.00	137	137	26.00	-13.50	3.75	E		
	<i>Bilge Pump</i>	1.00	137	137	-30.00	-13.50	3.75	E		
	<i>Ballast Pump</i>	2.00	455	910	34.00	12.83	4.75	E		
	<i>MSD Unit</i>	1.00	8500	8,500	-22.00	12.33	5.75	E	Estimated wet weight Content Wt Separate in GHS Estimate	
	<i>Zero Discharge Tank 500gal</i>	2.00	308	616	-40.00	12.33	6.25	E		
	<i>Sewage Pump</i>	2.00	200	400	-37.00	6.00	4.75	E		
	<i>Potable Water Pressure Tank</i>	1.00	676	676	46.00	9.00	5.75	E		
	<i>Potable Water Pump</i>	2.00	53	106	46.00	8.17	4.75	E		
	<i>HVAC Condensers</i>	5.00	350	1,750	0.00	18.00	22.50	E		
	580	<b>Life Saving Equipment</b>								
		Rescue Boat & Cradle	1	1500	1,500	26.00	19.00	25.25	E	
Rescue Boat Davit		1	2000	2,000	36.00	19.00	28.00	E		
Anchor		1	400	400	-68.00	17.17	14.00	C	Anchor Sizing Calc	
PFDs - Adult		300	3	900	-4.00	16.00	22.00	E		
PFDs - Child		30	3	90	-4.00	16.00	22.00	E		
PFD Lockers		6	50	300	-4.00	16.00	22.00	E		
Life Rings		8	6	48	0.00	10.00	18.00	E		
Life Rafts		5	300	1,500	-20.00	20.50	22.50	E		
Fire Extinguishers		20.00	30	600	0.00	5.00	10.00	E		
<b>AUXILIARY SYSTEMS - SUBTOTAL</b>				40500	-3.57	5.42	12.119			
				18.08						

SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
	Paint <i>Typical assumption: 2.4% of hull weight for steel hull or 4% of structure weight when hull is aluminum</i>	0.024	604076	14,498	-0.08	1.43	8.45		
623	Ladders and Railings								
	EOS Ladder	1.00	400	400	20.00	14.00	5.00	E	
	01 Access Ladders	2.00	500	1,000	0.00	18.00	16.00	E	
	Pilot House Ladders	2.00	500	1,000	0.00	14.00	26.00	E	
	Housetop Railing	49.67	10	500	0.00	9.00	41.00		1.5" dia pipe
	Housetop Access Ladder	12.25	20	250	0.00	13.25	37.25		ladder height in feet, J13098
	Bridge Deck Railing	82.08	9	750	0.00	9.00	31.75		perimeter length in feet
	Bridge Deck Access Stairs	2.00	225	450	0.00	13.25	26.25		J13098
	01 Deck Railing	1.00	1000	1,000	-4.00	14.50	22.20	E	Estimated
640	Furnishings								
	Pilothouse Chair	2	30	60	0.00	8.17	33.67	E	
	Pilothouse Console	4	200	800	0.00	10.00	33.67	E	
	Coffee Maker	1	10	10	-2.00	7.33	33.67	E	
	Work Desk	2	50	100	0.00	7.33	33.67	E	
	Chair	1	10	10	0.00	8.00	33.67	E	
	PFDs - Crew	2	5	10	0.00	7.00	33.67	E	
	Crew Settee	1	100	100	-9.00	10.00	23.00	E	
	Settee Couch	1	150	150	-9.00	7.50	23.00	E	
	Settee Chairs	3	10	30	-9.00	12.50	23.00	E	
	Counter	1	100	100	-10.00	15.00	23.00	E	
	Coffee Maker	1	10	10	-9.00	15.00	24.00	E	
	Microwave	1	20	20	-11.00	15.00	24.00	E	
