Subject: National Competitive Bidding for Fabrication, Transportation, Installation, Testing, and Commissioning of Quick Pontoon Opening Mechanism (QPOM) Comprising of Self-Propelled Pontoons in the state of Uttar Pradesh (01- Ballia District) and Bihar (01-Patna District).

IFB No: IN-IWAI-341909-GO-RFB

CPP Portal Ref: 2023_JMVP_750094_1

Amendment – 2

Amendment triggered due to Pre-bid responses

S. No.	Bid document Section, Clause	As per Bidding Documents	Amended
1.	BDS, ITB 41.1, Page No 43	ITB 41.1: The maximum percentage by which quantities may be increased is: 15% The maximum percentage by which quantities may be decreased is: 15%	**The same be read as follows:** ITB 41.1: The maximum percentage by which quantities may be increased is: **Nil** The maximum percentage by which quantities may be decreased is: **Nil**
2.	ITB 32.1(b), Page No 45 to 46.	The bidder should have experience of supply & commissioning of one (01) similar item in the last 5 years. "Supply and commissioning of similar items" means Fabrication, Transportation, Testing and Commissioning of self-propelled/ non propelled barges/ vessels /moored barges duly certified by any classification society or registering authorities under Inland Vessel Act or any other relevant act / regulation"	***The clause may be read as:*** *The bidder should have experience of supply & commissioning of one (01) similar item in the last 5 years "Supply and commissioning of similar items" means Fabrication, Transportation, Testing and Commissioning of self-propelled/ non propelled barges/ vessels /moored barges duly certified by any classification society and registered by any registering authorities under Inland Vessel Act or any other relevant act / regulation".*
3.	Clause no 2, Objective, Page No 81	The design has been carried out by Department of Naval Architecture and Ocean Technology, Indian Institute of Technology Kharagpur.	**The same may be read as follows:** IRS appraised detailed drawings prepared by CICMT, Indian Institute of Technology Kharagpur are attached herewith as **Annexure-1** for Mooring barge and Main barge for ready reference. The bidders to adhere the technical specifications mentioned in the tender documents.

<table>
<tr>
<td>4.</td>
<td>Clause no 3.1, point no 15, Page No 83</td>
<td>As a passenger ferry can carry a maximum of 16 loaded matador vans (8 port and 8 starboard) + 600 (300 port + 300 passengers) passengers at a time.</td>
<td>The clause may be read as:
As a passenger ferry, it should be capable of carrying a maximum of 16 loaded matador vans (8 port and 8 starboard) and100 passengers at any given point of time</td>
</tr>
<tr>
<td>5</td>
<td>Clause no-7b of Technical Specifications, Page no 94</td>
<td>Clause 7(b): “In the ferry mode, the economic speed should be about 7 to 8 knots in still water without shallow water effect and the maximum speed 8.5 knots at 92% MCR of the propulsion units”.</td>
<td>The clause may be read as:
The economic speed should be about 7 to 8 knots in still water without shallow water effect.</td>
</tr>
<tr>
<td>6</td>
<td>Clause no- 21d, Page No- 97</td>
<td>Clause No 21(d): “In the ferry mode, the economic speed should be about 7 to 8 knots and the maximum speed 9 knots at 92% MCR of the propulsion units.”</td>
<td>The clause may be read as:
The maximum speed as 8.5 knots at 92% MCR of the propulsion units.</td>
</tr>
<tr>
<td>7</td>
<td>Clause no 30, Page No 99</td>
<td>Adequate firefighting, Life-saving appliances, and Light and sound signals as per class rules are to be provided.</td>
<td>The clause may be read as:
Adequate firefighting, Life-saving appliances, and Light and sound signals as per class rules are to be provided as per IV/IRS Rule 2022</td>
</tr>
<tr>
<td>8</td>
<td>SCC, GCC 16.1, Page No 133 & 134</td>
<td>Mobilization payment: 10% of the total contract amount to be paid within thirty (30) days of signing of Contract and upon submission of claim / against a simple receipt and a bank guarantee for the equivalent amount valid until the completion of the contract, in the form, provided in the bidding documents or another form acceptable to the Purchaser. The mandatory documents such as work methodology, work schedule, QAP and insurance document are also required to be submitted by the Supplier with the claim.
II. Payment schedule of 65% of the total contract amount as per the below milestones:
<table>
<tr><th>Sr No</th><th>Milestones / Key Deliverables</th><th>Payment Schedule (to be paid on prorata basis as per the Price Schedule-Supply)</th></tr>
</table>
</td>
<td>The payment schedule has been clarified & may be read as follows:
I. Mobilization payment: 10% of the total contract amount to be paid within thirty (30) days of signing of Contract and upon submission of claim / against a simple receipt and a bank guarantee for the equivalent amount valid until the completion of the contract, in the form, provided in the bidding documents or another form acceptable to the Purchaser. The mandatory documents such as work methodology, work schedule, QAP and insurance document are also required to be submitted by the Supplier with the claim.
II. Payment schedule for fabrication work at Supplier’s yard is as per the below milestones:
<table>
<tr><th>Sr No</th><th>Milestones / Key Deliverables</th><th>Percentage on contract Amount</th></tr>
<tr><td>a</td><td>Completion of Keel Laying with certification of EIC.</td><td>10%</td></tr>
<tr><td>b</td><td>Completion of 50% of Hull</td><td>20%</td></tr>
</table>
</td>
</tr>
</table>

a	Completion of Keel Laying with certification of EIC.	10%
b	Completion of 50% of Hull fabrication at the Supplier's yard after certification by EIC & any classification society as per Inland Vessel act.	20%
c	Completion of 100% of Hull fabrication at the Supplier's yard after certification by EIC & any classification society as per Inland Vessel act.	20%
D	Successful launching, Testing and Trail run of the complete units at Supplier's yard (as per Price Schedule) after certification of EIC & any classification society.	15%

III. Payment schedule of 20% of the total contract amount as per the below milestones:

	fabrication at the Supplier's yard after certification by EIC & any classification society as per Inland Vessel act.	
c	Completion of 100% of Hull fabrication at the Supplier's yard after certification by EIC & any classification society as per Inland Vessel act.	20%
d	Successful launching. Testing and Trail run of the complete units at Supplier's yard (as per Price Schedule) after certification of EIC & any classification society.	15%

III. *Payment schedule for Transportation from Supplier's yard to respective site as per the below milestones:*

Sr No	**Milestones / Key Deliverables**	**Percentage on contract Amount**
e	Successful transportation from Supplier's yard to the respective site (as per Price Schedule) and satisfactory installation of the same with certification by EIC & any classification society including submission of SOP/ Manual for Operation of the unit and training of purchaser's personnel in Train the Trainer Mode.	10%
f	Testing, commissioning, and trial of the complete units at the respective site (as per Price Schedule) along	10%

Sr No	Milestones / Key Deliverables	Payment Schedule (to be paid on prorata basis as per the Price Schedule-Supply)
f	Successful transportation from Supplier's yard to the respective site (as per Price Schedule) and satisfactory installation of the same with certification by EIC & any classification society including submission of SOP/ Manual for Operation of the unit and training of purchaser's personnel in Train the Trainer Mode.	10%
g	Testing, commissioning, and trial of the complete units at the respective site (as per Price	10%

	with the certification, any classification society & EIC including registration of the units in the name of the purchaser.	

IV. On Final acceptance: 5% of the contract amount shall be paid within thirty (30) days after the date of the Acceptance Certificate issued by EIC in the proforma given in Section VII.

All the percentages mentioned in the tables above (serial number I, II, III & IV) shall be calculated on the total contract amount.

			Schedule) along with the certification, any classification society & EIC including registration of the units in the name of the purchaser.	
		IV. On Final acceptance: 5% of the contract amount shall be paid within thirty (30) days after the date of the Acceptance Certificate issued by EIC in the proforma given in Section VII.		
All other terms and conditions shall remain unaltered				

IRCLASS
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CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166771-222116

05-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001158
Project name	Design App – Main Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI1/7
Plan Title	FRAMING SECTIONS 19 MAY2022-Model
Rev.No.	1
Upload.No.	1
Submitted Date	25-September-2022
Review Status	Reviewed
Parent Plan Title	

The plan has been examined for compliance with:

. IRS Rules

Rules and Regulations for the Construction and Classification of Inland Waterways Vessels, July 2022

Notes

1. The review status Reviewed indicates:
   The stated plan has been Reviewed against appropriate Regulations/Codes/Standards.
2. The list of remarks is part of this letter. Please address these comments by reply to us.

Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

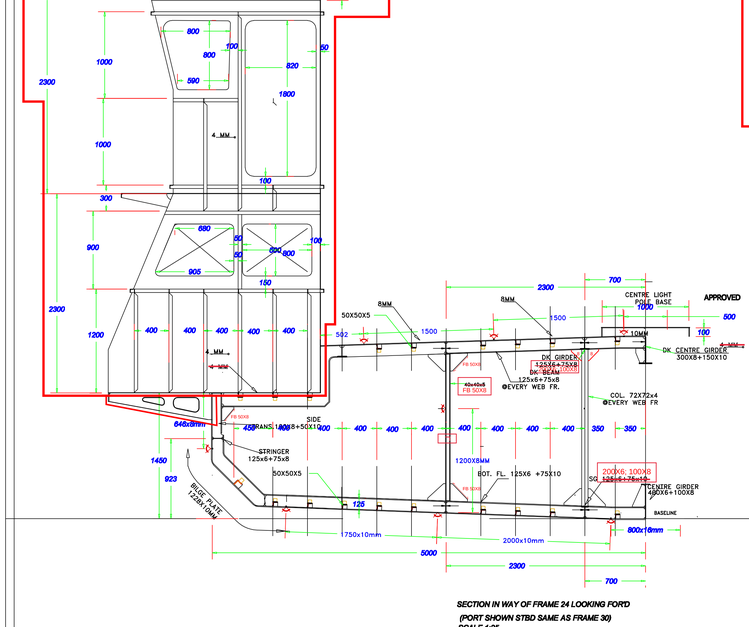
Amit Gandhi
Senior Surveyor

This is an electronically published document and does not require signature.

