



Double-Ended Azimuth Drive Ferry

Weight Estimate

Prepared for: North Carolina DOT • Raleigh, NC

Ref: 18026-200-833-1-

Rev. [-]

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PREPARED BY

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GENERAL NOTES**REVISIONS**

REV	DESCRIPTION	DATE	AUTHOR	APPROVED
-	Initial Issue	8/3/2018	RIW/SKW	KAJ

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1 PURPOSE

The purpose of this document is to provide an estimated light ship weight and center of gravity for the Double-Ended Azimuth Drive Ferry. The vessel is a passenger and vehicular ferry that will be owned and operated by North Carolina DOT that intended to operate in the Outer Banks of North Carolina and associated rivers. The vessel particulars are 183'-7" x 46' x 46'-10".

The calculations and assumptions contained within this document follow the guidelines published in the SNAME *Weight Estimation and Margins Manual* [1] and the *Design Margin Management and Procedures for US Navy Small Craft* [2] for the estimation of vessel light ship weight.

2 PROCEDURE

The weight estimate was created using a Microsoft Excel spreadsheet. The spreadsheet sums the known and calculated structural, equipment, and outfit weights of the vessel. The source of weights in the spreadsheet are identified as calculated (C), estimated (E), or from vendor (V) data. Various margins were 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, etc. Detailed weights are shown in Appendix A.

2.1 Margins

As shown in Table 1, weight margins for Groups 100 and 200 were applied according to the *Design Margin Management and Procedures for the U.S. Navy Small Craft*, Reference [2].

Table 1: Design Margin Management and Procedures for the U.S. Navy Small Craft

Suggested Weight Margins (1)
(Margins remaining at end of each design phase)

Weight Group	Concept/ Feasibility	Design Phase				Boat Alt. (4)
		Preliminary	Contract	Detail		
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 (2)	15	9	6	2	3	
300 Electrical (2)	20	12	8	2	5	
400 C ³ and N	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	

2.2 Coordinate System

The coordinate system of this estimate uses a Right Hand coordinate system with:

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

2.3 Detailed Weights

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

The remaining weights are identified through a combination of the Technical Specification (Reference [4]), vendor documentation and from various system diagrams and located through the Profile and Arrangements drawing (Reference [5]) or Machinery Arrangement drawing (Reference [6]).

3 CONCLUSIONS

The subject vessel is estimated to have the following light ship weight and center of gravity.

Light Ship Weight:	395 LT
Longitudinal Center of Gravity:	0.8 ft
Transverse Center of Gravity:	1.73 ft
Vertical Center of Gravity:	9.54 ft

Margins are applied based on the design being at the contract level. Specific line items such as pipe runs may have additional margins to account for bends and fittings.

A service life margin will be included in the stability calculations.

4 REFERENCES

- [1] TnR 7-8 - Weight Estimation and Margins Manual, SNAME
- [2] *Design Margin Management and Procedures for US Navy Small Craft*, Naval Sea Combat Systems Engineering Station, Norfolk, VA: May 1988
- [3] *18026-200-061-1, Rev.-, Scantling Calculations*, Elliott Bay Design Group: July 30, 2018.
- [4] *18026-200-832-1, Rev.-, Technical Specifications*, Elliott Bay Design Group: July 25, 2018.
- [5] *18026-200-101-0, Rev. - Profile and Arrangements*, Elliott Bay Design Group: July 25, 2018.
- [6] *18026-200-201-0, Rev. - Machinery Arrangement*, Elliott Bay Design Group: July 31, 2018.

Appendix A

Weight Estimate Calculations

VESSEL WEIGHT SUMMARY

Group	Description	Wt. w/ Margin (lb)	Included Margin	LCG (+ aft) (ft)	TCG (+ stbd) (ft)	VCG (+ abl) (ft)	Weight Fraction
1	STRUCTURE	648,627	5.0%	0.42	1.43	8.50	73.3%
2	MACHINERY	59,333	7.1%	0.19	1.08	6.41	6.7%
3	ELECTRICAL	65,031	8.6%	3.93	-2.17	6.39	7.4%
4	ELECTRONICS & IC	1,522	8.0%	0.95	8.78	28.67	0.2%
5	AUXILIARY SYSTEMS	44,996	11.8%	-8.34	6.47	9.68	5.1%
6	OUTFIT	65,144	14.0%	8.34	5.74	11.74	7.4%
	LIGHT SHIP WEIGHT	884,653 395 LT	6.4%	0.80	1.73	8.54	100%

SWBS No.	1 STRUCTURE Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
100	Estimate for Roll and Weld				18,892		0.42	1.43	8.50		
110	Shell and Supporting Structure				261,395	5%	-0.39	0.01	3.75		
120	Hull Structural Bulkheads				53,325	5%	2.76	0.99	6.52		
130	Hull Decks				175,284	5%	0.02	-0.05	10.57		
140	Hull Platforms and Flats				-	5%					
150	Deck House Structure				87,539	5%	1.01	10.71	19.75		
160	Special Structures				-	5%					
170	Masts, Kingposts, and Service Platforms				-	5%					
180	Foundations				10,187	5%	-1.34	-2.12	4.13		
190	Special Purpose Systems				12,018	5%	10.93	-8.82	12.17		
Subgroup-based Margin Total					29,987	5%	0.42	1.43	8.50		
Item-based Margin Total					-	0%					
Group Total W/ Margin					648,627	5%	0.42	1.43	8.50		

100.0 Hull Structure, General

101.0	Estimate for Roll and Weld	3%		629,735	18,892		0.42	1.43	8.50	E	3% per EBDG standard
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110.0 Shell and Supporting Structure

