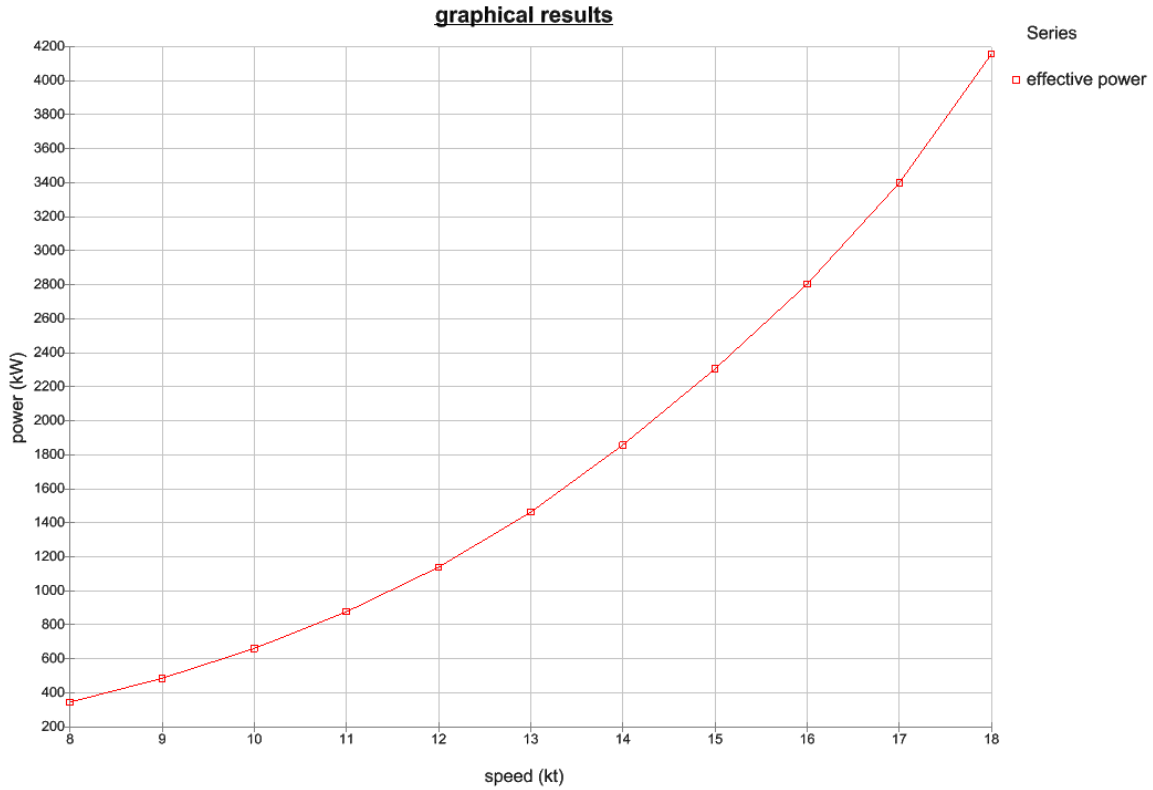


APPENDIX A - CALCULATIONS

SUBJECT: Power estimation and Propulsion

Initial Power estimation using Holtrop Series



Based on the power obtained, propeller selection is done.

Design Parameters	Obtained
Propeller series	Wageningen B
Search Method	Specify diameter
Efficiency reduction	Fixed Pitch
Design speed (knots)	18
Number of blades	3
Diameter (m)	3
Blade area ratio	0.350
Pitch ratio	0.724
Design shaft speed (rpm)	362.43
Design advance ratio	0.433
Design open water efficiency (%)	59.218

Overview of Propulsion plant:

	Propulsion Type	Prime Mover	Auxiliary Engines	Bow Thruster	Max Speed
L. J. Cowley	Diesel Geared Drive	2 Diesel Engines rated at 1560 kW	3 rated at 400 kW	Yes	15 knots

Mission Profile:

Mode	Rescue Mission	Normal Transit	High Speed Transit	Manuev.	Oil Spill recovery	port
% of time	5%	65%	10%	5%	5%	10%

Estimated load on the Propeller:

Mode	Rescue Mission	Normal Transit	High Speed Transit	Manuev.	Oil Spill recovery	port
% of time	5%	65%	10%	5%	5%	10%
Propeller load (kW)	1600	1311.95	4679.3	218.66	218.66	0

Mission profile based on the load:

Mode	Units	Rescue Operation	Normal Transit	High Speed Transit	Manuev.	Oil Spill Recovery	Port
% time		5%	65%	10%	5%	5%	10%
annual hours	h	420	5460	840	420	420	840
Propeller load	kW	1600.00	1311.95	4679.30	218.66	218.66	0
thruster	ekW	450	0	0	450	450	0
ship service	ekW	500	400	400	400	600	300
Total Generator load	ekW	950.00	400.00	400.00	1092.95	1292.95	300.00

Loading Conditions

mode	units	Rescue Operation	normal transit	high speed transit	maneuv.	oil spill recovery	port
% time		5%	65%	10%	5%	5%	10%
annual hours	h	420	5460	840	420	420	840
Propeller load	kW	1600.00	1311.95	4679.30	218.66	218.66	0
thruster	ekW	450	0	0	450	450	0
ship service	ekW	500	400	400	400	600	300
Total Generator load	ekW	950.00	400.00	400.00	1092.95	1292.95	300.00
Main Engine #1	CAT 9M20C						
rated power	kW	1710	1710	1710	1710	1710	1710
load	kW	1600.00	1311.95	1700.00	0.00	0.00	0.00
loading	%P	93.57%	76.72%	99.42%	0.00%	0.00%	0.00%
sfr	g/kWh	188.58	187.66	189.88	215.30	215.30	215.30
fuel rate	t/h	0.30	0.25	0.32	0.00	0.00	0.00
fuel/yr	t/y	126.73	1344.26	271.15	0.00	0.00	0.00
Main Engine #2	CAT 6M32C						
rated power	kW	3000	3000	3000	3000	3000	3000
load	kW	0.00	0.00	2979.30	0.00	0.00	0.00
loading	%P	0.00%	0.00%	99.31%	0.00%	0.00%	0.00%
sfr	g/kWh	202.10	202.10	178.22	202.10	202.10	202.10