Our Ref: E-166771-222116

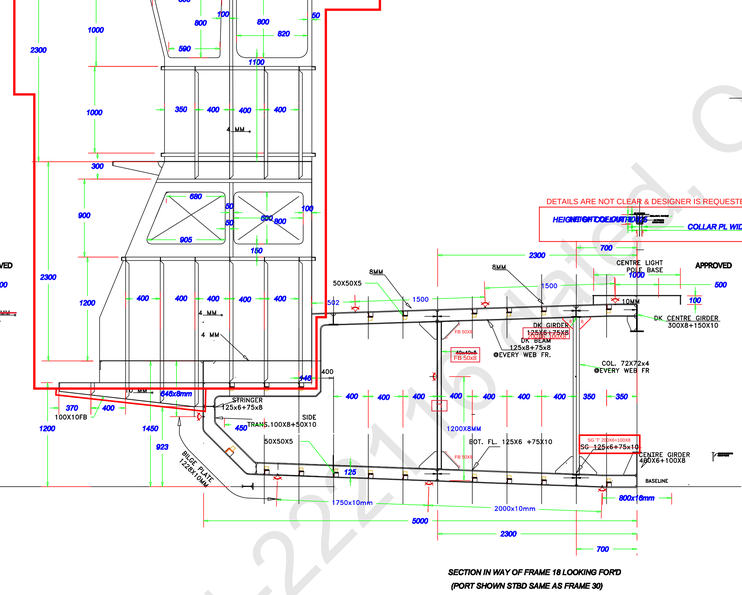
Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	05-October-2022	Plans to be resubmitted for our final endorsement after finalization of shipyard.	For Info
2	05-October-2022	Deckhouse and it's local reinforement is reserved. Details of the same are to be submitted in deckhouse plan including all scantlings and plan/profile views.	Head Office
3	05-October-2022	Amendments indicated in the plan to be duly incorporated.	For Info
4	05-October-2022	Plan is reviewed considering following loads: 1. Maximum axle load on Deck= 0.75T, Number of load area per axle =2, Tyre print area = 300 mm x 150 mm 2. Live load on Deck = 500 kg/m2 Should there be change in above design loads, plan need to be re-examined.	For Info
5	05-October-2022	Plate thickness indicated in the plan are not consistent with approved copy of Midship Section Plan (Dwg. No : CICMT/IWAI/KULFI1/5, REV.1) Accordingly, we have considered plate thickness indicated in Midship Section during approval of this drawing. Designer is requested to amend the plate thickness as per Midship Section Plan.	Head Office
6	05-October-2022	Transverse Section at Fr.2 & 64 indicated in the plan is not matching with General Arrangement/Deck & Profile plan. Designer is requested to correct the sectional view.	Head Office

RESERVED



SECTION IN WAY OF FRAME 24 LOOKING FORD
(PORT SHOWN STBD SAME AS FRAME 30)
SCALE 1:25

RESERVED



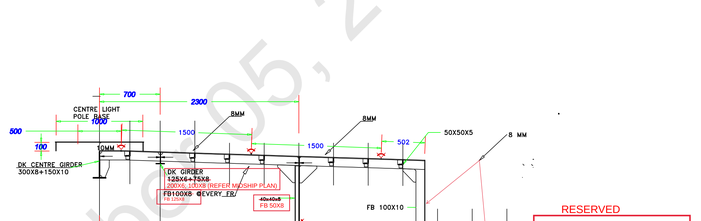
SECTION IN WAY OF FRAME 18 LOOKING FORD
(PORT SHOWN STBD SAME AS FRAME 30)
SCALE 1:25

DETAILS ARE NOT CLEAR & DESIGNER IS REQUESTED TO RECONCILE.

HEIGHT OF COLLAR PL

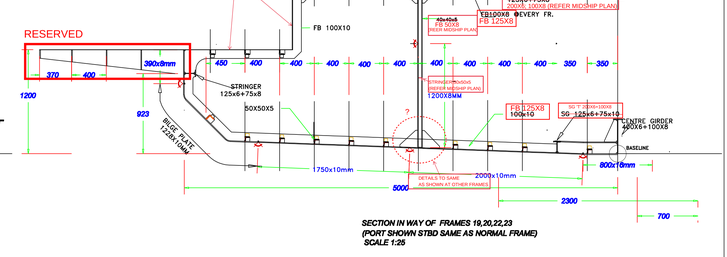
COLLAR PL WIDTH 120

WIDTH OF CUT 110

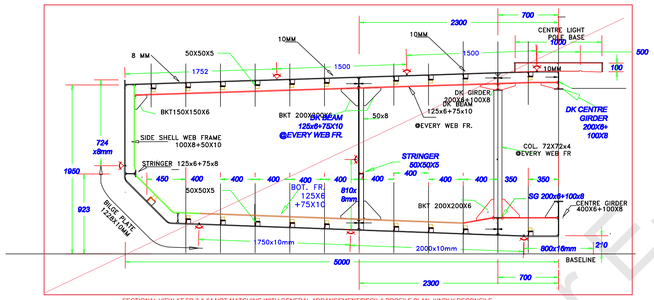


SECTION IN WAY OF FRAMES 49,50,52,53,55
(STBD SHOWN PORT SAME AS NORMAL FRAME)
SCALE 1:25

RESERVED

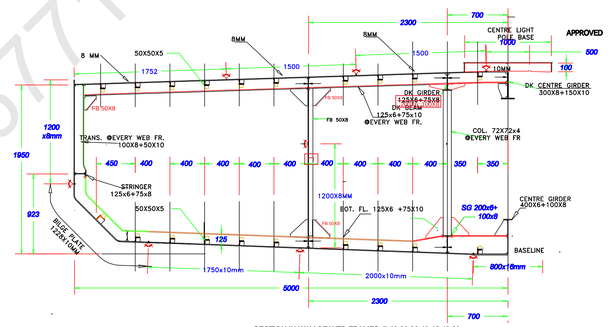


SECTION IN WAY OF FRAMES 19,20,22,23
(PORT SHOWN STBD SAME AS NORMAL FRAME)
SCALE 1:25

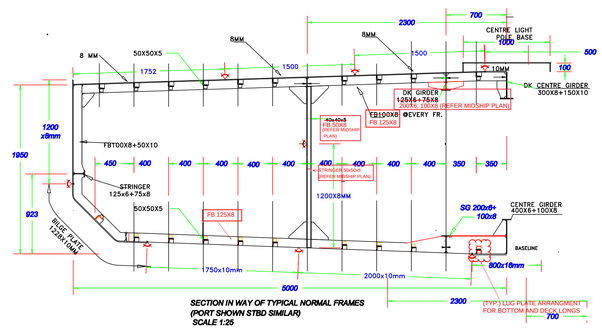


SECTIONAL VIEW AT FR.2 & 64 NOT MATCHING WITH GENERAL ARRANGEMENT/DECK & PROFILE PLAN. KINDLY RECONCILE

SECTION IN WAY OF FRAME 2,64
(PORT SHOWN STBD SIMILAR)
SCALE 1:25



SECTION IN WAY OF WEB FRAMES 7,10,30,36,42,45,46,60
(PORT SHOWN STBD SIMILAR)
SCALE 1:25



SECTION IN WAY OF TYPICAL NORMAL FRAMES
(PORT SHOWN STBD SIMILAR)
SCALE 1:25

IT IS OBSERVED THAT PLATE THICKNESS (DECK, BOTTOM, SIDE SHELL, BILGE ETC.) INDICATED IN THE PLAN ARE NOT CONSISTENT WITH APPROVED COPY OF MIDSHIP SECTION PLAN (DWG.NO : CICMT/IWAI/KULFI1/5, REV.1)
ACCORDINGLY, WE HAVE CONSIDERED PLATE THICKNESS INDICATED IN MIDSHIP SECTION DURING APPROVAL OF THIS DRAWING. DESIGNER IS REQUESTED TO AMEND THE PLATE THICKNESS AS PER MIDSHIP SECTION PLAN.

SEE LETTER : E-166771-222116

INDIAN REGISTER OF SHIPPING MUMBAI
DATE: 05-Oct-2022
REVIEWED

AS AMENDED

ALL MATERIAL TO BE IRS GRADE A OR EQ.

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURETE

QUICK MECHANICAL OPENING MECHAN FOR PONTOON KULFI SYSTEM

MAIN BARGE FRAMING PLAN

APPROVED	.
CHECKED	
DRAWN	

SIZE	SCALE	DWG. NO.	CLASS	DATE	REV. NO.	SHEETS
A0	1:25	CICMT/IWAI/KULFI1/7		07/MAY/2022	1	1

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52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166765-222183

12-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001158
Project name	Design App – Main Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI1/1
Plan Title	(1)GENERAL ARRANGEMENT PLAN Main and Moored Barge SystemMAY 07- 2022 Model
Rev.No.	2
Upload.No.	2
Submitted Date	26-September-2022
Review Status	Noted
Parent Plan Title	

Notes

1. The review status Noted indicates:
   The stated plan has been noted for our information.
2. The list of remarks is part of this letter. Please address these comments by reply to us.