Shell Plating											
	Keel Plate -1/2" PL	1274	ft ²	20.40	25,990	0%	0.00	0.00	0.00	C	
	Keel Plate at Ends - 3/4" PL	78.53	ft ²	30.60	2,403	0%	0.00	0.00	0.00	C	
	Bottom Shell - 3/8" PL	5912.8	ft ²	15.30	90,466	0%	0.00	0.00	2.05	C	
	Side Shell - 5/16" PL	2192.8	ft ²	12.75	27,958	0%	0.00	0.00	7.18	C	
	Guard - 3/4" PL	620.75	ft ²	30.60	18,995	0%	0.00	0.00	9.85	C	
Bottom Longitudinal Girders											
	CVK - 14-5/8"x1/2" PL Web	195	ft ²	20.40	3,978		0.00	0.00	0.63	C	
	CVK - 9"x1" PL Flg	120	ft ²	40.80	4,896		0.00	0.00	1.25	C	
	14"x3"x5/16" Flg Pl Grdrs	921.97	ft ²	12.75	11,755		0.25	0.15	2.56	C	
Transverse Frames											
	Bottom 5/16" Flg Pl Web Frames	434.76	ft ²	12.75	5,543		0.75	0.00	2.09	C	
	Bottom Flg - 6"x3/8" Flg	14.58	ft ²	15.30	223		1.60	0.00	1.25	C	
	Deck Brackets - 5/16" PL	40.19	ft ²	12.75	512		0.62	0.19	9.54	C	
	Bilge Brackets - 5/16" PL	50.1	ft ²	12.75	639		0.67	0.13	2.54	C	
	Side - 12"x3"x1/4" Flg Pl	71.59	ft ²	10.20	730		0.86	-0.03	6.14	C	
	Half Frames - 1/4" FL PL	798.7	ft ²	10.20	8,147		-2.81	0.00	3.96	C	
	Tonnage BHDs -1/4" Pl	1843	ft ²	10.20	18,799		-4.61	0.00	6.27	C	
	Tonnage Stiffs - 4"x1/4" FB	860.5	ft	3.40	2,926		-5.06	0.18	6.30	C	
	Flanges - 6x3/8" FB	62.535	ft ²	15.30	957		-2.54	0.00	5.46	C	
	Floors OB Thrusters - 1/4" PL	334.88	ft ²	10.20	3,416		0.00	0.00	8.72	C	
	Stiffs - 3x1/4" FB	79	ft	2.55	201		0.00	0.00	8.72	C	
Other Brackets											
	Bilge Bracket - 1/4" PL w/3" Flg	309.3	ft ²	10.20	3,155		0.40	0.00	3.21	C	
	Skeg Bracket - 1/4" PL w/3" Flg	400.37	ft ²	10.20	4,084		0.00	0.00	2.85	C	
	Deck Brackets - 1/4" Pl	237.7	ft ²	10.20	2,425		-0.26	0.01	9.91	C	
Longitudinal Stiffeners											
	Bottom - 5"x3-1/2"x1/4"L	691.4	ft ²	10.20	7,052		3.54	-0.13	0.86	C	
	Xverse Mmt Connection - 6x4x5/16" L	16.6	ft ²	12.75	212		0.00	0.00	1.98	C	
	Side Shell - 4"x3"x1/4"L&4"x1/4"FB	498.8	ft ²	10.20	5,088		0.90	0.00	6.69	C	
	Bottom - 5"x1/4" FB	500.93	ft ²	10.20	5,109		-3.01	0.00	1.74	C	
	Ring Frames At Ends - 1/4" PL	420.42	ft ²	10.20	4,288		0.00	0.00	8.54	C	
	Stem Bar	2.96	ft ³	489.6	1,449		0.00	0.00	5.68	C	
120.0 Hull Structural Bulkheads											
	Transverse BHDs - 1/4" PL	1818	ft ²	10.20	18,544		4.73	1.16	6.26	C	
	Stiffeners - 4x3x1/4 L	660.32	ft ²	10.20	6,735		2.65	0.79	6.37	C	

