Royal Canadian Mounted Police / Gendarmerie royale du Canada

**RETURN BIDS TO:**
**RETOURNER LES SOUMISSIONS A** :

Procurement & Contracting Services
Bid Receiving Unit
VISITOR'S CENTRE - Main Entrance
73 Leikin Drive, Mailstop #15
Ottawa, Ontario K1A 0R2
Canada
Attn: Shannon Plunkett

Services d'acquisitions et des marchés
Module de réception des soumissions
CENTRE DES VISITEURS - Entrée Principale
73 promenade Leikin, arrêt postal nº15
Ottawa (Ontario) K1A 0R2
Canada
A/S : Shannon Plunkett

# SOLICITATION AMENDMENT

# MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments: - Commentaries :

| | | |
|---|---|---|
| **Title – Sujet**<br>RCMP Patrol Vessel Transportation | | **Date**<br>October 31, 2016 |
| **Solicitation No. – Nº de l'invitation**<br>201605344/B | | **Amendment No. –**<br>**Nº de la modification**<br>004 |
| **Client Reference No. - No. De Référence du Client**<br>201605344 | | |
| **Solicitation Closes – L'invitation prend fin** | | |
| **At /à :** | 2 :00 PM | EST (Eastern Standard Time)<br>HNE (heure normale de l'Est) |
| **On / le :** | November 17, 2016 | |
| **Delivery - Livraison** | **Taxes - Taxes** | **Duty – Droits** |
| **Destination of Goods and Services – Destinations des biens et services** | | |
| **Instructions**<br>See herein — Voir aux présentes | | |
| **Address Inquiries to –**<br>**Adresser toute demande de renseignements à**<br>Anna Rozanski (anna.rozanski@rcmp-grc.gc.ca) | | |
| **Telephone No. – No. de téléphone**<br>613-843-6972 | **Facsimile No. – No. de télécopieur**<br>613-825-0082 | |

| | |
|---|---|
| **Delivery Required** –<br>**Livraison exigée** | **Delivery Offered** –<br>**Livraison proposée** |
| **Vendor/Firm Name, Address and Representative – Raison sociale, adresse et représentant du fournisseur/de l'entrepreneur:** | |
| **Telephone No. – No. de téléphone** | **Facsimile No. – No. de télécopieur** |
| **Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) – Nom et titre de la personne autorisée à signer au nom du fournisseur/de l'entrepreneur (taper ou écrire en caractères d'imprimerie)** | |
| **Signature** | **Date** |

Canada

This amendment is raised to address the following:

- To respond to questions received during the solicitation period; and
- To revise the solicitation accordingly, as applicable.

**QUESTIONS AND ANSWERS**

Question 1: The Insurance Requirements detailed in Annex B of the RFP, the Contractor must insure for not less than $10,000,000.00 on Replacement Cost (new) basis. Can you confirm the replacement value will not exceed $10,000,000? If it does exceed $10,000,000.00, what would the value be?

Answer 1: RCMP cannot confirm that replacement value will not exceed $10,000,000.00. The exact Replacement Cost (new) is unknown. Ten million dollars is RCMP's best estimate, excluding cost of on board equipment.

Question 2: Will the Zodiac and life rafts be transported as well? And will equipment inside the vessel be secured for sea?

Answer 2: All equipment on board will be transported with the vessel as described in Annex A: Statement of Work, article 7 Contractor's Obligations.

Question 3: Will the UHF and VHF antennas be removed for transport?

Answer 3: All equipment on board will be transported with the vessel as described in Annex A: Statement of Work, article 7 Contractor's Obligations.

Questions 4: Are there restrictions on the lifting of the vessel?

Answer 4: Documents are provided in subsequent pages of this amendment for determination of lifting arrangements. These documents and answer 5 below should allow calculation of Centre of Gravity of the vessel, as per Question 2 of RFP amendment 003.

Question 5: How much fuel is on board?

Answer 5: Tank 1 has 963 litres and Tank 2 has 970 litres of diesel fuel. (Tank 4 has 98 litres of fresh water and Tank 5 has 98 litres of fresh water.)

Question 6: Will an earlier transport date be considered more favourably than a later date?

Answer 6: No, an earlier transport date is not more favourable than a later date. Please refer to the Basis of Selection on page 8 of the RFP which states, "A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price will be recommended for award of a contract."

Question 7: How will other options (modes of transport) than the preferred option be evaluated?

Answer 7: Other modes of transport are evaluated at mandatory technical evaluation criterion M5. The criterion is further clarified and amended at Solicitation Revision 1 below.

**SOLICITATION REVISIONS**

1) On page 23-24, D2.2 Mandatory Criteria Table,

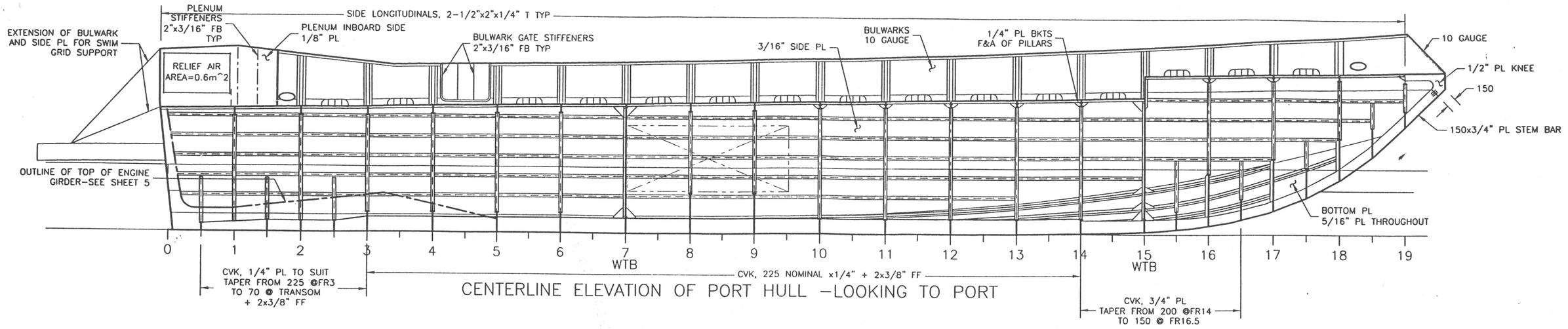
Delete:

| | | |
|---|---|---|
| M5 | The preferred method of transportation is for the Patrol Vessel to be carried on a larger vessel however other modes of transport would be considered if they are more cost effective and do not involve higher risk.<br><br>If the Bidder proposes a method of transport other than the preferred, the Bidder must demonstrate that the proposed method does not involve higher risk. | |

Insert:

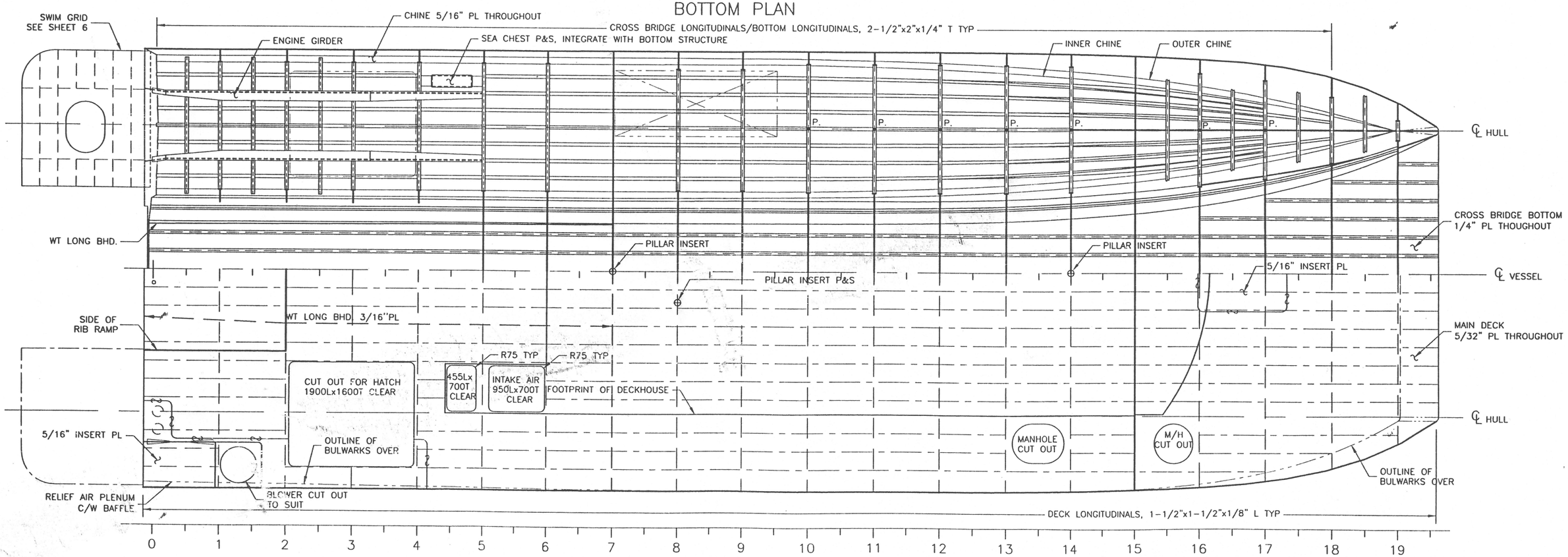
| | | |
|---|---|---|
| M5 | The preferred method of transportation is for the Patrol Vessel to be carried on a larger vessel however other modes of transport would be considered.<br><br>If the Bidder proposes a mode of transport other than the preferred, the Bidder must provide a detailed description of all risks and explain how each risk will be mitigated.<br><br>RCMP will determine, at its sole discretion, that the proposed other mode of transport does not involve higher risk and that the risks and mitigation strategies outlined by the Bidder are acceptable. | |

2) The solicitation closing date is extended to November 17, 2016 as detailed on page 1 of this amendment. The tender notice at https://buyandsell.gc.ca/procurement-data/tender-notice/PW-16-00750146 is revised accordingly.




CENTERLINE ELEVATION OF PORT HULL -LOOKING TO PORT

BOTTOM PLAN




DECK PLAN

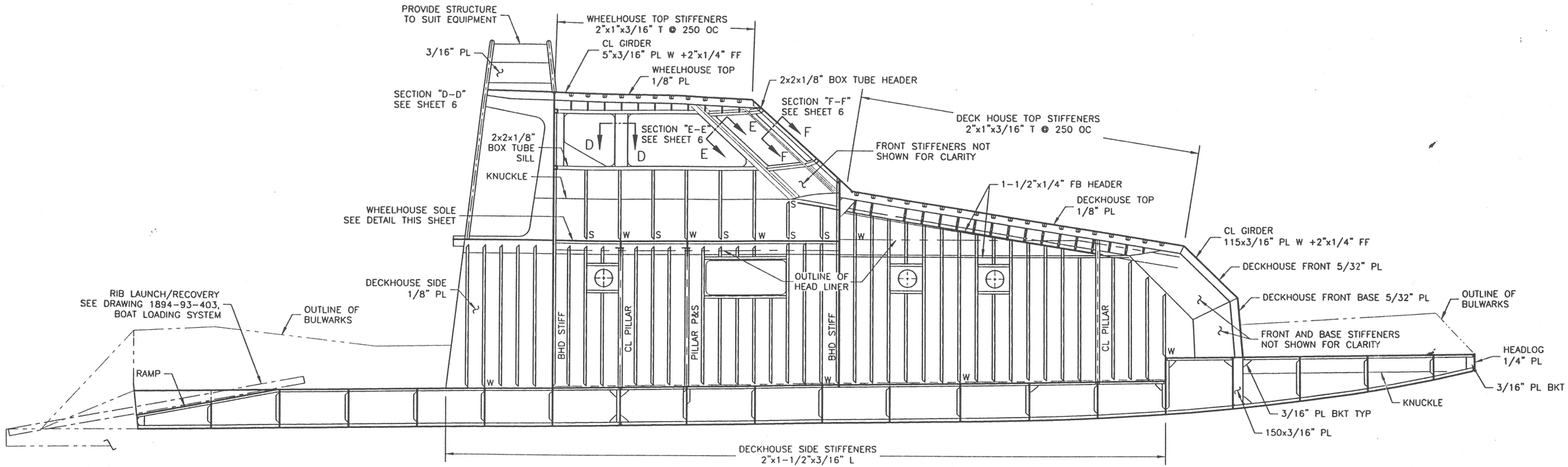
0 1 2 3 4 5

METRES

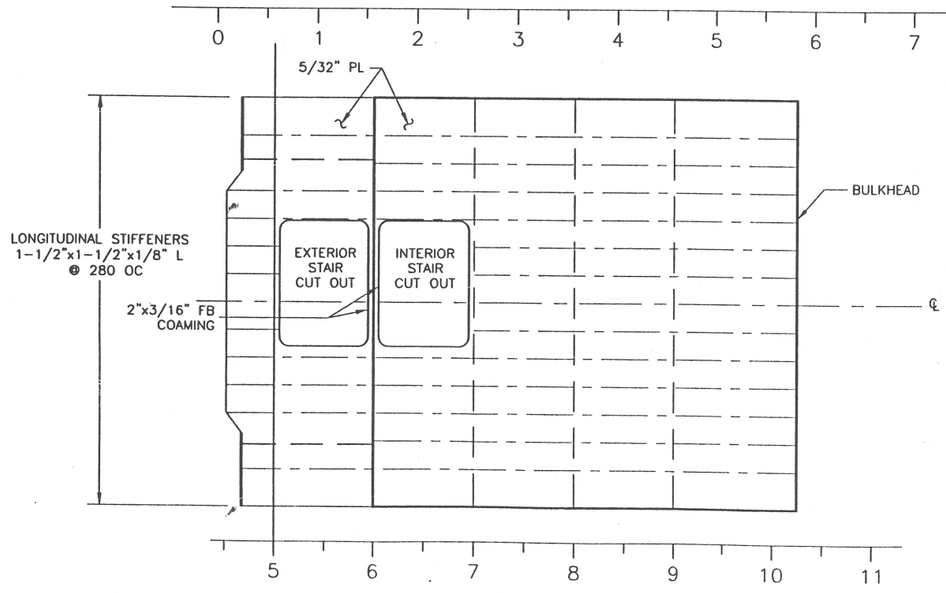
TITLE: STRUCTURAL ARRANGEMENT

| SCALE | PROJECT No. | DWG. No. | SHEET |
|---|---|---|---|
| 1:60 | 201-133 | 21010 | 3 OF 8 |

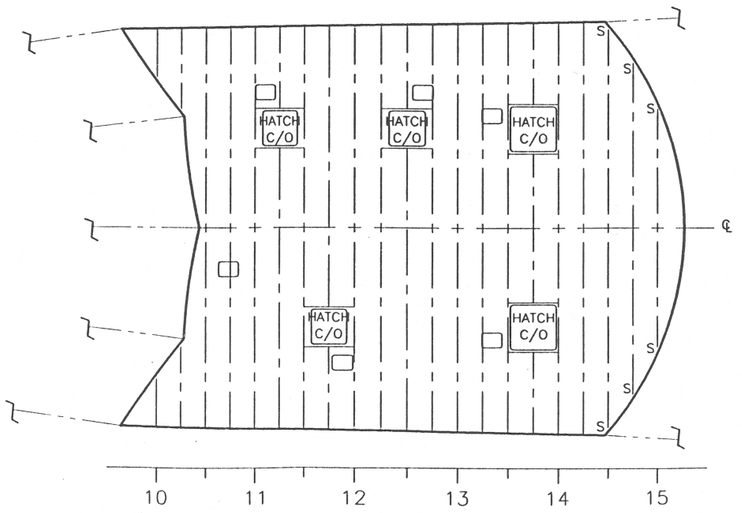
ROBERT ALLAN LTD. REV. 2



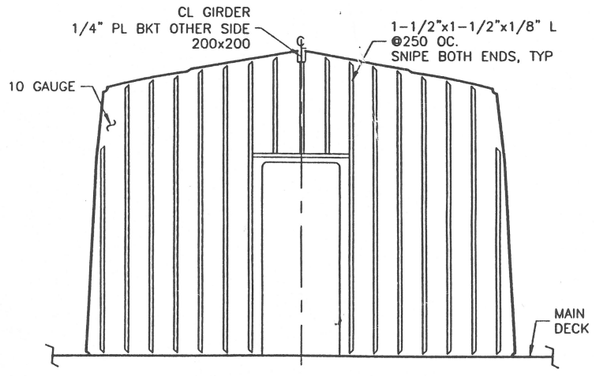

CENTERLINE ELEVATION –LOOKING TO PORT



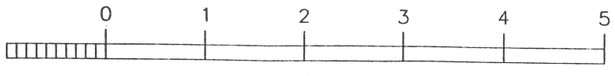

WHEELHOUSE SOLE –PLAN




DECKHOUSE TOP –PLAN




BULKHEAD @ FR 10.25
LOOKING FORWARD




| | | | |
|---|---|---|---|
| TITLE: STRUCTURAL ARRANGEMENT | | | |
| SCALE 1:60 | PROJECT No. 201-133 | DWG. No. 21010 | SHEET 2 OF 8 |
| ROBERT ALLAN LTD. | | | REV. 2 |

E.Y.E. MARINE CONSULTANTS
Suite 1, 327 Prince Albert Road, Dartmouth, Nova Scotia, Canada B2Y 1N7
Tel: (902) 463-8940
Fax: (902) 463-6319

# "MURRAY"

# TRIM AND STABILITY BOOKLET

DRAFT

**BY:** E.Y.E. MARINE CONSULTANTS
**FOR:** A.F. THERIAULT & SON LTD.
**DATE:** 15 MARCH 2005
**JOB NO:** 04060

H:\04Files\04060\STAB-COVER.wp

# TABLE OF CONTENTS

# 1

# GENERAL PARTICULARS

# PRINCIPAL PARTICULARS

| | |
|---|---|
| Vessel Name: | 'MURRAY' |
| Type: | Patrol Vessel |
| Built | A.F. Theriault<br>2005 |
| Length, Overall | 19.75m |
| Length Between Perpendiculars | 17.60m |
| Length on Waterline | 17.68m |
| Beam | 6.70m |
| Depth | 1.99m |
| Draft | 0.70m |
| No. of Crew | 4 |

# 2

# NOMENCLATURE AND DATUMS

# NOMENCLATURE AND DATUMS

| | |
|---|---|
| a | - Aft of midships |
| B.O.K. | - Bottom of keel |
| Critical Height | - Vertical distance from the waterline to the critical point. |
| Critical Points | - Points on the vessel which would cause progressive flooding if immersed. |
| Deck Imm | - The angle at which any point of the weather deck is submerged. |
| Depth | - Distance from the origin to the waterplane and measured perpendicular to the waterplane. It is used in place of "draft" which becomes undefined at significant angles of heel. |
| Displ. (MT) | - The total weight of the vessel in Metric tons |
| f | - Forward of midships |
| FSM | - Free surface moment |
| GML | - The longitudinal metacentre (used for trim calculations only) |
| GMT | - The transverse geometric metacentre (i.e. the distance from the vessel's VCG to the metacentre) |
| GM Upright | - The GM of the vessel if it were at zero heel (may not be the current loading) |
| KML | - The distance from the baseline to the longitudinal metacentre. |
| KMT | - The distance from the baseline to the transverse metacentre. |
| KN | - The righting arm calculated for various angles assuming the VCG = 0. Must be corrected for free surface to determine the actual righting arm. |

| | |
|---|---|
| LCB | - The longitudinal centre of buoyancy measured from the origin. |
| LCF | - The longitudinal centre of flotation measured from the origin. |
| LCG | - The longitudinal centre of gravity measured from the origin. |
| Max FSM | - The maximum free surface of a tank (may not be the current loading). |
| Moment/deg Trim | - Moment to change trim 1 degree |
| Origin | - The origin is the intersection of the three orthogonal co-ordinate axes (see datum points) |
| SpGr | - Specific Gravity: weight of a liquid relative to FW (i.e SW is 1.025, FO is 0.87) |
| TCB | - Transverse centre of buoyancy |
| TCG | - Transverse centre of gravity. |
| VCB | - Vertical centre of buoyancy above keel. |
| VCG | - Vertical centre of gravity above keel |
| Weight/cm | - Weight, in MT, required to sink vessel 1 cm. |

## ORIGIN PLANES

Vertical: Baseline (BL) is as defined on enclosed datums drawing

Perpendiculars: Planes located at the aft and fwd draft mark locations
Aft perpendicular located 8.808m aft of midships.
Fwd perpendicular located 8.788m fwd of midships as defined on enclosed datums drawing

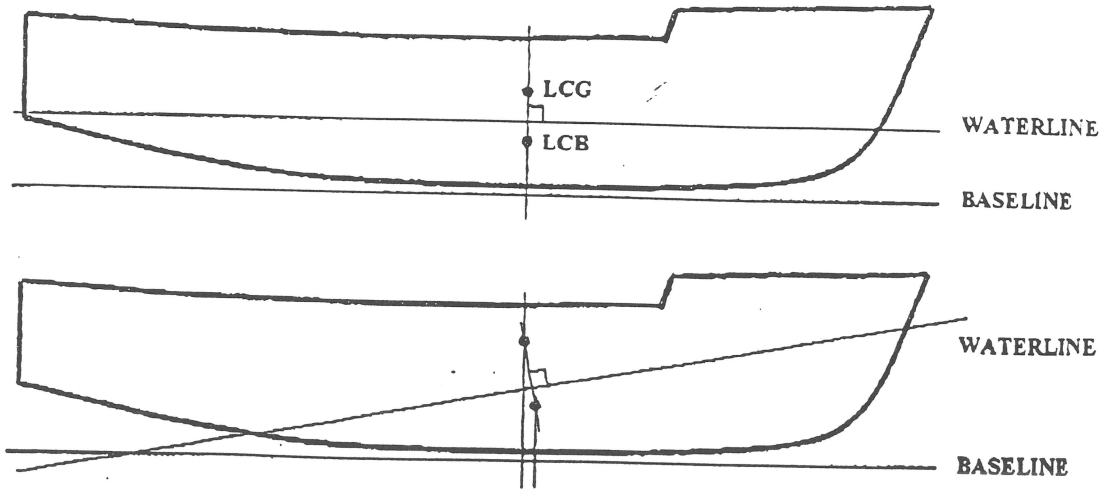
Transverse: The centerline of the vessel with starboard designated as positive.