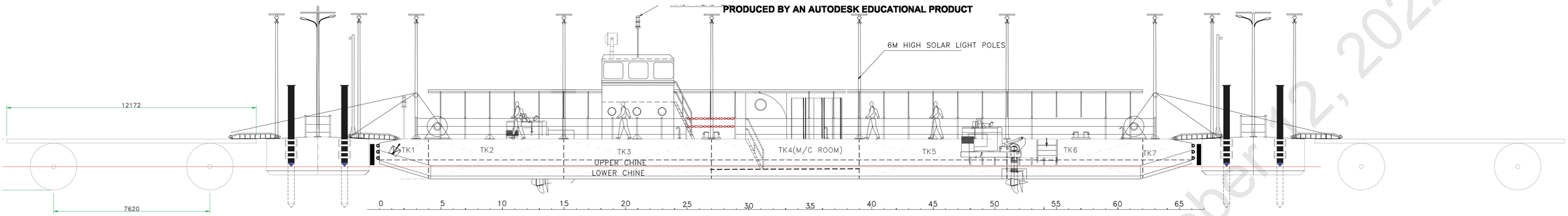
Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

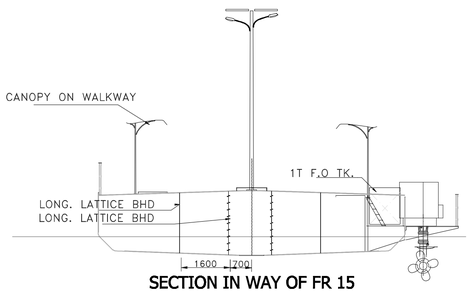
This is an electronically published document and does not require signature.

Our Ref: E-166765-222183

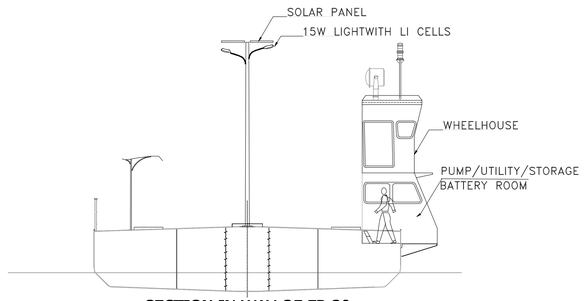
Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	12-October-2022	It is noted that mooring barge is not provided with collision & aft peak bulkhead as required by IRS Inland Waterway Rule Part 3, Ch.9, Sec.2 In view of above, calculations showing that with the ship fully loaded to summer draught on even keel, flooding of any compartment will not result in any part of the bulkhead deck / freeboard deck becoming submerged, nor result in any unacceptable loss of stability to be submitted for our review.	Head Office



PROFILE VIEW



SECTION IN WAY OF FR 15
LOOKING FORWARD



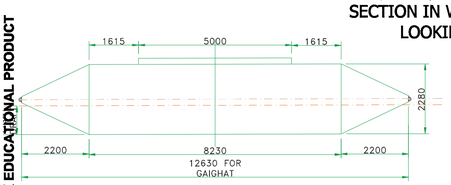
SECTION IN WAY OF FR 20
LOOKING AFT

PRINCIPAL DIMENSIONS (MAIN BARGE)

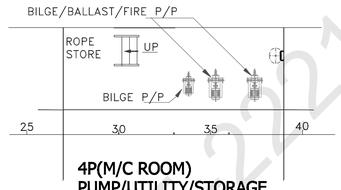
LENGTH OVERALL	39.60 M
BREADTH OF HULL	10.00 M
BREADTH OVERALL	13.40 M
DEPTH AT SIDE	1.95 M
DEPTH AT CENTRE	2.10 M
DRAUGHT (LOADED)	0.60 M

PRINCIPAL DIMENSIONS (MOORING BARGE)

LENGTH OVERALL	20.40 M
BREADTH OF HULL	5.00 M
DEPTH AT SIDE	1.75 M
DEPTH AT CENTRE	1.85 M
DRAUGHT (LOADED)	0.40 M



DIMENSIONS OF FLOATER UNIT FOR PIPA UNIT AT GAIGHAT
AS RECEIVED FROM IWAI

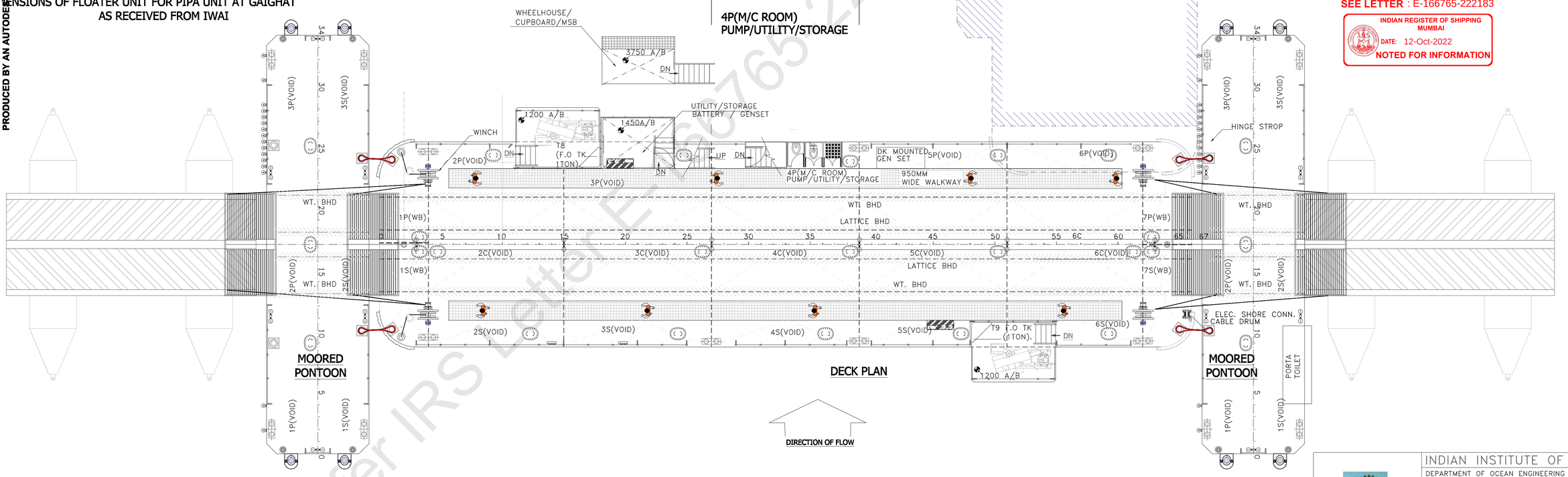


4P(M/C ROOM)
PUMP/UTILITY/STORAGE

MAIN PONTOON
IN RETRACTED
POSITION

SEE LETTER : E-166765-222183

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 12-Oct-2022
NOTED FOR INFORMATION



MOORED PONTOON

DECK PLAN

MOORED PONTOON

DIRECTION OF FLOW

INDIAN INSTITUTE OF TECHNOLOGY KHARA
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURE(CICMT)

QUICK MECHANICAL OPENING MECHANISM
FOR PONTOON KULFI SYSTEM

APPROVED	.
CHECKED	

GENERAL ARRANGEMENT PLAN

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Indian Register of Shipping
CIN: U61100MH1975NPL018244

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Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166768-222113

05-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001158
Project name	Design App – Main Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI1/4
Plan Title	MAIN BARGE DECK & PROFILE 22 MAY 2022-Model
Rev.No.	1
Upload.No.	1
Submitted Date	25-September-2022
Review Status	Reviewed
Parent Plan Title	

The plan has been examined for compliance with:

. IRS Rules

Rules and Regulations for the Construction and Classification of Inland Waterways Vessels, July 2022

Notes

1. The review status Reviewed indicates:
   The stated plan has been Reviewed against appropriate Regulations/Codes/Standards.
2. The list of remarks is part of this letter. Please address these comments by reply to us.

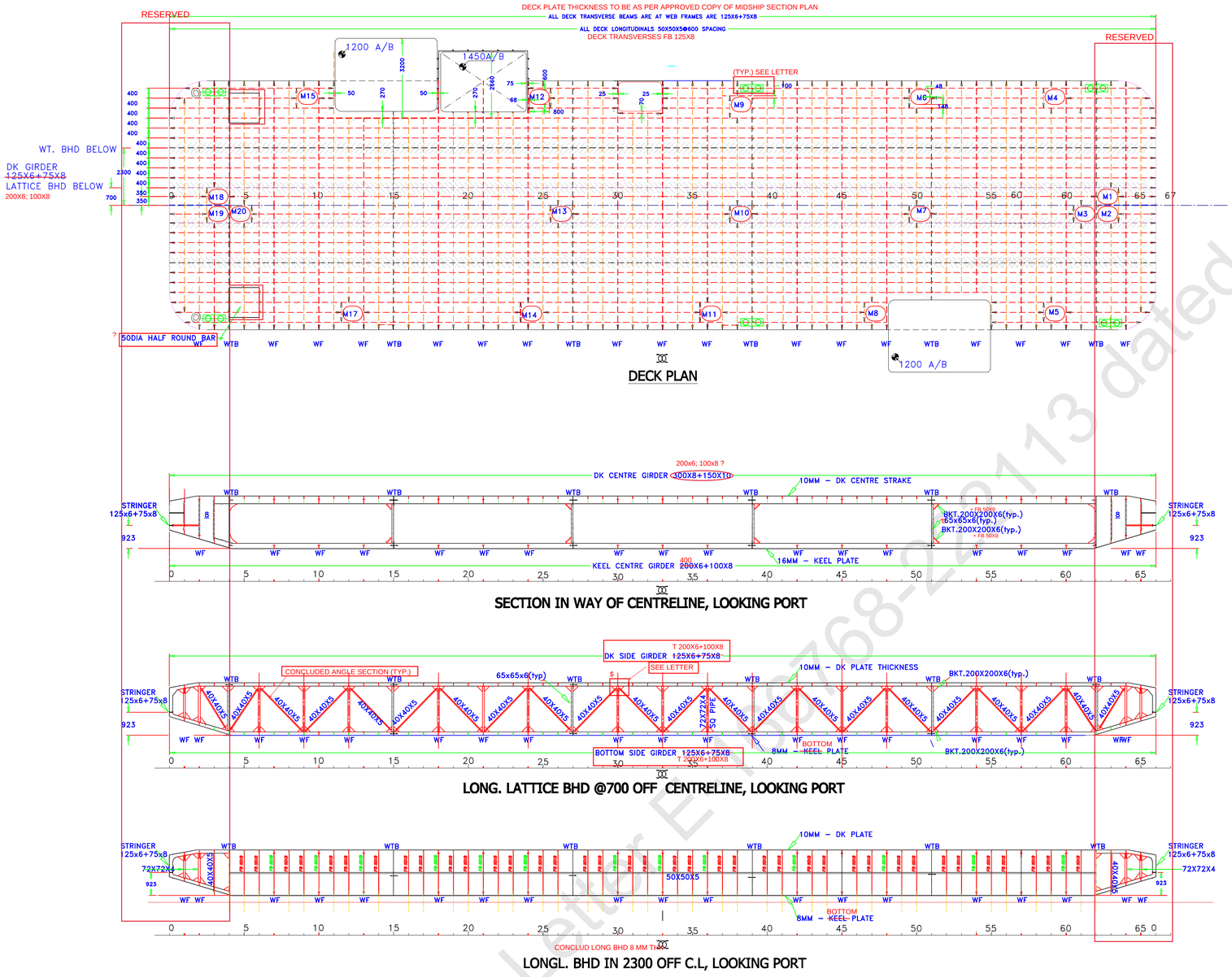
Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

This is an electronically published document and does not require signature.