SWBS No.	1 STRUCTURE Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
	Misc. Brackets - 1/4 PL	188.22	ft ²	10.20	1,920		3.14	0.64	9.89	C	
	Long'l BHDs -1/4" PL	208.3	ft ²	10.20	2,125		13.86	9.55	5.66	C	
	Stiffeners - 4x3x1/4 L	172	ft ²	10.20	1,754		3.51	2.50	6.24	C	
	Brackets - 1/4"	16.09	ft ²	10.20	164		0.00	0.00	10.58	C	
	Ballast Tank BHDs -5/16"PL	1732	ft ²	12.75	22,083		0.00	0.00	6.56	C	Stiffeners included in trsv
130.0	Hull Decks										
	Equipment Access Hatches?										
	Main Deck - 5/16" PL	5261.6	ft ²	12.75	67,086		0.12	-0.12	10.77	C	
	Main Deck CL - 1/2" PL	1864.2	ft ²	20.40	38,030		0.00	0.00	11.00	C	
	Main Deck Stiffeners - HP140x8 U.N.O	6069.8	ft	7.279	44,182		-0.19	-0.09	10.59	C	
	Main Deck Girders - 14"x3"x5/16"Flg Pl	803.82	ft ²	12.75	10,249		-0.28	-0.20	10.21	C	
	Brackets - 5/16	5.25	ft ²	12.75	67		4.76	12.50	10.66	C	
	S.Stl Insert Plates - 1" PL	71.167	ft ²	42.64	3,035		0.00	0.00	11.00	C	
	Stanchions - 5'OCL 5" Sch80	104.5	ft	20.78	2,172		1.33	0.00	5.87	C	
	Stanchions - 12'OCL 4" Sch40	62.67	ft	10.79	676		-2.05	-2.97	5.69	C	
	1/2" Sole Plates	44	qty	5.10	224		-2.29	0.57	5.96	C	
	L Stanchions - 6"x3-1/2"x5/16"L	197.33	ft ²	12.75	2,516		1.09	-0.35	6.18	C	
	Webs - 14"x3"5/16"	423.3	ft ²	12.75	5,397		0.54	1.20	10.17	C	
	Flange - 6"x1/2" PL	33.25	ft ²	35.70	1,187		1.14	0.00	9.83	C	
	Web Brackets 5/16"PL w/3" Flg	36.35	ft ²	12.75	463		-1.85	2.54	9.54	C	
140.0	Hull Platforms and Flats										
150.0	Deck House Structure										
	Bulwarks - 5/16" PL	539.92	ft ²	12.75	6,884		0.00	-21.11	12.23	C	
	Bulwark Stiffeners (5/16" PL)	205.88	ft ²	12.75	2,625		3.43	-6.48	12.69	C	
	Bulwark Ends -12"Sch40 Pipe	19.333	ft	49.56	958		0.00	0.00	13.08	C	
	1/4" Pipe Cap	4.12	ft ²	10.20	42		0.00	0.00	15.50	C	
	Bulwark Cap	204.91	ft ²	5.95	1,219		0.00	-9.45	14.25	C	
	Window Mullions (WT 6"x15#)	100	ft	15	1,500		3.60	21.80	15.50	C	
	Window Headers (6"x3"x3/16" FP)	120.6	ft ²	7.65	923		5.41	21.80	15.03	C	
	Side Stiffeners (4"x3"x1/4" L)	34.9	ft ²	10.2	356		43.05	21.27	15.50	C	
	Window T&B Stiffeners (2.5"x3/16" FB)	30.58	ft ²	7.65	234		2.15	22.07	15.98	C	
	Main Dk Bulkheads - 1/4" PL	2217	ft ²	10.2	22,613		-1.74	17.23	15.42	C	
	Main Dk Bulkheads - 5/16" PL	685	ft ²	12.75	8,734		7.74	16.28	15.59	C	
	Main Dk BHD Stiffeners (3"x3"x1/4" L)	323.9	ft ²	10.2	3,304		3.38	14.28	15.66	C	
	01 Deck Plating - 1/4" PL	1185	ft ²	10.2	12,087		0.00	15.50	20.50	C	
	01 Deck Girders (8"x3"x1/4" L)	34.2	ft131	10.2	349		0.00	15.19	19.90	C	
	01 Deck Stiffeners (3"x2"x3/16" L)	208.94	ft132	7.65	1,598		0.02	15.65	20.33	C	
	01 Deck Coaming - 8"x1/4" PL	48.18	ft133	10.2	491		-0.96	11.31	20.42	C	
	01 Deck Bkts - 3/16" PL	15.6	ft134	7.65	119		0.00	9.04	19.59	C	
	01 Deck Bulkheads - 1/4" PL	1005.9	ft ²	10.2	10,260		1.38	11.12	25.06	C	
	01 Deck BHD Stiffeners (3"x2"x3/16" L)	134	ft ²	7.65	1,025		0.00	11.00	25.25	C	
	Pilothouse Deck - 1/4" PL	413.4	ft ²	10.2	4,217		0.00	10.40	30.00	C	
	Pilothouse Deck Stiffeners (2"x3/16" FB))	81.71	ft ²	7.65	625		0.17	9.79	29.77	C	
	Pilothouse Deck Coaming (1/4" PL))	56.42	ft ²	10.2	575		0.00	10.40	30.00	C	
	Pilothouse Bulkheads - 3/16" PL	433	ft ²	7.65	3,312		0.00	9.00	35.18	C	J16101
	Pilothouse BHD Stiffeners (2"x3/16" FB)	35.25	ft	1.275	45		0.00	9.00	35.18	E	J16101
	Coamings/Tops/Misc - 3/16" PL	450	ft ²	7.65	3,443		0.00	8.99	39.08	C	J16101
160.0	Special Structures										
170.0	Masts, Kingposts, and Service Platforms										
180.0	Foundations										

SWBS No.	1 STRUCTURE Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
180.0	Thruster Foundations										
	Ring	6.24	ft ³	489.6	3,055		0.00	0.00	5.37	C	
	Flange -	1.568	ft ³	489.6	768		0.00	0.00	6.20	C	
	Brackets - 3/8" PL	83.16	ft ²	15.3	1,272		0.00	0.00	5.18	C	
	Flanges - 1/2" PL	56.28	ft ²	20.4	1,148		0.00	0.00	6.57	C	
181.0	Generator Foundations										
	Web - 5/16"	121.26	ft ²	12.75	1,546		-3.95	-6.36	0.97	C	
	Flange - 3/4"	54.37	ft ²	30.6	1,664		-4.00	-6.25	1.78	C	
	Bkts - 1/4"	22.95	ft ²	10.2	234		-3.90	-5.94	1.15	C	
	Miscellaneous Foundations	1	qty	500	500		0.00	0.00	4.00	E	Weight Allowance
190.0	Special Purpose Systems										
	Masts	3		600	1,800		0.00	9.00	38.00	E	J16101
	Radar Mast	2		75	150		0.00	9.00	44.83	E	J16101
	Spotlight	4		75	300		0.00	9.00	44.83	E	J16101
	Fuel Tanks (1,750 gal)	2		3391.5	6,783		0.00	-13.0	5.75	E	J16101
	Potable Water Tank (1,500 gal)	1		2984.52	2,985		44.00	-12.8	6.25	E	J16101

SWBS No.	2 MACHINERY Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
200	Propulsion Plant, General				-	6%					
220	Energy Generating Systems (Nonnuclear)				-	6%					
230	Propulsion Units				38,762	6%	0.00	0.00	5.10		
240	Transmission and Propulsor Systems				-	6%					
250	Propulsion Support Systems (Except Fuel/Lube)				13,611	6%	0.89	6.63	10.40		
260	Propulsion Support Systems (Fuel and Lube Oil)				3,018	6%	-0.03	-10.44	3.27		
270	Lube Oil Fill, Transfer, and Purification				-	6%					
280	Lube Oil Fill, Transfer, and Purification				-	6%					
290	Special Purpose Systems				-	6%					
Subgroup-based Margin Total					3,323	6%	0.22	1.06	6.30		
Item-based Margin Total					619	1%	-2.28	3.23	17.08		
Group Total W/ Margin					59,333	7%	0.19	1.08	6.41		