Longitudinal: Midships – a plane 194mm aft of frame 9 as defined on enclosed datums drawing.

NOTE: Weights centers are measured in the plan of the vessel, i.e. along the baseline or centerline.

All references are in "Boat Co-ordinates" (baseline, etc.) If the waterplane is not parallel to the baseline (trimmed or heeled condition) then the line between the LCG and LCB, which is perpendicular to the waterplane, cannot be perpendicular to the baseline plane. Hence, if the LCG and LCB are separated vertically then equal and parallel references from the origin on the baseline plane cannot be equal and parallel on the waterplane.

The important point to remember is that the definition of equilibrium is: ***RA (Righting Arm) = 0***



# 3

# NOTES TO MASTER

'MURRAY'

## Notes to Master Regarding Stability and Loading of Vessel

1. Compliance with the stability criteria indicated does not ensure immunity against capsizing regardless of the circumstances, or absolve the master from his responsibilities. Masters should, therefore, exercise prudence and good seamanship having regard to the season of the year, weather forecasts and the navigational zone and should take the appropriate action as to speed and course warranted by the prevailing circumstances.

2. Care should be taken to ensure that the cargo allocated to the vessel is capable of being stowed so that the compliance with the criteria can be achieved. If necessary, the amount should be limited to the extent that ballast weight may be required.

3. Before a voyage commences care should be taken to ensure cargo and pieces of equipment have been properly stowed or lashed so as to minimize the possibility of both longitudinal and lateral shifting while as sea under the effect of acceleration caused by rolling and pitching.

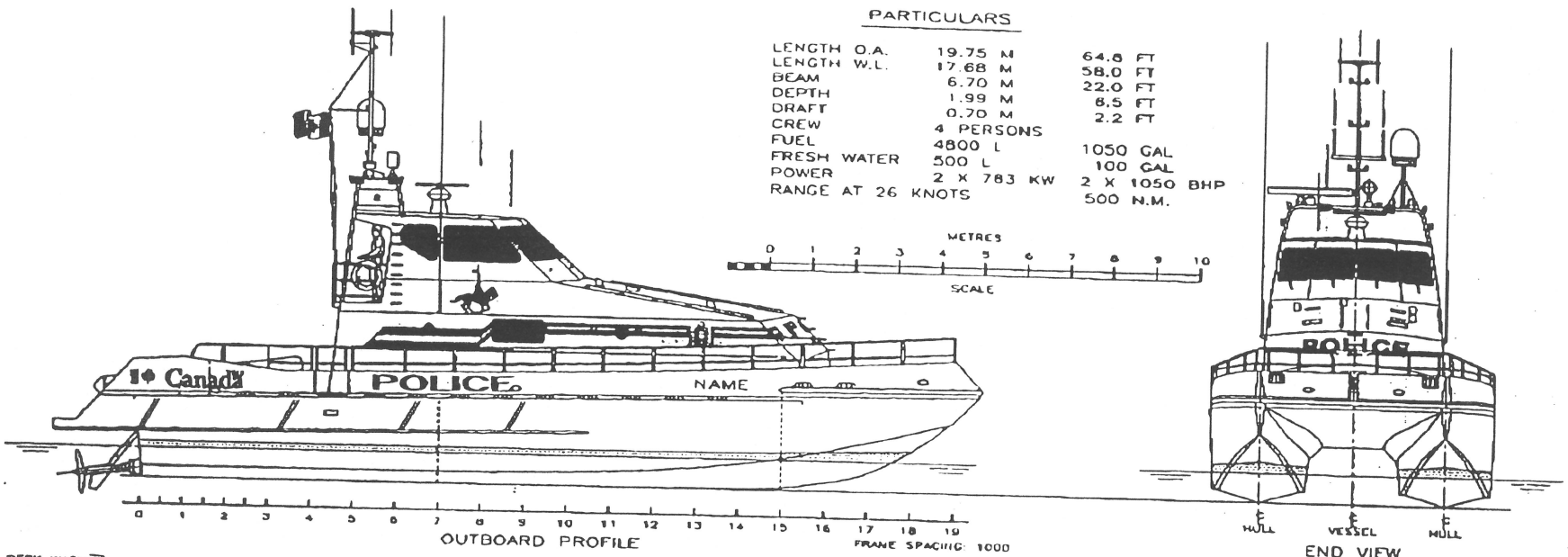
4. The stability of this vessel has been evaluated according to TP7301, Stab 6. As this vessel is a a catamaran, the maximum righting arm occurs at a lesser engle than stated in the regulations and the point of vanishing stability occurs at 36.92 degrees in the port arrival condition. Because the upright GM exceeds the required value by approximately 40 times and the area under the curve to 40 degrees (or when RA=0) exceeds the required value by approximately 5 times, the vessel has sufficient righting energy to operate safely.

# 4

# GENERAL ARRANGEMENT

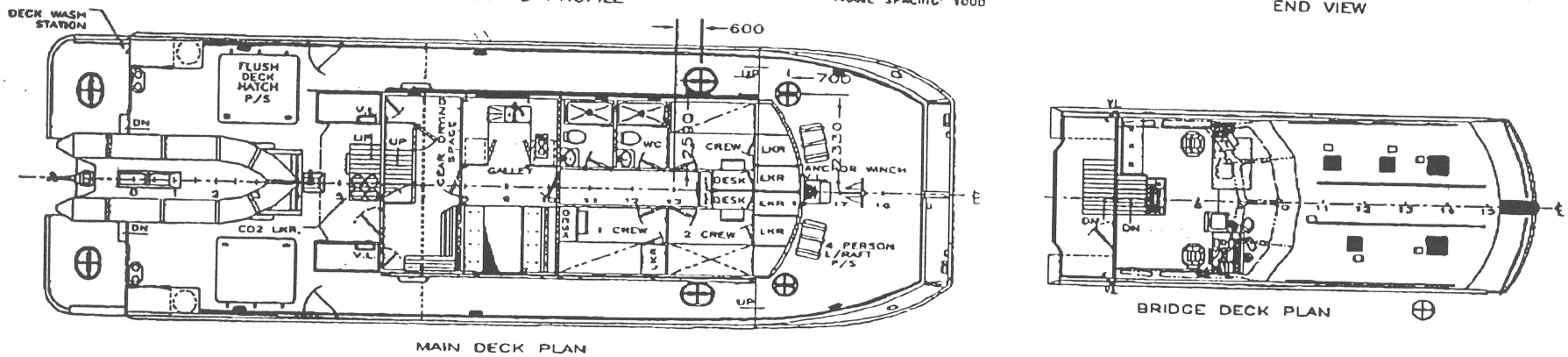
## PARTICULARS

| | | |
|---|---|---|
| LENGTH O.A. | 19.75 M | 64.8 FT |
| LENGTH W.L. | 17.68 M | 58.0 FT |
| BEAM | 6.70 M | 22.0 FT |
| DEPTH | 1.99 M | 6.5 FT |
| DRAFT | 0.70 M | 2.2 FT |
| CREW | 4 PERSONS | |
| FUEL | 4800 L | 1050 GAL |
| FRESH WATER | 500 L | 100 GAL |
| POWER | 2 X 783 KW | 2 X 1050 BHP |
| RANGE AT 26 KNOTS | | 500 N.M. |




OUTBOARD PROFILE

END VIEW




MAIN DECK PLAN

BRIDGE DECK PLAN

## 'MURRAY'

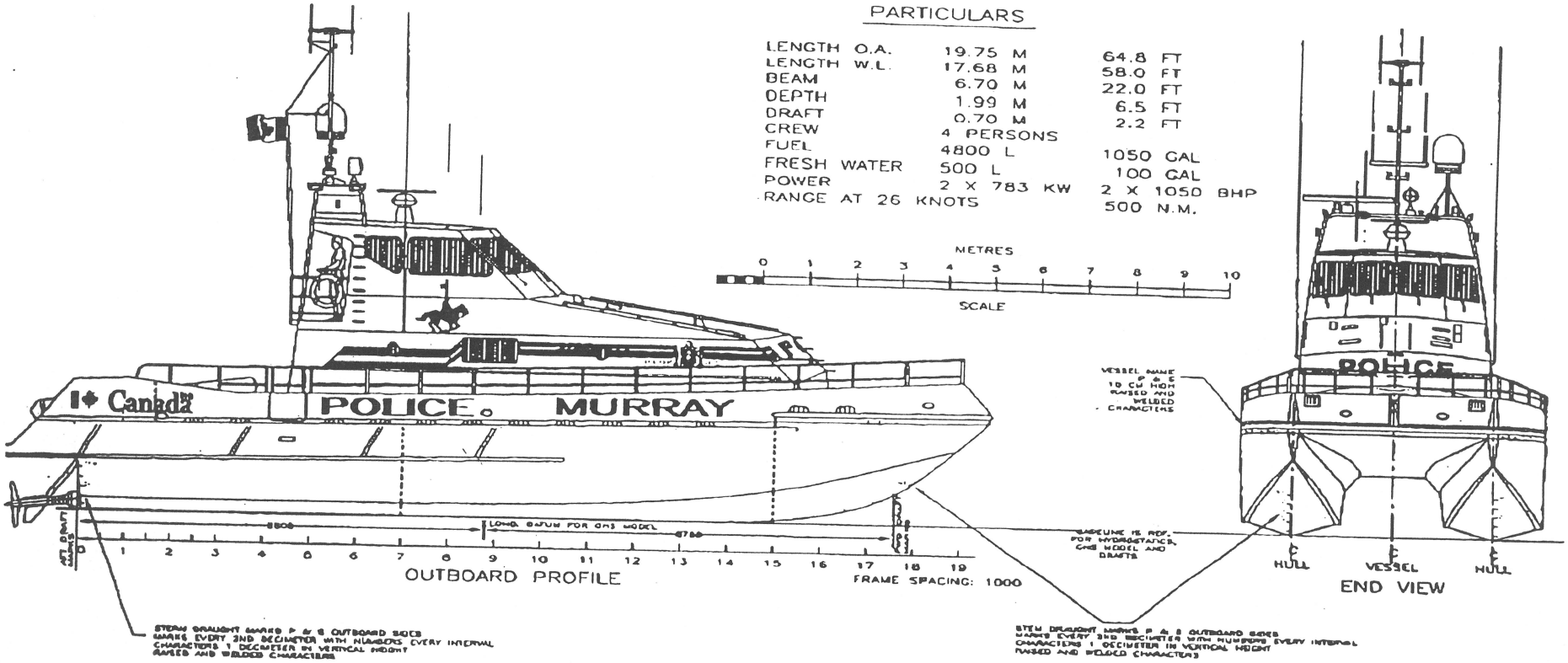
GENERAL ARRANGEMENT

# 5

# DRAFT MARKS AND DATUMS

## PARTICULARS

| | | |
|---|---|---|
| LENGTH O.A. | 19.75 M | 64.8 FT |
| LENGTH W.L. | 17.68 M | 58.0 FT |
| BEAM | 6.70 M | 22.0 FT |
| DEPTH | 1.99 M | 6.5 FT |
| DRAFT | 0.70 M | 2.2 FT |
| CREW | 4 PERSONS | |
| FUEL | 4800 L | 1050 GAL |
| FRESH WATER | 500 L | 100 GAL |
| POWER | 2 X 783 KW | 2 X 1050 BHP |
| RANGE AT 26 KNOTS | | 500 N.M. |




'MURRAY'

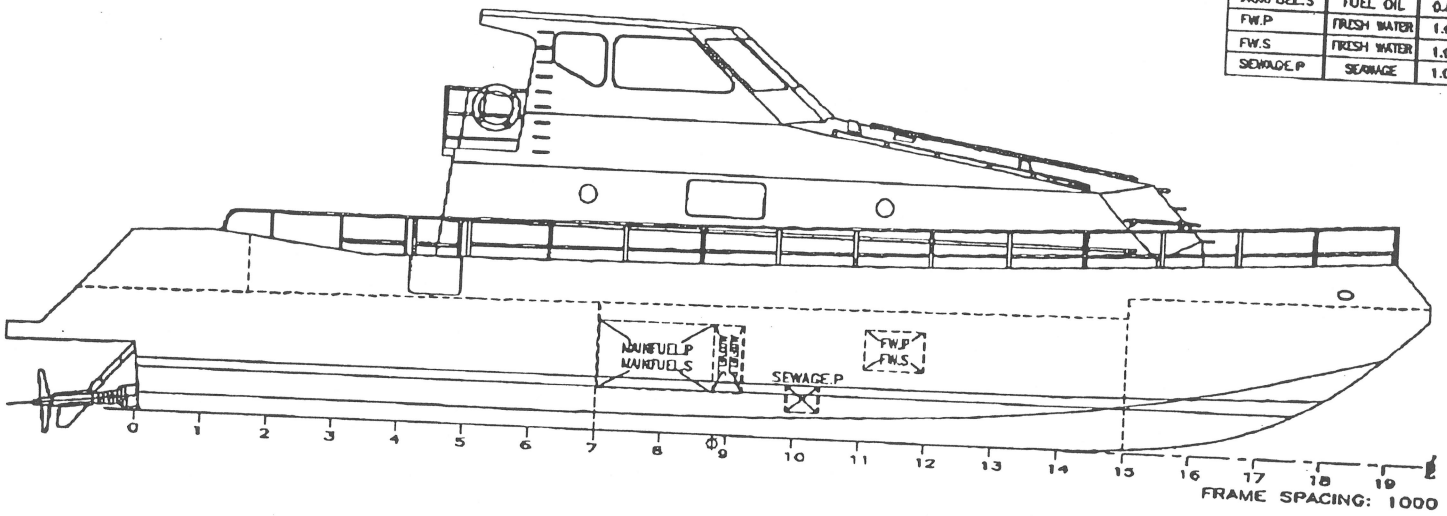
LOCATION OF DRAFT MARKS AND DATUMS

# 6

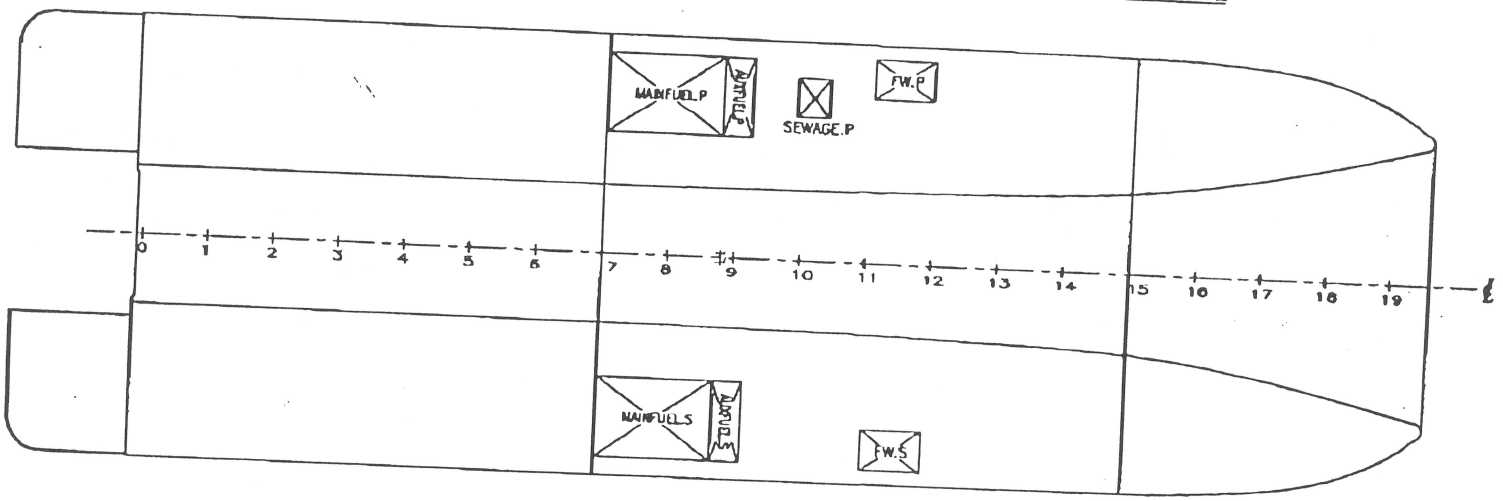
# TANK CAPACITIES

TANK CAPACITIES

| TANK | CONTENTS | SPECIFIC GRAVITY | WEIGHT (MT) | LCG (M) | TCG (M) | VCG (M) |
|---|---|---|---|---|---|---|
| MAINFUEL.P | FUEL OIL | 0.870 | 1.86 | 0.916a | 2.441p | 1.182 |
| MAINFUEL.S | FUEL OIL | 0.870 | 1.86 | 0.916a | 2.441s | 1.182 |
| AUXFUEL.P | FUEL OIL | 0.870 | 0.48 | 0.184f | 2.441p | 1.182 |
| AUXFUEL.S | FUEL OIL | 0.870 | 0.48 | 0.184f | 2.441s | 1.182 |
| FW.P | FRESH WATER | 1.000 | 0.25 | 2.696f | 2.816p | 1.417 |
| FW.S | FRESH WATER | 1.000 | 0.25 | 2.696f | 2.816s | 1.417 |
| SEWAGE.P | SEWAGE | 1.025 | 0.12 | 1.334f | 2.485p | 0.609 |




PROFILE




PLAN

# 'MURRAY'
# TANK CAPACITIES

05-03-15 11:25:24
GHS 8.06A

E.Y.E. Marine Consultants
MURRAY



TANK STATUS
Trim: zero, Heel: zero

| Part | Load | SpGr | Weight (MT) | LCG | TCG | VCG | FSM |
|---|---|---|---|---|---|---|---|
| MAINFUEL.S | 1.000 | 0.870 | 1.86 | 0.916a | 2.441s | 1.182 | 0.22 |
| MAINFUEL.P | 1.000 | 0.870 | 1.86 | 0.916a | 2.441p | 1.182 | 0.22 |
| AUXFUEL.S | 1.000 | 0.870 | 0.48 | 0.184f | 2.441s | 1.182 | 0.06 |
| AUXFUEL.P | 1.000 | 0.870 | 0.48 | 0.184f | 2.441p | 1.182 | 0.06 |
| FW.S | 1.000 | 1.000 | 0.25 | 2.696f | 2.816s | 1.417 | 0.01 |
| FW.P | 1.000 | 1.000 | 0.25 | 2.696f | 2.816p | 1.417 | 0.01 |
| SEWAGE.P | 1.000 | 1.025 | 0.12 | 1.334f | 2.485p | 0.609 | 0.01 |
| Total Tanks----------> | | | 5.30 | 0.325f | 0.056p | 1.191 | 0.59 |

Distances in METERS.----------Moments in M.-MT.