Our Ref: E-166768-222113

Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	05-October-2022	Plans to be resubmitted for our final endorsement after finalization of shipyard.	For Info
2	05-October-2022	'$' : (TYP.) Connection details of stanchions and diagonals to be submitted for our review.	Head Office
3	05-October-2022	Local stiffening details in way of mooring bollards/winches is not a part of our present scrutiny & these details to be seen on a separate plan.	For Info
4	05-October-2022	All amendments indicated in the plan to be duly incorporated.	For Info
5	05-October-2022	Details in way of Forepeak & Aft peak ballast tanks is reserved & these details to be seen as and when detailed transverse sectional view is submitted by designer.	Head Office



SEE LETTER: E-166768-222113

INDIAN REGISTER OF SHIPPING MUMBAI
DATE: 05-Oct-2022
REVIEWED

AS AMENDED

Any opening not shown on the approved plan which may be cut in Rule decks or shell plating are to be properly framed and adequate compensation provided to the Surveyor's satisfaction. The loss of sectional area of longitudinal materials is to be resorted by doublers or increased thickness of plating in way of and around such openings. Adequate compensation is also to be fitted for the cutting of other strength members as may be necessary.

NOTE: ALL MATERIAL TO BE IRS GRADE A OR EQ.

PRINCIPAL DIMENSIONS (MAIN BARGE)

LENGTH OVERALL	39.60 M
BREADTH OF HULL	10.00 M
BREADTH OVERALL	13.40 M
DEPTH AT SIDE	1.95 M
DEPTH AT CENTRE	2.10 M
DRAUGHT (LOADED)	0.60 M

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURE(CICMT)

QUICK MECHANICAL OPENING MECHANISM FOR PONTOON KULFI SYSTEM

TYPICAL BULKHEAD DRAWING

APPROVED	.
CHECKED	
DRAWN	

SIZE	SCALE	DWG. NO.	CLASS	DATE	REV. NO.	SHEETS
A1	1:100	CICMT/IWAI/KULFI1/4	.	07/MAY/2022	1	1

IRCLASS
Indian Register of Shipping
CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166769-222114

30-September-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001158
Project name	Design App – Main Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI1/5
Plan Title	MAIN BARGE MIDSHIP SECTION 20MAY2022-Model
Rev.No.	1
Upload.No.	1
Submitted Date	25-September-2022
Review Status	Reviewed
Parent Plan Title	

The plan has been examined for compliance with:

. IRS Rules

Rules and Regulations for the Construction and Classification of Inland Waterways Vessels, July 2022

Notes

1. The review status Reviewed indicates:
   The stated plan has been Reviewed against appropriate Regulations/Codes/Standards.
2. The list of remarks is part of this letter.

Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

This is an electronically published document and does not require signature.

Our Ref: E-166769-222114

Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	30-September-2022	Plans to be resubmitted for our final endorsement after finalization of shipyard.	For Info
2	30-September-2022	Amendments indicated in the plan to be duly incorporated.	For Info
3	30-September-2022	Plan is reviewed considering following loads: 1. Maximum axle load on Deck= 0.75T, Number of load area per axle =2, tyre print area = 300 mm x 150 mm 2. Live load on Deck = 500 kg/m2 Should there be change in above design loads, plan need to be re-examined.	For Info

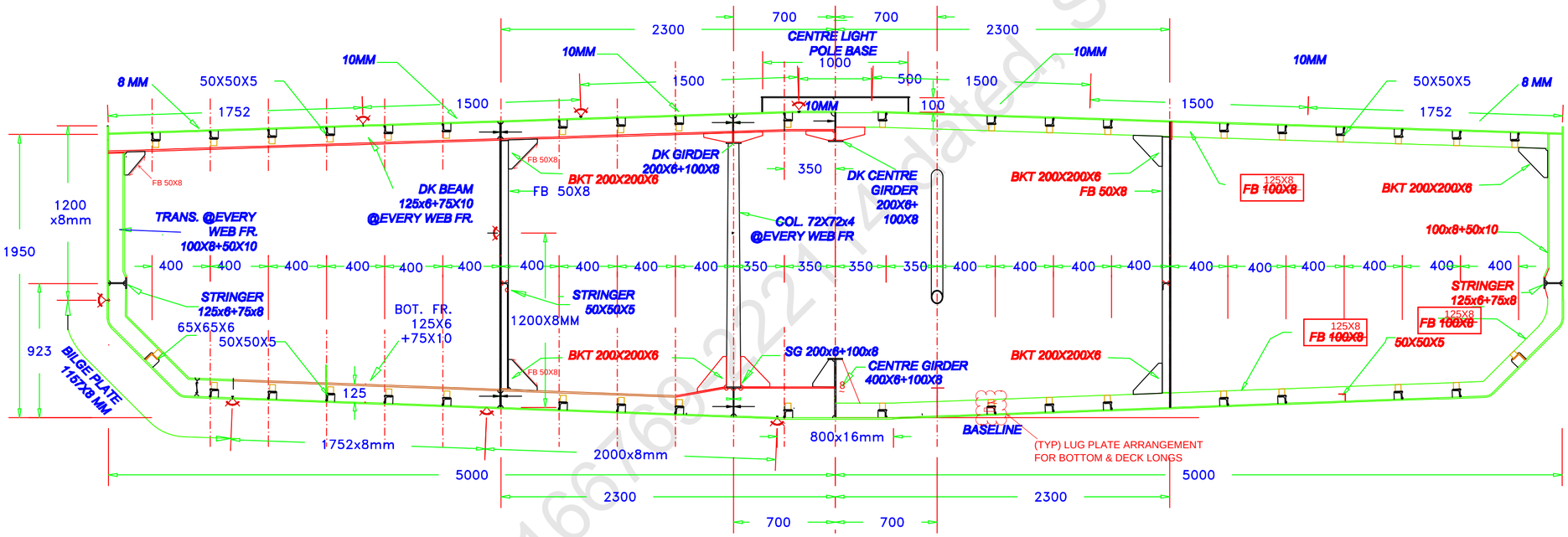
PLAN IS REVIEWED CONSIDERING FOLLOWING DESIGN LOADS :

1. MAX. AXLE LOAD = 0.75 T
   NUMBER OF LOAD AREA PER AXLE = 2
   TYRE PRINT AREA = 300 x 150

2. LIVE LOAD ON DECK = 500 KG/m2

PRINCIPAL DIMENSIONS (MAIN BARGE)

LENGTH OVERALL	39.60 M
BREADTH OF HULL	10.00 M
BREADTH OVERALL	13.40 M
DEPTH	1.95 M
DRAUGHT (LOADED)	0.75 M



SECTION IWO FR 36 , WEB FRAME

SECTION IWO FR 35 , NORMAL FRAME

CLASS NOTATION : SWASTIKA IWL, ZONE3, FERRY
SWASTIKA IY

SEE LETTER : E-166769-222114

INDIAN REGISTER OF SHIPPING MUMBAI
DATE: 30-Sep-2022
REVIEWED

AS AMENDED

MATERIAL : ALL MATERIAL TO BE IRS GRADE A OR EQ.

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURETE

QUICK MECHANICAL OPENING MECHANISM FOR PONTOON KULFI SYSTEM

APPROVED	.
CHECKED	
DRAWN	

MAIN BARGE MIDSHIP SECTION DRAWING

SIZE	SCALE	DWG. NO.	CLASS	DATE	REV. NO.	SHEETS
A2	1:25	CICMT/IWAI/KULFI1/5		07/MAY/2022	1	1

IRCLASS
Indian Register of Shipping
CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166770-222115

06-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001158
Project name	Design App – Main Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI1/6
Plan Title	MAIN BARGE TYP.BULKHEAD 07 MAY 2022-Model
Rev.No.	1
Upload.No.	1
Submitted Date	25-September-2022
Review Status	Reviewed
Parent Plan Title	

The plan has been examined for compliance with:

. IRS Rules

Rules and Regulations for the Construction and Classification of Inland Waterways Vessels, July 2022

Notes

1. The review status Reviewed indicates:
   The stated plan has been Reviewed against appropriate Regulations/Codes/Standards.
2. The list of remarks is part of this letter.

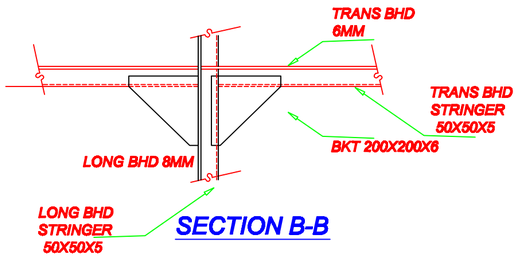
Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

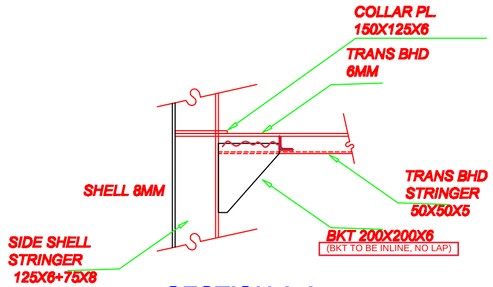
This is an electronically published document and does not require signature.