200	Propulsion Plant, General										
220	Energy Generating Systems (Nonnuclear)										
230	Propulsion Units										
	Schottel Combi Drive 150 Twin	4	qty	8816	35,264		0.00	0.00	5.00	V	Wt w/o oil, includes moto
	Thruster Oil (192liters)	4	qty	388.6	1,554		0.00	0.00	5.00	C	
	Thruster Control Cabinet	4	qty	286	1,144		0.00	0.00	7.00	V	Email dated 7/12
	Thruster Converter Cabinet	4	qty	200	800		0.00	0.00	7.00	E	
240	Transmission and Propulsor Systems										
250	Propulsion Support Systems (Except Fuel/Lube)										
256	Cooling System										
	Sea Chests 20"SchXS Pipe	2	qty	500	1,000		-0.50	0.80	2.22	E	Est. Weight
	Engine Room Sea Strainer	2	qty	400	800		-0.50	0.80	2.22	V	Miller Leaman 6" Duplex
	Auxiliary Sea Water Pump	2	qty	175	350		-12.00	0.00	2.22	E	Email 08/01/18
	FW Cooling Pump	2	qty	146	292		24.00	10.79	2.22	V	AMPCO ZC2 50gpm
	Air Separator	1	qty	15.25	15		24.00	10.79	2.22	V	xylem EAS-2
	Expansion Tank	1	qty	20	20		24.00	10.79	2.22	E	Est. Weight
	FW Cooling HEX	2	qty	147	294		24.00	6.21	2.22	V	Email 08/01/18
	Propulsion Drive HEX	2	qty	500	1,000		24.00	10.79	2.22	E	Email 08/01/18
	Cooling Water (5" Cu-Ni Piping)	44.691	ft	0.58	26	15%	0.40	0.40	1.70	C	Margin for Fittings
	Cooling Water 2" Cu-Ni Generator Piping	60	ft	1.264	76	15%	0.00	-10.00	1.70	C	Margin for Fittings
	Cooling Water 2" Cu-Ni SWBD Rm Piping	60	ft	1.264	76	15%	-42.00	3.00	1.70	C	Margin for Fittings
	FW Cooling 1-1/4" Sch10 Piping	456	ft	1.81	825		0.00	0.00	2.22	E	Weight Allowance
	Propulsion VFD Cooling Cabinet	1	qty	600	600		0.00	10.00	7.00	E	Email 08/01/18
	Entrained Water	1	qty	2500	2,500		0.00	3.00	2.22	E	Weight Allowance
259	Exhaust System										
	Generator Silencer (10" w/spark arrestor)	2	qty	401	802		0.00	14.17	14.17	V	2 @Main Deck, HAPCO
	10" Sch.20 Exhaust Piping	49	ft	28.04	1,374	10%	0.00	14.17	31.42	C	Margin for Insulation
	10" Expansion Joint	2	qty	60	120		0.00	14.17	18.92	E	
	6" Pipe Run Aft Gen	25.417	ft	18.97	482	15%	6.00	0.00	10.00	E	Margin for Bends and ins
	6" Pipe Run Fwd Gen	30.917	ft	18.97	586	15%	-14.00	0.00	10.00	E	Margin for Bends
	Generator Silencer(10" w/spark arrestor)	1	qty	401	401		0.00	13.08	23.81	V	1 @01 Deck, HAPCO245
	10" Sch.20 Exhaust Piping	26.167	ft	28.04	734	15%	0.00	13.08	31.42	C	Margin for Insulation
	10" Expansion Joint	1	qty	10	10		0.00	13.08	19.42	E	
	6" Pipe Run	24.333	ft	18.97	462	15%	-2.00	0.00	10.00	E	Margin for Bends
	Heat Shield (3/16" Perforated S.Steel)	97.5	ft ²	5	488		0.00	13.50	22.08	C	Est. Weight Constant
	E-Gen Silencer (4")	1	qty	102	102		-44.00	20.00	18.58	V	HAPCO 1236VRS4SI-SC
	E-Gen Spark Arrestor	1	qty	8	11		-44.00	20.00	21.33	V	HAPCO 5AA
	Flex Pipe	2	ft	7.5	15		-44.00	20.00	17.00	E	Est. Weight
	Flanged Connections	3	qty	5	15		-44.00	20.00	20.00	E	Est. Weight
	4" Exhaust Piping Sch40	4.5	ft	10.79	49		-44.00	20.00	21.33	C	
	Heat Shield (3/16" Perforated S.Steel)	17.5	ft ²	5	88		-44.00	20.00	22.00	C	Est. Weight Constant

SWBS No.	2 MACHINERY Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
260	Propulsion Support Systems (Fuel and Lube Oil)										
261	Fuel Oil System										
	Fuel Oil Transfer Pump	1	qty	15	15		0.00	-10.00	3.75	E	Est. Weight
	Genset Fuel Oil Filter	3	qty	2	6		0.00	-10.00	3.75	E	
	EDG Fuel Oil Filter	1	qty	2	2		-44.00	20.00	3.75	E	
	Sight Flow Indicator	1	qty	2	2		0.00	-10.00	3.75	E	
	2" Sch40 Pipe Runs	144	ft	3.65	526	15%	0.00	-10.00	3.00	E	Margin for fittings
	3/4" Sch40 Pipe Connections	56	ft	1.13	63	15%	0.00	-10.00	3.00	E	Margin for fittings
	2" Sch 80Fill Lines	14	ft	5.02	70	15%	0.00	-16.00	7.00	E	Margin for fittings
	2-1/2" Sch 80 Vent Lines	14	ft	7.66	107	15%	0.00	-16.00	7.00	E	Margin for fittings
	Misc. FO Tank Fittings	2	qty	50	100		0.00	-13.25	3.75	E	Weight Allowance
	Entrained Oil	6.2832	ft³	338.387	2,126		0.00	-10.00	3.00	C	

SWBS No.	3 ELECTRICAL Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
310	Electric Power Generation				33,319	8%	-8.27	-5.34	6.54		
320	Power Distribution Systems				23,180	8%	22.16	0.37	5.58		
330	Lighting System				3,000	8%	0.00	14.00	11.00		
340	Power Generation Support Systems				400	8%	-4.00	-7.98	5.50		
350	Turbine Support Systems				-						
360	Turbine Support Systems				-						
370	Turbine Support Systems				-						
380	Turbine Support Systems				-						
390	Special Purpose Systems				-						
Subgroup-based Margin Total					4,792	8%	3.95	-2.18	6.38		
Item-based Margin Total					340	1%	0.00	0.00	8.00		
Group Total W/ Margin					65,031	9%	3.93	-2.17	6.39		