TANK CHARACTERISTICS
No Trim, No Heel
Tank: MAINFUEL.P, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 20 | 35 | 0.03 | 0.916a | 2.355p | 0.660 | 12.88 | 0.13 |
| 40 | 70 | 0.06 | 0.916a | 2.360p | 0.670 | 6.50 | 0.14 |
| 60 | 107 | 0.09 | 0.916a | 2.365p | 0.680 | 4.38 | 0.15 |
| 80 | 143 | 0.12 | 0.916a | 2.370p | 0.691 | 3.31 | 0.16 |
| 100 | 181 | 0.16 | 0.916a | 2.375p | 0.701 | 2.67 | 0.17 |
| 120 | 219 | 0.19 | 0.916a | 2.380p | 0.711 | 2.25 | 0.18 |
| 140 | 258 | 0.22 | 0.916a | 2.386p | 0.722 | 1.94 | 0.19 |
| 160 | 298 | 0.26 | 0.916a | 2.391p | 0.732 | 1.71 | 0.20 |
| 180 | 338 | 0.29 | 0.916a | 2.396p | 0.743 | 1.53 | 0.21 |
| 200 | 379 | 0.33 | 0.916a | 2.401p | 0.753 | 1.39 | 0.22 |
| 220 | 421 | 0.37 | 0.916a | 2.406p | 0.764 | 1.25 | 0.22 |
| 240 | 462 | 0.40 | 0.916a | 2.410p | 0.774 | 1.14 | 0.22 |
| 260 | 503 | 0.44 | 0.916a | 2.413p | 0.784 | 1.05 | 0.22 |
| 280 | 545 | 0.47 | 0.916a | 2.416p | 0.795 | 0.97 | 0.22 |
| 300 | 586 | 0.51 | 0.916a | 2.419p | 0.805 | 0.90 | 0.22 |
| 320 | 628 | 0.55 | 0.916a | 2.421p | 0.815 | 0.84 | 0.22 |
| 340 | 669 | 0.58 | 0.916a | 2.422p | 0.825 | 0.79 | 0.22 |
| 360 | 710 | 0.62 | 0.916a | 2.424p | 0.836 | 0.74 | 0.22 |
| 380 | 752 | 0.65 | 0.916a | 2.425p | 0.846 | 0.70 | 0.22 |
| 400 | 793 | 0.69 | 0.916a | 2.427p | 0.856 | 0.67 | 0.22 |
| 420 | 834 | 0.73 | 0.916a | 2.428p | 0.866 | 0.63 | 0.22 |
| 440 | 876 | 0.76 | 0.916a | 2.429p | 0.876 | 0.60 | 0.22 |
| 460 | 917 | 0.80 | 0.916a | 2.430p | 0.886 | 0.58 | 0.22 |
| 480 | 959 | 0.83 | 0.916a | 2.431p | 0.896 | 0.55 | 0.22 |
| 500 | 1000 | 0.87 | 0.916a | 2.432p | 0.906 | 0.53 | 0.22 |
| 520 | 1041 | 0.91 | 0.916a | 2.432p | 0.917 | 0.51 | 0.22 |
| 540 | 1083 | 0.94 | 0.916a | 2.433p | 0.927 | 0.49 | 0.22 |
| 560 | 1124 | 0.98 | 0.916a | 2.434p | 0.937 | 0.47 | 0.22 |
| 580 | 1165 | 1.01 | 0.916a | 2.434p | 0.947 | 0.45 | 0.22 |
| 600 | 1207 | 1.05 | 0.916a | 2.435p | 0.957 | 0.44 | 0.22 |
| 620 | 1248 | 1.09 | 0.916a | 2.435p | 0.967 | 0.42 | 0.22 |
| 640 | 1290 | 1.12 | 0.916a | 2.436p | 0.977 | 0.41 | 0.22 |
| 660 | 1331 | 1.16 | 0.916a | 2.436p | 0.987 | 0.40 | 0.22 |
| 680 | 1372 | 1.19 | 0.916a | 2.437p | 0.997 | 0.38 | 0.22 |
| 700 | 1414 | 1.23 | 0.916a | 2.437p | 1.007 | 0.37 | 0.22 |
| 720 | 1455 | 1.27 | 0.916a | 2.437p | 1.017 | 0.36 | 0.22 |
| 740 | 1496 | 1.30 | 0.916a | 2.438p | 1.027 | 0.35 | 0.22 |
| 760 | 1538 | 1.34 | 0.916a | 2.438p | 1.037 | 0.34 | 0.22 |
| 780 | 1579 | 1.37 | 0.916a | 2.438p | 1.047 | 0.33 | 0.22 |
| 800 | 1621 | 1.41 | 0.916a | 2.439p | 1.057 | 0.33 | 0.22 |
| 820 | 1662 | 1.45 | 0.916a | 2.439p | 1.067 | 0.32 | 0.22 |
| 840 | 1703 | 1.48 | 0.916a | 2.439p | 1.077 | 0.31 | 0.22 |

Soundings in mm.-------Other distances in METERS.----------
MAINFUEL.P Reference Point: Long.= 0.916a Trans.= 2.450p Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS, continued
No Trim, No Heel
Tank: MAINFUEL.P, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 860 | 1745 | 1.52 | 0.916a | 2.439p | 1.087 | 0.30 | 0.22 |
| 880 | 1786 | 1.55 | 0.916a | 2.440p | 1.097 | 0.30 | 0.22 |
| 900 | 1827 | 1.59 | 0.916a | 2.440p | 1.107 | 0.29 | 0.22 |
| 920 | 1869 | 1.63 | 0.916a | 2.440p | 1.117 | 0.28 | 0.22 |
| 940 | 1910 | 1.66 | 0.916a | 2.440p | 1.127 | 0.28 | 0.22 |
| 960 | 1952 | 1.70 | 0.916a | 2.441p | 1.137 | 0.27 | 0.22 |
| 980 | 1993 | 1.73 | 0.916a | 2.441p | 1.147 | 0.26 | 0.22 |
| 1000 | 2034 | 1.77 | 0.916a | 2.441p | 1.157 | 0.26 | 0.22 |
| 1020 | 2076 | 1.81 | 0.916a | 2.441p | 1.168 | 0.25 | 0.22 |
| 1040 | 2117 | 1.84 | 0.916a | 2.441p | 1.178 | 0.25 | 0.22 |
| 1060 | 2137 | 1.86 | 0.916a | 2.441p | 1.182 | | |

Soundings in mm.-------Other distances in METERS.----------
MAINFUEL.P Reference Point: Long.= 0.916a Trans.= 2.450p Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS
No Trim, No Heel
Tank: MAINFUEL.S, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 20 | 35 | 0.03 | 0.916a | 2.355s | 0.660 | 12.88 | 0.13 |
| 40 | 70 | 0.06 | 0.916a | 2.360s | 0.670 | 6.50 | 0.14 |
| 60 | 107 | 0.09 | 0.916a | 2.365s | 0.680 | 4.38 | 0.15 |
| 80 | 143 | 0.12 | 0.916a | 2.370s | 0.691 | 3.31 | 0.16 |
| 100 | 181 | 0.16 | 0.916a | 2.375s | 0.701 | 2.67 | 0.17 |
| 120 | 219 | 0.19 | 0.916a | 2.380s | 0.711 | 2.25 | 0.18 |
| 140 | 258 | 0.22 | 0.916a | 2.386s | 0.722 | 1.94 | 0.19 |
| 160 | 298 | 0.26 | 0.916a | 2.391s | 0.732 | 1.71 | 0.20 |
| 180 | 338 | 0.29 | 0.916a | 2.396s | 0.743 | 1.53 | 0.21 |
| 200 | 379 | 0.33 | 0.916a | 2.401s | 0.753 | 1.39 | 0.22 |
| 220 | 421 | 0.37 | 0.916a | 2.406s | 0.764 | 1.25 | 0.22 |
| 240 | 462 | 0.40 | 0.916a | 2.410s | 0.774 | 1.14 | 0.22 |
| 260 | 503 | 0.44 | 0.916a | 2.413s | 0.784 | 1.05 | 0.22 |
| 280 | 545 | 0.47 | 0.916a | 2.416s | 0.795 | 0.97 | 0.22 |
| 300 | 586 | 0.51 | 0.916a | 2.419s | 0.805 | 0.90 | 0.22 |
| 320 | 628 | 0.55 | 0.916a | 2.421s | 0.815 | 0.84 | 0.22 |
| 340 | 669 | 0.58 | 0.916a | 2.422s | 0.825 | 0.79 | 0.22 |
| 360 | 710 | 0.62 | 0.916a | 2.424s | 0.836 | 0.74 | 0.22 |
| 380 | 752 | 0.65 | 0.916a | 2.425s | 0.846 | 0.70 | 0.22 |
| 400 | 793 | 0.69 | 0.916a | 2.427s | 0.856 | 0.67 | 0.22 |
| 420 | 834 | 0.73 | 0.916a | 2.428s | 0.866 | 0.63 | 0.22 |
| 440 | 876 | 0.76 | 0.916a | 2.429s | 0.876 | 0.60 | 0.22 |
| 460 | 917 | 0.80 | 0.916a | 2.430s | 0.886 | 0.58 | 0.22 |
| 480 | 959 | 0.83 | 0.916a | 2.431s | 0.896 | 0.55 | 0.22 |
| 500 | 1000 | 0.87 | 0.916a | 2.432s | 0.906 | 0.53 | 0.22 |
| 520 | 1041 | 0.91 | 0.916a | 2.432s | 0.917 | 0.51 | 0.22 |
| 540 | 1083 | 0.94 | 0.916a | 2.433s | 0.927 | 0.49 | 0.22 |
| 560 | 1124 | 0.98 | 0.916a | 2.434s | 0.937 | 0.47 | 0.22 |
| 580 | 1165 | 1.01 | 0.916a | 2.434s | 0.947 | 0.45 | 0.22 |
| 600 | 1207 | 1.05 | 0.916a | 2.435s | 0.957 | 0.44 | 0.22 |
| 620 | 1248 | 1.09 | 0.916a | 2.435s | 0.967 | 0.42 | 0.22 |
| 640 | 1290 | 1.12 | 0.916a | 2.436s | 0.977 | 0.41 | 0.22 |
| 660 | 1331 | 1.16 | 0.916a | 2.436s | 0.987 | 0.40 | 0.22 |
| 680 | 1372 | 1.19 | 0.916a | 2.437s | 0.997 | 0.38 | 0.22 |
| 700 | 1414 | 1.23 | 0.916a | 2.437s | 1.007 | 0.37 | 0.22 |
| 720 | 1455 | 1.27 | 0.916a | 2.437s | 1.017 | 0.36 | 0.22 |
| 740 | 1496 | 1.30 | 0.916a | 2.438s | 1.027 | 0.35 | 0.22 |
| 760 | 1538 | 1.34 | 0.916a | 2.438s | 1.037 | 0.34 | 0.22 |
| 780 | 1579 | 1.37 | 0.916a | 2.438s | 1.047 | 0.33 | 0.22 |
| 800 | 1621 | 1.41 | 0.916a | 2.439s | 1.057 | 0.33 | 0.22 |
| 820 | 1662 | 1.45 | 0.916a | 2.439s | 1.067 | 0.32 | 0.22 |
| 840 | 1703 | 1.48 | 0.916a | 2.439s | 1.077 | 0.31 | 0.22 |

Soundings in mm.-------Other distances in METERS.----------
MAINFUEL.S Reference Point: Long.= 0.916a Trans.= 2.450s Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS, continued
No Trim, No Heel
Tank: MAINFUEL.S, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 860 | 1745 | 1.52 | 0.916a | 2.439s | 1.087 | 0.30 | 0.22 |
| 880 | 1786 | 1.55 | 0.916a | 2.440s | 1.097 | 0.30 | 0.22 |
| 900 | 1827 | 1.59 | 0.916a | 2.440s | 1.107 | 0.29 | 0.22 |
| 920 | 1869 | 1.63 | 0.916a | 2.440s | 1.117 | 0.28 | 0.22 |
| 940 | 1910 | 1.66 | 0.916a | 2.440s | 1.127 | 0.28 | 0.22 |
| 960 | 1952 | 1.70 | 0.916a | 2.441s | 1.137 | 0.27 | 0.22 |
| 980 | 1993 | 1.73 | 0.916a | 2.441s | 1.147 | 0.26 | 0.22 |
| 1000 | 2034 | 1.77 | 0.916a | 2.441s | 1.157 | 0.26 | 0.22 |
| 1020 | 2076 | 1.81 | 0.916a | 2.441s | 1.168 | 0.25 | 0.22 |
| 1040 | 2117 | 1.84 | 0.916a | 2.441s | 1.178 | 0.25 | 0.22 |
| 1060 | 2137 | 1.86 | 0.916a | 2.441s | 1.182 | | |

Soundings in mm.-------Other distances in METERS.----------
MAINFUEL.S Reference Point: Long.= 0.916a Trans.= 2.450s Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS
No Trim, No Heel
Tank: AUXFUEL.P, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 20 | 9 | 0.01 | 0.184f | 2.355p | 0.660 | 0.85 | 0.03 |
| 40 | 18 | 0.02 | 0.184f | 2.360p | 0.670 | 0.43 | 0.04 |
| 60 | 27 | 0.02 | 0.184f | 2.365p | 0.680 | 0.29 | 0.04 |
| 80 | 37 | 0.03 | 0.184f | 2.370p | 0.691 | 0.22 | 0.04 |
| 100 | 47 | 0.04 | 0.184f | 2.375p | 0.701 | 0.18 | 0.04 |
| 120 | 56 | 0.05 | 0.184f | 2.380p | 0.711 | 0.15 | 0.05 |
| 140 | 66 | 0.06 | 0.184f | 2.386p | 0.722 | 0.13 | 0.05 |
| 160 | 77 | 0.07 | 0.184f | 2.391p | 0.732 | 0.11 | 0.05 |
| 180 | 87 | 0.08 | 0.184f | 2.396p | 0.743 | 0.10 | 0.05 |
| 200 | 98 | 0.08 | 0.184f | 2.401p | 0.753 | 0.09 | 0.06 |
| 220 | 108 | 0.09 | 0.184f | 2.406p | 0.764 | 0.08 | 0.06 |
| 240 | 119 | 0.10 | 0.184f | 2.410p | 0.774 | 0.08 | 0.06 |
| 260 | 130 | 0.11 | 0.184f | 2.413p | 0.784 | 0.07 | 0.06 |
| 280 | 140 | 0.12 | 0.184f | 2.416p | 0.795 | 0.06 | 0.06 |
| 300 | 151 | 0.13 | 0.184f | 2.419p | 0.805 | 0.06 | 0.06 |
| 320 | 161 | 0.14 | 0.184f | 2.421p | 0.815 | 0.06 | 0.06 |
| 340 | 172 | 0.15 | 0.184f | 2.422p | 0.825 | 0.05 | 0.06 |
| 360 | 183 | 0.16 | 0.184f | 2.424p | 0.836 | 0.05 | 0.06 |
| 380 | 193 | 0.17 | 0.184f | 2.425p | 0.846 | 0.05 | 0.06 |
| 400 | 204 | 0.18 | 0.184f | 2.427p | 0.856 | 0.04 | 0.06 |
| 420 | 215 | 0.19 | 0.184f | 2.428p | 0.866 | 0.04 | 0.06 |
| 440 | 225 | 0.20 | 0.184f | 2.429p | 0.876 | 0.04 | 0.06 |
| 460 | 236 | 0.21 | 0.184f | 2.430p | 0.886 | 0.04 | 0.06 |
| 480 | 247 | 0.21 | 0.184f | 2.431p | 0.896 | 0.04 | 0.06 |
| 500 | 257 | 0.22 | 0.184f | 2.432p | 0.906 | 0.03 | 0.06 |
| 520 | 268 | 0.23 | 0.184f | 2.432p | 0.917 | 0.03 | 0.06 |
| 540 | 279 | 0.24 | 0.184f | 2.433p | 0.927 | 0.03 | 0.06 |
| 560 | 289 | 0.25 | 0.184f | 2.434p | 0.937 | 0.03 | 0.06 |
| 580 | 300 | 0.26 | 0.184f | 2.434p | 0.947 | 0.03 | 0.06 |
| 600 | 310 | 0.27 | 0.184f | 2.435p | 0.957 | 0.03 | 0.06 |
| 620 | 321 | 0.28 | 0.184f | 2.435p | 0.967 | 0.03 | 0.06 |
| 640 | 332 | 0.29 | 0.184f | 2.436p | 0.977 | 0.03 | 0.06 |
| 660 | 342 | 0.30 | 0.184f | 2.436p | 0.987 | 0.03 | 0.06 |
| 680 | 353 | 0.31 | 0.184f | 2.437p | 0.997 | 0.03 | 0.06 |
| 700 | 364 | 0.32 | 0.184f | 2.437p | 1.007 | 0.02 | 0.06 |
| 720 | 374 | 0.33 | 0.184f | 2.437p | 1.017 | 0.02 | 0.06 |
| 740 | 385 | 0.33 | 0.184f | 2.438p | 1.027 | 0.02 | 0.06 |
| 760 | 396 | 0.34 | 0.184f | 2.438p | 1.037 | 0.02 | 0.06 |
| 780 | 406 | 0.35 | 0.184f | 2.438p | 1.047 | 0.02 | 0.06 |
| 800 | 417 | 0.36 | 0.184f | 2.439p | 1.057 | 0.02 | 0.06 |
| 820 | 428 | 0.37 | 0.184f | 2.439p | 1.067 | 0.02 | 0.06 |
| 840 | 438 | 0.38 | 0.184f | 2.439p | 1.077 | 0.02 | 0.06 |

Soundings in mm.-------Other distances in METERS.----------
AUXFUEL.P Reference Point: Long.= 0.184f Trans.= 2.450p Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS, continued
No Trim, No Heel
Tank: AUXFUEL.P, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 860 | 449 | 0.39 | 0.184f | 2.439p | 1.087 | 0.02 | 0.06 |
| 880 | 460 | 0.40 | 0.184f | 2.440p | 1.097 | 0.02 | 0.06 |
| 900 | 470 | 0.41 | 0.184f | 2.440p | 1.107 | 0.02 | 0.06 |
| 920 | 481 | 0.42 | 0.184f | 2.440p | 1.117 | 0.02 | 0.06 |
| 940 | 491 | 0.43 | 0.184f | 2.440p | 1.127 | 0.02 | 0.06 |
| 960 | 502 | 0.44 | 0.184f | 2.441p | 1.137 | 0.02 | 0.06 |
| 980 | 513 | 0.45 | 0.184f | 2.441p | 1.147 | 0.02 | 0.06 |
| 1000 | 523 | 0.46 | 0.184f | 2.441p | 1.157 | 0.02 | 0.06 |
| 1020 | 534 | 0.46 | 0.184f | 2.441p | 1.168 | 0.02 | 0.06 |
| 1040 | 545 | 0.47 | 0.184f | 2.441p | 1.178 | 0.02 | 0.06 |
| 1060 | 550 | 0.48 | 0.184f | 2.441p | 1.182 | | |

Soundings in mm.-------Other distances in METERS.----------
AUXFUEL.P Reference Point: Long.= 0.184f Trans.= 2.450p Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS
No Trim, No Heel
Tank: AUXFUEL.S, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 20 | 9 | 0.01 | 0.184f | 2.355s | 0.660 | 0.85 | 0.03 |
| 40 | 18 | 0.02 | 0.184f | 2.360s | 0.670 | 0.43 | 0.04 |
| 60 | 27 | 0.02 | 0.184f | 2.365s | 0.680 | 0.29 | 0.04 |
| 80 | 37 | 0.03 | 0.184f | 2.370s | 0.691 | 0.22 | 0.04 |
| 100 | 47 | 0.04 | 0.184f | 2.375s | 0.701 | 0.18 | 0.04 |
| 120 | 56 | 0.05 | 0.184f | 2.380s | 0.711 | 0.15 | 0.05 |
| 140 | 66 | 0.06 | 0.184f | 2.386s | 0.722 | 0.13 | 0.05 |
| 160 | 77 | 0.07 | 0.184f | 2.391s | 0.732 | 0.11 | 0.05 |
| 180 | 87 | 0.08 | 0.184f | 2.396s | 0.743 | 0.10 | 0.05 |
| 200 | 98 | 0.08 | 0.184f | 2.401s | 0.753 | 0.09 | 0.06 |
| 220 | 108 | 0.09 | 0.184f | 2.406s | 0.764 | 0.08 | 0.06 |
| 240 | 119 | 0.10 | 0.184f | 2.410s | 0.774 | 0.08 | 0.06 |
| 260 | 130 | 0.11 | 0.184f | 2.413s | 0.784 | 0.07 | 0.06 |
| 280 | 140 | 0.12 | 0.184f | 2.416s | 0.795 | 0.06 | 0.06 |
| 300 | 151 | 0.13 | 0.184f | 2.419s | 0.805 | 0.06 | 0.06 |
| 320 | 161 | 0.14 | 0.184f | 2.421s | 0.815 | 0.06 | 0.06 |
| 340 | 172 | 0.15 | 0.184f | 2.422s | 0.825 | 0.05 | 0.06 |
| 360 | 183 | 0.16 | 0.184f | 2.424s | 0.836 | 0.05 | 0.06 |
| 380 | 193 | 0.17 | 0.184f | 2.425s | 0.846 | 0.05 | 0.06 |
| 400 | 204 | 0.18 | 0.184f | 2.427s | 0.856 | 0.04 | 0.06 |
| 420 | 215 | 0.19 | 0.184f | 2.428s | 0.866 | 0.04 | 0.06 |
| 440 | 225 | 0.20 | 0.184f | 2.429s | 0.876 | 0.04 | 0.06 |
| 460 | 236 | 0.21 | 0.184f | 2.430s | 0.886 | 0.04 | 0.06 |
| 480 | 247 | 0.21 | 0.184f | 2.431s | 0.896 | 0.04 | 0.06 |
| 500 | 257 | 0.22 | 0.184f | 2.432s | 0.906 | 0.03 | 0.06 |
| 520 | 268 | 0.23 | 0.184f | 2.432s | 0.917 | 0.03 | 0.06 |
| 540 | 279 | 0.24 | 0.184f | 2.433s | 0.927 | 0.03 | 0.06 |
| 560 | 289 | 0.25 | 0.184f | 2.434s | 0.937 | 0.03 | 0.06 |
| 580 | 300 | 0.26 | 0.184f | 2.434s | 0.947 | 0.03 | 0.06 |
| 600 | 310 | 0.27 | 0.184f | 2.435s | 0.957 | 0.03 | 0.06 |
| 620 | 321 | 0.28 | 0.184f | 2.435s | 0.967 | 0.03 | 0.06 |
| 640 | 332 | 0.29 | 0.184f | 2.436s | 0.977 | 0.03 | 0.06 |
| 660 | 342 | 0.30 | 0.184f | 2.436s | 0.987 | 0.03 | 0.06 |
| 680 | 353 | 0.31 | 0.184f | 2.437s | 0.997 | 0.03 | 0.06 |
| 700 | 364 | 0.32 | 0.184f | 2.437s | 1.007 | 0.02 | 0.06 |
| 720 | 374 | 0.33 | 0.184f | 2.437s | 1.017 | 0.02 | 0.06 |
| 740 | 385 | 0.33 | 0.184f | 2.438s | 1.027 | 0.02 | 0.06 |
| 760 | 396 | 0.34 | 0.184f | 2.438s | 1.037 | 0.02 | 0.06 |
| 780 | 406 | 0.35 | 0.184f | 2.438s | 1.047 | 0.02 | 0.06 |
| 800 | 417 | 0.36 | 0.184f | 2.439s | 1.057 | 0.02 | 0.06 |
| 820 | 428 | 0.37 | 0.184f | 2.439s | 1.067 | 0.02 | 0.06 |
| 840 | 438 | 0.38 | 0.184f | 2.439s | 1.077 | 0.02 | 0.06 |