Our Ref: E-166770-222115

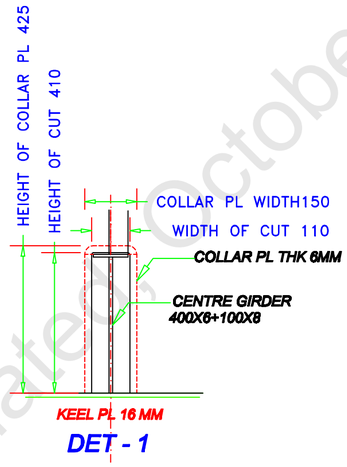
Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	06-October-2022	Plans to be resubmitted for our final endorsement after finalization of shipyard.	For Info
2	06-October-2022	Amendments indicated in the plan to be duly incorported.	For Info



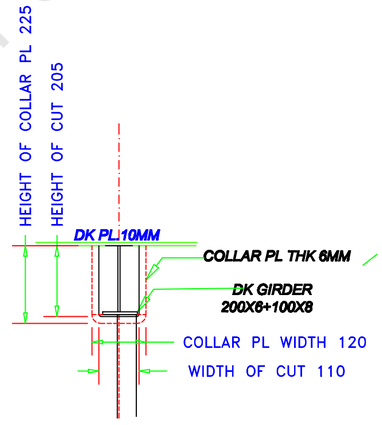
SECTION B-B



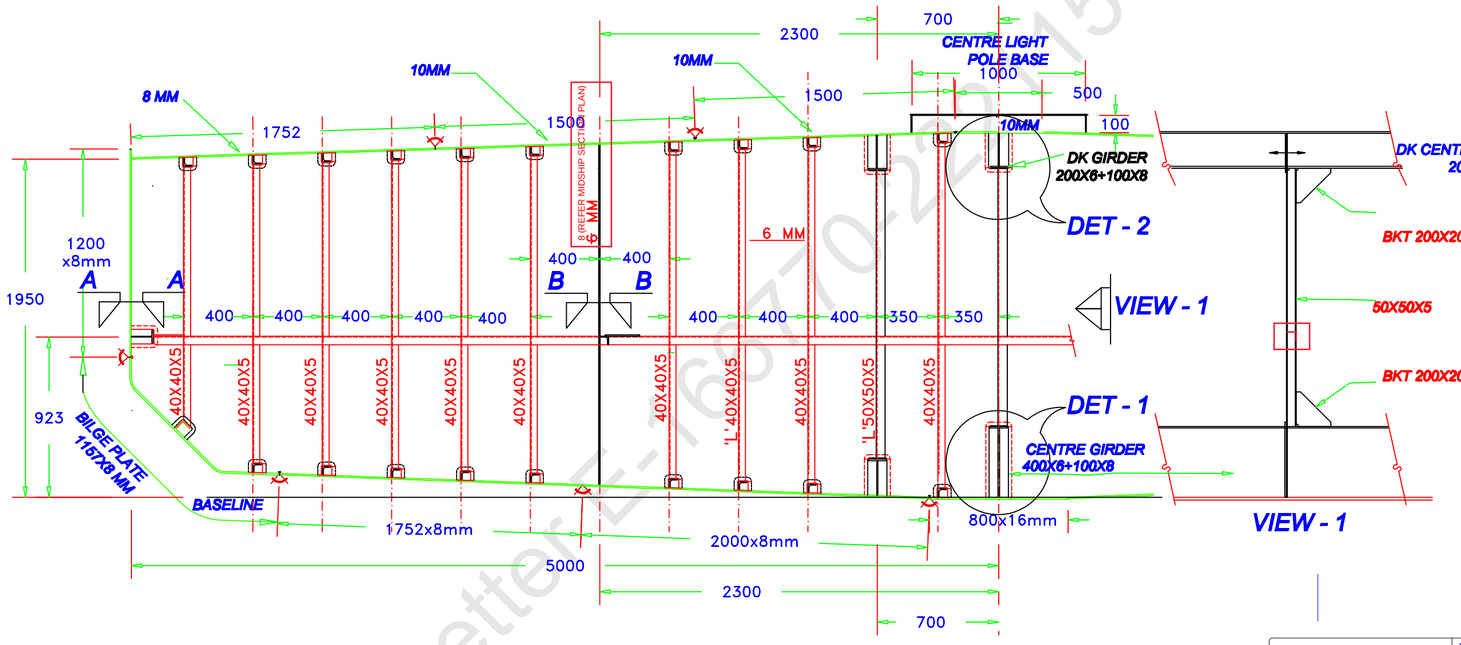
SECTION A-A



DET - 1

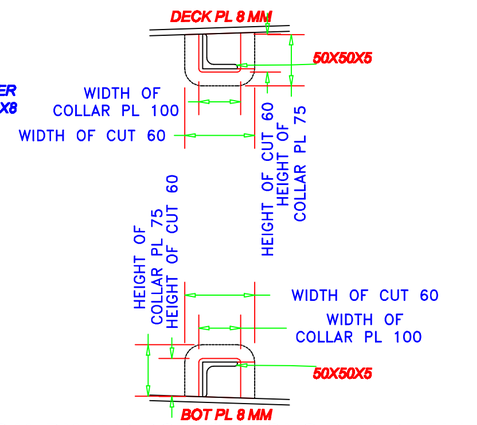


DET - 2



TYP. BHD DETAIL

VIEW - 1



TYPICAL DK AND BOTTOM LONG PEN. DETAIL

SEE LETTER : E-166770-222115

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 06-Oct-2022
REVIEWED

AS AMENDED

ALL MATERIAL TO BE IRS GRADE A OR EQ.

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURE(CICMT)

QUICK MECHANICAL OPENING MECHANISM FOR PONTOON KULFI SYSTEM

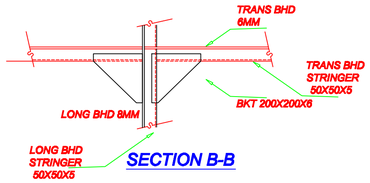
TYPICAL BULKHEAD DRAWING

APPROVED	.
CHECKED	
DRAWN	

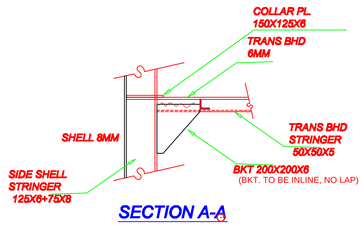
SIZE	SCALE	DWG. NO.	CLASS	DATE	REV. NO.	SHEETS
A2	1:25	CICMT/IWAI/KULFI1/6	.	07/MAY/2022	1	1

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

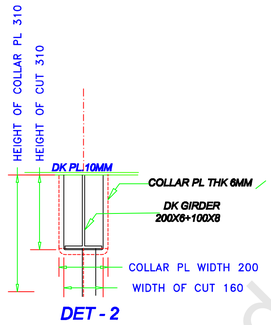
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT



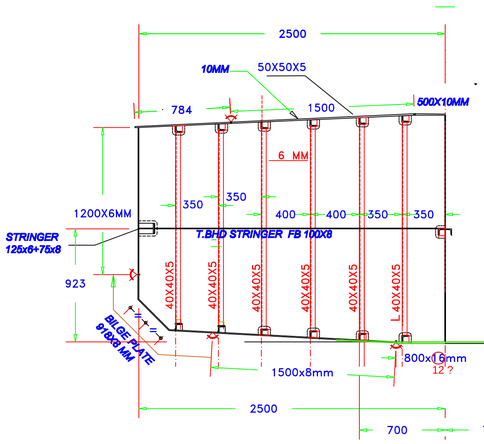
SECTION B-B



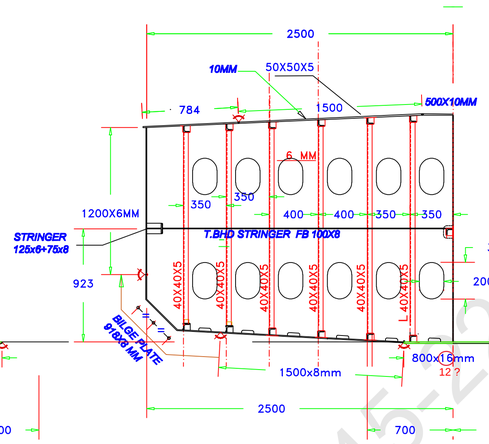
SECTION A-A



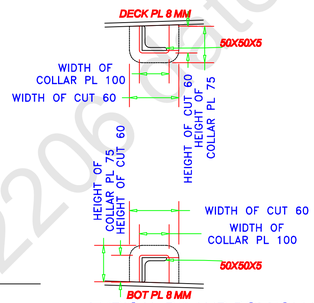
DET - 2



TYP. T. BHD DETAIL(FR 13 & 21)
PORT SHOWN STB SIMILAR BUT OPPOSITE



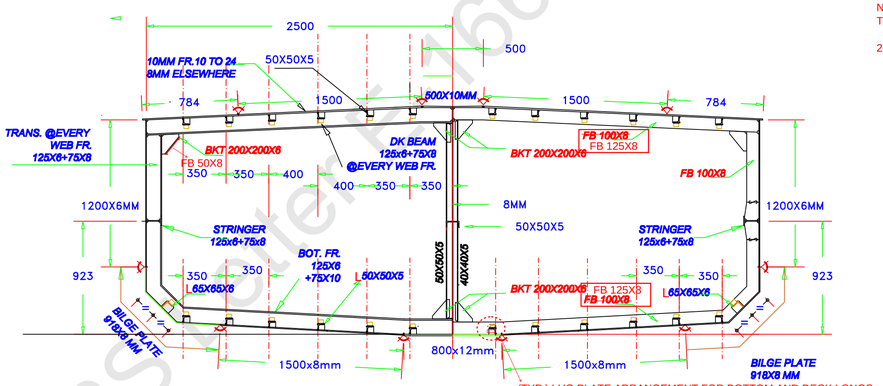
TYP. T. BHD DETAIL(FR 16 & 18
PORT SHOWN STB SIMILAR BUT OPPOSITE



TYPICAL DK AND BOTTOM LONG PEN. DETAIL

PRINCIPAL DIMENSIONS (MOORING BARGE)

LENGTH OVERALL	20.40 M
BREADTH OF HULL	05.00 M
DEPTH @ SIDE	1.75 M
DEPTH @ CENTRE	1.85 M
DRAUGHT (LOADED)	0.45 M



(TYP.) LUG PLATE ARRANGEMENT FOR BOTTOM AND DECK LONGS

SECTION IWO WEB FRAME

SECTION IWO NORMAL FRAME

PLAN IS REVIEWED CONSIDERING FOLLOWING DESIGN LOADS:-

1. MAX. AXLE LOAD = 0.75T
NUMBER OF LOAD AREA PER AXLE = 2
TYRE PRINT AREA = 300X150

2. LIVE LOAD ON DECK = 500KG/M2

MATERIAL : ALL MATERIAL TO BE IRS GRADE A OR EQ.