310 Electric Power Generation											
	Caterpillar C18	3	qty	9747	29,241		-4.00	-7.98	5.50	V	Dry Weight
	C18 Water Weight	3	qty	99.96	300		-4.00	-7.98	5.50	C	12 gallons ea
	C18 Oil Weight	3	qty	129.6	389		-4.00	-7.98	5.50	C	18 gallons ea
	Emergency Generator, CAT C4.4	1	qty	3389	3,389		-46.00	18.00	15.75	V	Dry Weight
320 Power Distribution Systems											
	Main Switchboard	1	qty	5000	5,000		20.00	-13.09	4.95	V	Email dated May 17
	VFD Cabinet	4	qty	1700	6,800		30.00	2.50	4.95	V	Email dated May 17
	Ship Service Switchboard	1	qty	500	500		10.00	17.50	4.95	E	
	Ship Service Transformer	2	qty	990	1,980		20.00	17.50	7.00	E	
	Active Harmonic Filter	4	qty	1250	5,000		30.00	2.50	4.95	E	
	Powering Cable	1	qty	3400	3,400	10%	0.00	0.00	8.00	E	Margin for Control&Sign
	Braking Resistors	4	qty	125	500		30.00	2.50	4.95	E	
330 Lighting System											
	General Ship Service Wiring	1	qty	2000	2,000		0.00	14.00	11.00	E	
	Cable Hangers, Trays and Straps	1	qty	1000	1,000		0.00	14.00	11.00	E	
340 Power Generation Support Systems											
	Generator Start Batteries	4	qty	100	400		-4.00	-7.98	5.50	E	

SWBS No.	4 ELECTRONICS & IC Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
410	Command and Control Systems				700	8%	1.06	8.97	29.44		
420	Navigation Systems				280	8%	0.64	8.98	29.46		
430	Interior Communications				413	8%	1.02	8.66	26.97		
440	Exterior Communications				16	8%	0.00	0.00	25.00		
450	Surveillance Systems, Surface and Air				-						
460	Surveillance Systems (Underwater)				-						
470	Countermeasure Systems				-						
480	Fire Control Systems				-						
490	Special Purpose Systems				-						
Subgroup-based Margin Total					113	8%	0.95	8.78	28.67		
Item-based Margin Total					-	0%					
Group Total W/ Margin					1,522	8%	0.95	8.78	28.67		

410 Command and Control Systems											
	Cabling	1	qty	700	700		1.06	8.97	29.44	E	
420 Navigation Systems											
	6" marine barometer thermometer	1	qty	1	1		0.00	9.50	34.00	E	pilot house
	clinometer	1	qty	1	1		-3.50	12.25	34.00	E	pilot house door
	clinometer	2	qty	1	2		0.00	9.50	34.00	E	pilot house
	clinometer	1	qty	1	1		14.00	10.00	6.00	E	EOS
	6" quartz marine clock	1	qty	1	1		0.00	9.50	34.00	E	pilot house
	airhorn system	2	qty	2	4		0.00	9.50	34.00	E	pilot house
	12" diameter cast bronze fog bell	1	qty	5	5		0.00	9.50	34.00	E	pilot house
	navigation light control panel	1	qty	15	15		0.00	9.50	40.00	E	pilot house
	Fwd Masthead Light (White)	2	qty	5	10		0.00	9.50	37.58	E	
	Stern Light (White)	2	qty	5	10		0.00	16.00	16.67	E	
	Aft Masthead Light (White)	2	qty	5	10		0.00	11.00	50.00	E	
	Aft Anchor Light (White)	1	qty	5	5		80.00	16.00	16.67	E	
	Fwd Anchor Light (White)	1	qty	5	5		-46.00	16.00	44.25	E	
	Not Under Command (Red)	4	qty	5	20		0.00	9.50	50.00	E	
	Running Light (Red)	2	qty	5	10		0.00	9.50	31.17	E	
	Running Light (Green)	2	qty	5	10		0.00	9.50	31.17	E	
	Morse Light (White)	1	qty	5	5		0.00	11.00	50.00	E	
	Multi Functional Displays	4	qty	10	40		0.00	11.00	34.00	E	
	Chart Plotter Display	2	qty	10	20		0.00	11.00	34.00	E	
	Radar Display	2	qty	10	20		0.00	11.00	34.00	E	
	GPS Antenna	1	qty	5	5		0.00	11.00	34.00	E	
	AIS Transceiver	1	qty	5	5		0.00	11.00	34.00	E	
	Depth Sounder Transducer	2	qty	15	30		0.00	0.00	0.00	E	Bottom skeg near Fr39
	Cable Conduit (S.S. Sch80 pipe)	2	qty	8	16		0.00	0.00	1.50	E	
	Stuffing Box	2	qty	2	4		0.00	0.00	3.00	E	
	Digital Compass	2	qty	5	10		0.00	11.00	34.00	E	
	Ultrasonic Weather Station	1	qty	5	5		0.00	11.00	34.00	E	
	Night Vision System	2	qty	5	10		0.00	11.00	34.00	E	
430 Interior Communications											
	PA/GA Passenger Area Speakers	1	qty	25	25		0.00	14.00	25.00	E	
	PA/GA Control Panel	1	qty	15	15		0.00	11.00	34.00	E	Pilot House
	Hand Microphone	2	qty	4	8		0.00	11.00	34.00	E	Pilot House
	Loudhailer Speakers	2	qty	5	10		0.00	11.00	40.00	E	Top of Pilot House
	Intercom/Talkback Stations	4	qty	5	20		0.00	0.00	25.00	E	
	Emergency Phone Stations	9	qty	10	90		0.00	0.00	25.00	E	

SWBS No.	4 ELECTRONICS & IC Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
	Alarm Monitoring System Display	3	qty	20	60		0.00	11.00	34.00	E	
	Main Alarm Control Panel	1	qty	15	15		14.00	10.00	6.00	E	EOS
	Remote Alarm Control Panel	2	qty	15	30		0.00	11.00	34.00	E	Pilot House
	Ionization Type Smoke Detectors	1	qty	25	25		0.00	14.00	25.00	E	general
	Manual Call Stations	2	qty	10	20		0.00	12.00	20.00	E	passenger lounge
	Main Alarm Panel	1	qty	15	15		0.00	11.00	34.00	E	Pilot House
	Remote Alarm Panel	1	qty	15	15		14.00	10.00	6.00	E	EOS
	CCTV Cameras	9	qty	5	45		0.00	14.00	25.00	E	passenger spaces
	Flat Screen Monitor 19"	1	qty	30	20		0.00	9.50	34.00	E	Pilot House
440	Exterior Communications										
	VHF Radio Stations	4	qty	4	16		0.00	0.00	25.00	E	

