



ADDENDUM

SOLICITATION NO.: RFP110356257SF

SOLICITATION NAME: 2019 DRYDOCK & REPAIR R/V
OCEANUS

ADDENDUM NO.: 3

DUE DATE AND TIME: JANUARY 4, 2019, 1:00 PM PT

DATE: DECEMBER 21, 2018

PROCUREMENT ANALYST: SHANNON FANOURAKIS

The solicitation named above is hereby modified as follows:

1. Attachment 1 to Exhibit A “Specifications for the 2019 Drydocking and Repair of the Oregon State University Research Vessel Oceanus”: Item No. 107 Tailshaft, Rudder & CPP, [5] Statement of Work, first paragraph is modified to read as follows:

All activities concerning the tailshaft and propeller will be accomplished under the direction of a qualified technical representative furnished by the Contractor. (Sound Propeller Systems and Rolls-Royce Naval/Marine Systems are the approved technical representatives for work on the Bird-Johnson Controllable Pitch Propeller system. Due to their long experience with this particular vessel’s system, Sound Propeller is the Owner’s preferred technical representative and will be performing an informational check prior to vessel departure for the yard.) The Contractor shall provide all labor and materials (other than that shown as Owner-Furnished) to perform the work identified below:

2. Add the attached documents:

- International Load Line Certificate
- UT Test Results
- T&S Booklet

The following questions were received with regard to the solicitation named above. OSU has provided answers below to each question, but the RFP or contract documents have not been modified as a result.

1. What square footage will need cleaning and spot-priming in Item 109 (Potable Water Tanks)?

Answer: 24 square feet, non-contiguous.

2. Are the Potable Water Tanks open for inspection?

Answer: No.

3. Is the chain locker available for inspection?

Answer: Can be opened, but chain cannot be removed without drydocking.

4. Will rolling addenda be issued over the course of the Q&A period (ending 28 Dec 18)?

Answer: Yes, as possible given the holiday season.

5. Will the ship need to be shifted and re-blocked for underwater hull painting?

Answer: No. Blocking plan rotates to different positions each drydocking to pick up those areas that were previously blocked.

6. Are the heat exchangers in Item 114 the same units removed and reinstalled in previous drydockings?

Answer: Yes.

7. Is any deck gear to be worked on?

Answer: None specified at this time. ABS will require witnessing of anchor windlass in operation when chain is returned to locker.

8. Will spool pieces be required in place of valves when painting seachest crossover pipe (Item 109)?

Answer: Yes. This is in the written specification for this item.

9. A shipyard still has a crate of OFM parts for Item 108 (Bow Thruster) from the previous dry-docking. Should these be returned prior to award?

Answer: Yes. OSU will arrange for shipping ASAP.

10. Is there an estimated square footage and type of work for Item 202 (Steel Renewals)?

Answer: No. This item is intended to provide unit pricing in case of additional work found.

11. Is lagging on heat exchanger piping known to contain asbestos?

Answer: No. Lagging was replaced at previous drydocking. See 5.8.6 of the General Specification.

12. Is lead paint present in any part of the ship?

Answer: Yes. The underside of most steel decks and associated structure (below 01 level) is coated with "red lead" (original paint from 1975.) See 5.8.6 of the General Specification.

13. Will OSU be subcontracting any work in the current specifications independently of the shipyard?

Answer: No. All subcontractors for the current specified work will be contracted by the shipyard. Note that this does not alter the terms in 5.14 of the General Specification.

14. Will "if needed" Owner Furnished Material be ordered and shipped by OSU?

Answer: Yes.

15. Will tank levels be known and provided at arrival at the yard?

Answer: Yes.

16. Are Marine Technicians subcontractors?

Answer: No. They are OSU Ship Operations personnel.

17. Who is responsible for removing interferences (cabinetry and contents) to access the #11 Port ballast water tank?

Answer: OSU will remove.

18. Are broken tank cover studs (discovered or broken during tank opening) included in the current specification?

Answer: No. Stud repairs/replacements, if needed, will be dealt with through the Change Order process.

19. Can a standard PDF of the written specifications be provided in addition to the scanned copy on the Business Opportunities site?

Answer: Yes. This will be emailed to Proposers in a separate email

20. RFP Section 4.01 Minimum Qualifications: It is required to provide “documented history of compliance” and “documented experience with managing.” What documents are you referring to and/or prefer to be provided?

Answer: There are no specific documents required. However Proposers must submit enough information to show a history of compliance and experience, e.g. examples and/or company documents showing compliance history and experience.

21. RFP Section 4.02 Preferred Qualifications: What is “documented history?” What documents are you referring to of us successfully drydocking research vessels?

Answer: There are no specific documents required. However Proposers should submit enough history to show their history of successfully drydocking research vessels, e.g, examples.

22. RFP Section 5.02 Required Submittals: What is Section 3? Are you referring to Exhibit A Sample Contract/Statement of Work? In what format do you need to see it? As a statement?

Answer: Section 3 is the Statement of Work which includes Exhibit A Sample Contract and Attachment 1 to Exhibit A. There is no particular format required, however proposers must include enough information to show that they can meet what is included in the specifications and requirements.

23. Could you please provide the below information?:

- Sea valve list for item 106 (Appendix B)

Answer: The valve list is already included in RFP Addendum 2

- A list for all the fuel and ballast tank vent valves for item 105 (size and type would be helpful)

Answer: The tank vent valves (ballast tanks don't have ball check valves) are listed on page 7 of the attached document titled “ABS LL-11-D”

- Tank list (a list of all the tanks and their sizes) for item 105

Answer: Tanks and their locations and capacities are in the attached T&S booklet

- Could you please provide the actual size for the underwater body area?

Answer: 8500 square feet is a reasonable approximation. Actual is not available.

- Do we need to include an ABS costs for surveys or will owner be working directly with them?

Answer: Item 105 specifies in [5] that the yard will contract with ABS for the survey.

Entities are not required to return addendums with their offers but are responsible to make themselves aware of, obtain and incorporate into their final offer any information contained in addendums. Failure to do so may make the offer non-responsive and cause it to be rejected.

INTERNATIONAL LOAD LINE CERTIFICATE

ISSUED UNDER THE PROVISIONS OF THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO UNDER THE AUTHORITY OF THE GOVERNMENT OF

UNITED STATES OF AMERICA Commandant, U.S. Coast Guard

American Bureau of Shipping
 (Organization Authorized)

Particulars of Ship

Name of Ship	Distinctive Number or Letters	Port of Registry	Length(L) as defined in article 2(8)	IMO Number ¹
OCEANUS	WXAQ	Newport, OR	158 Feet 4-3/4 Inches	7603617

Freeboard assigned as: New

Type of Ship: Type B Increased

Freeboard from Deck Line 3 Feet 2-7/8 Inches

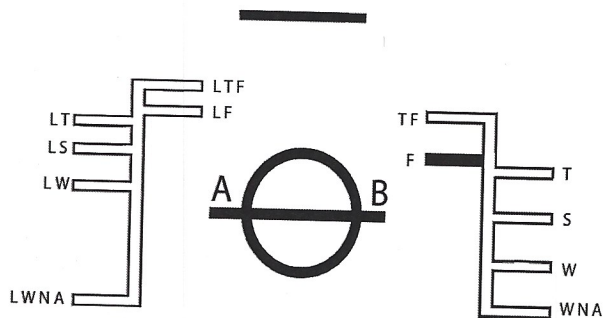
Load Line

Tropical	N/A	(T)	N/A	above (S)
Summer	N/A	(S)	Upper edge of line through center of ring	
Winter	N/A	(W)	N/A	below (S)
Winter North Atlantic	N/A	(WNA)	N/A	below (S)
Timber tropical	N/A	(LT)	N/A	above (LS)
Timber summer	N/A	(LS)	N/A	above (S)
Timber winter	N/A	(LW)	N/A	below (LS)
Timber winter North Atlantic	N/A	(LWNA)	N/A	below (LS)

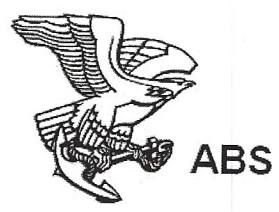
Allowance for fresh water for all freeboards other than timber 3-1/2 Inches

For timber freeboards N/A

The upper edge of the deck line from which these freeboards are measured is: Opposite The Top of Upper Steel deck at side.



THIS CERTIFICATE IS VALID ONLY SO LONG AS THE OPERATING RESTRICTIONS IN THE VESSEL'S STABILITY LETTER, ISSUED BY THE USCG MARINE SAFETY CENTER AND DATED 15 MARCH 2007 ARE OBSERVED.



¹ In accordance with the IMO Ship Identification Number Scheme, adopted by resolution A.600(15).

~~Deadweight: 0~~**THIS IS TO CERTIFY:**

1. That the ship has been surveyed in accordance with the requirements of article 14 of the Convention.
2. That the survey showed that the freeboards have been assigned and load lines shown above have been marked in accordance with the Convention.

This certificate is valid until 06 March 2019²

Subject to the annual surveys in accordance with article 14(1)(c) of the Convention.

Completion date of the survey on which this certificate is based: 25 March 2014Issued at San Francisco, CA USA
*Place of issue of certificate*25 March 2014 Marasigan, Shaun, San Francisco Port
Date of issue *Surveyor, American Bureau of Shipping*

NOTES:

1. When a ship departs from a port situated on a river or inland waters, deeper loading shall be permitted corresponding to the weight of fuel and all other materials required for consumption between the point of departure and the sea.
2. When a ship is in fresh water of unit density the appropriate load line may be submerged by the amount of fresh water allowance shown above. Where the density is other than unity, an allowance shall be made proportional to the difference between 1.025 and the actual density.
3. It is the owner's responsibility to furnish the master with approved information and instructions for loading and ballasting this vessel to provide guidance as to stability of the vessel under varying conditions of service and to avoid unacceptable stresses in the vessel's structure, as defined in 46 CFR 42.09-1.
4. The Winter North Atlantic Load Line applies only to vessels of 328 ft. in length or less, which enter any part of the North Atlantic Ocean during the winter months as defined by the Load Line Regulations in 46 CFR 42.30-5 and 42.30-35. The periods during which the other seasonal load lines apply in different parts of the world are stated in the Load Line Regulations 46 CFR 42.30-5 to 42.30-30, inclusive.
5. This Load Line Certificate will be cancelled by the Commandant, U. S. Coast Guard, if...
 - a) The annual surveys have not been carried out with three months either way of each anniversary date of the certificate.
 - b) The certificate is not endorsed to show that the ship has been surveyed as indicated in (a).
 - c) Material alterations have been made to the hull or superstructures such as would necessitate the assignment of an increased freeboard.
 - d) The fittings and appliance for the protection of the openings, guardrails, freeing ports, or the means of access to the crew's quarters have not been in as effective a condition as they were when the Certificate was issued.
 - e) The structural strength of the ship is lowered to such an extent that the ship is unsafe.
6. When this Certificate has expired or been cancelled, it must be delivered to the Assigning Authority.



² Insert the date of expiry as specified by the Administration in accordance with article 19(1) of the Convention. The day and the month of this date correspond to the anniversary date as defined in article 2(9) of the Convention, unless amended in accordance with article 19(8) of the Convention.

Deadweight: 0

ENDORSEMENT FOR ANNUAL SURVEYS

THIS IS TO CERTIFY that, at an annual survey required by article 14(1)(c) of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Annual Survey:

Signed:

[Signature]
Surveyor, American Bureau of Shipping

Place:

NEWPORT, OR

Date:

18 March 2015

Annual Survey:

Signed:

[Signature]
Surveyor, American Bureau of Shipping

Place:

Newport, OR

Date:

22 February 2016

Annual Survey:

Signed:

[Signature]
Surveyor, American Bureau of Shipping

Place:

Newport, OR

Date:

08 Dec 2016

Annual Survey:

Signed:

[Signature]
Surveyor, American Bureau of Shipping

Place:

Newport, OR

Date:

05 March 2018

ANNUAL SURVEY IN ACCORDANCE WITH ARTICLE 19(8)(c)

THIS IS TO CERTIFY that, at a survey in accordance with article 19(8)(c) of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Signed:

Surveyor, American Bureau of Shipping

Place:

Date:

Endorsement to extend the certificate if valid for less than 5 years where article 19(3) applies

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with article 19(3) of the Convention, be accepted as valid until _____

Signed:

Surveyor, American Bureau of Shipping

Place:

Date:



~~Deadweight:0.~~

Endorsement where the renewal survey has been completed and article 19(4) applies

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with article 19(4) of the Convention, be accepted as valid until _____

Signed: _____
Surveyor, American Bureau of Shipping

Place: _____

Date: _____

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where article 19(5) or 19(6) applies.

This certificate shall, in accordance with article 19(5)/19(6)³ of the Convention, be accepted as valid until _____

Signed: _____
Surveyor, American Bureau of Shipping

Place: _____

Date: _____

Endorsement for advancement of anniversary date where article 19(8) applies

In accordance with article 19(8) of the Convention, the new anniversary date is _____

Signed: _____
Surveyor, American Bureau of Shipping

Place: _____

Date: _____

In accordance with article 19(8) of the Convention, the new anniversary date is _____

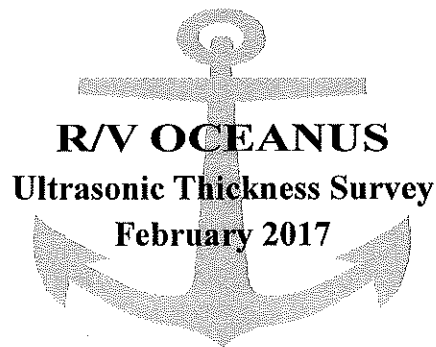
Signed: _____
Surveyor, American Bureau of Shipping

Place: _____

Date: _____



INTERNATIONAL
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Specialists in Nondestructive Examination



All drawings, specifications, and copies thereof furnished by International Inspection, Inc. (hereafter, "the Work Product") are and shall remain the property of International Inspection, Inc. The Work Product is to be used only with respect to work on the vessel/project listed above (hereafter, "The Project") and is not to be used on any other project or delivered to any person or entity not directly involved with The Project. Submission or distribution of the Work Product to meet official regulatory requirements for other purposes in connection with The Project is not to be construed as publication in derogation of International Inspection, Inc.'s common law copyright or other reserved rights to Work Product.

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Los Angeles: 10600 Pioneer Blvd., Unit A, Santa Fe Springs, CA 90670 Phone: 562/944-3166 Fax: 562/944-3114
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INTERNATIONAL INSPECTION

Specialists in Nondestructive Examination

Ultrasonic thickness measurements were obtained for Oregon State University on the vessel *RV OCEANUS* on February 10th – 14th, 2017 at Bay Ship and Yacht in Alameda, California. The owners were represented by Mr. Tom Mattoon. The survey was conducted by International Inspection personnel.

EXTENT OF SURVEY

The following items were ultrasonically gauged:

- ALL EXPOSED DECKS.
- WIND AND WATER STRAKES.
- GIRTHBELTS AT FRAMES:
 - 27.5, 34.5, 61.5
- FORE PEAK INTERNALS.
- BOTTOM PLATING.
- SEACHESTS.
- SUSPECT AREAS:
 - BOW THRUSTER FLAT.
 - BOW THRUSTER "SLEEVE".
 - BOW THRUSTER "U" PIPE.
 - CHAIN LOCKER FLAT.
 - ENGINE ROOM PIPING.
 - STERN TUBE.

RESULTS OF SURVEY

The results are shown within the following report.

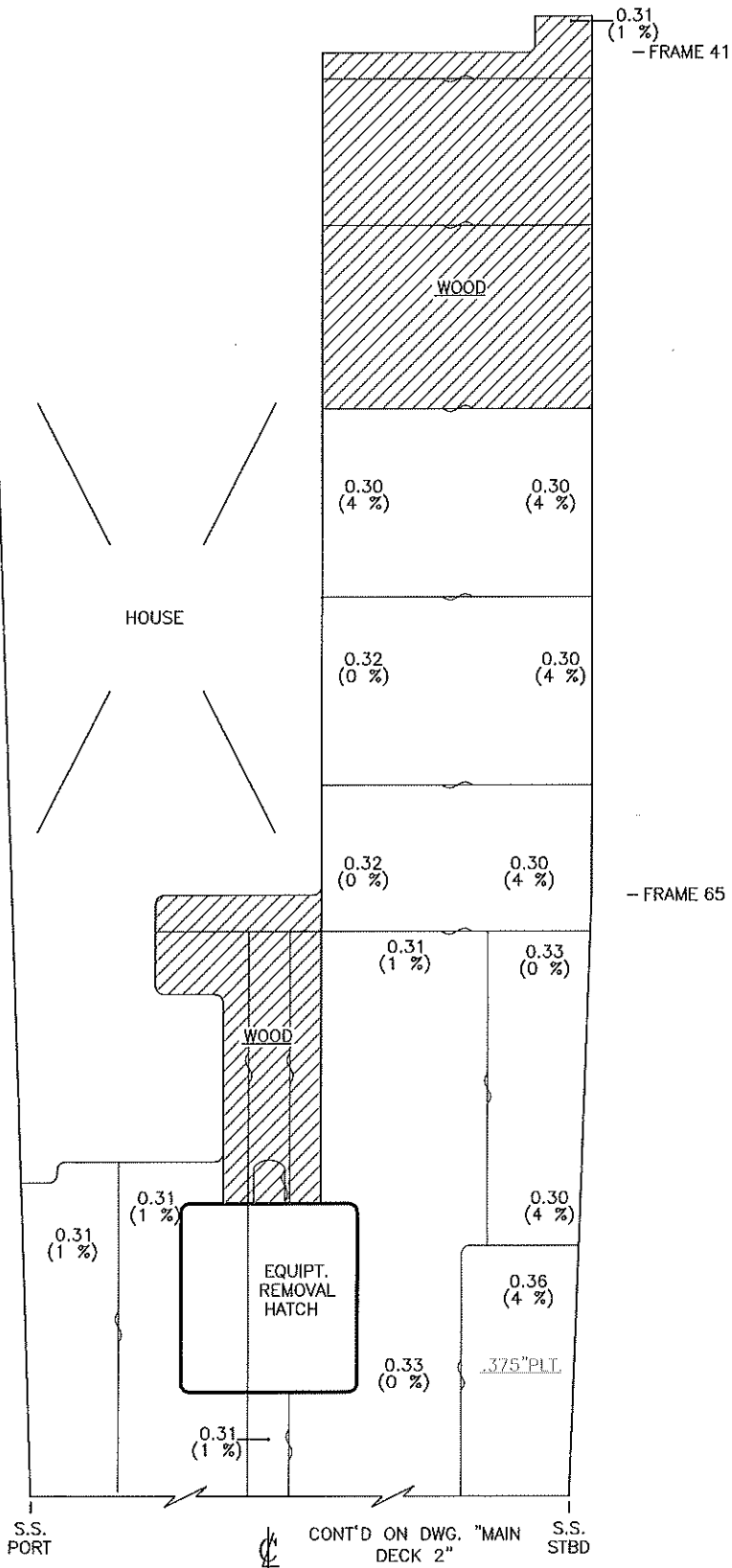
Respectfully submitted,

INTERNATIONAL INSPECTION, Inc.



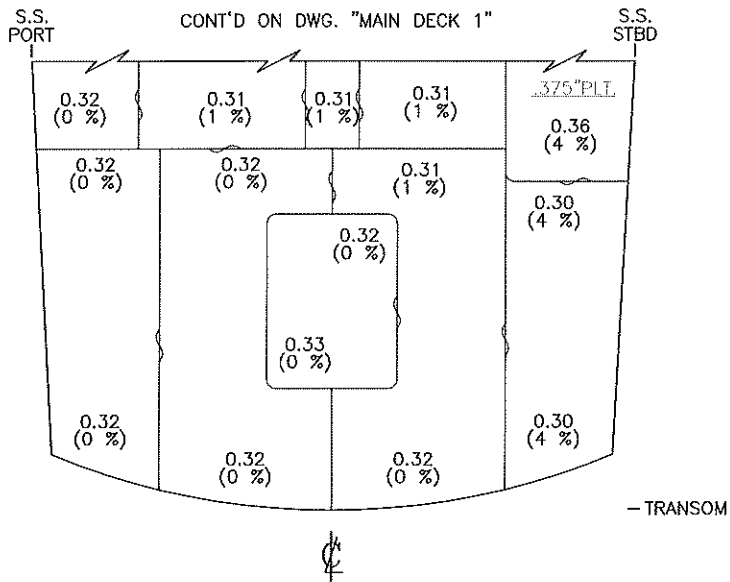
Wilbert Ramirez.
Level II Technician
A1439

FWD



VESSEL: OCEANUS		DESCRIPTION: MAIN DECK - AFT SECTION PLAN VIEW - PAGE 1 OF 2	
DRAWN BY: S.ORTIZ	JOB # A1439	DWG # MAIN DECK 1	DATE: FEBRUARY 2017

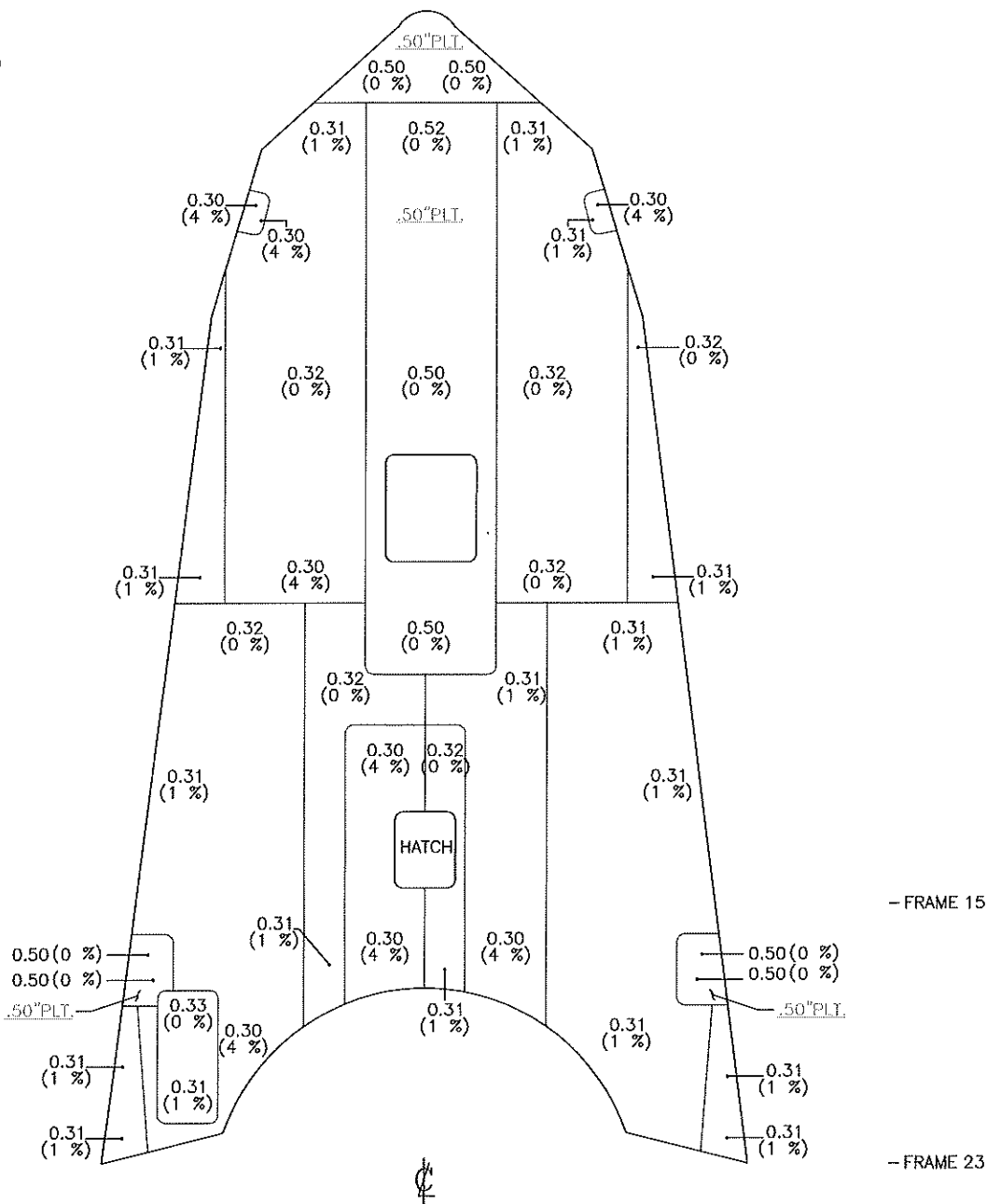
↑
FWD



NOTE:
MAIN DECK .3125"PLT UNLESS NOTED OTHERWISE.

<p>VESSEL: OCEANUS</p>	<p style="text-align: center;">MAIN DECK - AFT SECTION</p> <p>DESCRIPTION: PLAN VIEW - PAGE 2 OF 2</p>		
DRAWN BY: Q. TRAPP	JOB # A1439	DWG # MAIN DECK 2	v1.1 DATE: FEBRUARY 2017

FWD ↑

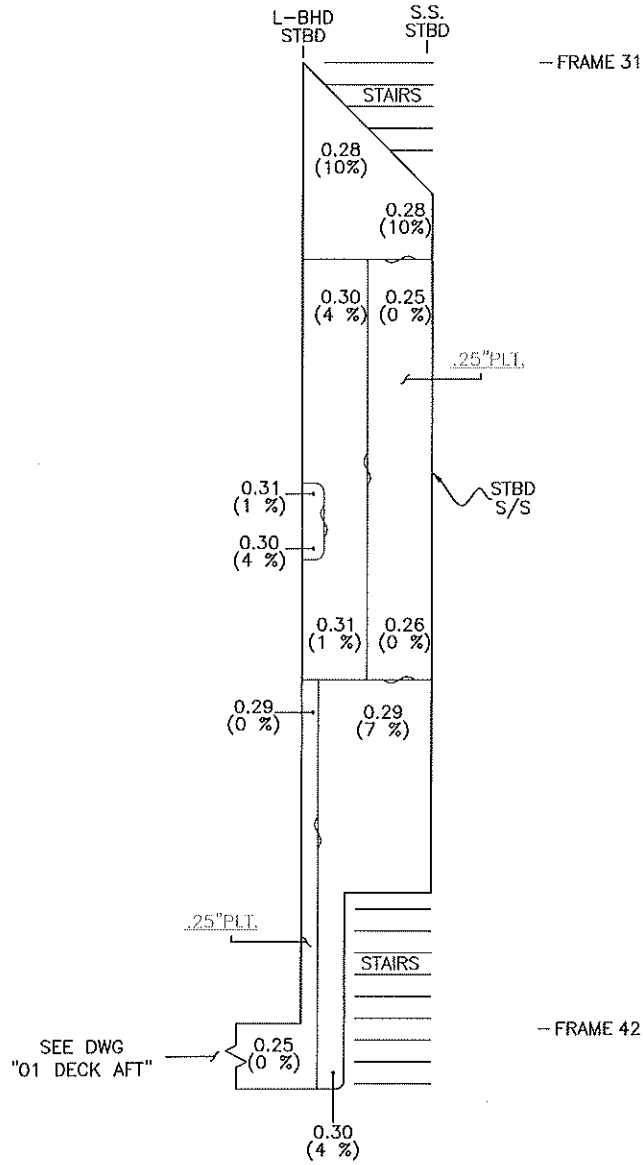


NOTE:
01 DECK .3125"PLT UNLESS NOTED OTHERWISE.