SEE LETTER : E-166845-222206

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 13-Oct-2022
REVIEWED

AS AMENDED

CLASS NOTATION :
SWASTIKA IW, ZONE 3, PONTOON

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURE(CICMT)

QUICK MECHANICAL OPENING MECHANISM
FOR PONTOON KULFI SYSTEM

MIDSHIP SECTION AND
BULKHEAD DRAWING – MOORED BARGES

APPROVED	.
CHECKED	
DRAWN	

SIZE	SCALE	DWG. NO.	CLASS	DATE	REV. NO.	SHEETS
A1	1:25	CICMT/TWAI/KULFM2/05		07/MAY/2022	1	1

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IRCLASS
Indian Register of Shipping
CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166845-222206

13-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001159
Project name	Design App – Mooring Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI2/5
Plan Title	BHDS AND MIDSHIP MOORED BARGE 07 MAY 2022-Model
Rev.No.	1
Upload.No.	1
Submitted Date	26-September-2022
Review Status	Reviewed
Parent Plan Title	

The plan has been examined for compliance with:

. IRS Rules

Rules and Regulations for the Construction and Classification of Inland Waterways Vessels, July 2022

Notes

1. The review status Reviewed indicates:
   The stated plan has been Reviewed against appropriate Regulations/Codes/Standards.
2. The list of remarks is part of this letter.

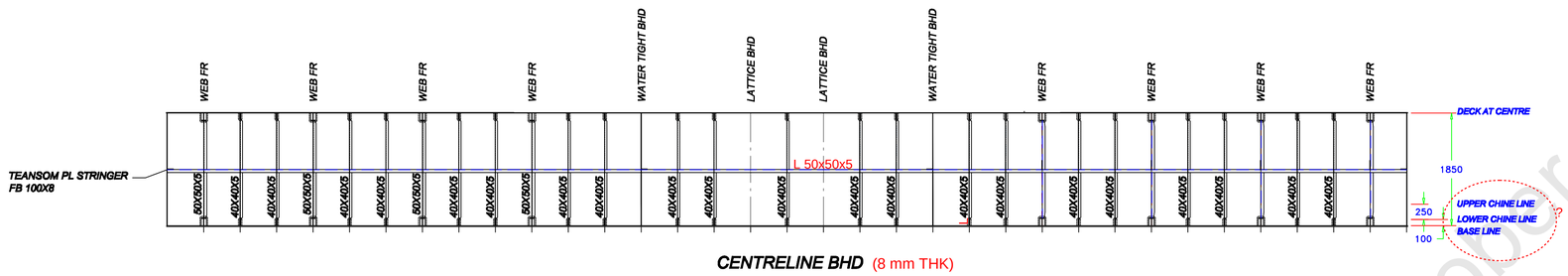
Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

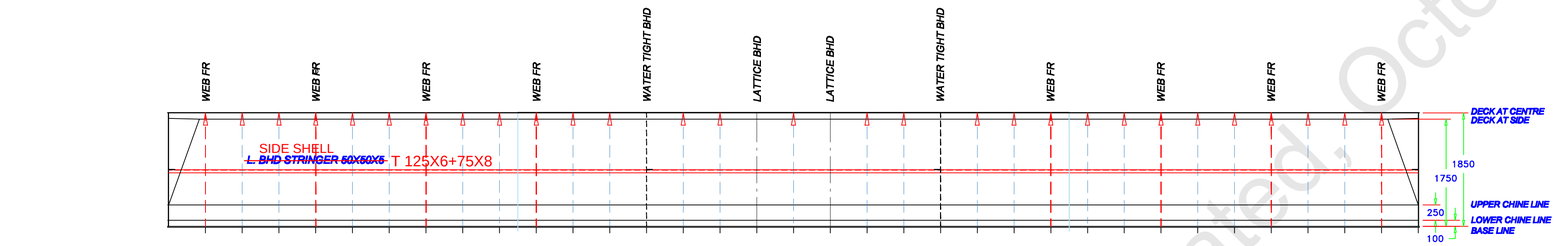
This is an electronically published document and does not require signature.

Our Ref: E-166845-222206

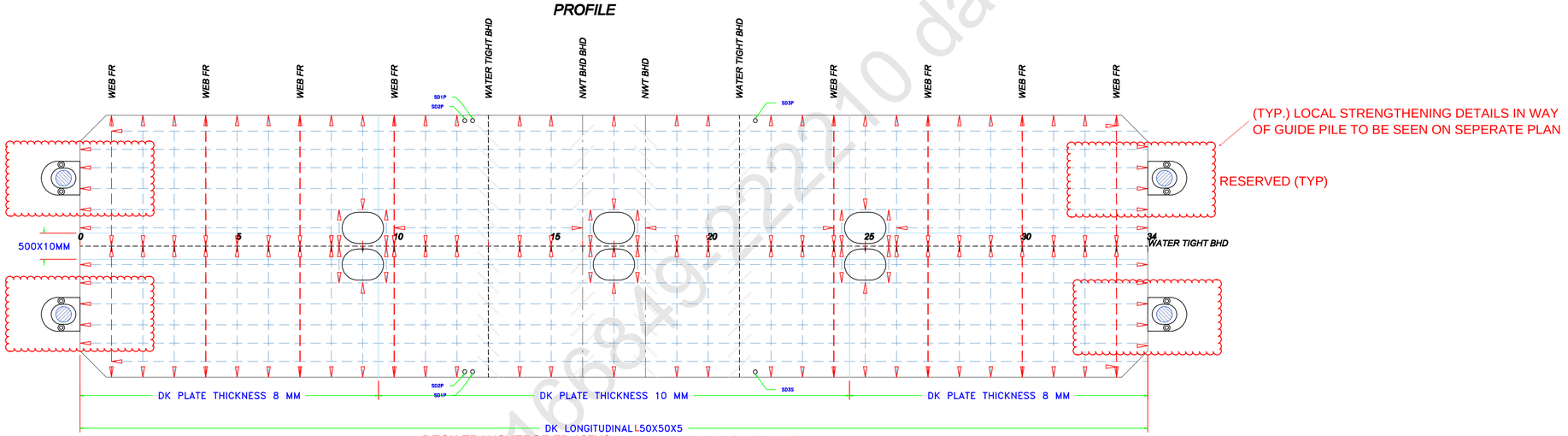
Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	13-October-2022	Plan is reviewed considering following loads: 1. Maximum axle load on Deck= 0.75T, Number of load area per axle =2, tyre print area = 300 mm x 150 mm 2. Live load on Deck = 500 kg/m2 Should there be change in above design loads, plan need to be re-examined.	For Info
2	13-October-2022	Amendments indicated in the plan to be duly incorporated.	For Info
3	13-October-2022	Plans to be resubmitted for our final endorsement after finalization of shipyard.	For Info



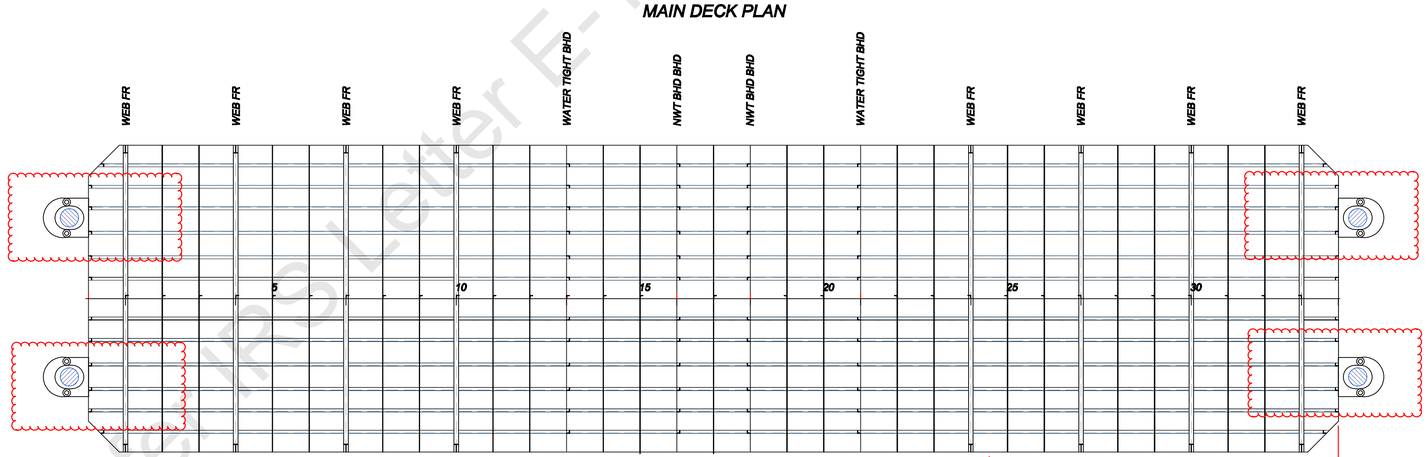
CENTRELINE BHD (8 mm THK)



PROFILE



MAIN DECK PLAN



BOTTOM PLAN

SEE LETTER : E-166849-222210

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 13-Oct-2022
REVIEWED

AS AMENDED

Any opening not shown on the approved plan which may be cut in Rule decks or shell plating are to be properly framed and adequate compensation provided to the Surveyor's satisfaction. The loss of sectional area of longitudinal materials is to be resorted by doublers or increased thickness of plating in way of and around such openings. Adequate compensation is also to be fitted for the cutting of other strength members as may be necessary.