Soundings in mm.-------Other distances in METERS.----------
AUXFUEL.S Reference Point: Long.= 0.184f Trans.= 2.450s Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS, continued
No Trim, No Heel
Tank: AUXFUEL.S, Contents: FUEL OIL at 0.870 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 860 | 449 | 0.39 | 0.184f | 2.439s | 1.087 | 0.02 | 0.06 |
| 880 | 460 | 0.40 | 0.184f | 2.440s | 1.097 | 0.02 | 0.06 |
| 900 | 470 | 0.41 | 0.184f | 2.440s | 1.107 | 0.02 | 0.06 |
| 920 | 481 | 0.42 | 0.184f | 2.440s | 1.117 | 0.02 | 0.06 |
| 940 | 491 | 0.43 | 0.184f | 2.440s | 1.127 | 0.02 | 0.06 |
| 960 | 502 | 0.44 | 0.184f | 2.441s | 1.137 | 0.02 | 0.06 |
| 980 | 513 | 0.45 | 0.184f | 2.441s | 1.147 | 0.02 | 0.06 |
| 1000 | 523 | 0.46 | 0.184f | 2.441s | 1.157 | 0.02 | 0.06 |
| 1020 | 534 | 0.46 | 0.184f | 2.441s | 1.168 | 0.02 | 0.06 |
| 1040 | 545 | 0.47 | 0.184f | 2.441s | 1.178 | 0.02 | 0.06 |
| 1060 | 550 | 0.48 | 0.184f | 2.441s | 1.182 | | |

Soundings in mm.-------Other distances in METERS.----------
AUXFUEL.S Reference Point: Long.= 0.184f Trans.= 2.450s Vert.= 0.650
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS
No Trim, No Heel
Tank: FW.P, Contents: FRESH WATER at 1.000 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 20 | 1 | 0.00 | 2.696f | 2.816p | 1.114 | 6.75 | 0.00 |
| 40 | 3 | 0.00 | 2.696f | 2.816p | 1.128 | 3.38 | 0.00 |
| 60 | 8 | 0.01 | 2.696f | 2.816p | 1.141 | 2.25 | 0.00 |
| 80 | 14 | 0.01 | 2.696f | 2.816p | 1.154 | 1.69 | 0.00 |
| 100 | 21 | 0.02 | 2.696f | 2.816p | 1.167 | 1.27 | 0.01 |
| 120 | 30 | 0.03 | 2.696f | 2.816p | 1.180 | 0.95 | 0.01 |
| 140 | 38 | 0.04 | 2.696f | 2.816p | 1.191 | 0.77 | 0.01 |
| 160 | 47 | 0.05 | 2.696f | 2.816p | 1.202 | 0.64 | 0.01 |
| 180 | 56 | 0.06 | 2.696f | 2.816p | 1.213 | 0.56 | 0.01 |
| 200 | 65 | 0.07 | 2.696f | 2.816p | 1.225 | 0.49 | 0.01 |
| 220 | 75 | 0.07 | 2.696f | 2.816p | 1.236 | 0.44 | 0.01 |
| 240 | 85 | 0.08 | 2.696f | 2.816p | 1.247 | 0.40 | 0.01 |
| 260 | 95 | 0.10 | 2.696f | 2.816p | 1.258 | 0.37 | 0.01 |
| 280 | 106 | 0.11 | 2.696f | 2.816p | 1.269 | 0.34 | 0.02 |
| 300 | 116 | 0.12 | 2.696f | 2.816p | 1.281 | 0.32 | 0.02 |
| 320 | 127 | 0.13 | 2.696f | 2.816p | 1.292 | 0.30 | 0.02 |
| 340 | 138 | 0.14 | 2.696f | 2.816p | 1.303 | 0.26 | 0.02 |
| 360 | 149 | 0.15 | 2.696f | 2.816p | 1.314 | 0.24 | 0.02 |
| 380 | 160 | 0.16 | 2.696f | 2.816p | 1.324 | 0.22 | 0.01 |
| 400 | 170 | 0.17 | 2.696f | 2.816p | 1.334 | 0.20 | 0.01 |
| 420 | 180 | 0.18 | 2.696f | 2.816p | 1.344 | 0.18 | 0.01 |
| 440 | 189 | 0.19 | 2.696f | 2.816p | 1.353 | 0.17 | 0.01 |
| 460 | 198 | 0.20 | 2.696f | 2.816p | 1.362 | 0.15 | 0.01 |
| 480 | 207 | 0.21 | 2.696f | 2.816p | 1.371 | 0.14 | 0.01 |
| 500 | 216 | 0.22 | 2.696f | 2.816p | 1.380 | 0.13 | 0.01 |
| 520 | 224 | 0.22 | 2.696f | 2.816p | 1.389 | 0.12 | 0.01 |
| 540 | 232 | 0.23 | 2.696f | 2.816p | 1.397 | 0.11 | 0.01 |
| 560 | 239 | 0.24 | 2.696f | 2.816p | 1.405 | 0.09 | 0.00 |
| 580 | 245 | 0.24 | 2.696f | 2.816p | 1.410 | 0.06 | 0.00 |
| 600 | 248 | 0.25 | 2.696f | 2.816p | 1.414 | 0.04 | 0.00 |
| 620 | 250 | 0.25 | 2.696f | 2.816p | 1.417 | 0.01 | 0.00 |
| 640 | 251 | 0.25 | 2.696f | 2.816p | 1.417 | | |

Soundings in mm.-------Other distances in METERS.----------
FW.P Reference Point: Long.= 2.696f Trans.= 2.816p Vert.= 1.101
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS
No Trim, No Heel
Tank: FW.S, Contents: FRESH WATER at 1.000 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 20 | 1 | 0.00 | 2.696f | 2.816s | 1.114 | 6.75 | 0.00 |
| 40 | 3 | 0.00 | 2.696f | 2.816s | 1.128 | 3.38 | 0.00 |
| 60 | 8 | 0.01 | 2.696f | 2.816s | 1.141 | 2.25 | 0.00 |
| 80 | 14 | 0.01 | 2.696f | 2.816s | 1.154 | 1.69 | 0.00 |
| 100 | 21 | 0.02 | 2.696f | 2.816s | 1.167 | 1.27 | 0.01 |
| 120 | 30 | 0.03 | 2.696f | 2.816s | 1.180 | 0.95 | 0.01 |
| 140 | 38 | 0.04 | 2.696f | 2.816s | 1.191 | 0.77 | 0.01 |
| 160 | 47 | 0.05 | 2.696f | 2.816s | 1.202 | 0.64 | 0.01 |
| 180 | 56 | 0.06 | 2.696f | 2.816s | 1.213 | 0.56 | 0.01 |
| 200 | 65 | 0.07 | 2.696f | 2.816s | 1.225 | 0.49 | 0.01 |
| 220 | 75 | 0.07 | 2.696f | 2.816s | 1.236 | 0.44 | 0.01 |
| 240 | 85 | 0.08 | 2.696f | 2.816s | 1.247 | 0.40 | 0.01 |
| 260 | 95 | 0.10 | 2.696f | 2.816s | 1.258 | 0.37 | 0.01 |
| 280 | 106 | 0.11 | 2.696f | 2.816s | 1.269 | 0.34 | 0.02 |
| 300 | 116 | 0.12 | 2.696f | 2.816s | 1.281 | 0.32 | 0.02 |
| 320 | 127 | 0.13 | 2.696f | 2.816s | 1.292 | 0.30 | 0.02 |
| 340 | 138 | 0.14 | 2.696f | 2.816s | 1.303 | 0.26 | 0.02 |
| 360 | 149 | 0.15 | 2.696f | 2.816s | 1.314 | 0.24 | 0.02 |
| 380 | 160 | 0.16 | 2.696f | 2.816s | 1.324 | 0.22 | 0.01 |
| 400 | 170 | 0.17 | 2.696f | 2.816s | 1.334 | 0.20 | 0.01 |
| 420 | 180 | 0.18 | 2.696f | 2.816s | 1.344 | 0.18 | 0.01 |
| 440 | 189 | 0.19 | 2.696f | 2.816s | 1.353 | 0.17 | 0.01 |
| 460 | 198 | 0.20 | 2.696f | 2.816s | 1.362 | 0.15 | 0.01 |
| 480 | 207 | 0.21 | 2.696f | 2.816s | 1.371 | 0.14 | 0.01 |
| 500 | 216 | 0.22 | 2.696f | 2.816s | 1.380 | 0.13 | 0.01 |
| 520 | 224 | 0.22 | 2.696f | 2.816s | 1.389 | 0.12 | 0.01 |
| 540 | 232 | 0.23 | 2.696f | 2.816s | 1.397 | 0.11 | 0.01 |
| 560 | 239 | 0.24 | 2.696f | 2.816s | 1.405 | 0.09 | 0.00 |
| 580 | 245 | 0.24 | 2.696f | 2.816s | 1.410 | 0.06 | 0.00 |
| 600 | 248 | 0.25 | 2.696f | 2.816s | 1.414 | 0.04 | 0.00 |
| 620 | 250 | 0.25 | 2.696f | 2.816s | 1.417 | 0.01 | 0.00 |
| 640 | 251 | 0.25 | 2.696f | 2.816s | 1.417 | | |

Soundings in mm.-------Other distances in METERS.----------
FW.S Reference Point: Long.= 2.696f Trans.= 2.816s Vert.= 1.101
(Zero Sounding is at the Reference Point.)

TANK CHARACTERISTICS
No Trim, No Heel
Tank: SEWAGE.P, Contents: SEWAGE at 1.025 Specific Gravity

| Snding | Volume LITERS | Weight METRIC TON | Center of Gravity LCG | TCG | VCG | GML | FSM M.-MT |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.00 | | | | | |
| 10 | 3 | 0.00 | 1.334f | 2.485p | 0.411 | 1.94 | 0.01 |
| 20 | 6 | 0.01 | 1.334f | 2.485p | 0.416 | 0.97 | 0.01 |
| 30 | 9 | 0.01 | 1.334f | 2.485p | 0.421 | 0.65 | 0.01 |
| 40 | 11 | 0.01 | 1.334f | 2.485p | 0.426 | 0.48 | 0.01 |
| 50 | 14 | 0.01 | 1.334f | 2.485p | 0.431 | 0.39 | 0.01 |
| 60 | 17 | 0.02 | 1.334f | 2.485p | 0.436 | 0.32 | 0.01 |
| 70 | 20 | 0.02 | 1.334f | 2.485p | 0.441 | 0.28 | 0.01 |
| 80 | 23 | 0.02 | 1.334f | 2.485p | 0.446 | 0.24 | 0.01 |
| 90 | 26 | 0.03 | 1.334f | 2.485p | 0.451 | 0.22 | 0.01 |
| 100 | 28 | 0.03 | 1.334f | 2.485p | 0.456 | 0.19 | 0.01 |
| 110 | 31 | 0.03 | 1.334f | 2.485p | 0.461 | 0.18 | 0.01 |
| 120 | 34 | 0.04 | 1.334f | 2.485p | 0.466 | 0.16 | 0.01 |
| 130 | 37 | 0.04 | 1.334f | 2.485p | 0.471 | 0.15 | 0.01 |
| 140 | 40 | 0.04 | 1.334f | 2.485p | 0.476 | 0.14 | 0.01 |
| 150 | 43 | 0.04 | 1.334f | 2.485p | 0.481 | 0.13 | 0.01 |
| 160 | 46 | 0.05 | 1.334f | 2.485p | 0.486 | 0.12 | 0.01 |
| 170 | 48 | 0.05 | 1.334f | 2.485p | 0.491 | 0.11 | 0.01 |
| 180 | 51 | 0.05 | 1.334f | 2.485p | 0.496 | 0.11 | 0.01 |
| 190 | 54 | 0.06 | 1.334f | 2.485p | 0.501 | 0.10 | 0.01 |
| 200 | 57 | 0.06 | 1.334f | 2.485p | 0.506 | 0.10 | 0.01 |
| 210 | 60 | 0.06 | 1.334f | 2.485p | 0.511 | 0.09 | 0.01 |
| 220 | 63 | 0.06 | 1.334f | 2.485p | 0.516 | 0.09 | 0.01 |
| 230 | 65 | 0.07 | 1.334f | 2.485p | 0.521 | 0.08 | 0.01 |
| 240 | 68 | 0.07 | 1.334f | 2.485p | 0.526 | 0.08 | 0.01 |
| 250 | 71 | 0.07 | 1.334f | 2.485p | 0.531 | 0.08 | 0.01 |
| 260 | 74 | 0.08 | 1.334f | 2.485p | 0.536 | 0.07 | 0.01 |
| 270 | 77 | 0.08 | 1.334f | 2.485p | 0.541 | 0.07 | 0.01 |
| 280 | 80 | 0.08 | 1.334f | 2.485p | 0.546 | 0.07 | 0.01 |
| 290 | 83 | 0.08 | 1.334f | 2.485p | 0.551 | 0.07 | 0.01 |
| 300 | 85 | 0.09 | 1.334f | 2.485p | 0.556 | 0.06 | 0.01 |
| 310 | 88 | 0.09 | 1.334f | 2.485p | 0.561 | 0.06 | 0.01 |
| 320 | 91 | 0.09 | 1.334f | 2.485p | 0.566 | 0.06 | 0.01 |
| 330 | 94 | 0.10 | 1.334f | 2.485p | 0.571 | 0.06 | 0.01 |
| 340 | 97 | 0.10 | 1.334f | 2.485p | 0.576 | 0.06 | 0.01 |
| 350 | 100 | 0.10 | 1.334f | 2.485p | 0.581 | 0.06 | 0.01 |
| 360 | 103 | 0.11 | 1.334f | 2.485p | 0.586 | 0.05 | 0.01 |
| 370 | 105 | 0.11 | 1.334f | 2.485p | 0.591 | 0.05 | 0.01 |
| 380 | 108 | 0.11 | 1.334f | 2.485p | 0.596 | 0.05 | 0.01 |
| 390 | 111 | 0.11 | 1.334f | 2.485p | 0.601 | 0.05 | 0.01 |
| 400 | 114 | 0.12 | 1.334f | 2.485p | 0.606 | 0.05 | 0.01 |
| 410 | 115 | 0.12 | 1.334f | 2.485p | 0.609 | | |

Soundings in mm.-------Other distances in METERS.----------
SEWAGE.P Reference Point: Long.= 1.334f Trans.= 2.485p Vert.= 0.406
(Zero Sounding is at the Reference Point.)

# 7

# HYDROSTATIC PROPERTIES

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E.Y.E. Marine Consultants
MURRAY



HYDROSTATIC PROPERTIES
No Trim, No Heel, VCG = 0.000

| Draft@ Origin | Displacement Weight(MT) | Buoyancy-Ctr. LCB | VCB | Weight/ CM | LCF | Moment/ CM trim | KML | KMT |
|---|---|---|---|---|---|---|---|---|
| 0.250 | 6.64 | 1.800a | 0.164 | 0.51 | 1.834a | 0.50 | 131.87 | 38.943 |
| 0.275 | 8.02 | 1.827a | 0.181 | 0.58 | 1.976a | 0.57 | 124.36 | 37.126 |
| 0.300 | 9.50 | 1.837a | 0.197 | 0.60 | 1.854a | 0.59 | 109.94 | 32.342 |
| 0.325 | 11.01 | 1.830a | 0.213 | 0.61 | 1.768a | 0.62 | 98.43 | 28.426 |
| 0.350 | 12.56 | 1.809a | 0.229 | 0.62 | 1.660a | 0.64 | 89.71 | 25.623 |
| 0.375 | 14.12 | 1.789a | 0.243 | 0.63 | 1.608a | 0.66 | 81.94 | 23.064 |
| 0.400 | 15.70 | 1.768a | 0.258 | 0.64 | 1.559a | 0.67 | 75.57 | 20.988 |
| 0.425 | 17.30 | 1.746a | 0.272 | 0.64 | 1.513a | 0.69 | 70.21 | 19.269 |
| 0.450 | 18.91 | 1.723a | 0.286 | 0.65 | 1.467a | 0.71 | 65.72 | 17.830 |
| 0.475 | 20.54 | 1.699a | 0.300 | 0.66 | 1.392a | 0.73 | 62.39 | 16.696 |
| 0.500 | 22.19 | 1.674a | 0.314 | 0.66 | 1.359a | 0.74 | 58.84 | 15.601 |
| 0.525 | 23.85 | 1.650a | 0.328 | 0.67 | 1.326a | 0.76 | 55.76 | 14.652 |
| 0.550 | 25.52 | 1.627a | 0.342 | 0.67 | 1.293a | 0.77 | 53.05 | 13.820 |
| 0.575 | 27.20 | 1.604a | 0.355 | 0.68 | 1.221a | 0.79 | 51.28 | 13.168 |
| 0.600 | 28.91 | 1.580a | 0.369 | 0.68 | 1.196a | 0.81 | 49.00 | 12.495 |
| 0.625 | 30.63 | 1.557a | 0.383 | 0.69 | 1.170a | 0.82 | 46.97 | 11.895 |
| 0.650 | 32.35 | 1.535a | 0.396 | 0.69 | 1.144a | 0.83 | 45.15 | 11.357 |
| 0.675 | 34.09 | 1.513a | 0.410 | 0.70 | 1.119a | 0.84 | 43.48 | 10.869 |
| 0.700 | 35.84 | 1.492a | 0.424 | 0.70 | 1.095a | 0.85 | 41.92 | 10.422 |
| 0.725 | 37.61 | 1.471a | 0.437 | 0.71 | 1.030a | 0.88 | 41.04 | 10.070 |
| 0.750 | 39.39 | 1.449a | 0.451 | 0.71 | 1.012a | 0.89 | 39.64 | 9.688 |
| 0.775 | 41.17 | 1.428a | 0.464 | 0.72 | 0.993a | 0.90 | 38.36 | 9.339 |
| 0.800 | 42.97 | 1.408a | 0.478 | 0.72 | 0.975a | 0.91 | 37.17 | 9.018 |
| 0.825 | 44.77 | 1.390a | 0.491 | 0.72 | 0.963a | 0.92 | 35.97 | 8.732 |
| 0.850 | 46.58 | 1.373a | 0.505 | 0.72 | 0.945a | 0.93 | 34.96 | 8.466 |
| 0.875 | 48.39 | 1.356a | 0.518 | 0.73 | 0.927a | 0.94 | 34.02 | 8.218 |
| 0.900 | 50.22 | 1.338a | 0.531 | 0.74 | 0.864a | 0.96 | 33.67 | 8.026 |
| 0.925 | 52.06 | 1.321a | 0.545 | 0.74 | 0.849a | 0.97 | 32.80 | 7.805 |
| 0.950 | 53.91 | 1.304a | 0.558 | 0.74 | 0.826a | 0.98 | 31.91 | 7.612 |
| 0.975 | 55.86 | 1.302a | 0.573 | 0.83 | 1.729a | 1.34 | 42.21 | 8.204 |
| 1.000 | 57.94 | 1.317a | 0.588 | 0.83 | 1.711a | 1.35 | 41.04 | 7.959 |

Distances in METERS.-----Specific Gravity = 1.025.----------Moment in M.-MT.
Trim is per 17.60M.

