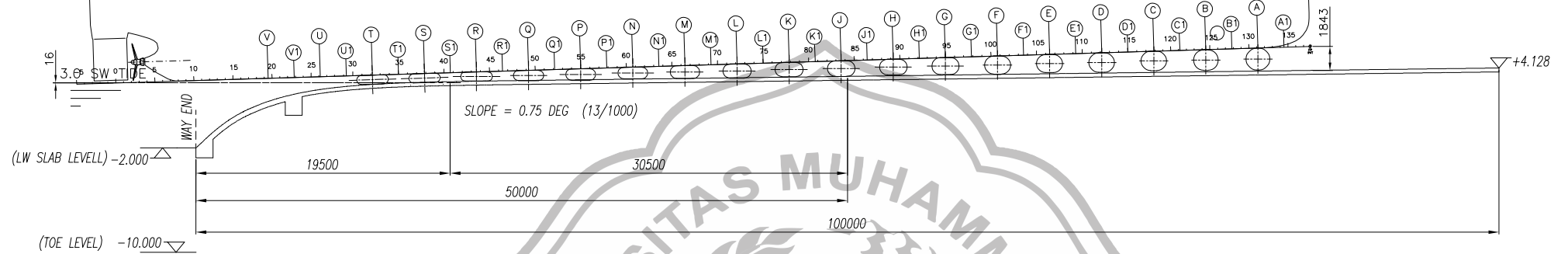


LAMPIRAN – PERHITUNGAN LAUNCHING
DAN GAMBAR POSISI KAPAL SAAT LAUNCHING

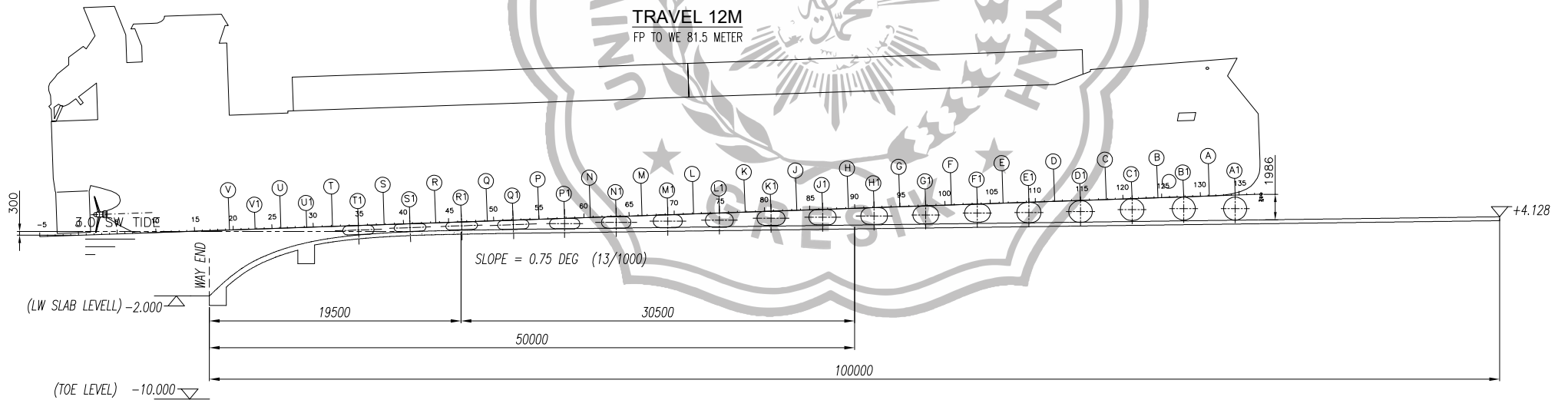
Pada halaman selanjutnya



TRAVEL 8M
 FP TO WE 85.5 METER
 SHIP START TOUCHING WATER



TRAVEL 12M
 FP TO WE 81.5 METER



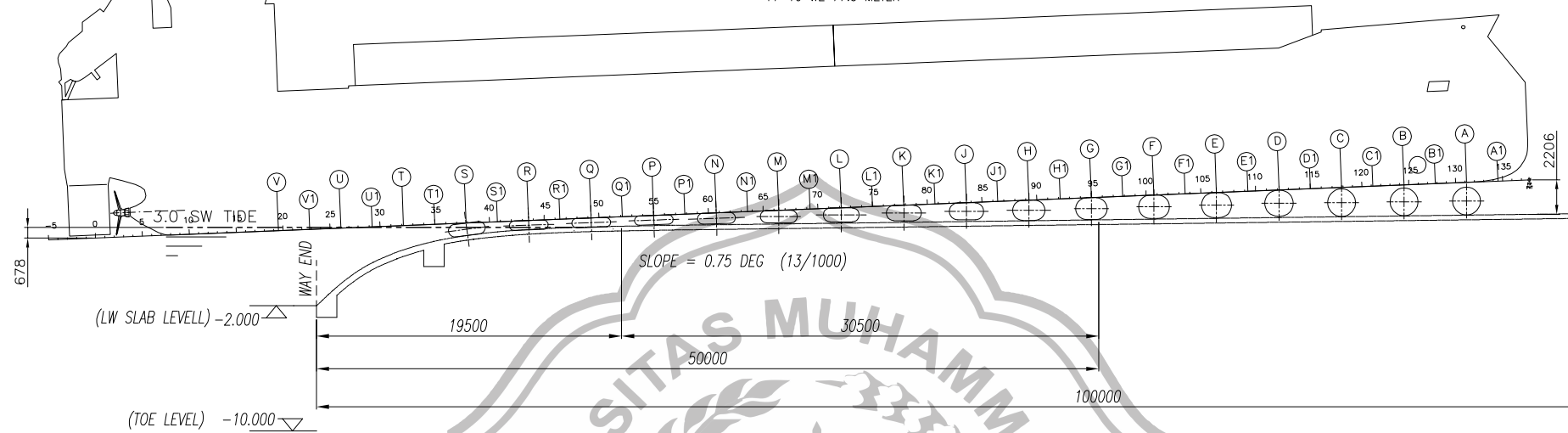
PELUNCURAN KAPAL 93.5 METER

TRAVEL : 8 METER & 12 METER

REV	DATE	BY	DESCRIPTION

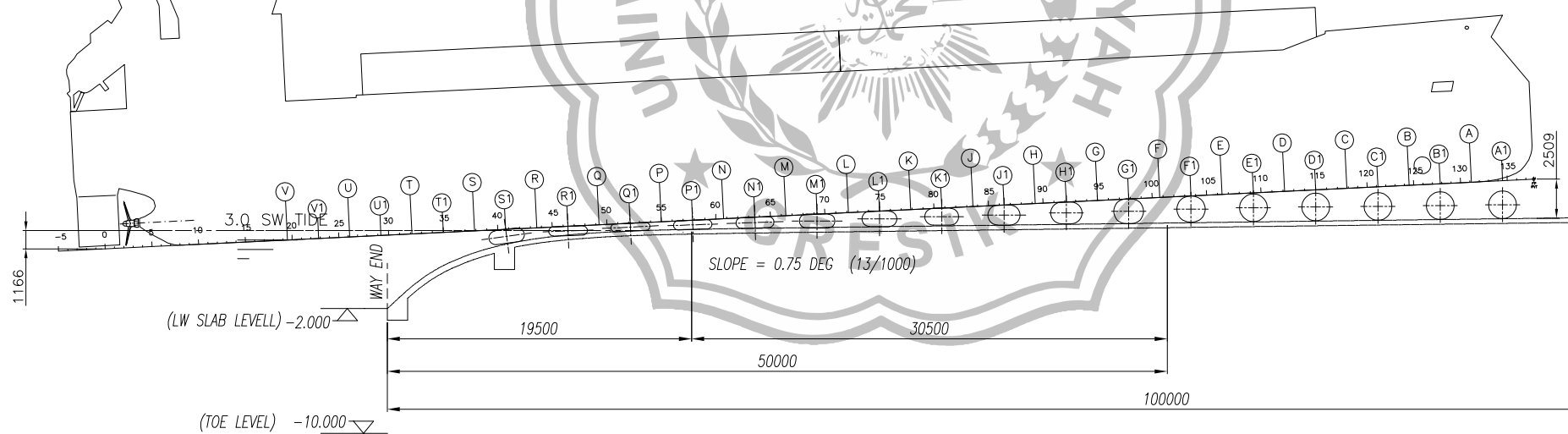
TRAVEL 16M

FP TO WE 77.5 METER



TRAVEL 20M

FP TO WE 73.5 MEJER



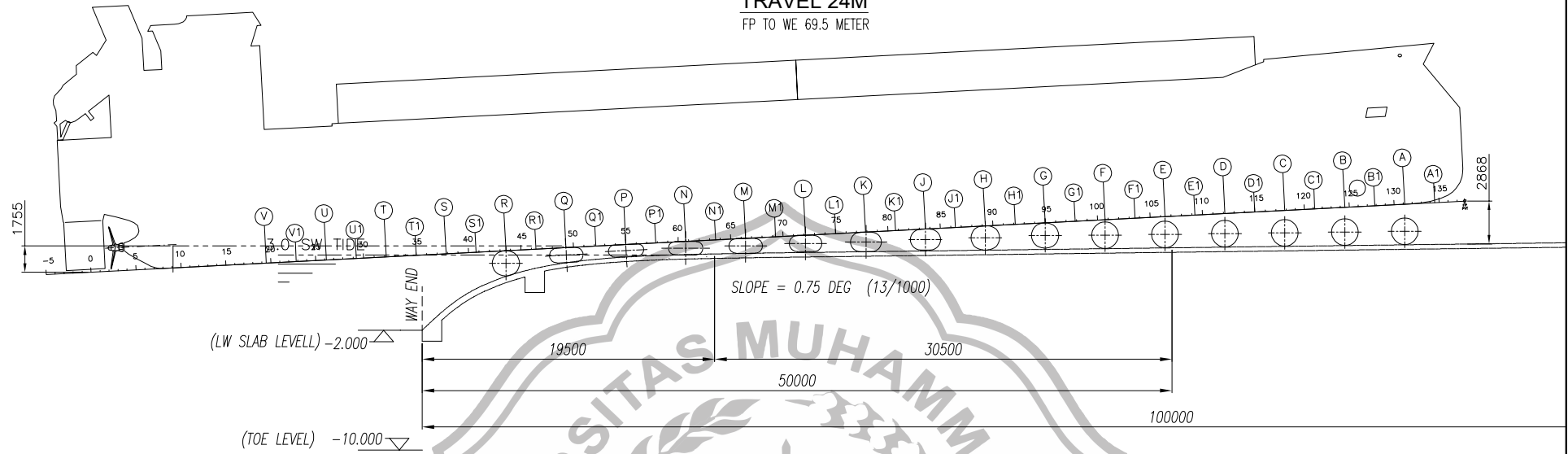
PELUNCURAN KAPAL 93.5 METER

TRAVEL : 16 METER & 20 METER

REV	DATE	BY	DESCRIPTION

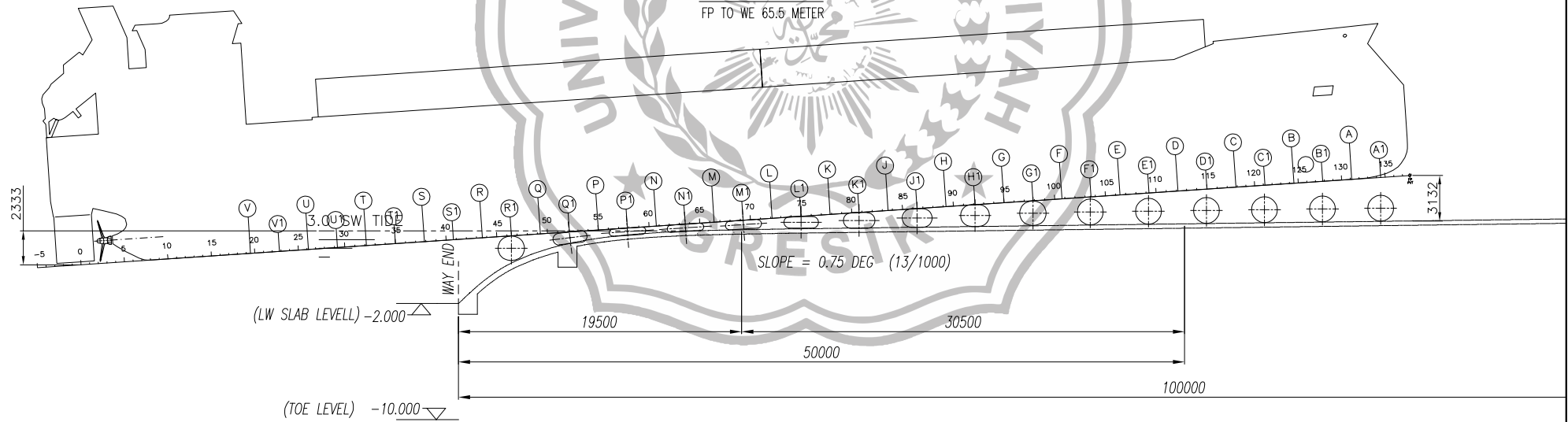
TRAVEL 24M

FP TO WE 69.5 METER



TRAVEL 28M

FP TO WE 65.5 METER



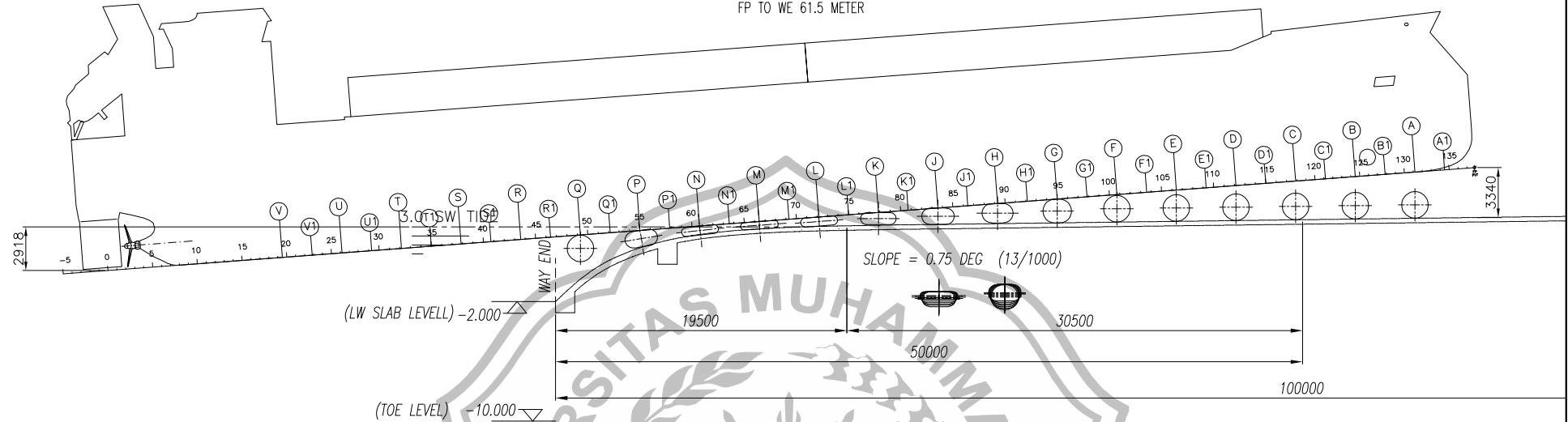
PELUNCURAN KAPAL 93.5 METER

TRAVEL : 24 METER & 28 METER

REV	DATE	BY	DESCRIPTION

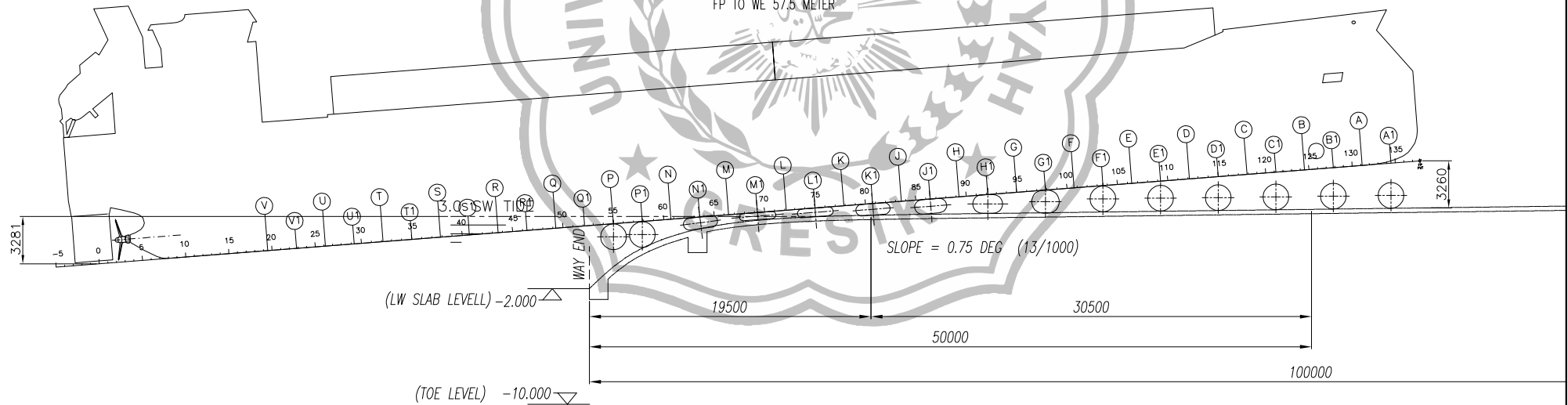
TRAVEL 32M

FP TO WE 61.5 METER



TRAVEL 36M

FP TO WE 57.5 METER

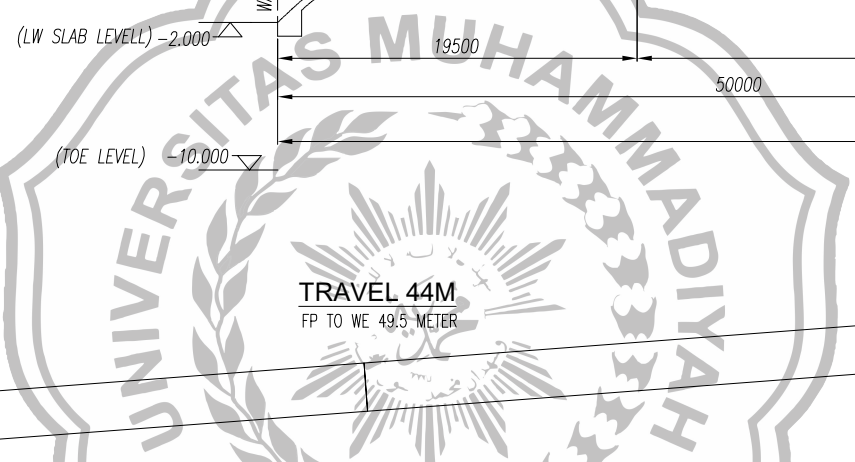


PELUNCURAN KAPAL 93.5 METER

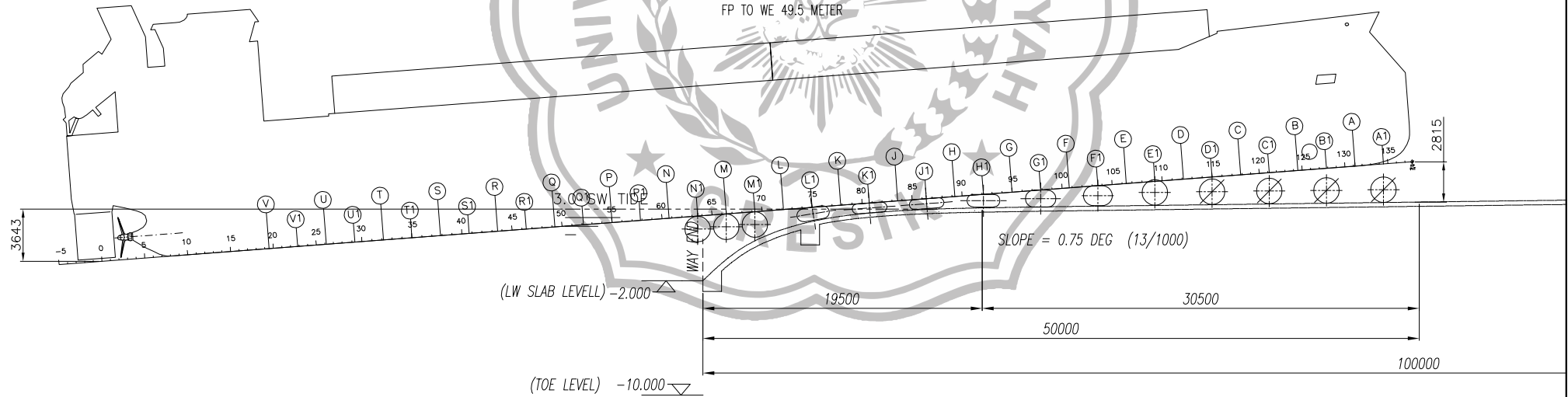
TRAVEL : 32 METER & 36 METER

REV	DATE	BY	DESCRIPTION

FP TO WE 53.5 METER
STARTING STERN LIFT



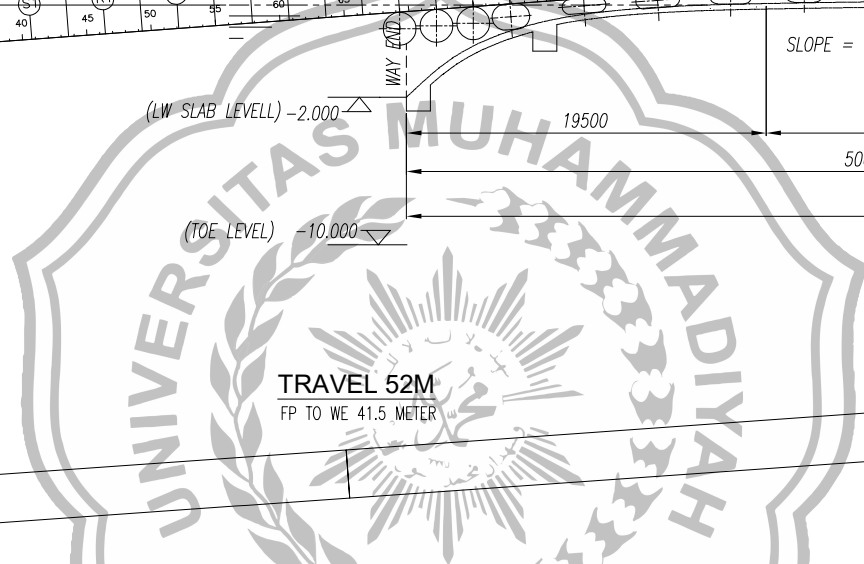
FP TO WE 49.5 METER



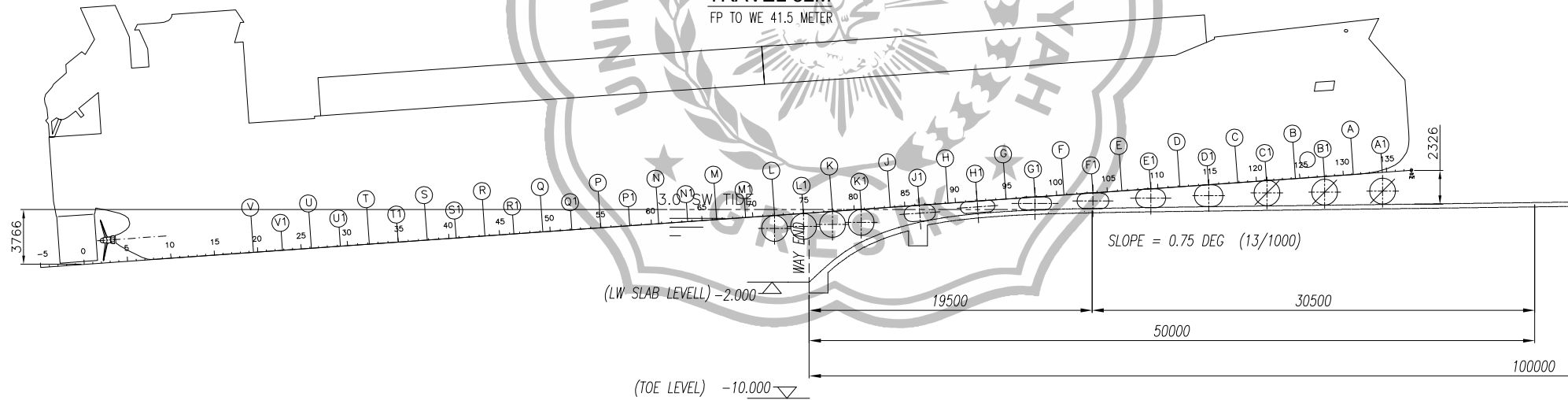
TRAVEL : 40 METER & 44 METER

REV	DATE	BY	DESCRIPTION

FP TO WE 45.5 METER



FP TO WE 41.5 METER



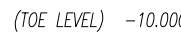
REV	DATE	BY	DESCRIPTION

TRAVEL : 48 METER & 52 METER

FP TO WE 37.5 METER



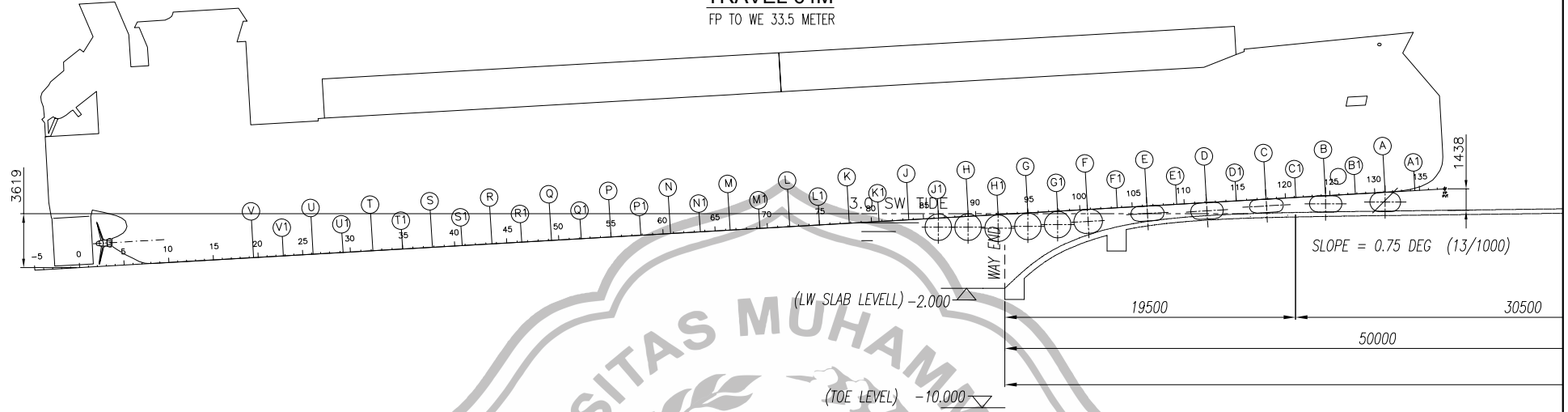
FP TO WE 33.5 METER



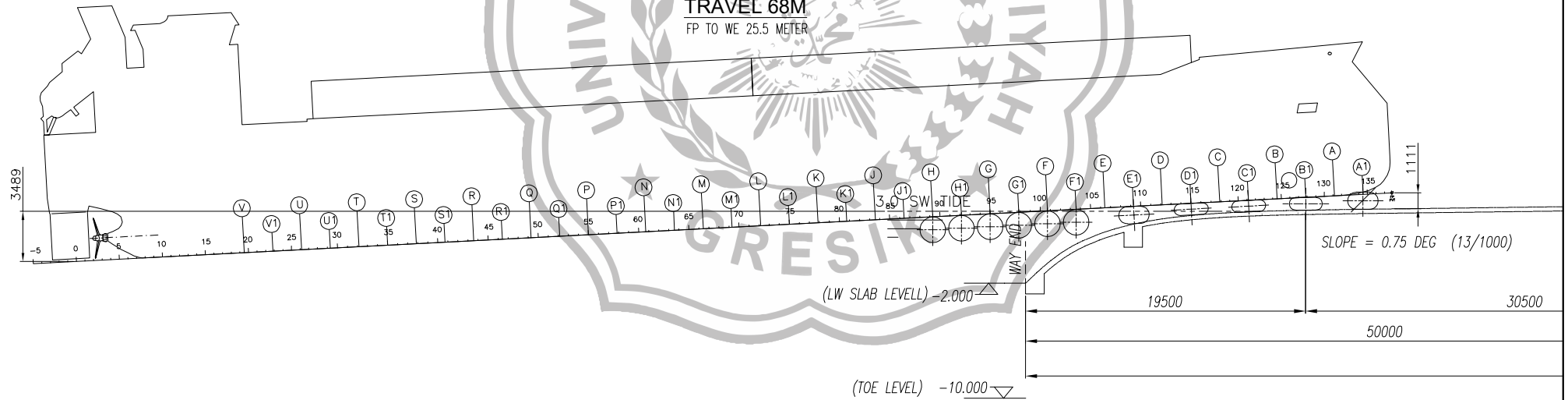
TRAVEL : 56 METER & 60 METER

REV	DATE	BY	DESCRIPTION

TRAVEL 64M
FP TO WE 33.5 METER



TRAVEL 68M
FP TO WE 25.5 METER



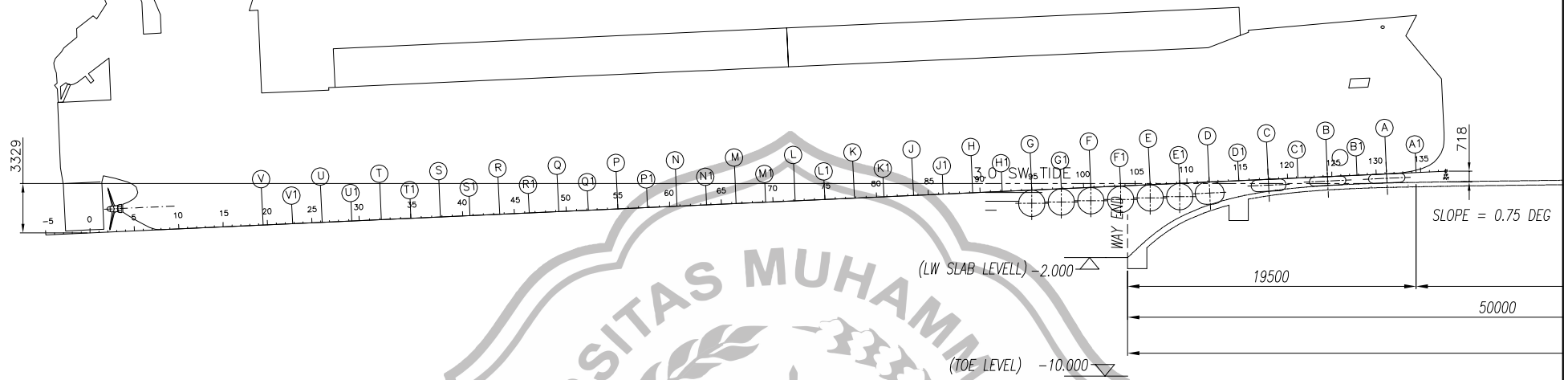
PELUNCURAN KAPAL 93.5 METER

TRAVEL : 64 METER & 68 METER

REV	DATE	BY	DESCRIPTION

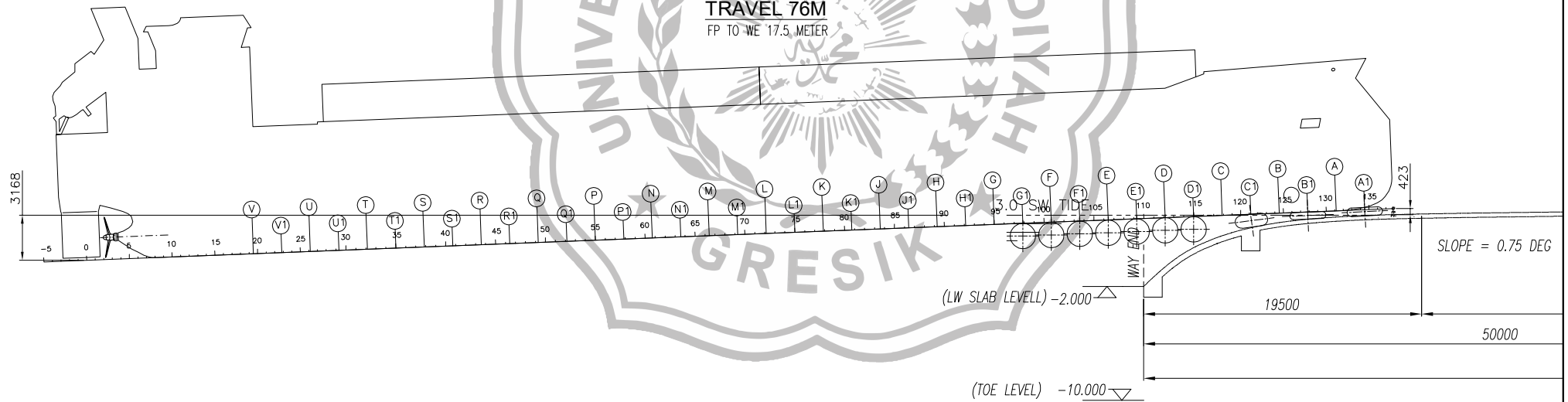
TRAVEL 72M

FP TO WE 21.5 METER



TRAVEL 76M

FP TO WE 17.5 METER

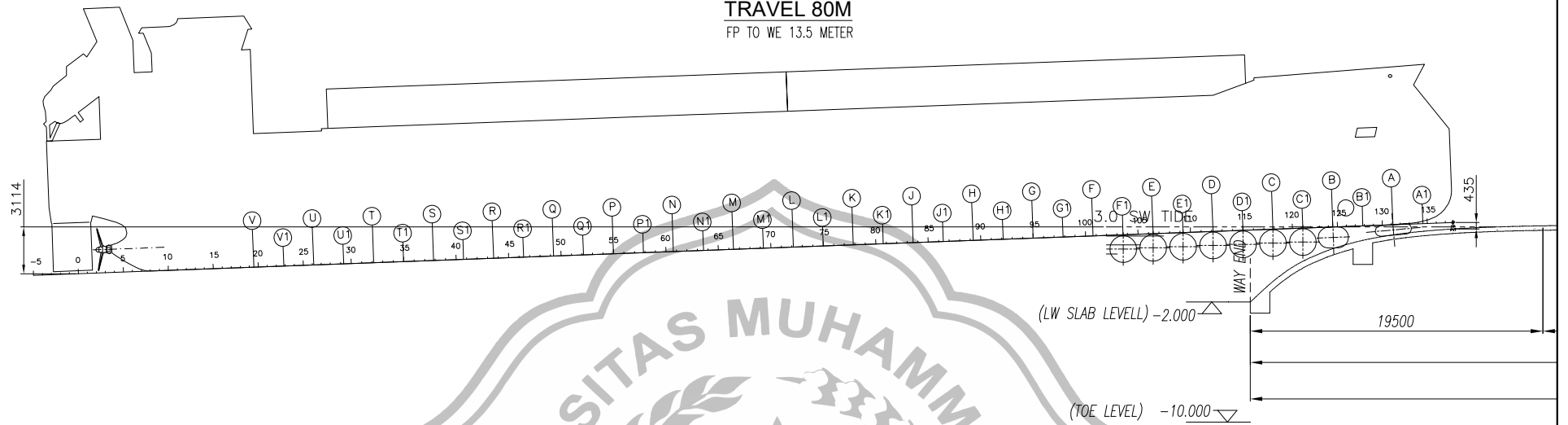


PELUNCURAN KAPAL 93.5 METER

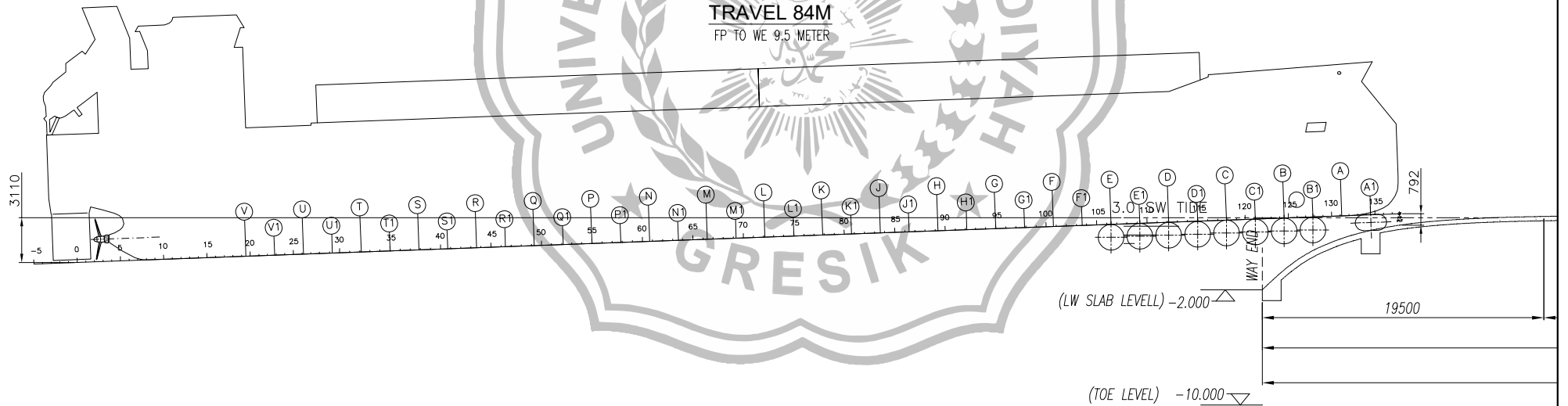
TRAVEL : 72 METER & 76 METER

REV	DATE	BY	DESCRIPTION

TRAVEL 80M
FP TO WE 13.5 METER



TRAVEL 84M
FP TO WE 9.5 METER

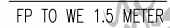


PELUNCURAN KAPAL 93.5 METER

TRAVEL : 80 METER & 84 METER

REV	DATE	BY	DESCRIPTION

FP TO WE 5.5 METER



PERHITUNGAN PELUNCURAN

PERGERAKAN SETIAP 4 METER

LAUNCHING PARTICULARS:

LPP	91.7 m
AP to FPop	91.7 meter
Fore Poppet	0.0 m from FP
Slope of Launch ways	0.013 0.74 deg
Travel Space	4.00 meter
Launching Weight	1,710 ton
LCG	38.80 meter from AP
VCG	5.1 meter above BL
Tide	3.0 meter
Way End to 0 tide	-2.0 meter

A	Issue for Final Project Review	1-Jun-25	ASB
Rev.	Description	Date	By

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	0.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton
Launch Way slope (deg)	Trim (aft)	2.472	H of keel at Fore Poppet =		1.712	Depth over way end		5.000	AP to FPop		91.7	meter
1.30% 0.74	Draft FP	-2.757	m	Draft Midship =		-1.521	Draft at AP =		-0.285	FP to way end		93.5 meter

Hydrostatics 1	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 2.0000 A00N150	-1.5	0	0	0	0	0	0	0	0	0	0
Slope (deg) 1.2497 A00N145	-1.45	0	0	0	0	0	0	0	0	0	0
	-1.521	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Hydrostatics 2	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 2.5000 A00N150	-1.5	0	0	0	0	0	0	0	0	0	0