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURE(CICMT)

QUICK MECHANICAL OPENING MECHANISM
FOR PONTOON KULFI SYSTEM

DECKS AND PROFILES
OF THE MOORED BARGES

APPROVED	.
CHECKED	
DRAWN	

SIZE	SCALE	DWG. NO.	CLASS	DATE	REV. NO.	SHEETS
A1	1:50	CICMT/IWAI/KULFI2/4	.	07/MAY/2022	1	1

IRCLASS
Indian Register of Shipping
CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166849-222210

13-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001159
Project name	Design App – Mooring Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI2/4
Plan Title	DECKS AND PROFILES MOORED BARGE 07 MAY 2022-Model
Rev.No.	1
Upload.No.	1
Submitted Date	26-September-2022
Review Status	Reviewed
Parent Plan Title	

The plan has been examined for compliance with:

. IRS Rules

Rules and Regulations for the Construction and Classification of Inland Waterways Vessels, July 2022

Notes

1. The review status Reviewed indicates:
   The stated plan has been Reviewed against appropriate Regulations/Codes/Standards.
2. The list of remarks is part of this letter. Please address these comments by reply to us.

Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

This is an electronically published document and does not require signature.

Our Ref: E-166849-222210

Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	13-October-2022	All amendments indicated in the plan to be duly incorporated.	For Info
2	13-October-2022	Plans to be resubmitted for our final endorsement after finalization of shipyard.	For Info
3	13-October-2022	Plan is reviewed considering following loads: 1. Maximum axle load on Deck= 0.75T, Number of load area per axle =2, tyre print area = 300 mm x 150 mm 2. Live load on Deck = 500 kg/m2 Should there be change in above design loads, plan need to be re-examined.	For Info
4	13-October-2022	Strengthening details in way of Pile guide is reserved & these details to be seen on separate plan as and when submitted by designer.	Head Office

IRCLASS
Indian Register of Shipping
CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166841-222202

12-October-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001159
Project name	Design App – Mooring Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI1/1
Plan Title	GENERAL ARRANGEMENT FERRY-CUM-PONTOON SYSTEM 26SEP2022 REV2-Model
Rev.No.	2
Upload.No.	1
Submitted Date	26-September-2022
Review Status	Noted
Parent Plan Title	

Notes

1. The review status Noted indicates:
   The stated plan has been noted for our information.
2. The list of remarks is part of this letter. Please address these comments by reply to us.

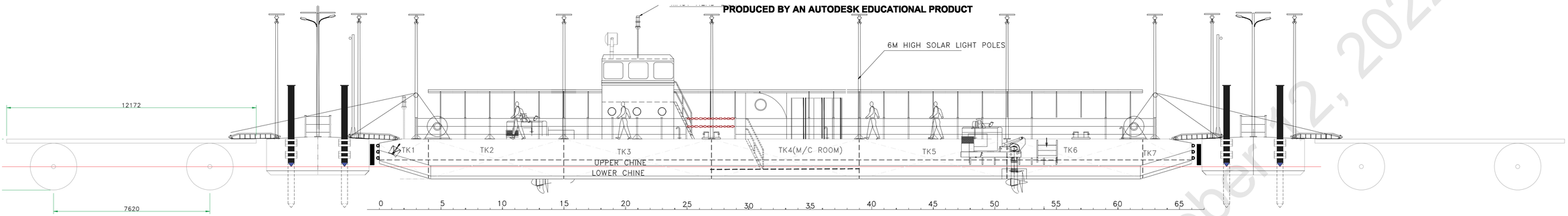
Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Amit Gandhi
Senior Surveyor

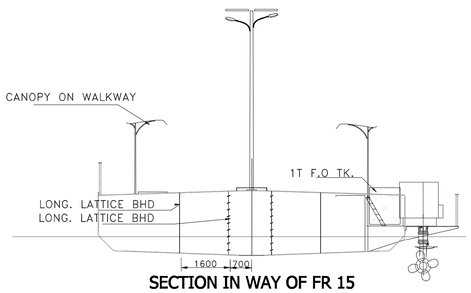
This is an electronically published document and does not require signature.

Our Ref: E-166841-222202

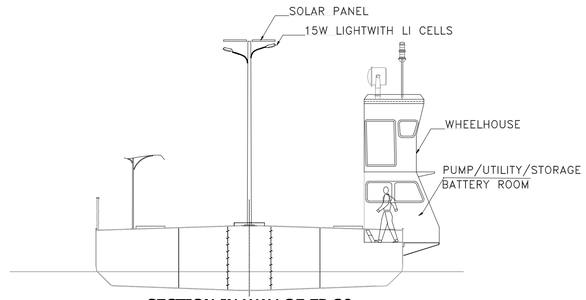
Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	12-October-2022	It is noted that mooring barge is not provided with collision & aft peak bulkhead as required by IRS Inland Waterway Rule Part 3, Ch.9, Sec.2 In view of above, calculations showing that with the ship fully loaded to summer draught on even keel, flooding of any compartment will not result in any part of the bulkhead deck /freeboard deck becoming submerged, nor result in any unacceptable loss of stability to be submitted for our review.	Head Office



PROFILE VIEW



SECTION IN WAY OF FR 15
LOOKING FORWARD



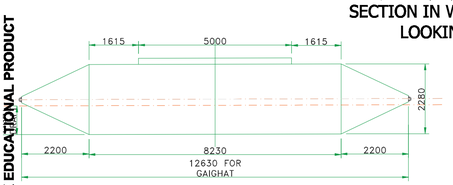
SECTION IN WAY OF FR 20
LOOKING AFT

PRINCIPAL DIMENSIONS (MAIN BARGE)

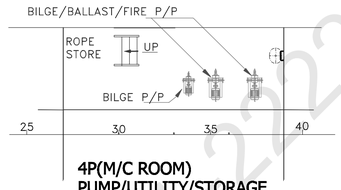
LENGTH OVERALL	39.60 M
BREADTH OF HULL	10.00 M
BREADTH OVERALL	13.40 M
DEPTH AT SIDE	1.95 M
DEPTH AT CENTRE	2.10 M
DRAUGHT (LOADED)	0.60 M

PRINCIPAL DIMENSIONS (MOORING BARGE)

LENGTH OVERALL	20.40 M
BREADTH OF HULL	5.00 M
DEPTH AT SIDE	1.75 M
DEPTH AT CENTRE	1.85 M
DRAUGHT (LOADED)	0.40 M



DIMENSIONS OF FLOATER UNIT FOR PIPA UNIT AT GAIGHAT
AS RECEIVED FROM IWAI

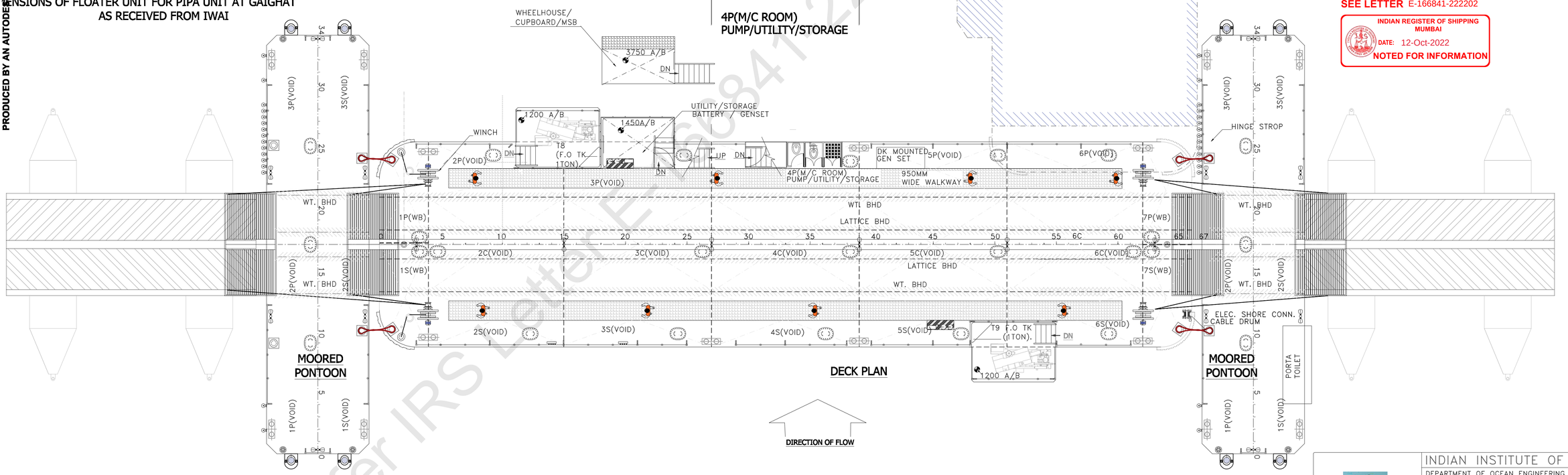


4P(M/C ROOM)
PUMP/UTILITY/STORAGE

MAIN PONTOON
IN RETRACTED
POSITION

SEE LETTER E-166841-222202

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 12-Oct-2022
NOTED FOR INFORMATION



DECK PLAN

DIRECTION OF FLOW

INDIAN INSTITUTE OF TECHNOLOGY KHARA
DEPARTMENT OF OCEAN ENGINEERING AND NAVAL ARCHITECTURE(CICMT)

QUICK MECHANICAL OPENING MECHANISM
FOR PONTOON KULFI SYSTEM

APPROVED	.
CHECKED	

GENERAL ARRANGEMENT PLAN

IRCLASS
Indian Register of Shipping
CIN: U61100MH1975NPL018244

52 A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072, India
Phone : +91 22 30519400 / +91 22 7119 9400
Fax : +91 22 2570 3611
E-mail : ho@irclass.org ★ Website : www.irclass.org

Our ref: E-166854-222215

08-December-2022

Company : Centre For Maritime & Coastal Maritime Technology

Dear Sir/Madam,

Your document (detailed below) has been reviewed.