SWBS No.	5 AUXILIARY SYSTEMS Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
510	Climate Control				10,179	8%	0.52	-0.85	13.55		
520	Sea Water Systems				18,899	8%	-15.08	7.90	5.99		
530	Fresh Water Systems				1,320	8%	-45.71	-5.83	6.75		
540	Fuels and Lubricants, Handling and Storage				-						
550	Air, Gas, and Miscellaneous Fluid Systems				2,306	8%	-16.48	10.34	7.01		
560	Ship Control Systems				-						
570	Replenishment Systems				-						
580	Mechanical Handling Systems				593	8%	-68.00	17.17	14.00		
590	Special Purpose Systems				6,959	8%	11.36	14.49	15.29		
Subgroup-based Margin Total					3,220	8%	-8.43	6.65	9.71		
Item-based Margin Total					1,520	4%	-5.88	1.24	8.73		
Group Total W/ Margin					44,996	12%	-8.34	6.47	9.68		

510 Climate Control

513.0 Machinery Ventilation

Engine Room Supply Plenum	4	qty	300	1,200	-4.00	-20.00	12.67	E	Est. Weight
18"x18" Fire Damper	4	qty	15	60	0.00	-20.00	8.75	E	
Engine Room Supply Fan	4	qty	100	400	0.00	-20.00	8.75	E	15" Supply Fan
Mist Eliminator	4	qty	30	120	0.00	-20.00	12.67	E	Impingent 18"x25" 6300C
Supply Louvre + Vanstone Flanges	8	qty	50	400	0.00	-20.00	8.75	E	Est. Weight
6" Ducting Beneath Grating	2	ft	3	6	0.00	-20.00	2.00	E	Est. Weight
SWBD Room Supply Fan	1	qty	15	15	33.00	-20.00	12.67	E	4" Inline
SWBD Room Outdoor Air Filter	1	qty	20	20	33.00	-20.00	12.67	E	Est. Weight
SWBD Room Fan Coil	2	qty	145.76	292	24.00	0.00	8.75	V	FM20085
SWBD Room Return Air Filter	2	qty	20	40	22.00	0.00	8.75	E	Est. Weight
EOS Fan Coil	1	qty	116.11	116	22.00	14.92	8.75	V	FM20084
EOS Return Air Filter	1	qty	20	20	22.00	14.92	8.75	E	Est. Weight
EOS Supply Fan	1	qty	15	15	22.00	14.92	8.75	E	4" Inline
Machinery Space HVAC Chiller	4	qty	249.73	999	8.00	6.48	6.00	V	FM20062
Chilled Water Pump	2	qty	150	300	3.00	9.58	6.00	E	Est. Weight
Machinery Space Unit Heater	3	qty	70	210				V	TRIAD 5kw Heater
Void Supply Plenum	2	qty	250	500	0.00	-19.00	12.67	E	louver, closure plate
Void Supply Fan	2	qty	44	88	0.00	-7.00	8.75	V	12" Delta-T Axial Fan
Mist Eliminator	2	qty	50	100	0.00	-19.00	12.67	E	Impingent 12"x12" 1000C
12" Ventilation Ducting	2	qty	150	300	0.00	-15.00	8.75	E	16101 Wt Est
Void Exhaust Plenum	2	qty	100	200	2.00	15.00	12.67	E	Closure Plate + Exhaust I
Thruster Room Supply Plenum	2	qty	250	500	0.00	-18.75	12.67	E	louver, closure plate
Thruster Room Supply Fan	2	qty	44	88	0.00	-16.17	8.75	V	12" Delta-T Axial Fan
Mist Eliminator	2	qty	50	100	0.00	-18.75	12.67	E	Impingent 12"x12" 1000C
12" Ventilation Ducting	2	qty	150	300	0.00	-15.00	8.75	E	16101 Wt Est
Thruster Room Exhaust Plenum	2	qty	100	200	0.00	19.00	12.67	E	Closure Plate + Exhaust I
E-Gen Supply Louver 39"x60"	1	qty	60	60	-48.00	15.75	17.17	E	
E-Gen Supply Fire Damper	1	qty	60	60	-48.00	15.75	17.17	E	
E-Gen Exhaust Louver 39"x60"	1	qty	60	60	-50.00	18.75	15.50	E	
E-Gen Exhaust Fire Damper	1	qty	60	60	-50.00	18.75	15.50	E	
Flex Duct	1	qty	10	10	-50.00	18.75	15.50	E	
512.9 Passenger Space HVAC									
HVAC Condensers	5	qty	350	1,750	0.00	18.00	22.50	E	
Window Defrosting System	2	qty	50	100	0.00	9.83	30.25	E	Est. Weight
Pilot House Heat Pump(Indoor)	2	qty	70	140	0.00	9.83	30.25	E	24,000BTU/hr
Crew Lounge Heat Pump	1	qty	70	70	0.00	14.00	30.00	E	Est. Weight