Slope (deg) 1.5622 A00N145	-1.45	0	0	0	0	0	0	0	0	0	0
	-1.521	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Hydrostatics 3	Factor										
Slope =	Trim = 2.4724	-1.521	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00
	Slope (deg) 1.5450										

Weights & Moments	Weight	Dist FP	Moment
	t	m	t x m
Launching weight =	1710.0	52.900	90459
Buoyancy Barge =	0.0	91.700	0.0
Load on Air Bags =	1710.0	52.849	90370
(Equilibrium moment)	0.0		89

RESULT

SLOPE (deg)	
LAUNCH WAY	0.74
VESSEL KEEL	1.5450

Area Supported by Air Bag	216.827 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.096 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
1.7133
1.7493
Trim (P) -0.002
2.4724
2.4724

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 3 Rev. A UMG-TPAL-20-007	
TRAVEL		0.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		2.696%					
4 meter		0.74 1.300%		1.712 meter		7.757 meter		5.995 meter		(deg)		1.545					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	1.654	0.045	2.527	2.54	0.060	0.060	0.24	0.05	0.3	1.3	8		
B	8.0	1.8	12.0	3.485	1.599	0.046	2.510	2.54	0.060	0.060	0.33	1.15	7.1	56.5	10		
C	12.0	1.8	12.0	6.742	1.542	0.046	2.492	2.54	0.060	0.061	0.41	2.75	17.0	204.5	12		
D	16.0	1.8	12.0	9.923	1.485	0.046	2.464	2.54	0.060	0.062	0.50	4.99	31.3	501.2	14		
E	20.0	1.8	12.0	12.000	1.429	0.047	2.431	2.54	0.060	0.063	0.60	7.16	45.9	917.1	16		
F	24.0	1.8	12.0	12.000	1.372	0.048	2.399	2.54	0.060	0.064	0.68	8.11	52.6	1261.8	18		
G	28.0	1.8	12.0	12.000	1.315	0.049	2.356	2.54	0.060	0.065	0.77	9.24	61.0	1708.3	20		
H	32.0	1.8	12.0	12.000	1.259	0.050	2.307	2.54	0.060	0.066	0.86	10.37	69.9	2238.0	22		
J	36.0	1.8	12.0	12.000	1.203	0.051	2.262	2.54	0.060	0.068	0.94	11.31	77.8	2801.5	24		
K	40.0	1.8	12.0	12.000	1.146	0.052	2.203	2.54	0.060	0.069	1.04	12.44	87.9	3516.4	26		
L	44.0	1.8	12.0	12.000	1.089	0.054	2.138	2.54	0.060	0.071	1.13	13.57	98.8	4348.0	28		
M	48.0	1.8	12.0	12.000	1.032	0.055	2.079	2.54	0.060	0.073	1.21	14.51	108.7	5215.4	30		
N	52.0	1.8	12.0	12.000	0.976	0.057	2.004	2.54	0.060	0.076	1.30	15.65	121.5	6319.5	32		
P	56.0	1.8	12.0	12.000	0.919	0.060	1.923	2.54	0.060	0.079	1.40	16.78	135.8	7605.2	34		
Q	60.0	1.8	12.0	12.000	0.863	0.062	1.851	2.54	0.060	0.082	1.48	17.72	149.0	8940.4	36		
R	64.0	1.8	12.0	12.000	0.807	0.065	1.759	2.54	0.060	0.087	1.57	18.85	166.8	10672.4	38		
S	68.0	1.8	12.0	12.000	0.750	0.069	1.662	2.54	0.060	0.092	1.67	19.98	187.1	12721.7	40		
T	72.0	1.8	12.0	12.000	0.701	0.072	1.594	2.54	0.060	0.096	1.73	20.73	202.4	14573.3	42		
U	76.0	1.8	12.0	6.462	0.672	0.074	1.542	2.54	0.060	0.076	1.77	11.47	89.1	6768.0	44		
								Max Pressure =		0.096	Total	216.8	1710.0	90370.4			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	4.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton
Launch Way slope (deg)	Trim (aft)	2.520	H of keel at Fore Poppet =		1.728	Depth over way end		5.000	AP to FPop	91.7	meter	
1.300% 0.74	Draft FP	-2.723	m	Draft Midship =	-1.463	Draft at AP =		-0.203	FP to way end	89.5	meter	

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	2.5000 A00N150	-1.5	0	0	0	0	0	0	0	0	0	0
Slope (deg)	1.5622 A00N145	-1.45	0	0	0	0	0	0	0	0	0	0
		-1.463	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.0000 A00N150	-1.5	0	0	0	0	0	0	0	0	0	0
Slope (deg)	1.8748 A00N145	-1.45	0	0	0	0	0	0	0	0	0	0
		-1.463	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	2.5200	-1.463	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
	Slope (deg)	1.5747											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		0.0	91.700	0.0
Load on Air Bags =		1713.1	52.786	90431
(Equilibrium moment)		-3.1		28

RESULT

SLOPE (deg)	
LAUNCH WAY	0.74
VESSEL KEEL	1.5747

Area Supported by Air Bag	215.069 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.094 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
1.729
1.728
Trim (P) -0.001
2.521
2.52

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 5 Rev. A UMG-TPAL-20-007	
TRAVEL		4.00 m													
Air Bag															
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 1.728 meter		H of FPop over WE 7.723 meter		Position A1 above WE 5.969 meter		Vessel Slope (deg) 2.748% 1.575					
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data
A1	2.0	1.8	12.0	0.150	1.699	0.045	2.535	2.54	0.060	0.060	0.17	0.03	0.2	0.3	7
B1	6.0	1.8	12.0	1.857	1.640	0.045	2.525	2.54	0.060	0.060	0.25	0.47	2.9	17.1	9
C1	10.0	1.8	12.0	5.114	1.582	0.046	2.507	2.54	0.060	0.060	0.35	1.77	10.9	108.8	11
D1	14.0	1.8	12.0	8.363	1.523	0.046	2.483	2.54	0.060	0.061	0.44	3.68	22.9	320.4	13
E1	18.0	1.8	12.0	11.182	1.464	0.047	2.454	2.54	0.060	0.062	0.53	5.97	37.8	680.1	15
F1	22.0	1.8	12.0	12.000	1.405	0.047	2.419	2.54	0.060	0.063	0.63	7.54	48.5	1067.2	17
G1	26.0	1.8	12.0	12.000	1.347	0.048	2.378	2.54	0.060	0.064	0.72	8.67	56.7	1475.2	19
H1	30.0	1.8	12.0	12.000	1.289	0.049	2.332	2.54	0.060	0.065	0.82	9.80	65.4	1962.3	21
J1	34.0	1.8	12.0	12.000	1.230	0.050	2.280	2.54	0.060	0.067	0.91	10.93	74.6	2536.9	23
K1	38.0	1.8	12.0	12.000	1.172	0.051	2.233	2.54	0.060	0.068	0.99	11.88	82.8	3145.3	25
L1	42.0	1.8	12.0	12.000	1.113	0.053	2.171	2.54	0.060	0.070	1.08	13.01	93.3	3916.6	27
M1	46.0	1.8	12.0	12.000	1.054	0.054	2.103	2.54	0.060	0.073	1.18	14.14	104.6	4813.0	29
N1	50.0	1.8	12.0	12.000	0.995	0.056	2.029	2.54	0.060	0.075	1.27	15.27	117.1	5854.7	31
P1	54.0	1.8	12.0	12.000	0.937	0.059	1.950	2.54	0.060	0.078	1.37	16.40	130.9	7067.2	33
Q1	58.0	1.8	12.0	12.000	0.878	0.061	1.865	2.54	0.060	0.082	1.46	17.53	146.3	8483.2	35
R1	62.0	1.8	12.0	12.000	0.819	0.065	1.775	2.54	0.060	0.086	1.56	18.66	163.6	10145.3	37
S1	66.0	1.8	12.0	12.000	0.761	0.068	1.695	2.54	0.060	0.090	1.63	19.60	180.0	11878.8	39
T1	70.0	1.8	12.0	12.000	0.720	0.070	1.629	2.54	0.060	0.094	1.70	20.36	194.5	13618.4	41
U1	74.0	1.8	12.0	11.421	0.720	0.070	1.629	2.54	0.060	0.091	1.70	19.38	180.3	13339.9	43
Max Pressure =								0.094		Total		215.1 1713.1		90430.6	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	8.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	2.802	H of keel at Fore Poppet =	1.843	Depth over way end	5.000	AP to FPop	91.7	meter
1.30% 0.74	Draft FP	-2.786	Draft Midship =	-1.385	Draft at AP =	0.016	FP to way end	85.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	2.5000 A25N135	-1.35	0	0	0	0	0	0	0	0	0	0
Slope (deg)	1.5622 A25N140	-1.4	0	0	0	0	0	0	0	0	0	0
		-1.385	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.0000 A30N135	-1.35	0	0	0	0	0	0	0	0	0	0
Slope (deg)	1.8748 A30N140	-1.4	0	0	0	0	0	0	0	0	0	0
		-1.385	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	2.8020	-1.385	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
	Slope (deg)	1.7510											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		0.0	91.700	0.0
Load on Air Bags =		1711.3	52.880	90492
(Equilibrium moment)		-1.3		-33

RESULT

SLOPE (deg)	
LAUNCH WAY	0.74
VESSEL KEEL	1.7510

Area Supported by Air Bag	216.269 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.099 Mpa

AIR BAG PRESSURE

- O K -

Weight (L)	Trim (P)
0.001	0.001
1.842	2.801
1.843	2.802

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 7 Rev. A UMG-TPAL-20-007	
TRAVEL		8.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		3.055%					
4 meter		0.74 1.300%		1.843 meter		7.786 meter		5.892 meter		(deg)		1.751					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	1.772	0.045	2.544	2.54	0.060	0.060	0.05	0.01	0.1	0.3	8		
B	8.0	1.8	12.0	3.485	1.701	0.045	2.537	2.54	0.060	0.060	0.16	0.55	3.4	26.8	10		
C	12.0	1.8	12.0	6.742	1.630	0.045	2.522	2.54	0.060	0.060	0.27	1.80	11.1	132.8	12		
D	16.0	1.8	12.0	9.923	1.559	0.046	2.496	2.54	0.060	0.061	0.39	3.90	24.2	387.5	14		
E	20.0	1.8	12.0	12.000	1.488	0.046	2.464	2.54	0.060	0.062	0.50	6.03	38.1	761.9	16		
F	24.0	1.8	12.0	12.000	1.417	0.047	2.425	2.54	0.060	0.063	0.61	7.35	47.2	1132.2	18		
G	28.0	1.8	12.0	12.000	1.346	0.048	2.378	2.54	0.060	0.064	0.72	8.67	56.7	1588.7	20		
H	32.0	1.8	12.0	12.000	1.275	0.049	2.324	2.54	0.060	0.066	0.83	9.99	66.9	2140.9	22		
J	36.0	1.8	12.0	12.000	1.204	0.051	2.262	2.54	0.060	0.068	0.94	11.31	77.8	2801.5	24		
K	40.0	1.8	12.0	12.000	1.133	0.052	2.192	2.54	0.060	0.070	1.05	12.63	89.7	3586.6	26		
L	44.0	1.8	12.0	12.000	1.063	0.054	2.115	2.54	0.060	0.072	1.16	13.95	102.7	4517.2	28		
M	48.0	1.8	12.0	12.000	0.991	0.056	2.029	2.54	0.060	0.075	1.27	15.27	117.1	5620.6	30		
N	52.0	1.8	12.0	12.000	0.920	0.059	1.936	2.54	0.060	0.079	1.38	16.59	133.3	6932.5	32		
P	56.0	1.8	12.0	12.000	0.850	0.063	1.821	2.54	0.060	0.084	1.51	18.10	154.7	8661.6	34		
Q	60.0	1.8	12.0	12.000	0.779	0.067	1.711	2.54	0.060	0.089	1.62	19.42	176.6	10593.5	36		
R	64.0	1.8	12.0	12.000	0.715	0.071	1.612	2.54	0.060	0.095	1.71	20.55	198.4	12699.3	38		
S	68.0	1.8	12.0	12.000	0.672	0.074	1.542	2.54	0.060	0.099	1.77	21.30	215.0	14620.9	40		
T	72.0	1.8	12.0	12.000	0.718	0.071	1.612	2.54	0.060	0.095	1.71	20.55	198.4	14286.7	42		
U	76.0	1.8	12.0	6.462	0.989	0.057	2.017	2.54	0.000	0.000	1.29	8.32	0.0	0.0	44		
								Max Pressure =		0.099		Total		216.3 1711.3 90491.5			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	12.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	3.179	H of keel at Fore Poppet =	1.986	Depth over way end	5.000	AP to FPop	91.7	meter
1.300%	0.74		Draft FP	-2.878	m	Draft Midship =	-1.289	Draft at AP =	0.300
								FP to way end	81.5
									meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)	
Trim =	3.0000	A30N125	-1.25	0.123	5.198	2.4	3.436	5.711	0.038	2.673	84.977	0.035	0.001
Slope (deg)	1.8748	A30N130	-1.3	0.011	4.306	1.017	1.169	4.678	0.026	5.407	306.684	0.012	0
			-1.289	0.0	4.50	1.3	1.7	4.91	0.03	4.81	257.91	0.02	0.00

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)	
Trim =	3.5000	A35N125	-1.25	2.58	7.609	22.719	21.645	9.14	0.105	4.918	66.628	0.222	0.019
Slope (deg)	2.1874	A35N130	-1.3	1.651	7.029	14.496	15.44	8.225	0.088	3.515	56.926	0.158	0.01
			-1.289	1.9	7.16	16.3	16.8	8.43	0.09	3.82	59.06	0.17	0.01

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	3.1790	-1.289	0.7	5.45	6.7	7.1	6.17	0.05	4.45	186.72	0.07	0.00
	Slope (deg)	1.9867											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		0.7	86.247	59.3
Load on Air Bags =		1714.5	52.712	90373
(Equilibrium moment)		-5.2		27

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	1.9867

Area Supported by Air Bag	211.066 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.105 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.0005
Trim (P) 0.001
1.986 3.179
1.9867 3.179

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TRAVEL		12.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		3.466%					
4 meter		0.74 1.300%		1.986 meter		7.878 meter		5.866 meter		(deg)		1.987					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	1.943	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	1.855	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	1.768	0.045	2.543	2.54	0.060	0.060	0.06	0.32	2.0	19.7	11		
D1	14.0	1.8	12.0	8.363	1.680	0.045	2.533	2.54	0.060	0.060	0.19	1.58	9.7	135.4	13		
E1	18.0	1.8	12.0	11.182	1.593	0.046	2.510	2.54	0.060	0.061	0.33	3.69	22.8	411.3	15		
F1	22.0	1.8	12.0	12.000	1.506	0.046	2.474	2.54	0.060	0.062	0.47	5.65	35.6	782.6	17		
G1	26.0	1.8	12.0	12.000	1.418	0.047	2.425	2.54	0.060	0.063	0.61	7.35	47.2	1226.6	19		
H1	30.0	1.8	12.0	12.000	1.331	0.048	2.371	2.54	0.060	0.064	0.74	8.86	58.1	1744.5	21		
J1	34.0	1.8	12.0	12.000	1.244	0.050	2.298	2.54	0.060	0.066	0.88	10.56	71.5	2430.3	23		
K1	38.0	1.8	12.0	12.000	1.156	0.052	2.213	2.54	0.060	0.069	1.02	12.25	86.2	3274.6	25		
L1	42.0	1.8	12.0	12.000	1.068	0.054	2.115	2.54	0.060	0.072	1.16	13.95	102.7	4311.9	27		
M1	46.0	1.8	12.0	12.000	0.982	0.057	2.017	2.54	0.060	0.076	1.29	15.46	119.3	5487.5	29		
N1	50.0	1.8	12.0	12.000	0.894	0.060	1.894	2.54	0.060	0.081	1.43	17.15	140.9	7046.6	31		
P1	54.0	1.8	12.0	12.000	0.806	0.065	1.759	2.54	0.060	0.087	1.57	18.85	166.8	9004.8	33		
Q1	58.0	1.8	12.0	12.000	0.720	0.071	1.612	2.54	0.060	0.095	1.71	20.55	198.4	11508.7	35		
R1	62.0	1.8	12.0	12.000	0.650	0.076	1.506	2.54	0.060	0.101	1.81	21.68	224.0	13889.4	37		
S1	66.0	1.8	12.0	12.000	0.621	0.079	1.451	2.54	0.060	0.105	1.85	22.24	238.6	15745.1	39		
T1	70.0	1.8	12.0	12.000	0.740	0.070	1.645	2.54	0.060	0.093	1.68	20.17	190.8	13353.8	41		
U1	74.0	1.8	12.0	11.421	1.202	0.051	2.262	2.54	0.000	0.000	0.94	10.76	0.0	0.0	43		
								Max Pressure =		0.105		Total		211.1		1714.5 90372.9	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL 16.00 m	Tide = 3.00 m	LCG 38.80 m frm AP	L Weight 1710 ton
Launch Way slope (deg)	Trim (aft) 3.725	H of keel at Fore Poppet = 2.206	Depth over way end 5.000	AP to FPop 91.7 meter
1.30% 0.74	Draft FP -3.047 m	Draft Midship = -1.185	Draft at AP = 0.678	FP to way end 77.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 3.5000	A35N115	-1.15	5.661	9.029	42.79	40.879	11.255	0.129	12.966	85.316	0.419	0.053
Slope (deg) 2.1874	A35N120	-1.2	3.897	8.297	28.929	29.305	10.073	0.117	6.963	72.981	0.3	0.031
		-1.185	4.4	8.52	33.2	32.9	10.44	0.12	8.82	76.80	0.34	0.04

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 4.0000	A40N115	-1.15	18.281	11.589	97.861	97.888	14.342	0.179	41.912	87.909	1.003	0.175
Slope (deg) 2.5001	A40N120	-1.2	13.716	10.795	83.755	79.444	13.536	0.171	35.031	87.446	0.814	0.131
		-1.185	15.1	11.04	88.1	85.2	13.79	0.17	37.16	87.59	0.87	0.14

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim = 3.7250		-1.185	9.3	9.66	57.9	56.4	11.95	0.14	21.58	81.66	0.58	0.09
	Slope (deg) 2.3281												

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		9.3	82.043	759.2
Load on Air Bags =		1703.1	52.605	89589
(Equilibrium moment)		-2.3		111

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	2.3281

Area Supported by Air Bag	193.454 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.113 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.001
2.205
2.206
Trim (R) 0.001
3.724
3.725

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TRAVEL		16.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		4.061%					
4 meter		0.74 1.300%		2.206 meter		8.047 meter		5.789 meter		(deg)		2.328					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m ²)	(m ²)	(MPa)	(MPa)	(m)	(m ²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	2.096	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	8		
B	8.0	1.8	12.0	3.485	1.984	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	10		
C	12.0	1.8	12.0	6.742	1.873	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	12		
D	16.0	1.8	12.0	9.923	1.761	0.045	2.543	2.54	0.060	0.060	0.06	0.62	3.8	61.0	14		
E	20.0	1.8	12.0	12.000	1.651	0.045	2.527	2.54	0.060	0.060	0.24	2.83	17.4	348.3	16		
F	24.0	1.8	12.0	12.000	1.539	0.046	2.487	2.54	0.060	0.061	0.42	5.09	31.8	764.3	18		
G	28.0	1.8	12.0	12.000	1.428	0.047	2.431	2.54	0.060	0.063	0.60	7.16	45.9	1283.9	20		
H	32.0	1.8	12.0	12.000	1.316	0.049	2.356	2.54	0.060	0.065	0.77	9.24	61.0	1952.4	22		
J	36.0	1.8	12.0	12.000	1.206	0.051	2.262	2.54	0.060	0.068	0.94	11.31	77.8	2801.5	24		
K	40.0	1.8	12.0	12.000	1.094	0.053	2.149	2.54	0.060	0.071	1.12	13.38	96.9	3877.5	26		
L	44.0	1.8	12.0	12.000	0.983	0.057	2.017	2.54	0.060	0.076	1.29	15.46	119.3	5248.9	28		
M	48.0	1.8	12.0	12.000	0.872	0.061	1.865	2.54	0.060	0.082	1.46	17.53	146.3	7020.5	30		
N	52.0	1.8	12.0	12.000	0.761	0.068	1.695	2.54	0.060	0.090	1.63	19.60	180.0	9359.1	32		
P	56.0	1.8	12.0	12.000	0.657	0.076	1.506	2.54	0.060	0.101	1.81	21.68	224.0	12545.2	34		
Q	60.0	1.8	12.0	12.000	0.574	0.084	1.356	2.54	0.060	0.113	1.93	23.18	266.0	15961.3	36		
R	64.0	1.8	12.0	12.000	0.579	0.084	1.356	2.54	0.060	0.113	1.93	23.18	266.0	17025.3	38		
S	68.0	1.8	12.0	12.000	0.810	0.065	1.759	2.54	0.060	0.087	1.57	18.85	166.8	11339.4	40		
T	72.0	1.8	12.0	12.000	1.572	0.046	2.503	2.54	0.000	0.000	0.36	4.34	0.0	0.0	42		
U	76.0	1.8	12.0	6.462	3.594	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44		
								Max Pressure =		0.113	Total	193.5	1703.1	89588.5			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	20.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	4.465	H of keel at Fore Poppet =	2.509	Depth over way end	5.000	AP to FPop	91.7	meter
1.300%	0.74	Draft FP	-3.298	m	Draft Midship =	-1.066	Draft at AP =	1.166	FP to way end
								73.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	4.0000 A40N105	-1.05	30.295	12.976	128.532	135.73	15.699	0.201	45.286	88.25	1.391	0.291
Slope (deg)	2.5001 A40N110	-1.1	23.771	12.305	115.533	115.703	14.998	0.189	44.256	86.549	1.186	0.224
		-1.066	28.2	12.76	124.4	129.3	15.47	0.20	44.96	87.71	1.33	0.27

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	4.5000 A45N105	-1.05	56.73	14.223	195.091	183.802	16.988	0.266	39.068	81.591	1.884	0.503
Slope (deg)	2.8128 A45N110	-1.1	47.838	13.775	177.544	174.773	16.806	0.251	42.509	88.454	1.791	0.46
		-1.066	53.9	14.08	189.5	180.9	16.93	0.26	40.17	83.79	1.85	0.49

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	4.4650	-1.066	52.1	13.99	184.9	177.3	16.83	0.26	40.50	84.06	1.82	0.47
	Slope (deg)	2.7909											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		52.1	77.713	4047.8
Load on Air Bags =		1660.6	51.993	86340
(Equilibrium moment)		-2.7		71

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	2.7909

Area Supported by Air Bag	174.924 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.125 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.0005
Trim (P) 0.001
2.509
2.5005
4.465
4.465

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 13 Rev. A UMG-TPAL-20-007	
TRAVEL		20.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		4.867%					
4 meter		0.74 1.300%		2.509 meter		8.298 meter		5.764 meter		(deg)		2.791					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	2.437	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	2.293	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	2.151	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	11		
D1	14.0	1.8	12.0	8.363	2.007	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	13		
E1	18.0	1.8	12.0	11.182	1.863	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	15		
F1	22.0	1.8	12.0	12.000	1.720	0.045	2.540	2.54	0.060	0.060	0.13	1.51	9.2	203.3	17		
G1	26.0	1.8	12.0	12.000	1.577	0.046	2.503	2.54	0.060	0.061	0.36	4.34	27.0	700.9	19		
H1	30.0	1.8	12.0	12.000	1.433	0.047	2.437	2.54	0.060	0.063	0.58	6.97	44.5	1336.2	21		
J1	34.0	1.8	12.0	12.000	1.289	0.049	2.332	2.54	0.060	0.065	0.82	9.80	65.4	2223.9	23		
K1	38.0	1.8	12.0	12.000	1.146	0.052	2.203	2.54	0.060	0.069	1.04	12.44	87.9	3340.5	25		
L1	42.0	1.8	12.0	12.000	1.002	0.056	2.042	2.54	0.060	0.075	1.26	15.08	114.9	4827.2	27		
M1	46.0	1.8	12.0	12.000	0.859	0.062	1.836	2.54	0.060	0.083	1.49	17.91	151.8	6983.3	29		
N1	50.0	1.8	12.0	12.000	0.716	0.071	1.612	2.54	0.060	0.095	1.71	20.55	198.4	9921.3	31		
P1	54.0	1.8	12.0	12.000	0.590	0.082	1.395	2.54	0.060	0.109	1.90	22.81	254.5	13743.2	33		
Q1	58.0	1.8	12.0	12.000	0.505	0.094	1.217	2.54	0.060	0.125	2.04	24.50	313.3	18170.5	35		
R1	62.0	1.8	12.0	12.000	0.568	0.086	1.337	2.54	0.060	0.114	1.95	23.37	272.1	16868.6	37		
S1	66.0	1.8	12.0	12.000	0.974	0.057	2.004	2.54	0.060	0.076	1.30	15.65	121.5	8020.9	39		
T1	70.0	1.8	12.0	12.000	2.179	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	3.695	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.125	Total	174.9	1660.6	86339.8			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	24.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	5.361	H of keel at Fore Poppet =	2.868	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74	Draft FP	-3.606	m	Draft Midship =	-0.926	Draft at AP =	1.755	FP to way end 69.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	5.0000 A50N090	-0.9	126.981	16.099	280.144	268.573	19.164	0.386	30.259	83.427	2.753	1.15
Slope (deg)	3.1256 A50N095	-0.95	113.575	15.76	270.763	252.502	18.708	0.369	31.205	80.349	2.588	0.991
		-0.926	120.1	15.93	275.4	260.4	18.93	0.38	30.74	81.86	2.67	1.07

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	5.5000 A55N090	-0.9	169.015	16.561	318.529	301.083	19.867	0.461	26.679	82.605	3.086	1.514
Slope (deg)	3.4386 A55N095	-0.95	153.963	16.258	307.14	285.14	19.408	0.444	27.333	78.963	2.923	1.318
		-0.926	161.3	16.41	312.7	293.0	19.63	0.45	27.01	80.75	3.00	1.41

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	5.3610	-0.926	149.9	16.27	302.3	283.9	19.44	0.43	28.05	81.06	2.91	1.32
	Slope (deg)	3.3516											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		149.9	75.427	11305.5
Load on Air Bags =		1564.9	50.620	79215
(Equilibrium moment)		-4.8		-61

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSSEL KEEL
0.74	3.3516

Area Supported by Air Bag	157.205 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.135 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.0005
Trim (P) 0.0005
2.8675
5.3605
-0.926
5.361

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 15 Rev. A UMG-TPAL-20-007	
TRAVEL		24.00 m													
Air Bag															
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 2.868 meter		H of FPop over WE 8.606 meter		Position A above WE 5.687 meter		Vessel Slope (deg) 5.843% 3.352					
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data
A	4	1.8	12.0	0.228	2.685	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	8
B	8.0	1.8	12.0	3.485	2.502	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	10
C	12.0	1.8	12.0	6.742	2.320	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	12
D	16.0	1.8	12.0	9.923	2.138	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	14
E	20.0	1.8	12.0	12.000	1.955	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	16
F	24.0	1.8	12.0	12.000	1.772	0.045	2.544	2.54	0.060	0.060	0.05	0.57	3.5	83.0	18
G	28.0	1.8	12.0	12.000	1.590	0.046	2.510	2.54	0.060	0.061	0.33	3.96	24.5	687.2	20
H	32.0	1.8	12.0	12.000	1.407	0.047	2.419	2.54	0.060	0.063	0.63	7.54	48.5	1552.3	22
J	36.0	1.8	12.0	12.000	1.224	0.050	2.280	2.54	0.060	0.067	0.91	10.93	74.6	2686.1	24
K	40.0	1.8	12.0	12.000	1.043	0.055	2.091	2.54	0.060	0.073	1.19	14.33	106.6	4265.1	26
L	44.0	1.8	12.0	12.000	0.860	0.062	1.836	2.54	0.060	0.083	1.49	17.91	151.8	6679.6	28
M	48.0	1.8	12.0	12.000	0.685	0.073	1.559	2.54	0.060	0.098	1.76	21.11	210.7	10113.4	30
N	52.0	1.8	12.0	12.000	0.530	0.091	1.258	2.54	0.060	0.121	2.01	24.13	298.5	15523.4	32
P	56.0	1.8	12.0	12.000	0.464	0.101	1.134	2.54	0.060	0.135	2.10	25.26	346.5	19405.9	34
Q	60.0	1.8	12.0	12.000	0.623	0.079	1.451	2.54	0.060	0.105	1.85	22.24	238.6	14313.8	36
R	64.0	1.8	12.0	12.000	1.314	0.049	2.356	2.54	0.060	0.065	0.77	9.24	61.0	3904.8	38
S	68.0	1.8	12.0	12.000	3.265	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40
T	72.0	1.8	12.0	12.000	3.397	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42
U	76.0	1.8	12.0	6.462	4.163	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44
								Max Pressure =		0.135	Total	157.2	1564.9	79214.7	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	28.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	6.152	H of keel at Fore Poppet =	3.132	Depth over way end	5.000	AP to FPop	91.7	meter
1.300%	0.74	Draft FP	-3.819	m	Draft Midship =	-0.743	Draft at AP =	2.333	FP to way end 65.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.0000 A60N070	-0.7	285.777	17.896	420.82	376.681	21.488	0.611	21.049	87.973	3.861	2.723
Slope (deg)	3.7516 A60N075	-0.75	266.002	17.607	369.785	357.708	20.966	0.594	21.234	82.09	3.667	2.364
		-0.743	268.8	17.65	376.9	360.4	21.04	0.60	21.21	82.91	3.69	2.41

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.5000 A65N070	-0.7	338.318	18.028	450.156	398.251	21.628	0.692	19.201	86.308	4.082	3.159
Slope (deg)	4.0647 A65N075	-0.75	318.31	17.813	434.997	385.546	21.329	0.674	19.575	83.964	3.952	2.891
		-0.743	321.1	17.84	437.1	387.3	21.37	0.68	19.52	84.29	3.97	2.93

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	6.1520	-0.743	284.7	17.71	395.2	368.6	21.14	0.62	20.70	83.33	3.78	2.57
	Slope (deg)	3.8468											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		284.7	73.993	21064.5
Load on Air Bags =		1434.0	48.382	69379
(Equilibrium moment)		-8.7		16

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	3.8468

Area Supported by Air Bag	138.733 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.130 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.001
3.131
6.432
Trim (R) 0.001
6.151
6.152

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TRAVEL		28.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		6.704%					
4 meter		0.74 1.300%		3.132 meter		8.819 meter		5.661 meter		(deg)		3.847					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	3.024	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	2.806	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	2.589	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	11		
D1	14.0	1.8	12.0	8.363	2.373	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	13		
E1	18.0	1.8	12.0	11.182	2.155	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	15		
F1	22.0	1.8	12.0	12.000	1.938	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	17		
G1	26.0	1.8	12.0	12.000	1.721	0.045	2.540	2.54	0.060	0.060	0.13	1.51	9.2	240.3	19		
H1	30.0	1.8	12.0	12.000	1.504	0.046	2.474	2.54	0.060	0.062	0.47	5.65	35.6	1067.2	21		
J1	34.0	1.8	12.0	12.000	1.287	0.049	2.332	2.54	0.060	0.065	0.82	9.80	65.4	2223.9	23		
K1	38.0	1.8	12.0	12.000	1.070	0.054	2.115	2.54	0.060	0.072	1.16	13.95	102.7	3901.3	25		
L1	42.0	1.8	12.0	12.000	0.853	0.062	1.836	2.54	0.060	0.083	1.49	17.91	151.8	6376.0	27		
M1	46.0	1.8	12.0	12.000	0.654	0.076	1.506	2.54	0.060	0.101	1.81	21.68	224.0	10305.0	29		
N1	50.0	1.8	12.0	12.000	0.496	0.096	1.197	2.54	0.060	0.128	2.06	24.69	321.1	16055.1	31		
P1	54.0	1.8	12.0	12.000	0.484	0.097	1.176	2.54	0.060	0.130	2.07	24.88	329.2	17778.7	33		
Q1	58.0	1.8	12.0	12.000	0.817	0.065	1.775	2.54	0.060	0.086	1.56	18.66	163.6	9490.8	35		
R1	62.0	1.8	12.0	12.000	1.949	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1940.6	37		
S1	66.0	1.8	12.0	12.000	3.391	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	70.0	1.8	12.0	12.000	3.123	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	3.854	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
Max Pressure =								0.130		Total		138.7		1434.0		69378.9	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	32.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	6.894	H of keel at Fore Poppet =	3.340	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74		Draft FP	-3.976 m	Draft Midship =	-0.529	Draft at AP =	2.918	FP to way end 61.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.5000 A65N050	-0.5	424.819	18.877	510.113	447.662	22.75	0.767	17.671	95.299	4.589	4.379
Slope (deg)	4.0647 A65N055	-0.55	402.209	18.666	495.137	435.469	22.477	0.748	18.048	93.063	4.464	4.049
		-0.529	411.7	18.75	501.4	440.6	22.59	0.76	17.89	94.00	4.52	4.19

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	7.0000 A70N050	-0.5	483.643	18.872	535.028	464.424	22.699	0.853	16.423	92.846	4.76	4.852
Slope (deg)	4.3780 A70N055	-0.55	460.164	18.682	520.784	452.993	22.443	0.834	16.739	90.888	4.643	4.519
		-0.529	470.0	18.76	526.8	457.8	22.55	0.84	16.61	91.71	4.69	4.66

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	6.8940	-0.529	457.7	18.76	521.4	454.1	22.56	0.82	16.88	92.20	4.65	4.56
	Slope (deg)	4.3116											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		457.7	72.940	33381.7
Load on Air Bags =		1246.7	45.828	57135
(Equilibrium moment)		5.6		-57

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	4.3116

Area Supported by Air Bag	124.596 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.128 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 3.341
Trim (P) 6.894

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 19 Rev. A UMG-TPAL-20-007	
TRAVEL		32.00 m													
Air Bag															
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 3.340 meter		H of FPop over WE 8.976 meter		Position A above WE 5.584 meter		Vessel Slope (deg) 7.511% 4.312					
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data
A	4	1.8	12.0	0.228	3.091	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	8
B	8.0	1.8	12.0	3.485	2.842	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	10
C	12.0	1.8	12.0	6.742	2.592	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	12
D	16.0	1.8	12.0	9.923	2.342	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	14
E	20.0	1.8	12.0	12.000	2.093	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	16
F	24.0	1.8	12.0	12.000	1.844	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	18
G	28.0	1.8	12.0	12.000	1.594	0.046	2.510	2.54	0.060	0.061	0.33	3.96	24.5	687.2	20
H	32.0	1.8	12.0	12.000	1.345	0.048	2.378	2.54	0.060	0.064	0.72	8.67	56.7	1815.6	22
J	36.0	1.8	12.0	12.000	1.096	0.053	2.149	2.54	0.060	0.071	1.12	13.38	96.9	3489.7	24
K	40.0	1.8	12.0	12.000	0.854	0.062	1.836	2.54	0.060	0.083	1.49	17.91	151.8	6072.4	26
L	44.0	1.8	12.0	12.000	0.632	0.078	1.470	2.54	0.060	0.104	1.84	22.05	233.6	10277.1	28
M	48.0	1.8	12.0	12.000	0.499	0.096	1.197	2.54	0.060	0.128	2.06	24.69	321.1	15412.9	30
N	52.0	1.8	12.0	12.000	0.592	0.082	1.395	2.54	0.060	0.109	1.90	22.81	254.5	13234.2	32
P	56.0	1.8	12.0	12.000	1.216	0.050	2.271	2.54	0.060	0.067	0.93	11.12	76.2	4267.6	34
Q	60.0	1.8	12.0	12.000	3.099	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1878.0	36
R	64.0	1.8	12.0	12.000	3.164	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38
S	68.0	1.8	12.0	12.000	3.864	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40
T	72.0	1.8	12.0	12.000	3.563	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42
U	76.0	1.8	12.0	6.462	3.262	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44
Max Pressure =								0.128		Total		124.6		1246.7 57134.8	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	36.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton
Launch Way slope (deg)	Trim (aft)	7.125	H of keel at Fore Poppet =		3.260		Depth over way end		5.000	AP to FPop	91.7	meter
1.300% 0.74	Draft FP	-3.844	m	Draft Midship =		-0.282	Draft at AP =		3.281	FP to way end	57.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	7.0000 A70N025	-0.25	612.016	19.884	601.098	542.329	24.682	0.949	15.557	114.245	5.559	7.561
Slope (deg)	4.3780 A70N030	-0.3	583.367	19.621	592.969	510.291	23.759	0.932	15.304	100.923	5.23	6.361
		-0.282	594.0	19.72	596.0	522.1	24.10	0.94	15.40	105.85	5.35	6.80

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	7.5000 A75N025	-0.25	677.892	19.743	629.031	560.794	24.22	1.042	14.95	110.179	5.748	8.068
Slope (deg)	4.6914 A75N030	-0.3	645.228	19.412	594.193	503.95	22.427	1.028	14.266	84.118	5.165	5.846
		-0.282	657.3	19.53	607.1	525.0	23.09	1.03	14.52	93.76	5.38	6.67

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	7.1250	-0.282	609.8	19.67	598.8	522.9	23.85	0.96	15.18	102.83	5.36	6.77
	Slope (deg)	4.4563											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		609.8	72.028	43922.7
Load on Air Bags =		1095.6	42.465	46523
(Equilibrium moment)		4.6		13

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSSEL KEEL
0.74	4.4563

Area Supported by Air Bag	110.458 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.116 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
3.261
3.26

Trim (P) -0.001
7.125
7.125

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TRAVEL		36.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		7.762%					
4 meter		0.74 1.300%		3.260 meter		8.844 meter		5.559 meter		(deg)		4.456					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	3.130	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	2.871	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	2.611	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	11		
D1	14.0	1.8	12.0	8.363	2.351	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	13		
E1	18.0	1.8	12.0	11.182	2.091	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	15		
F1	22.0	1.8	12.0	12.000	1.833	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	17		
G1	26.0	1.8	12.0	12.000	1.573	0.046	2.503	2.54	0.060	0.061	0.36	4.34	27.0	700.9	19		
H1	30.0	1.8	12.0	12.000	1.313	0.049	2.356	2.54	0.060	0.065	0.77	9.24	61.0	1830.4	21		
J1	34.0	1.8	12.0	12.000	1.054	0.054	2.103	2.54	0.060	0.073	1.18	14.14	104.6	3557.5	23		
K1	38.0	1.8	12.0	12.000	0.812	0.065	1.775	2.54	0.060	0.086	1.56	18.66	163.6	6218.1	25		
L1	42.0	1.8	12.0	12.000	0.612	0.080	1.432	2.54	0.060	0.107	1.87	22.43	243.7	10235.8	27		
M1	46.0	1.8	12.0	12.000	0.558	0.087	1.318	2.54	0.060	0.116	1.96	23.56	278.3	12803.6	29		
N1	50.0	1.8	12.0	12.000	0.848	0.063	1.821	2.54	0.060	0.084	1.51	18.10	154.7	7733.6	31		
P1	54.0	1.8	12.0	12.000	1.937	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1690.2	33		
P	56.0	1.8	12.0	12.000	3.493	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1752.8	35		
R1	62.0	1.8	12.0	12.000	3.027	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	66.0	1.8	12.0	12.000	3.716	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	70.0	1.8	12.0	12.000	3.405	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	3.094	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.116	Total	110.5	1095.6	46522.8			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	40.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	7.095	H of keel at Fore Poppet =	3.056	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74	Draft FP	-3.589	m	Draft Midship =	-0.042	Draft at AP =	3.506	FP to way end
								53.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	7.0000 A70P000	0	752.932	20.707	693.69	589.719	25.126	1.055	14.311	114.933	6.045	9.35
Slope (deg)	4.3780 A70N005	-0.05	723.114	20.531	677.2	576.968	24.884	1.035	14.522	112.165	5.914	8.763
		-0.042	728.2	20.56	680.0	579.1	24.93	1.04	14.49	112.64	5.94	8.86

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	7.5000 A75P000	0	822.65	20.477	718.177	605.02	24.617	1.151	13.527	113.723	6.201	10.099
Slope (deg)	4.6914 A75N005	-0.05	792.168	20.32	702.322	592.826	24.403	1.13	13.71	111.248	6.076	9.513
		-0.042	797.3	20.35	705.0	594.9	24.44	1.13	13.68	111.67	6.10	9.61

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	7.0950	-0.042	741.3	20.52	684.8	582.1	24.83	1.06	14.33	112.45	5.97	9.01
	Slope (deg)	4.4375											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		741.3	71.180	52767.3
Load on Air Bags =		971.9	38.764	37674
(Equilibrium moment)		-3.2		17

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	4.4375

Area Supported by Air Bag	103.861 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.105 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.001
3.055
3.056
Trim (P) 0.001
7.094
7.095

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 23 Rev. A UMG-TPAL-20-007	
TRAVEL		40.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		7.729%					
4 meter		0.74 1.300%		3.056 meter		8.589 meter		5.482 meter		(deg)		4.438					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	2.798	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	8		
B	8.0	1.8	12.0	3.485	2.539	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	10		
C	12.0	1.8	12.0	6.742	2.282	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	12		
D	16.0	1.8	12.0	9.923	2.023	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	14		
E	20.0	1.8	12.0	12.000	1.765	0.045	2.543	2.54	0.060	0.060	0.06	0.75	4.6	92.3	16		
F	24.0	1.8	12.0	12.000	1.507	0.046	2.474	2.54	0.060	0.062	0.47	5.65	35.6	853.8	18		
G	28.0	1.8	12.0	12.000	1.249	0.050	2.298	2.54	0.060	0.066	0.88	10.56	71.5	2001.4	20		
H	32.0	1.8	12.0	12.000	0.998	0.056	2.029	2.54	0.060	0.075	1.27	15.27	117.1	3747.0	22		
J	36.0	1.8	12.0	12.000	0.768	0.068	1.695	2.54	0.060	0.090	1.63	19.60	180.0	6479.4	24		
K	40.0	1.8	12.0	12.000	0.626	0.079	1.451	2.54	0.060	0.105	1.85	22.24	238.6	9542.5	26		
L	44.0	1.8	12.0	12.000	0.710	0.072	1.594	2.54	0.060	0.096	1.73	20.73	202.4	8905.9	28		
M	48.0	1.8	12.0	12.000	1.325	0.048	2.364	2.54	0.060	0.065	0.75	9.05	59.6	2859.6	30		
N1	50.0	1.8	12.0	12.000	2.009	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1565.0	31		
N	52.0	1.8	12.0	12.000	3.200	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1627.6	32		
Q	60.0	1.8	12.0	12.000	2.947	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34		
R	64.0	1.8	12.0	12.000	3.637	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36		
S	68.0	1.8	12.0	12.000	3.328	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38		
T	72.0	1.8	12.0	12.000	3.018	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40		
U	76.0	1.8	12.0	6.462	2.709	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42		
								Max Pressure =		0.105		Total		103.9 971.9 37674.4			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL 44.00 m	Tide = 3.00 m	LCG 38.80 m frm AP	L Weight 1710 ton
Launch Way slope (deg)	Trim (aft) 6.940	H of keel at Fore Poppet = 2.815	Depth over way end 5.000	AP to FPop 91.7 meter
1.300% 0.74	Draft FP -3.297 m	Draft Midship = 0.173	Draft at AP = 3.643	FP to way end 49.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 6.5000	A65P015	0.15	777.593	21.501	717.245	616.951	26.362	1.023	14.514	126.891	6.324	10.673
Slope (deg) 4.0647	A65P020	0.2	808.981	21.677	724.652	620.114	26.287	1.044	14.096	123.781	6.356	10.828
		0.173	792.0	21.58	720.7	618.4	26.33	1.03	14.32	125.46	6.34	10.74

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 7.0000	A70P015	0.15	846.232	21.231	741.223	631.389	25.87	1.116	13.73	125.22	6.472	11.453
Slope (deg) 4.3780	A70P020	0.2	878.258	21.39	748.849	635.061	25.779	1.138	13.373	122.675	6.509	11.64
		0.173	861.0	21.30	744.7	633.1	25.83	1.13	13.57	124.05	6.49	11.54

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim = 6.9400		0.173	852.7	21.34	741.8	631.3	25.89	1.11	13.66	124.22	6.47	11.44
	Slope (deg) 4.3404												

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		852.7	70.363	59997.6
Load on Air Bags =		861.8	35.322	30440
(Equilibrium moment)		-4.5		21

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	4.3404

Area Supported by Air Bag	92.586 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.096 Mpa

AIR BAG PRESSURE

- O K -

Weight (L)	Trim (P)
0.001	0.001
2.814	6.933
3.643	6.94

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 25 Rev. A UMG-TPAL-20-007			
TRAVEL		44.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		7.561%					
4 meter		0.74 1.300%		2.815 meter		8.297 meter		5.456 meter		(deg)		4.340					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	2.690	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	2.438	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	2.186	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	11		
D1	14.0	1.8	12.0	8.363	1.935	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	13		
E1	18.0	1.8	12.0	11.182	1.684	0.045	2.533	2.54	0.060	0.060	0.19	2.11	12.9	233.0	15		
F1	22.0	1.8	12.0	12.000	1.432	0.047	2.437	2.54	0.060	0.063	0.58	6.97	44.5	979.8	17		
G1	26.0	1.8	12.0	12.000	1.181	0.051	2.243	2.54	0.060	0.068	0.97	11.69	81.1	2108.6	19		
H1	30.0	1.8	12.0	12.000	0.948	0.058	1.964	2.54	0.060	0.078	1.35	16.21	128.5	3854.2	21		
J1	34.0	1.8	12.0	12.000	0.755	0.068	1.679	2.54	0.060	0.091	1.65	19.79	183.5	6238.6	23		
K1	38.0	1.8	12.0	12.000	0.709	0.072	1.594	2.54	0.060	0.096	1.73	20.73	202.4	7691.5	25		
L1	42.0	1.8	12.0	12.000	1.007	0.056	2.042	2.54	0.060	0.075	1.26	15.08	114.9	4827.2	27		
M1	46.0	1.8	12.0	12.000	2.105	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1439.8	29		
N	48.0	1.8	12.0	12.000	3.298	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1502.4	30		
N1	50.0	1.8	12.0	12.000	3.513	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1565.0	31		
P	58.0	1.8	12.0	12.000	3.907	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35		
R1	62.0	1.8	12.0	12.000	3.605	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	66.0	1.8	12.0	12.000	3.302	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	70.0	1.8	12.0	12.000	2.999	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	2.697	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.096	Total	92.6	861.8	30440.2			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	48.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	6.766	H of keel at Fore Poppet =	2.581	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74	Draft FP	-3.012	m	Draft Midship =	0.371	Draft at AP =	3.754	FP to way end
								45.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.5000 A65P035	0.35	909.018	22.273	790.66	668.93	27.31	1.104	13.588	138.331	6.857	13.603
Slope (deg)	4.0647 A65P040	0.4	943.52	22.463	808.208	682.302	27.554	1.125	13.387	141.368	6.994	14.43
		0.371	923.5	22.35	798.0	674.5	27.41	1.11	13.50	139.61	6.91	13.95

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	7.0000 A70P035	0.35	979.671	21.914	809.165	677.979	26.674	1.201	12.921	133.562	6.949	14.141
Slope (deg)	4.3780 A70P040	0.4	1015.107	22.094	826.44	703.031	27.316	1.222	12.936	143.7	7.206	15.772
		0.371	994.6	21.99	816.4	688.5	26.94	1.21	12.93	137.82	7.06	14.83

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	6.7660	0.371	961.3	22.16	807.8	682.0	27.16	1.16	13.20	138.66	6.99	14.42
	Slope (deg)	4.2314											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		961.3	69.540	66849.6
Load on Air Bags =		745.5	31.658	23600
(Equilibrium moment)		3.2		9

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	4.2314

Area Supported by Air Bag	83.040 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.088 Mpa

AIR BAG PRESSURE

- O K -

Weight (L)	Trim (P)
-0.001	-0.001
2.582	6.767
6.581	6.766

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 27 Rev. A UMG-TPAL-20-007	
TRAVEL		48.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		7.372%					
4 meter		0.74 1.300%		2.581 meter		8.012 meter		5.379 meter		(deg)		4.231					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	2.338	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	8		
B	8.0	1.8	12.0	3.485	2.094	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	10		
C	12.0	1.8	12.0	6.742	1.850	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	12		
D	16.0	1.8	12.0	9.923	1.606	0.046	2.513	2.54	0.060	0.061	0.31	3.12	19.3	308.2	14		
E	20.0	1.8	12.0	12.000	1.362	0.048	2.393	2.54	0.060	0.064	0.69	8.29	54.0	1079.0	16		
F	24.0	1.8	12.0	12.000	1.126	0.052	2.182	2.54	0.060	0.070	1.07	12.82	91.4	2194.7	18		
G	28.0	1.8	12.0	12.000	0.910	0.060	1.923	2.54	0.060	0.079	1.40	16.78	135.8	3802.6	20		
H	32.0	1.8	12.0	12.000	0.783	0.066	1.728	2.54	0.060	0.088	1.60	19.23	173.2	5542.9	22		
J	36.0	1.8	12.0	12.000	0.881	0.061	1.880	2.54	0.060	0.081	1.45	17.34	143.6	5168.5	24		
K	40.0	1.8	12.0	12.000	1.511	0.046	2.479	2.54	0.060	0.062	0.46	5.47	34.3	1373.0	26		
L1	42.0	1.8	12.0	12.000	2.202	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1314.6	27		
L	44.0	1.8	12.0	12.000	3.400	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1377.2	28		
M1	46.0	1.8	12.0	12.000	3.618	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1439.8	29		
P	56.0	1.8	12.0	12.000	3.880	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34		
Q	60.0	1.8	12.0	12.000	3.585	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36		
R	64.0	1.8	12.0	12.000	3.290	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38		
S	68.0	1.8	12.0	12.000	2.995	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40		
T	72.0	1.8	12.0	12.000	2.700	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42		
U	76.0	1.8	12.0	6.462	2.404	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44		
								Max Pressure =		0.088	Total	83.0	745.5	23600.5			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	52.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	6.471	H of keel at Fore Poppet =	2.326	Depth over way end	5.000	AP to FPop	91.7	meter
1.300%	0.74	Draft FP	-2.705	m	Draft Midship =	0.531	Draft at AP =	3.766	FP to way end 41.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.0000 A60P050	0.5	946.266	23.269	827.101	701.956	28.82	1.073	13.704	153.187	7.195	15.697
Slope (deg)	3.7516 A60P055	0.55	982.593	23.481	845.527	715.914	29.077	1.093	13.479	156.53	7.338	16.655
		0.531	968.4	23.40	838.3	710.5	28.98	1.09	13.57	155.23	7.28	16.28

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.5000 A65P050	0.5	1014.505	22.842	842.856	708.38	28.047	1.166	13.004	146.939	7.261	16.127
Slope (deg)	4.0647 A65P055	0.55	1051.121	23.029	860.142	721.171	28.293	1.187	12.818	149.562	7.392	17.008
		0.531	1036.8	22.96	853.4	716.2	28.20	1.18	12.89	148.54	7.34	16.66

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	6.4710	0.531	1032.9	22.98	852.5	715.9	28.24	1.17	12.93	148.93	7.34	16.64
	Slope (deg)	4.0466											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1032.9	68.718	70977.2
Load on Air Bags =		674.3	28.857	19458
(Equilibrium moment)		2.8		24

RESULT

SLOPE (deg)	
LAUNCH WAY	0.74
VESSEL KEEL	4.0466

Area Supported by Air Bag	72.696 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.082 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
2.327
6.226
Trim (P) 0.001
6.471
6.471

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 29 Rev. A UMG-TPAL-20-007	
TRAVEL		52.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		7.051%					
4 meter		0.74 1.300%		2.326 meter		7.705 meter		5.354 meter		(deg)		4.047					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	2.210	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	1.980	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	1.748	0.045	2.542	2.54	0.060	0.060	0.00	0.00	0.0	0.0	11		
D1	14.0	1.8	12.0	8.363	1.517	0.046	2.479	2.54	0.060	0.061	0.46	3.81	23.7	332.2	13		
E1	18.0	1.8	12.0	11.182	1.287	0.049	2.332	2.54	0.060	0.065	0.82	9.13	60.6	1090.3	15		
F1	22.0	1.8	12.0	12.000	1.074	0.054	2.126	2.54	0.060	0.072	1.15	13.76	100.7	2216.0	17		
G1	26.0	1.8	12.0	12.000	0.901	0.060	1.909	2.54	0.060	0.080	1.41	16.96	138.3	3597.0	19		
H1	30.0	1.8	12.0	12.000	0.876	0.061	1.865	2.54	0.060	0.082	1.46	17.53	146.3	4387.8	21		
J1	34.0	1.8	12.0	12.000	1.195	0.051	2.252	2.54	0.060	0.068	0.96	11.50	79.5	2701.3	23		
K1	38.0	1.8	12.0	12.000	2.312	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1189.4	25		
L1	40.0	1.8	12.0	12.000	3.516	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1252.0	26		
M1	42.0	1.8	12.0	12.000	3.741	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1314.6	27		
N1	44.0	1.8	12.0	12.000	3.600	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1377.2	28		
P1	50.0	1.8	12.0	12.000	4.177	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	33		
Q1	54.0	1.8	12.0	12.000	3.894	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35		
R1	58.0	1.8	12.0	12.000	3.612	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	62.0	1.8	12.0	12.000	3.330	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	66.0	1.8	12.0	12.000	3.048	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	70.0	1.8	12.0	11.421	2.765	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.082	Total	72.7	674.3	19457.8			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	56.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	6.115	H of keel at Fore Poppet =	2.034	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74	Draft FP	-2.362	m	Draft Midship =	0.696	Draft at AP =	3.753	FP to way end
								37.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)	
Trim =	6.0000	A60P065	0.65	1057.268	23.9	887.32	747.888	29.749	1.134	13.154	165.705	7.666	18.974
Slope (deg)	3.7516	A60P070	0.7	1095.648	24.108	902.33	759.037	29.93	1.154	12.94	166.993	7.78	19.815
			0.696	1092.2	24.09	901.0	758.0	29.91	1.15	12.96	166.88	7.77	19.74

Hydrostatics 2			Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.5000	A65P065	0.65	1126.387	23.4	895.041	747.02	28.78	1.229	12.49	154.976	7.657	18.885
Slope (deg)	4.0647	A65P070	0.7	1164.914	23.582	918.218	764.844	29.186	1.25	12.418	160.723	7.84	20.259
			0.696	1161.4	23.57	916.1	763.2	29.15	1.25	12.42	160.21	7.82	20.14

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	6.1150	0.696	1108.1	23.97	904.5	759.2	29.74	1.17	12.84	165.34	7.78	19.83
	Slope (deg)	3.8236											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1108.1	67.731	75054.4
Load on Air Bags =		604.7	25.439	15383
(Equilibrium moment)		-2.8		22

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	3.8236

Area Supported by Air Bag	64.970 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.081 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.001
2.033
6.034
Trim (P) 0.001
6.114
6.115

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 31 Rev. A UMG-TPAL-20-007	
TRAVEL		56.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		6.664%					
4 meter		0.74 1.300%		2.034 meter		7.362 meter		5.277 meter		(deg)		3.824					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	1.818	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	8		
B	8.0	1.8	12.0	3.485	1.604	0.046	2.513	2.54	0.060	0.060	0.31	1.09	0.0	0.0	10		
C	12.0	1.8	12.0	6.742	1.388	0.048	2.406	2.54	0.060	0.062	0.66	4.45	28.1	336.8	12		
D	16.0	1.8	12.0	9.923	1.180	0.051	2.243	2.54	0.060	0.067	0.97	9.66	65.5	1048.6	14		
E	20.0	1.8	12.0	12.000	0.992	0.056	2.029	2.54	0.060	0.075	1.27	15.27	117.1	2341.9	16		
F	24.0	1.8	12.0	12.000	0.894	0.060	1.894	2.54	0.060	0.081	1.43	17.15	140.9	3382.4	18		
G	28.0	1.8	12.0	12.000	1.020	0.056	2.055	2.54	0.060	0.074	1.24	14.89	112.8	3158.6	20		
H	32.0	1.8	12.0	12.000	1.678	0.045	2.531	2.54	0.060	0.060	0.20	2.45	15.1	482.1	22		
J1	34.0	1.8	12.0	12.000	2.384	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1064.2	23		
J	36.0	1.8	12.0	12.000	3.595	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1126.8	24		
K1	38.0	1.8	12.0	12.000	3.828	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1189.4	25		
K	40.0	1.8	12.0	12.000	3.695	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1252.0	26		
N	52.0	1.8	12.0	12.000	3.894	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	32		
P	56.0	1.8	12.0	12.000	3.628	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34		
Q	60.0	1.8	12.0	12.000	3.361	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36		
R	64.0	1.8	12.0	12.000	3.094	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38		
S	68.0	1.8	12.0	12.000	2.827	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40		
T	72.0	1.8	12.0	12.000	2.561	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42		
U	76.0	1.8	12.0	6.462	2.294	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44		
								Max Pressure =		0.081	Total	65.0	604.7	15382.7			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	60.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	5.709	H of keel at Fore Poppet =	1.752	Depth over way end	5.000	AP to FPop	91.7	meter
1.300%	0.74	Draft FP	-2.029	m	Draft Midship =	0.825	Draft at AP =	3.680	FP to way end 33.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	5.5000 A55P080	0.8	1110.258	25.148	924.805	799.797	31.901	1.101	13.385	192.551	8.198	23.18
Slope (deg)	3.4386 A55P085	0.85	1143.91	25.177	898.852	749.458	29.922	1.128	12.372	153.701	7.682	19.033
		0.825	1127.4	25.16	911.6	774.1	30.89	1.11	12.87	172.74	7.93	21.07

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	6.0000 A60P080	0.8	1175.367	24.545	946.86	812.693	31.409	1.194	12.928	191	8.33	24.328
Slope (deg)	3.7516 A60P085	0.85	1211.863	24.632	921.254	762.598	29.458	1.219	12	152.81	7.817	20.034
		0.825	1194.0	24.59	933.8	787.1	30.41	1.21	12.45	171.52	8.07	22.14

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	5.7090	0.825	1155.2	24.92	920.9	779.6	30.69	1.15	12.70	172.23	7.99	21.51
	Slope (deg)	3.5694											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1155.2	66.777	77143.5
Load on Air Bags =		553.8	24.074	13333
(Equilibrium moment)		0.9		-18

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	3.5694

Area Supported by Air Bag	59.751 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.078 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
1.753
1.752
Trim (P) -0.001
5.71
5.709

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 33 Rev. A UMG-TPAL-20-007	
TRAVEL		60.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		6.222%					
4 meter		0.74 1.300%		1.752 meter		7.029 meter		5.251 meter		(deg)		3.569					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m ²)	(m ²)	(MPa)	(MPa)	(m)	(m ²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	1.653	0.045	2.527	2.54	0.060	0.060	0.24	0.04	0.2	0.4	7		
B1	6.0	1.8	12.0	1.857	1.455	0.047	2.448	2.54	0.060	0.060	0.55	1.02	0.0	0.0	9		
C1	10.0	1.8	12.0	5.114	1.258	0.050	2.307	2.54	0.060	0.062	0.86	4.42	28.1	281.4	11		
D1	14.0	1.8	12.0	8.363	1.078	0.054	2.126	2.54	0.060	0.068	1.15	9.59	66.2	927.4	13		
E1	18.0	1.8	12.0	11.182	0.939	0.059	1.950	2.54	0.060	0.077	1.37	15.28	119.5	2150.5	15		
F1	22.0	1.8	12.0	12.000	0.947	0.058	1.964	2.54	0.060	0.078	1.35	16.21	128.5	2826.4	17		
G1	26.0	1.8	12.0	12.000	1.299	0.049	2.340	2.54	0.060	0.065	0.80	9.61	63.9	1662.1	19		
H1	30.0	1.8	12.0	12.000	1.611	0.046	2.516	2.54	0.060	0.061	0.30	3.58	22.2	664.5	20		
J1	34.0	1.8	12.0	12.000	3.546	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1064.2	22		
K1	38.0	1.8	12.0	12.000	3.663	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1189.4	23		
L1	40.0	1.8	12.0	12.000	3.539	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1252.0	24		
M1	42.0	1.8	12.0	12.000	3.414	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1314.6	25		
N1	44.0	1.8	12.0	12.000	4.290	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	31		
P1	50.0	1.8	12.0	12.000	3.916	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	33		
Q1	54.0	1.8	12.0	12.000	3.667	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35		
R1	58.0	1.8	12.0	12.000	3.418	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	62.0	1.8	12.0	12.000	3.169	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	66.0	1.8	12.0	12.000	2.920	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	70.0	1.8	12.0	11.421	2.671	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.078	Total	59.8	553.8	13333.1			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL 64.00 m	Tide = 3.00 m	LCG 38.80 m frm AP	L Weight 1710 ton
Launch Way slope (deg)	Trim (aft) 5.282	H of keel at Fore Poppet = 1.438	Depth over way end 5.000	AP to FPop 91.7 meter
1.30% 0.74	Draft FP -1.663 m	Draft Midship = 0.978	Draft at AP = 3.619	FP to way end 29.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 5.0000	A50P095	0.95	1174.166	26.57	972.536	838.274	33.592	1.071	13.314	209.155	8.592	26.644
Slope (deg) 3.1256	A50P100	1	1217.925	26.839	1012.028	856.272	33.99	1.091	13.144	214.874	8.777	28.394
		0.978	1198.7	26.72	994.7	848.4	33.81	1.08	13.22	212.36	8.70	27.62

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim = 5.5000	A55P095	0.95	1234.068	25.827	987.619	838.213	32.604	1.161	12.746	199.175	8.592	26.648
Slope (deg) 3.4386	A55P100	1	1277.304	26.064	1003.484	855.228	32.997	1.181	12.599	204.305	8.766	28.293
		0.978	1258.3	25.96	996.5	847.7	32.82	1.17	12.66	202.05	8.69	27.57

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim = 5.2820		0.978	1232.3	26.29	995.7	848.0	33.26	1.13	12.91	206.54	8.69	27.59
	Slope (deg) 3.3021												

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1232.3	65.409	80602.3
Load on Air Bags =		477.2	20.670	9863
(Equilibrium moment)		0.6		-6

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	3.3021

Area Supported by Air Bag	43.682 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.077 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.001
1.437
1.438
Trim (P) 0.001
5.281
5.282

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 35 Rev. A UMG-TPAL-20-007	
TRAVEL		64.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		5.757%					
4 meter		0.74 1.300%		1.438 meter		6.663 meter		5.174 meter		(deg)		3.302					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	1.259	0.050	2.307	2.54	0.060	0.060	0.86	0.20	0.0	0.0	8		
B	8.0	1.8	12.0	3.485	1.087	0.054	2.138	2.54	0.060	0.063	1.13	3.94	25.3	202.3	10		
C	12.0	1.8	12.0	6.742	0.936	0.059	1.950	2.54	0.060	0.069	1.37	9.21	64.9	778.4	12		
D	16.0	1.8	12.0	9.923	0.873	0.061	1.865	2.54	0.060	0.077	1.46	14.50	113.8	1820.4	14		
E	20.0	1.8	12.0	12.000	1.036	0.055	2.079	2.54	0.060	0.073	1.21	14.51	108.7	2173.1	16		
F	24.0	1.8	12.0	12.000	1.731	0.045	2.541	2.54	0.060	0.060	0.11	1.32	8.1	194.0	18		
G	26.0	1.8	12.0	12.000	3.799	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	813.8	20		
H	28.0	1.8	12.0	12.000	4.050	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	876.4	21		
J1	30.0	1.8	12.0	12.000	3.935	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	939.0	22		
J	32.0	1.8	12.0	12.000	3.820	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1001.6	23		
K1	34.0	1.8	12.0	12.000	4.705	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1064.2	24		
K	48.0	1.8	12.0	12.000	3.898	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	26		
N	52.0	1.8	12.0	12.000	3.668	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	32		
P	56.0	1.8	12.0	12.000	3.437	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34		
Q	60.0	1.8	12.0	12.000	3.207	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36		
R	64.0	1.8	12.0	12.000	2.977	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38		
S	68.0	1.8	12.0	12.000	2.746	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40		
T	72.0	1.8	12.0	12.000	2.516	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42		
U	76.0	1.8	12.0	6.462	2.285	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44		
								Max Pressure =		0.077	Total	43.7	477.2	9863.1			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	68.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	4.774	H of keel at Fore Poppet =	1.111	Depth over way end	5.000	AP to FPop	91.7	meter
1.300%	0.74	Draft FP	-1.285	m	Draft Midship =	1.102	Draft at AP =	3.489	FP to way end
								25.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	4.5000 A45P110	1.1	1255.728	28.326	1057.631	908.927	36.349	1.042	13.497	248.804	9.316	33.928
Slope (deg)	2.8128 A45P115	1.15	1302.748	28.623	1074.027	925.672	36.756	1.061	13.278	253.31	9.488	35.836
		1.102	1257.6	28.34	1058.3	909.6	36.37	1.04	13.49	248.98	9.32	34.00

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	5.0000 A50P110	1.1	1307.376	27.359	1049.792	891.19	34.767	1.129	12.802	225.543	9.135	31.995
Slope (deg)	3.1256 A50P115	1.15	1353.325	27.618	1078.338	907.175	35.12	1.149	12.624	229.759	9.299	33.739
		1.102	1309.2	27.37	1050.9	891.8	34.78	1.13	12.79	225.71	9.14	32.06

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	4.7740	1.102	1285.9	27.81	1054.3	899.9	35.50	1.09	13.11	236.23	9.22	32.94
	Slope (deg)	2.9842											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1285.9	63.893	82159.1
Load on Air Bags =		425.8	19.513	8308
(Equilibrium moment)		-1.7		-8

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSSEL KEEL
0.74	2.9842

Area Supported by Air Bag	33.572 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.075 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) 0.001
Trim (P) 0.002
1.11 4.772
1.111 4.774

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 37 Rev. A UMG-TPAL-20-007	
TRAVEL		68.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		5.204%					
4 meter		0.74 1.300%		1.111 meter		6.285 meter		5.148 meter		(deg)		2.984					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	1.033	0.055	2.079	2.54	0.060	0.060	1.21	0.18	0.0	0.0	7		
B1	6.0	1.8	12.0	1.857	0.894	0.060	1.894	2.54	0.060	0.062	1.43	2.65	16.9	101.4	9		
C1	10.0	1.8	12.0	5.114	0.795	0.066	1.744	2.54	0.060	0.069	1.59	8.11	57.3	573.1	11		
D1	14.0	1.8	12.0	8.363	0.844	0.063	1.821	2.54	0.060	0.075	1.51	12.61	96.2	1346.8	13		
E1	18.0	1.8	12.0	11.182	1.237	0.050	2.290	2.54	0.060	0.066	0.90	10.01	67.5	1215.8	15		
F1	22.0	1.8	12.0	12.000	2.429	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	688.6	17		
G1	24.0	1.8	12.0	12.000	3.670	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	751.2	18		
H1	26.0	1.8	12.0	12.000	3.931	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	813.8	19		
J1	28.0	1.8	12.0	12.000	3.827	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	876.4	20		
K1	30.0	1.8	12.0	12.000	3.723	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	939.0	21		
L1	32.0	1.8	12.0	12.000	4.619	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	1001.6	22		
M1	46.0	1.8	12.0	12.000	3.890	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	29		
N1	50.0	1.8	12.0	12.000	3.682	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	31		
P1	54.0	1.8	12.0	12.000	3.474	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	33		
Q1	58.0	1.8	12.0	12.000	3.265	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35		
R1	62.0	1.8	12.0	12.000	3.057	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	66.0	1.8	12.0	12.000	2.849	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	70.0	1.8	12.0	12.000	2.641	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	2.432	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.075	Total	33.6	425.8	8307.8			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	72.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	4.162	H of keel at Fore Poppet =	0.718	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74		Draft FP	-0.833 m	Draft Midship =	1.248	Draft at AP =	3.329	FP to way end 21.5 meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	4.0000 A40P120	1.2	1308.959	30.143	1134.568	974.419	38.986	0.995	13.786	293.754	9.988	41.789
Slope (deg)	2.5001 A40P125	1.25	1359.365	30.48	1151.973	991.951	39.467	1.014	13.539	298.447	10.168	44.092
		1.248	1357.3	30.47	1151.3	991.2	39.45	1.01	13.55	298.26	10.16	44.00

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	4.5000 A45P120	1.2	1350.629	28.918	1113.595	943.63	37.156	1.08	13.085	258.793	9.672	37.958
Slope (deg)	2.8128 A45P125	1.25	1399.352	29.211	1137.181	961.691	37.56	1.099	12.904	264.304	9.857	40.165
		1.248	1397.4	29.20	1136.2	961.0	37.54	1.10	12.91	264.08	9.85	40.08

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	4.1620	1.248	1370.3	30.06	1146.4	981.4	38.83	1.04	13.34	287.19	10.06	42.73
	Slope (deg)	2.6014											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1370.3	61.644	84472.5
Load on Air Bags =		338.0	17.790	6013
(Equilibrium moment)		1.6		-27

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	2.6014

Area Supported by Air Bag	21.376 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.072 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
Trim (P) -0.002
0.719 4.164
0.718 4.162

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 39 Rev. A UMG-TPAL-20-007	
TRAVEL		72.00 m													
Air Bag															
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 0.718 meter		H of FPop over WE 5.833 meter		Position A above WE 5.036 meter		Vessel Slope (deg) 4.537% 2.601					
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at Aux Data
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m ²)	(m ²)	(MPa)	(MPa)	(m)	(m ²)	(ton)	(ton.m)	
A	4	1.8	12.0	0.228	0.615	0.080	1.432	2.54	0.060	0.061	1.87	0.43	2.6	10.5	8
B	8.0	1.8	12.0	3.485	0.602	0.081	1.414	2.54	0.060	0.069	1.88	6.57	46.1	369.1	10
C	12.0	1.8	12.0	6.742	0.813	0.065	1.775	2.54	0.060	0.072	1.56	10.48	77.3	927.1	12
D	16.0	1.8	12.0	9.923	1.557	0.046	2.496	2.54	0.060	0.061	0.39	3.90	24.2	387.5	14
E	18.0	1.8	12.0	12.000	2.305	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	563.4	15
F	20.0	1.8	12.0	12.000	3.559	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	626.0	16
G	22.0	1.8	12.0	12.000	3.834	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	688.6	17
H	24.0	1.8	12.0	12.000	3.744	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	751.2	18
J	26.0	1.8	12.0	12.000	3.653	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	813.8	19
K	28.0	1.8	12.0	12.000	4.562	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	876.4	20
L	44.0	1.8	12.0	12.000	3.836	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	28
M	48.0	1.8	12.0	12.000	3.654	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	30
N	52.0	1.8	12.0	12.000	3.473	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	32
P	56.0	1.8	12.0	12.000	3.291	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34
Q	60.0	1.8	12.0	12.000	3.110	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36
R	64.0	1.8	12.0	12.000	2.928	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38
S	68.0	1.8	12.0	12.000	2.747	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40
T	72.0	1.8	12.0	12.000	2.565	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42
U	76.0	1.8	12.0	6.462	2.384	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44
								Max Pressure =		0.072	Total	21.4	338.0	6013.5	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	76.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton	
Launch Way slope (deg)	Trim (aft)	3.627	H of keel at Fore Poppet =		0.423	Depth over way end		5.000	AP to FPop		91.7	meter	
1.300% 0.74	Draft FP	-0.459	m	Draft Midship =		1.355	Draft at AP =		3.168	FP to way end		17.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m ²)	WPA (m ²)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.5000 A35P135	1.35	1435.768	32.738	1223.198	1053.217	41.905	0.97	13.406	338.914	10.795	52.913
Slope (deg)	2.1874 A35P140	1.4	1490.953	33.106	1259.017	1081.15	42.807	0.989	13.1	355.316	11.082	57.61
		1.355	1440.7	32.77	1226.4	1055.7	41.99	0.97	13.38	340.39	10.82	53.34

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m ²)	WPA (m ²)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	4.0000 A40P135	1.35	1462.719	31.144	1204.426	1025.702	40.333	1.052	13.048	306.717	10.513	48.757
Slope (deg)	2.5001 A40P140	1.4	1515.708	31.472	1227.979	1041.801	40.709	1.071	12.789	310.392	10.678	51.128
		1.355	1467.5	31.17	1206.5	1027.2	40.37	1.05	13.02	307.05	10.53	48.97

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m ²)	WPA (m ²)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	3.6270	1.355	1447.5	32.37	1221.4	1048.5	41.57	0.99	13.29	331.92	10.75	52.23
	Slope (deg)	2.2668											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1447.5	59.335	85888.7
Load on Air Bags =		261.2	17.461	4561
(Equilibrium moment)		1.3		10

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	2.2668

Area Supported by Air Bag	10.948 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.066 Mpa

AIR BAG PRESSURE

- O K -

Weight (L)	Trim (P)
-0.001	-0.002
0.424	3.623
0.423	3.627

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 41 Rev. A UMG-TPAL-20-007			
TRAVEL		76.00 m															
Air Bag																	
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 0.423 meter		H of FPop over WE 5.459 meter		Position A1 above WE 4.969 meter		Vessel Slope (deg) 3.954% 2.267							
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m ²)	(m ²)	(MPa)	(MPa)	(m)	(m ²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	0.411	0.111	1.027	2.54	0.060	0.060	2.18	0.33	2.0	4.0	7		
B1	6.0	1.8	12.0	1.857	0.510	0.094	1.217	2.54	0.060	0.065	2.04	3.79	25.2	151.4	9		
C1	10.0	1.8	12.0	5.114	0.952	0.058	1.977	2.54	0.060	0.066	1.34	6.83	46.1	461.5	11		
D1	14.0	1.8	12.0	8.363	2.194	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.0	0.0	13		
E1	16.0	1.8	12.0	11.182	3.460	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	500.8	14		
F1	18.0	1.8	12.0	12.000	3.747	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	563.4	15		
G1	20.0	1.8	12.0	12.000	3.668	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	626.0	16		
H1	22.0	1.8	12.0	12.000	3.589	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	688.6	17		
J1	24.0	1.8	12.0	12.000	4.510	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	751.2	18		
K1	26.0	1.8	12.0	12.000	4.431	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	813.8	19		
L1	42.0	1.8	12.0	12.000	3.798	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	27		
M1	46.0	1.8	12.0	12.000	3.640	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	29		
N1	50.0	1.8	12.0	12.000	3.481	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	31		
P1	54.0	1.8	12.0	12.000	3.323	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	33		
Q1	58.0	1.8	12.0	12.000	3.165	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35		
R1	62.0	1.8	12.0	12.000	3.007	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	66.0	1.8	12.0	12.000	2.849	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	70.0	1.8	12.0	12.000	2.690	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	2.532	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.066	Total	10.9	261.2	4560.6			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	80.00 m	Tide =	3.00 m	LCG	38.80 m	m frm AP	L Weight	1710 ton
Launch Way slope (deg)	Trim (aft)	3.417	H of keel at Fore Poppet =	0.435	Depth over way end	5.000	AP to FPop	91.7	meter
1.30%	0.74	Draft FP	-0.303	m	Draft Midship =	1.406	Draft at AP =	3.114	FP to way end
								13.5	meter

Hydrostatics 1		Draft @ MS (m)	Displ (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.0000 A30P140	1.4	1475.204	34.985	1271.77	1096.006	43.853	0.913	13.201	376.11	11.234	60.359
Slope (deg)	1.8748 A30P145	1.45	1531.481	35.312	1284.049	1101.154	43.92	0.934	12.827	367.554	11.287	61.229
		1.406	1481.4	35.02	1273.1	1096.6	43.86	0.92	13.16	375.17	11.24	60.45

Hydrostatics 2		Draft @ MS (m)	Displ (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.5000 A35P140	1.4	1490.953	33.106	1259.017	1081.15	42.807	0.989	13.1	355.316	11.082	57.61
Slope (deg)	2.1874 A35P145	1.45	1546.263	33.447	1272.699	1085.242	42.828	1.008	12.761	346.081	11.124	58.187
		1.406	1497.0	33.14	1260.5	1081.6	42.81	0.99	13.06	354.30	11.09	57.67

Hydrostatics 3		Factor	Draft @ MS (m)	Displ (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	3.4170	1.406	1494.4	33.46	1262.6	1084.1	42.98	0.98	13.08	357.76	11.11	58.14
	Slope (deg)	2.1355											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1494.4	58.245	87043.4
Load on Air Bags =		214.3	15.903	3408
(Equilibrium moment)		1.3		7

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSSEL KEEL
0.74	2.1355

Area Supported by Air Bag	2.321 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.061 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
0.436
0.435
Trim (P) -0.002
3.419
3.417

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN						SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 43 Rev. A UMG-TPAL-20-007	
TRAVEL		80.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A above WE		Vessel Slope		3.725%					
4 meter		0.74 1.300%		0.435 meter		5.303 meter		4.475 meter		(deg)		2.135					
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	0.679	0.074	1.542	2.54	0.060	0.060	1.77	0.40	2.5	10.0	8		
B	8.0	1.8	12.0	3.485	1.455	0.047	2.448	2.54	0.060	0.061	0.55	1.92	11.8	94.8	10		
C	10.0	1.8	12.0	6.742	2.219	0.045	2.545	2.54	0.060	0.060	0.00	0.00	17.6	175.9	11		
D	12.0	1.8	12.0	9.923	3.490	0.045	2.545	2.54	0.060	0.060	0.00	0.00	25.9	310.6	12		
E	14.0	1.8	12.0	12.000	3.781	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	438.2	13		
F	16.0	1.8	12.0	12.000	3.707	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	500.8	14		
G	18.0	1.8	12.0	12.000	3.632	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	563.4	15		
H	20.0	1.8	12.0	12.000	4.558	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	626.0	16		
J	22.0	1.8	12.0	12.000	4.483	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	688.6	17		
K	40.0	1.8	12.0	12.000	3.812	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	26		
L	44.0	1.8	12.0	12.000	3.663	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	28		
M	48.0	1.8	12.0	12.000	3.514	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	30		
N	52.0	1.8	12.0	12.000	3.365	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	32		
P	56.0	1.8	12.0	12.000	3.216	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34		
Q	60.0	1.8	12.0	12.000	3.067	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36		
R	64.0	1.8	12.0	12.000	2.918	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38		
S	68.0	1.8	12.0	12.000	2.769	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40		
T	72.0	1.8	12.0	12.000	2.620	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42		
U	76.0	1.8	12.0	6.462	2.471	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44		
Max Pressure =								0.061		Total		2.3		214.3		3408.2	

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	84.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton
Launch Way slope (deg)	Trim (aft)	3.377	H of keel at Fore Poppet =		0.792		Depth over way end		5.000	AP to FPop	91.7	meter
1.300% 0.74	Draft FP	-0.267	m	Draft Midship =		1.421	Draft at AP =		3.110	FP to way end	9.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)	
Trim =	3.0000	A30P140	1.4	1475.204	34.985	1271.77	1096.006	43.853	0.913	13.201	376.11	11.234	60.359
Slope (deg)	1.8748	A30P145	1.45	1531.481	35.312	1284.049	1101.154	43.92	0.934	12.827	367.554	11.287	61.229
			1.421	1499.4	35.13	1277.0	1098.2	43.88	0.92	13.04	372.43	11.26	60.73

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)	
Trim =	3.5000	A35P140	1.4	1490.953	33.106	1259.017	1081.15	42.807	0.989	13.1	355.316	11.082	57.61
Slope (deg)	2.1874	A35P145	1.45	1546.263	33.447	1272.699	1085.242	42.828	1.008	12.761	346.081	11.124	58.187
			1.421	1514.7	33.25	1264.9	1082.9	42.82	1.00	12.95	351.34	11.10	57.86

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	3.3770	1.421	1511.0	33.71	1267.9	1086.7	43.08	0.98	12.98	356.53	11.14	58.57
	Slope (deg)	2.1105											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1511.0	57.987	87615.7
Load on Air Bags =		197.5	14.478	2860
(Equilibrium moment)		1.5		-17

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	2.1105

Area Supported by Air Bag	0.170 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.060 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
0.793
0.792
Trim (P) -0.001
3.378
3.377

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 45 Rev. A UMG-TPAL-20-007	
TRAVEL		84.00 m													
Air Bag															
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 0.792 meter		H of FPop over WE 5.267 meter		Position A1 above WE 4.111 meter		Vessel Slope (deg) 3.682% 2.110					
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data
A1	2.0	1.8	12.0	0.150	1.082	0.054	2.138	2.54	0.060	0.060	1.13	0.17	1.0	2.1	7
B1	6.0	1.8	12.0	1.857	2.335	0.045	2.545	2.54	0.060	0.060	0.00	0.00	4.8	29.1	9
C1	8.0	1.8	12.0	5.114	3.606	0.045	2.545	2.54	0.060	0.060	0.00	0.00	13.3	106.7	10
D1	10.0	1.8	12.0	8.363	3.899	0.045	2.545	2.54	0.060	0.060	0.00	0.00	21.8	218.1	11
E1	12.0	1.8	12.0	11.182	3.825	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	375.6	12
F1	14.0	1.8	12.0	12.000	3.751	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	438.2	13
G1	16.0	1.8	12.0	12.000	4.678	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	500.8	14
H1	18.0	1.8	12.0	12.000	4.604	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	563.4	15
J1	20.0	1.8	12.0	12.000	4.530	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	626.0	16
K1	38.0	1.8	12.0	12.000	3.868	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	25
L1	42.0	1.8	12.0	12.000	3.720	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	27
M1	46.0	1.8	12.0	12.000	3.573	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	29
N1	50.0	1.8	12.0	12.000	3.426	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	31
P1	54.0	1.8	12.0	12.000	3.278	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	33
Q1	58.0	1.8	12.0	12.000	3.131	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35
R1	62.0	1.8	12.0	12.000	2.984	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37
S1	66.0	1.8	12.0	12.000	2.836	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39
T1	70.0	1.8	12.0	12.000	2.689	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41
U1	74.0	1.8	12.0	11.421	2.542	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43
Max Pressure =								0.060		Total		0.2		197.5	2860.0

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	88.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton	
Launch Way slope (deg)	Trim (aft)	3.309	H of keel at Fore Poppet =		1.664	Depth over way end		5.000	AP to FPop	91.7	meter		
1.30%	0.74	Draft FP	-0.214	m	Draft Midship =		1.441	Draft at AP =		3.095	FP to way end	5.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.0000 A30P140	1.4	1475.204	34.985	1271.77	1096.006	43.853	0.913	13.201	376.11	11.234	60.359
Slope (deg)	1.8748 A30P145	1.45	1531.481	35.312	1284.049	1101.154	43.92	0.934	12.827	367.554	11.287	61.229
		1.441	1520.8	35.25	1281.7	1100.2	43.91	0.93	12.90	369.18	11.28	61.06

Hydrostatics 2		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.5000 A35P140	1.4	1490.953	33.106	1259.017	1081.15	42.807	0.989	13.1	355.316	11.082	57.61
Slope (deg)	2.1874 A35P145	1.45	1546.263	33.447	1272.699	1085.242	42.828	1.008	12.761	346.081	11.124	58.187
		1.441	1535.8	33.38	1270.1	1084.5	42.82	1.00	12.83	347.84	11.12	58.08

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	3.3090	1.441	1530.0	34.10	1274.5	1090.5	43.24	0.98	12.85	355.99	11.18	59.22
	Slope (deg)	2.0680											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1530.0	57.604	88136.8
Load on Air Bags =		178.4	13.089	2334
(Equilibrium moment)		1.6		-12

RESULT

SLOPE (deg)	
LAUNCH WAY	VESEL KEEL
0.74	2.0680

Area Supported by Air Bag	0.000 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.060 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
1.665
1.664
Trim (P) -0.001
3.31
3.309

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 47 Rev. A UMG-TPAL-20-007			
TRAVEL		88.00 m															
Air Bag																	
Air Bag Spacing 4 meter		Launch-way Slope 0.74 1.300%		H of keel over FPop 1.664 meter		H of FPop over WE 5.214 meter		Position A above WE 1.366 meter		Vessel Slope (deg) 3.608% 2.068							
Name Code	Position from Fpop	Diameter	Length Effective	Length On Load	Constrain Height	Pressure L Full	Sec. area at Hcons	Cylindrical shape Area Pressure		Pressure L Effect.	Contact width	Contact Area	Lifting Force	Moment form FP	Air Bag Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A	4	1.8	12.0	0.228	3.704	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.6	2.4	8		
B	6.0	1.8	12.0	3.485	3.997	0.045	2.545	2.54	0.060	0.060	0.00	0.00	9.1	54.5	9		
C	8.0	1.8	12.0	6.742	3.925	0.045	2.545	2.54	0.060	0.060	0.00	0.00	17.6	140.7	10		
D	10.0	1.8	12.0	9.923	3.853	0.045	2.545	2.54	0.060	0.060	0.00	0.00	25.9	258.8	11		
E	12.0	1.8	12.0	12.000	4.781	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	375.6	12		
F	14.0	1.8	12.0	12.000	4.709	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	438.2	13		
G	16.0	1.8	12.0	12.000	4.637	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	500.8	14		
H	18.0	1.8	12.0	12.000	4.564	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	563.4	15		
J	36.0	1.8	12.0	12.000	3.915	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	24		
K	40.0	1.8	12.0	12.000	3.771	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	26		
L	44.0	1.8	12.0	12.000	3.626	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	28		
M	48.0	1.8	12.0	12.000	3.482	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	30		
N	52.0	1.8	12.0	12.000	3.338	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	32		
P	56.0	1.8	12.0	12.000	3.193	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	34		
Q	60.0	1.8	12.0	12.000	3.049	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	36		
R	64.0	1.8	12.0	12.000	2.905	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	38		
S	68.0	1.8	12.0	12.000	2.760	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	40		
T	72.0	1.8	12.0	12.000	2.616	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	42		
U	76.0	1.8	12.0	6.462	2.472	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	44		
								Max Pressure =		0.060	Total	0.0	178.4	2334.4			

SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER
PERHITUNGAN PELUNCURAN
PERGERAKAN SETIAP 4 METER

Draft calcs :	TRAVEL	92.00	m	Tide =	3.00	m	LCG	38.80	m frm AP	L Weight	1710	ton
Launch Way slope (deg)	Trim (aft)	3.104	H of keel at Fore Poppet =		3.700		Depth over way end		5.000	AP to FPop	91.7	meter
1.300% 0.74	Draft FP	-0.066	m	Draft Midship =		1.486	Draft at AP =		3.038	FP to way end	1.5	meter

Hydrostatics 1		Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)	
Trim =	3.0000	A30P145	1.45	1531.481	35.312	1284.049	1101.154	43.92	0.934	12.827	367.554	11.287	61.229
Slope (deg)	1.8748	A30P150	1.5	1588.03	35.619	1295.825	1105.696	43.969	0.955	12.477	358.938	11.333	61.994
			1.486	1572.2	35.53	1292.5	1104.4	43.96	0.95	12.58	361.35	11.32	61.78

Hydrostatics 2			Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Trim =	3.5000	A35P145	1.45	1546.263	33.447	1272.699	1085.242	42.828	1.008	12.761	346.081	11.124	58.187
Slope (deg)	2.1874	A35P150	1.5	1602.141	33.778	1289.673	1095.228	43.051	1.028	12.439	344.014	11.226	59.925
			1.486	1586.5	33.69	1284.9	1092.4	42.99	1.02	12.53	344.59	11.20	59.44

Hydrostatics 3		Factor	Draft @ MS (m)	Displt (t)	LCB (m)	WSA (m^2)	WPA (m^2)	LCF (m)	VCB (m)	KMT (m)	KML (m)	TPC (t/cm)	MTC (t-m/cm)
Slope =	Trim =	3.1040	1.486	1575.2	35.15	1290.9	1101.9	43.75	0.96	12.57	357.86	11.29	61.29
	Slope (deg)	1.9398											

Weights & Moments		Weight	Dist FP	Moment
		t	m	t x m
Launching weight =		1710.0	52.900	90459
Buoyancy Barge =		1575.2	56.551	89077.9
Load on Air Bags =		134.3	10.437	1401
(Equilibrium moment)		0.5		-20

RESULT

SLOPE (deg)	
LAUNCH WAY	VESSEL KEEL
0.74	1.9398

Area Supported by Air Bag	0.000 m ²
Normal Safe Working Pressure	0.150 Mpa
Max. Pressure Factor	1.250
Max. Pressure of Air Bag (Limit)	0.188 Mpa
Max Pressure of Air Bag (Actual)	0.060 Mpa

AIR BAG PRESSURE

- O K -

Weight (L) -0.001
3.701
3.7
Trim (P) -0.002
3.104
3.104

UNIV. MUHAMMADIYAH GRESIK TEKNIK KONSTRUKSI PERKAPALAN				SKRIPSI PELUNCURAN KAPAL CARGO 93.5 METER PERHITUNGAN PELUNCURAN PERGERAKAN SETIAP 4 METER										Page 49 Rev. A UMG-TPAL-20-007			
TRAVEL		92.00 m															
Air Bag																	
Air Bag Spacing		Launch-way Slope		H of keel over FPop		H of FPop over WE		Position A1 above WE		Vessel Slope		3.384%					
4 meter		0.74 1.300%		3.700 meter		5.066 meter		1.000 meter		(deg) 1.940							
Name	Position	Diameter	Length	Length	Constrain	Pressure	Sec. area	Cylindrical shape		Pressure	Contact	Contact	Lifting	Moment	Air Bag		
Code	from Fpop		Effective	On Load	Height	L Full	at Hcons	Area	Pressure	L Effect.	width	Area	Force	form FP	Series at		
(-)	(m)	(m)	(m)	(m)	(m)	(MPa)	(m²)	(m²)	(MPa)	(MPa)	(m)	(m²)	(ton)	(ton.m)	Aux Data		
A1	2.0	1.8	12.0	0.150	3.998	0.045	2.545	2.54	0.060	0.060	0.00	0.00	0.4	0.8	7		
B1	4.0	1.8	12.0	1.857	3.931	0.045	2.545	2.54	0.060	0.060	0.00	0.00	4.8	19.4	8		
C1	6.0	1.8	12.0	5.114	3.863	0.045	2.545	2.54	0.060	0.060	0.00	0.00	13.3	80.0	9		
D1	8.0	1.8	12.0	8.363	4.795	0.045	2.545	2.54	0.060	0.060	0.00	0.00	21.8	174.5	10		
E1	10.0	1.8	12.0	11.182	4.728	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	313.0	11		
F1	12.0	1.8	12.0	12.000	4.660	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	375.6	12		
G1	14.0	1.8	12.0	12.000	4.592	0.045	2.545	2.54	0.060	0.060	0.00	0.00	31.3	438.2	13		
H1	30.0	1.8	12.0	12.000	4.051	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	21		
J1	34.0	1.8	12.0	12.000	3.915	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	23		
K1	38.0	1.8	12.0	12.000	3.780	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	25		
L1	42.0	1.8	12.0	12.000	3.644	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	27		
M1	46.0	1.8	12.0	12.000	3.509	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	29		
N1	50.0	1.8	12.0	12.000	3.374	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	31		
P1	54.0	1.8	12.0	12.000	3.238	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	33		
Q1	58.0	1.8	12.0	12.000	3.103	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	35		
R1	62.0	1.8	12.0	12.000	2.967	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	37		
S1	66.0	1.8	12.0	12.000	2.832	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	39		
T1	70.0	1.8	12.0	12.000	2.697	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	41		
U1	74.0	1.8	12.0	11.421	2.561	0.045	2.545	2.54	0.000	0.000	0.00	0.00	0.0	0.0	43		
								Max Pressure =		0.060	Total	0.0	134.3	1401.5			