fuel rate	t/h	0.00	0.00	0.53	0.00	0.00	0.00
fuel/yr	t/y	0.00	0.00	446.03	0.00	0.00	0.00
Auxiliary Generator #1	C18 ACERT						
rated power	ekW	525	525	525	525	525	525
load	ekW	475.00	400.00	400.00	420.00	490.00	0.00
loading	%P	90.48%	76.19%	76.19%	80.00%	93.33%	0.00%
sfr	g/ekWh	221.01	222.12	222.12	221.39	221.30	310.48
fuel rate	t/h	0.10	0.09	0.09	0.09	0.11	0.00
fuel/yr	t/y	44.09	485.11	74.63	39.05	45.54	0.00
Auxiliary Generator #2	C18 ACERT						
rated power	ekW	525	525	525	525	525	525
load	ekW	475.00	0.00	0.00	420.00	490.00	0.00
loading	%P	90.48%	0.00%	0.00%	80.00%	93.33%	0.00%
sfr	g/ekWh	221.01	310.48	310.48	221.39	221.30	310.48
fuel rate	t/h	0.10	0.00	0.00	0.09	0.11	0.00
fuel/yr	t/y	44.09	0.00	0.00	39.05	45.54	0.00
Auxiliary Generator #3	C18 ACERT						
rated power	ekW	330	330	330	330	330	330
load	ekW	0.00	0.00	0.00	252.95	312.95	300.00
loading	%P	0.00%	0.00%	0.00%	76.65%	94.83%	90.91%

sfr	g/ekWh	295.27	295.27	295.27	211.14	210.67	210.21
fuel rate	t/h	0.00	0.00	0.00	0.05	0.07	0.06
fuel/yr	t/y	0.00	0.00	0.00	22.43	27.69	52.97
total fuel/yr	t/y	214.91	1829.37	791.81	100.54	118.78	52.97
annual fuel cost	\$	214,907.93	1,829,373.38	791,807.22	100,539.89	118,778.18	52,973.42
Total annual cost	\$						3,108,380.03

SUBJECT: Midship structure

Minimum plate thickness t

$$t = 667s \sqrt{\frac{p}{F_2 R_{eH}}} + t_c$$

The section modulus for the stiffeners within the ice belt

$$z = \frac{F_4 p h \ell^2}{m_1 R_{eH}} 10^6$$

Materials selected for the ship structure:

Material	Application	Yield Stress (N/mm ²)
Steel Grade A	General	235
Steel grade AH32	Ice Belt	315

Side shell plating:

Plate	Thickness (mm)
Top Deck	10
Main Deck	10
Tank Top	12
Ice Belt	22
Bilge	12
Sheer strake	10

Longitudinal stiffeners in midship section:

Stiffening	Profile
Top Deck	L-bar 130x100x12
Main Deck	L-bar 100x100x10
Tank Top	L-bar 100x100x10
Elsewhere	L-bar 100x100x10

Longitudinal girders in midship section:

Girder	Profile
Longitudinal Girders	T - 300x100x12x12

SUBJECT: Intact Stability

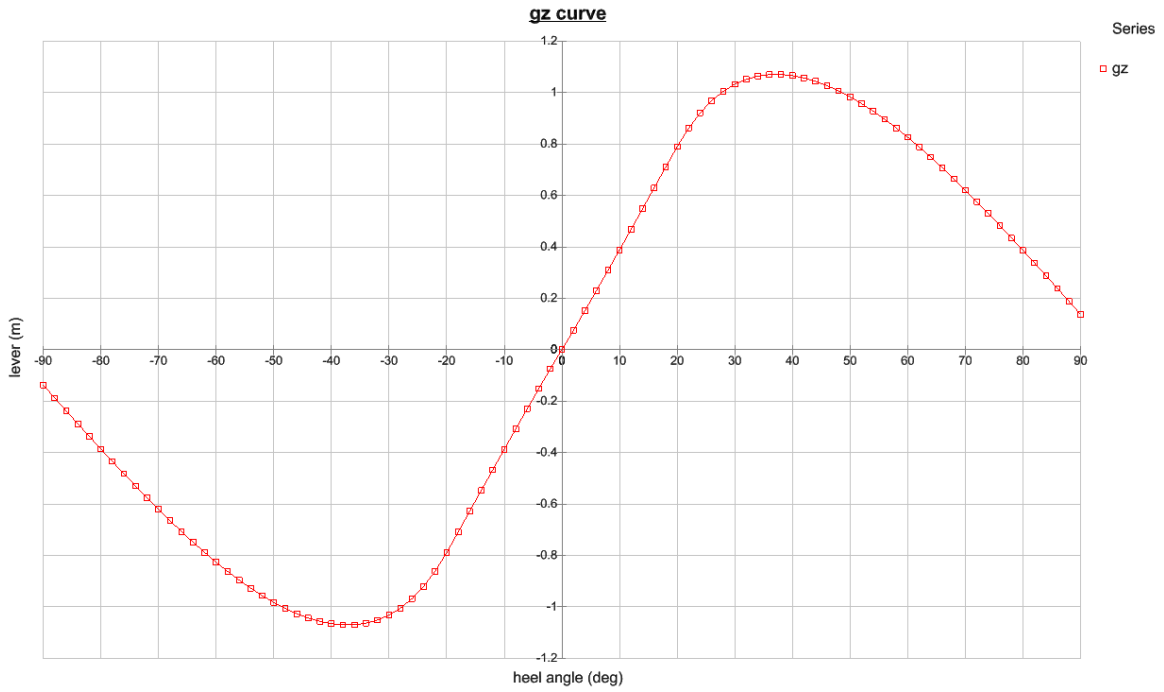


Figure 30 - GZ curve for fully loaded arrival condition

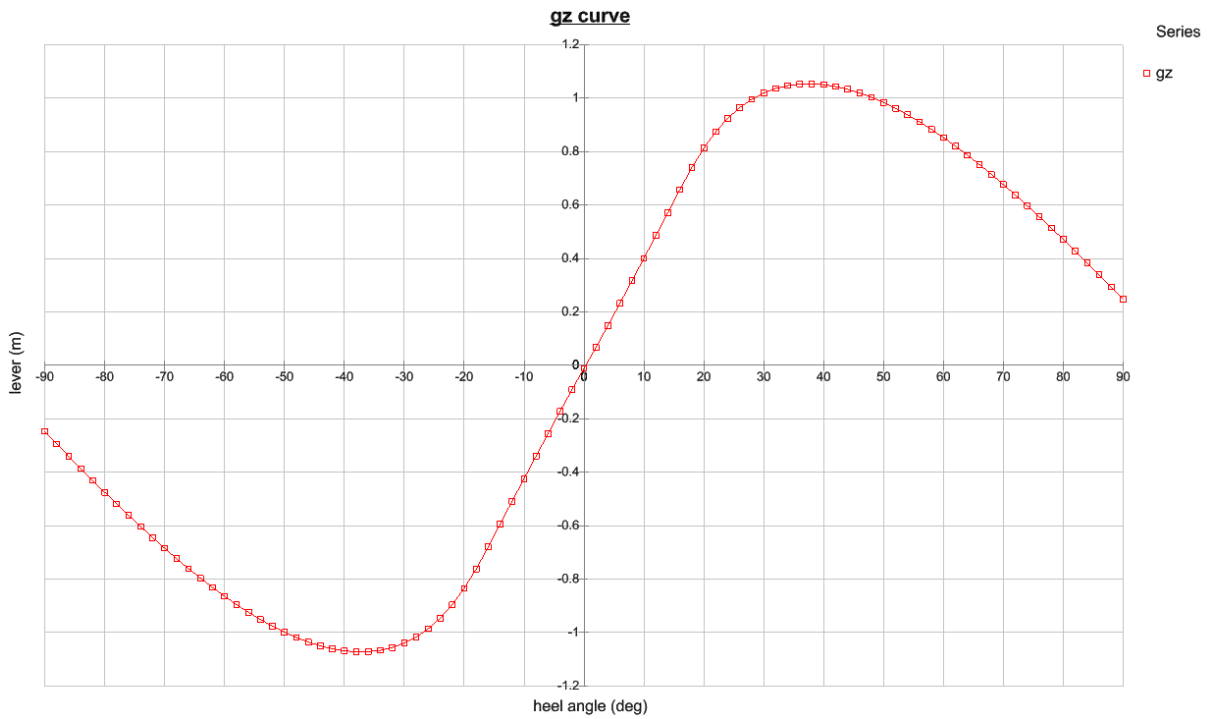
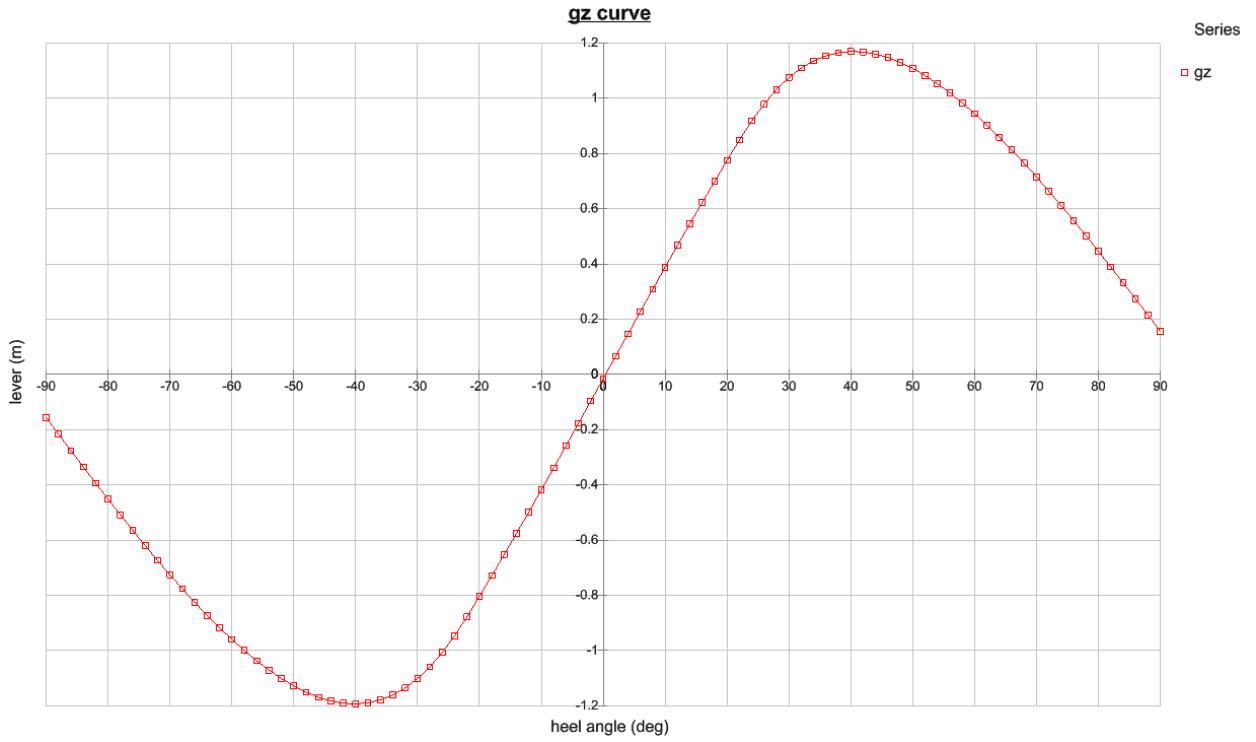
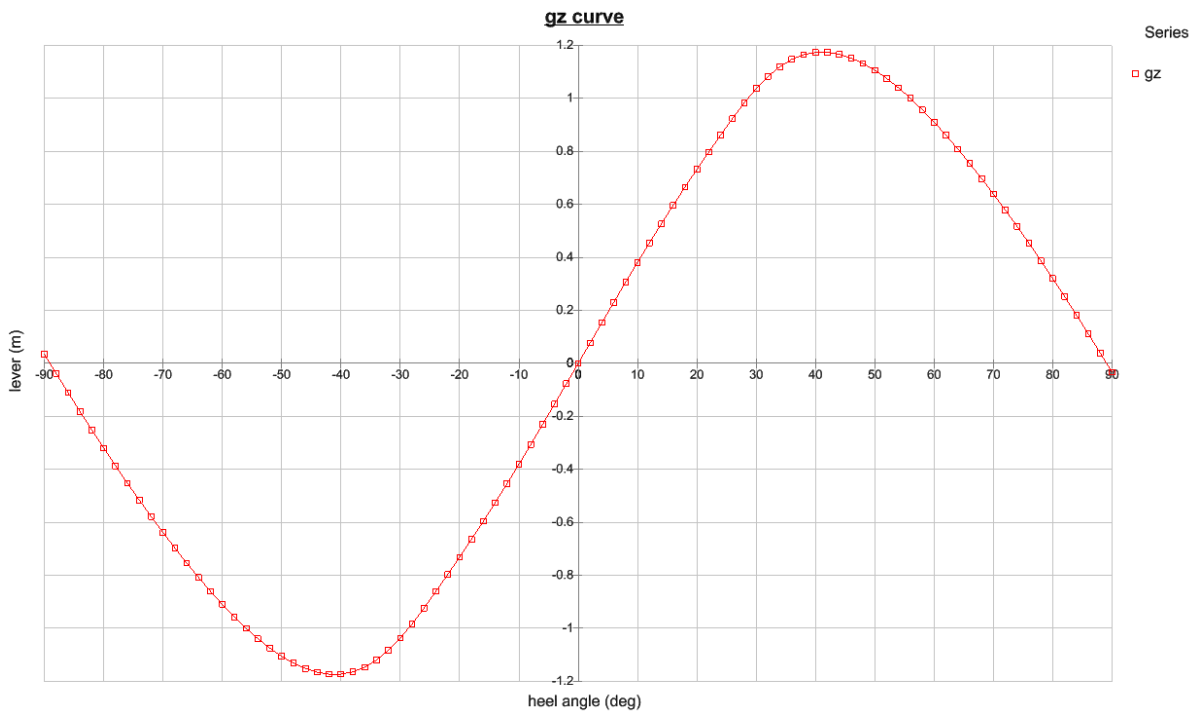