VESSEL: OCEANUS		01 DECK PLATING - FORWARD SECTION	
		DESCRIPTION: PLAN VIEW - PAGE 1 OF 3	
DRAWN BY: S.ORTIZ	JOB # A1439	DWG # 01 DECK FWD	DATE: FEBRUARY 2017

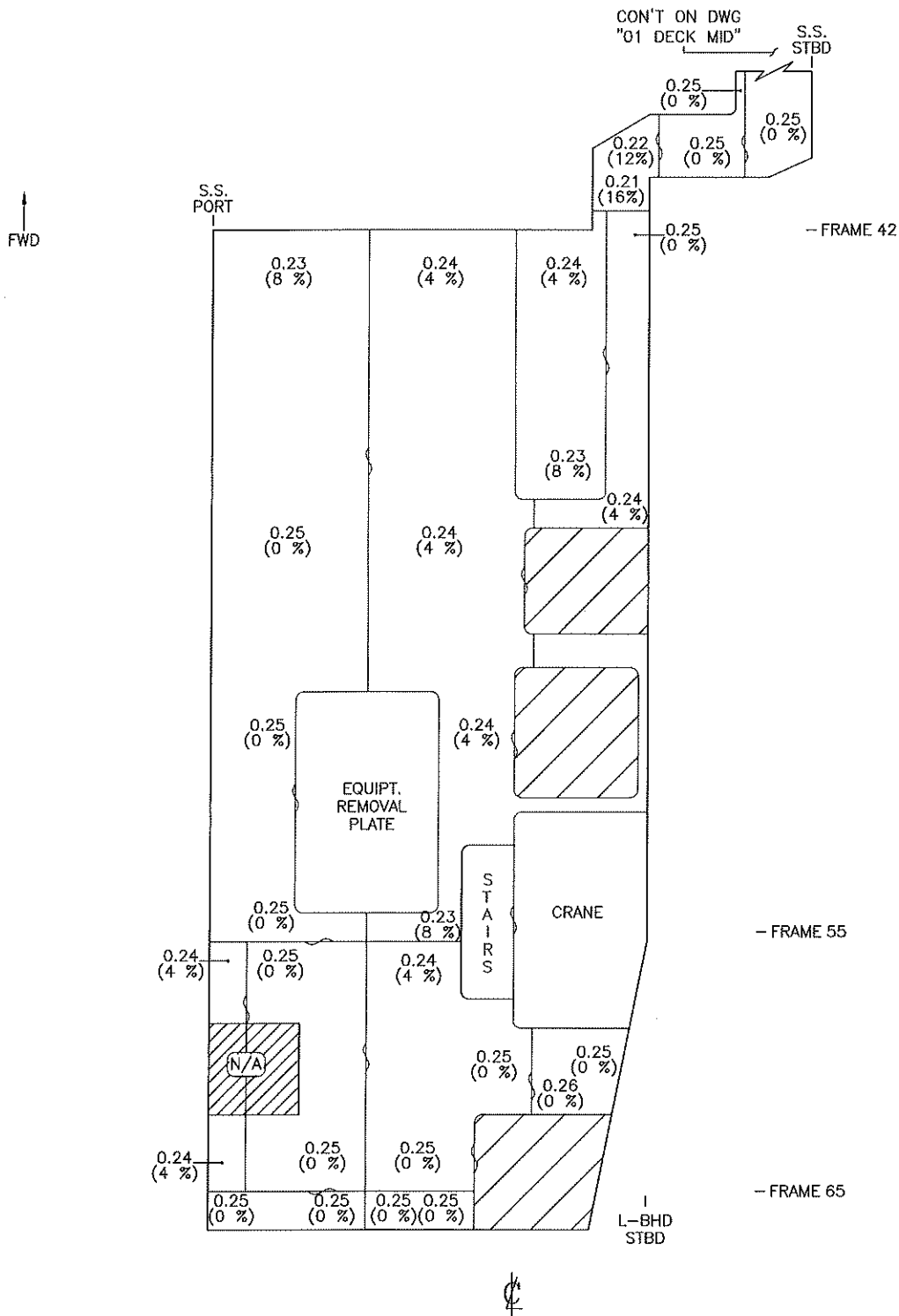
FWD ↑

CONT'D ON DWG
"01 DECK FWD"



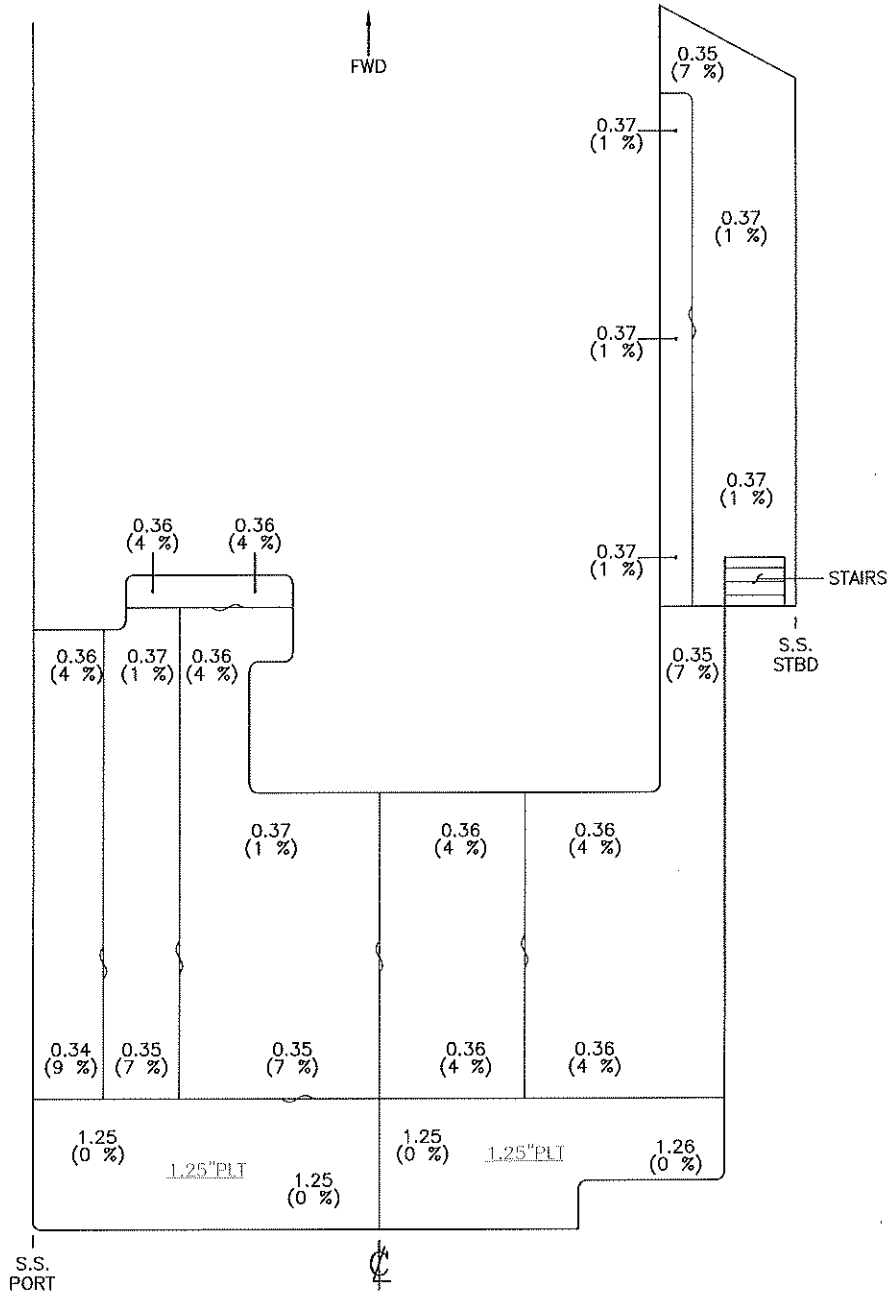
NOTE:
01 DECK .3125\" PLT UNLESS NOTED OTHERWISE.

VESSEL: OCEANUS		01 DECK PLATING - MIDDLE SECTION	
		DESCRIPTION: PLAN VIEW - PAGE 2 OF 3	
DRAWN BY: W. RAMIREZ	JOB # A1439	DWG # 01 DECK MID	DATE: FEBRUARY 2017



NOTE:
 O1 DECK .25" PLTG.
 [Hatched Box] = DOUBLER PLATE.

VESSEL: OCEANUS		DESCRIPTION: O1 DECK PLATING - AFT SECTION PLAN VIEW - PAGE 3 OF 3	
DRAWN BY: S.ORTIZ	JOB # A1439	DWG # O1 DECK AFT	DATE: FEBRUARY 2017

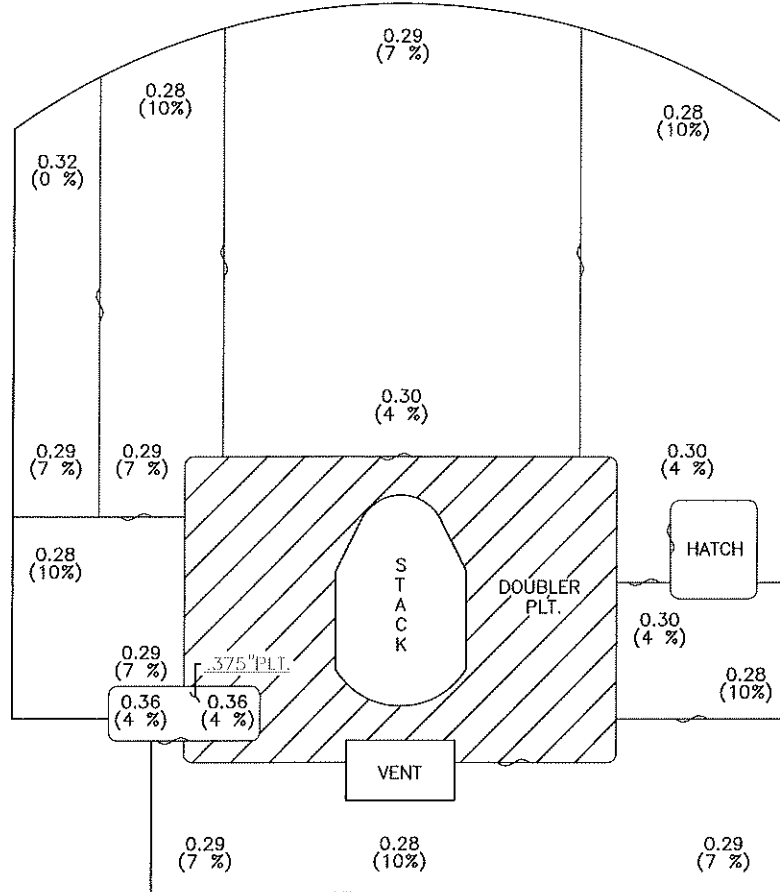


NOTE:
DECK .375"PLT UNLESS NOTED OTHERWISE.

VESSEL: OCEANUS		DESCRIPTION: 02 DECK PLATING PLAN VIEW	
DRAWN BY: S.ORTIZ	JOB # A1439	DWG # 02 DECK	DATE: FEBRUARY 2017

FWD
↑

- FRAME 18

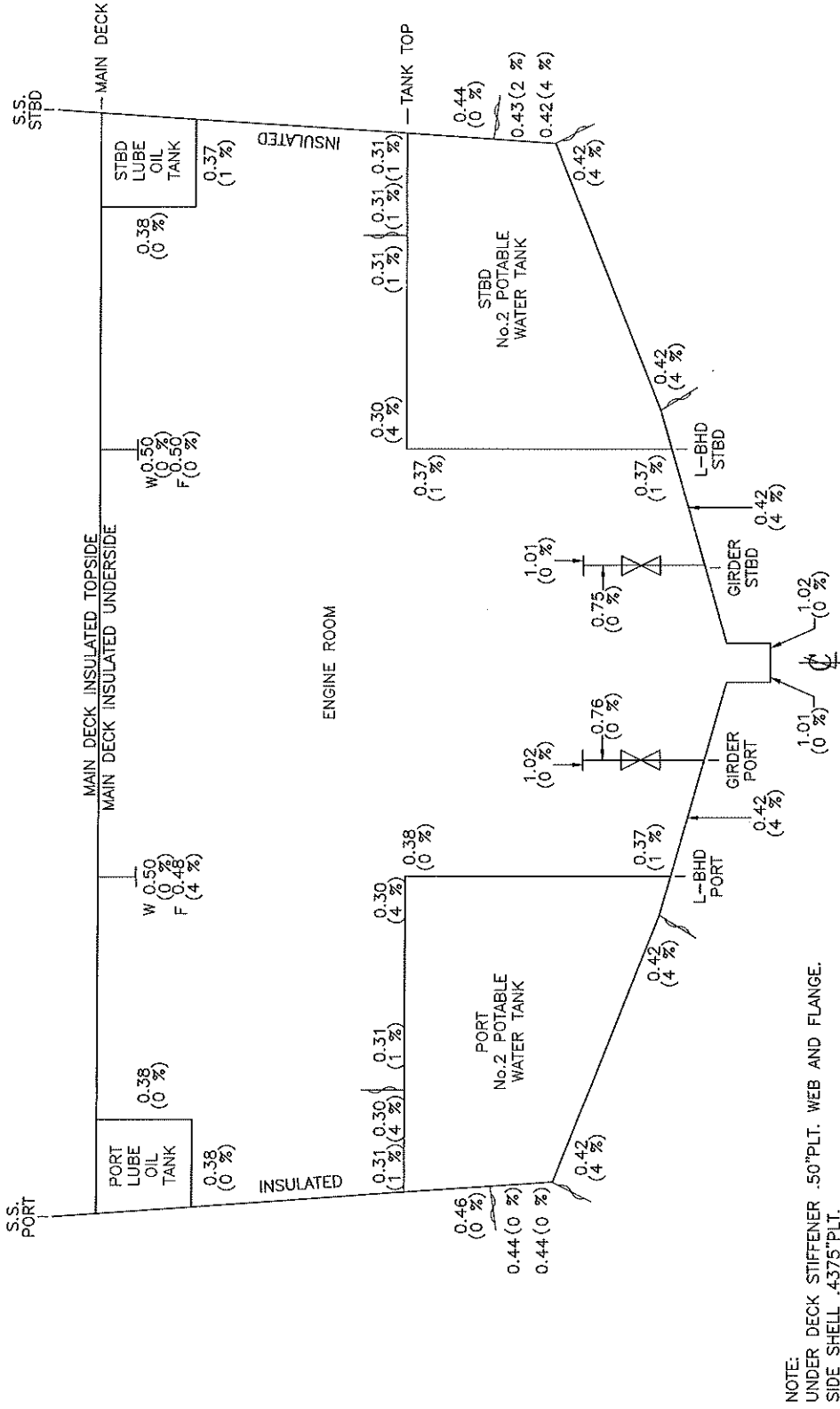


- FRAME 35

⌀

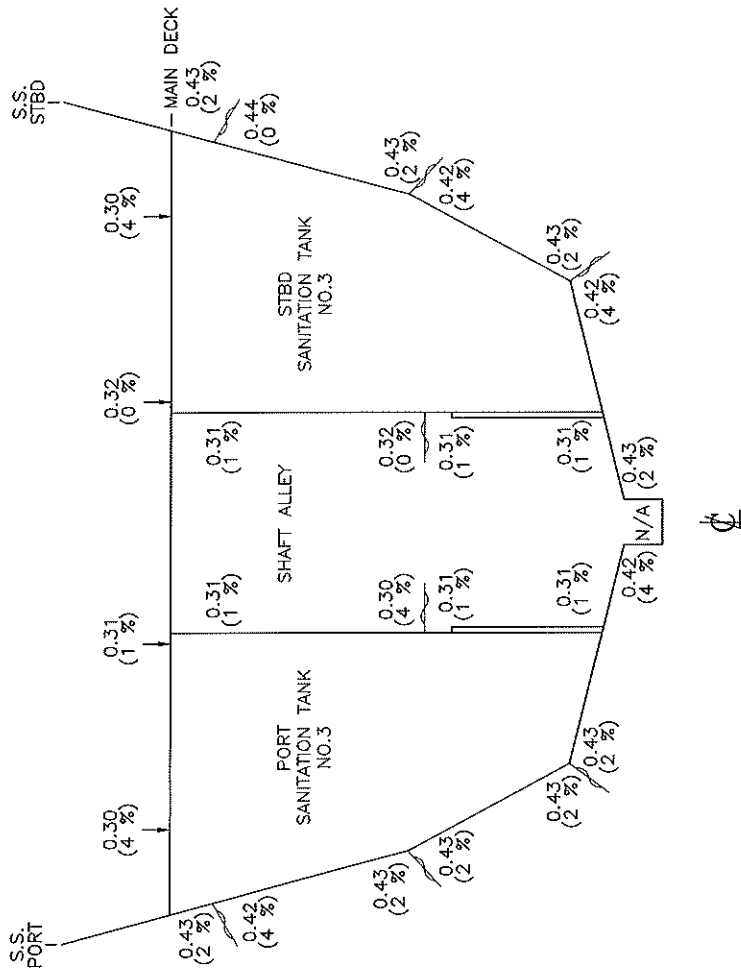
NOTE:
DECK .3125\"/>

VESSEL: OCEANUS		DESCRIPTION: 03 DECK PLATING PLAN VIEW	
DRAWN BY: S.ORTIZ	JOB # A1439	DWG # 03 DECK	DATE: FEBRUARY 2017



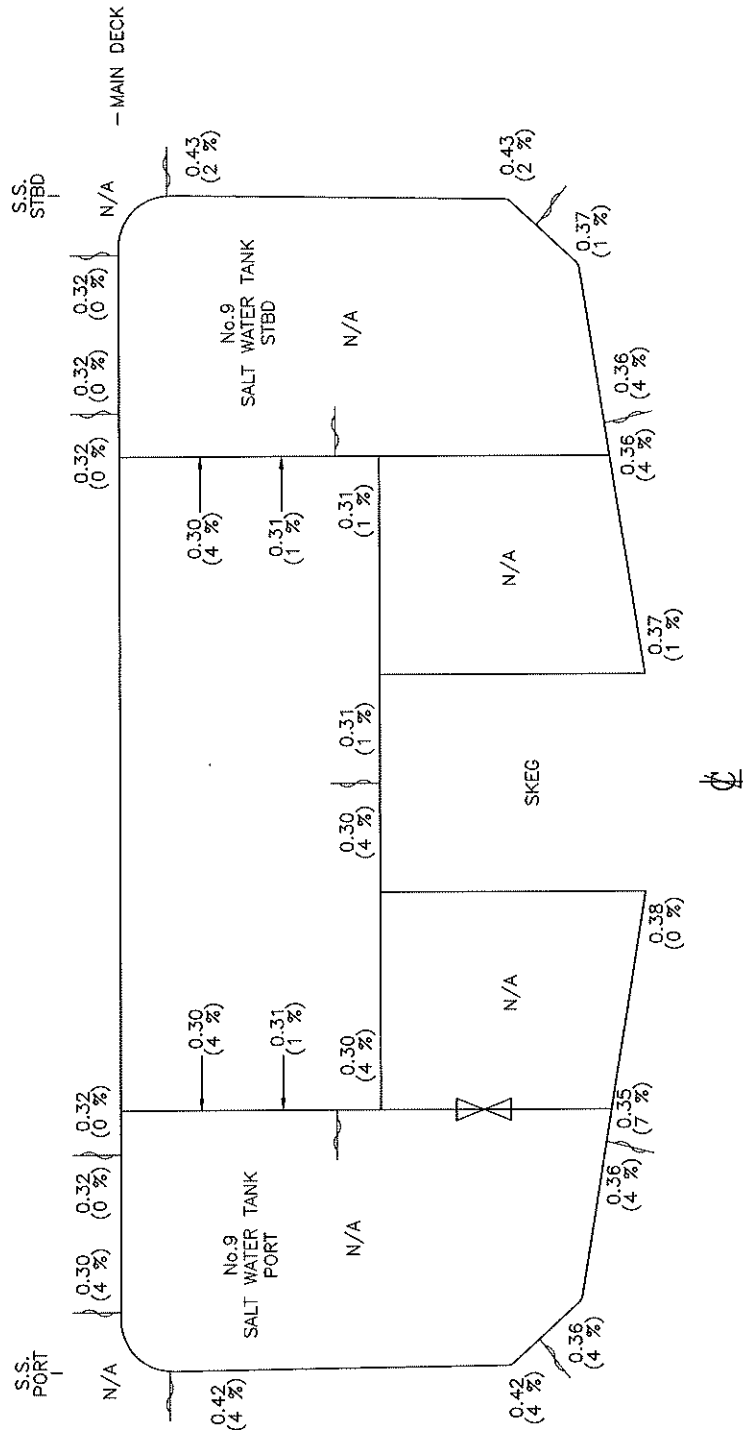
NOTE:
 UNDER DECK STIFFENER .50"PLT. WEB AND FLANGE.
 SIDE SHELL .4375"PLT.
 TANK TOP .3125"PLT.
 LUBE OIL TANK .4375"PLT.
 L/BHD .375"PLT.
 L/GIRDER .75" WEB, 1.00" FLANGE.
 BOTTOM SHELL .4375"PLT.
 KEEL 1.00"PLT.
 W = WEB / F = FLANGE.
 N/A = NOT ACCESSIBLE AT TIME OF SURVEY.

VESSEL: OCEANUS		DESCRIPTION: GIRTH BELT AT FRAME 27.5	
DRAWN BY: Q. TRAPP		DATE: FEBRUARY 2017	
JOB # A1439	DWG # BELT 28	v.1.1	



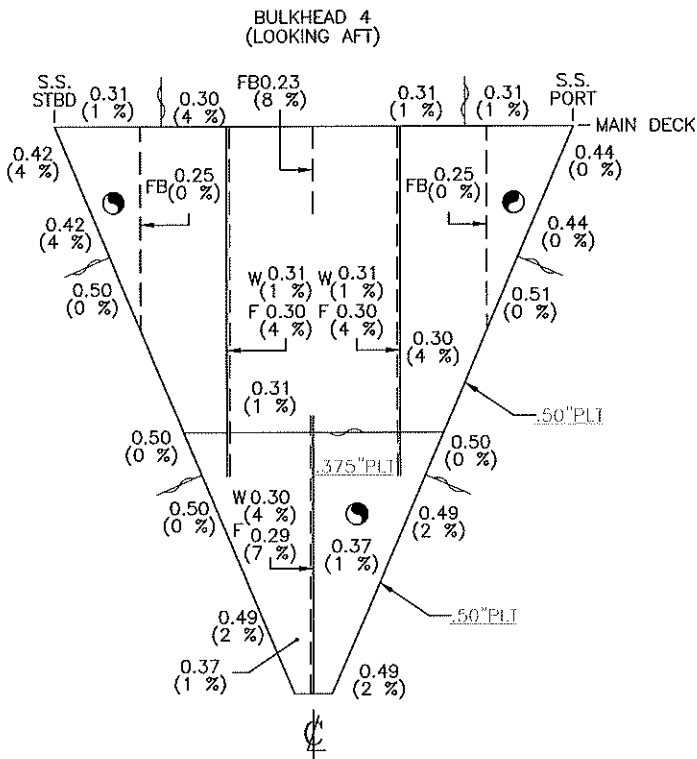
NOTE:
 MAIN DECK .3125"PLT.
 SHEAR STRAKE .4375"PLT.
 SIDE SHELL .4375"PLT.
 BOTTOM PLATE .50"PLT.
 L/BHD .3125"PLT.
 N/A= NOT ACCESSIBLE

VESSEL: OCEANUS		DESCRIPTION: GIRTH BELT AT FRAME 34.5	
DRAWN BY: Q.TRAPP		DATE: FEBRUARY 2017	
JOB # A1439	DWG # BELT 34.5	v.1.1	

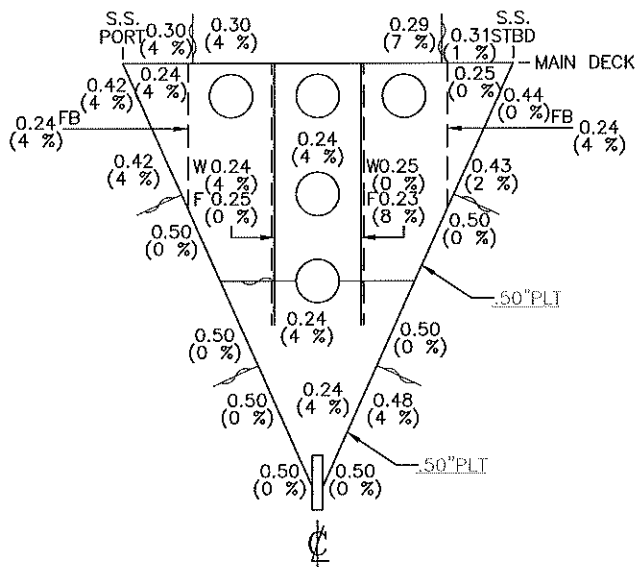


NOTE:
 MAIN DECK .3125"PLTG.
 SHEAR STRAKE .4375"PLTG.
 SIDE SHELL .4375" PLTG.
 TANK TOP .3125"PLTG.
 L/BHD .3125"PLTG.
 L/GIRDER .3125"PLTG.
 BOTTOM PLATE .375"PLTG.

VESSEL: OCEANUS		DESCRIPTION: GIRTH BELT AT FRAME 61.5	
DRAWN BY: Q. TRAPP		DATE: FEBRUARY 2017	
JOB # A1439	DWG # BELT 61.5	vi.1	

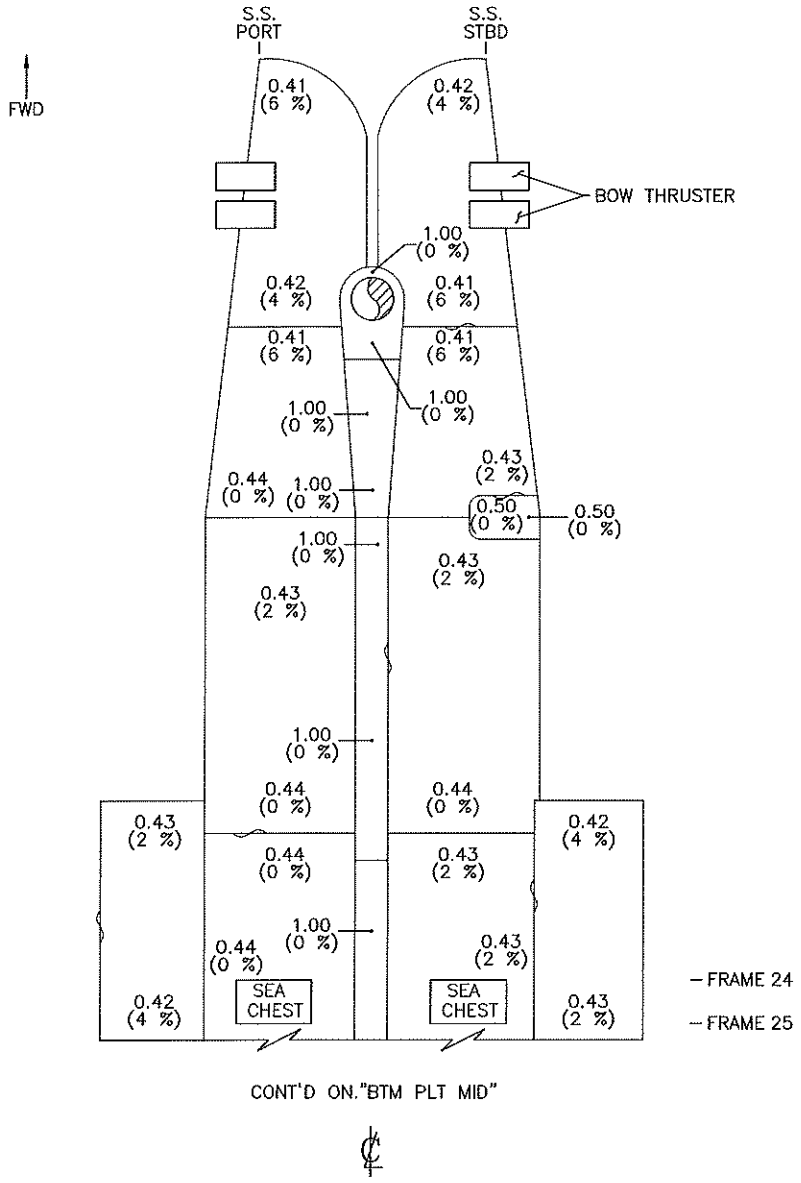


FRAME 2 (LOOKING FORWARD)



NOTE:
 ALL BULKHEAD 4 PLATING .3125" UNLESS NOTED OTHERWISE.
 ALL VERTICAL BULKHEAD STIFFENERS .3125"L.
 ALL SIDE SHELL .4375"PLT UNLESS NOTED OTHERWISE.
 MAIN DECK .3125"PLT.
 ALL FLAT BAR STIFFENERS .25"PLT.
 ALL FRAME 2 PLATING .25"
 ALL VERTICAL FRAME STIFFENERS .25"L.
 FB = FLAT BAR STIFFENER.
 W = WEB, F = FLANGE.