SWBS No.	5 AUXILIARY SYSTEMS Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
	EOS Heat Pump	1	qty	70	70		10.00	14.00	11.00	E	Est. Weight
	Passenger/Crew Space Heat Pump(Outdoor)	7	qty	170	1,190	20%	0.00	9.00	17.00	E	Margin for fdn and piping
	Passenger Head Ventilator	2	qty	10	20		0.00	9.00	17.00	E	100CFM
520	Sea Water Systems										
	<i>Sea Chests included under SWBS 200</i>										
521.1	Fire Main System										
	Fire Pump	2	qty	760	1,520		10.00	8.00	4.75	E	Est. Weight
	Strainer	2	qty	130	260		10.00	8.00	4.75	V	4" Eaton Model 72
	3"Cu-Ni Piping	169	ft	4.33	732	50%	0.00	0.00	11.00	E	Margin for bends and fittings
526.1	Deck Drain System										
	2"Sch10S, Stainless Steel Piping	100	ft	5.03	503	10%	0.00	18.00	25.00	E	Margin for Bends
	Drain	14	qty	0.5	7		0.00	18.00	25.00	E	Est. Weight
528.1	Sanitary System										
	MSD Unit	1	qty	8500	8,500		-28.00	12.33	5.75	E	Estimated wet weight J16
	Zero Discharge Tank 500gal	2	qty	308	616		-40.00	12.33	6.25	E	Content separate in GHS
	Sewage Pump	2	qty	20	40		-37.00	6.00	4.75	V	1/2HP Red Fox P/P
	2" Sch80 Pipe	126	ft	5.02	633		-10.00	12.33	11.00	E	Est. Weight
	Entrained Fluids	2.7489	ft³	62.3	171		-10.00	12.33	11.00	C	
529.1	Bilge & Ballast System										
	Bilge Piping Steel 3"Sch80	76	ft	10.25	779	35%	-9.00	-12.00	3.75	E	Margin for Fittings
	Bilge Piping Steel 2"Sch80	264	ft	5.02	1,325	30%	-9.00	6.00	3.75	E	Margin for Fittings
	Bilge Pump	1	qty	137	137		26.00	-13.50	3.75	E	Est. Weight Flomax10
	Bilge Pump	1	qty	137	137		-24.00	-6.75	3.75	E	Est. Weight Flomax 10
	Strainer	2	qty	130	260		1.00	-10.67	4.75	V	4" Eaton Model 72
	Ballast Piping 3" Cu-Ni	164.25	ft	4.33	711	15%	-4.30	6.00	2.80	E	Rhino, Margin for Fitting
	Ballast Pump	2	qty	455	910		-3.90	11.00	3.43	E	Est. Weight Goulds3196
	Strainer	2	qty	235	470		-3.90	11.00	3.43	V	6" Eaton Model 72
	Remote Ballast System Valve Automation	1	qty	500	500		-4.30	6.00	2.80	E	Weight Allowance
529.2	Waste and Lube Oil System										
	Waste Oil Pump	1	qty	117	117		-4.00	-17.50	6.75	E	
	Waste Oil Strainer	1	qty	36	36		-4.00	-17.50	6.75	V	Eaton 1-1/2" Model 72
	Waste Oil Tank 60 gal	1	qty	200	200		-4.00	-17.50	4.00	E	Est. Weight
	Lube Oil Tank 60 gal	1	qty	200	200		0.00	-17.50	4.00	E	Est. Weight
	1-1/2" Sch 80 Piping	37.25	ft	3.63	135	30%	-2.00	-19.00	10.00	E	Margin for Fittings
530	Fresh Water Systems										
533.1	Potable Water System										
	Potable Water Pressure Tank	1	qty	676	676		-46.00	-6.17	5.75	E	Wet Weight
	Potable Water Pump	2	qty	23	46		-46.00	0.00	4.75	V	Mach 5PW Pump
	Strainer	1	qty	36	36		-46.00	-2.54	5.75	V	1-1/2" Eaton Model 72
	Water Heater Rheem 12gal	1	qty	76	76		-41.00	-6.17	5.75	V	Rheem EGSP20
	Hot Water Expansion Tank	1	qty	338	338		-46.00	-6.17	5.75	V	Therm-X-Trol WX-404C
	Cu-Ni Piping 1/2"	80	ft	1.76	141	30%	-46.00	-6.00	15.00	E	Margin for Fittings
	Entrained Water	0.1091	ft³	62.3	7		-46.00	-6.00	15.00	C	
540	Fuels and Lubricants, Handling and Storage										
550	Air, Gas, and Miscellaneous Fluid Systems										
	Air Compressor and Receiver	2	qty	850	1,700		-20.00	11.42	5.75	V	
	Ship's Horn	2	qty	10	20		0.00	11.42	50.00	E	Top of Pilot House
	Air Filter	1	qty	100	100		-20.00	11.42	5.75	E	Est. Weight and Location
	Air Dryer	1	qty	100	100		-20.00	11.42	5.75	E	Est. Weight and Location
	Piping	178	ft	2.17	386		0.00	5.00	11.00	E	1" SCH 80

SWBS No.	5 AUXILIARY SYSTEMS Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
560	Ship Control Systems										
570	Replenishment Systems										
580	Mechanical Handling Systems										
	Anchor	1	qty	400	400		-68.00	17.17	14.00	V	400lb Danforth
	Anchor Chain	25	qty	5.04	126	5%	-68.00	17.17	14.00	C	13/16 Chain
	Anchor Rode	100	qty	0.67	67		-68.00	17.17	14.00	C	1-5/8 Line
590	Special Purpose Systems										
	PFDs - Crew	7	qty	3	21		0.00	8.00	33.67	C	
	PFDs - Adult	300	qty	3	900		-4.00	16.00	22.00	C	
	PFDs - Child	30	qty	3	90		-4.00	16.00	22.00	C	
	PFD Lockers	6	qty	50	300		-4.00	16.00	22.00	C	
	Life Rings	8	qty	6	48		0.00	10.00	18.00	C	
	Life Rafts	5	qty	300	1,500		-20.00	20.50	22.50	C	
	Fire Extinguishers	20	qty	30	600		0.00	5.00	10.00	C	
	Novac Fire Suppression Bottles	4	qty	800	3,200		40.00	16.00	10.00	E	
	EGEN Fire Suppression Bottle	1	qty	300	300		-46.00	-18.00	15.75	E	

SWBS No.	6 OUTFIT Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
610	Ship Fittings				-	8%					
620	Hull Compartmentation				22,575	8%	14.17	6.01	11.18		
630	Preservatives and Coverings				22,357	8%	0.36	2.04	9.10		
640	Living Spaces				975	8%	-2.58	9.24	23.64		
650	Service Spaces				5,350	8%	-5.64	14.63	16.07		
660	Working Spaces				2,230	8%	1.18	3.96	17.98		
670	Stowage Spaces				150	8%	41.00	14.17	13.00		
680	Cargo Stowage				3,500	8%	31.71	19.00	26.82		
690	Special Purpose Systems				-						
Subgroup-based Margin Total					4,571	8%	7.26	6.06	12.27		
Item-based Margin Total					3,436	6%	27.72	0.05	2.27		
Group Total W/ Margin					65,144	14%	8.34	5.74	11.74		