Figure 31 - GZ curve for fully loaded departure condition



GZ curve for ballast arrival condition



GZ curve for ballast departure condition

SUBJECT: Damage stability calculations

For Damage cases 1 – 3:

SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED DEPARTURE					
				CASE #1		CASE #2		CASE #3	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	1.873	PASS	2.372	PASS	2.176	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	48.32	PASS	52.50	PASS	53.29	PASS
Equilibrium angle	less than	12.0	degrees	5.32	PASS	4.99	PASS	6.34	PASS
Area under GZ curve	greater than	0.015	m-rad	0.324	PASS	0.362	PASS	0.481	PASS
Maximum righting lever	greater than	0.100	m	0.423	PASS	0.536	PASS	0.582	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED ARRIVAL					
				CASE #1		CASE #2		CASE #3	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.973	PASS	0.992	PASS	1.162	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	49.72	PASS	51.64	PASS	52.32	PASS
Equilibrium angle	less than	12.0	degrees	4.78	PASS	5.82	PASS	6.54	PASS
Area under GZ curve	greater than	0.015	m-rad	0.102	PASS	0.286	PASS	0.352	PASS
Maximum righting lever	greater than	0.100	m	1.025	PASS	1.121	PASS	1.073	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST ARRIVAL					
				CASE #1		CASE #2		CASE #3	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.993	PASS	1.032	PASS	1.129	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	51.35	PASS	51.58	PASS	52.92	PASS
Equilibrium angle	less than	12.0	degrees	6.82	PASS	7.22	PASS	7.91	PASS
Area under GZ curve	greater than	0.015	m-rad	0.297	PASS	0.330	PASS	0.423	PASS
Maximum righting lever	greater than	0.100	m	0.532	PASS	0.627	PASS	0.720	PASS

SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST DEPARTURE					
				CASE #1		CASE #2		CASE #3	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.540	PASS	0.579	PASS	0.677	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	49.72	PASS	48.15	PASS	49.82	PASS
Equilibrium angle	less than	12.0	degrees	7.23	PASS	7.49	PASS	7.80	PASS
Area under GZ curve	greater than	0.015	m-rad	0.132	PASS	0.136	PASS	0.148	PASS
Maximum righting lever	greater than	0.100	m	0.628	PASS	0.739	PASS	0.758	PASS

For damage cases 4 – 6:

SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED DEPARTURE					
				CASE #4		CASE #5		CASE #6	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.735	PASS	0.792	PASS	0.867	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	51.76	PASS	51.80	PASS	52.91	PASS
Equilibrium angle	less than	12.0	degrees	4.11	PASS	4.87	PASS	5.72	PASS
Area under GZ curve	greater than	0.015	m-rad	0.324	PASS	0.362	PASS	0.481	PASS
Maximum righting lever	greater than	0.100	m	0.423	PASS	0.536	PASS	0.582	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED ARRIVAL					
				CASE #4		CASE #5		CASE #6	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.973	PASS	0.992	PASS	1.162	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	49.72	PASS	51.64	PASS	52.32	PASS
Equilibrium angle	less than	12.0	degrees	4.78	PASS	5.82	PASS	6.54	PASS
Area under GZ curve	greater than	0.015	m-rad	0.102	PASS	0.286	PASS	0.352	PASS
Maximum righting lever	greater than	0.100	m	1.025	PASS	1.121	PASS	1.073	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST ARRIVAL					
				CASE #4		CASE #5		CASE #6	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.532	PASS	0.619	PASS	0.689	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	35.15	PASS	34.82	PASS	35.69	PASS
Equilibrium angle	less than	12.0	degrees	7.18	PASS	7.52	PASS	7.33	PASS
Area under GZ curve	greater than	0.015	m-rad	0.589	PASS	0.592	PASS	0.513	PASS
Maximum righting lever	greater than	0.100	m	1.342	PASS	1.237	PASS	1.278	PASS

SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST DEPARTURE					
				CASE #4		CASE #5		CASE #6	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.254	PASS	0.291	PASS	0.374	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	55.75	PASS	54.15	PASS	54.18	PASS
Equilibrium angle	less than	12.0	degrees	4.12	PASS	5.31	PASS	5.88	PASS
Area under GZ curve	greater than	0.015	m-rad	0.392	PASS	0.423	PASS	0.468	PASS
Maximum righting lever	greater than	0.100	m	1.121	PASS	1.180	PASS	1.470	PASS

For damage cases 7 – 9:

SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED DEPARTURE					
				CASE #7		CASE #8		CASE #9	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.263	PASS	1.117	PASS	0.982	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	31.64	PASS	42.84	PASS	43.19	PASS
Equilibrium angle	less than	12.0	degrees	7.19	PASS	4.11	PASS	4.78	PASS
Area under GZ curve	greater than	0.015	m-rad	0.297	PASS	0.344	PASS	0.427	PASS
Maximum righting lever	greater than	0.100	m	0.565	PASS	0.640	PASS	0.781	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED ARRIVAL					
				CASE #7		CASE #8		CASE #9	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.973	PASS	0.992	PASS	1.162	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	49.72	PASS	51.64	PASS	52.32	PASS
Equilibrium angle	less than	12.0	degrees	4.78	PASS	5.82	PASS	6.54	PASS
Area under GZ curve	greater than	0.015	m-rad	0.102	PASS	0.286	PASS	0.352	PASS
Maximum righting lever	greater than	0.100	m	1.025	PASS	1.121	PASS	1.073	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST ARRIVAL					
				CASE #7		CASE #8		CASE #9	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.735	PASS	0.792	PASS	0.867	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	51.76	PASS	51.80	PASS	52.91	PASS
Equilibrium angle	less than	12.0	degrees	4.11	PASS	4.87	PASS	5.72	PASS
Area under GZ curve	greater than	0.015	m-rad	0.324	PASS	0.362	PASS	0.481	PASS
Maximum righting lever	greater than	0.100	m	0.423	PASS	0.536	PASS	0.582	PASS

SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST DEPARTURE					
				CASE #7		CASE #8		CASE #9	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.257	PASS	0.299	PASS	0.345	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	45.17	PASS	44.12	PASS	44.82	PASS
Equilibrium angle	less than	12.0	degrees	7.93	PASS	7.21	PASS	6.38	PASS
Area under GZ curve	greater than	0.015	m-rad	0.102	PASS	0.236	PASS	0.385	PASS
Maximum righting lever	greater than	0.100	m	0.912	PASS	0.890	PASS	0.863	PASS

For damage cases 10 – 12:

SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED DEPARTURE					
				CASE #10		CASE #11		CASE #12	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.487	PASS	0.579	PASS	0.618	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	41.47	PASS	42.94	PASS	42.06	PASS
Equilibrium angle	less than	12.0	degrees	6.92	PASS	5.21	PASS	6.42	PASS
Area under GZ curve	greater than	0.015	m-rad	0.138	PASS	0.318	PASS	0.242	PASS
Maximum righting lever	greater than	0.100	m	1.122	PASS	0.984	PASS	1.378	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				FULLY LOADED ARRIVAL					
				CASE #10		CASE #11		CASE #12	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.658	PASS	0.562	PASS	0.628	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	53.70	PASS	52.43	PASS	51.11	PASS
Equilibrium angle	less than	12.0	degrees	8.92	PASS	7.11	PASS	7.94	PASS
Area under GZ curve	greater than	0.015	m-rad	0.298	PASS	0.391	PASS	0.425	PASS
Maximum righting lever	greater than	0.100	m	0.425	PASS	0.591	PASS	0.527	PASS
SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST ARRIVAL					
				CASE #10		CASE #11		CASE #12	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.795	PASS	0.688	PASS	1.872	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	59.11	PASS	57.98	PASS	55.42	PASS
Equilibrium angle	less than	12.0	degrees	6.13	PASS	5.66	PASS	5.13	PASS
Area under GZ curve	greater than	0.015	m-rad	0.324	PASS	0.362	PASS	0.481	PASS
Maximum righting lever	greater than	0.100	m	0.565	PASS	1.180	PASS	0.882	PASS

SOLAS 90 – 2 COMPARTMENT FLOODING				BALLAST DEPARTURE					
				CASE #10		CASE #11		CASE #12	
Evaluation criteria	Pass if	Value	Units	Obtained	Result	Obtained	Result	Obtained	Result
Margin line emergence	greater than	0.000	m	0.524	PASS	0.791	PASS	1.842	PASS
Righting lever range past Equilibrium	greater than	15.0	degrees	45.17	PASS	45.28	PASS	46.96	PASS
Equilibrium angle	less than	12.0	degrees	3.61	PASS	4.53	PASS	5.08	PASS
Area under GZ curve	greater than	0.015	m-rad	0.120	PASS	0.502	PASS	0.581	PASS
Maximum righting lever	greater than	0.100	m	0.720	PASS	0.762	PASS	0.917	PASS

SUBJECT: Weights distribution, Areas and Volumes

Service crew spaces:

Crew Accommodation						
Cabin Category	No. of cabins	beds per cabin	Size/ cabin (m ²)	total size (m ²)	height (m)	volume (m ³)
officers	10	1	12	120	3	360
crews	10	2	11	110	3	330
cabin corridors		25% of cabin area		57.5	3	172.5
Total	20	7.23 m²/crew		287.5		862.5

Crew common spaces:

Crew Common Spaces						
Category	Seats	m ² /seat	m ² /crew	Height (m)	Area (m ²)	Volume (m ³)
Mess room	30	1.67	1.67	3	50	150
Captain Day room				3	25	75
Ship Office	8	2.50	0.67	3	20	60
OGD Office				3	20	60
Gym			1.00	3	30	90
Hobby/game room			1.00	3	30	90
Total					175	525

Service facilities:

Ship Service			
Use of Space:	Height (m)	Area (m ²)	Volume (m ³)
Wheelhouse	3	60	180
sick bay	3	28	84
Total		88	264

Catering Spaces			
Use of Space:	Height (m)	Area (m ²)	Volume (m ³)
Galley	3	24	72
refrigerated store	3	20	60
dry store	3	20	60
Total		64	192

Hotel Services			
Use of Space:	Height (m)	Area (m ²)	Volume (m ³)
Laundry	3	18	54
Linen Store	3	20	60
Total		38	114

Technical Spaces:

Technical Spaces			
Use of Space:	Height (m)	Area (m ²)	Volume (m ³)
Machinery Control Room	4	33	132
Steering Room	4	62	248
Engineer store	4	30	120
Workshop 1	3	30	90
Workshop2	4	30	120
Engine Room	4	64	256
Bow Thruster	4	27	108
Emergency Generator	3	66	198
Funnel	16	6	96
Incinerator Room	3	22	66
Total		370	1434

Tanks and Void Spaces			
Use of Space:			Volume (m ³)
Fuel Oil			350
Lub oil			3
Dirty Oil			2
Fresh Water			50
Sewage			0.12
Water Ballast			312.5
void			106.875
Total			824.50

Gross tonnage:

$$GT = K \times V$$

$$K = 0.2$$

$$0.02 \times \log_{10}(V)$$

V= Ship's total volume in cubic meters

Total Area (m ²)	1143.82
Total Volume (m ³)	4248.48
Gross Tonnage	1157.98

Lightship weight:

Lightweight				
Weight Group	Unit	Value	Coeff ton/unit	Weight (ton)
Deckhouse	volume	363.00	0.06	21.78
Hull Structure	volume	3885.48	0.13	505.11
Interior Outfitting	Area	958.50	0.15	143.78
Ship Outfitting	volume	4248.48	0.005	21.24
Machinery				264.00
Total				955.91
Reserve	%	5.00		47.80
Lightweight				1003.70

Deadweight:

Deadweight				
Item	Unit	Value	Coeff ton/unit	Weight (ton)
Provision & Store	person	30	0.3	9.00
Crew	person	30	0.1	3.00
Fuel oil	volume	350	0.99	346.50
Lube oil	volume	3	0.88	2.64
Dirty oil	volume	2	0.9	1.8
Fresh Water	volume	50	1	50
Sewage	volume	0.12	1.5	0.18
SAR				2.95
Oil Spill				1.11
Deadweight				413.12

SUBJECT: Economic analysis

Design stage equations for economic analysis

SWBS	Labor Man-Hours	Material Dollars
100	$CF \times 177 \times \text{Weight}_{100}^{0.862}$	$800 \times \text{Weight}_{100}$
200	$CF \times 365 \times \text{Weight}_{200}^{0.704}$	$15,000 + 20,000 \times \text{Weight}_{200}$
300	$682 \times \text{Weight}_{300}^{1.025}$	$25,000 \times \text{Weight}_{300}$
400	$1,605 \times \text{Weight}_{400}^{0.795}$	$40,000 \times \text{Weight}_{400}$
500	$CF \times 34.8 \times \text{Weight}_{500}^{1.24}$	$\text{Weight}_{500} \times 10,000 + 10,000$
600	$310 \times \text{Weight}_{600}^{0.949}$	$5,000 + 10,000 \times \text{Weight}_{600}$

Size Factor	2.29
Ship Type	4
CF	9.14
Labor Rate(\$/Hr)	150

Labour cost for each system:

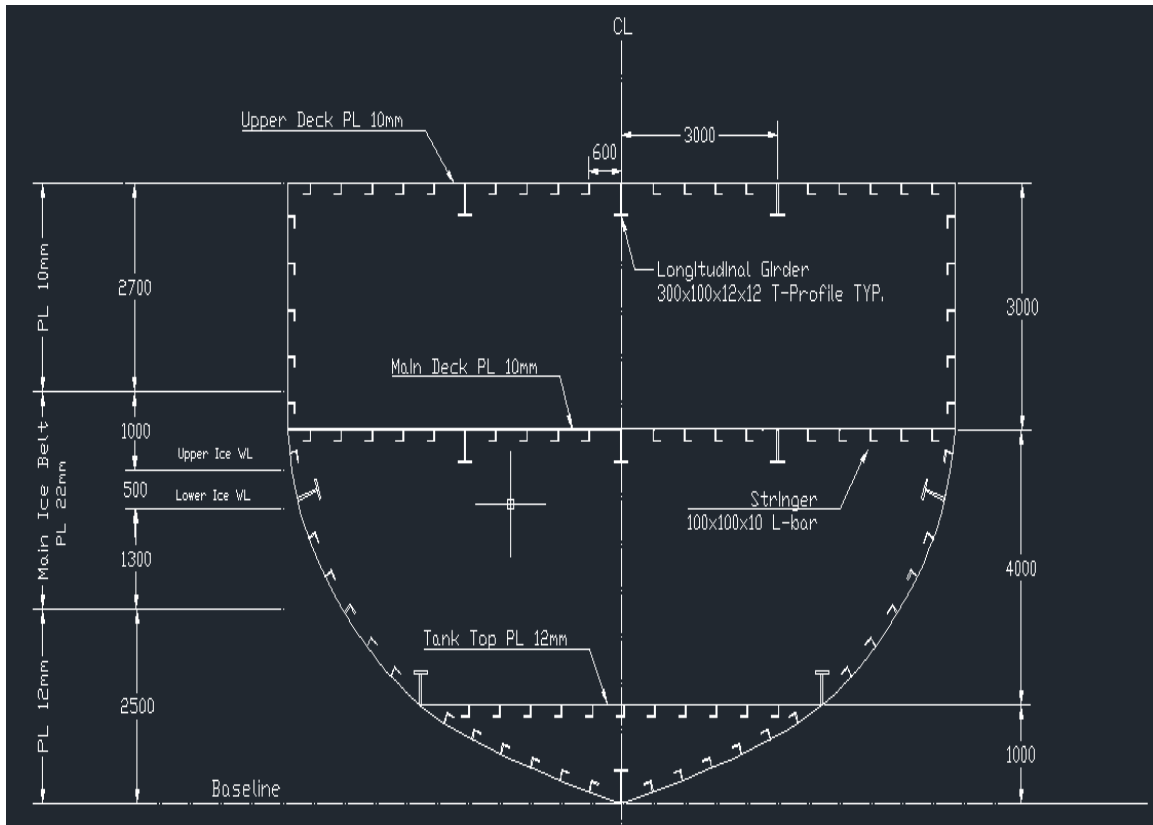
System Number	Title	Weight [Ton]	Man Hours	Material Cost (\$)	Labor Cost (\$)
100	Hull	639	418,456	511,200	62,768,458
200	Propulsion M/C	106.4	89,160	2,129,280	13,374,132
300	Electrical	18.9	13,852	471,825	2,077,842
400	Command & Comm	27	22,050	1,080,000	3,307,504
500	Auxilliary M/C	15.3	915	163,000	137,298
600	Outfit	246.6	286,703	2,471,000	43,005,535
800	Engineering		207,784		31,167,693
900	Support Services		415,569		62,335,386
Total		1053	1,454,492	6,826,305	218,173,851

Total Cost

Crew Cost (\$/year)	2,000,000
Fuel Cost (\$/year)	3,108,380
Total Building Cost (\$)	653,999,710