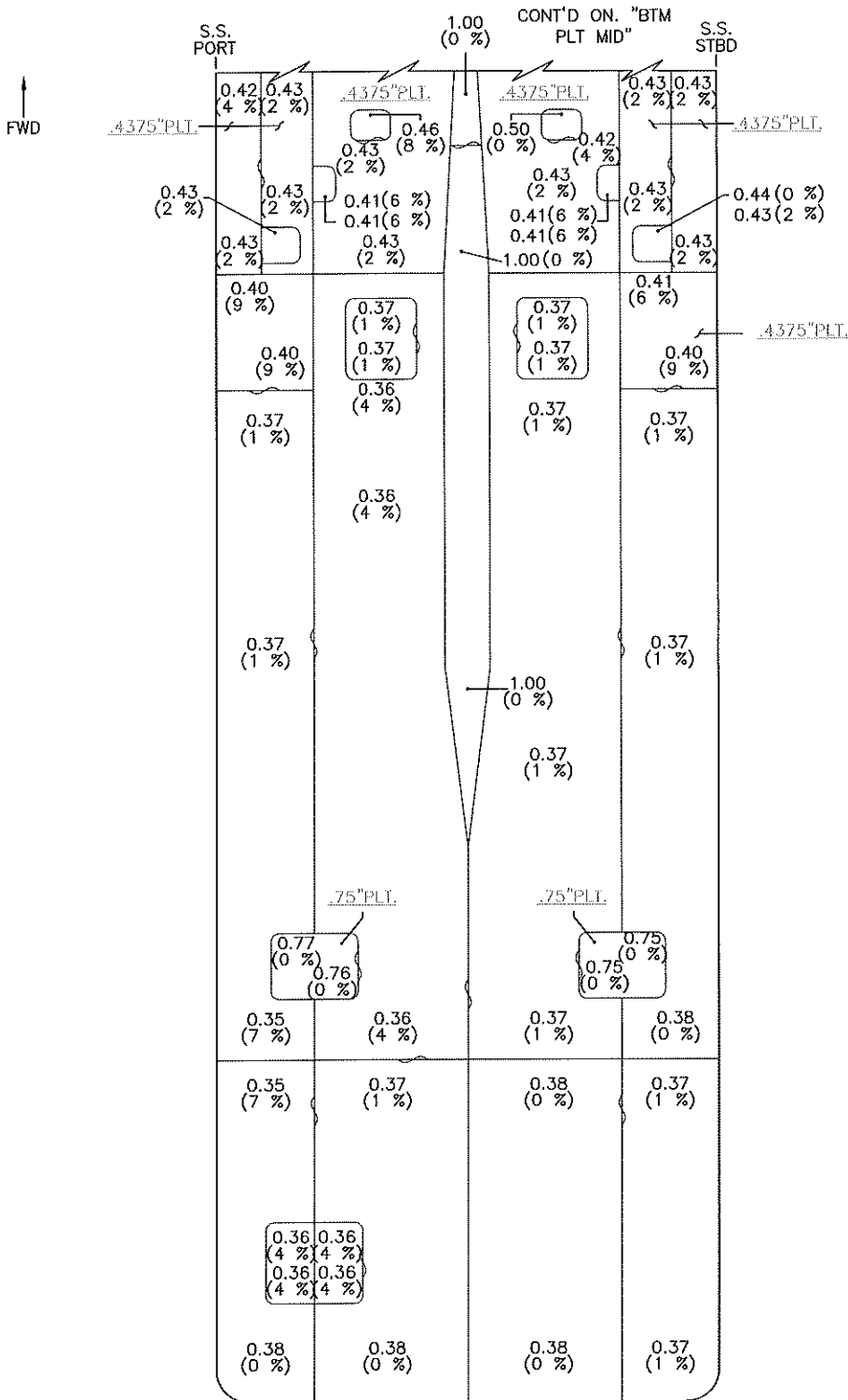
VESSEL: OCEANUS		DESCRIPTION: FORE PEAK TANK - BULKHEAD 4 & FRAME 2 VIEWED AS NOTED	
DRAWN BY: Q.TRAPP	JOB # A1439	DWG # BHD 4 & FRM 2	DATE: FEBRUARY 2017



NOTE:
 BOTTOM PLATE .4375"PLT.
 SKEG 1.00"PLT.

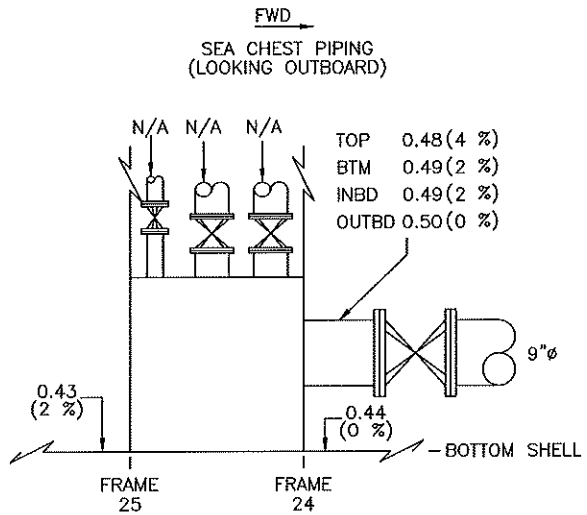
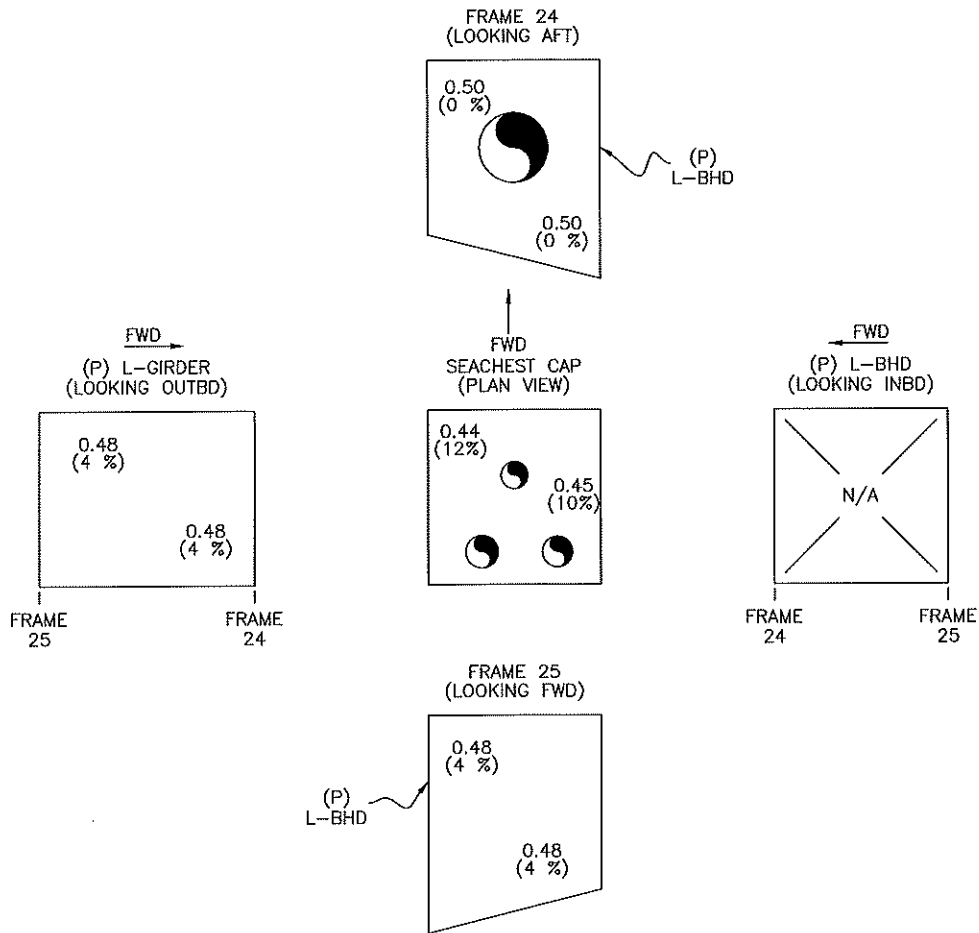
<p>VESSEL: OCEANUS</p>		<p>BOTTOM PLATE - FORWARD SECTION</p> <p>DESCRIPTION: PLAN VIEW - PAGE 1 OF 3</p>	
DRAWN BY: Q. TRAPP	JOB # A1439	DWG # BTM PLT FWD	DATE: FEBRUARY 2017

INTERNATIONAL INSPECTION, INC.



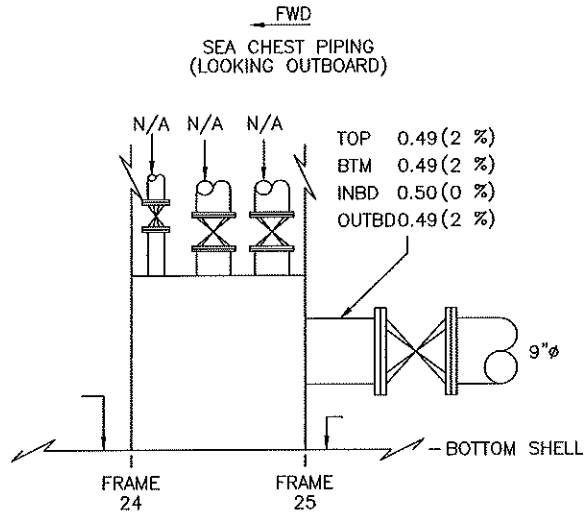
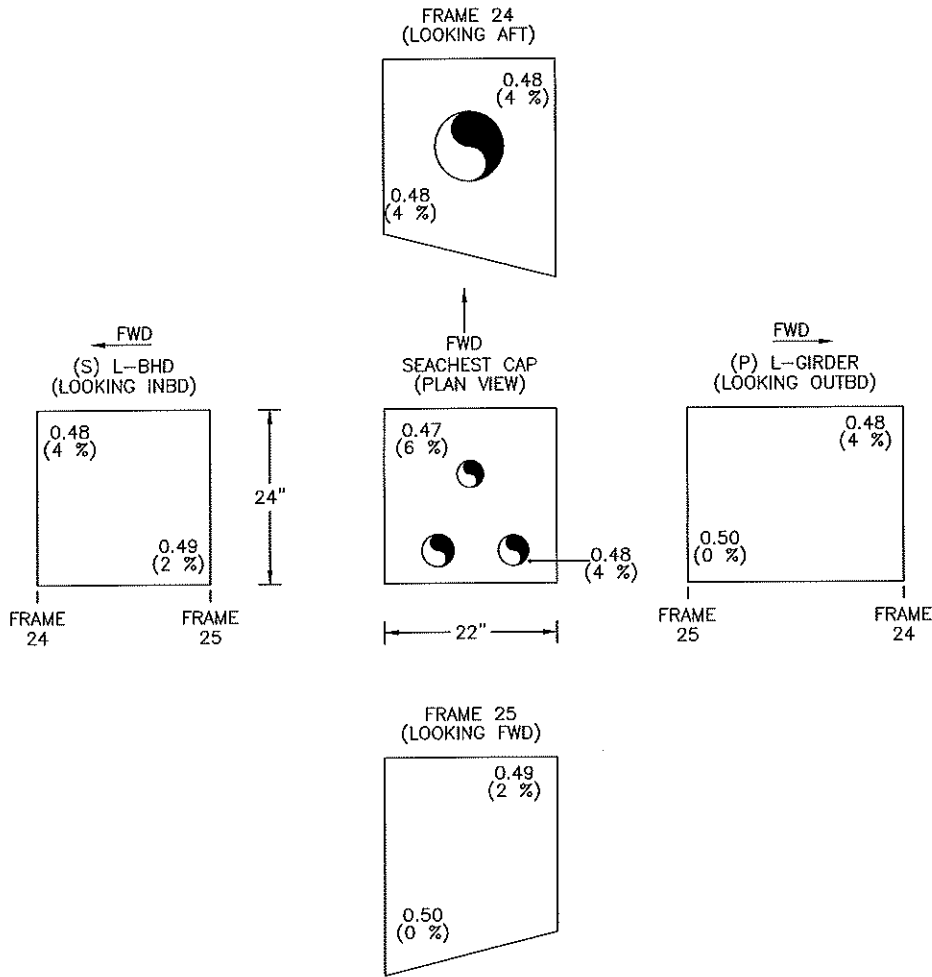
NOTE:
 BOTTOM PLATE .375"PLT UNLESS NOTED OTHERWISE.
 KEEL 1.00"PLT.

VESSEL: OCEANUS		DESCRIPTION: BOTTOM PLATE - AFT SECTION	
DRAWN BY: Q.TRAPP		DATE: FEBRUARY 2017	
JOB # A1439	DWG # BTM PLT AFT	v1.1	



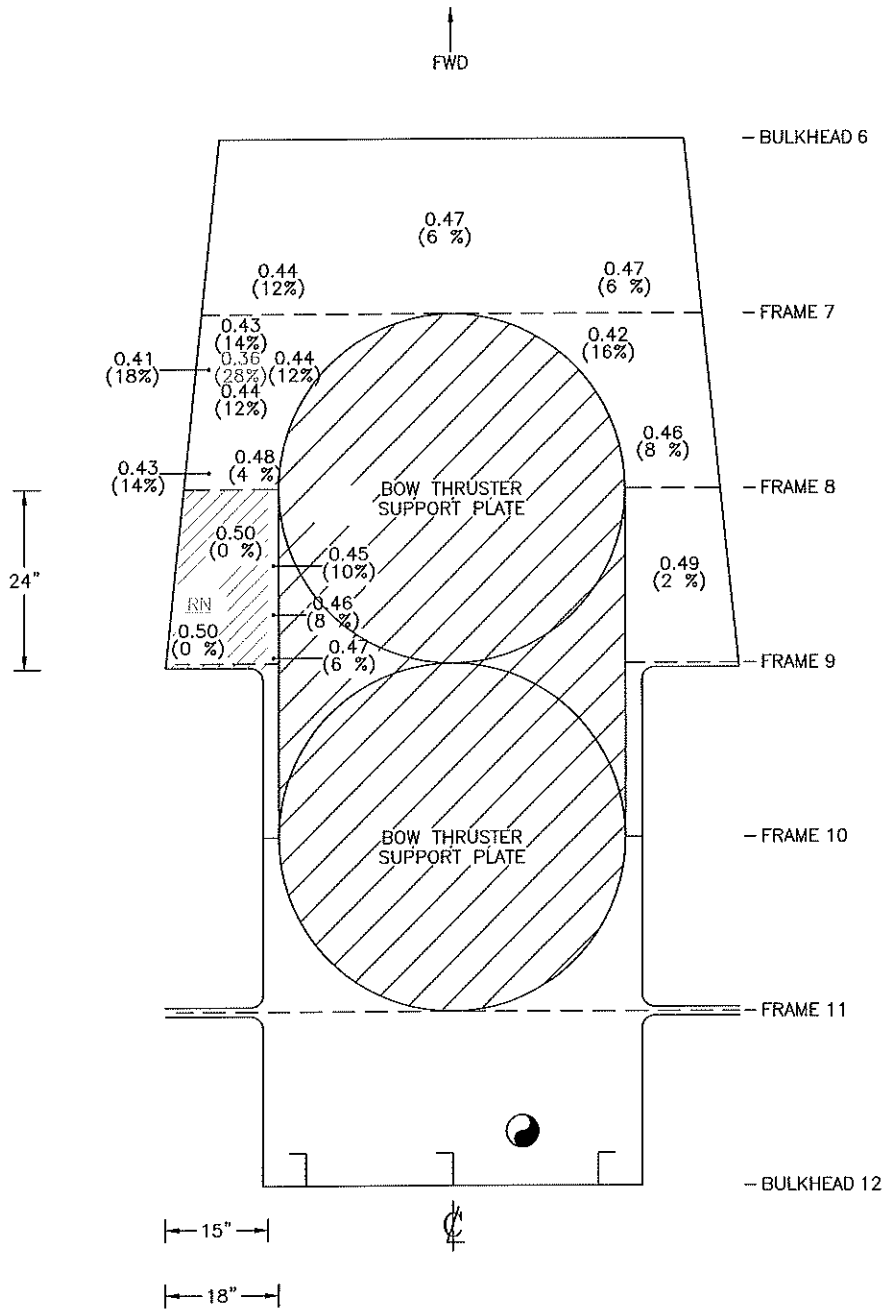
NOTE:
ALL SEA CHEST PLATING .50".
9" X-HEAVY PIPE (.50" WALL THICKNESS).
BOTTOM PLATING .4375"PLT.
N/A = NOT ACCESSIBLE AT TIME OF SURVEY.
SEA CHEST PIPING SCHEDULED FOR REPLACEMENT.

VESSEL: OCEANUS		DESCRIPTION: SEA CHEST (PORT SIDE) VIEWED AS NOTED	
DRAWN BY: Q.TRAPP	JOB # A1439	DWG # SEA CHEST (P)	DATE: FEBRUARY 2017



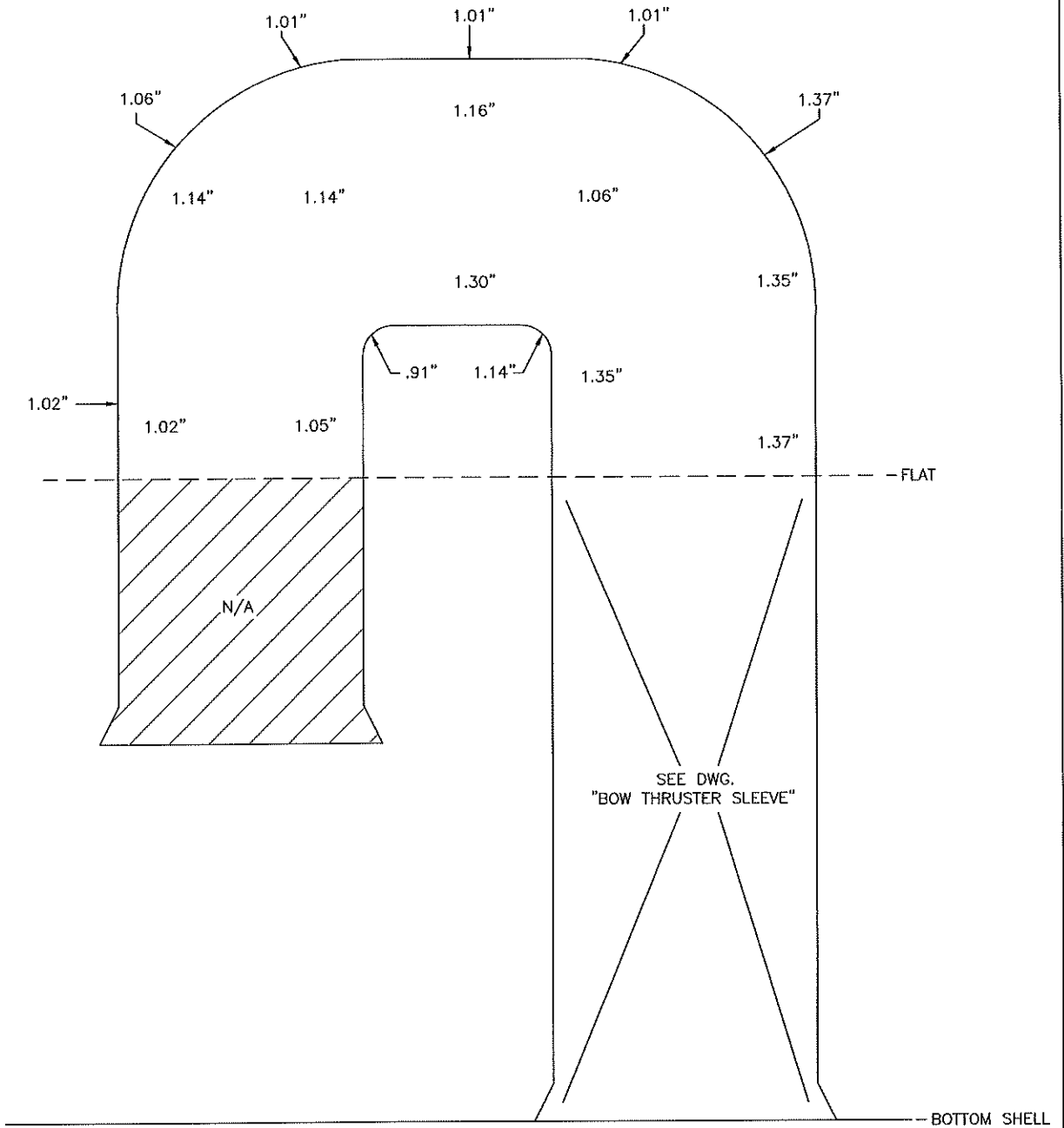
NOTE:
ALL SEA CHEST PLATING .50".
9" X-HEAVY PIPE (.50" WALL THICKNESS).
BOTTOM PLATING .4375"PLT.
N/A = NOT ACCESSIBLE AT TIME OF SURVEY.
SEA CHEST PIPING SCHEDULED FOR REPLACEMENT.

VESSEL: OCEANUS		DESCRIPTION: SEA CHEST (STARBOARD SIDE) VIEWED AS NOTED	
DRAWN BY: Q.TRAPP	JOB # A1439	DWG # SEA CHEST (S)	DATE: FEBRUARY 2017



NOTE:
 ALL PLATING .50".
 GREEN = SUBSTANTIAL WASTAGE.
 [Hatched Box] = RENEWED PLATE.

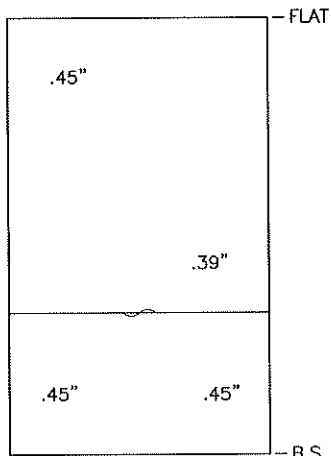
VESSEL: R/V OCEANUS		DESCRIPTION: BOW THRUSTER TANK TOP	
DRAWN BY: W. RAMIREZ		DATE: FEBRUARY 2017	
JOB # A1439		DWG # BOW THRUST TT	
		v.1	



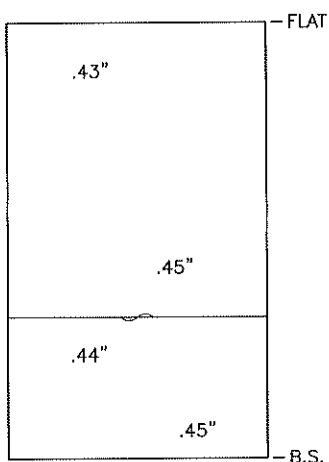
NOTE:
NO ORIGINAL THICKNESS AVAILABLE AT TIME OF SURVEY.

VESSEL: R/V OCEANUS		DESCRIPTION: BOW THRUSTER U-TUBE	
DRAWN BY: W. RAMIREZ		DATE: FEBRUARY 2017	
JOB # A1439	DWG # U-TUBE	v1.1	

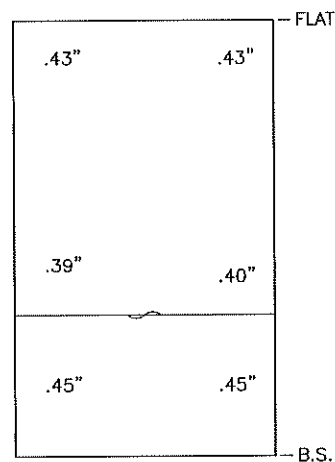
FORWARD PLATE
(LOOKING FORWARD)



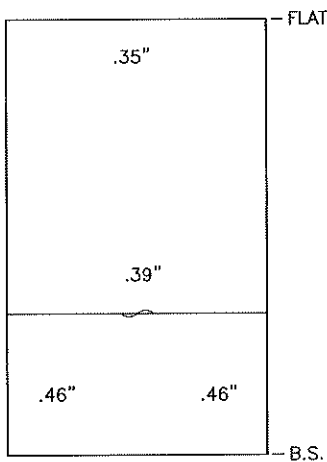
PORT PLATE
(LOOKING OUTBOARD)



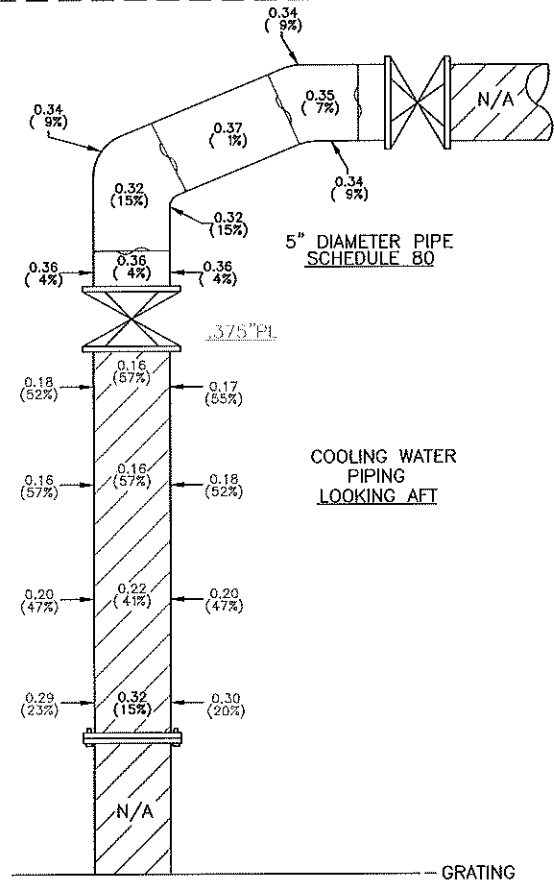
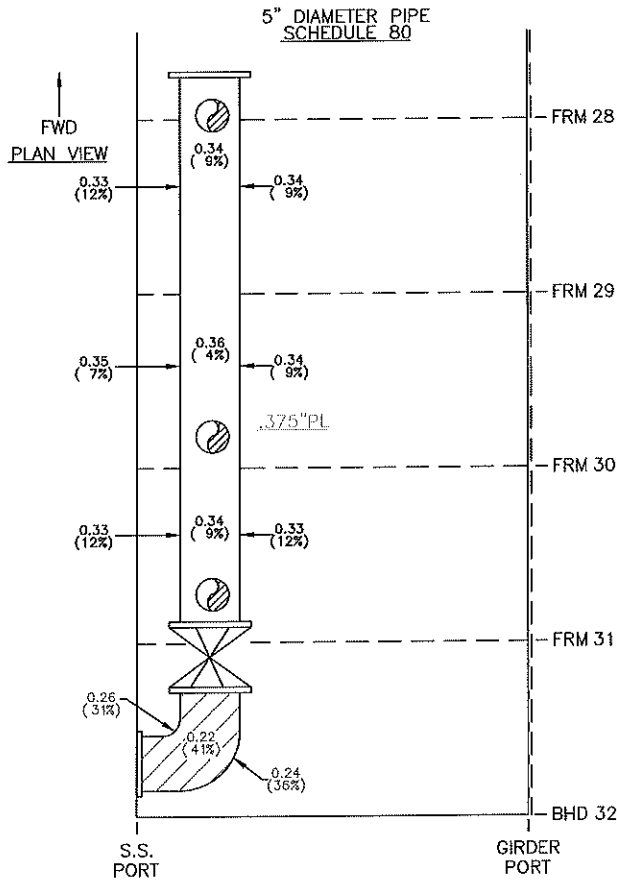
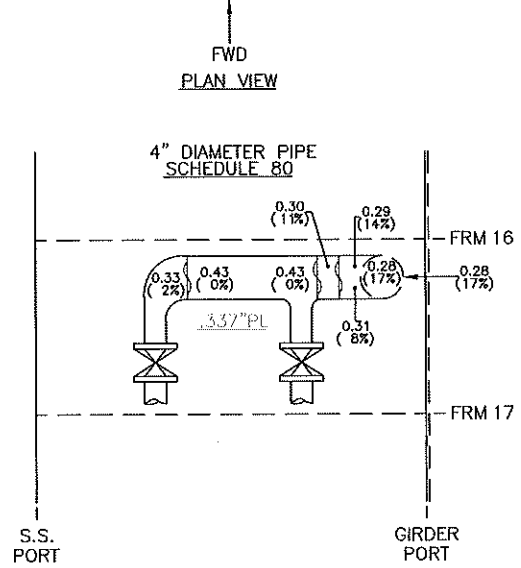
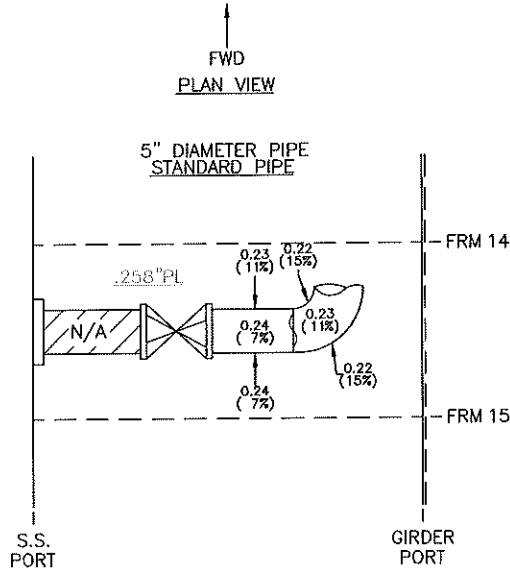
STARBOARD PLATE
(LOOKING OUTBOARD)