Draft is from BL.

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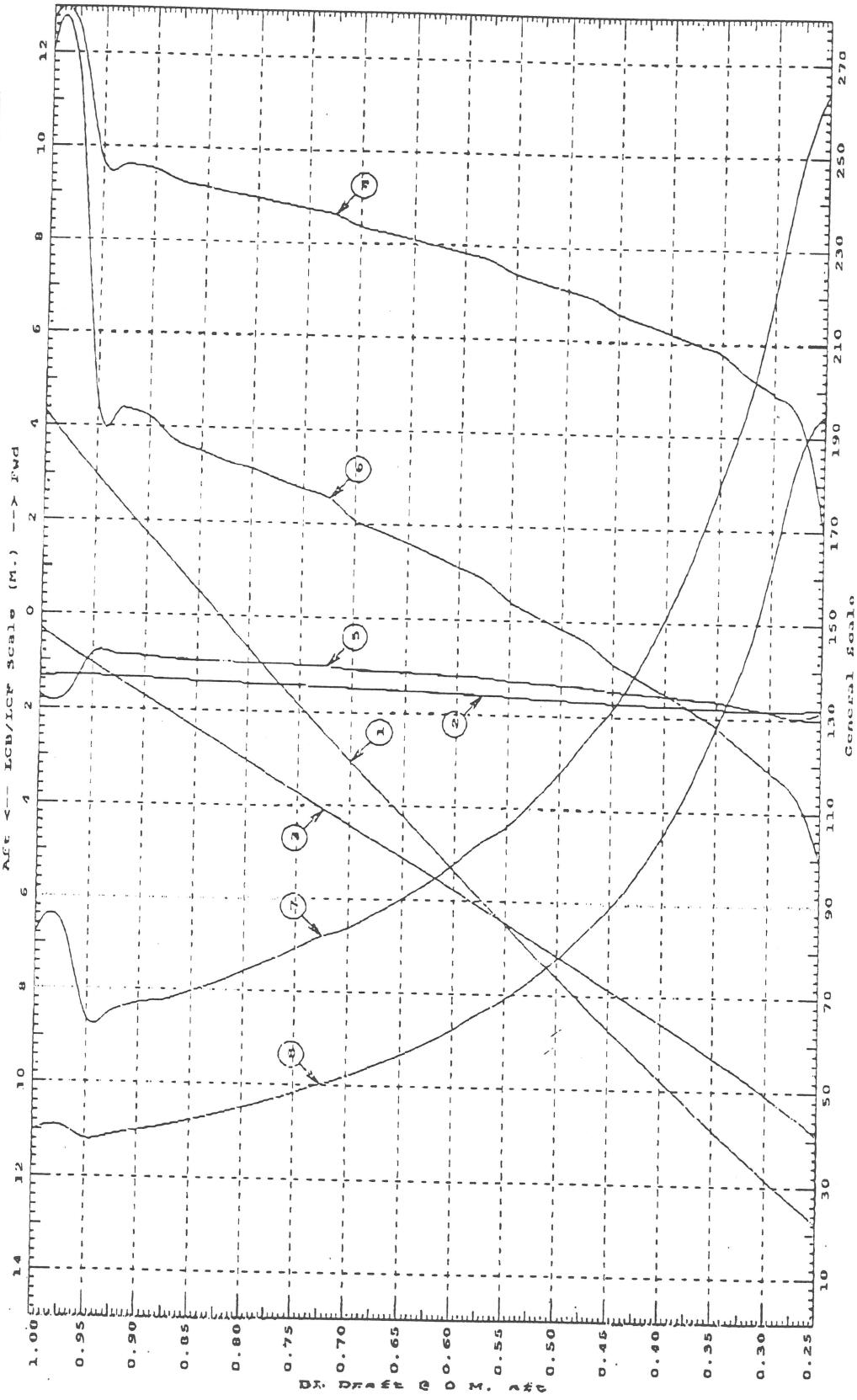
MURRAY



HYDROSTATIC PROPERTIES at LEVEL TRIM




(1) Displacement 1=.3 MT
(2) LCB (use top scale)
(3) VCB (KB) 1=.004 M.
(4) Immersion 1=.003 MT/CM
(4) WPA 1=.293 Sq.M.
(5) LCF (use top scale)
(6) Moment/Trim 1=.005 M.-MT/CM
(7) KML 1=.5 M.
(8) KMT 1=.2 M.

Specific Gravity = 1.025 Assumed KG = 0.00 M.
Trim is per 17.596 M. "K" = Baseline

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MURRAY



CROSS CURVES OF STABILITY
Showing righting arms in heel at VCG = 0.00
Trim: zero at zero heel (trim righting arm held at zero)

| Displacement METRIC TONS | Heel Angles in Degrees 5.00s | 10.00s | 20.00s | 30.00s | 40.00s |
|---|---|---|---|---|---|
| 30.00 | 1.059s | 1.994s | 2.450s | 2.488s | 2.471s |
| 32.00 | 1.005s | 1.923s | 2.452s | 2.489s | 2.473s |
| 34.00 | 0.957s | 1.859s | 2.454s | 2.490s | 2.474s |
| 36.00 | 0.915s | 1.798s | 2.456s | 2.493s | 2.473s |
| 38.00 | 0.878s | 1.742s | 2.458s | 2.496s | 2.471s |
| 40.00 | 0.846s | 1.689s | 2.461s | 2.499s | 2.468s |
| 42.00 | 0.817s | 1.639s | 2.463s | 2.503s | 2.465s |
| 44.00 | 0.792s | 1.593s | 2.466s | 2.505s | 2.462s |
| 46.00 | 0.769s | 1.548s | 2.469s | 2.507s | 2.459s |
| 48.00 | 0.748s | 1.506s | 2.472s | 2.508s | 2.455s |
| 50.00 | 0.729s | 1.465s | 2.474s | 2.508s | 2.451s |
| 52.00 | 0.712s | 1.427s | 2.467s | 2.507s | 2.447s |
| 54.00 | 0.696s | 1.391s | 2.446s | 2.504s | 2.443s |
| 56.00 | 0.681s | 1.359s | 2.411s | 2.501s | 2.438s |
| 58.00 | 0.668s | 1.328s | 2.371s | 2.495s | 2.432s |
| 60.00 | 0.656s | 1.299s | 2.331s | 2.488s | 2.424s |

| METRIC TONS | 50.00s | 60.00s | @ Flooding Arm | Angle |
|---|---|---|---|---|
| 30.00 | 2.365s | 2.166s | | |
| 32.00 | 2.364s | 2.163s | | |
| 34.00 | 2.361s | 2.159s | | |
| 36.00 | 2.358s | 2.154s | 2.154s | 60.00s |
| 38.00 | 2.354s | 2.149s | 2.195s | 58.03s |
| 40.00 | 2.349s | 2.143s | 2.245s | 55.51s |
| 42.00 | 2.343s | 2.137s | 2.288s | 53.12s |
| 44.00 | 2.337s | 2.131s | 2.337s | 50.00s |
| 46.00 | 2.331s | 2.124s | 2.355s | 48.48s |
| 48.00 | 2.324s | 2.118s | 2.385s | 46.00s |
| 50.00 | 2.318s | 2.111s | 2.413s | 43.52s |
| 52.00 | 2.312s | 2.104s | 2.447s | 40.00s |
| 54.00 | 2.306s | 2.098s | 2.460s | 38.20s |
| 56.00 | 2.299s | 2.091s | 2.480s | 34.88s |
| 58.00 | 2.292s | 2.084s | 2.491s | 31.22s |
| 60.00 | 2.285s | 2.077s | 2.491s | 27.36s |

Distances in METERS.---Specific Gravity = 1.025.---

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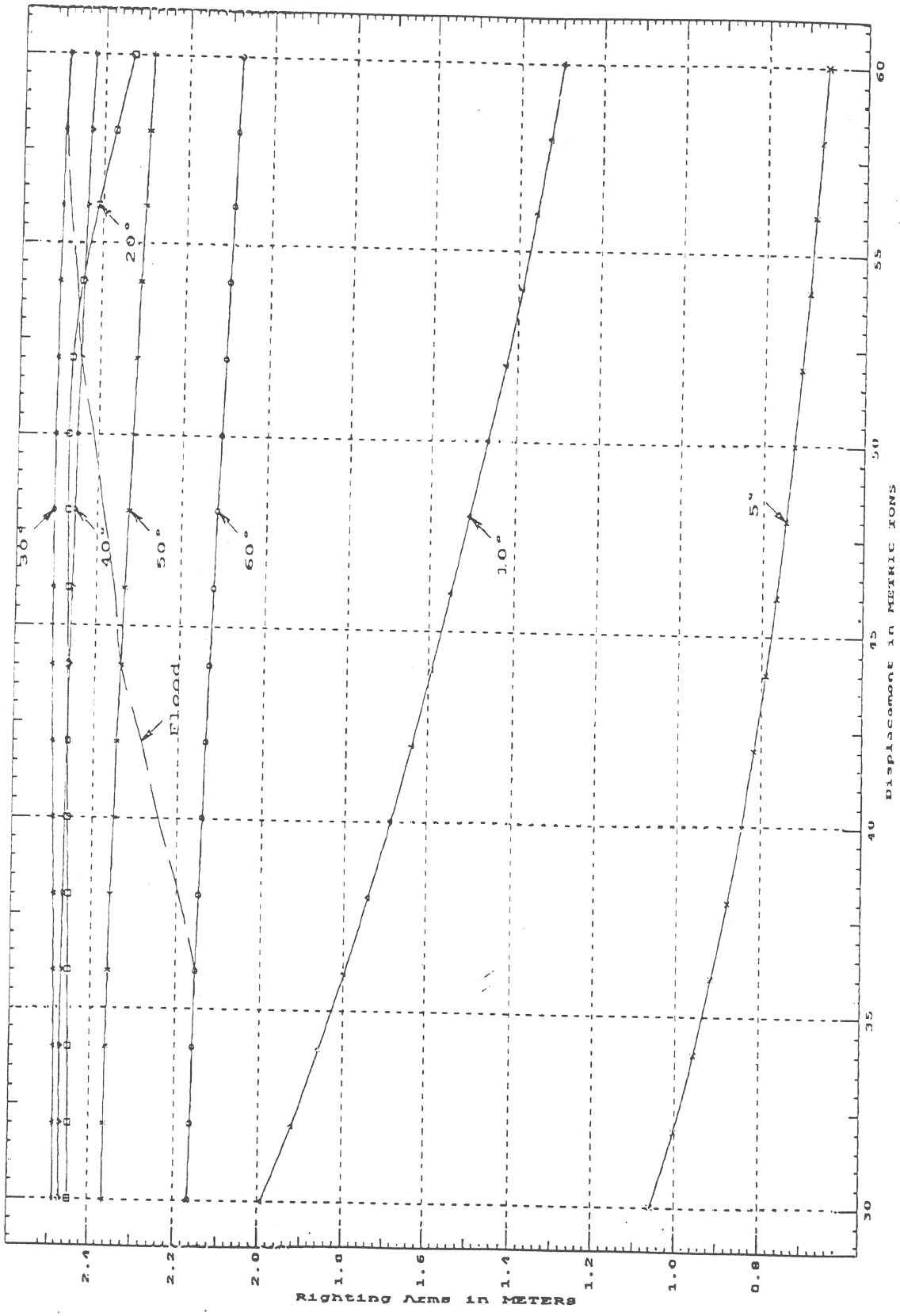
MURRAY



CROSS CURVES OF STABILITY with - Stbd Heel
at LEVEL TRIM (initial)



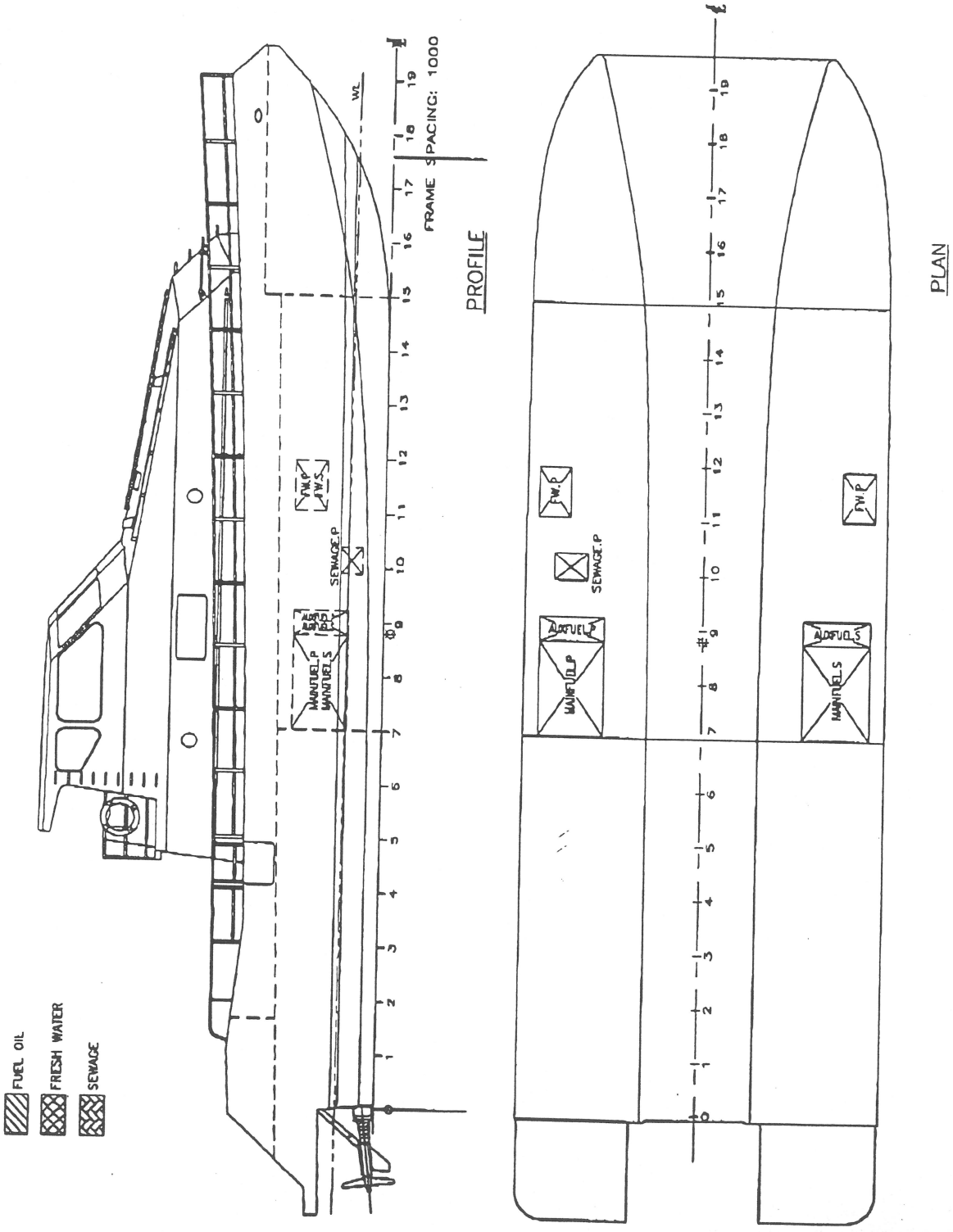

Specific Gravity = 1.025 Assumed KG = 0.00 M.
"K" = Baseline

# 8

# INTACT LOADING CONDITIONS

E.Y.E. Marine Consultants
"MURRAY"

# CONDITION NUMBER 1
## LIGHTSHIP
## *** NON OPERATIONAL CONDITION ***



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CONDITION NUMBER 1

LIGHTSHIP **Non Operational Condition**
WEIGHT STATUS
Trim: Aft 0.119/17.596, Heel: Port 0.28 deg.

| Part | Weight(MT) | LCG | TCG | VCG | FSM |
|---|---|---|---|---|---|
| WEIGHT | 34.59 | 1.766a | 0.033p | 4.135 | |

| Load | SpGr | Weight(MT) | LCG | TCG | VCG |
|---|---|---|---|---|---|
| Total Tanks---------> | | 0.00 | | | |

Distances in METERS. Moments in M.-MT. 0.00

HYDROSTATIC REPORT ON THE EQUILIBRIUM WATERLINE
DISPLACEMENT and WATERPLANE STATUS
BL draft: 0.615 @ 8.79f, 0.734 @ 8.81a
Trim: Aft 0.119/17.596, Heel: Port 0.28 deg.

| Part | SpGr | Displ(MT) | LCB | TCB | VCB | RefHt |
|---|---|---|---|---|---|---|
| HULL | 1.025 | 34.59 | 1.791a | 0.051p | 0.415 | -0.674 |

| Part | SpGr | WPA | LCF | TCF | BML | BMT |
|---|---|---|---|---|---|---|
| Total Waterplane----> | 1.025 | 67.5 | 1.184a | 0.014p | 41.35 | 10.244 |

| | MT/CM | M.-MT/CM | GML | GMT |
|---|---|---|---|---|
| | 0.69 | 0.74 | 37.63 | 6.524 |

Distances in METERS.

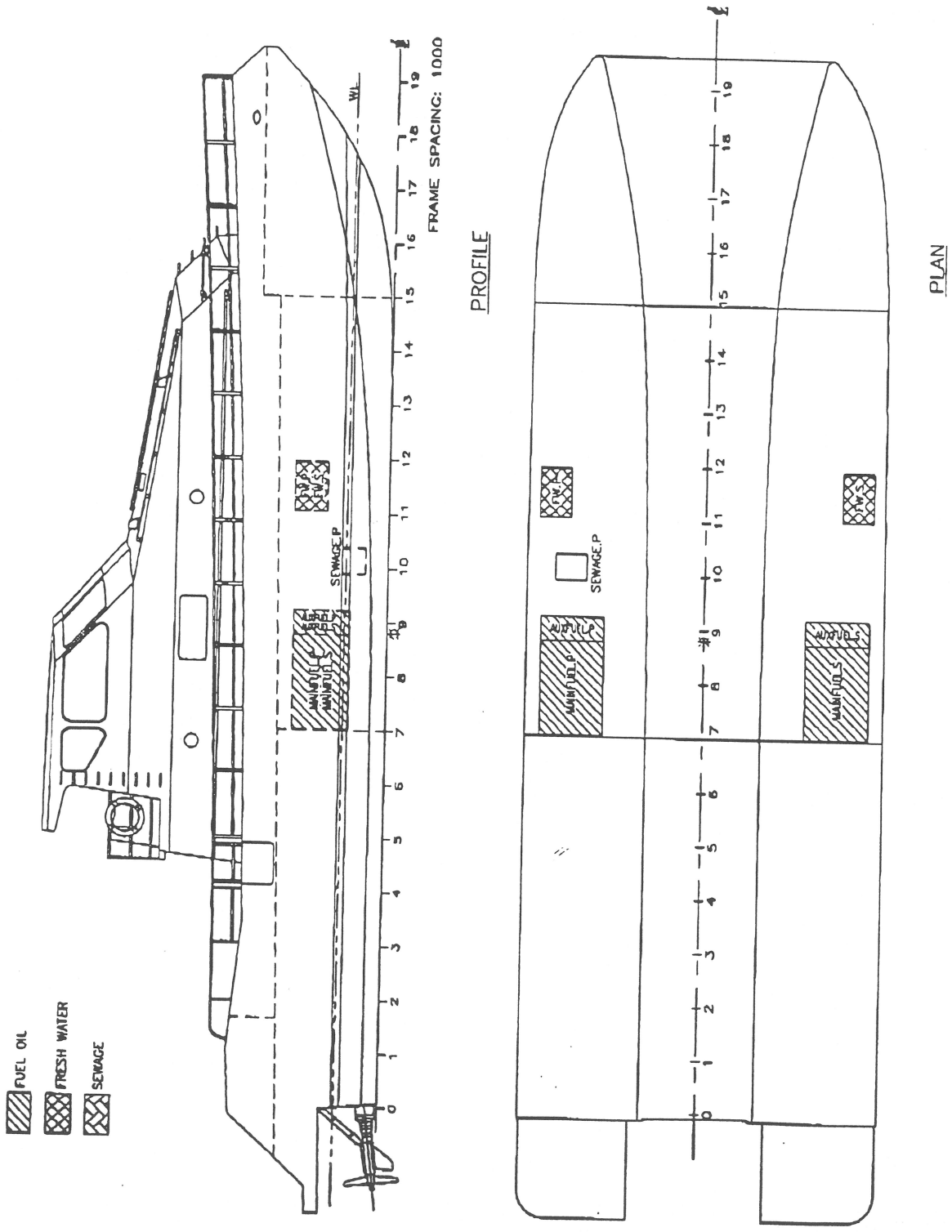
HYDROSTATIC PROPERTIES
Trim: Aft 0.119/17.596, Heel: Port 0.28 deg., VCG = 4.135

| Draft@ Origin | Displacement Weight(MT) | Buoyancy-Ctr. LCB | VCB | Weight/ Moment/ CM | LCF | CM trim | GML | GMT |
|---|---|---|---|---|---|---|---|---|
| 0.674 | 34.59 | 1.791a | 0.415 | 0.69 | 1.184a | 0.74 | 37.63 | 6.524 |

Distances in METERS. Specific Gravity = 1.025. Moment in M.-MT.
Trim is per 17.60M.
Draft is from BL.