APPENDIX B – DRAWINGS

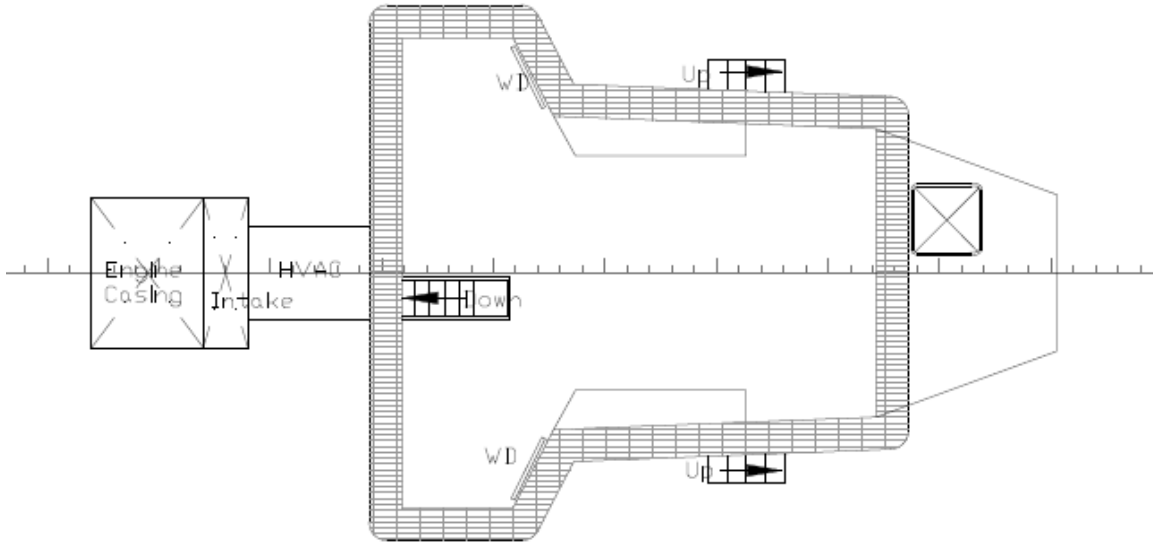
Midship Structure:



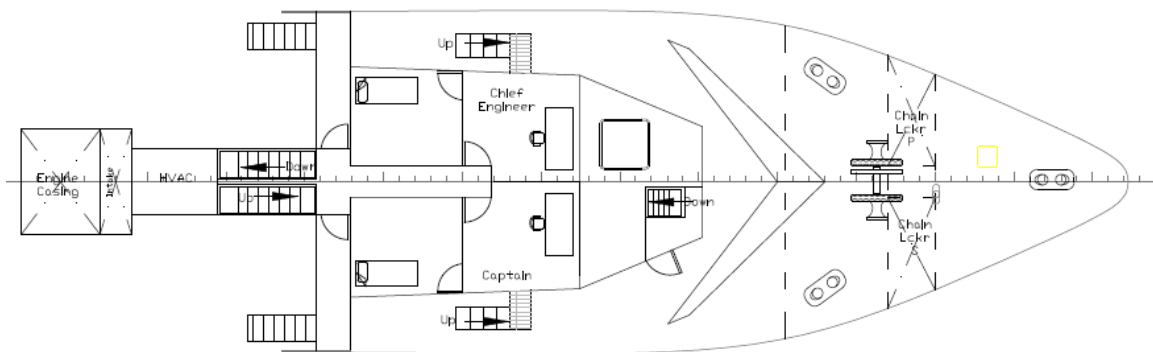
Decks:



Navigation Bridge:

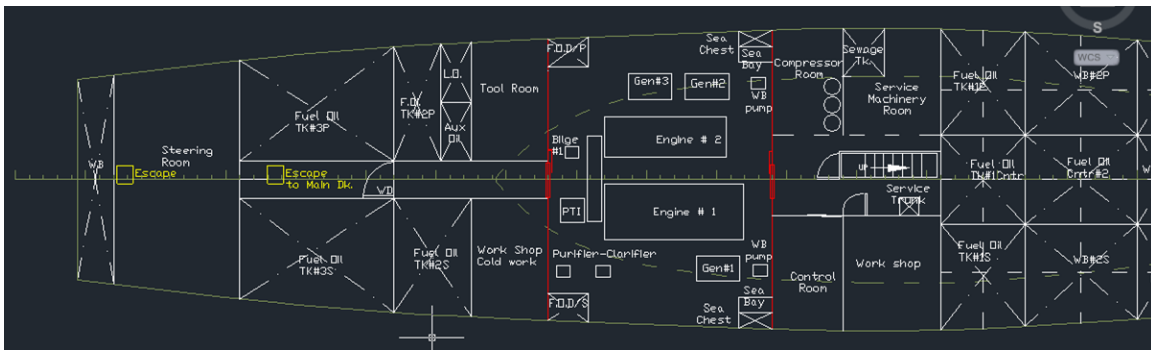
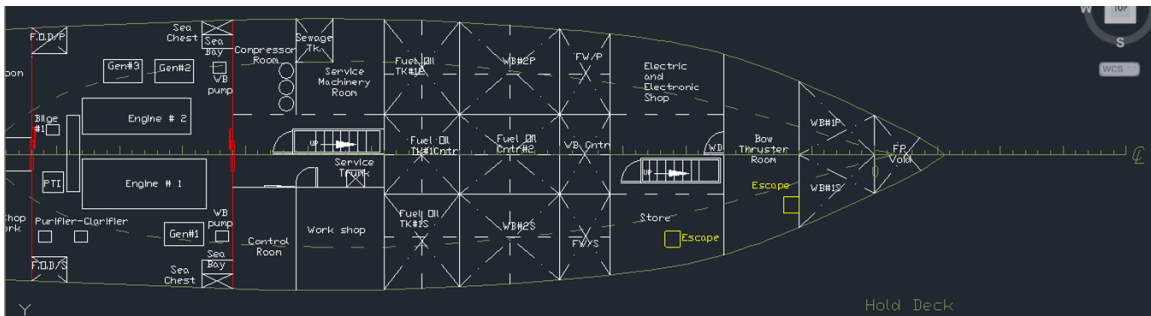
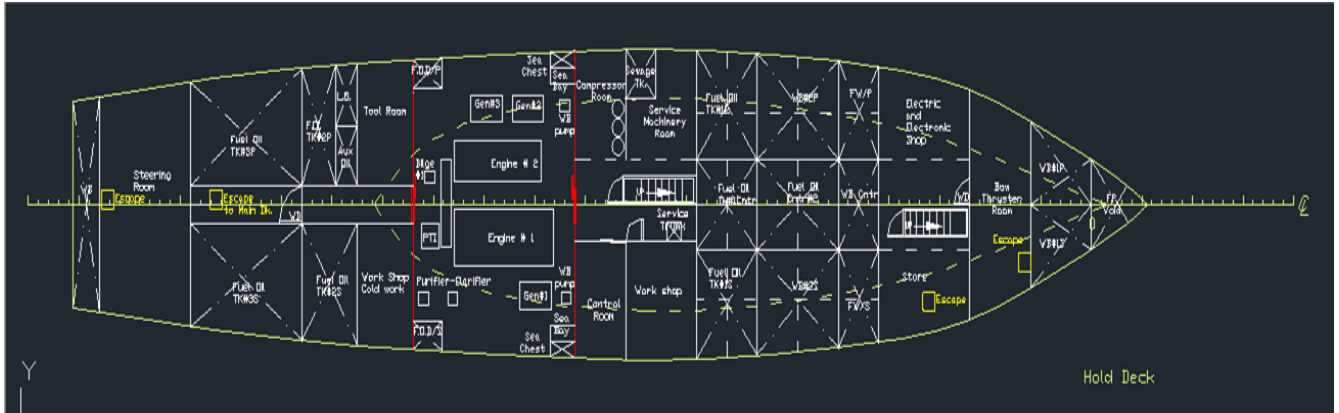