AFT PLATE
(LOOKING AFT)

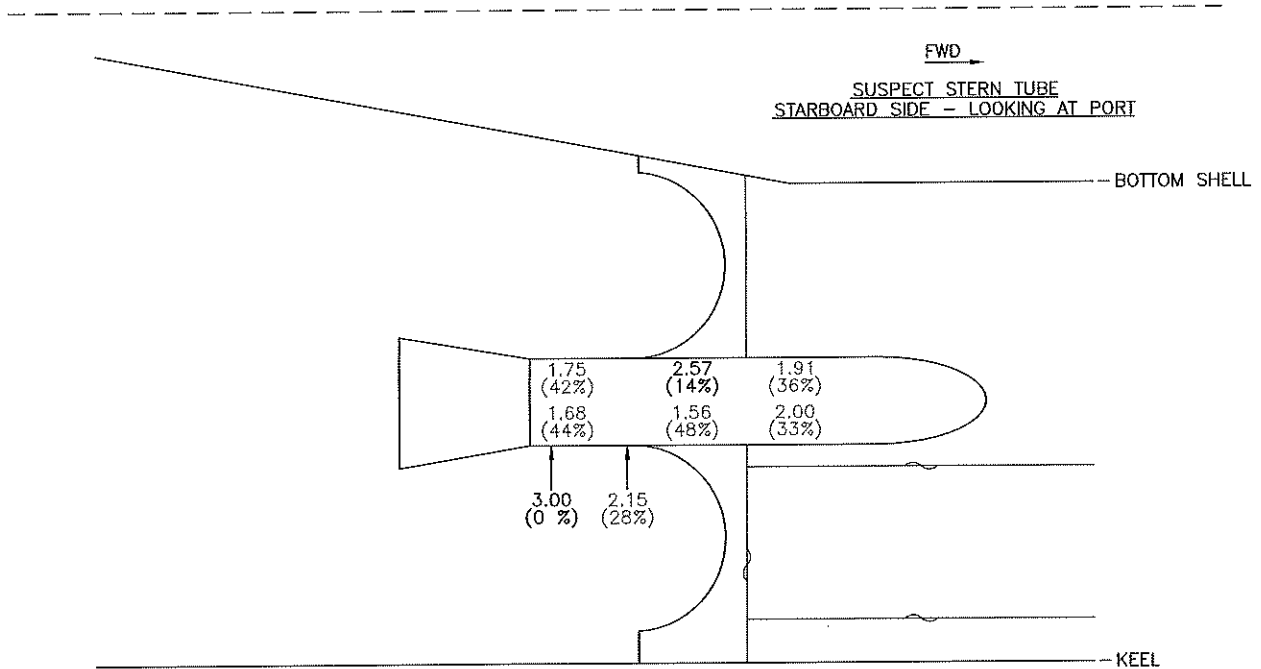
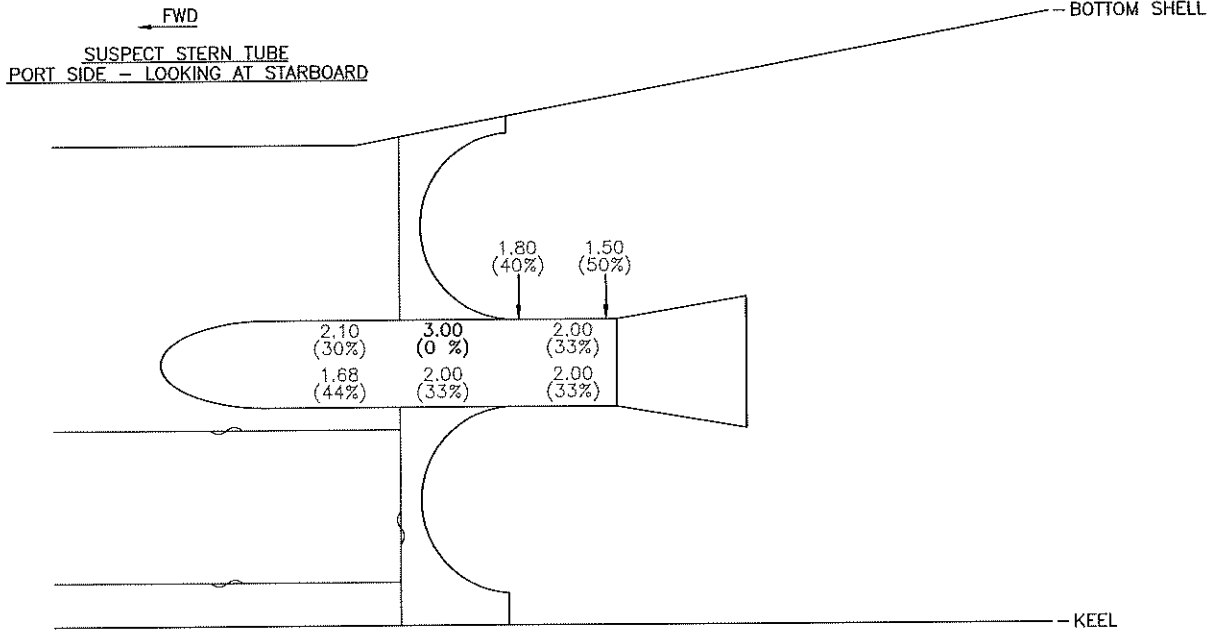


VESSEL: R/V OCEANUS		DESCRIPTION: BOW THRUSTER SLEEVE	
DRAWN BY: W. RAMIREZ		DATE: FEBRUARY 2017	
JOB # A1439	DWG # BOW THRUSTER SLEEVE	DATE: FEBRUARY 2017	DATE: FEBRUARY 2017



NOTE:
ALL THICKNESS AS NOTED.
GREEN = SUBSTANTIAL WASTAGE.
RED = EXCESSIVE WASTAGE.

VESSEL: R/V OCEANUS	SUSPECT ENGINE ROOM PIPING DESCRIPTION: PLAN VIEW		
DRAWN BY: W. RAMIREZ	JOB # A1439	DWG # SUSP ENG RM PIPING	DATE: FEBRUARY 2017



NOTE:
NO ORIGINAL THICKNESS AVAILABLE AT TIME OF SURVEY.
PERCENT WASTAGE BASED OFF OF NOMINAL THICKNESS.
ALL NOMINAL THICKNESS 3.00" PLT.
RED = EXCESSIVE WASTAGE.

VESSEL: R/V OCEANUS		DESCRIPTION: SUSPECT STERN TUBE PLATING VIEWED AS NOTED	
DRAWN BY: W. RAMIREZ	JOB # A1439	DWG # SUSP STERN TUBE	DATE: FEBRUARY 2017

**R/V Oceanus
Trim & Stability Booklet
Revision C**

Prepared for

**Woods Hole Oceanographic Institution
Woods Hole, Massachusetts**

**R/V Oceanus
Trim & Stability Booklet
Revision C**

Prepared for

**Woods Hole Oceanographic Institution
Woods Hole, Massachusetts**

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Justin M. Morgan, P.E.
Project Manager

File No. 07009
February 2007



THE GLOSTEN ASSOCIATES
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Table of Contents

REVISIONS	2
REFERENCES	2
GENERAL DESCRIPTION	3
VESSEL CHARACTERISTICS	3
ADMEASURED DATA (1976).....	3
LOADLINE DATA	3
GENERAL NOTES	4
OBJECTIVE	4
GENERAL DESCRIPTION.....	4
OPERATING INSTRUCTIONS	4
INSTRUCTIONS	5
INSTRUCTIONS FOR COMPUTING VESSEL TRIM AND STABILITY	5
CRANE USAGE INSTRUCTIONS.....	6
CRANE LOAD CAPACITY CHART	7
DRAFT MARKS	8
LOCATION OF DRAFT MARKS & KEEL IN REFERENCE TO BASELINE	8
DRAFT DIAGRAM	9
HYDROSTATICS	10
REQUIRED GM	11
LOADING RESTRICTIONS (MINIMUM GM)	12
TRIM DIAGRAM	12
TRIM DIAGRAM	13
LIQUID LOADING DIAGRAM	15
TANK CAPACITIES	17
GENERAL ARRANGEMENT	18
MEAN LIGHT OPERATING CONDITION	21
LOADING CONDITIONS (EXAMPLES)	22
LIGHTSHIP CONDITION	22
FULL LOAD DEPARTURE, 100% CONSUMABLES	25
MID-VOYAGE, 50% CONSUMABLES	28
BURNOUT, 10% CONSUMABLES	31
HEAVY DEPARTURE	34
BLANK CALCULATION WORKSHEETS	37
FIXED BALLAST: AMOUNT AND LOCATION	40

Revisions

Revision	#	Date	Sheet	Description
A	1	7/15/2004	13-15, 21-33	Load Cases were revised to include updated information from Reference 1 and 2.
	2		9, 21-33	Load Cases were revised to include new GM Required curves from Reference 3.
	3		9	Hydrostatics changed due to new hydrostatics model developed for work related to References 3 & 4.
	4		7	Crane guidance changed to reflect new cases and GM required curve.
B	1	12/16/2005		Changed format of cases to match GSSP.
	2			Revised Crane chart and guidance based on Reference 6.
	3			Inserted Trim Change Diagram from Reference 7.
	4			Inserted Liquid Loading Diagram from Reference 7, updated values based on Reference 3.
	5			Inserted Draft Mark reference drawing from Reference 7.
	6			Inserted new General Arrangement drawings for better legibility.
	7			Changed Length Between Perpendiculars to 165' to match Reference 8.
C	1	2/14/2007		Lightship revised to include new KU Band Antenna and Mast
	2			Load Cases revised to include new GM Required curves and new antenna weight

References

1. R/V Oceanus, Stability Test Data Report for test on 7 February 2004
2. Glosten Drawing 03125-02 R/V Oceanus Lead Ballast Installation, Rev -
3. Glosten Report, R/V Oceanus Intact Stability, dated 12 July 2004
4. Trim & Stability Booklet for R/V Oceanus, prepared by RAVE Technologies, Approved 20 January 1995
5. Tank Capacity Tables, PBI Drawing No. 9250-800-16, Dated 16 January 1976
6. Glosten Report, R/V Oceanus, Crane Stability, Dated 14 October 2005
7. Trim & Stability Booklet for R/V Oceanus, prepared by Gilbert, Approved 23 March 1976
8. Peterson Builders Drawing 9250-800-23, 165 Ft. Oceanographic Research Vessel Lines, Rev. B
9. Trim & Stability Booklet for R/V Oceanus, Rev. B, prepared by The Glosten Associates, Inc., Approved 24 March 2006
10. Glosten Drawing 07009-01, R/V Oceanus KU-Band Antenna Installation, Rev. -

R/V OCEANUS
TRIM & STABILITY BOOKLET

Date
2/14/07

Sheet
2 of 42

Rev
C

General Description

Vessel Characteristics

Length overall, Molded	177' -0"
Length on waterline	165' -0"
Length between Perpendiculars	165' -0"
Lightship displacement	787.77LT
Lightship VCG	15.27' abl
Lightship LCG	81.53' aft FR 0 (82.53 aft FP)
Breadth break Deck Molded	33' -0"
Depth to Break Deck Molded	17' -6"
Design Draft	-above Base Line 12" -6"
	-at FWD Draft Marks 11' -6 1/2"
	-at After Draft Marks 17' -8"
Power, Total Max. Continuous SHP	2800

Admeasured Data (1976)

Registered Dimensions	
Length	158.8 feet
Breadth	30.0 feet
Depth	11.9 feet
Gross Tonnage	288.90 GT
Net Tonnage	214.00 NT
Official Number	Not Documented (Public Vessel)
Builder	Peterson Builders Inc., Sturgeon Bay, Wisconsin
Builders Hull No.	9259-1
Year Built	1975
Mid Life Modifications by	Atlantic Dry Dock Inc., 1994, Jacksonville, Florida
Panama Canal Gross Tonnage	610.61
Suez Canal Tonnage	548.40

Loadline Data

Subdivision Loadline Center of disk is 3'-2 7/8" below top of steel upper deck.

General Notes

Objective

This booklet has been prepared to assist operating personnel in determining the vessel's operating metacentric height (corrected GM), and draft for any condition of loading or operation so as to maintain satisfactory trim and stability.

General Description

1. The loading conditions shown in the booklet cover the extreme operating range of the vessel.
2. The minimum allowable GM is shown plotted versus draft on sheet 12.

Operating Instructions

1. It shall be the master's responsibility to maintain the vessel in a satisfactory stability condition at all times.
2. No fixed ballast or other such weights shall be added, removed, altered and/or relocated without the authorization and supervision of the cognizant Officer in Charge, Marine Inspection.
3. Cross-connections, if installed, between port and starboard tanks shall be kept closed at all times while underway.
4. Free surface shall be maintained at a minimum. Trim should be minimized, bearing in mind that the loadline should never be submerged.
5. The vessel's bilges and voids shall be kept pumped to minimum content at all times consistent with pollution prevention requirements.
6. Permanent science outfit is included in Lightship (see sheet 21). Variable science equipment such as stores, vans, portable cranes, power supplies, laboratory equipment, scientific personnel and their effects should be added on the vessel's loading form.
7. Extreme care should be exercised when using the crane at sea especially in adverse weather conditions. The guidelines on sheet 6 should be read and understood thoroughly.
8. The vessel shall not be operated at a draft greater than 14' -3 3/8" molded. (16' -8 7/8" mean keel).
9. Every effort should be made to determine the cause of any list before taking any action.
10. Any opening that could allow water to enter into the hull or deckhouse should be kept closed when rough weather or sea conditions exist or are anticipated.
11. Deck freeing ports shall be maintained operable and completely unobstructed at all times.

Instructions

Instructions for Computing Vessel Trim and Stability

1. A typical condition is calculated by determining the amount and location of cargo on board, the weight and location of fuel oil and/or ballast water, potable water, crew and effects, and stores. These weights are entered into the weight column (for example, see sheets 22-36) and the distances of their centers of gravity from a reference plane, entered into the appropriate column. The moment due to the weight is the product of the weight and the distance from the reference plane center. The moment calculated is entered into the appropriate moment column.

For this booklet the reference point is the intersection of a vertical line through the Forward Perpendicular (FP), the center line, and the base line. The forward perpendicular is located at the intersection of the stern and the 12' -6" design waterline. Frame 0 is located 12" aft of the FP.

2. The free surface moment (FSM) is included for all tanks and is used in the calculation when a tank is not either empty or 100% full as follows:
 - For tanks that are slack (less than 95% full) enter the maximum free surface moment.
 - For tanks that are empty (less than 5% full) enter 0 (zero) for free surface moment.
 - For tanks that are 100% full enter 0 (zero) for free surface moment.
 - For other tanks enter the "full" free surface moment value. Full free surface is defined as the free surface at 95% full with 5 degrees of heel.
 - The following tanks should be considered slack in all loading conditions:

F.O. Day Tank (Gen)
1 F.O. Main Eng Port
1 F.O. Main Eng Stbd
L.O. Port
L.O. Stbd
Dirty Oil
Hydraulic Oil
Fresh Water Port
Fresh Water Stbd
Sewage Tank Port
Sewage Tank Stbd

3. The free surface (FSM), weights, vertical moment (Vmom), transverse moment (Tmom), and longitudinal moment (Lmom), columns are summed to determine the values to be entered on the totals line. The sum of the free surface, vertical, transverse, and longitudinal moment, columns are divided by the sum of the weight column to give the free surface correction(FScorr), the VCG, TCG, and LCG values respectively.
4. To determine the stability of the vessel, the displacement values from sheet 10 are used to find the corresponding baseline draft and metacentric height (KMt). From the vessel's displacement (DISPL), the draft (Tm) and transverse KM (KMt) can be interpolated from the hydrostatics chart on sheet 10. These values should be entered on the work sheet in the appropriate boxes. The transverse metacentric height (GMt) is the value of the VCG subtracted from the interpolated transverse KM (KMt). The available GM (GMavail) is a measure of the stability of the vessel. The available GM (GMavail) is obtained by subtracting the free surface correction (FScorr) from the value of the transverse metacentric height (GMt). The resulting available GM (GMavail) value must be greater than the minimum acceptable GM (GMreq) values plotted on sheet 12, for the particular mean draft.
5. To determine the trim, first determine the longitudinal center of buoyancy (LCB), the longitudinal metacentric height (KML) and the longitudinal center of flotation (LCF), from sheet 10, by interpolating the value of the displacement (DISPL). The moment to trim one inch (MT1) is calculated. The trimming lever (TL) is computed by subtracting the LCB from the LCG, and may be positive or negative. The displacement (DISPL) times the trimming lever (TL) divided by the moment to trim one inch (MT1) times 12 gives the trim (TRIM) in feet. A positive answer is a trim by the stern, a negative answer is a trim by the bow.

The draft at the forward perpendicular (TFP) is calculated by subtracting the result of (TRIM / LBP x LCF) from the molded draft (Tm) at the LCF. This result may be positive or negative.

The draft at the A.P. (TAP) is calculated by adding the trim (TRIM) to the draft at the forward perpendicular (TFP).

The keel draft at the forward perpendicular is calculated by subtracting 13" from the draft at the forward perpendicular (TFP).

The keel draft at midship is determined by computing the molded draft at midships and then adding 2' 5-1/2" as shown in the following formula:

$$\text{Keel Draft at MP} = T_m - (\text{TRIM} / \text{LBP} * (\text{LCF} - 82.5)) + 2' 5-1/2''$$

The keel draft at the aft perpendicular is calculated by adding 5' 1-13/16" to the draft at the aft perpendicular (TAP).

The LBP for these hydrostatic particulars has been taken as 165 feet.

The draft marks on the transom and forward can be obtained by plotting the molded draft at the LCF on the diagram on sheet 9.

6. To determine heel the total transverse moment (Tmom) is divided by the moment to alter heel one (1) degree (MH1). The moment to alter heel 1deg is calculated by multiplying 0.01745 (= π/180) times the GM available (GMavail) times the displacement (DISPL). Heel can be positive or negative. A positive answer indicates heel to starboard, a negative answer is heel to port.
7. Sheets 37 to 39 are provided for calculating a particular condition not found within this Trim and Stability Booklet.

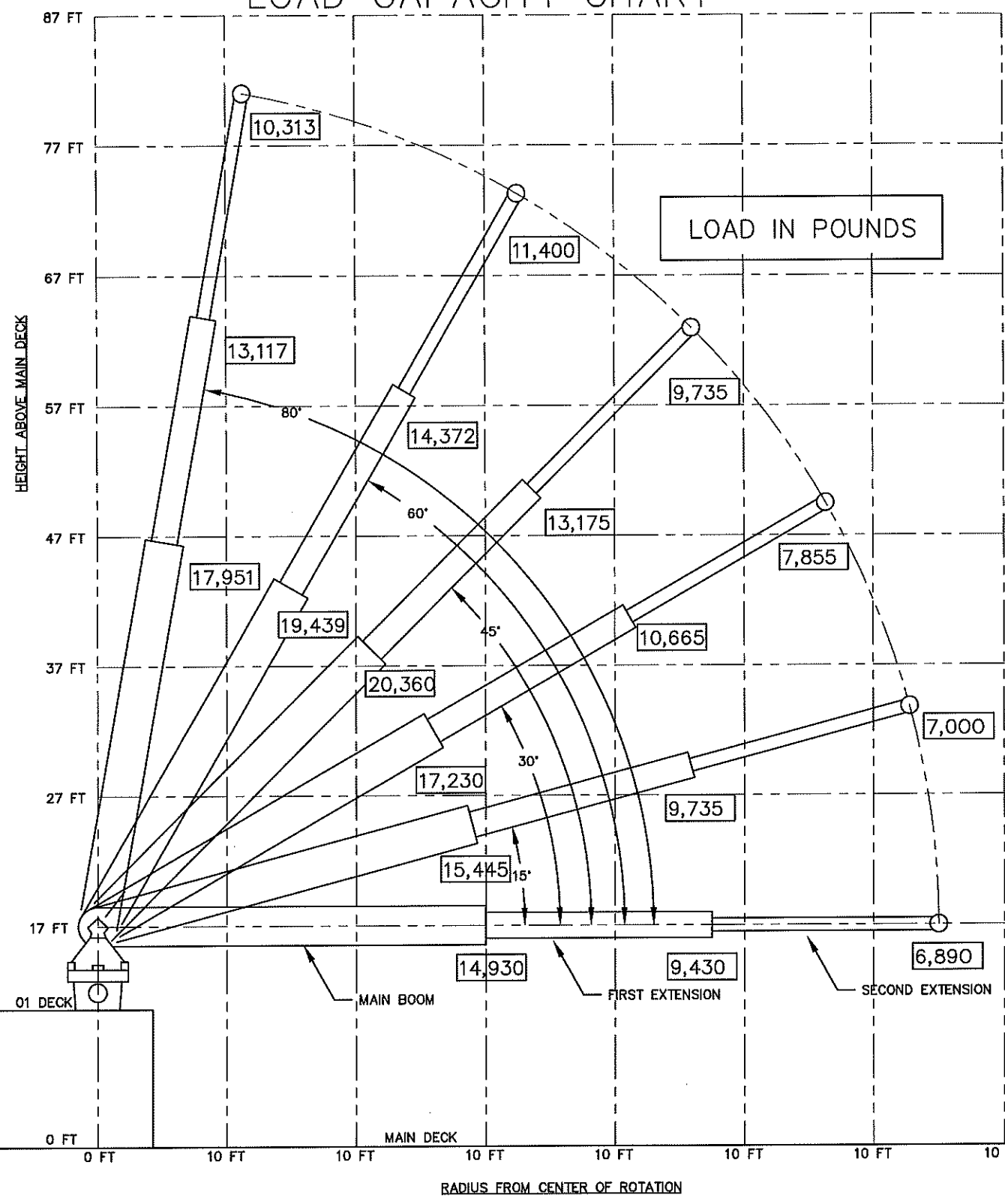
Crane Usage Instructions

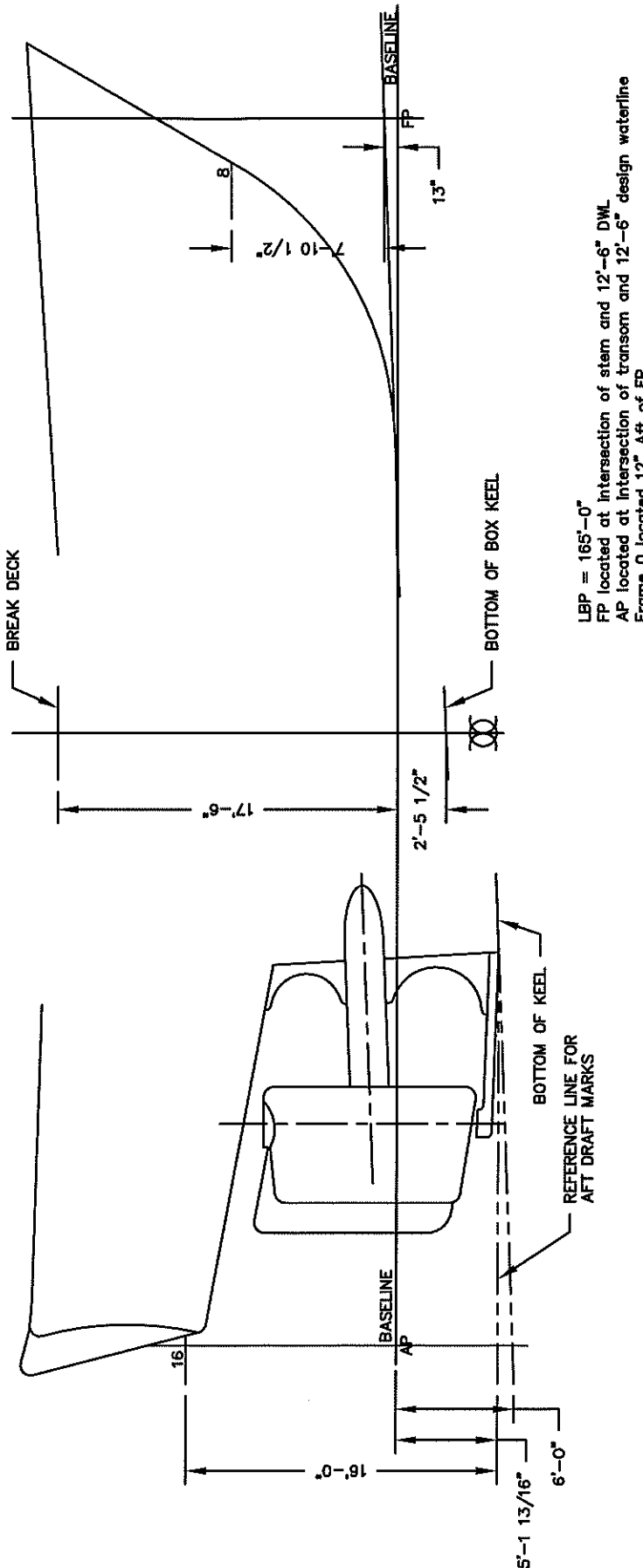
1. It is important that prior to any lift, the Officer-in-Charge study this document and refer to any other data that is supplied to insure that a safe lift is performed.
2. Extreme caution should be given to the hook load and crane radius. The following parameters are given for guidance and it is the intent that the Officer-In-Charge take precautions with the following criteria in mind:

Motion	Maximum Amplitude
Roll	15 degree heel each way
Pitch	5 degree trim from horizontal
Heave	2 feet up or down

3. Adequate GM is required when making any crane lift. The Officer-in-Charge must recalculate the vessel's GM considering the rise in VCG due to lifting the load and compare to the "Loading Restrictions (Minimum GM)" curve on sheet 12. When calculating the VCG of the lift, the added weight must be considered at the tip of the crane until it is set on deck or released from the cable.
4. The chart on sheet 7 shows the maximum pick weight for various boom lengths and angles. This chart is based on both the 200 ft moment capacity of the crane and the example stability case "Heavy Departure" on sheet 36. In this case the vessel has a minimum GM for all example cases. If the vessel is loaded such that there is less GM than this case, the chart is invalid and the Officer-in-Charge must check the stability of the vessel prior to any crane usage.
5. Doors and vents on the main deck were not considered downflooding points in the verification of adequate stability when lifting as all such openings should be secured when making a heavy lift at sea.
6. Final responsibility for deck crane usage must depend on the Officer-in-Charge's ability and experience to insure safe working conditions for the crew and satisfactory stability conditions for the vessel.