	Cupboard	1	50	50	-10.00	15.00	26.00	E	
	Counter	1	200	200	1.00	7.00	23.00	E	
	Sink	1	50	50	2.00	7.00	24.00	E	
	Cupboard	1	50	50	-0.50	7.00	26.00	E	
	Crew Head	1	200	200	8.00	8.00	24.00	E	
	PFDs - Crew	3	5	15	-4.00	7.00	26.00	E	
	Vending Machines	2	400	800	-15.00	14.00	14.00	C/E	
	Water Fountain	1	150	150	-18.00	13.00	14.00	C/E	
	Passenger Lounge Chair Group 1	14	30	420	-28.00	19.17	13.00	C/E	
	Passenger Lounge Chair Group 2	7	30	210	-18.00	17.00	13.00	C/E	
	Passenger Lounge Chair Group 3	9	30	270	4.00	15.17	13.00	C/E	
	ADA Head	2	250	500	-2.00	14.83	14.00	E	Estimated
	Bulkhead Insulation/Joinery	1	3000	3,000	0.00	14.00	18.00	E	Rough Estimate
	Cleaning Gear - Sink	1	50	50	41.00	14.17	13.00	E	
	Cleaning Gear - Shelves	1	40	40	41.00	14.17	13.00	E	
	Cleaning Gear - Misc	1	60	60	41.00	14.17	13.00	E	
	EOS - Console	1	200	200	7.50	10.00	5.50	E	
	EOS - Chair	1	20	20	8.00	12.00	5.50	E	
	EOS - Coffee Maker	1	10	10	10.00	10.00	5.50	E	
	EOS - Fridge	1	50	50	10.00	10.00	4.50	E	
	EOS - PFDs - Crew	2	5	10	12.00	10.00	5.00	E	
	E/R - Storage Cabinet	1	150	150	24.00	20.00	5.50	E	
	E/R - Workbench	1	200	200	-12.17	-8.33	5.50	E	
	E/R - Storage Cabinets	4	150	600	-1.50	-8.17	5.50	E	
623	Machinery Space Gratings								
	Engine Room Grating	1596	3.53	5,635	-2.60	-2.50	2.00	E	
	EOS Floor	323	3.53	1,140	15.80	14.70	2.50	E	
	Vooids/Thruster Grating	718	3.53	2,535	0.00	0.00	3.00	E	
	Foundations	2637	4.04	10,655	0.00	0.00	2.00	E	
	PH False Floor	144	5.00	720	0.00	9.00	31.50	E	

SWBS No.	Description	Unit Wt.		Total Wt. (lbs)	LCG (+ aft)	TCG (+ stbd)	VCG (+ abl)	Source C, E, V *	Notes
		Qty.	(lbs)						
624	Doors, Windows, Hatches								
	<i>Watertight Doors</i>	4	500	2,000	0.00	3.00	6.00	E	
	<i>Joiner Doors</i>	5	75	375	0.00	16.00	15.00	E	
	<i>Weathertight Doors</i>	8	150	1,200	0.00	16.00	20.00	E	
	<i>Hold - EOS Windows</i>	4	50	200	-7.00	10.00	8.00	E	
	<i>Main Deck - Passenger Windows (Large)</i>	8	100	800	0.00	22.00	15.00	E	
	<i>Main Deck - Passenger Windows (Small)</i>	3	40	120	0.00	22.00	15.00	E	
	<i>01 Deck - Crew Lounge Windows</i>	4	25	100	-3.00	8.50	27.00	E	
	<i>Pilot House Windows</i>	13	75	975	0.00	8.50	36.00	E	
634	Deck Coverings								
	EOS Tiles	1.00	150	150	10.00	16.00	2.50	E	
	Main Deck	600	2	1,200	0.00	15.00	11.00	E	
	Crew Lounge	144	2	288	0.00	10.00	21.00	E	
635	Fire Insulation								
	Engine Room & EOS	2576	2	5,152	0.00	0.00	10.00	E	
<b>OUTFIT - SUBTOTAL</b>				61797	-0.29	4.64	10.306		
				27.59					