DRAFT REPORT
BL draft: 0.615 @ 8.79f, 0.734 @ 8.81a

# CONDITION NUMBER 2
# FULLY LOADED DEPARTURE
# *** WORST OPERATING ***



CONDITION NUMBER 2
FULLY LOADED DEPARTURE
WEIGHT STATUS
Trim: Aft 0.067/17.596, Heel: Port 0.18 deg.

| Part | Load | SpGr | Weight (MT) | LCG | TCG | VCG | FSM |
|---|---|---|---|---|---|---|---|
| LIGHT SHIP | | | 34.59 | 1.766a | 0.033p | 4.135 | |
| CREW | | | 0.40 | 0.375a | 0.250s | 4.155 | |
| Total Fixed---------> | | | 34.99 | 1.750a | 0.030p | 4.135 | |
| MAINFUEL.S | 0.980 | 0.870 | 1.82 | 0.917a | 2.441s | 1.172 | 0.22 |
| MAINFUEL.P | 0.920 | 0.870 | 1.71 | 0.917a | 2.441p | 1.141 | 0.22 |
| AUXFUEL.S | 0.950 | 0.870 | 0.45 | 0.184f | 2.441s | 1.157 | 0.06 |
| AUXFUEL.P | 0.950 | 0.870 | 0.45 | 0.184f | 2.441p | 1.157 | 0.06 |
| FW.S | 0.950 | 1.000 | 0.24 | 2.696f | 2.816s | 1.403 | 0.00 |
| FW.P | 0.950 | 1.000 | 0.24 | 2.696f | 2.816p | 1.403 | 0.00 |
| Total Tanks---------> | | | 4.92 | 0.364a | 0.055s | 1.181 | 0.55 |
| Total Weight--------> | | | 39.91 | 1.579a | 0.019p | 3.771 | |
| Free Surface Adjustment----------> | | | | | | 0.014 | |
| Adjusted CG----------> | | | | 1.579a | 0.019p | 3.785 | |

Distances in METERS. Moments in M.-MT.

HYDROSTATIC REPORT ON THE EQUILIBRIUM WATERLINE
DISPLACEMENT and WATERPLANE STATUS
BL draft: 0.720 @ 8.79f, 0.787 @ 8.81a
Trim: Aft 0.067/17.596, Heel: Port 0.18 deg.

| Part | SpGr | Displ (MT) | LCB | TCB | VCB | RefHt |
|---|---|---|---|---|---|---|
| HULL | 1.025 | 39.91 | 1.591a | 0.029p | 0.455 | -0.753 |

| Part | SpGr | WPA | LCF | TCF | BML | BMT |
|---|---|---|---|---|---|---|
| Total Waterplane----> | 1.025 | 69.2 | 1.036a | 0.013p | 38.10 | 9.084 |

| MT/CM | M.-MT/CM | GML | GMT |
|---|---|---|---|
| 0.71 | 0.79 | 34.78 | 5.768 |

Distances in METERS.

HYDROSTATIC PROPERTIES
Trim: Aft 0.067/17.596, Heel: Port 0.18 deg., VCG = 3.771

| Draft@ Origin | Displacement Weight (MT) | Buoyancy-Ctr. LCB | VCB | Weight/ CM | Moment/ LCF | CM trim | GML | GMT |
|---|---|---|---|---|---|---|---|---|
| 0.753 | 39.91 | 1.591a | 0.455 | 0.71 | 1.036a | 0.79 | 34.78 | 5.768 |

Distances in METERS. Specific Gravity = 1.025. Moment in M.-MT.
Trim is per 17.60M.
Draft is from BL. True Free Surface included.

DRAFT REPORT
BL draft: 0.720 @ 8.79f, 0.787 @ 8.81a

CCG STABILITY ASSESSMENT

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MURRAY



RIGHTING ARMS vs HEEL ANGLE

Fixed CG: LCG = 1.750a TCG = 0.030p VCG = 4.135

| Origin Depth | Degrees of Trim | Heel | Displacement Weight(MT) | Righting Arms in Trim | in Heel | --> Area | Flood Pt --Height |
|---|---|---|---|---|---|---|---|
| 0.753 | 0.22a | 0.00 | 39.90 | 0.000 | 0.019s | 0.0000 | 1.405(1) |
| 0.753 | 0.22a | 0.18p | 39.91 | 0.000 | 0.000p | -0.0000 | 1.397(1) |
| 0.751 | 0.23a | 2.50p | 39.91 | 0.000 | 0.237p | 0.0048 | 1.288(1) |
| 0.747 | 0.24a | 3.84p | 39.90 | 0.000 | 0.375p | 0.0119 | 1.226(1) |
| 0.742 | 0.23a | 5.18p | 39.90 | 0.000 | 0.519p | 0.0224 | 1.167(1) |
| 0.728 | 0.21a | 7.68p | 39.91 | 0.000 | 0.788p | 0.0508 | 1.058(1) |
| 0.705 | 0.22a | 10.18p | 39.90 | 0.000 | 1.031p | 0.0905 | 0.951(1) |
| 0.668 | 0.24a | 12.68p | 39.90 | 0.000 | 1.213p | 0.1395 | 0.853(1) |
| 0.652 | 0.26a | 13.49p | 39.91 | 0.000 | 1.258p | 0.1569 | Deck Imm. |
| 0.614 | 0.31a | 15.18p | 39.91 | 0.000 | 1.327p | 0.1951 | 0.761(1) |
| 0.592 | 0.37a | 15.95p | 39.91 | 0.000 | 1.340p | 0.2130 | 0.734(1) |
| 0.523 | 0.45a | 17.68p | 39.91 | 0.000 | 1.276p | 0.2526 | 0.697(1) |
| 0.413 | 0.47a | 20.18p | 39.90 | 0.000 | 1.139p | 0.3056 | 0.663(1) |
| 0.303 | 0.49a | 22.68p | 39.90 | 0.000 | 1.002p | 0.3524 | 0.628(1) |
| 0.192 | 0.51a | 25.18p | 39.90 | 0.000 | 0.863p | 0.3930 | 0.592(1) |
| 0.081 | 0.53a | 27.68p | 39.91 | 0.000 | 0.723p | 0.4276 | 0.555(1) |
| -0.023 | 0.55a | 30.00p | 39.90 | 0.000 | 0.593p | 0.4543 | 0.518(1) |
| -0.031 | 0.55a | 30.18p | 39.91 | 0.000 | 0.583p | 0.4561 | 0.515(1) |
| -0.143 | 0.59a | 32.68p | 39.90 | 0.000 | 0.441p | 0.4784 | 0.473(1) |
| -0.253 | 0.64a | 35.18p | 39.91 | 0.000 | 0.299p | 0.4946 | 0.427(1) |
| -0.363 | 0.71a | 37.68p | 39.90 | 0.000 | 0.156p | 0.5045 | 0.378(1) |
| -0.462 | 0.78a | 40.00p | 39.90 | 0.000 | 0.022p | 0.5082 | 0.329(1) |
| -0.469 | 0.78a | 40.18p | 39.91 | 0.000 | 0.012p | 0.5082 | 0.325(1) |
| -0.478 | 0.79a | 40.38p | 39.91 | 0.000 | 0.000p | 0.5082 | 0.320(1) |
| -0.575 | 0.86a | 42.68p | 39.90 | 0.000 | -0.133p | 0.5056 | 0.269(1) |
| -0.678 | 0.96a | 45.18p | 39.90 | 0.000 | -0.279p | 0.4966 | 0.210(1) |
| -0.780 | 1.06a | 47.68p | 39.89 | 0.000 | -0.425p | 0.4812 | 0.149(1) |
| -0.879 | 1.16a | 50.18p | 39.91 | 0.000 | -0.572p | 0.4595 | 0.086(1) |
| -0.977 | 1.27a | 52.68p | 39.90 | 0.000 | -0.718p | 0.4313 | 0.022(1) |
| -1.011 | 1.31a | 53.55p | 39.91 | 0.000 | -0.769p | 0.4200 | -0.000(1) |
| -1.073 | 1.38a | 55.18p | 39.90 | 0.000 | -0.864p | 0.3968 | -0.042(1) |
| -1.167 | 1.49a | 57.68p | 39.90 | 0.000 | -1.009p | 0.3559 | -0.106(1) |
| -1.257 | 1.59a | 60.18p | 39.91 | 0.002a | -1.151p | 0.3088 | -0.171(1) |

Distances in METERS.----Specific Gravity = 1.025.---------Area in M.-Rad.

Note: The Center of Gravity shown above is for the Fixed Weight of 34.99 MT. As the tank load centers shift with heel and trim, the total Center of Gravity varies. The righting arms shown above include the effect of the C.G. variation.

| Critical Point | | LCP | TCP | VCP |
|---|---|---|---|---|
| (1) Exhaust Plenum | FLOOD | 7.883a | 2.650 | 2.189 |

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| LIN----------CCG STAB 6 CRITERION---------- | Min/Max | | | Attained | |
|---|---|---|---|---|---|
| (1) GM Upright | > | 0.150 | M. | 5.774 | P |
| (2) Area from Equilibrium to abs 30 deg or Flood | > | 0.0550 | M.-Rad | 0.4543 | P |
| (3) Area from Equilibrium to abs 40 deg or RAzero | > | 0.0900 | M.-Rad | 0.5082 | P |
| (4) Area from abs 30 deg to abs 40 or RAzero | > | 0.0300 | M.-Rad | 0.0539 | P |
| (5) Angle from abs 0 deg to MaxRA | > | 25.00 | deg | 15.95 | F |
| (6) Righting Arm at abs 30 deg or MaxRA | > | 0.200 | M. | 0.593 | P |
| (7) Angle from abs 0 deg to Deck/margin Immersion | > | 0.00 | deg | 13.49 | P |

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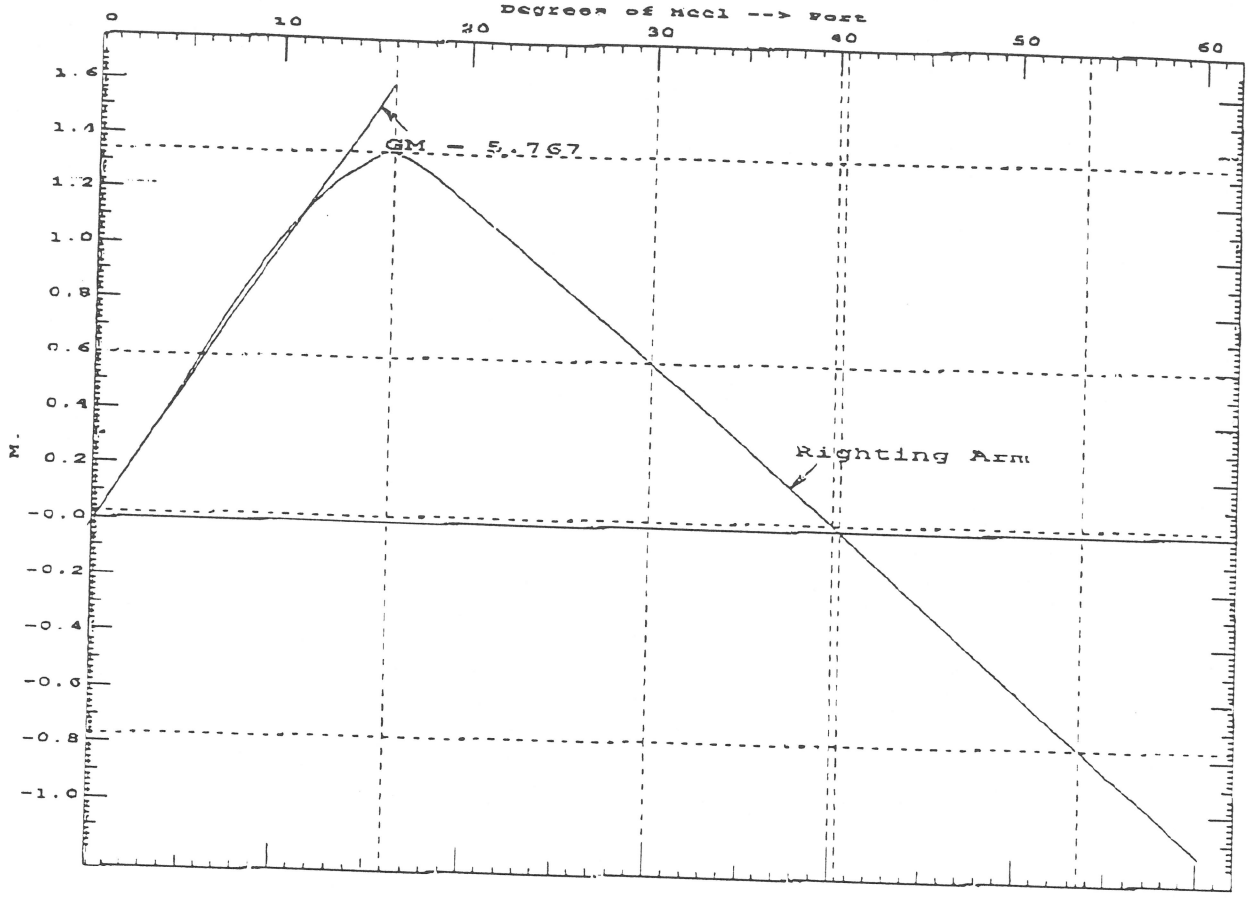


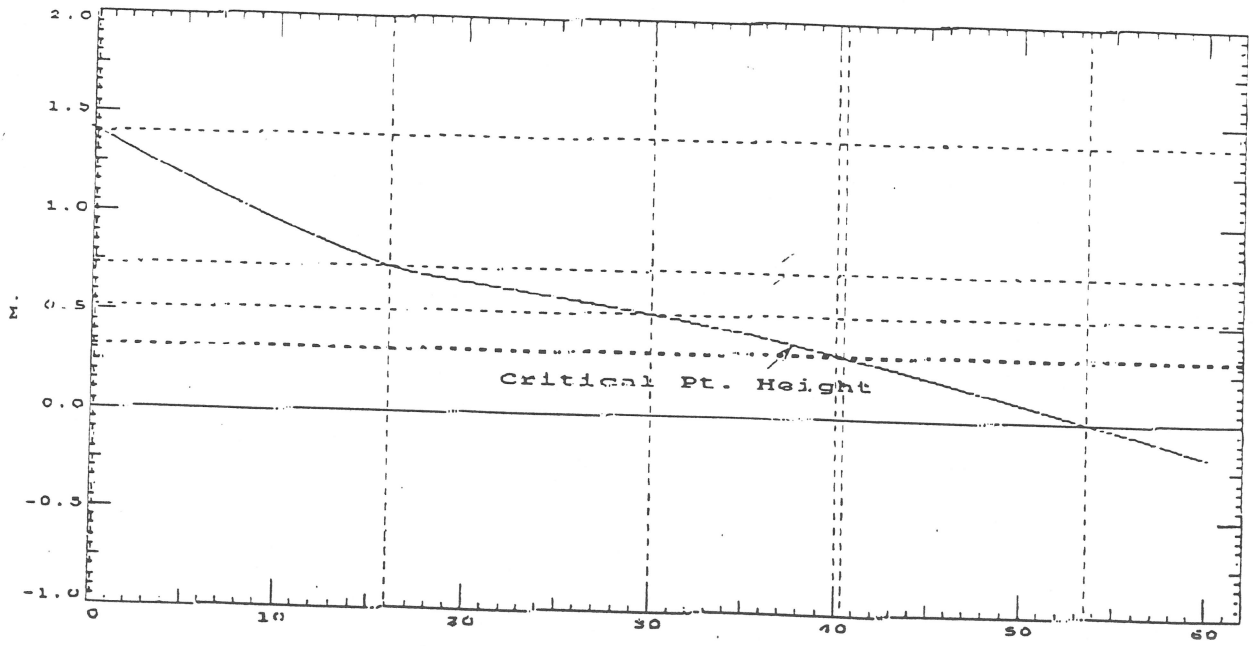

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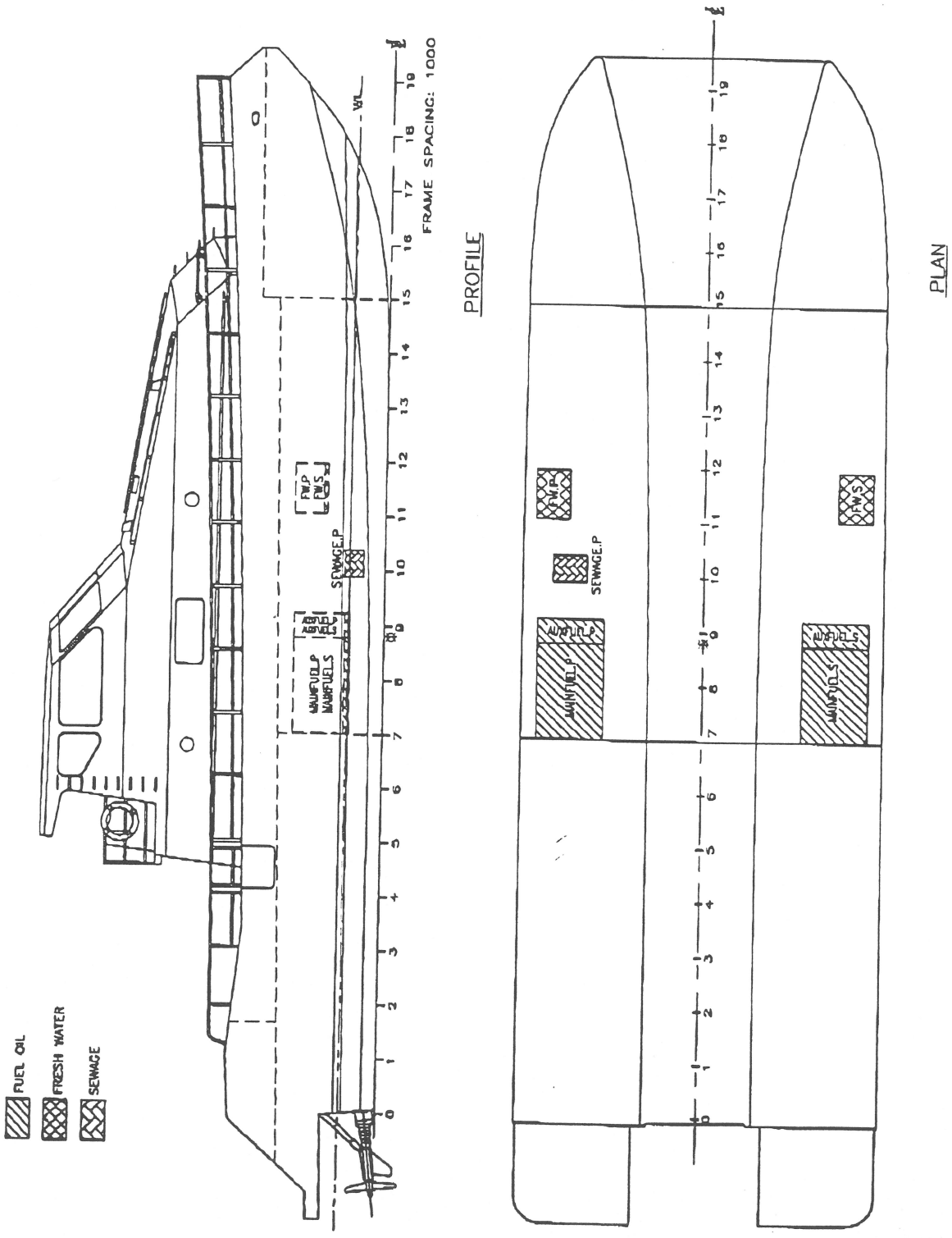
# CONDITION NUMBER 3
# PORT ARRIVAL



CONDITION NUMBER 3
PORT ARRIVAL
WEIGHT STATUS
Trim: Aft 0.106/17.596, Heel: Port 0.32 deg.

| Part | Load | SpGr | Weight(MT) | LCG | TCG | VCG | FSM |
|---|---|---|---|---|---|---|---|
| LIGHT SHIP | | | 34.59 | 1.766a | 0.033p | 4.135 | |
| CREW | | | 0.40 | 0.375a | 0.250s | 4.155 | |
| Total Fixed----------> | | | 34.99 | 1.750a | 0.030p | 4.135 | |
| MAINFUEL.S | 0.100 | 0.870 | 0.19 | 0.930a | 2.375s | 0.710 | 0.17 |
| MAINFUEL.P | 0.100 | 0.870 | 0.19 | 0.930a | 2.385p | 0.710 | 0.18 |
| AUXFUEL.S | 0.100 | 0.870 | 0.05 | 0.183f | 2.375s | 0.710 | 0.04 |
| AUXFUEL.P | 0.100 | 0.870 | 0.05 | 0.183f | 2.385p | 0.710 | 0.05 |
| FW.S | 0.100 | 1.000 | 0.03 | 2.690f | 2.814s | 1.173 | 0.01 |
| FW.P | 0.100 | 1.000 | 0.03 | 2.690f | 2.817p | 1.173 | 0.01 |
| SEWAGE.P | 0.900 | 1.025 | 0.11 | 1.334f | 2.485p | 0.588 | 0.01 |
| Total Tanks----------> | | | 0.62 | 0.083a | 0.427p | 0.726 | 0.46 |
| Total Weight---------> | | | 35.61 | 1.721a | 0.037p | 4.075 | |
| Free Surface Adjustment----------> | | | | | | 0.013 | |
| Adjusted CG----------> | | | | 1.721a | 0.037p | 4.088 | |

Distances in METERS.----------Moments in M.-MT.