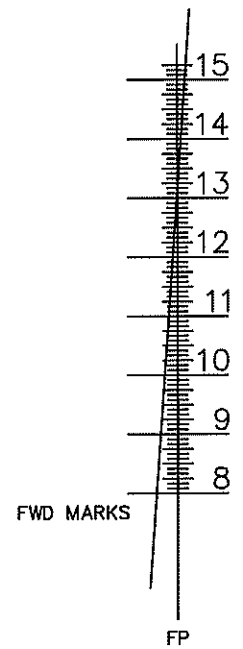
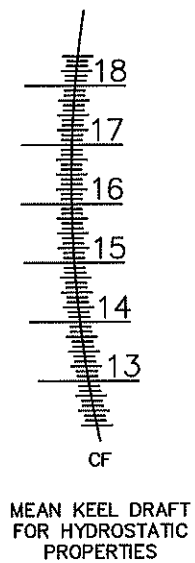
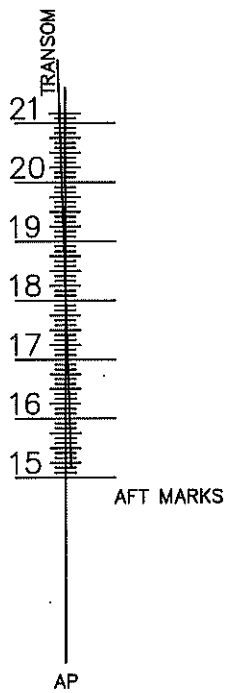
ALLIED MARINE CRANE LOAD CAPACITY CHART





LBP = 165'-0"
 FP located at intersection of stem and 12'-6" DWL
 AP located at intersection of transom and 12'-6" design waterline
 Frame 0 located 12" Aft of FP

LOCATION OF DRAFT MARKS AND KEEL
IN REFERENCE TO BASE LINE



OCEANUS – DRAFT MARKS
AS MARKED ON VESSEL

Hydrostatics

Trim = 0.00 ft (Specific Gravity = 1.025)

Mean Keel Draft ft	Molded Draft ft	Displacement LT	LCB ft aft FP	VCB ft abv BL	TPI LT/in	LCF ft aft FP	MT1" LT-ft/in	KML ft abv BL	KMT ft abv BL
13.25	10.50	738.58	84.82	6.41	9.34	89.21	85.52	229.30	16.57
13.35	10.60	749.81	84.88	6.47	9.38	89.35	86.60	228.70	16.54
13.46	10.70	761.09	84.95	6.53	9.42	89.48	87.65	228.00	16.52
13.56	10.80	772.43	85.02	6.60	9.47	89.61	88.68	227.30	16.50
13.67	10.90	783.81	85.09	6.66	9.51	89.73	89.72	226.60	16.48
13.77	11.00	795.25	85.15	6.72	9.55	89.85	90.73	225.90	16.47
13.88	11.10	806.74	85.22	6.78	9.59	89.96	91.74	225.20	16.45
13.98	11.20	818.27	85.29	6.84	9.63	90.07	92.74	224.40	16.44
14.09	11.30	829.85	85.36	6.90	9.67	90.17	93.67	223.50	16.43
14.19	11.40	841.48	85.42	6.97	9.71	90.26	94.61	222.60	16.42
14.29	11.50	853.15	85.49	7.03	9.75	90.34	95.51	221.70	16.41
14.40	11.60	864.86	85.55	7.09	9.78	90.42	96.42	220.70	16.40
14.50	11.70	876.62	85.62	7.15	9.82	90.50	97.33	219.80	16.39
14.61	11.80	888.42	85.69	7.21	9.85	90.58	98.23	218.90	16.39
14.71	11.90	900.26	85.75	7.27	9.89	90.66	99.13	218.00	16.38
14.81	12.00	912.15	85.81	7.33	9.93	90.73	100.00	217.10	16.38
14.91	12.10	924.07	85.88	7.39	9.96	90.79	100.81	216.00	16.38
15.02	12.20	936.03	85.94	7.46	9.99	90.84	101.62	215.00	16.37
15.12	12.30	948.04	86.00	7.52	10.02	90.89	102.43	213.90	16.37
15.22	12.40	960.08	86.06	7.58	10.05	90.94	103.24	212.90	16.37
15.32	12.50	972.15	86.12	7.64	10.08	90.99	104.05	211.90	16.37
15.42	12.60	984.26	86.18	7.70	10.11	90.97	104.52	210.30	16.37
15.52	12.70	996.41	86.24	7.76	10.14	91.01	105.31	209.30	16.37
15.63	12.80	1,008.59	86.30	7.82	10.17	91.05	106.06	208.20	16.38
15.73	12.90	1,020.81	86.36	7.88	10.19	91.07	106.78	207.10	16.38
15.83	13.00	1,033.05	86.41	7.94	10.22	91.09	107.48	206.00	16.38
15.93	13.10	1,045.34	86.47	8.00	10.25	91.11	108.18	204.90	16.38
16.03	13.20	1,057.65	86.52	8.06	10.27	91.13	108.87	203.80	16.39
16.13	13.30	1,070.00	86.58	8.12	10.30	91.14	109.55	202.70	16.39
16.23	13.40	1,082.37	86.63	8.18	10.33	91.15	110.22	201.60	16.40
16.33	13.50	1,094.78	86.68	8.24	10.35	91.16	110.87	200.50	16.40
16.43	13.60	1,107.21	86.73	8.30	10.38	91.16	111.52	199.40	16.41
16.53	13.70	1,119.68	86.78	8.36	10.40	91.17	112.15	198.30	16.41
16.63	13.80	1,132.18	86.83	8.42	10.42	91.17	112.79	197.30	16.42
16.73	13.90	1,144.70	86.87	8.48	10.45	91.17	113.43	196.20	16.43
16.83	14.00	1,157.25	86.92	8.54	10.47	91.17	114.07	195.20	16.44
16.93	14.10	1,169.83	86.97	8.60	10.49	91.16	114.70	194.10	16.44
17.03	14.20	1,182.44	87.01	8.66	10.52	91.14	115.32	193.10	16.45
17.13	14.30	1,195.08	87.05	8.71	10.54	91.13	115.95	192.10	16.46
17.23	14.40	1,207.74	87.10	8.77	10.56	91.12	116.58	191.10	16.47
17.33	14.50	1,220.43	87.14	8.83	10.58	91.10	117.21	190.20	16.48
17.43	14.60	1,233.15	87.18	8.89	10.61	91.09	117.83	189.20	16.49
17.53	14.70	1,245.89	87.22	8.95	10.63	91.07	118.46	188.30	16.50
17.63	14.80	1,258.67	87.26	9.01	10.65	91.05	119.08	187.30	16.51
17.72	14.90	1,271.46	87.30	9.07	10.67	91.03	119.69	186.40	16.53
17.82	15.00	1,284.29	87.33	9.13	10.70	91.01	120.31	185.50	16.54

Notes: MT1" based on length between marks = 165.00 ft, assuming VCG = 0

Required GM

Zero Trim

Mean Keel Draft ft	Molded Draft ft	GMr, 1 ft	GMr, 2 ft	GMr, 3 ft
13.25	10.50	2.61	2.48	2.25
13.35	10.60	2.58	2.45	2.24
13.46	10.70	2.56	2.43	2.23
13.56	10.80	2.53	2.40	2.22
13.67	10.90	2.51	2.38	2.21
13.77	11.00	2.48	2.35	2.20
13.88	11.10	2.46	2.33	2.17
13.98	11.20	2.44	2.31	2.15
14.09	11.30	2.42	2.29	2.12
14.19	11.40	2.40	2.28	2.10
14.29	11.50	2.38	2.26	2.07
14.40	11.60	2.37	2.24	2.05
14.50	11.70	2.35	2.22	2.02
14.61	11.80	2.33	2.21	2.00
14.71	11.90	2.31	2.19	1.97
14.81	12.00	2.29	2.17	1.95
14.91	12.10	2.28	2.15	1.92
15.02	12.20	2.26	2.14	1.89
15.12	12.30	2.25	2.13	1.87
15.22	12.40	2.24	2.12	1.84
15.32	12.50	2.23	2.10	1.81
15.42	12.60	2.21	2.09	1.80
15.52	12.70	2.20	2.08	1.79
15.63	12.80	2.19	2.07	1.78
15.73	12.90	2.17	2.06	1.77
15.83	13.00	2.16	2.04	1.76
15.93	13.10	2.15	2.03	1.76
16.03	13.20	2.15	2.02	1.76
16.13	13.30	2.14	2.02	1.77
16.23	13.40	2.13	2.01	1.77
16.33	13.50	2.12	2.00	1.77
16.43	13.60	2.11	1.99	1.78
16.53	13.70	2.11	1.99	1.80
16.63	13.80	2.10	1.98	1.81
16.73	13.90	2.09	1.97	1.83
16.83	14.00	2.08	1.97	1.84
16.93	14.10	2.08	1.96	1.86
17.03	14.20	2.08	1.96	1.88
17.13	14.30	2.08	1.95	1.91
17.23	14.40	2.07	1.95	1.93
17.33	14.50	2.07	1.95	1.95
17.43	14.60	2.07	1.95	1.98
17.53	14.70	2.06	1.94	2.02
17.63	14.80	2.06	1.94	2.05
17.72	14.90	2.06	1.94	2.09
17.82	15.00	2.06	1.94	2.12

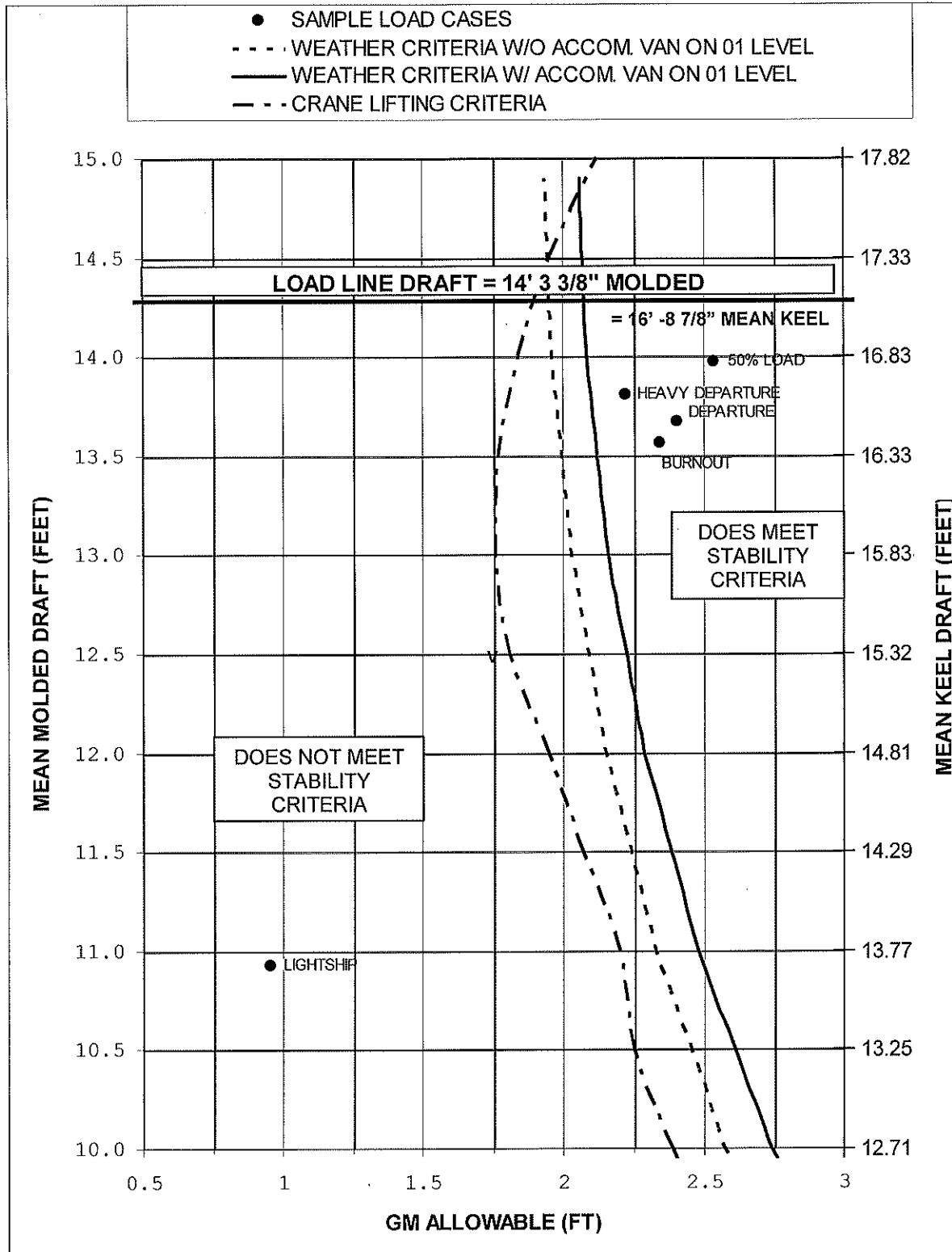
GMr, 1: Weather Criteria - Accommodations Van on 01 Level

GMr, 2: Weather Criteria - No Accommodations Van on 01 Level

GMr, 3: Crane Lifting Criteria

Loading Restrictions (Minimum GM)

GM ALLOWABLE -VS- DISPLACEMENT



Trim Diagram

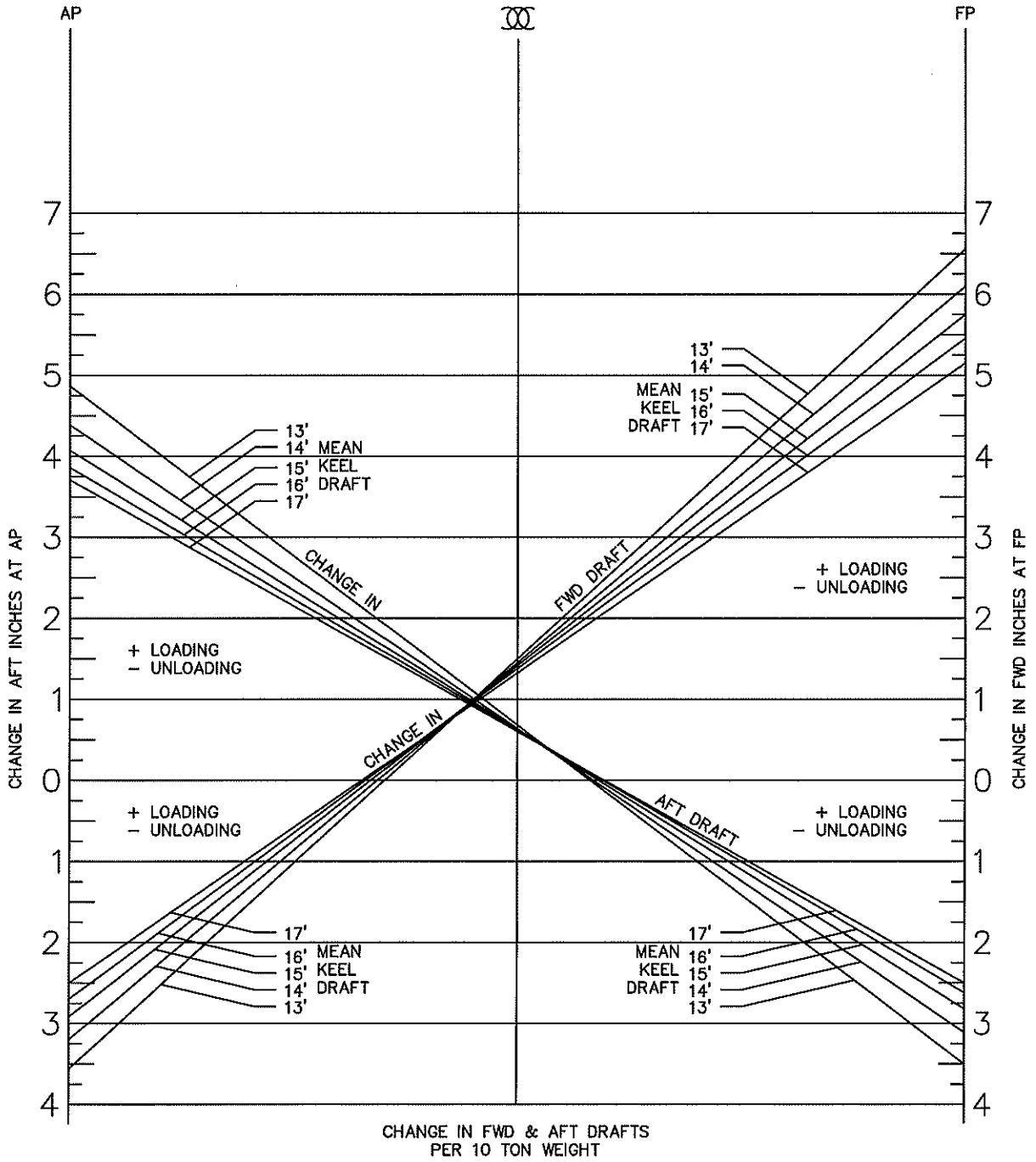
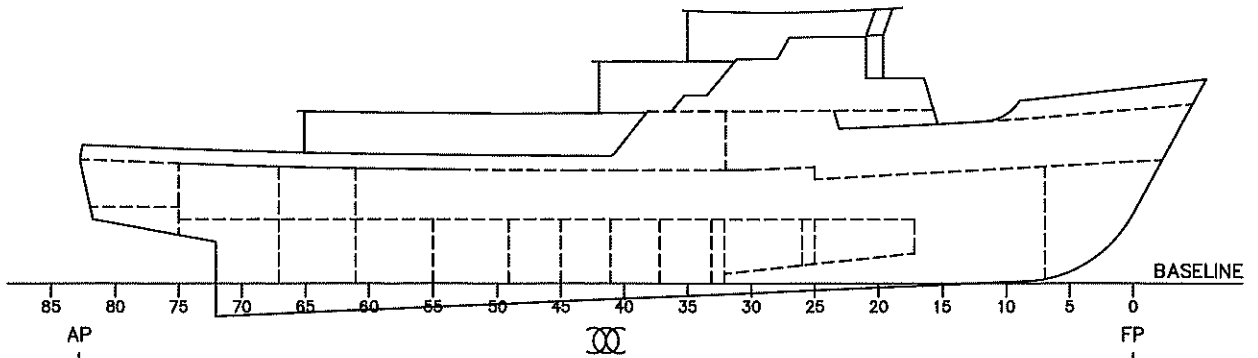
If one has a loaded condition for which the draft at the marks is known, the mean keel draft may be read from sheet 9 by drawing a straight line between the draft at the fwd and aft marks. The effect of moving, loading or unloading on the vessel's draft at the perpendiculars can be found by using the trim diagram on sheet 14.

Example: With the existing drafts of 18'-4" at the aft marks and 10'-10 1/2" at the fwd marks, (mean keel draft from sheet 9 is 15'-0") what will be the new draft if 15 ton weight is added at frame 65.

1. Follow a vertical line from Fr. 65 to CHANGE IN AFT DRAFT line for 15 feet mean draft.
2. Project horizontally from this intersection to CHANGE IN AFT DRAFT scale to read 2.72".
3. Continue vertical line to CHANGE IN FWD DRAFT line for 15 feet mean draft.
4. Project horizontally from this intersection to CHANGE IN FWD DRAFT scale to read -1.15".
5. Since these changes are for loading 10 tons, draft changes have to be modified by the ratio 15/10. Aft draft change is $15/10 \times 2.72" = 4.08"$. NEW AFT DRAFT is $18'-4" + 4" = 18'-8"$. Fwd draft change is $15/10 \times -1.15" = -1.725"$. NEW FWD DRAFT is $10'-10 \frac{1}{2}" - 1 \frac{3}{4}" = 10'-8 \frac{3}{4}"$.

As the hull sinkage and trim characteristics vary with draft, five values of mean draft (average of forward and aft drafts) are shown for determining the change in draft. After loading or unloading a given amount, the new mean draft should be used for the next calculations. The position for mean drafts other than those shown may be interpolated.

Note that the sign (plus or minus) shows if the change in draft is to be added to or subtracted from the present draft, reflecting whether the weight is being loaded or unloaded and the weight's location along the hull.



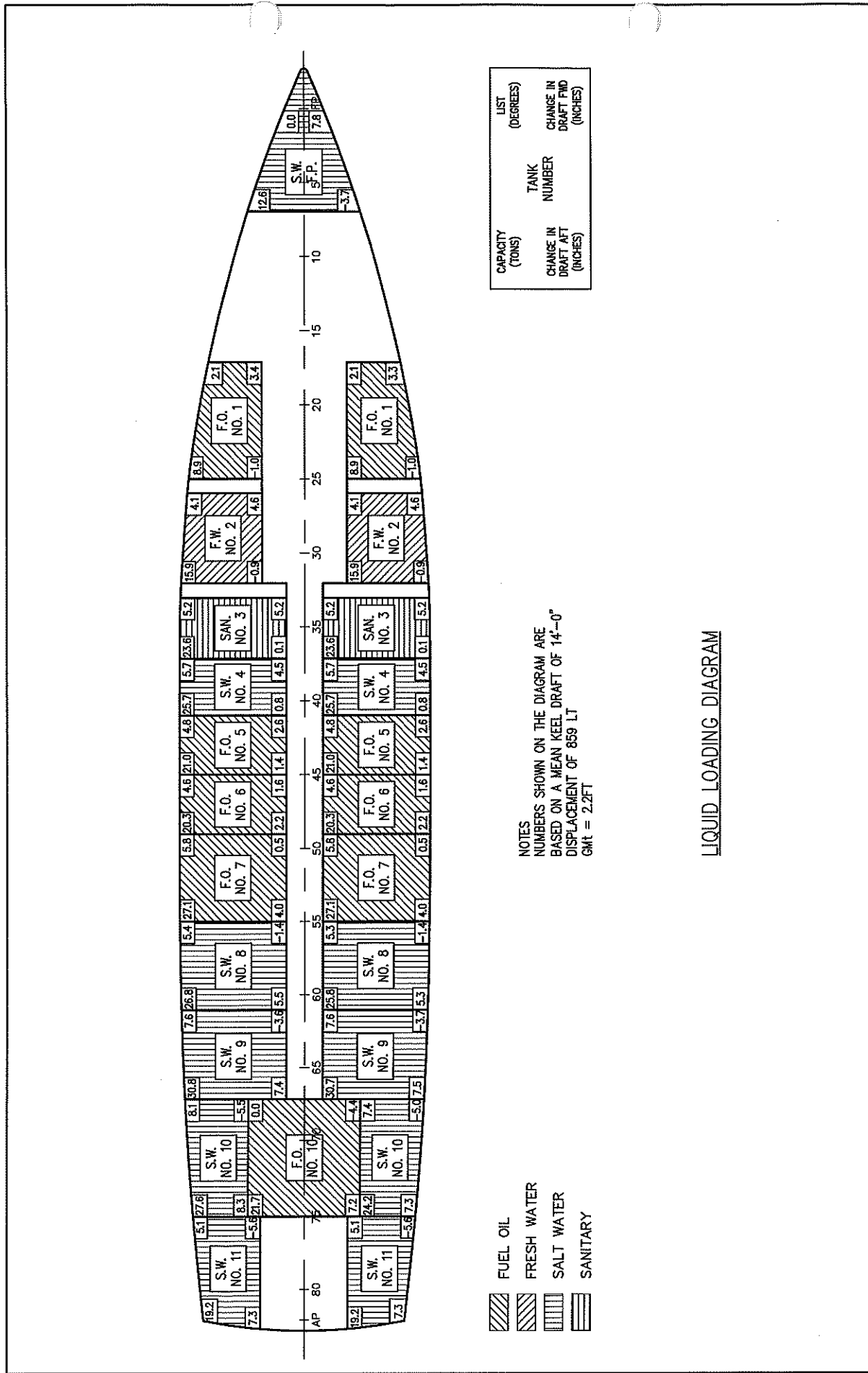
TRIM DIAGRAM

Liquid Loading Diagram

The purpose of the liquid loading diagram is to show the distribution and amount of liquids normally carried on board and the effect on trim and heel of filling each tank with its normal capacity liquid.





In the upper left corner appears the normal capacity of the tank in tons. For fuel oil tanks, this would be the weight of oil at 95% full. For water tanks it is the weight at 100% full.

In the upper right corner is shown the change of list that will be caused by filling each tank to the above capacities, and the lower right and lower left show the changes in draft forward and aft, respectively, to be expected from filling the tank. Emptying a tank will have the opposite effect.