610	Ship Fittings										
620	Hull Compartmentation										
622.0	Floors										
	ER Aluminum Diamond Plate 1/4"	2415	ft²	3.53	8,525	30%	30.00	-0.99	2.33	C	Margin for Support Struct
	EOS Al Diamond Plate 1/4"	241	ft²	3.53	851	30%	13.10	15.56	2.33	C	Margin for Support Struct
	SWBD RM Al Diamond Plate 1/4"	589	ft²	3.53	2,079	30%	24.38	-2.03	2.00	C	Margin for Support Struct
623.0	Ladders and Railings										
	EOS Ladder	1	qty	400	400		20.00	14.00	5.00	E	
	01 Access Ladders	2	qty	500	1,000		0.00	18.00	16.00	E	
	Pilot House Ladders	2	qty	500	1,000		0.00	14.00	26.00	E	
	Housetop Railing	49.667	ft	10.0671	500		0.00	9.00	41.00	C	1.5" dia pipe
	Housetop Access Ladder	12.25	ft	20.4082	250		0.00	13.25	37.25	C	ladder height in feet, J130
	Bridge Deck Railing	82.083	ft	9.13706	750		0.00	9.00	31.75	C	perimeter length in feet
	Bridge Deck Access Stairs	2	qty	225	450		0.00	13.25	26.25	E	J13098
	01 Deck Railing	1	qty	1000	1,000		-4.00	14.50	22.20	E	Estimated
624.0	Doors, Windows, and Hatches										
	Watertight Doors	4	qty	500	2,000		0.00	3.00	6.00	E	
	Joiner Doors	5	qty	75	375		0.00	16.00	15.00	E	
	Weatheright Doors	8	qty	150	1,200		0.00	16.00	20.00	E	
	Hold - EOS Windows	4	qty	50	200		-7.00	10.00	8.00	E	
	Main Deck - Passenger Windows (Large)	8	qty	100	800		0.00	22.00	15.00	E	
	Main Deck - Passenger Windows (Small)	3	qty	40	120		0.00	22.00	15.00	E	
	01 Deck - Crew Lounge Windows	4	qty	25	100		-3.00	8.50	27.00	E	
	Pilot House Windows	13	qty	75	975		0.00	8.50	36.00	E	
630	Preservatives and Coverings										
631.0	Paint (2.4% LS for steel or 4% for Al Vessels)	2.4%		648627	15,567		0.42	1.43	8.50	E	
634.0	Deck Coverings										
	EOS Tiles	1	qty	150	150		10.00	16.00	2.50	E	
	Main Deck	600	ft²	2	1,200		0.00	15.00	11.00	E	
	Crew Lounge	144	ft²	2	288		0.00	10.00	21.00	E	
635.0	Fire Insulation										
	Engine Room & EOS	2576	qty	2	5,152		0.00	0.00	10.00	E	
640	Living Spaces										
	Crew Settee	1	qty	100	100		-9.00	10.00	23.00	E	
	Settee Couch	1	qty	150	150		-9.00	7.50	23.00	E	
	Settee Chairs	3	qty	10	30		-9.00	12.50	23.00	E	
	Counter	1	qty	100	100		-10.00	15.00	23.00	E	

SWBS No.	6 OUTFIT Description	Qty.	Unit	Unit Wt. (lb)	Total Wt. (lb)	Margin	LCG (ft)	TCG (ft)	VCG (ft)	Source C, E, V	Notes
	Coffee Maker	1	qty	10	10	-9.00	15.00	24.00	E		
	Microwave	1	qty	20	20	-11.00	15.00	24.00	E		
	Cupboard	1	qty	50	50	-10.00	15.00	26.00	E		
	Counter	1	qty	200	200	1.00	7.00	23.00	E		
	Sink	1	qty	50	50	2.00	7.00	24.00	E		
	Cupboard	1	qty	50	50	-0.50	7.00	26.00	E		
	Crew Head	1	qty	200	200	8.00	8.00	24.00	E		
	PFDs - Crew	3	qty	5	15	-4.00	7.00	26.00	E		
650	Service Spaces										
	Vending Machines	2	qty	400	800	-15.00	14.00	14.00	C/E		
	Water Fountain	1	qty	150	150	-18.00	13.00	14.00	C/E		
	Passenger Lounge Chair Group 1	14	qty	30	420	-28.00	19.17	13.00	C/E		
	Passenger Lounge Chair Group 2	7	qty	30	210	-18.00	17.00	13.00	C/E		
	Passenger Lounge Chair Group 3	9	qty	30	270	4.00	15.17	13.00	C/E		
	ADA Head	2	qty	250	500	-2.00	14.83	14.00	E		Estimated
	Bulkhead Insulation/Joinery	1	qty	3000	3,000	0.00	14.00	18.00	E		Rough Estimate
660	Working Spaces										
	Pilothouse Chair	2	qty	30	60	0.00	8.17	33.67	E		
	Pilothouse Console	4	qty	200	800	0.00	10.00	33.67	E		
	Coffee Maker	1	qty	10	10	-2.00	7.33	33.67	E		
	Work Desk	2	qty	50	100	0.00	7.33	33.67	E		
	Chair	1	qty	10	10	0.00	8.00	33.67	E		
	PFDs - Crew	2	qty	5	10	0.00	7.00	33.67	E		
	EOS - Console	1	qty	200	200	7.50	10.00	5.50	E		
	EOS - Chair	1	qty	20	20	8.00	12.00	5.50	E		
	EOS - Coffee Maker	1	qty	10	10	10.00	10.00	5.50	E		
	EOS - Fridge	1	qty	50	50	10.00	10.00	4.50	E		
	EOS - PFDs - Crew	2	qty	5	10	12.00	10.00	5.00	E		
	E/R - Storage Cabinet	1	qty	150	150	24.00	20.00	5.50	E		
	E/R - Workbench	1	qty	200	200	-12.17	-8.33	5.50	E		
	E/R - Storage Cabinets	4	qty	150	600	-1.50	-8.17	5.50	E		
670	Stowage Spaces										
	Cleaning Gear - Sink	1	qty	50	50	41.00	14.17	13.00	E		
	Cleaning Gear - Shelves	1	qty	40	40	41.00	14.17	13.00	E		
	Cleaning Gear - Misc	1	qty	60	60	41.00	14.17	13.00	E		
680	Cargo Stowage										
	Rescue Boat & Cradle	1	qty	1500	1,500	26.00	19.00	25.25	V		Fassmer RR4.2.
	Rescue Boat Davit	1	qty	2000	2,000	36.00	19.00	28.00	V		Global Davit Rhs11/3.5M
690	Special Purpose Systems										