HYDROSTATIC REPORT ON THE EQUILIBRIUM WATERLINE
DISPLACEMENT and WATERPLANE STATUS
BL draft: 0.637 @ 8.79f, 0.743 @ 8.81a
Trim: Aft 0.106/17.596, Heel: Port 0.32 deg.

| Part | SpGr | Displ(MT) | LCB | TCB | VCB | RefHt |
|---|---|---|---|---|---|---|
| HULL | 1.025 | 35.62 | 1.743a | 0.057p | 0.423 | -0.690 |

| Part | SpGr | WPA | LCF | TCF | BML | BMT |
|---|---|---|---|---|---|---|
| Total Waterplane----> | 1.025 | 67.8 | 1.160a | 0.015p | 40.57 | 9.976 |

| MT/CM | M.-MT/CM | GML | GMT |
|---|---|---|---|
| 0.69 | 0.75 | 36.91 | 6.323 |

Distances in METERS.----------

HYDROSTATIC PROPERTIES
Trim: Aft 0.106/17.596, Heel: Port 0.32 deg., VCG = 4.075

| Draft@ Origin | Displacement Weight(MT) | Buoyancy-Ctr. LCB | VCB | Weight/ CM | Moment/ LCF | CM trim | GML | GMT |
|---|---|---|---|---|---|---|---|---|
| 0.690 | 35.62 | 1.743a | 0.423 | 0.69 | 1.160a | 0.75 | 36.91 | 6.323 |

Distances in METERS.-----Specific Gravity = 1.025.----------Moment in M.-MT.
Trim is per 17.60M.
Draft is from BL. True Free Surface included.

DRAFT REPORT
BL draft: 0.637 @ 8.79f, 0.743 @ 8.81a

CCG STABILITY ASSESSMENT

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RIGHTING ARMS vs HEEL ANGLE

Fixed CG: LCG = 1.750a TCG = 0.030p VCG = 4.135

| Origin Depth | Degrees of Trim | Heel | Displacement Weight(MT) | Righting Arms in Trim | in Heel | --> Area | Flood Pt --Height |
|---|---|---|---|---|---|---|---|
| 0.690 | 0.34a | 0.00 | 35.61 | 0.000 | 0.037s | 0.0000 | 1.452(1) |
| 0.690 | 0.34a | 0.32p | 35.61 | 0.000 | 0.000p | -0.0001 | 1.437(1) |
| 0.687 | 0.36a | 2.50p | 35.61 | 0.000 | 0.245p | 0.0045 | 1.335(1) |
| 0.684 | 0.38a | 3.91p | 35.62 | 0.000 | 0.402p | 0.0125 | 1.267(1) |
| 0.678 | 0.39a | 5.32p | 35.61 | 0.000 | 0.565p | 0.0244 | 1.202(1) |
| 0.662 | 0.41a | 7.82p | 35.62 | 0.000 | 0.853p | 0.0553 | 1.090(1) |
| 0.634 | 0.43a | 10.32p | 35.61 | 0.000 | 1.088p | 0.0977 | 0.986(1) |
| 0.590 | 0.48a | 12.82p | 35.62 | 0.000 | 1.250p | 0.1487 | 0.890(1) |
| 0.557 | 0.55a | 14.13p | 35.60 | 0.000 | 1.298p | 0.1778 | Deck Imm. |
| 0.542 | 0.58a | 14.62p | 35.60 | 0.000 | 1.304p | 0.1890 | 0.826(1) |
| 0.517 | 0.64a | 15.32p | 35.62 | 0.000 | 1.293p | 0.2049 | 0.805(1) |
| 0.411 | 0.68a | 17.82p | 35.61 | 0.000 | 1.153p | 0.2588 | 0.768(1) |
| 0.303 | 0.68a | 20.32p | 35.61 | 0.000 | 1.003p | 0.3062 | 0.735(1) |
| 0.195 | 0.69a | 22.82p | 35.61 | 0.000 | 0.852p | 0.3467 | 0.700(1) |
| 0.085 | 0.69a | 25.32p | 35.61 | 0.000 | 0.701p | 0.3805 | 0.665(1) |
| -0.025 | 0.70a | 27.82p | 35.61 | 0.000 | 0.549p | 0.4078 | 0.628(1) |
| -0.121 | 0.70a | 30.00p | 35.61 | 0.000 | 0.417p | 0.4261 | 0.595(1) |
| -0.135 | 0.71a | 30.32p | 35.61 | 0.000 | 0.398p | 0.4284 | 0.590(1) |
| -0.246 | 0.72a | 32.82p | 35.61 | 0.000 | 0.247p | 0.4425 | 0.550(1) |
| -0.356 | 0.75a | 35.32p | 35.61 | 0.000 | 0.096p | 0.4500 | 0.507(1) |
| -0.425 | 0.77a | 36.92p | 35.62 | 0.000 | 0.000p | 0.4513 | 0.477(1) |
| -0.465 | 0.79a | 37.82p | 35.62 | 0.000 | -0.055p | 0.4509 | 0.460(1) |
| -0.559 | 0.84a | 40.00p | 35.61 | 0.000 | -0.186p | 0.4463 | 0.417(1) |
| -0.573 | 0.85a | 40.32p | 35.62 | 0.000 | -0.206p | 0.4452 | 0.410(1) |
| -0.679 | 0.92a | 42.82p | 35.61 | 0.000 | -0.358p | 0.4329 | 0.357(1) |
| -0.784 | 1.00a | 45.32p | 35.60 | 0.000 | -0.512p | 0.4139 | 0.302(1) |
| -0.887 | 1.08a | 47.82p | 35.61 | 0.000 | -0.666p | 0.3882 | 0.245(1) |
| -0.989 | 1.16a | 50.32p | 35.60 | 0.000 | -0.820p | 0.3558 | 0.187(1) |
| -1.088 | 1.24a | 52.82p | 35.60 | 0.002a | -0.974p | 0.3167 | 0.129(1) |
| -1.184 | 1.32a | 55.32p | 35.61 | 0.000 | -1.127p | 0.2708 | 0.069(1) |
| -1.279 | 1.40a | 57.82p | 35.61 | 0.000 | -1.277p | 0.2184 | 0.009(1) |
| -1.293 | 1.41a | 58.21p | 35.62 | 0.000 | -1.300p | 0.2097 | 0.000(1) |
| -1.371 | 1.48a | 60.32p | 35.62 | 0.000 | -1.426p | 0.1594 | -0.052(1) |

Distances in METERS.----Specific Gravity = 1.025.---------Area in M.-Rad.

Note: The Center of Gravity shown above is for the Fixed Weight of 34.99 MT. As the tank load centers shift with heel and trim, the total Center of Gravity varies. The righting arms shown above include the effect of the C.G. variation.

| Critical Point | | LCP | TCP | VCP |
|---|---|---|---|---|
| (1) Exhaust Plenum | FLOOD | 7.883a | 2.650 | 2.189 |

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| LIM----------CCG STAB 6 CRITERION---------- | Min/Max | | Attained | |
|---|---|---|---|---|
| (1) GM Upright | > | 0.150 M. | 6.333 | P |
| (2) Area from Equilibrium to abs 30 deg or Flood | > | 0.0550 M.-Rad | 0.4262 | P |
| (3) Area from Equilibrium to abs 40 deg or RAzero | > | 0.0900 M.-Rad | 0.4514 | P |
| (4) Area from abs 30 deg to abs 40 or RAzero | > | 0.0300 M.-Rad | 0.0252 | F |
| (5) Angle from abs 0 deg to MaxRA | > | 25.00 deg | 14.62 | F |
| (6) Righting Arm at abs 30 deg or MaxRA | > | 0.200 M. | 0.417 | P |
| (7) Angle from abs 0 deg to Deck/margin Immersion | > | 0.00 deg | 14.13 | P |

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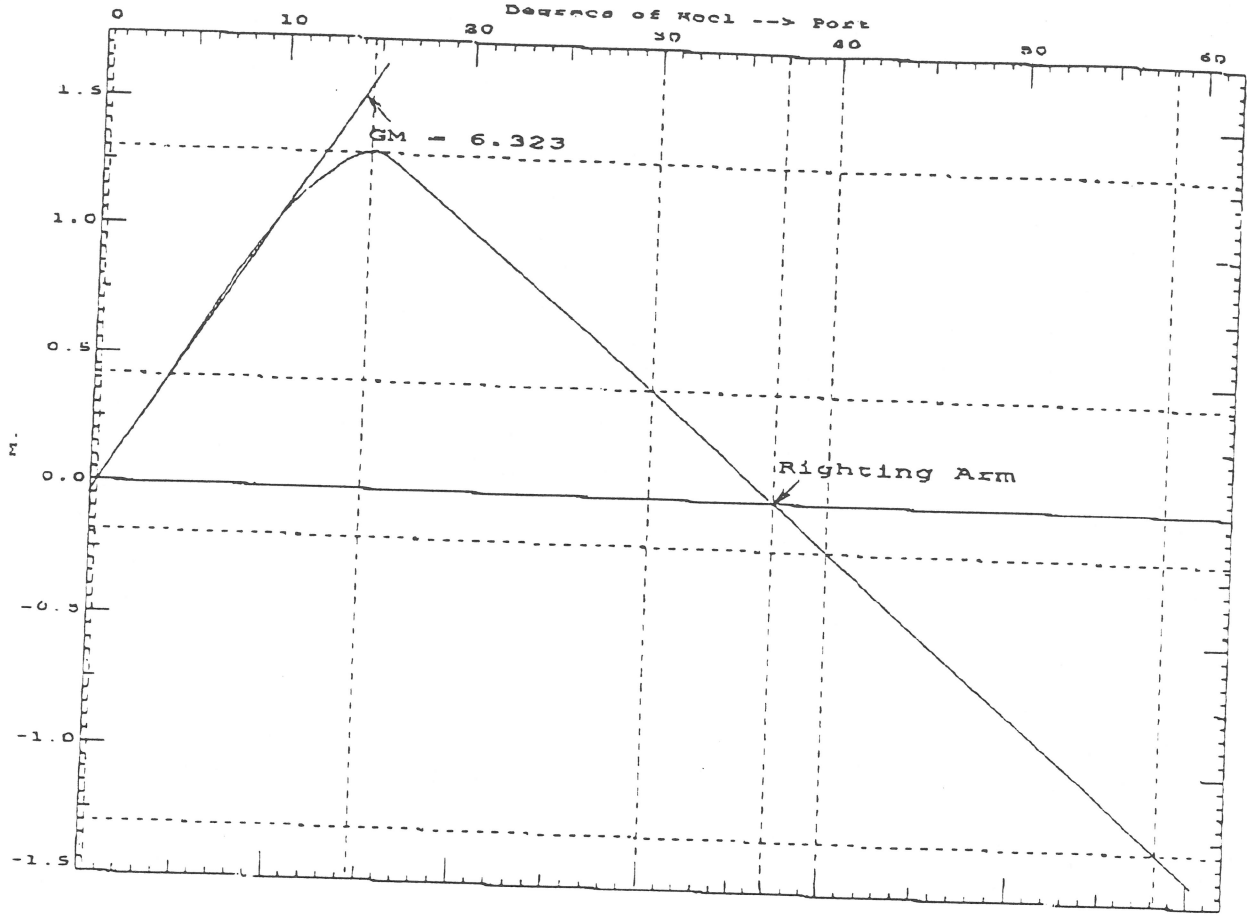
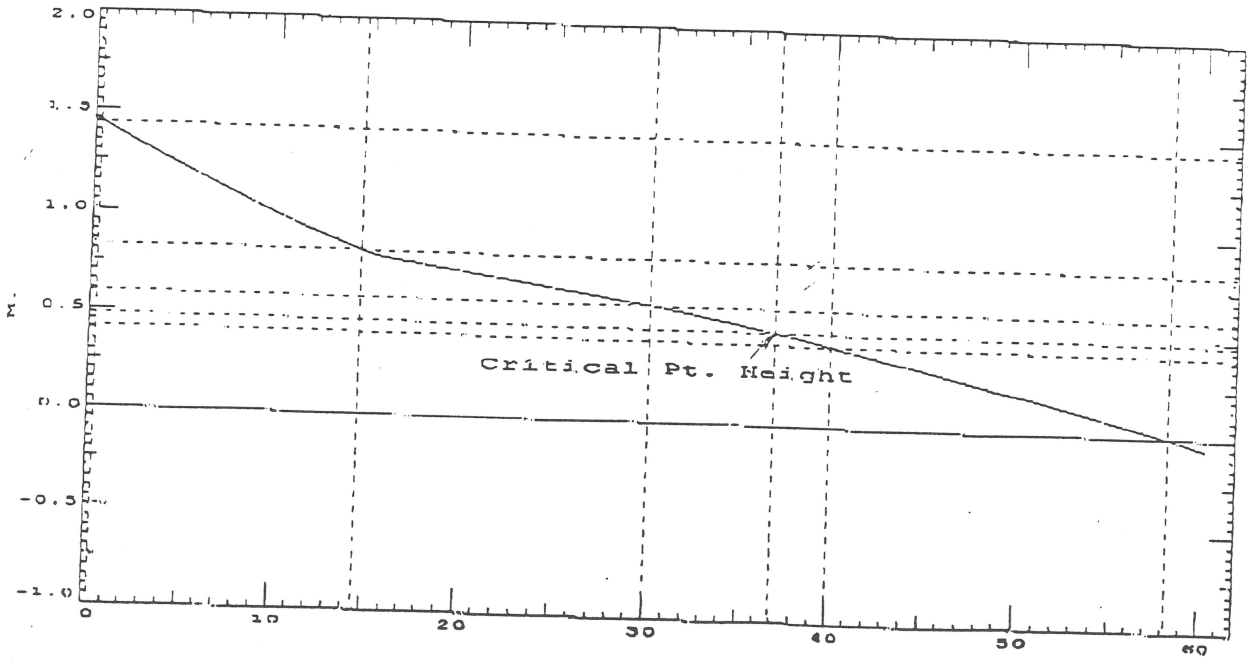
MURRAY





# 9

# STABILITY CALCULATION WORKED EXAMPLE

# STABILITY CALCULATION WORKED EXAMPLE

The following is a manual calculation of condition #3, Arrival Condition, to show the differences which may occur due to simplifying the calculations.

The major simplifications are:

1. Upright hydrostatics used without effect of heel or trim

2. Cross Curves are for zero trim

Generally a manual calculation is a conservative estimate of the stability of the vessel. Differences will exist if the vessel is trimmed.

'MURRAY'

Condition: 3, PORT ARRIVAL CONDITION

Consumables Remaining: 10 %

| DESCRIPTION | % | MAX FSM | Δ WEIGHT | LCG | L.MMT | VCG | V.MMT |
|---|---|---|---|---|---|---|---|
| Light Ship | | | 34.59 | 1.77 | 61.09 | 4.14 | 143.03 |
| Crew & Effects | | | 0.40 | 0.38 | 0.15 | 4.18 | 1.66 |
| Tanks: | | | | | | | |
| MAINFUEL.P | 10% | 0.22 | 0.19 | 0.92 | 0.17 | 0.71 | 0.13 |
| MAINFUEL.S | 10% | 0.22 | 0.19 | 0.92 | 0.17 | 0.71 | 0.13 |
| AUXFUEL.P | 10% | 0.06 | 0.05 | -0.18 | -0.01 | 0.71 | 0.04 |
| AUXFUEL.S | 10% | 0.06 | 0.05 | -0.18 | -0.01 | 0.71 | 0.04 |
| FW.P | 10% | 0.01 | 0.03 | -2.70 | -0.07 | 1.17 | 0.03 |
| FW.S | 10% | 0.01 | 0.03 | -2.70 | -0.07 | 1.17 | 0.03 |
| SEWAGE.P | 90% | 0.01 | 0.11 | -1.33 | -0.15 | 0.59 | 0.06 |
| Total: | | 0.59 | 35.63 | 1.72 | 61.28 | 4.07 | 145.16 |

'MURRAY'

Condition: 3, PORT ARRIVAL CONDITION

Consumables Remaining: 10 %

| | | | |
|---|---|---|---|
| Mean Draft (hydrostatics) | 0.70 m | LCG (weight table) | 1.72 m |
| MCT cm (hydrostatics) | 0.85 m-tonnes | LCB (hydrostatics) | 1.50 m |
| LCF (hydrostatics) | 1.10 m | BG (LCB-LCG) | -0.21 m |
| L BTWN MKS (particulars) | 17.60 m | TR. MMT. (Δ*BG) | -7.48 m-tonnes |
| AFT MKS AFT OF MIDSHIPS | 8.81 m | TRIM | -0.088 m |
| FWD MKS FWD OF MIDSHIPS | 8.79 m | TRIM AFT | -0.0386 m |
| L AFT LCF (AFT MKS-LCF) | 7.71 m | TRIM FWD | 0.0495 m |
| L FWD LCF (FWD MKS+LCF) | 9.89 m | | |
| KG (VCG weight table) | 4.07 m | | |
| KM (hydrostatics) | 10.48 m | | |
| GM (KM-KG) | 6.40 m | | |
| FS (Total FSM/Δ) | 0.02 m | | |
| GM Fluid (GM-FS) | 6.38 m | | |
| | | DRAFT AFT | 0.74 m |
| | | DRAFT FWD | 0.65 m |

TRIM = [Trim Moment/MCT 1cm]/100
Trim aft/fwd = L/LBM*TRIM
Draft aft/fwd = Mean Draft -TRIM aft/fwd

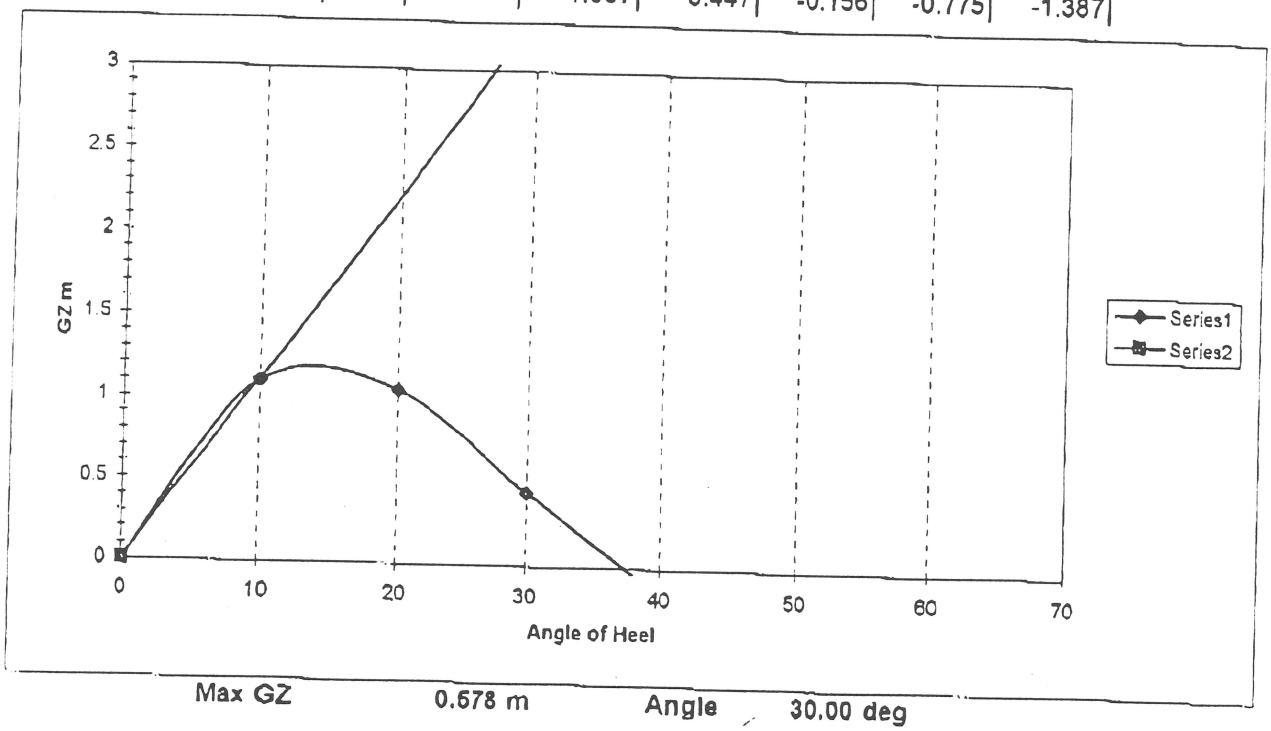
'MURRAY'

Condition: 3, PORT ARRIVAL CONDITION

Consumables Remaining: 10 %

| | |
|---|---|
| Displacement | 35.63 tonnes |
| **GM (fluid)** | **6.38 m** |
| KG (actual) | 4.07 m |
| FS | 0.02 m |
| KG' (fluid) = KG + FS | 4.09 m |

| Angle | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|
| KN (cross curves) | | 1.809 | 2.456 | 2.492 | 2.473 | 2.359 | 2.155 |
| GZ = KN-(KG' fluid)sinΘ | 0 | 1.099 | 1.057 | 0.447 | -0.156 | -0.775 | -1.387 |




| | | | |
|---|---|---|---|
| **Max GZ** | **0.678 m** | **Angle** | **30.00 deg** |
| GZ @10 | 1.099 m | Angle | 10.00 deg |
| GZ @20 | 1.057 m | Angle | 20.00 deg |
| GZ @30 | 0.447 m | Angle | 30.00 deg |
| GZ @40 | -0.156 m | Angle | 40.00 deg |

| | | | |
|---|---|---|---|
| **Area Under Curve** | **0-30** | 3/8(0+3*GZ@10+3*GZ@20+1*GZ@30)*10/57.3 | **0.452** m-Rad |
| | **0-40** | 1/3(0+4*GZ@10+2*GZ@20+4*GZ@30+GZ@40)*10/57.3 | **0.473** m-Rad |
| | **30-40** | area 0-30 - area 0-40 | **0.021** m-Rad |

'MURRAY'

Condition:

Consumables Remaining: %

| DESCRIPTION | % | MAX FSM | Δ WEIGHT | LCG | L.MMT | VCG | V.MMT |
|---|---|---|---|---|---|---|---|
| Light Ship | | | 34.59 | 1.77 | 61.09 | 4.14 | 143.03 |
| Tanks: | | | | | | | |
| MAINFUEL.P | | | | | | | |
| MAINFUEL.S | | | | | | | |
| AUXFUEL.P | | | | | | | |
| AUXFUEL.S | | | | | | | |
| FW.P | | | | | | | |
| FW.S | | | | | | | |
| SEWAGE.P | | | | | | | |
| Total: | | | | | | | |

'MURRAY'

Condition:

Consumables Remaining: %

| | | |
|---|---|---|
| Mean Draft (hydrostatics) | | m |
| MCT cm (hydrostatics) | | m-tonnes |
| LCF (hydrostatics) | | m |
| L BTWN MKS (particulars) | 17.60 | m |
| AFT MKS AFT OF MIDSHIPS | | m |
| FWD MKS FWD OF MIDSHIPS | | m |
| L AFT LCF (AFT MKS-LCF) | | m |
| L FWD LCF (FWD MKS+LCF) | | m |
| KG (VCG weight table) | | m |
| KM (hydrostatics) | | m |
| GM (KM-KG) | | m |
| FS (Total FSM/Δ) | | m |
| GM Fluid (GM-FS) | | m |

| | | |
|---|---|---|
| LCG (weight table) | | m |
| LCB (hydrostatics) | | m |
| BG (LCB-LCG) | | m |
| TR. MMT. (Δ*BG) | | m-tonnes |
| TRIM | | m |
| TRIM AFT | | m |
| TRIM FWD | | m |

| | | |
|---|---|---|
| [(ROK AFT + ROK FWD)/2] | 0 | m |
| DRAFT AFT | | m |
| DRAFT FWD | | m |

TRIM = [Trim Moment/MCT 1cm]/100
Trim aft/fwd = L/LBM*TRIM
Draft aft/fwd = Mean Draft -TRIM aft/fwd

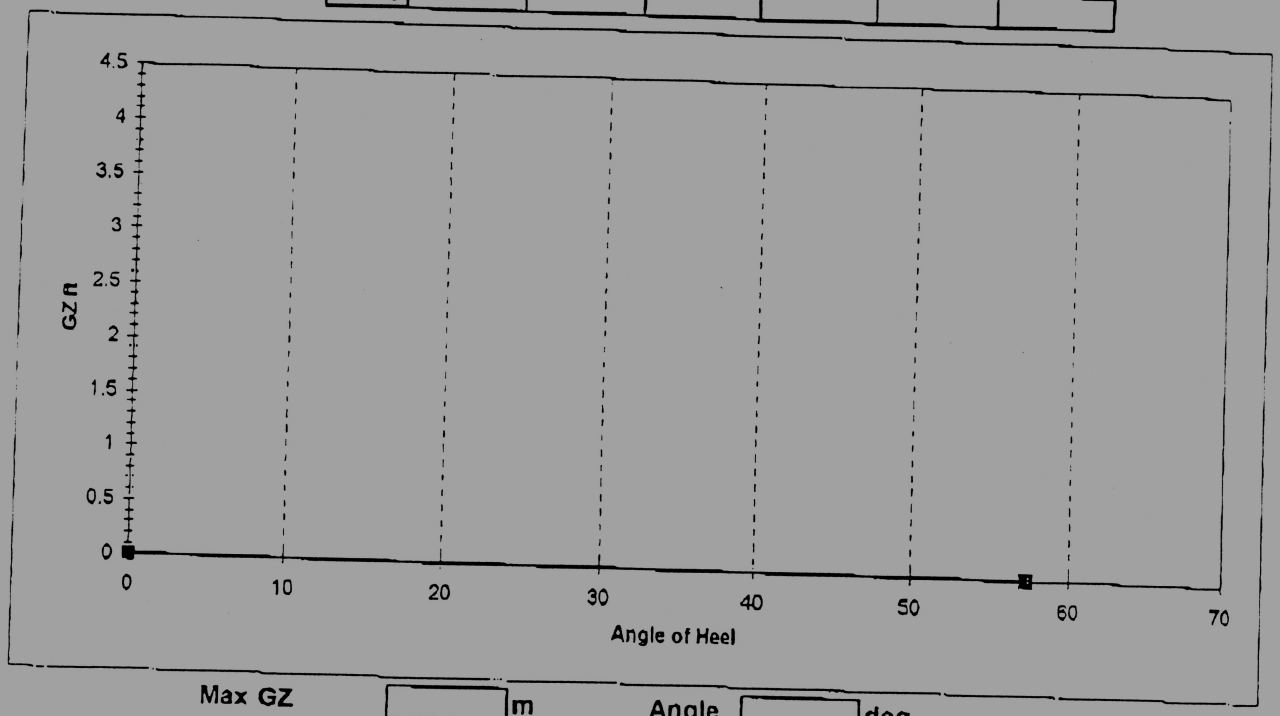
'MURRAY'

Condition:

Consumables Remaining: % 

| | | |
|---|---|---|
| Displacement | | tonnes |
| GM (fluid) | | m |
| KG (actual) | | m |
| FS | | m |
| KG' (fluid) = KG + FS | | m |

| Angle | | | | | | | |
|---|---|---|---|---|---|---|---|
| GZ = (KN-KG' fluid)sin⊖ | 0 | | | | | | |




| | | | | |
|---|---|---|---|---|
| Max GZ | | m | Angle | deg |
| GZ @10 | | m | Angle | deg |
| GZ @20 | | m | Angle | deg |
| GZ @30 | | m | Angle | deg |
| GZ @40 | | m | Angle | deg |

| | | | |
|---|---|---|---|
| Area Under Curve | 0-30 | 3/8(0+3*GZ@10+3*GZ@20+1*GZ@30)*10/57.3 | m-Rad |
| | 0-40 | 1/3(0+4*GZ@10+2*GZ@20+4*GZ@30+GZ@40)*10/57.3 | m-Rad |
| | 30-40 | area 0-30 - area 0-40 | m-Rad |

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# INCLINING EXPERIMENT REPORT

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# "MURRAY"

# INCLINING EXPERIMENT

Transport Canada / Transports Canada

APPROVED - APPROUVÉ

ON THE AUTHORITY OF THE CANADA SHIPPING ACT AND REGULATIONS MADE THEREUNDER.

EN VERTU DE LA LOI SUR LA MARINE MARCHANDE DU CANADA ET DES RÈGLEMENTS CONNEXES.

ON BEHALF OF THE BOARD OF STEAMSHIP INSPECTION DEPARTMENT OF TRANSPORT.

POUR LE COMPTE DU BUREAU D'INSPECTION DE NAVIRES À VAPEUR. MINISTÈRE DES TRANSPORTS.

FEB 2 5 2005

DATE

SUBJECT TO THE ACCURACY OF THE BASIC DATA BEING THE RESPONSIBILITY OF THE OWNER. HIS NAVAL ARCHITECT OR THE SHIP-BUILDER.

SOUS RÉSERVE QU'IL INCOMBE AU PROPRIÉTAIRE, À SON ARCHITECTE NAVAL OU AU CONSTRUCTEUR DE NAVIRES DE S'ASSURER QUE LES DONNÉES DE BASES SONT PRÉCICES.

TRANSPORT CANADA TRANSPORTS CANADA MARINE SAFETY SÉCURITÉ MARITIME CANADA Dartmouth, N.S.

**BY:** E.Y.E. MARINE CONSULTANTS
**FOR:** A.F. THERIAULT & SON LTD.
**DATE:** 21 FEBRUARY 2005
**JOB NO:** 04060

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# "MURRAY"
## Inclining Report

This is the report of the inclining of the vessel "Murray" which was performed on January 9th 2005 in Meteghan River commencing at 9:00 AM

### REPRESENTATIVES

| | |
|---|---|
| Jerry Peet | EYE Marine Consultants |
| Dave Lutwick | EYE Marine Consultants |
| Mike Orr | Transport Canada |
| Graham Oakley | A.F. Theriault |
| George Kwan | PWGSC |

### LOCATION

A.F. Theriault Wharf, Meteghan River, NS

### WEATHER CONDITIONS

Sea conditions were relatively calm, the vessel was free to incline throughout the test.
The gangway was removed and the mooring lines were slack.
Snow and ice was removed from all decks and house tops.

### INCLINING WEIGHTS

Inclining weights consisted of steel drums filled with concrete.
The weights were certified by a TCMS inspector.
Calibration Certificate for the scale used to measure the weights is included.

(See attached sketch for location of inclining weights)

| Inclining Wt Id | Wt (lbs) | Wt(t) |
|---|---|---|
| 1 | 1120.0 | 0.508 |
| 2 | 1160.0 | 0.526 |
| 3 | 1120.0 | 0.508 |
| 4 | 1160.0 | 0.526 |

### HYDROMETER READING

Measured Specific Gravity of water = 1.0075

### DRAFT MARKS and FREEBOARDS

Note : Freeboards were recorded at vessel in inches and converted to metric

| | Aft Marks (m) | Fwd Marks (m) | Aft Freeboard (m) | Mid Freeboard (m) | Fwd Freeboard (m) |
|---|---|---|---|---|---|
| Port | 0.740 | 0.680 | 1.181 | 1.295 | 1.819 |
| Stbd | 0.725 | 0.675 | 1.175 | 1.308 | 1.819 |
| Ave | 0.733 | 0.678 | 0.721 | 0.682 | 0.617 |
| Dist to Datum | 8.808aft | 8.788fwd | 6.621aft | 0.576aft | 10.877fwd |

Measured freeboard in metres

Draft in metres from avg. freeboard measurements

- Drafts obtained from mid and fwd freeboard readings were not included due to erroneous results and large error occuring when included. All other drafts were input into the computer for least square analysis. Results confirmed maximum error of +/- 3mm which was determined to be within the accuracy of the measurement

- Heel =0.13deg to port determined from the aft draft marks

"MURRAY"
Inclining Report

## PENDULUM LENGTHS

| | Length (in) | Length (m) |
|---|---|---|
| Aft Pendulum = | 115.500 | 2.934 |
| Fwd Pendulum = | 87.625 | 2.226 |
| Ave Pendulum Length | 101.563 | 2.580 |

## PENDULUM DEFLECTIONS

| GENERAL DATA | | | AFT PEND. 2.934 | FWD PEND. 2.226 | |
|---|---|---|---|---|---|
| Shift No. | Weight (t) | Distance (m) | Deflection (mm) | Deflection (mm) | Direction of Shift |
| 1 | 0.508 | 3.962 | 27.000 | 20.000 | Stbd-Port |
| 2 | 0.526 | 3.962 | 26.500 | 23.000 | Stbd-Port |
| 3 | 0.526 | 3.962 | 25.000 | 23.000 | Port-Stbd |
| 4 | 0.508 | 3.962 | 29.000 | 20.000 | Port-Stbd |
| 5 | 0.508 | 3.962 | 24.500 | 22.500 | Port-Stbd |
| 6 | 0.526 | 3.962 | 28.500 | 21.500 | Port-Stbd |
| 7 | 0.526 | 3.962 | 26.000 | 21.500 | Stbd-Port |
| 8 | 0.508 | 3.962 | 28.500 | 22.500 | Stbd-Port |
| Averages | 0.517 | 3.962 | 26.875 | 21.750 | |

## CALCULATION OF GMTM

Average Pendulum Length = L = 2.580 m

Average Pendulum Deflection = defl = 0.024 m

Average Weight = w = 0.517 t

Average Shift = d = 3.962 m

GMTM = $\frac{w \times d \times L}{defl}$ = **220.198** t-m Input to Computer

displ = 35.74 t Displacement at inclining

GM = $\frac{GMTM}{displ}$ = **6.161 m**

"MURRAY"
Inclining Report

## CONDITION OF TANKS DURING INCLINING

Tanks were completely empty during inclining. Tanks were sounded to confirm this.

## WEIGHTS TO BE ADDED/REMOVED

| | |
|---|---|
| Weights to be added - | Engine Room Insulation |
| | Aft Deck Boat |
| | Anchor Rope on FWD Winch |
| | 30 gallons of Hydraulic Fluid in Hydraulic Tank |
| | Ceiling Panels (Crew's Mess, Wet Locker, Wheelhouse) |
| | $CO_2$ Doors and Battery Doors |
| | Engine Room Grates |
| | Radar and Electronics |
| | Fluids in Systems |
| | Table in Gallery |
| | Wheelhouse Setee |
| | ER Intake Covers |
| Weights to be removed - | 5 personnel |
| | Inclining weights |
| | Inclining experiment equipment |
| | 4 Off 2" x 8" planks, 10' long |
| | Tools in Galley (20 lbs) |
| | Tools in Wheelhouse (45lbs) |
| Bilges- | All bilges dry |

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DRAFTS used to establish Waterline

| Location | Given | Used | Error |
|---|---|---|---|
| 8.808a | 0.733 | 0.730 | 0.003 |
| 6.621a | 0.721 | 0.724 | -0.003 |
| 8.788f | 0.678 | 0.678 | 0.000 |

Distances in METERS.---Drafts from Baseline---

WEIGHT and DISPLACEMENT STATUS
Baseline draft: 0.704 @ Origin
Trim: Aft 0.17 deg., Heel: Port 0.13 deg.

| Part | | Weight(MT) | LCG | TCG | VCG | FSM |
|---|---|---|---|---|---|---|
| WEIGHT | | 35.74 | 1.598a | 0.015p | 4.103 | |
| | Load SpGr | Weight(MT) | LCG | TCG | VCG | |
| Total Tanks---------> | | 0.00 | | | | 0.00 |
| | | Displ(MT) | LCB | TCB | VCB | |
| HULL | 1.008 | 35.74 | 1.609a | 0.023p | 0.428 | |
| Righting Arms: | | | 0.000 | 0.000s | | |

Distances in METERS.----------Moments in M.-MT.

** Condition at Inclining **

Baseline draft: 0.704 @ Origin

HYDROSTATIC PROPERTIES
Trim: Aft 0.17 deg., Heel: Port 0.13 deg., VCG = 4.103

| Draft@ Origin | Displacement Weight(MT) | Buoyancy-Ctr. LCB | VCB | CM | LCF | Weight/ Moment/ Deg trim | GML | GMT |
|---|---|---|---|---|---|---|---|---|
| 0.704 | 35.74 | 1.609a | 0.428 | 0.69 | 1.118a | 22.90 | 36.71 | 6.162 |

Distances in METERS.-----Specific Gravity = 1.008.----------Moment in M.-MT.
Draft is from Baseline.

The Following items were aboard and included in the Lightship:
Fluids in systems

Weights to Add or Deduct to Obtain Lightship

WEIGHT and DISPLACEMENT STATUS
Baseline draft: 0.687 @ Origin
Trim: Aft 0.17 deg., Heel: Port 0.13 deg.

| Part | Weight(MT) | LCG | TCG | VCG |
|---|---|---|---|---|
| Vessel as Inclined | 35.74 | 1.598a | 0.015p | 4.103 |
| Inclining Weights#1 | -0.51 | 3.566a | 2.796s | 2.465 |
| Inclining Weights#2 | -0.53 | 1.764a | 2.796s | 2.502 |
| Inclining Weights#3 | -0.51 | 2.736a | 2.782p | 2.488 |
| Inclining Weights#4 | -0.53 | 0.990a | 2.782p | 2.512 |
| 2 Men and Incline Equip F | -0.17 | 1.444f | 0.000 | 3.087 |
| 2 Men and Incline Equip A | -0.23 | 4.375a | 0.000 | 3.004 |
| Personnel on board | -0.09 | 8.000f | 0.000 | 4.046 |
| 2x8-10' Long Wood Planks | -0.09 | 2.240a | 0.000 | 1.955 |
| Tools in Galley | -0.01 | 0.250f | 0.985p | 3.040 |
| Life Rafts | -0.10 | 7.593f | 0.000 | 3.300 |
| Life Raft | 0.10 | 8.069a | 0.000 | 2.189 |
| Tools in Wheelhouse | -0.02 | 1.000a | 0.000 | 4.720 |
| Port E.R. Flooring | 0.03 | 3.805a | 2.200p | 0.500 |
| Stbd E.R. Flooring | 0.03 | 3.805a | 2.200p | 0.500 |
| Port E.R. Insulation | 0.25 | 5.305a | 2.200p | 2.100 |
| Stbd E.R. Insulation | 0.25 | 5.305a | 2.200s | 2.100 |
| RIB | 0.50 | 7.805a | 0.000 | 2.000 |
| Anchor Rode | 0.06 | 7.915f | 0.000 | 3.300 |
| Hydraulic Tank W/Oil | 0.14 | 3.805a | 3.000p | 1.500 |
| Ceiling in Mess | 0.01 | 0.195f | 0.000 | 4.000 |
| Ceiling in Wet Locker | 0.01 | 1.805a | 0.000 | 4.000 |
| Ceiling in Wheelhouse | 0.03 | 0.805a | 0.000 | 6.000 |
| Setee in Wheelhouse | 0.03 | 2.805a | 2.000p | 5.000 |
| Electronics in Wheelhouse | 0.04 | 2.805a | 1.000p | 5.000 |
| Dining Table | 0.01 | 0.195a | 2.000s | 3.000 |
| Spares | 0.03 | 2.305a | 0.000 | 2.000 |
| CO2 Locker Door | 0.01 | 2.805a | 0.000 | 3.000 |
| ER INtake Covers | 0.02 | 3.630a | 0.000 | 3.160 |
| Wet Locker Furnishings | 0.02 | 1.805a | 0.000 | 3.000 |
| Interior Furnishings | 0.03 | 0.195a | 0.000 | 3.000 |
| Towing Rope | 0.01 | 4.305a | 1.000p | 2.500 |
| Life Rings | 0.01 | 0.000 | 0.000 | 3.202 |
| Scanner Arm 4ft | 0.01 | 1.855a | 0.000 | 6.635 |
| Scanner Arm 6ft | 0.01 | 3.474a | 1.091s | 7.236 |
| Total Weight--------> | 34.59 | 1.766a | 0.033p | 4.135 |

| | SpGr | Displ(MT) | LCB | TCB | VCB | RefHt |
|---|---|---|---|---|---|---|
| HULL | 1.008 | 34.59 | 1.626a | 0.024p | 0.419 | -0.687 |
| Righting Arms: | | | 0.151f | 0.018s | | |

Distances in METERS.

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E.Y.E. Marine Consultants
MURRAY



WEIGHT STATUS
Trim: Aft 0.17 deg., Heel: Port 0.13 deg.

| Part | Weight(MT) | LCG | TCG | VCG |
|---|---|---|---|---|
| WEIGHT | 34.59 | 1.766a | 0.033p | 4.135 |

Distances in METERS.