NOTES
 NUMBERS SHOWN ON THE DIAGRAM ARE
 BASED ON A MEAN KEEL DRAFT OF 14'-0"
 DISPLACEMENT OF 859 LT
 GMT = 2.2FT

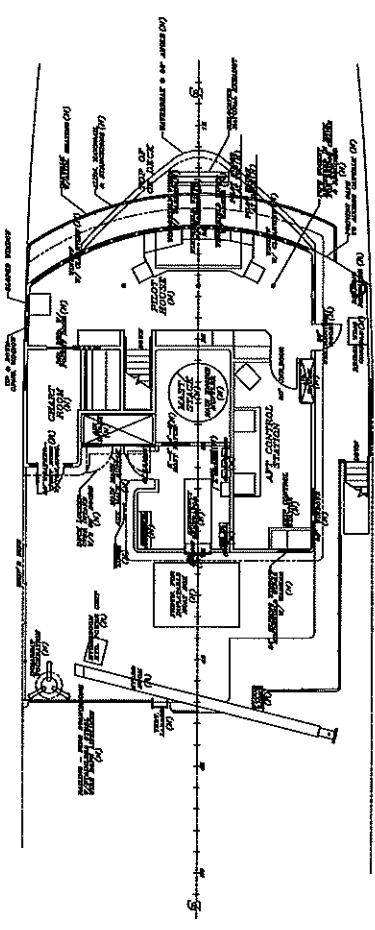
LIQUID LOADING DIAGRAM

-  FUEL OIL
-  FRESH WATER
-  SALT WATER
-  SANITARY

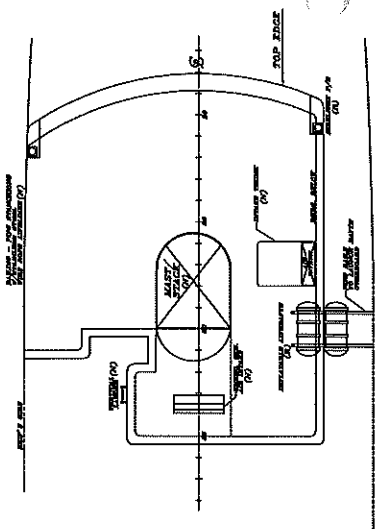
Tank Capacity Summary

Description	% Full	Sounding Inches	Volume Gallons	Weight LT	LCG ft aft FP	TCG ft stbd	VCG ft abv BL	FSM	
								95%	LT-ft Max
Diesel Tanks (Sp Gr = 0.870)									
F.O. DAY TANK (GEN)	100	104.00	740	2.40	20.00	8.79	22.14	2.3	2.3
1 F.O. MAIN ENG PORT	95	71.87	2,751	8.92	44.25	-7.95	6.88	5.1	9.4
1 F.O. MAIN ENG STBD	95	71.87	2,751	8.92	44.25	7.95	6.88	5.1	9.4
5 F.O. PORT	95	114.78	6,489	21.03	86.99	-8.44	6.07	24.7	45.3
5 F.O. STBD	95	113.88	6,489	21.03	86.99	8.44	6.07	24.6	45.3
6 F.O. PORT	95	114.32	6,260	20.29	94.96	-8.36	6.19	23.3	44.4
6 F.O. STBD	95	114.02	6,260	20.29	94.96	8.36	6.19	23.3	44.4
7 F.O. PORT	95	106.39	8,375	27.14	104.81	-8.15	6.54	29.5	63.1
7 F.O. STBD	95	101.63	8,375	27.14	104.81	8.15	6.54	29.5	63.1
10 F.O. CENTER	95	174.89	6,694	21.70	141.29	0.00	7.46	18.3	106.9
Total Diesel			55,183						
Potable Tanks (Sp Gr = 1.000)									
2 POTABLE WATER PORT	100	84.00	4,253	15.85	59.34	-9.35	6.36	11.4	20.8
2 POTABLE WATER STBD	100	84.00	4,253	15.85	59.34	9.35	6.36	11.4	20.8
Total Potable			8,507						
Lube Oil Tanks (Sp Gr = 0.924)									
LUBE OIL PORT	100	30.00	950	3.27	56.19	-13.37	17.19	2.5	3.8
LUBE OIL STBD	100	35.00	950	3.27	56.19	13.37	17.19	2.5	3.8
DIRTY OIL	100	72.00	477	1.82	28.99	0.00	3.32	0.4	0.4
Total Lube Oil			2,377						
Hydraulic Oil Tanks (Sp Gr = 0.924)									
HYDRAULIC OIL	100	48.00	236	0.81	149.50	-0.58	13.17	0.3	0.3
Total Hydraulic Oil			236						
Sewage Tanks (Sp Gr = 1.025)									
3 SANITARY PORT	100	116.00	6,335	24.19	71.06	-8.17	6.43	25.9	49.1
3 SANITARY STBD	100	116.00	6,335	24.19	71.06	8.17	6.43	25.9	49.1
Total Sewage			12,670						
Ballast Tanks (Sp Gr = 1.025)									
FOREPEAK BALLAST	100	182.00	3,311	12.64	5.14	0.00	15.07	7.2	17.9
4 SW BALLAST PORT	100	118.00	6,738	25.73	79.03	-8.41	6.31	28.4	52.5
4 SW BALLAST STBD	100	120.00	6,738	25.73	79.03	8.41	6.31	28.4	52.5
8 SW BALLAST PORT	100	103.00	7,016	26.79	116.72	-7.78	7.32	24.7	67.8
8 SW BALLAST STBD	100	102.00	6,766	25.84	116.89	7.96	7.36	23.9	64.0
9 SW BALLAST PORT	100	233.00	8,096	30.92	127.97	-9.51	10.82	13.1	51.6
9 SW BALLAST STBD	100	234.00	8,062	30.79	128.89	9.44	12.16	18.7	51.6
10 SW BALLAST PORT	100	138.00	7,351	28.07	142.45	-10.90	14.03	20.3	20.5
10 SW BALLAST STBD	100	139.00	6,364	24.30	142.70	11.08	14.71	19.7	20.4
11 SW BALLAST PORT	100	114.00	5,041	19.25	157.35	-9.42	15.36	17.2	19.5
11 SW BALLAST STBD	100	114.00	5,041	19.25	157.35	9.42	15.36	17.2	19.5
Total Ballast			70,525						

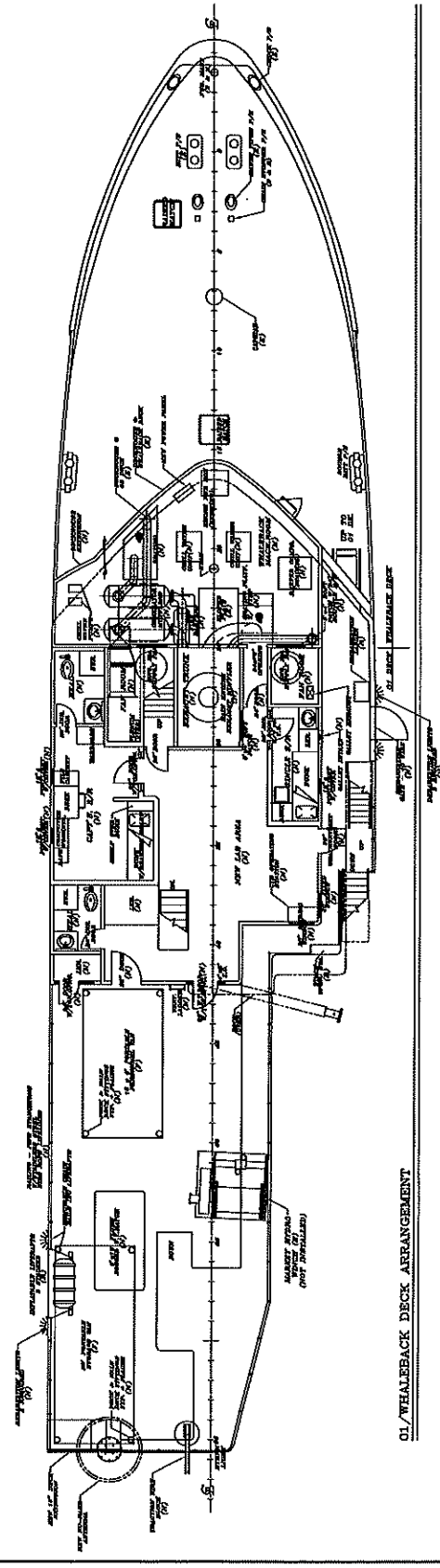
Notes: 1 ft³ = 7.480519 gallons
 95% FSM reported as FSM with 5° of heel



PLAN 01 NEW PILOT HOUSE DECK



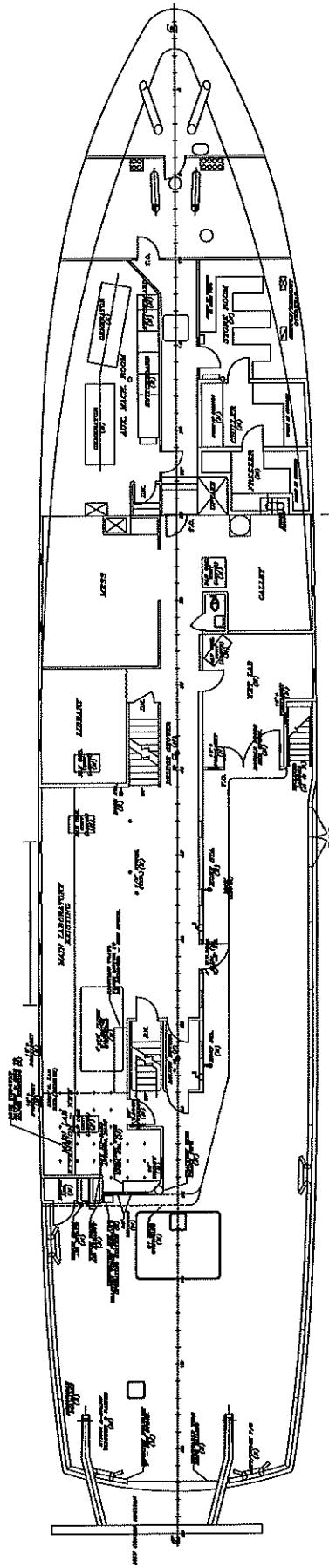
PLAN 02 NEW PILOT HOUSE TOP



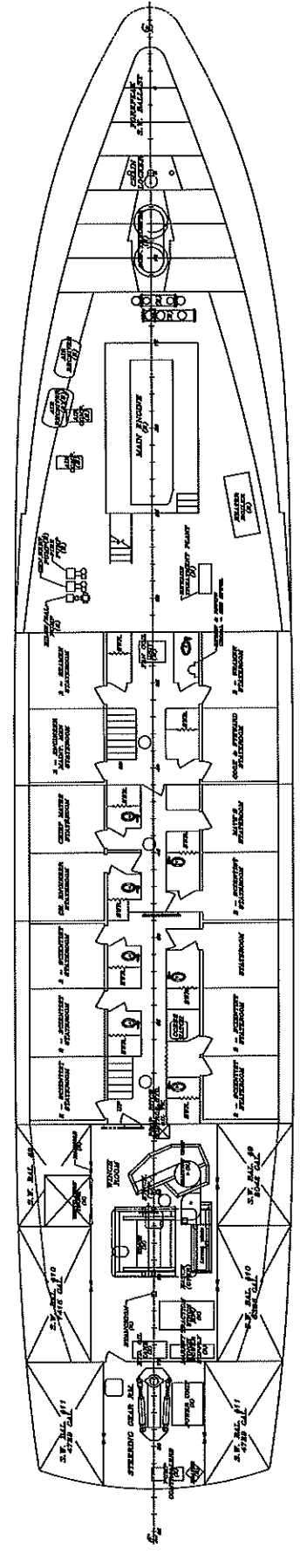
01/WHALEBACK DECK ARRANGEMENT

RODNEY E. LAV & ASSOCIATES
 13801 ATLANTIC BOULEVARD, JACKSONVILLE, FLORIDA 32225
 DRAWING UPDATED BY CEM MARINE TO REFLECT
 AS MODIFIED CONDITION AT MID - LIFE CONVERSION
 R/V OCEANUS MID - LIFE CONVERSION
 POST CONVERSION ARRANGEMENT - UPPER DECKS

R/V OCEANUS TRIM & STABILITY BOOKLET	Date	2/14/07	Sheet	18 of 42	Rev	C



MAIN / BREAK DECK ARRANGEMENT



PLATFORM DECK ARRANGEMENT

RODNEY E. LAY & ASSOCIATES
 1501 ALABAMA BOULEVARD, SUITE 1000, HOUSTON, TEXAS 77002
 DRAWING UPDATED BY CRI MARINE TO REFLECT
 AS SHOWN CONDITION AT AID - SEE CONTINUUM
 R/V OCEANUS 300 - LIFE CONVERSION
 LIFE CONVERSION ARRANGEMENT - PLATFORM & BREAK DECK

R/V OCEANUS TRIM & STABILITY BOOKLET	Date	2/14/07	Sheet	19 of 42	Rev	C

Mean Light Operating Condition

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Vessel								
CREW & EFFECTS	6.00	18.00	108.00	79.50	477.00	0.00	0.00	----
MISC & ENGINEER STORES								
<i>01 / Whaleback</i>								
New Lab Area	0.25	29.61	7.27	73.00	17.92	0.00	0.00	----
Whaleback Machinery Space	0.73	28.74	20.91	45.09	32.81	0.00	0.00	----
Open Deck Forward	0.33	25.76	8.40	35.47	11.56	0.00	0.00	----
CTD Operator cab	0.09	30.25	2.70	75.50	6.74	0.00	0.00	----
Cleaing Gear Locker	0.01	30.25	0.27	81.00	0.72	0.00	0.00	----
Head	0.01	30.25	0.27	81.00	0.72	0.00	0.00	----
Aft Open Deck	0.20	28.34	5.69	85.58	17.19	0.00	0.00	----
<i>Main Deck</i>								
Aft Open Deck	1.08	18.96	20.50	137.68	148.87	0.00	0.00	----
Deluge Shower room	0.02	21.00	0.47	115.00	2.57	0.00	0.00	----
Main Lab Extension	0.47	20.25	9.54	120.17	56.60	0.00	0.00	----
Main Lab	1.52	20.39	30.99	90.57	137.67	0.00	0.00	----
Library	0.25	21.85	5.36	76.00	18.66	0.00	0.00	----
Wet Lab	0.21	20.38	4.28	71.36	14.97	0.00	0.00	----
Stbd Waist	0.43	19.34	8.37	93.46	40.47	0.00	0.00	----
Head	0.01	22.03	0.20	63.00	0.56	0.00	0.00	----
Mess	0.07	21.53	1.44	61.00	4.08	0.00	0.00	----
Galley	0.17	20.27	3.35	55.00	9.08	0.00	0.00	----
FWD Passageway	0.16	20.62	3.22	37.57	5.87	0.00	0.00	----
Dry Stores	0.08	19.64	1.67	28.00	2.38	0.00	0.00	----
Genset Room	0.48	18.63	8.94	46.57	22.35	0.00	0.00	----
Bow Thruster Machinery Space	0.90	21.00	18.89	15.00	13.49	0.00	0.00	----
Bosun's Stores	1.52	21.57	32.79	5.00	7.60	0.00	0.00	----
<i>Hold</i>								
Steering Gear Compartment	0.61	14.22	8.70	146.19	89.41	0.00	0.00	----
Winch Room	0.58	12.63	7.33	144.05	83.60	0.00	0.00	----
Accomodations	0.08	13.44	1.05	79.14	6.18	0.00	0.00	----
Shaft Alley	0.09	2.00	0.18	119.00	10.63	0.00	0.00	----
Engine Room	1.12	11.45	12.78	51.25	57.20	0.00	0.00	----
Bow Thruster Room	0.83	10.04	8.37	19.33	16.11	0.00	0.00	----
Total Vessel	18.28	18.70	341.93	71.83	1,313.04	0.00	0.00	0.00

Note: The following Permanent Science Outfit are included in Lightship -

- A-Frame
- Work Boat
- DESH 5 winch & wire
- COM 15 winch & wire
- Dynacon winch & wire

Total Solids	18.28	18.70	341.93	71.83	1,313.04	0.00	0.00	0.00
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**R/V OCEANUS
TRIM & STABILITY BOOKLET**

Dat
2/14/07

Sheet
21 of 42

Rev
C

Intact Trim & Stability Calculation

Vessel Condition: *Weather Criteria - No Accommodations Van on 01 Level*
Tanks Condition: *T&S - Lightship*
Solids Condition: *T&S - Lightship*
Icing Condition: *<none>*

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft Fr0	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
<i>Tanks</i>								
<i>Diesel</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Potable</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Lube Oil</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Hydraulic oil</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Sanitary</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Sea Water</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Solids</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
TOTAL DEADWEIGHT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LIGHTSHIP	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	0.00
TOTAL DISPLACEMENT	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	(169.16)

Trim

Displacement	(DISPL)	= Total Weight	787.77	LT
Mean Molded Salt Water Draft	(Tm)	From Hydrostatics Table	10.93	ft
Longitudinal Center of Gravity	(LCG)	= Total Lmom / DISPL	82.53	ft
Longitudinal Center of Buoyancy	(LCB)	From Hydrostatics Table	85.11	ft
Trimming Lever	(TL)	= LCG - LCB	-2.58	ft
Longitudinal Metacentric Height	(KML)	From Hydrostatics Table	226.36	LT-ft
Moment to alter trim 1"	(MT1)	= (KML-VCG) * DISPL / LBP / 12 [LBP = 165 ft]	83.98	LT-ft
Trim (+ trim aft)	(TRIM)	= (DISPL * TL) / (12 * MT1)	-2.02	ft
Longitudinal Center of Flotation	(LCF)	From Hydrostatics Table	89.77	ft
Molded Draft at FP	(TFP)	= Tm - (TRIM / LBP * LCF) [LBP = 165 ft]	12.03	ft
Molded Draft at AP	(TAP)	= TFP + TRIM	10.01	ft
Keel Draft at FP		= TFP - 13"	10.95	ft
Keel Draft at MP		= Tm - (TRIM / LBP * (LCF-82.5)) + 2' 5-1/2"	13.48	ft
Keel Draft at AP		= TAP + 5' 1-13/16"	15.17	ft

Stability

Transverse KM	(KMt)	From Hydrostatics Table	16.48	ft
Vertical Center of Gravity	(VCG)	= Total Vmom / DISPL	15.27	ft
Transverse Metacentric Height	(GMt)	= KMt - VCG	1.21	ft
Free Surface Correction	(FScorr)	= Total FSM / DISPL	0.21	ft
GM Available	(GMavail)	= GMt - FScorr	0.99	ft
GM Required	(GMreq)	Weather Criteria - No Accommodations Van on 01 Level	2.25	ft
GM Margin		= GMavail - GMreq	-1.26	ft

Heel

Moment to alter Heel 1°	(MH1)	= 0.01745 * GMavail * DISPL	13.63	LT-ft
Heel (+ heel to stbd)		= Total Tmom / MH1	-0.47	deg

Observed Drafts

Draft at FWD Marks	Port:	ft	Stbd:	ft	Average:	ft
Draft at AFT Marks	Port:	ft	Stbd:	ft	Average:	ft
Observed Displacement		LT				
Difference		LT				
Expected Margin of Error		LT				

Notes: FSM calculated according to rules in T&S booklet.

R/V OCEANUS
TRIM & STABILITY BOOKLET

Date
2/14/07

Sheet
22 of 42

Rev
C

Tanks Loading Details - Summary

T&S - Lightship

Item	% Full	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	Actual FSM LT-ft
Diesel Tanks									
F.O. DAY TANK (GEN)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 F.O. MAIN ENG PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 F.O. MAIN ENG STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 F.O. PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 F.O. STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 F.O. PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 F.O. STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 F.O. PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 F.O. STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 F.O. CENTER	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Diesel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potable Tanks									
2 POTABLE WATER	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 POTABLE WATER STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Potable		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lube Oil Tanks									
LUBE OIL PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LUBE OIL STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DIRTY OIL	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Lube Oil		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydraulic oil Tanks									
HYDRAULIC OIL	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Hydraulic oil		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sanitary Tanks									
3 SANITARY PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 SANITARY STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sanitary		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sea Water Tanks									
FOREPEAK BALLAST	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sea Water		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Tanks		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Solids Loading Details - Summary

T&S - Lightship

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Total Solids	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	

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Intact Trim & Stability Calculation

Vessel Condition: *Weather Criteria - Accommodations Van on 01 Level*
Tanks Condition: *T&S - Full Load Departure 100% Consumables*
Solids Condition: *T&S - Full Load Departure 100% Consumables*
Icing Condition: *<none>*

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft Fr0	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Tanks								
<i>Diesel</i>	178.74	6.69	1,196.40	95.69	17,103.08	0.11	20.03	185.56
<i>Potable</i>	31.69	6.36	201.60	59.34	1,880.75	0.00	0.00	-----
<i>Lube Oil</i>	6.54	17.19	112.48	56.19	367.66	0.00	0.00	0.00
<i>Hydraulic oil</i>	0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	-----
<i>Sanitary</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Sea Water</i>	52.63	7.34	386.51	116.81	6,147.77	-0.06	-2.93	-----
<i>Mean Light Operating Condition</i>	18.28	18.70	341.93	71.83	1,313.03	0.00	0.00	-----
Solids	39.71	24.75	982.87	117.01	4,646.66	0.00	0.00	-----
TOTAL DEADWEIGHT								
	328.41	9.84	3,232.47	96.16	31,580.30	0.05	16.63	185.56
LIGHTSHIP								
	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	0.00
TOTAL DISPLACEMENT								
	1,116.18	13.67	15,261.72	86.54	96,594.96	0.01	8.75	(342.33)

Trim

Displacement	(DISPL)	= Total Weight	1,116.18	LT
Mean Molded Salt Water Draft	(Tm)	From Hydrostatics Table	13.67	ft
Longitudinal Center of Gravity	(LCG)	= Total Lmom / DISPL	86.54	ft
Longitudinal Center of Buoyancy	(LCB)	From Hydrostatics Table	86.77	ft
Trimming Lever	(TL)	= LCG - LCB	-0.23	ft
Longitudinal Metacentric Height	(KML)	From Hydrostatics Table	198.61	LT-ft
Moment to alter trim 1"	(MT1)	= (KML-VCG) * DISPL / LBP / 12 [LBP = 165 ft]	104.25	LT-ft
Trim (+ trim aft)	(TRIM)	= (DISPL * TL) / (12 * MT1)	-0.20	ft
Longitudinal Center of Flotation	(LCF)	From Hydrostatics Table	91.17	ft
Molded Draft at FP	(TFP)	= Tm - (TRIM / LBP * LCF) [LBP = 165 ft]	13.78	ft
Molded Draft at AP	(TAP)	= TFP + TRIM	13.58	ft
Keel Draft at FP		= TFP - 13"	12.70	ft
Keel Draft at MP		= Tm - (TRIM / LBP * (LCF-82.5)) + 2' 5-1/2"	16.14	ft
Keel Draft at AP		= TAP + 5' 1-13/16"	18.73	ft

Stability

Transverse KM	(KMt)	From Hydrostatics Table	16.41	ft
Vertical Center of Gravity	(VCG)	= Total Vmom / DISPL	13.67	ft
Transverse Metacentric Height	(GMt)	= KMt - VCG	2.74	ft
Free Surface Correction	(FScorr)	= Total FSM / DISPL	0.31	ft
GM Available	(GMavail)	= GMt - FScorr	2.43	ft
GM Required	(GMreq)	Weather Criteria - Accommodations Van on 01 Level	2.11	ft
GM Margin		= GMavail - GMreq	0.32	ft

Heel

Moment to alter Heel 1°	(MH1)	= 0.01745 * GMavail * DISPL	47.33	LT-ft
Heel (+ heel to stbd)		= Total Tmom / MH1	0.16	deg

Observed Drafts

Draft at FWD Marks	Port:	ft	Stbd:	ft	Average:	ft
Draft at AFT Marks	Port:	ft	Stbd:	ft	Average:	ft
Observed Displacement		LT				
Difference		LT				
Expected Margin of Error		LT				

Notes: FSM calculated according to rules in T&S booklet.

R/V OCEANUS	Date	Sheet	Rev
TRIM & STABILITY BOOKLET	2/14/07	25 of 42	C

Tanks Loading Details - Summary

T&S - Full Load Departure 100% Consumables

Item	% Full	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	Actual FSM LT-ft
Diesel Tanks									
F.O. DAY TANK (GEN)	95	2.28	21.97	50.06	20.01	45.59	8.79	20.03	2.26
1 F.O. MAIN ENG PORT	95	8.92	6.88	61.36	44.25	394.56	-7.95	-70.90	5.06
1 F.O. MAIN ENG STBD	95	8.92	6.88	61.36	44.25	394.56	7.95	70.90	5.06
5 F.O. PORT	95	21.03	6.07	127.73	86.99	1,829.60	-8.44	-177.51	24.65
5 F.O. STBD	95	21.03	6.07	127.73	86.99	1,829.60	8.44	177.51	24.58
6 F.O. PORT	95	20.29	6.19	125.56	94.96	1,926.77	-8.36	-169.67	23.34
6 F.O. STBD	95	20.29	6.19	125.56	94.96	1,926.77	8.36	169.67	23.30
7 F.O. PORT	95	27.14	6.54	177.58	104.81	2,844.99	-8.15	-221.17	29.48
7 F.O. STBD	95	27.14	6.54	177.58	104.81	2,844.99	8.15	221.17	29.51
10 F.O. CENTER	95	21.70	7.46	161.89	141.29	3,065.64	0.00	0.00	18.31
Subtotal Diesel		178.74	6.69	1,196.40	95.69	17,103.08	0.11	20.03	185.56
Potable Tanks									
2 POTABLE WATER	100	15.85	6.36	100.80	59.34	940.37	-9.35	-148.24	0.00
2 POTABLE WATER STBD	100	15.85	6.36	100.80	59.34	940.37	9.35	148.24	0.00
Subtotal Potable		31.69	6.36	201.60	59.34	1,880.75	0.00	0.00	0.00
Lube Oil Tanks									
LUBE OIL PORT	100	3.27	17.19	56.24	56.19	183.83	-13.37	-43.75	0.00
LUBE OIL STBD	100	3.27	17.19	56.24	56.19	183.82	13.37	43.75	0.00
DIRTY OIL	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Lube Oil		6.54	17.19	112.48	56.19	367.66	0.00	0.00	0.00
Hydraulic oil Tanks									
HYDRAULIC OIL	100	0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	0.00
Subtotal Hydraulic oil		0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	0.00
Sanitary Tanks									
3 SANITARY PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 SANITARY STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sanitary		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sea Water Tanks									
FOREPEAK BALLAST	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 SW BALLAST PORT	100	26.79	7.32	196.26	116.72	3,127.37	-7.78	-208.58	0.00
8 SW BALLAST STBD	100	25.84	7.36	190.26	116.89	3,020.40	7.96	205.66	0.00
9 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sea Water		52.63	7.34	386.51	116.81	6,147.77	-0.06	-2.93	0.00
Total Tanks		270.42	7.05	1,907.68	94.74	25,620.60	0.06	16.63	185.56

Solids Loading Details - Summary

T&S - Full Load Departure 100% Consumables

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Vessel								
Dry & Refer Stores	3.50	21.00	73.50	39.00	136.50	0.00	0.00	-----
SCIENTIFIC OUTFIT								
MAIN DECK								
6 ANCHORS	10.71	21.00	224.91	157.00	1,681.47	0.00	0.00	-----
3 SPHERES	3.35	22.00	73.70	145.00	485.75	0.00	0.00	-----
WINCH	3.13	22.00	68.86	122.00	381.86	0.00	0.00	-----
WIRE	2.23	22.00	49.06	106.00	236.38	0.00	0.00	-----
3 DECK BOXES	0.89	21.00	18.69	135.00	120.15	0.00	0.00	-----
CTD	0.67	21.00	14.07	89.00	59.63	0.00	0.00	-----
GORMAN GAS BOTTLES	0.89	22.00	19.58	96.00	85.44	0.00	0.00	-----
MAIN & WET LAB								
INSTRUMENTS	1.34	21.00	28.14	101.00	135.34	0.00	0.00	-----
GORMAN INSTRUMENTS	0.27	21.00	5.67	101.00	27.27	0.00	0.00	-----
01 DECK								
RAG TOP VAN WITH GLASS	8.04	32.50	261.30	95.00	763.80	0.00	0.00	-----
DRAG GEAR	1.12	31.00	34.72	127.00	142.24	0.00	0.00	-----
CHRIS HOUGHES GEAR (UK)	1.79	31.00	55.49	101.00	180.79	0.00	0.00	-----
MISC GEAR	0.89	31.00	27.59	101.00	89.89	0.00	0.00	-----
2 DECK BOXES	0.89	31.00	27.59	135.00	120.15	0.00	0.00	-----
Total Solids	39.71	24.75	982.87	117.01	4,646.66	0.00	0.00	0.00

Intact Trim & Stability Calculation

Vessel Condition: *Weather Criteria - Accommodations Van on 01 Level*

Tanks Condition: *T&S - Mid-Voyage 50% Consumables*

Solids Condition: *T&S - Mid-Voyage 50% Consumables*

Icing Condition: *<none>*

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft Fr0	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
<i>Tanks</i>								
<i>Diesel</i>	102.51	6.37	653.37	101.20	10,374.39	0.20	20.11	195.60
<i>Potable</i>	15.86	4.82	76.50	59.50	943.59	0.00	0.00	31.50
<i>Lube Oil</i>	6.54	17.19	112.48	56.19	367.66	0.00	0.00	0.00
<i>Hydraulic oil</i>	0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	-----
<i>Sanitary</i>	24.20	4.32	104.53	71.08	1,719.98	0.00	0.00	88.07
<i>Sea Water</i>	159.65	8.24	1,316.12	108.65	17,345.91	-0.49	-78.24	17.31
<i>Mean Light Operating Condition</i>	18.28	18.70	341.93	71.83	1,313.03	0.00	0.00	-----
<i>Solids</i>	37.96	24.92	946.12	120.61	4,578.41	0.00	0.00	-----
TOTAL DEADWEIGHT	365.81	9.74	3,561.73	100.50	36,764.32	-0.16	-58.61	332.49
LIGHTSHIP	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	0.00
TOTAL DISPLACEMENT	1,153.58	13.52	15,590.98	88.23	101,778.98	-0.06	-66.49	(411.97)

Trim

Displacement	(DISPL)	= Total Weight	1,153.58	LT
Mean Molded Salt Water Draft	(Tm)	From Hydrostatics Table	13.97	ft
Longitudinal Center of Gravity	(LCG)	= Total Lmom / DISPL	88.23	ft
Longitudinal Center of Buoyancy	(LCB)	From Hydrostatics Table	86.91	ft
Trimming Lever	(TL)	= LCG - LCB	1.32	ft
Longitudinal Metacentric Height	(KML)	From Hydrostatics Table	195.49	LT-ft
Moment to alter trim 1"	(MT1)	= (KML-VCG) * DISPL / LBP / 12 [LBP = 165 ft]	106.02	LT-ft
Trim (+ trim aft)	(TRIM)	= (DISPL * TL) / (12 * MT1)	1.20	ft
Longitudinal Center of Flotation	(LCF)	From Hydrostatics Table	91.17	ft
Molded Draft at FP	(TFP)	= Tm - (TRIM / LBP * LCF) [LBP = 165 ft]	13.31	ft
Molded Draft at AP	(TAP)	= TFP + TRIM	14.51	ft
Keel Draft at FP		= TFP - 13"	12.22	ft
Keel Draft at MP		= Tm - (TRIM / LBP * (LCF-82.5)) + 2' 5-1/2"	16.37	ft
Keel Draft at AP		= TAP + 5' 1-13/16"	19.66	ft

Stability

Transverse KM	(KMT)	From Hydrostatics Table	16.44	ft
Vertical Center of Gravity	(VCG)	= Total Vmom / DISPL	13.52	ft
Transverse Metacentric Height	(GMT)	= KMT - VCG	2.92	ft
Free Surface Correction	(FScorr)	= Total FSM / DISPL	0.36	ft
GM Available	(GMavail)	= GMT - FScorr	2.56	ft
GM Required	(GMreq)	Weather Criteria - Accommodations Van on 01 Level	2.08	ft
GM Margin		= GMavail - GMreq	0.48	ft

Heel

Moment to alter Heel 1°	(MH1)	= 0.01745 * GMavail * DISPL	51.63	LT-ft
Heel (+ heel to stbd)		= Total Tmom / MH1	-1.13	deg

Observed Drafts

Draft at FWD Marks	Port:	ft	Stbd:	ft	Average:	ft
Draft at AFT Marks	Port:	ft	Stbd:	ft	Average:	ft
Observed Displacement	LT					
Difference	LT					
Expected Margin of Error	LT					

Notes: FSM calculated according to rules in T&S booklet.

**R/V OCEANUS
TRIM & STABILITY BOOKLET**

Date	Sheet	Rev
2/14/07	28 of 42	C

Tanks Loading Details - Summary

T&S - Mid-Voyage 50% Consumables

Item	% Full	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	Actual FSM LT-ft
Diesel Tanks									
F.O. DAY TANK (GEN)	95	2.28	21.97	50.06	20.01	45.59	8.79	20.03	2.26
1 F.O. MAIN ENG PORT	50	4.69	5.73	26.85	44.65	209.32	-7.51	-35.23	5.85
1 F.O. MAIN ENG STBD	50	4.69	5.73	26.85	44.65	209.32	7.51	35.23	5.85
5 F.O. PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 F.O. STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 F.O. PORT	95	20.29	6.19	125.56	94.96	1,926.77	-8.36	-169.67	23.34
6 F.O. STBD	95	20.29	6.19	125.56	94.96	1,926.77	8.36	169.67	23.30
7 F.O. PORT	50	14.28	4.78	68.28	104.67	1,495.07	-7.52	-107.37	58.35
7 F.O. STBD	50	14.29	4.78	68.33	104.67	1,495.92	7.52	107.45	58.35
10 F.O. CENTER	95	21.70	7.46	161.89	141.29	3,065.64	0.00	0.00	18.31
Subtotal Diesel		102.51	6.37	653.37	101.20	10,374.39	0.20	20.11	195.60
Potable Tanks									
2 POTABLE WATER	50	7.93	4.82	38.25	59.50	471.79	-8.81	-69.84	15.75
2 POTABLE WATER STBD	50	7.93	4.82	38.25	59.50	471.79	8.81	69.84	15.75
Subtotal Potable		15.86	4.82	76.50	59.50	943.59	0.00	0.00	31.50
Lube Oil Tanks									
LUBE OIL PORT	100	3.27	17.19	56.24	56.19	183.83	-13.37	-43.75	0.00
LUBE OIL STBD	100	3.27	17.19	56.24	56.19	183.82	13.37	43.75	0.00
DIRTY OIL	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Lube Oil		6.54	17.19	112.48	56.19	367.66	0.00	0.00	0.00
Hydraulic oil Tanks									
HYDRAULIC OIL	100	0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	0.00
Subtotal Hydraulic oil		0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	0.00
Sanitary Tanks									
3 SANITARY PORT	50	12.10	4.32	52.26	71.08	859.99	-7.53	-91.14	44.03
3 SANITARY STBD	50	12.10	4.32	52.26	71.08	859.99	7.53	91.14	44.03
Subtotal Sanitary		24.20	4.32	104.53	71.08	1,719.98	0.00	0.00	88.07
Sea Water Tanks									
FOREPEAK BALLAST	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST PORT	100	25.73	6.31	162.30	79.03	2,033.57	-8.41	-216.46	0.01
4 SW BALLAST STBD	100	25.73	6.31	162.30	79.03	2,033.57	8.41	216.46	0.01
8 SW BALLAST PORT	100	26.79	7.32	196.26	116.72	3,127.37	-7.78	-208.58	0.00
8 SW BALLAST STBD	100	25.84	7.36	190.26	116.89	3,020.40	7.96	205.66	0.00
9 SW BALLAST PORT	100	30.92	10.82	334.51	127.97	3,956.62	-9.51	-293.88	0.00
9 SW BALLAST STBD	80	24.64	10.98	270.51	128.84	3,174.39	8.87	218.56	17.30
10 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sea Water		159.65	8.24	1,316.12	108.65	17,345.91	-0.49	-78.24	17.31
Total Tanks		309.57	7.34	2,273.68	99.73	30,872.88	-0.19	-58.61	332.49

Solids Loading Details - Summary

T&S - Mid-Voyage 50% Consumables

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Vessel								
Dry & Refer Stores	1.75	21.00	36.75	39.00	68.25	0.00	0.00	-----
SCIENTIFIC OUTFIT								
MAIN DECK								
6 ANCHORS	10.71	21.00	224.91	157.00	1,681.47	0.00	0.00	-----
3 SPHERES	3.35	22.00	73.70	145.00	485.75	0.00	0.00	-----
WINCH	3.13	22.00	68.86	122.00	381.86	0.00	0.00	-----
WIRE	2.23	22.00	49.06	106.00	236.38	0.00	0.00	-----
3 DECK BOXES	0.89	21.00	18.69	135.00	120.15	0.00	0.00	-----
CTD	0.67	21.00	14.07	89.00	59.63	0.00	0.00	-----
GORMAN GAS BOTTLES	0.89	22.00	19.58	96.00	85.44	0.00	0.00	-----
MAIN & WET LAB								
INSTRUMENTS	1.34	21.00	28.14	101.00	135.34	0.00	0.00	-----
GORMAN INSTRUMENTS	0.27	21.00	5.67	101.00	27.27	0.00	0.00	-----
01 DECK								
RAG TOP VAN WITH GLASS	8.04	32.50	261.30	95.00	763.80	0.00	0.00	-----
DRAG GEAR	1.12	31.00	34.72	127.00	142.24	0.00	0.00	-----
CHRIS HOUGHES GEAR (UK)	1.79	31.00	55.49	101.00	180.79	0.00	0.00	-----
MISC GEAR	0.89	31.00	27.59	101.00	89.89	0.00	0.00	-----
2 DECK BOXES	0.89	31.00	27.59	135.00	120.15	0.00	0.00	-----
Total Solids	37.96	24.92	946.12	120.61	4,578.41	0.00	0.00	0.00

Intact Trim & Stability Calculation

Vessel Condition: *Weather Criteria - Accommodations Van on 01 Level*

Tanks Condition: *T&S - Burnout 10% Consumables*

Solids Condition: *T&S - Burnout 10% Consumables*

Icing Condition: *<none>*

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft Fr0	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
<i>Tanks</i>								
<i>Diesel</i>	57.87	6.90	399.14	78.88	4,565.01	0.35	20.03	65.57
<i>Potable</i>	15.86	4.82	76.50	59.50	943.59	0.00	0.00	31.50
<i>Lube Oil</i>	1.57	7.90	12.37	41.14	64.43	0.00	0.00	7.10
<i>Hydraulic oil</i>	0.08	11.37	0.92	149.50	12.16	-0.58	-0.05	0.27
<i>Sanitary</i>	24.20	4.32	104.53	71.08	1,719.98	0.00	0.00	88.07
<i>Sea Water</i>	159.65	8.24	1,316.12	108.65	17,345.91	-0.49	-78.24	17.31
<i>Mean Light Operating Condition</i>	18.28	18.70	341.93	71.83	1,313.03	0.00	0.00	-----
<i>Solids</i>	36.56	25.07	916.72	123.74	4,523.81	0.00	0.00	-----
TOTAL DEADWEIGHT	314.07	10.09	3,168.23	97.07	30,487.93	-0.19	-58.26	209.83
LIGHTSHIP	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	0.00
TOTAL DISPLACEMENT	1,101.84	13.79	15,197.48	86.68	95,502.59	-0.06	-66.13	(267.43)

Trim

Displacement	(DISPL)	= Total Weight	1,101.84	LT
Mean Molded Salt Water Draft	(Tm)	From Hydrostatics Table	13.56	ft
Longitudinal Center of Gravity	(LCG)	= Total Lmom / DISPL	86.68	ft
Longitudinal Center of Buoyancy	(LCB)	From Hydrostatics Table	86.71	ft
Trimming Lever	(TL)	= LCG - LCB	-0.03	ft
Longitudinal Metacentric Height	(KML)	From Hydrostatics Table	199.88	LT-ft
Moment to alter trim 1"	(MT1)	= (KML-VCG) * DISPL / LBP / 12 [LBP = 165 ft]	103.55	LT-ft
Trim (+ trim aft)	(TRIM)	= (DISPL * TL) / (12 * MT1)	-0.03	ft
Longitudinal Center of Flotation	(LCF)	From Hydrostatics Table	91.16	ft
Molded Draft at FP	(TFP)	= Tm - (TRIM / LBP * LCF) [LBP = 165 ft]	13.57	ft
Molded Draft at AP	(TAP)	= TFP + TRIM	13.54	ft
Keel Draft at FP		= TFP - 13"	12.49	ft
Keel Draft at MP		= Tm - (TRIM / LBP * (LCF-82.5)) + 2' 5-1/2"	16.02	ft
Keel Draft at AP		= TAP + 5' 1-13/16"	18.69	ft

Stability

Transverse KM	(KMt)	From Hydrostatics Table	16.41	ft
Vertical Center of Gravity	(VCG)	= Total Vmom / DISPL	13.79	ft
Transverse Metacentric Height	(GMt)	= KMt - VCG	2.61	ft
Free Surface Correction	(FScorr)	= Total FSM / DISPL	0.24	ft
GM Available	(GMavail)	= GMt - FScorr	2.37	ft
GM Required	(GMreq)	Weather Criteria - Accommodations Van on 01 Level	2.11	ft
GM Margin		= GMavail - GMreq	0.26	ft

Heel

Moment to alter Heel 1°	(MH1)	= 0.01745 * GMavail * DISPL	45.57	LT-ft
Heel (+ heel to stbd)		= Total Tmom / MH1	-1.32	deg

Observed Drafts

Draft at FWD Marks	Port:	ft	Stbd:	ft	Average:	ft
Draft at AFT Marks	Port:	ft	Stbd:	ft	Average:	ft
Observed Displacement	LT					
Difference	LT					
Expected Margin of Error	LT					

Notes: FSM calculated according to rules in T&S booklet.

R/V OCEANUS
TRIM & STABILITY BOOKLET

Date	Sheet	Rev
2/14/07	31 of 42	C

Tanks Loading Details - Summary

T&S - Burnout 10% Consumables

Item	% Full	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	Actual FSM LT-ft
Diesel Tanks									
F.O. DAY TANK (GEN)	95	2.28	21.97	50.06	20.01	45.59	8.79	20.03	2.26
1 F.O. MAIN ENG PORT	80	7.51	6.52	48.98	44.35	332.94	-7.83	-58.78	8.34
1 F.O. MAIN ENG STBD	80	7.51	6.52	48.98	44.35	332.94	7.83	58.78	8.34
5 F.O. PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 F.O. STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 F.O. PORT	95	20.29	6.19	125.56	94.96	1,926.77	-8.36	-169.67	23.34
6 F.O. STBD	95	20.29	6.19	125.56	94.96	1,926.77	8.36	169.67	23.30
7 F.O. PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 F.O. STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 F.O. CENTER	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Diesel		57.87	6.90	399.14	78.88	4,565.01	0.35	20.03	65.57
Potable Tanks									
2 POTABLE WATER	50	7.93	4.82	38.25	59.50	471.79	-8.81	-69.84	15.75
2 POTABLE WATER STBD	50	7.93	4.82	38.25	59.50	471.79	8.81	69.84	15.75
Subtotal Potable		15.86	4.82	76.50	59.50	943.59	0.00	0.00	31.50
Lube Oil Tanks									
LUBE OIL PORT	10	0.33	16.09	5.28	57.99	19.02	-13.84	-4.54	3.37
LUBE OIL STBD	10	0.33	16.09	5.28	58.02	19.04	13.85	4.54	3.38
DIRTY OIL	50	0.91	1.99	1.81	28.98	26.37	0.00	0.00	0.35
Subtotal Lube Oil		1.57	7.90	12.37	41.14	64.43	0.00	0.00	7.10
Hydraulic oil Tanks									
HYDRAULIC OIL	10	0.08	11.37	0.92	149.50	12.16	-0.58	-0.05	0.27
Subtotal Hydraulic oil		0.08	11.37	0.92	149.50	12.16	-0.58	-0.05	0.27
Sanitary Tanks									
3 SANITARY PORT	50	12.10	4.32	52.26	71.08	859.99	-7.53	-91.14	44.03
3 SANITARY STBD	50	12.10	4.32	52.26	71.08	859.99	7.53	91.14	44.03
Subtotal Sanitary		24.20	4.32	104.53	71.08	1,719.98	0.00	0.00	88.07
Sea Water Tanks									
FOREPEAK BALLAST	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST PORT	100	25.73	6.31	162.30	79.03	2,033.57	-8.41	-216.46	0.01
4 SW BALLAST STBD	100	25.73	6.31	162.30	79.03	2,033.57	8.41	216.46	0.01
8 SW BALLAST PORT	100	26.79	7.32	196.26	116.72	3,127.37	-7.78	-208.58	0.00
8 SW BALLAST STBD	100	25.84	7.36	190.26	116.89	3,020.40	7.96	205.66	0.00
9 SW BALLAST PORT	100	30.92	10.82	334.51	127.97	3,956.62	-9.51	-293.88	0.00
9 SW BALLAST STBD	80	24.64	10.98	270.51	128.84	3,174.39	8.87	218.56	17.30
10 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sea Water		159.65	8.24	1,316.12	108.65	17,345.91	-0.49	-78.24	17.31
Total Tanks		259.23	7.37	1,909.58	95.09	24,651.09	-0.22	-58.26	209.83

Solids Loading Details - Summary

T&S - Burnout 10% Consumables

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Vessel								
Dry & Refer Stores	0.35	21.00	7.35	39.00	13.65	0.00	0.00	-----
SCIENTIFIC OUTFIT								
MAIN DECK								
6 ANCHORS	10.71	21.00	224.91	157.00	1,681.47	0.00	0.00	-----
3 SPHERES	3.35	22.00	73.70	145.00	485.75	0.00	0.00	-----
WINCH	3.13	22.00	68.86	122.00	381.86	0.00	0.00	-----
WIRE	2.23	22.00	49.06	106.00	236.38	0.00	0.00	-----
3 DECK BOXES	0.89	21.00	18.69	135.00	120.15	0.00	0.00	-----
CTD	0.67	21.00	14.07	89.00	59.63	0.00	0.00	-----
GORMAN GAS BOTTLES	0.89	22.00	19.58	96.00	85.44	0.00	0.00	-----
MAIN & WET LAB								
INSTRUMENTS	1.34	21.00	28.14	101.00	135.34	0.00	0.00	-----
GORMAN INSTRUMENTS	0.27	21.00	5.67	101.00	27.27	0.00	0.00	-----
01 DECK								
RAG TOP VAN WITH GLASS	8.04	32.50	261.30	95.00	763.80	0.00	0.00	-----
DRAG GEAR	1.12	31.00	34.72	127.00	142.24	0.00	0.00	-----
CHRIS HOUGHES GEAR (UK)	1.79	31.00	55.49	101.00	180.79	0.00	0.00	-----
MISC GEAR	0.89	31.00	27.59	101.00	89.89	0.00	0.00	-----
2 DECK BOXES	0.89	31.00	27.59	135.00	120.15	0.00	0.00	-----
Total Solids	36.56	25.07	916.72	123.74	4,523.81	0.00	0.00	0.00

Intact Trim & Stability Calculation

Vessel Condition: *Weather Criteria - Accommodations Van on 01 Level*
Tanks Condition: *T&S - Heavy Departure*
Solids Condition: *T&S - Heavy Departure*
Icing Condition: *<none>*

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft Fr0	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
<i>Tanks</i>								
<i>Diesel</i>	178.74	6.69	1,196.40	95.69	17,103.08	0.11	20.03	185.56
<i>Potable</i>	31.69	6.36	201.60	59.34	1,880.75	0.00	0.00	-----
<i>Lube Oil</i>	6.54	17.19	112.48	56.19	367.66	0.00	0.00	0.00
<i>Hydraulic oil</i>	0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	-----
<i>Sanitary</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----
<i>Sea Water</i>	52.63	7.34	386.51	116.81	6,147.77	-0.06	-2.93	-----
<i>Mean Light Operating Condition</i>	18.28	18.70	341.93	71.83	1,313.03	0.00	0.00	-----
<i>Solids</i>	57.50	25.23	1,450.64	123.95	7,127.04	0.00	0.00	-----
TOTAL DEADWEIGHT	346.20	10.69	3,700.24	98.38	34,060.68	0.05	16.63	185.56
LIGHTSHIP	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	0.00
TOTAL DISPLACEMENT	1,133.97	13.87	15,729.49	87.37	99,075.34	0.01	8.75	(342.33)

Trim

Displacement	(DISPL)	= Total Weight	1,133.97	LT
Mean Molded Salt Water Draft	(Tm)	From Hydrostatics Table	13.81	ft
Longitudinal Center of Gravity	(LCG)	= Total Lmom / DISPL	87.37	ft
Longitudinal Center of Buoyancy	(LCB)	From Hydrostatics Table	86.84	ft
Trimming Lever	(TL)	= LCG - LCB	0.53	ft
Longitudinal Metacentric Height	(KML)	From Hydrostatics Table	197.14	LT-ft
Moment to alter trim 1"	(MT1)	= (KML-VCG) * DISPL / LBP / 12 [LBP = 165 ft]	104.96	LT-ft
Trim (+ trim aft)	(TRIM)	= (DISPL * TL) / (12 * MT1)	0.48	ft
Longitudinal Center of Flotation	(LCF)	From Hydrostatics Table	91.17	ft
Molded Draft at FP	(TFP)	= Tm - (TRIM / LBP * LCF) [LBP = 165 ft]	13.55	ft
Molded Draft at AP	(TAP)	= TFP + TRIM	14.03	ft
Keel Draft at FP		= TFP - 13"	12.47	ft
Keel Draft at MP		= Tm - (TRIM / LBP * (LCF-82.5)) + 2' 5-1/2"	16.25	ft
Keel Draft at AP		= TAP + 5' 1-13/16"	19.18	ft

Stability

Transverse KM	(Kmt)	From Hydrostatics Table	16.42	ft
Vertical Center of Gravity	(VCG)	= Total Vmom / DISPL	13.87	ft
Transverse Metacentric Height	(GMt)	= Kmt - VCG	2.55	ft
Free Surface Correction	(FScorr)	= Total FSM / DISPL	0.30	ft
GM Available	(GMavail)	= GMt - FScorr	2.25	ft
GM Required	(GMreq)	Weather Criteria - Accommodations Van on 01 Level	2.10	ft
GM Margin		= GMavail - GMreq	0.15	ft

Heel

Moment to alter Heel 1°	(MH1)	= 0.01745 * GMavail * DISPL	44.49	LT-ft
Heel (+ heel to stbd)		= Total Tmom / MH1	0.17	deg

Observed Drafts

Draft at FWD Marks	Port:	ft	Stbd:	ft	Average:	ft
Draft at AFT Marks	Port:	ft	Stbd:	ft	Average:	ft
Observed Displacement	LT					
Difference	LT					
Expected Margin of Error	LT					

Notes: FSM calculated according to rules in T&S booklet.

R/V OCEANUS
TRIM & STABILITY BOOKLET

Date	Sheet	Rev
2/14/07	34 of 42	C

Tanks Loading Details - Summary

T&S - Heavy Departure

Item	% Full	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	Actual FSM LT-ft
Diesel Tanks									
F.O. DAY TANK (GEN)	95	2.28	21.97	50.06	20.01	45.59	8.79	20.03	2.26
1 F.O. MAIN ENG PORT	95	8.92	6.88	61.36	44.25	394.56	-7.95	-70.90	5.06
1 F.O. MAIN ENG STBD	95	8.92	6.88	61.36	44.25	394.56	7.95	70.90	5.06
5 F.O. PORT	95	21.03	6.07	127.73	86.99	1,829.60	-8.44	-177.51	24.65
5 F.O. STBD	95	21.03	6.07	127.73	86.99	1,829.60	8.44	177.51	24.58
6 F.O. PORT	95	20.29	6.19	125.56	94.96	1,926.77	-8.36	-169.67	23.34
6 F.O. STBD	95	20.29	6.19	125.56	94.96	1,926.77	8.36	169.67	23.30
7 F.O. PORT	95	27.14	6.54	177.58	104.81	2,844.99	-8.15	-221.17	29.48
7 F.O. STBD	95	27.14	6.54	177.58	104.81	2,844.99	8.15	221.17	29.51
10 F.O. CENTER	95	21.70	7.46	161.89	141.29	3,065.64	0.00	0.00	18.31
Subtotal Diesel		178.74	6.69	1,196.40	95.69	17,103.08	0.11	20.03	185.56
Potable Tanks									
2 POTABLE WATER	100	15.85	6.36	100.80	59.34	940.37	-9.35	-148.24	0.00
2 POTABLE WATER STBD	100	15.85	6.36	100.80	59.34	940.37	9.35	148.24	0.00
Subtotal Potable		31.69	6.36	201.60	59.34	1,880.75	0.00	0.00	0.00
Lube Oil Tanks									
LUBE OIL PORT	100	3.27	17.19	56.24	56.19	183.83	-13.37	-43.75	0.00
LUBE OIL STBD	100	3.27	17.19	56.24	56.19	183.82	13.37	43.75	0.00
DIRTY OIL	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Lube Oil		6.54	17.19	112.48	56.19	367.66	0.00	0.00	0.00
Hydraulic oil Tanks									
HYDRAULIC OIL	100	0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	0.00
Subtotal Hydraulic oil		0.81	13.17	10.69	149.50	121.35	-0.58	-0.47	0.00
Sanitary Tanks									
3 SANITARY PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 SANITARY STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sanitary		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sea Water Tanks									
FOREPEAK BALLAST	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 SW BALLAST PORT	100	26.79	7.32	196.26	116.72	3,127.37	-7.78	-208.58	0.00
8 SW BALLAST STBD	100	25.84	7.36	190.26	116.89	3,020.40	7.96	205.66	0.00
9 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST PORT	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 SW BALLAST STBD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal Sea Water		52.63	7.34	386.51	116.81	6,147.77	-0.06	-2.93	0.00
Total Tanks		270.42	7.05	1,907.68	94.74	25,620.60	0.06	16.63	185.56

Solids Loading Details - Summary

T&S - Heavy Departure

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Vessel								
Dry & Refer Stores	3.50	21.00	73.50	39.00	136.50	0.00	0.00	-----
SCIENTIFIC OUTFIT								
MAIN DECK								
6 ANCHORS	10.71	21.00	224.91	157.00	1,681.47	0.00	0.00	-----
3 SPHERES	3.35	22.00	73.70	145.00	485.75	0.00	0.00	-----
WINCH	3.13	22.00	68.86	122.00	381.86	0.00	0.00	-----
WIRE	2.23	22.00	49.06	106.00	236.38	0.00	0.00	-----
3 DECK BOXES	0.89	21.00	18.69	135.00	120.15	0.00	0.00	-----
CTD	0.67	21.00	14.07	89.00	59.63	0.00	0.00	-----
GORMAN GAS BOTTLES	0.89	22.00	19.58	96.00	85.44	0.00	0.00	-----
MAIN & WET LAB								
INSTRUMENTS	1.34	21.00	28.14	101.00	135.34	0.00	0.00	-----
GORMAN INSTRUMENTS	0.27	21.00	5.67	101.00	27.27	0.00	0.00	-----
01 DECK								
RAG TOP VAN WITH GLASS	8.04	32.50	261.30	95.00	763.80	0.00	0.00	-----
DRAG GEAR	1.12	31.00	34.72	127.00	142.24	0.00	0.00	-----
CHRIS HOUGHES GEAR (UK)	1.79	31.00	55.49	101.00	180.79	0.00	0.00	-----
MISC GEAR	0.89	31.00	27.59	101.00	89.89	0.00	0.00	-----
2 DECK BOXES	0.89	31.00	27.59	135.00	120.15	0.00	0.00	-----
HYDRO VAN	4.91	31.00	152.21	121.00	594.11	0.00	0.00	-----
HARD HATS & BASKETS	10.96	24.50	268.52	146.45	1,605.09	0.00	0.00	-----
ALUM TUBES	1.07	24.50	26.22	146.45	156.70	0.00	0.00	-----
MISC GEAR AND BLOCKS	0.85	24.50	20.83	146.45	124.48	0.00	0.00	-----
Total Solids	57.50	25.23	1,450.64	123.95	7,127.04	0.00	0.00	0.00

Intact Trim & Stability Calculation

Vessel Condition: _____
Tanks Condition: _____
Solids Condition: _____

Item	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft Fr0	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
<i>Tanks</i>								
<i>Diesel</i>								
<i>Potable</i>								
<i>Lube Oil</i>								
<i>Hydraulic oil</i>								
<i>Sanitary</i>								
<i>Sea Water</i>								
<i>Mean Light Operating Condition</i>	18.28	18.70	341.93	71.83	1,313.03	0.00	0.00	-----
TOTAL DEADWEIGHT LIGHTSHIP	787.77	15.27	12,029.25	82.53	65,014.66	-0.01	-7.88	0.00
TOTAL DISPLACEMENT								

Trim

Displacement	(DISPL)	= Total Weight	LT
Mean Molded Salt Water Draft	(Tm)	From Hydrostatics Table	ft
Longitudinal Center of Gravity	(LCG)	= Total Lmom / DISPL	ft
Longitudinal Center of Buoyancy	(LCB)	From Hydrostatics Table	ft
Trimming Lever	(TL)	= LCG - LCB	ft
Longitudinal Metacentric Height	(KML)	From Hydrostatics Table	ft
Moment to alter trim 1"	(MT1)	= (KML-VCG) * DISPL / LBP / 12 [LBP = 165 ft]	LT-ft/in
Trim (+ trim aft)	(TRIM)	= (DISPL * TL) / (12 * MT1)	ft
Longitudinal Center of Flotation	(LCF)	From Hydrostatics Table	ft
Molded Draft at FP	(TFP)	= Tm - (TRIM / LBP * LCF) [LBP = 165 ft]	ft
Molded Draft at AP	(TAP)	= TFP + TRIM	ft
Keel Draft at FP		= TFP - 13"	ft
Keel Draft at MP		= Tm - (TRIM / LBP * (LCF-82.5)) + 2' 5-1/2"	ft
Keel Draft at AP		= TAP + 5' 1-13/16"	ft

Stability

Transverse KM	(KMt)	From Hydrostatics Table	ft
Vertical Center of Gravity	(VCG)	= Total Vmom / DISPL	ft
Transverse Metacentric Height	(GMt)	= KMt - VCG	ft
Free Surface Correction	(FScorr)	= Total FSM / DISPL	ft
GM Available	(GMavail)	= GMt - FScorr	ft
GM Required	(GMreq)	Interpolated from Required GM Curve	ft
GM Margin		= GMavail - GMreq	ft