Forecastle Deck:

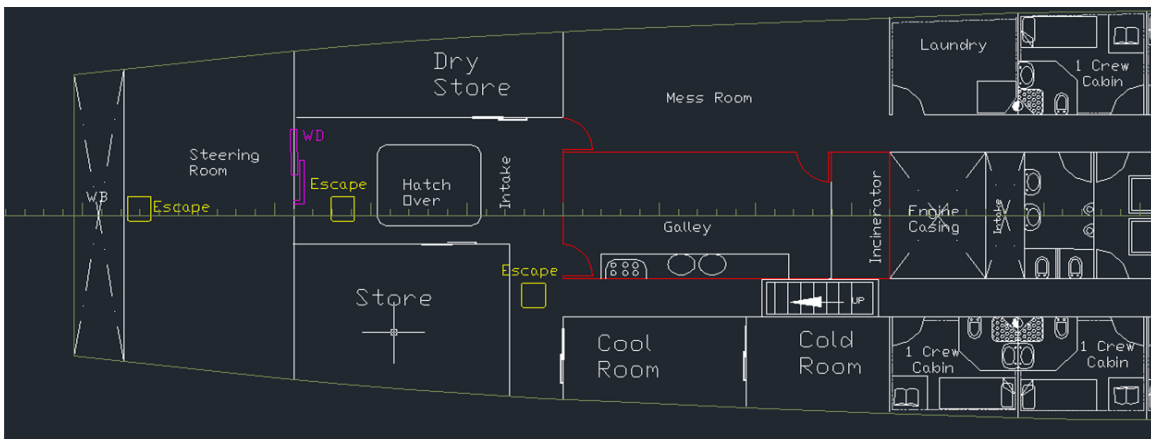
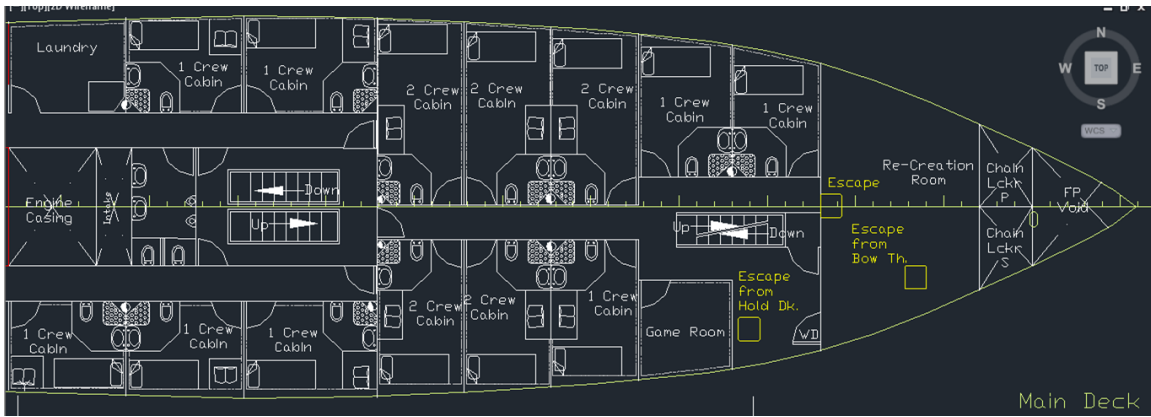
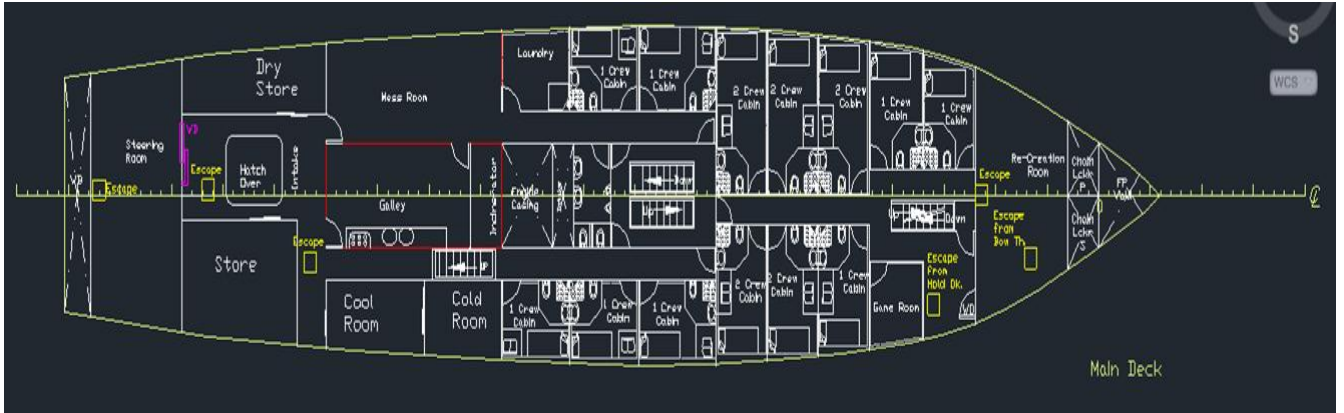


Forecastle Deck

Hold Deck:



Main Deck:



Upper Deck:

