BAB 5
PENUTUP

5.1 Kesimpulan

Berdasarkan hasil peninjauan pembangunan kapal Coaster 1200 GT dengan metode *Full Outfitting Block System* (FOBS) digalangan X, didapatkan beberapa kesimpulan sebagai berikut :

1. Penerapan metode *Full Outfitting Block System* (FOBS) dalam pemasangan pipa dapat mempersingkat waktu pembangunan kapal dengan cara meningkatkan produktivitas pekerjaan *Outfitting* dan melakukan pekerjaan *Outfitting* bersamaan dengan *hull construcsion.*

2. Dari hasil penelitian didapat nilai–nilai produktivitas yaitu produktivitas pemasangan sistem pemipaan di blok ABS 1 dan ABS 2 kapal Coaster menggunakan metode *Full Outfitting Block System* (FOBS) adalah 164 JO dan Produktivitas menggunakan metode Konvensional 188.85 JO. Maka dari hasil diatas, metode *Full Outfitting Block System* (FOBS) lebih efisien dibandingkan metode Konvensional.

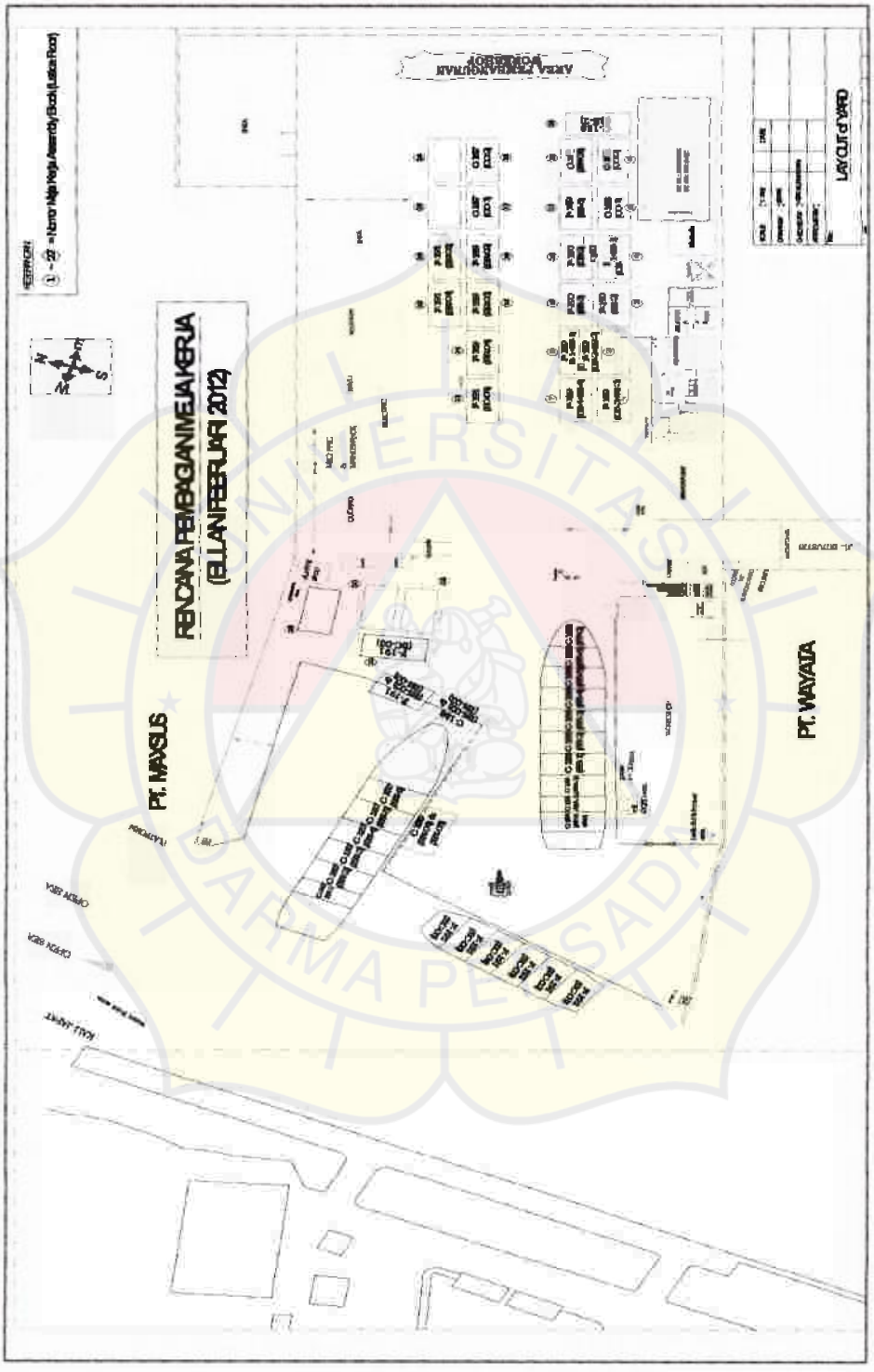
5.2 Saran

Adapun saran yang dapat diberikan, antara lain:

1. Galangan di Indonesia masih banyak menggunakan metode system block konvensioanal, sebaiknya galangan kini menggunakan metode FOBS karena metode FOBS sangat menguntungkan dalam proses pembangunan kapal baik dari segi produksi dan efisiensi waktu.

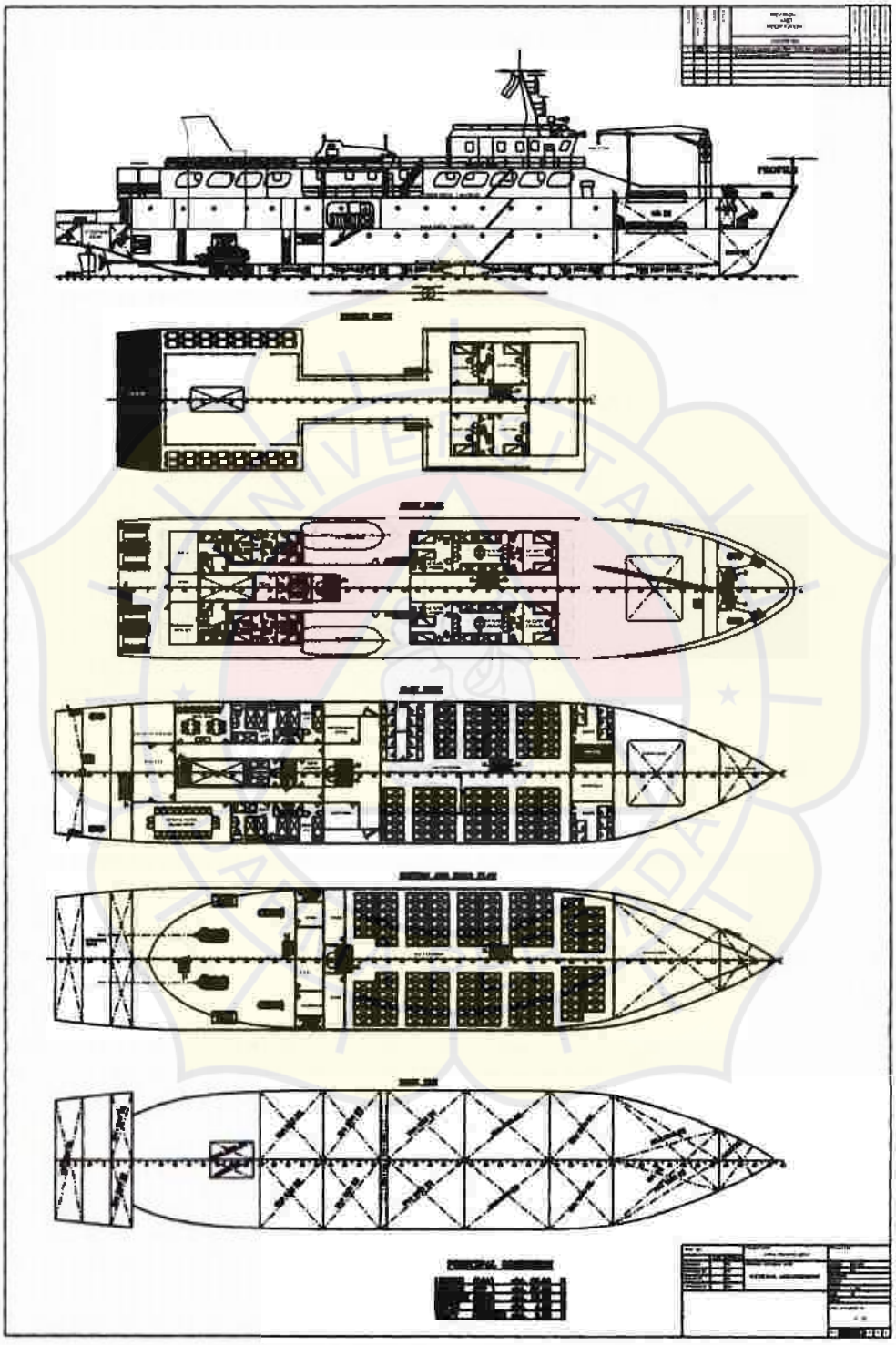
Lampiran 2

Lay Out Galangan



Lampiran 3

GA Kapal Coaster 1200 GT



Lampiran 4

Standar Daftar Jam Orang Di Galangan

CODE NO.	JENIS PEKERJAAN	VOLUME	JAM ORANG
6	**PEKERJAAN PIPA DIBENGKEL**		
6.01	**Persiapan Material**		
06.01.01	Ø(15–25) A	Batang	0,50
06.01.02	Ø(32–40) A	"	0,50
06.01.03	Ø(50–65) A	"	0,50
06.01.04	Ø(80 –90) A	"	0,50
06.01.05	Ø (100) A	"	0,50
06.01.06	Ø(125 – 150) A	"	0,75
06.01.07	Ø (200) A	"	0,75
06.01.08	Ø (250) A	"	0,75
06.01.09	Ø (300 - 350) A	"	0,75
6.02	**Marking**		
06.02.01	Ø(15–25)A	Buah	0,10
06.02.02	Ø(32 –40) A	"	0,10
06.02.03	Ø(50–65) A	"	0,20
06.02.04	Ø (80– 90) A	"	0,20
06.02.05	Ø (100) A	"	0,25
06.02.06	Ø(125 – 150) A	"	0,30
06.02.07	Ø (200) A	"	0,30
06.02.08	Ø (250) A	"	0,40
06.02.09	Ø (300 - 350) A	"	0,40
6.03	**Cutting & Grinding**		
06.03.01	Ø(15–25) A	Buah	0,20
06.03.02	Ø(32–40) A	"	0,20
06.03.03	Ø(50–65) A	"	0,20
06.03.04	Ø (80–90) A	"	0,25
06.03.05	Ø (100) A	"	0,25
06.03.06	Ø(125 – 150) A	"	0,30
06.03.07	Ø (200) A	"	0,30
06.03.08	Ø (250) A	"	0,50
06.03.09	Ø (300 - 350) A	"	0,50

6.04	**Bending/Bengkokkan**		
06.04.01	Ø(15–25) A	Buah	0,10
06.04.02	Ø(32 –40) A	"	0,10
06.04.03	Ø(50 –65) A	"	0,20
06.04.04	Ø (80–90) A	"	0,30
06.04.05	Ø (100) A	"	0,50
06.04.06	Ø(125– 150) A	"	1,00
06.04.07	Ø (200) A	"	1,00
06.04.08	Ø (250) A	"	2,00
06.04.09	Ø (300- 350) A	"	3,00
6.05	**Fit UP & EP**		
06.05.01	Ø(15 –25) A	Unit	0,25
06.05.02	Ø(32–40) A	"	0,25
06.05.03	Ø (50 –65) A	"	0,30
06.05.04	Ø(80 –90) A	"	0,30
06.05.05	Ø (100) A	"	0,40
06.05.06	Ø (125 – 150) A	"	0,50
06.05.07	Ø (200) A	"	1,00
06.05.08	Ø (250) A	"	1,00
06.05.09	Ø (300 - 350) A	"	1,50
6.06	**Welding (butt & fillet)**		
06.06.01	Ø(15–25) A	Lingkar	0,50
06.06.02	Ø(32–40) A	"	0,75
06.06.03	Ø(50–65) A	"	1,25
06.06.04	Ø (80–90) A	"	1,75
06.06.05	Ø(100)A	"	2,00
06.06.06	Ø(125 – 150) A	"	2,50
06.06.07	Ø(200) A	"	2,50
06.06.08	Ø(250) A	"	3,00
06.06.09	Ø(300 -350) A	"	3,50
6.07	**NDT**		
06.07.01	Ø(15–25) A	Batang	0,50
06.07.02	Ø(32 –40) A	"	0,50
06.07.03	Ø(50–65) A	"	0,50
06.07.04	Ø (80–90) A	"	0,50
06.07.05	Ø(100)A	"	0,75
06.07.06	Ø (125 – 150) A	"	0,75
06.07.07	Ø (200) A	"	1,25
06.07.08	Ø (250) A	"	1,25
06.07.09	Ø (300- 350) A	"	1,25

6.08	**S/B Primering**		
06.08.01	Ø(15–25) A	Batang	1,00
06.08.02	Ø(32–40) A	"	1,00
06.08.03	Ø(50– 65) A	"	1,00
06.08.04	Ø (80–90) A	"	1,00
06.08.05	Ø (100) A	"	1,00
06.08.06	Ø (125 – 150) A	"	1,00
06.08.07	Ø (200) A	"	1,00
06.08.08	Ø (250) A	"	1,00
06.08.09	Ø (300 - 350) A	"	1,00
6.09	**Coating**		
06.09.01	Ø(15–25) A	Batang	0,25
06.09.02	Ø (32 –40) A	"	0,25
06.09.03	Ø (50–65) A	"	0,25
06.09.04	Ø(80 –90) A	"	0,35
06.09.05	Ø (100) A	"	0,35
06.09.06	Ø(125 – 150) A	"	0,40
06.09.07	Ø (200) A	"	0,40
06.09.08	Ø(250) A	"	0,75
06.09.09	Ø (300- 350) A	"	1,00
6.10	**Instalation**		
06.10.01	Ø(15–25) A	Potong	0,25
06.10.02	Ø(32–40) A	"	0,25
06.10.03	Ø(50– 65) A	"	0,30
06.10.04	Ø (80– 90) A	"	0,30
06. 10.05	Ø(100)A	"	0,40
06.10.06	Ø (125 – 150) A	"	0,50
06.10.07	Ø (200) A	"	1,00
06.10.08	Ø (250) A	"	1,00
06.10.09	Ø (300 - 350) A	"	1,00

7	**PEKERJAAN PIPA DI KAPAL**		
7.01	**Transportasi**		
07.01.01	Ø (15–25) A	Sejalan	1,50
07.01.02	Ø(32–40) A	"	1,50
07.01.03	Ø (50–65) A	"	1,50
07.01.04	Ø (80 –90) A	"	1,50
07.01.05	Ø (100) A	"	1,50
07.01.06	Ø (125 – 150) A	"	1,50
07.01.07	Ø (200) A	"	1,50
07.01.08	Ø (250) A	"	1,50
07.01.09	Ø (300- 350) A	"	1,50
7.02	**Marking**		
07.02.01	Ø (15–25) A	Buah	0,20
07.02.02	Ø(32–40) A	"	0,20
07.02.03	Ø (50–65) A	"	0,25
07.02.04	Ø (80 –90) A	"	0,25
07.02.05	Ø (100) A	"	0,35
07.02.06	Ø(125 –150) A	"	0,35
07.02.07	Ø (200) A	"	0,40
07.02.08	Ø (250) A	"	0,50
07.02.09	Ø (300 - 350) A	"	0,50
7.03	**Cutting**		
07.03.01	Ø(15 –25)A	Buah	0,20
07.03.02	Ø(32–40) A	"	0,20
07.03.03	Ø(50–65) A	"	0,25
07.03.04	Ø(80–90) A	"	0,25
07.03.05	Ø (100) A	"	0,25
07.03.06	Ø(125 – 150) A	"	0,30
07.03.07	Ø (200) A	"	0,30
07.03.08	Ø(250) A	"	0,40
07.03.09	Ø (300- 350) A	"	0,40

7.04	**Fit UP**		
07.04.01	Ø(15–25)A	Unit	0,50
07.04.02	Ø(32–40) A	"	1,00
07.04.03	Ø(50–65) A	"	2,00
07.04.04	Ø (80–90) A	"	2,50
07.04.05	Ø (100) A	"	3,00
07.04.06	Ø (125 – 150) A	"	3,50
07.04.07	Ø (200) A	"	4,00
07.04.08	Ø (250) A	"	4,50
07.04.09	Ø (300 - 350) A	"	6,00
7.05	**Welding (butt & fillet)**		
07.05.01	Ø(15–25)A	Lingkaran	0,50
07.05.02	Ø(32 –40) A	"	0,75
07.05.03	Ø(50 –65) A	"	1,00
07.05.04	Ø (80–90) A	"	1,50
07.05.05	Ø (100) A	"	2,00
07.05.06	Ø(125 –150) A	"	2,50
07.05.07	Ø (200) A	"	2,50
07.05.08	Ø (250) A	"	3,00
07.05.09	Ø (300 - 350) A	"	3,50
7.06	**Instalation**		
07.06.01	Ø(15–25) A	Potong	0,75
07.06.02	Ø(32–40) A	"	0,75
07.06.03	Ø(50–65) A	"	1,00
07.06.04	Ø (80–90) A	"	1,00
07.06.05	Ø(100)A	"	1,50
07.06.06	Ø(125 – 150) A	"	2,00
07.06.07	Ø (200) A	"	2,50
07.06.08	Ø (250) A	"	3,00
07.06.09	Ø (300 -350) A	"	4,00
7.07	**Test Pressure**		
07.07.01	Ø(15–25) A	Jalur	4,00
07.07.02	Ø(32 –40) A	"	4,00
07.07.03	Ø (50–65) A	"	5,00
07.07.04	Ø(80 –90) A	"	5,00
07.07.05	Ø(100)A	"	6,00
07.07.06	Ø (125 – 150) A	"	6,00
07.07.07	Ø (200) A	"	7,00
07.07.08	Ø (250) A	"	7,50
07.07.09	Ø (300 - 350) A	"	8,00

MODIFICATION	ZONE	DATE	REVISION AND MODIFICATION — DESCRIPTION	DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY

RANCANG BANGUN

APPROVED

Yard Number : C241

Date : 20-12-2012

	DATE	APPROVAL
BY		
BY		
BY		

PROJECT NAME : PERINTIS 1200 GT

DRAWING / DOCUMENT NAME : ENGINE ROOM LAY OUT

PROJECT NO : 241 / ~~242~~

OWNER :

CLASS : BKI

DESIGNER :

GROUP :

SCALE :

SIZE : A4/A3

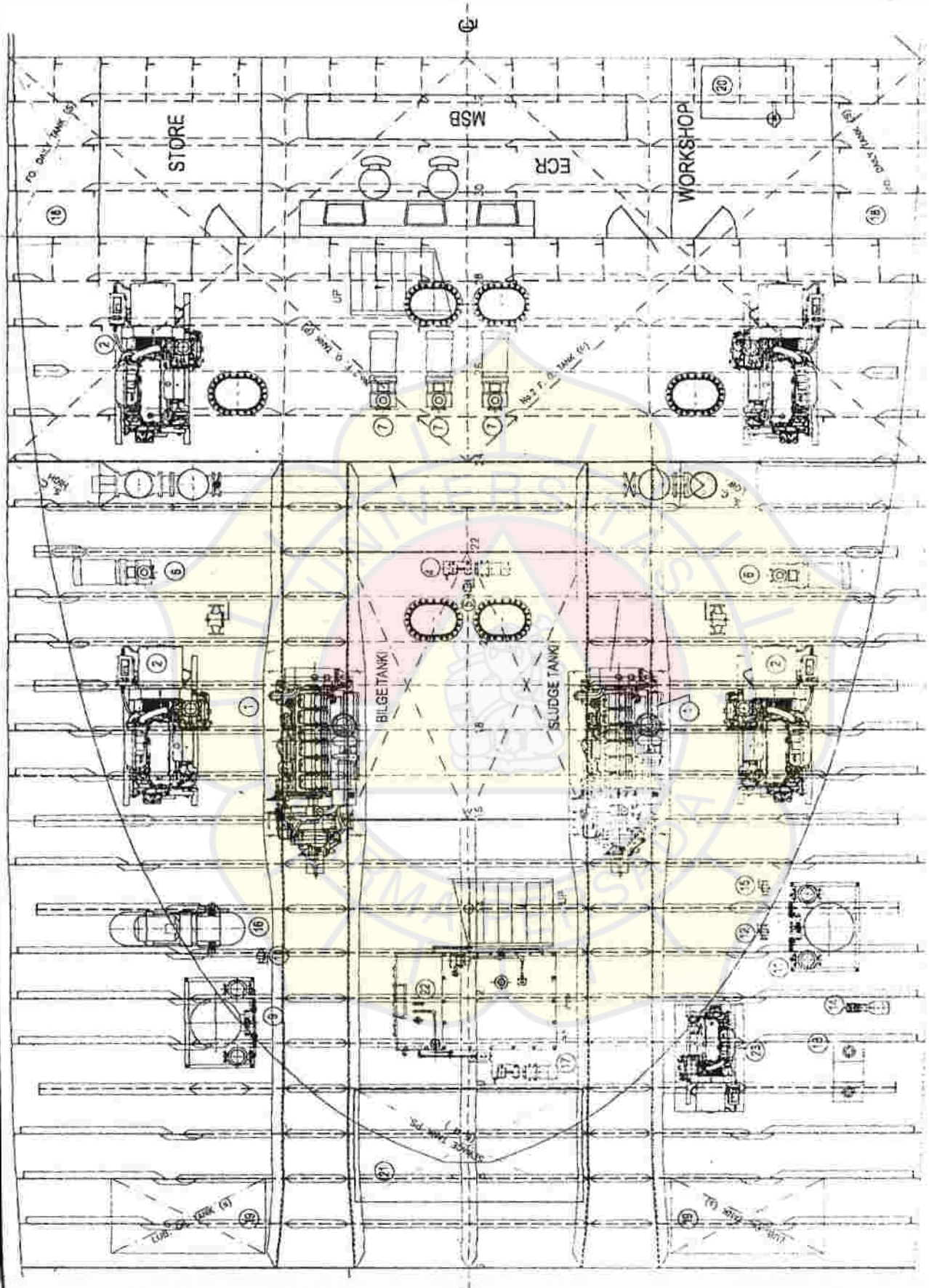
SHEET : 6 SHEETS WITH COVER

DRW/DOCUMENT NO : M-01

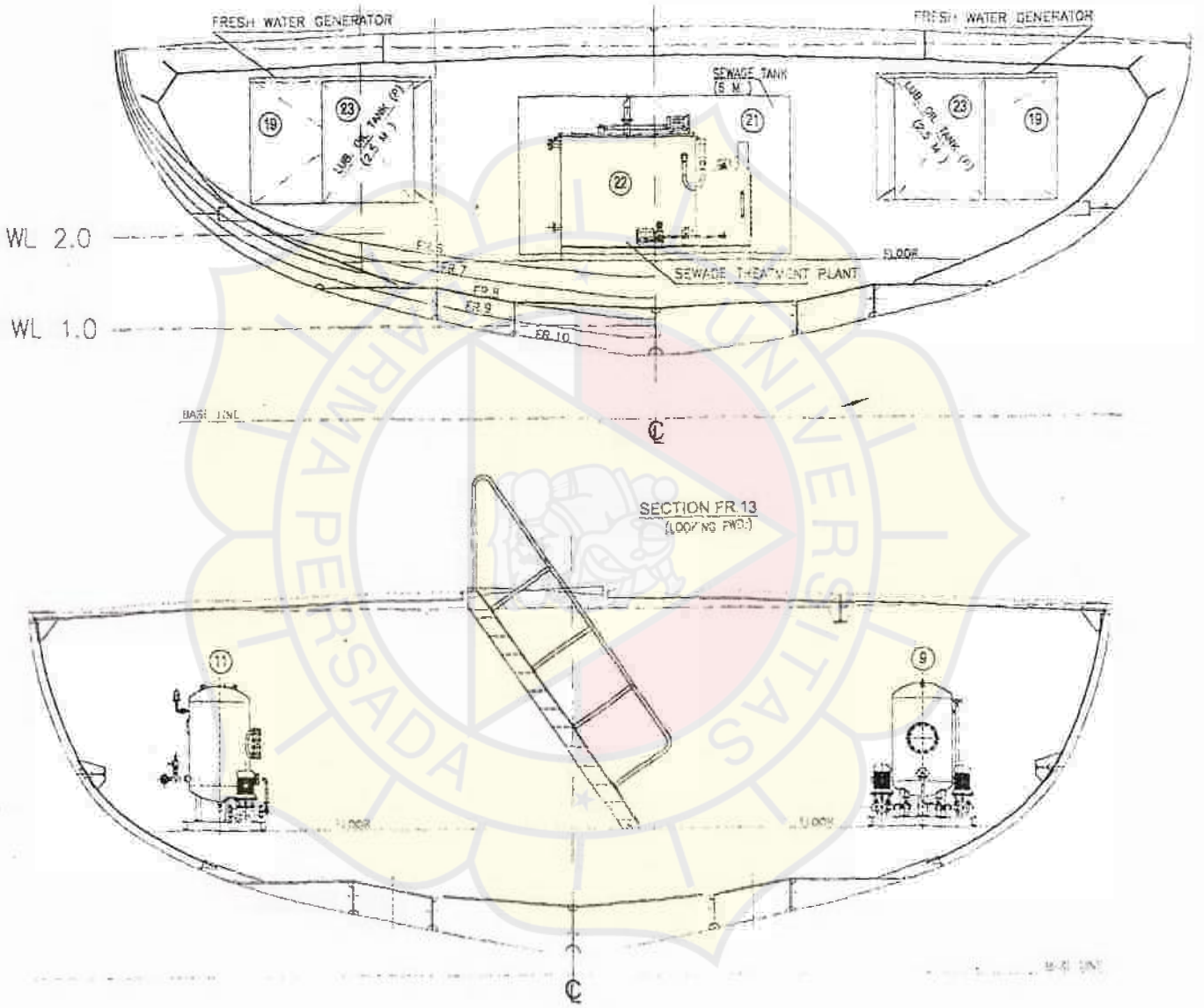
REV. 0 1 2 3 4 5

LIST OF MACHINE

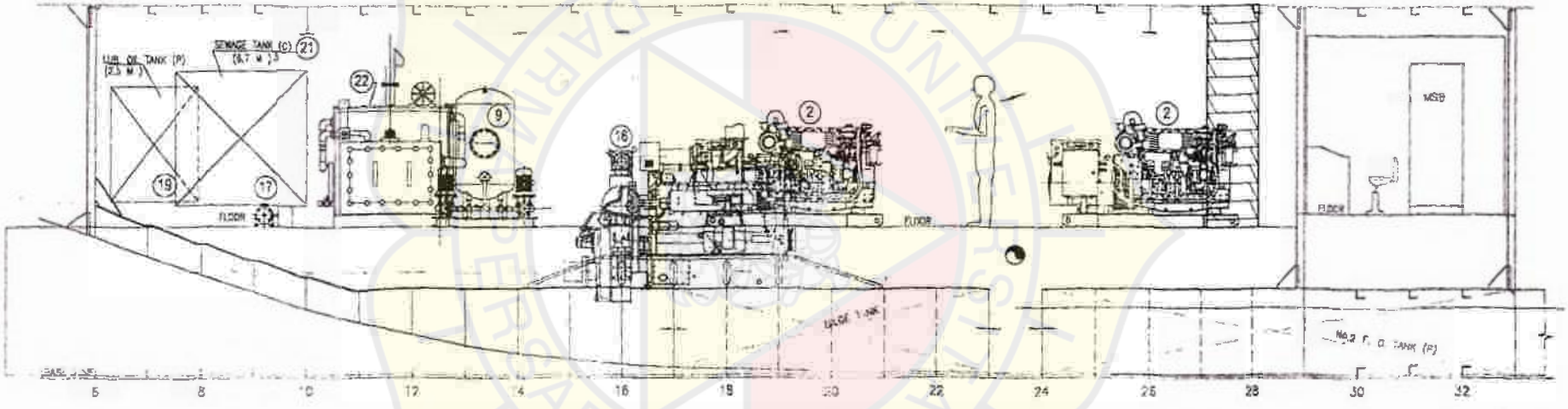
No.	DESCRIPTION	QTY	CAPACITY	REMARKS
1	MAIN ENGINE (MITSUBISHI S6A3-MTK)	2	2 x 1030 PS. 1450 RPM	
2	DIESEL ENGINE	3	1500 RPM, 3x150KVA AC 380/220V 3 Phase 50Hz	
3	HARBOUR GENERATOR	1	150 KVA, AC 380/220 V, 3 Phase, 50 Hz	
4	FO. TRANSFER PUMP	1	GEAR PUMP, 5 m^3/h 30m 1.5KW	
5	HAND PUMP FOR FO.	1		
6	BILGE PUMP	1	CENTR. SELF PRIMING, 36 m^3/h 24m 5.5KW	
7	BALLAST PUMP	3	CENTR. SELF PRIMING, 30 m^3/h 23m 5.5KW	
8	FIRE /GS. PUMP	1	CENTR. SELF PRIMING, 36 m^3/h 42m 5.5KW	
9	HYDROPHORE SW. PUMP	1	200L, CENTR. SLELF PRIMING 3 m^3/h 20m 1.1 KW	
10	HAND PUMP FOR SW.	1		
11	HYDROPHORE FW. PUMP	1	200L, CENTR. SLELF PRIMING 3 m^3/h 20m 1.1 KW	
12	HAND PUMP FOR FW.	1		
13	OILY WATER SEPARATOR	1	≤15 ppm	
14	BILGE PUMP FOR OWS.	1	CENTR. SELF PRIMING, 0.5 m^3/h 30m	
15	HAND PUMP FOR OWS.	1		
16	AIR COMPRESSOR	1	VBS Type/Model 10K 0.75 KW, 100 Ltr	
17	SEWAGE PUMP	1	CENT. PUMP TYPE, 10 m^3/h 20m 1.5KW	
18	FO. DAILY TANK	2		
19	LUB. OIL TANK	2	2.5 m^3	
20	WORKING TABLE	1		
21	SEWAGE TANK	1	6. m^3	
22	SEWAGE TREATMENT PLANT	1	Cap. 20 Persons	
23	FRESH WATER GENERATOR	1		
24	HARBOUR GENERATOR	1		
25				
26				
27				

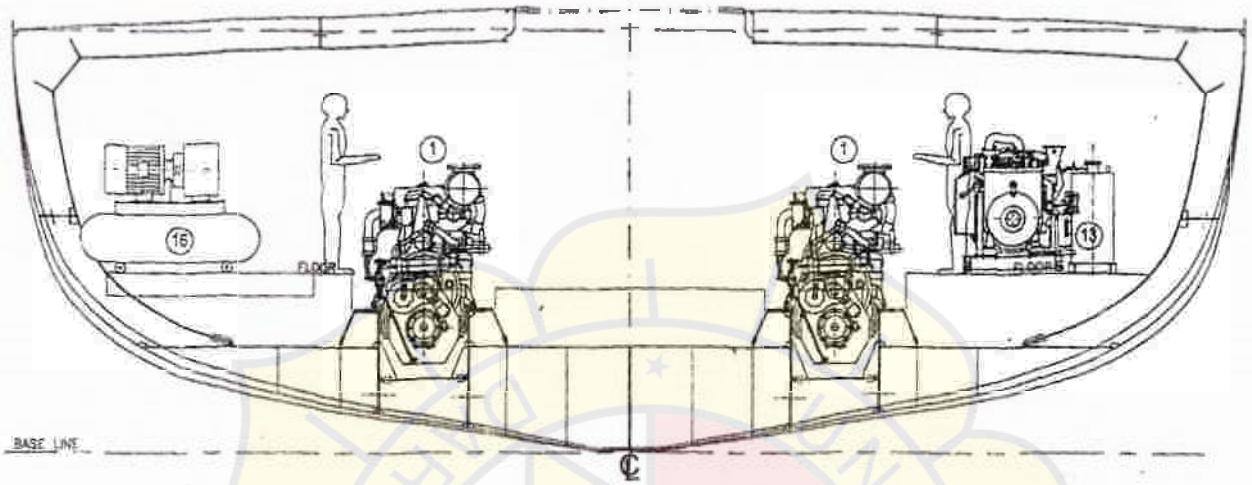

STORE
MSB
ECR
WORKSHOP
BILGE TANK
SLUDGE TANK

SECTION FR.6~10
(LOOKING FWD.)

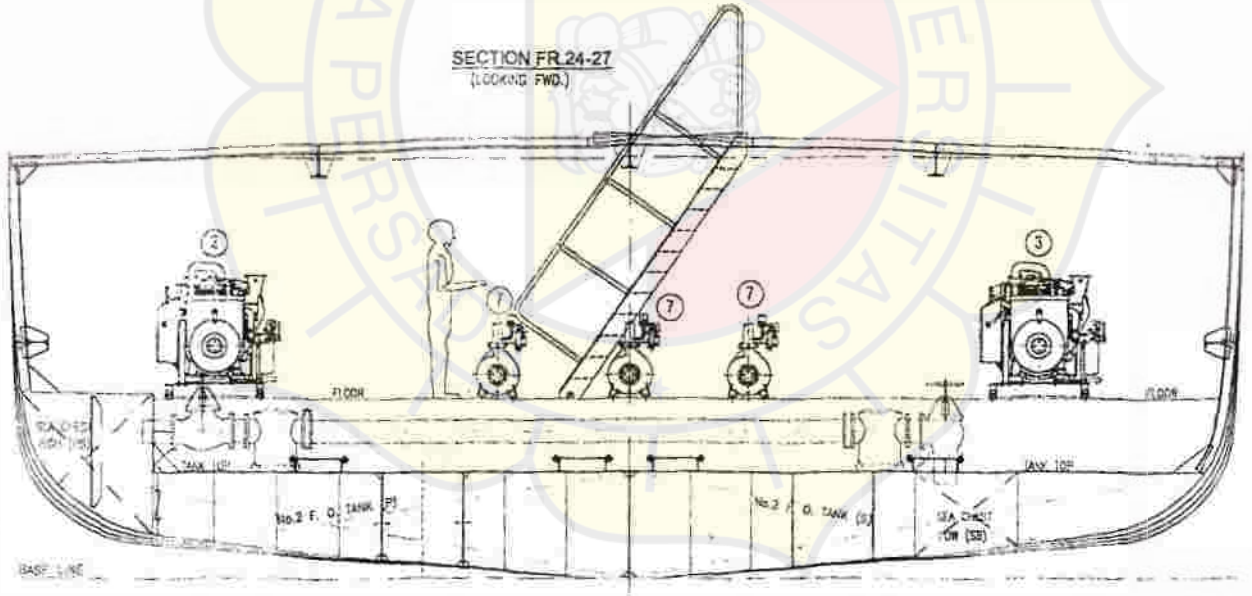


SECTION 1300 FROM CL. PS





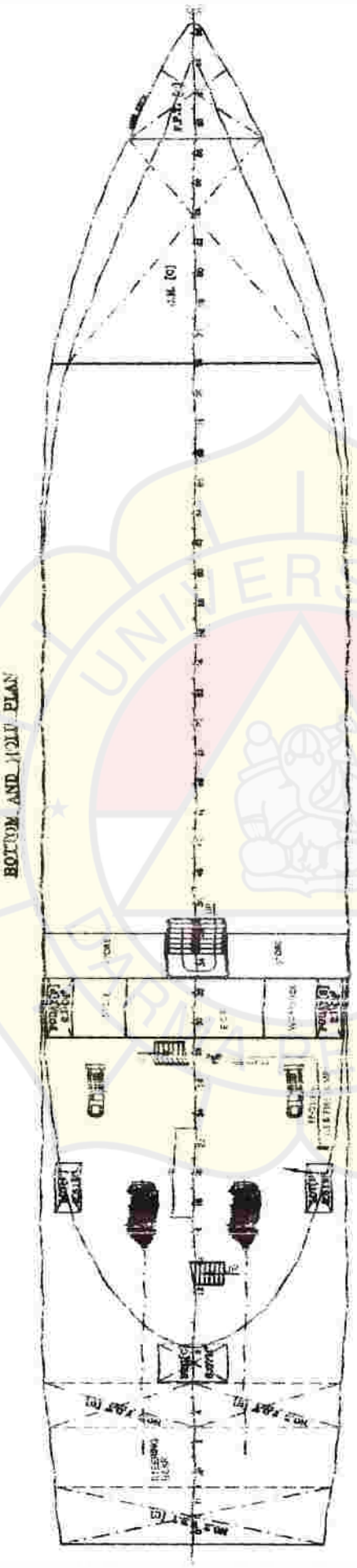
SECTION FR.24-27
(LOOKING FWD.)



INDEX OF REV MODIFICATION	ZONE	DATE	REVISION AND MODIFICATION — DESCRIPTION	DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY

PEMILIK / CLARIGAN

R : 2012			PROJECT NAME : KAPAL PERINTIS 1200 GT	PROJECT NO : 241
	DATE	APPROVAL		
WN BY	24/09	DYT	DRAWING / DOCUMENT NAME : **FIRE FIGHTING SYSTEM**	OWNER : DEPHUB
GNED BY		DYT		CLASS : BKI
EDBY		MM		DESIGNER :
OVED BY		HDP		GROUP : ENGINEERING
				SCALE : ~
				SIZE : A4
				SHEET : 2 SHEET WITH COVER
				DRW / DOCUMENT NO: PIPING 01
				REV (10) 2 3 4 5


BOTTOM AND 1/2LP PLAN

SHEET	INDEX OF REV MODIFICATION	ZONE	DATE	REVISION AND MODIFICATION — DESCRIPTION	DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY

BIRO KLASIFIKASI INDONESIA

APPROVED

DISETUJUI

Numbe r : 1201168 **Nomor**

27 MAR 2013

JAKARTA,

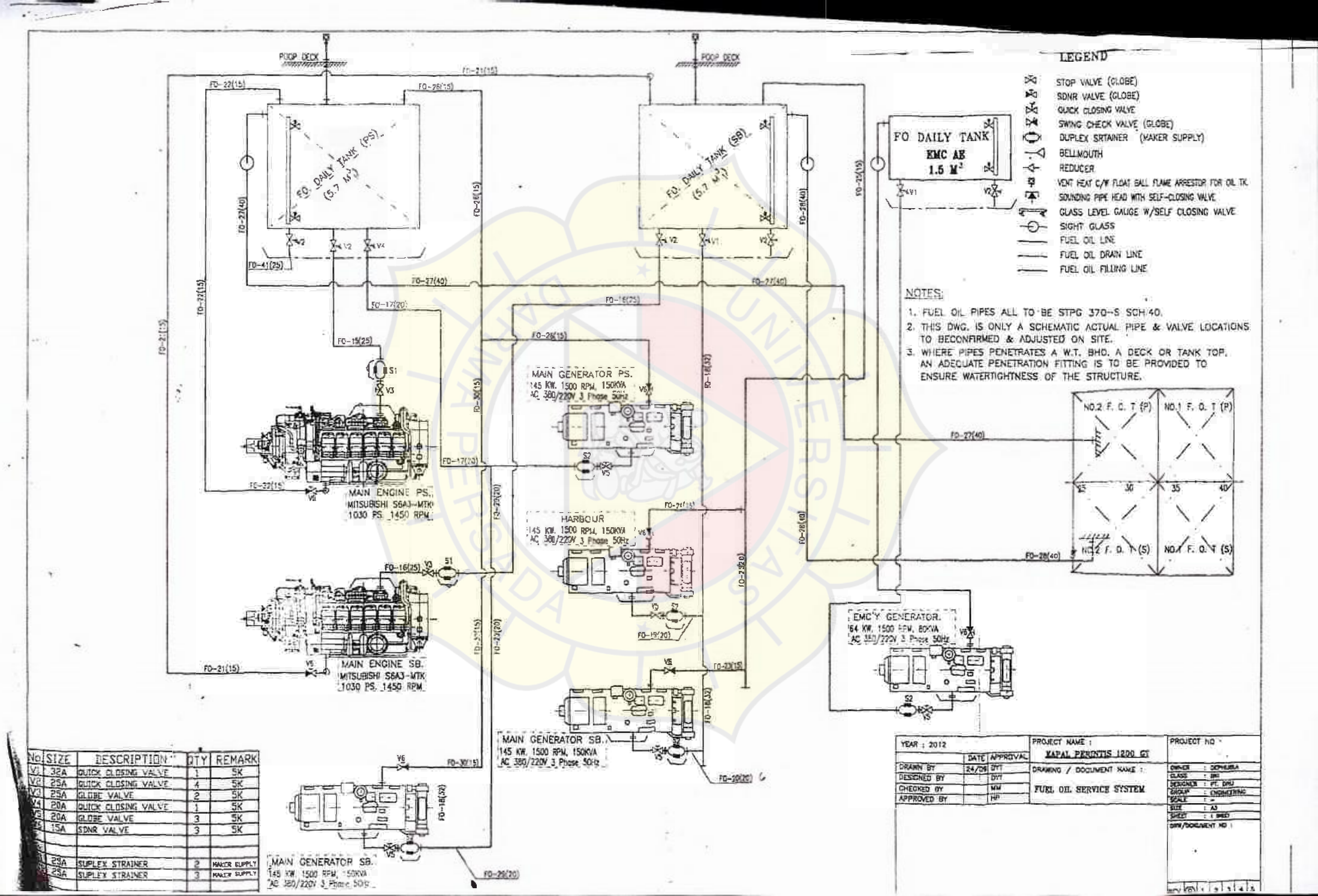
RED REMARKS OR OBSERVATIONS
CATATAN MERAH AGAR DIPERHATIKAN

GALANGAN

CATATAN:

1) FODT WATER DRAIN HARUS DILENGKAPI SELF CLOSING VALVE.
2) QUICK CLOSING VALVE HARUS DAPAT DITUTUP DARI LUAR KAMAR MESIN.

YEAR: 2012			PROJECT NAME: KAPAL PERINTIS 1200 GT	PROJECT NO: 241
	DATE	APPROVAL		
DRAWN BY	24/09	DYT	DRAWING / DOCUMENT NAME: **FUEL OIL SERVICE PIPING SYSTEM**	OWNER : DEPHUB
DESIGNED BY		DYT		CLASS : BKI
CHEKED BY		MM		DESIGNER :
APPROVED BY		HDP		GROUP : ENGINEERING
				SCALE : ~
				SIZE : A4
				SHEET : 2SHEET WITH COVER
				DRW / DOCUMENT NO :
				REV : (0) 2 3 4 5



No	SIZE	DESCRIPTION	QTY	REMARK
V1	32A	QUICK CLOSING VALVE	1	SK
V2	25A	QUICK CLOSING VALVE	4	SK
V3	25A	GLOBE VALVE	2	SK
V4	20A	QUICK CLOSING VALVE	1	SK
V5	20A	GLOBE VALVE	3	SK
V6	15A	SDNR VALVE	3	SK
S1	25A	SUPLEX STRAINER	2	MAKER SUPPLY
S2	25A	SUPLEX STRAINER	3	MAKER SUPPLY

YEAR : 2012			PROJECT NAME : KAPAL PERINTIS 1200 GT
	DATE	APPROVAL	
DRAWN BY	24/08	DYT	DRAWING / DOCUMENT NAME : FUEL OIL SERVICE SYSTEM
DESIGNED BY		DYT	
CHECKED BY		MW	
APPROVED BY		HP	

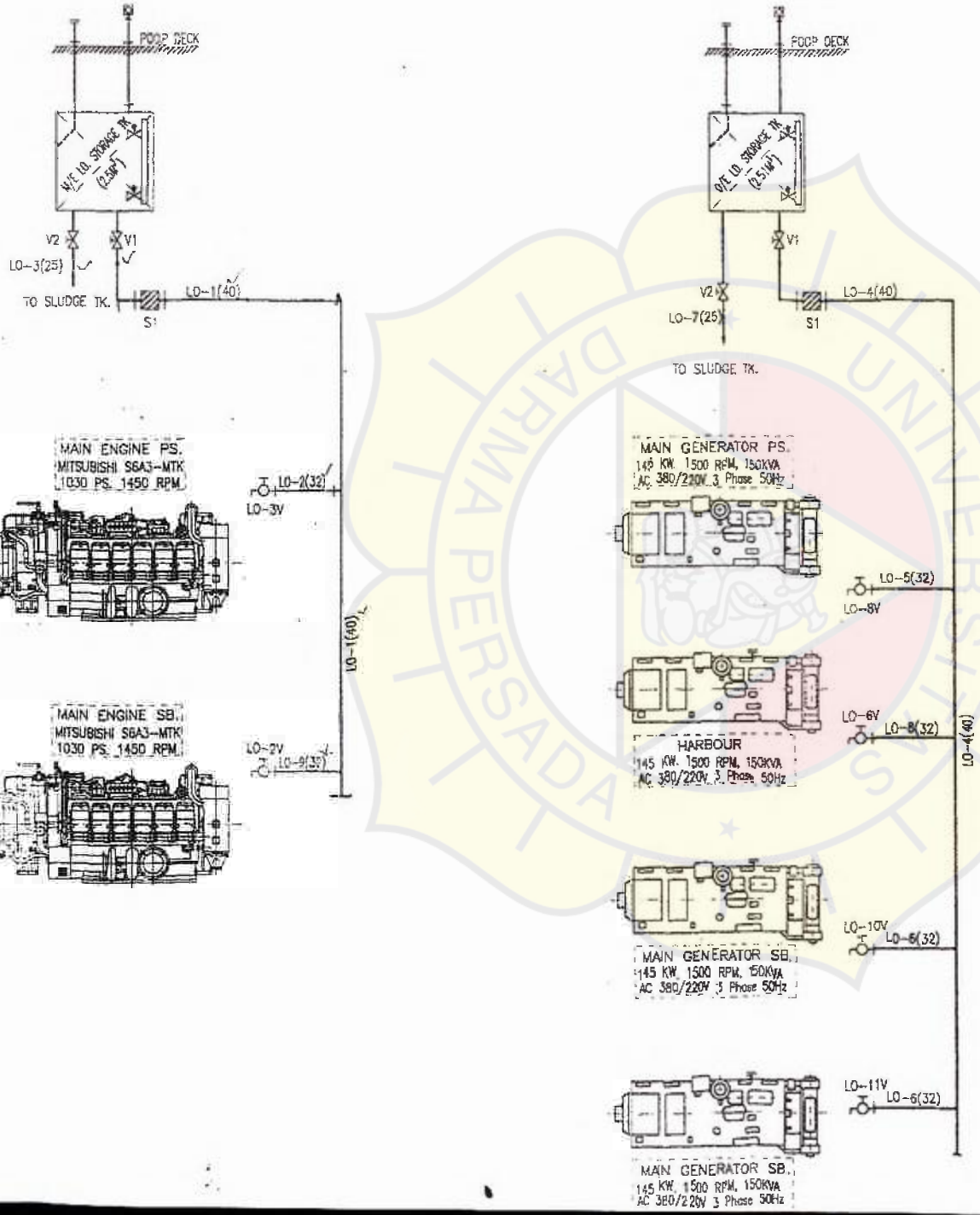
PROJECT NO :
OWNER : DEPHUBLA
CLASS : BKI
DESIGNER : PT. DRU
GROUP : ENGINEERING
SCALE : -
SIZE : A3
SHEET : 1 SHEET
DRW/DOCUMENT NO :
REV 0 | 1 | 2 | 3 | 4 | 5

SECTION	REVISION	ZONE	DATE	REVISION AND MODIFICATION — DESCRIPTION	DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY

PEMILIK / GALANGAN

BIRO KLASIFIKASI INDONESIA
SEEN
DIKETAHUI
Number: Nomor 120 116880
27 MAR 2013
JAKARTA.

YEAR : 2012			PROJECT NAME : KAPAL PERINTIS 1200 GT		PROJECT NO : 941
	DATE	APPROVAL			
DRAWN BY	27/09	DYT	DRAWING / DOCUMENT NAME : L.O PIPING SYSTEM		OWNER : DEPHUB
DESIGNED BY		DYT			CLASS : BKI
CHEKED BY		MM			DESIGNER GROUP : ENGINEERING
APPROVED BY		HDP			SCALE : ~
					SIZE : A4
					SHEET : 2 SHEET WITH COVE
					DRW / DOCUMENT NO :
					REV. 0 1 2 3 4



SYMBOLS	DESCRIPTION
	STOP VALVE (GLOBE)
	COCK VALVE (KRAN)
	STRAINER SIMPLEX
	VENT HEAT C/W FLOAT BALL FLAME ARRESTOR FOR OIL TK.
	FILLING PIPE
	GLASS LEVEL GAUGE W/SELF CLOSING VALVE
	LUBRICATING OIL LINE

1. PIPES No. LO-1 ~ LO-9
2. VALVES No. LO-1V ~ LO-10V
3. STRAINER No. LO-1S ~ LO-2S

NOTES:

1. LUB. OIL PIPES ALL TO BE STPG 370-S SCH.40.
2. THIS DWG. IS ONLY A SCHEMATIC ACTUAL PIPE & VALVE LOCATIONS TO BECONFIRMED & ADJUSTED ON SITE.

YEAR : 2012			PROJECT NAME : KAPAL PERINTIS 1200 GT
	DATE	APPROVAL	
DRAWN BY		DYT	DRAWING / DOCUMENT NAME : LUBRICATING OIL PIPING SYSTEM
DESIGNED BY		DYT	
CHECKED BY		MM	
APPROVED BY		HP	

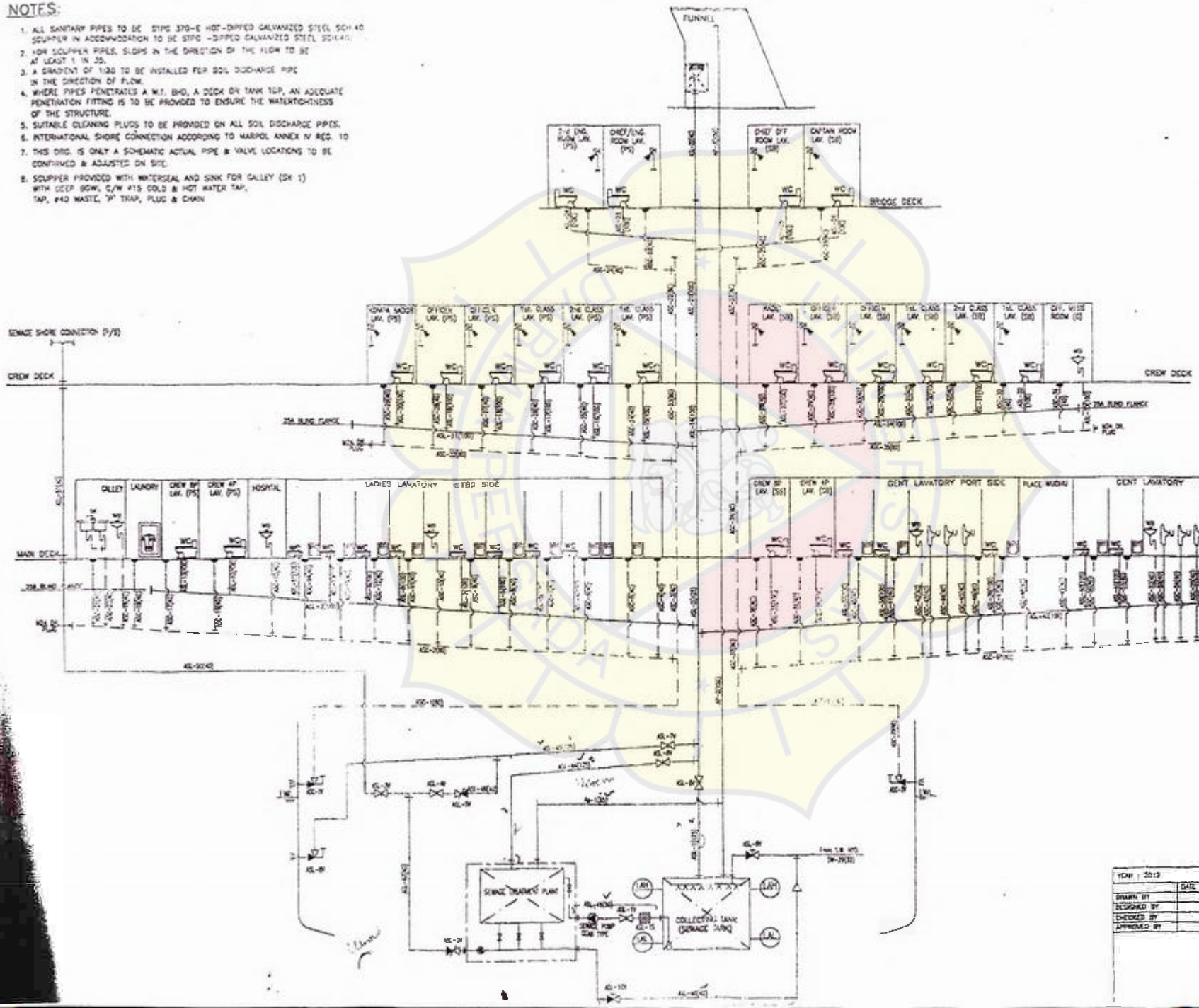
PROJECT NO :

OWNER	DEPHUBLA
CLASS	BKI
DESIGNER	PT. DRU
GROUP	
SCALE	
SIZE	
SHEET	
DRW/DOKUMENT NO	

NOTES:

1. ALL SANITARY PIPES TO BE STPG 370-E HOT-DIPPED GALVANIZED STEEL SCH 40 SCUPPER IN ACCOMMODATION TO BE STPG -DIPPED GALVANIZED STEEL SCH40.
2. FOR SCUPPER PIPES, SLOPS IN THE DIRECTION OF THE FLOW TO BE AT LEAST 1 IN 35.
3. A GRADIENT OF 1:30 TO BE INSTALLED FOR SOIL DISCHARGE PIPE IN THE DIRECTION OF FLOW.
4. WHERE PIPES PENETRATES A W.T. BHD, A DECK OR TANK TOP, AN ADEQUATE PENETRATION FITTING IS TO BE PROVIDED TO ENSURE THE WATERTIGHTNESS OF THE STRUCTURE.
5. SUITABLE CLEANING PLUGS TO BE PROVIDED ON ALL SOIL DISCHARGE PIPES.
6. INTERNATIONAL SHORE CONNECTION ACCORDING TO MARPOL ANNEX IV REG. 10
7. THIS DRG. IS ONLY A SCHEMATIC ACTUAL PIPE & VALVE LOCATIONS TO BE CONFIRMED & ADJUSTED ON SITE.
8. SCUPPER PROVIDED WITH WATERSEAL AND SINK FOR GALLEY (SK 1) WITH DEEP BOWL C/W #15 COLD & HOT WATER TAP, TAP, #40 WASTE, 'P' TRAP, PLUG & CHAIN

SYMBOL	REMARKS :
	SCREW DOWN STOP CHECK VALVE
	GATE VALVE
	SWING CHECK VALVE
	STORM VALVE (ANGLE)
	SIMPLEX STRAINER
	DRAIN PLUG
	REDUCER
	PUMP
	SCUPPER
	SHORE CONNECTION
	AIR PIPE
WC	WATER CLOSET
WB	WASH BASIN
SH	SHOWER
SK	SINK FOR GALLEY
BT	BATH TUB
WM	WASH MACHINE
	LEVEL SWITCH
AH	LEVEL ALARM HIGH
AL	LEVEL ALARM LOW
	PERFORATED PIPE
	SOIL LINE (STPG 370-E Sch. 40) GALV.
	DRAINAGE LINE (STPG 370-E Sch. 40) GALV.



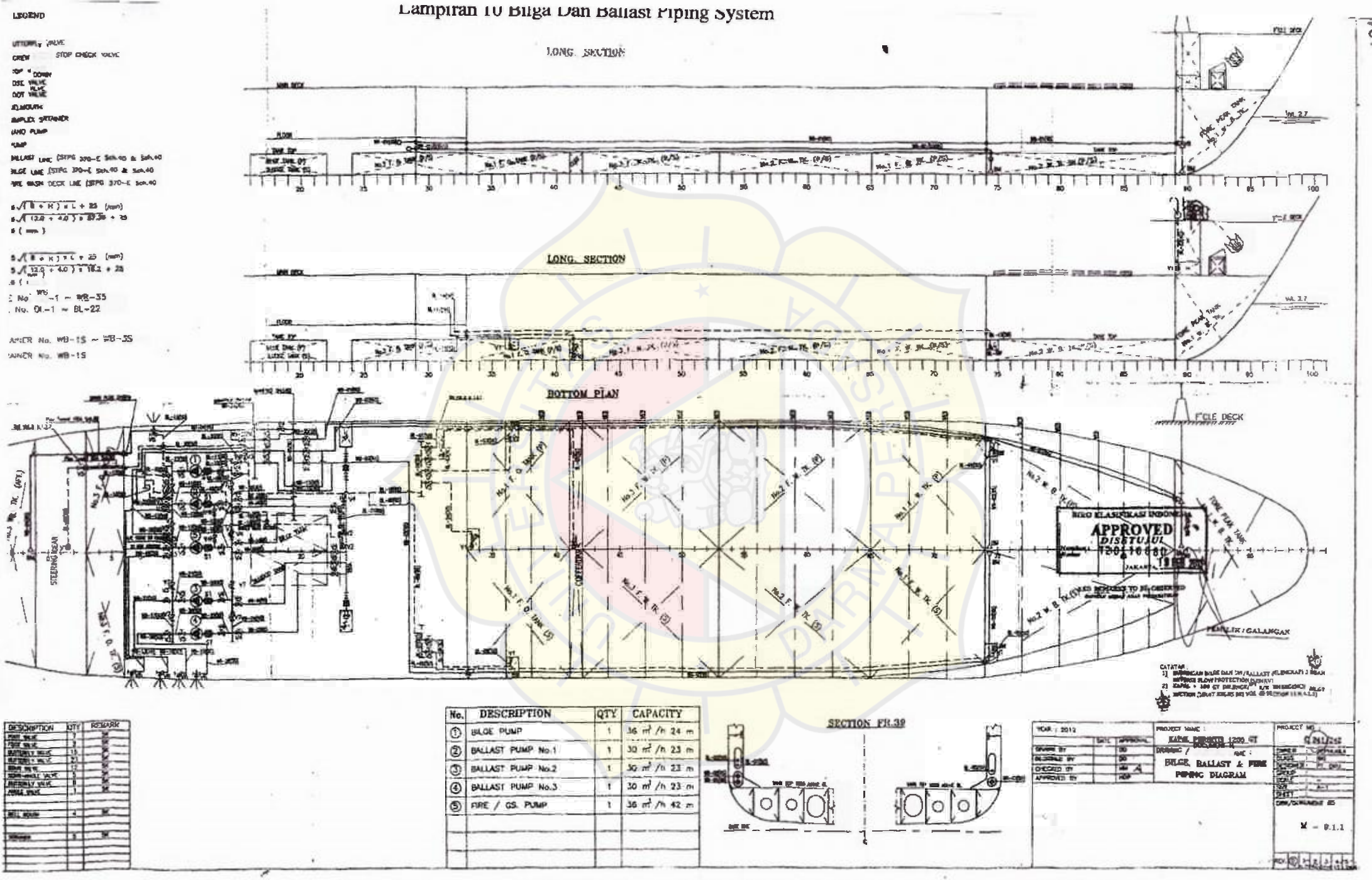
	DATE	APPROVAL
DRAWN BY		DYT
DESIGNED BY		DYT
CHECKED BY		MM
APPROVED BY		MP

PROJECT NAME : KAPAL PENUNTUN 1800 DT

DRAWING / DOCUMENT NAME : SEWAGE & SOIL PIPING DIAGRAM

PROJECT NO : 241

Lampiran 10 Bilga Dan Ballast Piping System



No.	DESCRIPTION	QTY	CAPACITY
①	BILGE PUMP	1	36 m³ /h 24 m
②	BALLAST PUMP No.1	1	30 m³ /h 23 m
③	BALLAST PUMP No.2	1	30 m³ /h 23 m
④	BALLAST PUMP No.3	1	30 m³ /h 23 m
⑤	FIRE / GS. PUMP	1	36 m³ /h 42 m

BILGE, BALLAST & FIRE PIPING DIAGRAM

M - 0.1.1

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Lampiran 1

Pembagian Block ABS 1 Dan ABS 2