Heel

Moment to alter Heel 1°	(MH1)	= 0.01745 * GMavail * DISPL	LT-ft
Heel (+ heel to stbd)		= Total Tmom / MH1	deg

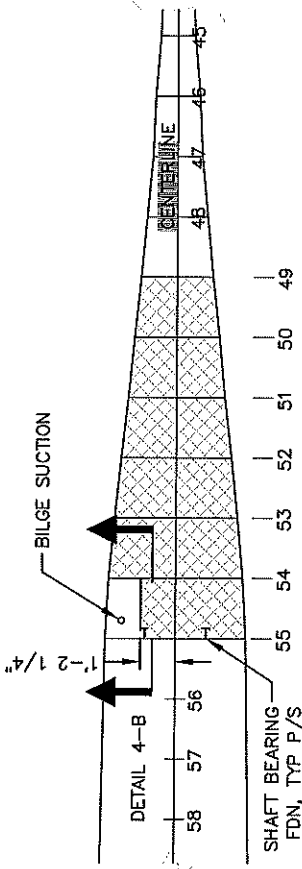
Observed Drafts

Draft at FWD Marks	Port:	ft	Stbd:	ft	Average:	ft
Draft at AFT Marks	Port:	ft	Stbd:	ft	Average:	ft
Observed Displacement		LT				
Difference		LT				
Expected Margin of Error		LT				

Tanks Loading Details - Summary

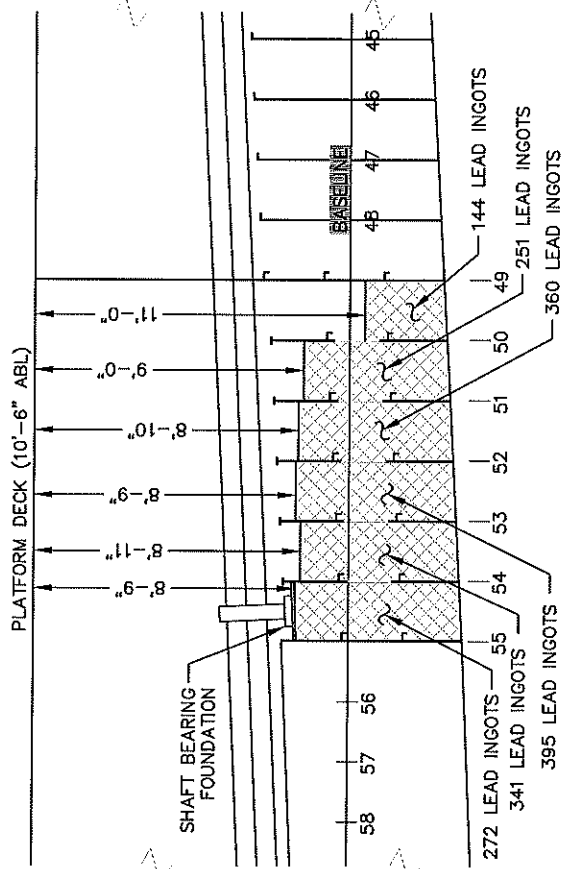
Condition: _____

Item	% Full	Weight LT	VCG ft abv BL	Vmom LT-ft	LCG ft aft FP	Lmom LT-ft	TCG ft stbd	Tmom LT-ft	FSM LT-ft
Diesel Tanks									
F.O. DAY TANK (GEN)									
1 F.O. MAIN ENG PORT									
1 F.O. MAIN ENG STBD									
5 F.O. PORT									
5 F.O. STBD									
6 F.O. PORT									
6 F.O. STBD									
7 F.O. PORT									
7 F.O. STBD									
10 F.O. CENTER									
Subtotal Diesel									
Potable Tanks									
2 POTABLE WATER									
2 POTABLE WATER STBD									
Subtotal Potable									
Lube Oil Tanks									
LUBE OIL PORT									
LUBE OIL STBD									
DIRTY OIL									
Subtotal Lube Oil									
Hydraulic oil Tanks									
HYDRAULIC OIL									
Subtotal Hydraulic oil									
Sanitary Tanks									
3 SANITARY PORT									
3 SANITARY STBD									
Subtotal Sanitary									
Sea Water Tanks									
FOREPEAK BALLAST									
4 SW BALLAST PORT									
4 SW BALLAST STBD									
8 SW BALLAST PORT									
8 SW BALLAST STBD									
9 SW BALLAST PORT									
9 SW BALLAST STBD									
10 SW BALLAST PORT									
10 SW BALLAST STBD									
11 SW BALLAST PORT									
11 SW BALLAST STBD									
Subtotal Sea Water									
Total Tanks									



PLAN 3-B

LEAD AT BASELINE, LOOKING DOWN
 1/4" = 1'-0"

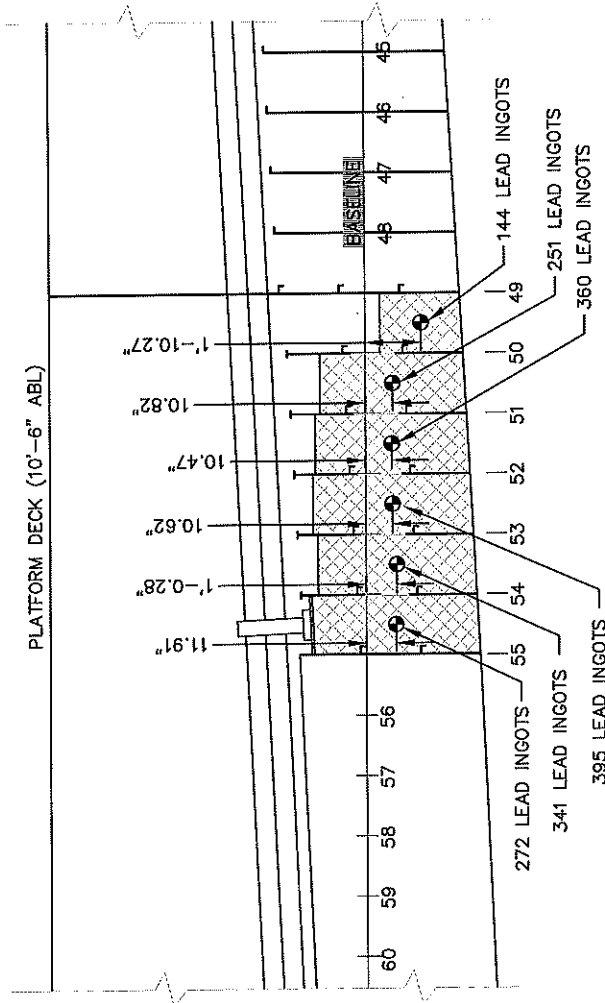


ELEVATION 3-A

KEEL ON CENTERLINE, LOOKING TO PORT
 1/4" = 1'-0"

THIS DIAGRAM IS BASED ON REFERENCE 2

R/V OCEANUS
 LEAD BALLAST INSTALLATION
 INSTALLATION DETAILS



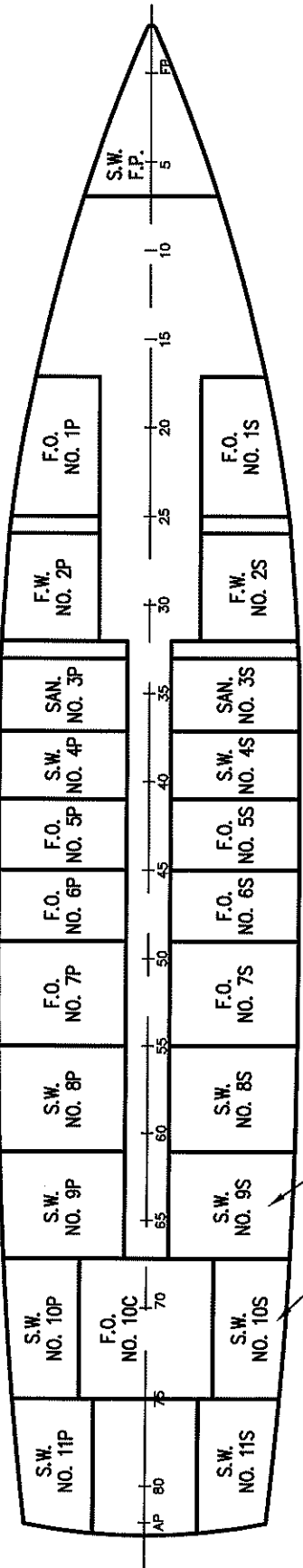
ELEVATION 3-A
 KEEL ON CENTERLINE, LOOKING TO PORT
 1/4" = 1'-0"

THIS DIAGRAM IS BASED ON REFERENCE 7

ITEM	WEIGHT (LT)	VCG (FT-ABL)	LCG (FT-FR 0)
LIGHTSHIP FROM 2/7/04 TEST	741.38	16.25	80.05
144 LEAD INGOTS (FR 49-50)	3.718	-0.99	99
251 LEAD INGOTS (FR 50-51)	6.481	-1.02	101
360 LEAD INGOTS (FR 51-52)	9.296	-0.89	103
395 LEAD INGOTS (FR 52-53)	10.199	-0.87	105
341 LEAD INGOTS (FR 53-54)	8.805	-0.90	107
272 LEAD INGOTS (FR 54-55)	7.023	-1.86	109
Subtotal Lead Ingots	45.523	-1.06	104.54
NEW LIGHTSHIP	786.90	15.25	81.47

TABLE 5-B
 WEIGHT CALCULATIONS

R/V OCEANUS
 LEAD BALLAST INSTALLATION
 WEIGHTS AND CENTERS



13.7 TONS POURED CONCRETE BALLAST
 9.7 TONS POURED CONCRETE BALLAST

THIS DIAGRAM IS BASED ON
 INFORMATION IN REFERENCE 4

7529631

PAGES 10 AND 11 REVISED PER NEW YORK
REPORT NY099 DATED 24 JANUARY 1995

WAYNE M. LIPINSKI

Form LL-11-D

* REVISED *

Page 1 of 1

American Bureau of Shipping
SURVEY FOR LOAD LINES

Report No. JS10454

Date: 9 June 1994



INTERNATIONAL CONVENTION ON LOAD LINES, 1966
(IMCO STANDARD FORM)

RECORD OF CONDITIONS OF ASSIGNMENT

Name of Ship Oceanus

Port of Registry Woods Hole, Ma.

Nationality USA

Distinctive Number or Letters WKAQ

Shipbuilders Peterson Builders Inc.

Yard Number 9250-1

Date of Build (Conversion) New 01 Deck and Pilot House Deck (Nov. 93 - June 94)

Freeboard assigned as a ship of Type "G" with Increased Freeboard

Classification Unclassed

Date and place of initial survey

75-260700

Form LL-11-D

*** REVISED ***

Page 1 of 12

**American Bureau of Shipping
SURVEY FOR LOAD LINES**Report No. JS10454Date: 9 June 1994**INTERNATIONAL CONVENTION ON LOAD LINES, 1966
(IMCO STANDARD FORM)****RECORD OF CONDITIONS OF ASSIGNMENT**Name of Ship **Oceanus**Port of Registry **Woods Hole, Ma.**Nationality **USA**Distinctive Number or Letters **WXAQ**Shipbuilders **Peterson Builders Inc.**Yard Number **9250-1**Date of Build (Conversion) **New 01 Deck and Pilot House Deck (Nov. '93 - June 94)**

Freeboard assigned as a ship of Type "B" with Increased Freeboard

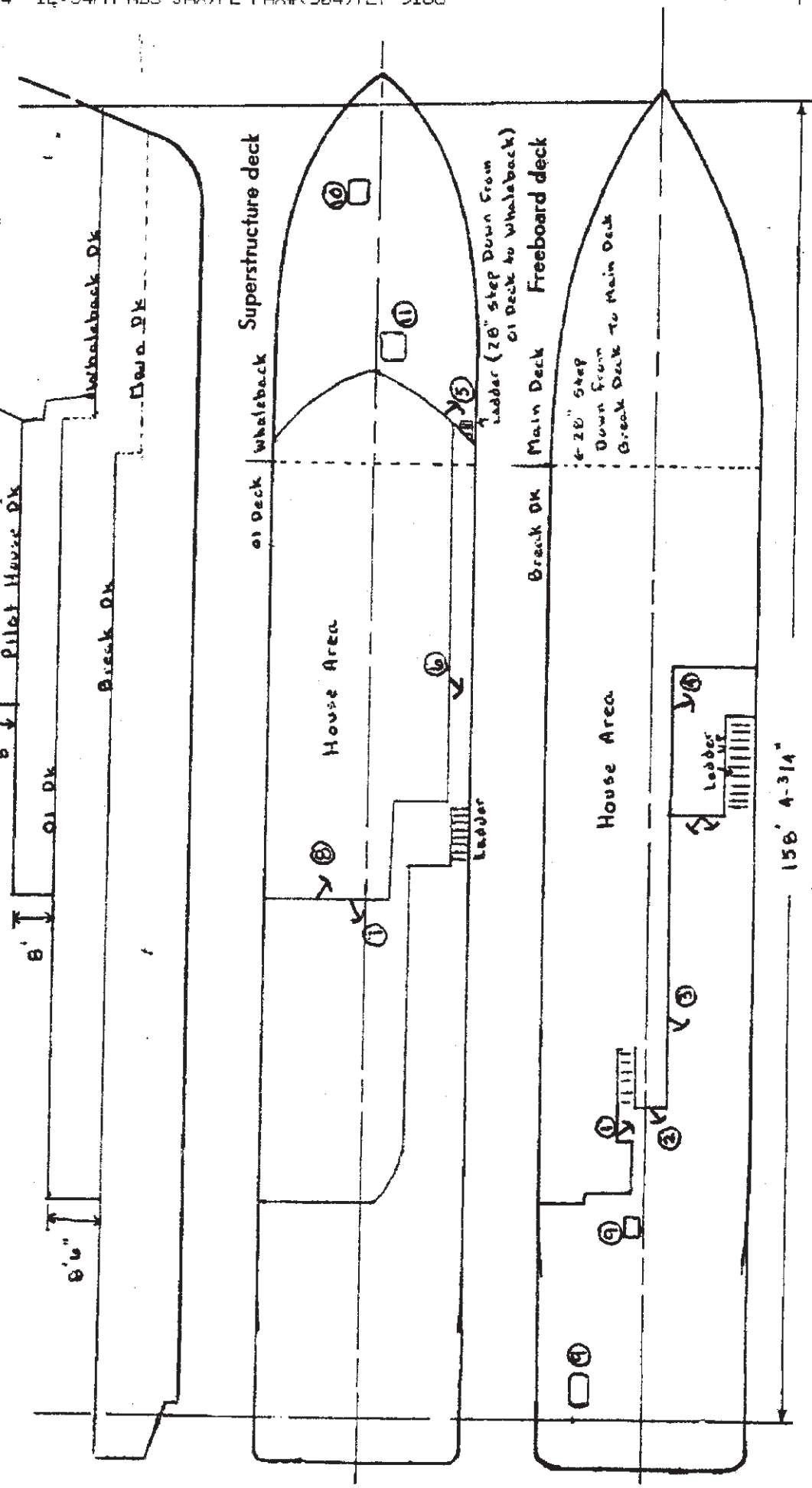
Classification **Unclassed**

Date and place of initial survey

ABS—Report No. JS 10454 Date 9 June 1994

A plan of suitable size may be attached to this Report in preference to sketches on this page.

Disposition and dimensions of superstructures, trunks, deckhouses, machinery casings; extent of bulkheads, guard rails and wood sheathing on exposed deck, to be inserted in the diagrams and tables following; together with positions of hatchways, gangways, and other means for the protection of the crew; cargo ports, bow and stern doors, side scuttles, scuppers, ventilators, air pipes, companionways, and other items that would affect the seaworthiness of the ship.



NOTE: In the case of existing vessels state (1) Current Freeboard (2) Extreme Draft

AIS Report No. **J510454** Date **9 June 1994**

DOORWAYS IN SUPERSTRUCTURES, EXPOSED MACHINERY CASINGS AND DECKHOUSES PROTECTING OPENINGS IN FREEBOARD AND SUPERSTRUCTURE DECKS (Refs. 12, 17 & 18)

Location	Ref. No. on Sketch or Plan Page 2	Number and Size of Openings	Height of Sills	Closing Appliances	
				Type and Material	Number of Dogs
In forecastle bulkhead	5 (Existing)	1- 54" x 30"	24"	Steel w/T. Gasket	6
In bridge side bulkhead (Pilot House Sld.) Longitudinal Bulkhd)	New	1- 74" x 27"	4"	W.T. Gasketed-Alum.	8
In bridge after bulkhead (Pilot House Port Side)	New	1- 74" x 27"	8"	W.T. Gasketed-Alum.	8
In raised quarter deck bulkhead	N.A.				
In poop bulkhead	N.A.				
In exposed machinery casings on freeboard deck	N.A.				

ABS Report No. JS 10454 Date 9 June 1994

DOORWAYS IN SUPERSTRUCTURES, EXPOSED MACHINERY CASINGS AND DECKHOUSES PROTECTING OPENINGS IN FREEBOARD AND SUPERSTRUCTURE DECKS (continued)

Location	Ref. No. on Sketch or Plan Page 2	Number and Size of Openings	Height of Sills	Closing Appliances	
				Type and Material	Number of Dogs
*In exposed machinery casings on superstructure decks	N/A				
In machinery casings within superstructures or deckhouses on freeboard deck	(Existing)	1-69" x 30"	9"	Steel w.T. Gasket	8
In deckhouses in Position 1 enclosing openings leading below freeboard deck	① New	1-64" x 36"	15"	w.T. Gasketed-Alum.	6
	② New	1-64" x 30"	15"	w.T. Gasketed-Alum.	6
	③ New	1-84" x 36"	6"	w.T. Gasketed-Alum.	8
	④ New	1-64" x 30"	15"	w.T. Gasketed-Alum.	8
In deckhouses in Position 2 enclosing openings leading within enclosed superstructures or below freeboard deck	⑤ New	1-76" x 30"	4"	w.T. Gasketed-Alum	4
	⑥ New	1-76" x 30"	8 1/2"	w.T. Gasketed-Alum	6
	⑦ New	1-76" x 36"	4"	w.T. Gasketed-Alum	6
In exposed pump room casings	N/A				

ABS — Report No. JF 10454 Date 9 June 1994

HATCHWAYS AT POSITIONS 1 AND 2 CLOSED BY PORTABLE COVERS AND SECURED WEATHERTIGHT BY TARPAULINS AND BATTENING DEVICES (Reg. 15)

Position and Reference No. on Sketch or Plan — Page 2	Dimensions of clear opening at top of coaming	Height of coamings above deck	PORTABLE BEAMS	Number	Spacing	Beating surface	Means of securing each beam	PORTABLE COVERS																											
<p>PORTABLE COVERS</p>				Material				Thickness				Direction fitted				Beating surface				Spacing of Cleats				TARPAULINS				No. of layers				Material			

Means of securing each section of covers:
 Are wood covers fitted with galvanized end bands?
 Position 1 — Upon exposed freeboard and raised quarter decks, and upon exposed superstructure decks situated forward of a point located a quarter of the ship's length from the forward perpendicular.
 Position 2 — Upon exposed superstructure decks situated abaft a quarter of the ship's length from the forward perpendicular.

NOTE: Some authorities require that galvanized steel bands protecting the ends of wood hatch boards be efficiently secured. Indicate if fitted.

ABS — Report No. J 6 10454 Date 9 June 1995

HATCHWAYS AT POSITIONS 1 AND 2 CLOSED BY WEATHERTIGHT COVERS OF STEEL (OR OTHER EQUIVALENT MATERIAL) FITTED WITH GASKETS AND CLAMPING DEVICES (Reg. 16)

Position and Reference No. on Sketch or Plan — Page 2	Green OK ⑨ (Existing)	Whaleback (Fused) Whaleback (Fused) ⑩ (Existing)	⑪ (Existing)	
Dimensions of clear opening at top of coaming	26" x 26"	31" x 31"	36" x 36"	
Height of coamings above deck	Flush	21"	22"	
Type of cover or Patent Name	Winged Gasket Acting 4 dogs	Winged Gasketed to dog	Winged Gasketed to dog	
Material	Steel	Steel	Steel	

MACHINERY SPACE OPENINGS AND MISCELLANEOUS OPENINGS IN FREEBOARD AND SUPERSTRUCTURE DECKS (Regs. 17 & 18)

Position and Reference No. on Sketch or Plan — Page 2				
Dimensions				
Height of coaming				
COVER { Material How attached				
Number and Spacing of Dogs				

Position and Reference No. on Sketch or Plan — Page 2				
Dimensions				
Height of coaming				
COVER { Material How attached				
Number and Spacing of Dogs				

AIR PAGES Report No. IS 10454 Date 9 June 1994

AIR PAGES
VENTILATORS ON FREEBOARD AND SUPERSTRUCTURE DECKS (POSITIONS 1 AND 2) (Reg. II)

Deck on which fitted	Number fitted	Coaming		Closing Appliances	Remarks
		Dimensions	Height		
<u>Deck DK</u>	0	2 1/2" φ	33"	Tapered Wooden Plugs	Chained
	1	2 1/2" φ	27"	" "	"
	1	2 1/2" φ	25"	" "	"
	1	2" φ	40"	" "	"
	1	2" φ	41"	Wager Ball Check	
	6	3" φ	44"	Wager Ball Check	
<u>Whaleback DK</u>	1	2 1/2" φ	15"	Tapered Wooden Plug	Chained
	1	2 1/2" φ	25"	Wager Ball Check	
	1	2 1/2" φ	20"	Wager Ball Check	
	1	2 1/2" φ	27"	Wager Ball Check	
<u>01 DK</u>					

(1) In vessels less than 100 meters (328 ft.) Closing Appliances: Are to have covers permanently attached. Indicate means of attachment, such as chained, linged, etc., in Remarks column.
(2) Coamings of ventilators which exceed 900 mm (35 1/2") in height are to be specially supported. Indicate means of support in Remarks column.

VENTILATORS
OF FREEBOARD AND SUPERSTRUCTURE DECKS (Reg. 2)
 19

Deck on which fitted	Number fitted	Coaming		Describe Closing Appliances
		Dimensions	Height	
<u>Deck DK</u>	1	42" x 15"	53"	Gasketed Cover w 4 dogs
	1	51" x 10"	44"	" " " " " "
	1	14" x 10"	7'6"	Gasketed Cover w 2 dogs
	1	16" x 10"	7'6"	" " " " " "
<u>DL DK</u>	1	11" x 6"	7'	Gasketed Cover w 2 dogs
	1	17" x 9"	6'2"	Gasketed Cover w 4 dogs
	1	20" x 8"	7'	Gasketed Cover w 2 dogs
	1	6" ϕ	24"	Gasketed Cover w 1 dog
<u>Whaleback DK</u>	1	66" x 15"	7'7"	Gasketed Cover w 6 dogs
<u>Pilot House DK</u>	1	10" x 7"	33"	Gasketed Cover w 2 dogs
	1	6" x 4"	7'	Gasketed Cover w 2 dogs
	1	76" x 42"	4"	Gasketed Cover w 10 dogs
<u>Pilot House Top</u>	2	8" x 2"	2'	Gasketed Cover w 2 dogs
	1	4' x 14"	2'	Gasketed Cover w 2 dogs
	1	4' x 5'9"	546 side of stack	Gasketed Cover w 8 dogs
	2	6" x 4"	35"	Gasketed Cover w 2 dogs
	1	6" x 4"	22"	Gasketed Cover w 1 dog
	1	9" x 6"	17"	Gasketed Cover w 1 dog

ABS Report No. 3530464 Date 9 June 1994

CARGO PORT AND OTHER SIMILAR OPENINGS (Reg. 21)

Position of port	Dimensions of opening	Distance of lower edge from freeboard deck	Securing devices	Remarks
	/			

SCUPPERS, INLETS AND DISCHARGES (Reg. 22)

State if Scupper, Inlet, or Discharge	Number	Pipe			From	Vertical distance above top of keel			Number, Type and Material of Discharge Valves	Position of Controls State Whether Accessible or Operable From Freeboard Deck
		Diameter	Thickness	Material		Discharge	Inboard end	Inboard Valve		
* Refer to Existing LL-II										

S — Scupper
 D — Discharge
 I — Inlet
 MS — Mild steel
 CS — Cast steel
 CM — Gun metal
 Any other approved material to be designated
 NOTE: Symbols may be used at the discretion of the Surveyor.
 SD — Screw down
 ANR — Automatic non-return
 SD ANR — Screw down automatic non-return

[Indicated Revision]

SIDE SCUTTLES (Reg. 23)

Location of side scuttle (airports) to spaces below freeboard deck, to spaces within enclosed super-structures, or to deck houses protecting access to spaces below freeboard deck.	Number fitted	Clear glass size	Fixed or opening	Material		Type of Glass and Thickness	Standards used and Type No.	
				Frame	Deadlight			
<u>Break Deck</u>	5 (Existing)	30" x 18"	Fixed					
	9 (Existing)	16" φ	Fixed					
	3 (New)	16" φ	Fixed	Bronze	Aluminum	Tempered 3/4"		
	3 (New)	32" x 30"	Fixed	Bronze	[ALUMINUM]	[3/4" Tempered]		
	3 (New)	18" φ	Fixed	Aluminum	[ALUMINUM]	[3/4" Tempered]		
	1 (New)	32" x 30"	Fixed	Aluminum	[11]	[3/4" Tempered]		
	1 (New)	32" x 30"	Opening	Aluminum	[11]	[3/4" Tempered]		
	<u>O1 Deck</u>							

No side scuttle shall be fitted in a position so that its sill is below a line drawn parallel to the freeboard deck at side and having its lowest point 2.5 percent of the breath (B) above the load waterline, or 500 millimeters (19 1/2 inches) whichever is the greater distance. Indicate all side scuttles not complying with this requirement.

NOTE: All side scuttles fitted with efficient hinged inside deadlights are to be arranged so that they can be effectively closed and secured watertight.

[Indicator Revision]

FREING PORTS (Reg. 24)

	Length of Bulwark	Height of Bulwark	Number and Size of Freeing Ports each side	Total Area each side	Required Area each side
Freeboard Deck After Well	84' 1" (stbd)	30"	One continuous from fr. 40 to stern - 1 1/2" high	14.06 sq ft	
Forward Well	32' 6" (port)	30"	One continuous from fr. bulk to stern [9" high]	[20.10 sq ft]	
Superstructure Deck					

State fore and aft position of each freeing port in relation to superstructure end bulkheads

{ After Well
 { Forward Well

Particulars of shutters, bars or rails fitted to freeing ports:

Height of lower edge of freeing port above deck: 1 1/2"

PROTECTION OF THE CREW (Regs. 25 & 26)

State particulars of bulwarks or guardrails on freeboard and superstructure decks:

Bulkhead BK: 30" high bulwark (fr. 40 to transom on stbd. side, fr. 60 to stern on port side)

Whaleback BK: 42" high bulwark at bow and tapers to 35" high at fr. 9, port & stbd.

3 tier guardrails from fr. 9 to whaleback bulkhead - 34" high.

O1 Deck: 30" high bulwark - stbd. side at shell plating, fr. 25-26. (In way of house)

3 tier wire rope with pipe stanchions, 34" high, inboard, outboard aft of house.

State details of lifelines, walkways, gangways or underdeck passageways where required to be fitted:

N.A.

Where is crew berthed? Indicate if unmanned. O1 Deck and Platform Deck

TIMBER DECK CARGO FITTINGS (Reg. 44)

State particulars of uprights, sockets, lashings, guardrails and lifelines:

N.A.

SKETCH GUNWALE CONNECTION

For Rounded Gunwale Indicate Relationship to Deckline Marked on Vessel to Deckline as Defined in Regulation 4.

OTHER SPECIAL FEATURES

The conditions of assignment shown on this form are a record of the arrangements and fittings provided on the ship and are in accordance with the requirements of the relevant regulations of the International Convention on Load Lines, 1966.

07 June '94

9 June 1994

(Date)


D. R. Carr


(Surveyor's signature)

F. C. Treptow