Project Details	
Project number	MI001159
Project name	Design App – Mooring Barge (Kulfi System for IWAI)
Project Manager	Ankur Anal
Project In-Charge	Amit Waje

Document Details	
Plan No.	CICMT/IWAI/KULFI2/7
Plan Title	MooredBarge-Hydro-KN-GZ-tankcalib
Rev.No.	1
Upload.No.	1
Submitted Date	26-September-2022
Review Status	Reviewed
Parent Plan Title	

Notes

1. The review status Reviewed indicates:
   Preliminary Stability Booklet has been examined pursuant to the requirements of 2008 Intact Stability Code, Part B, Chapter 2.2 and found to be in order based on the following conditions:

   • The Loading conditions have been verified based on the estimated lightship particulars.

   • Loading conditions 1& 2 is verified for Inland unmanned tow in fair weather and against favourable weather forecast only (Significant wave height not exceeding 0.6 m).

   Stability booklet to be resubmitted for our final endorsement after finalization of shipyard.
2. The list of remarks is part of this letter.

Thanking you,
Yours Sincerely,
For INDIAN REGISTER OF SHIPPING

Ramiz Ismail
Sr. Surveyor

This is an electronically published document and does not require signature.

Our Ref: E-166854-222215

Review Comments			
Sr.No	**Comment Date**	**Description**	**Clearing Responsibility**
1	08-December-2022	The following details are to be included in the stability booklet. • General Particulars • Coordinate reference, sign conventions • Notes on stability • Stability criteria followed have to be described • Details of unprotected openings (if any) • Draft mark plan • General arrangement plan.	For Info

REV. NO.	DATE	DESCRIPTION	BY	CHK.	APP.
0	7H MAY-2022	**Moored barge: Hydrostatics, KN-curves, Tank-calibration, Intact Stability**			

DESIGN OF
QUICK MECHANICAL OPENING MECHANISM
FOR
PONTOON KULFI SYSTEM

SEE LETTER:E-166854-222215
AS AMENDED
SEE PAGE NO. 11-15

PRELIMINARY

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 08-Dec-2022
REVIEWED

HULL NO.	PROJECT
	PONTOON KULFI SYSTEM

APPROVED	
CHECKED	
PREPARED	

Moored barge: Hydrostatics, KN-curves, Tank-calibration, Intact Stability

DATE	DRAWING NO.	REV. NO.	SHEETS
02-MAY-2022	CICMT/IWAI/KULFI2/7	1	

APPENDIX 2

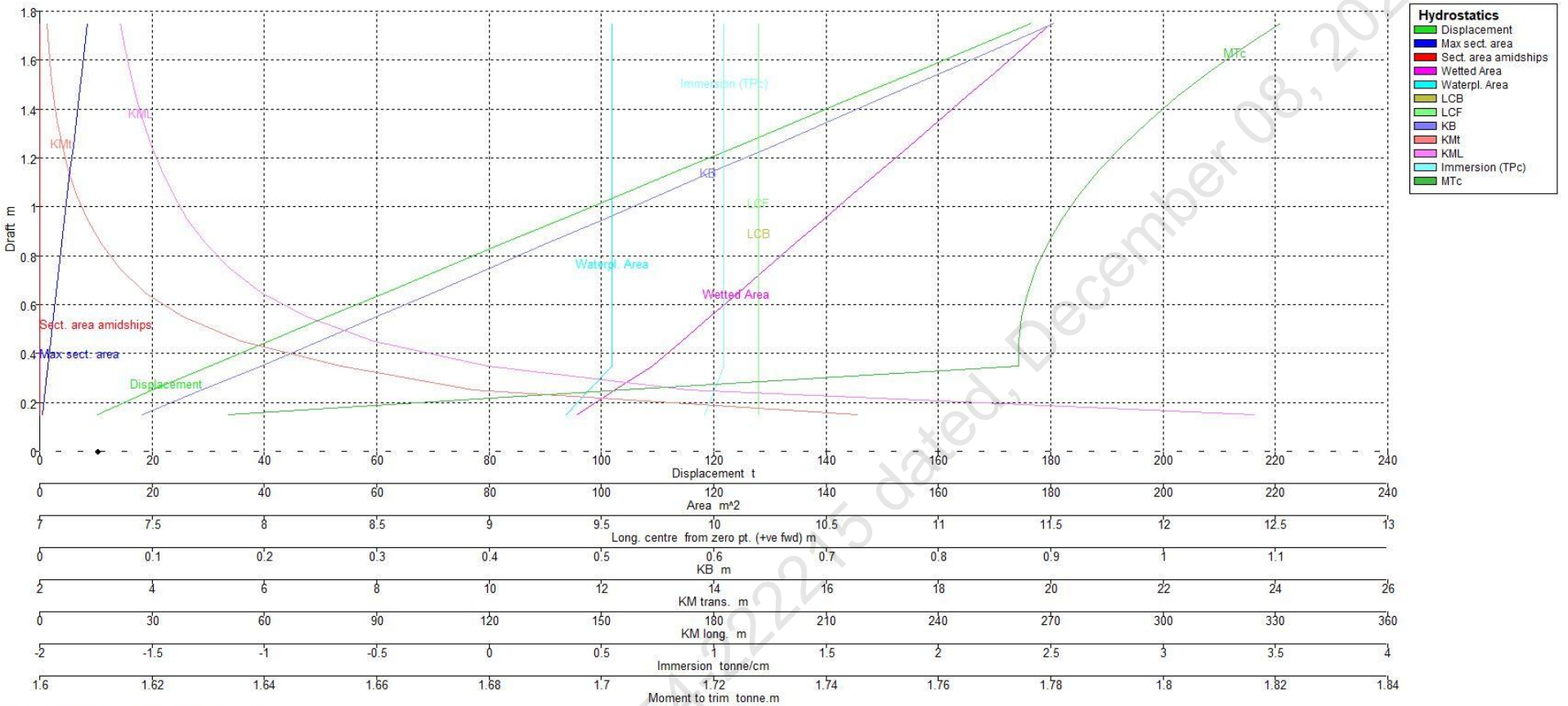
Hydrostatics - patna-moored barge_R4

Intact

Fixed Trim = 0 m (+ve by stern)

Specific gravity = 1.025; (Density = 1.025 tonne/m^3)

Draft Amidships m	**0.150**	**0.250**	**0.350**	**0.450**	**0.550**	**0.650**	**0.750**	**0.850**	**0.950**	**1.050**	**1.150**	**1.250**	**1.350**	**1.450**	**1.550**	**1.650**	**1.750**
Displacement t	10.29	20.11	30.34	40.79	51.23	61.68	72.12	82.56	93.01	103.5	113.9	124.3	134.8	145.2	155.7	166.1	176.6
Heel deg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Draft at FP m	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.950	1.050	1.150	1.250	1.350	1.450	1.550	1.650	1.750
Draft at AP m	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.950	1.050	1.150	1.250	1.350	1.450	1.550	1.650	1.750
Draft at LCF m	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.950	1.050	1.150	1.250	1.350	1.450	1.550	1.650	1.750
Trim (+ve by stern) m	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WL Length m	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400
Beam max extents on WL m	4.600	4.800	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
Wetted Area m^2	95.697	102.401	109.146	114.225	119.301	124.377	129.453	134.529	139.605	144.681	149.757	154.833	159.909	164.985	170.060	175.136	180.188
Waterpl. Area m^2	93.746	97.822	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.898	101.901
Prismatic coeff. (Cp)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Block coeff. (Cb)	0.713	0.801	0.829	0.867	0.891	0.908	0.920	0.929	0.936	0.942	0.947	0.951	0.955	0.958	0.961	0.963	0.965
Max Sect. area coeff. (Cm)	0.714	0.802	0.830	0.868	0.892	0.908	0.921	0.930	0.937	0.943	0.948	0.952	0.956	0.959	0.962	0.964	0.966
Waterpl. area coeff. (Cwp)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
LCB from zero pt. (+ve fwd) m	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200
LCF from zero pt. (+ve fwd) m	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200
KB m	0.091	0.144	0.197	0.249	0.300	0.351	0.401	0.452	0.502	0.552	0.603	0.653	0.703	0.753	0.803	0.853	0.903
KG m	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400
BMt m	16.470	9.575	7.172	5.335	4.247	3.528	3.017	2.635	2.340	2.103	1.910	1.750	1.614	1.498	1.398	1.310	1.232
BML m	324.239	173.123	119.500	88.898	70.774	58.789	50.275	43.915	38.983	35.048	31.834	29.160	26.900	24.966	23.291	21.826	20.535
GMt m	16.161	9.319	6.969	5.184	4.148	3.479	3.019	2.687	2.442	2.256	2.113	2.003	1.917	1.851	1.801	1.763	1.736
GML m	323.930	172.867	119.297	88.747	70.674	58.740	50.276	43.967	39.086	35.200	32.036	29.413	27.203	25.319	23.694	22.280	21.039
KMt m	16.561	9.719	7.369	5.584	4.548	3.879	3.419	3.087	2.842	2.656	2.513	2.403	2.317	2.251	2.201	2.163	2.136
KML m	324.330	173.267	119.697	89.147	71.074	59.140	50.676	44.367	39.486	35.600	32.436	29.813	27.603	25.719	24.094	22.680	21.439
Immersion (TPc) tonne/cm	0.961	1.003	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044	1.044
MTc tonne.m	1.634	1.704	1.774	1.774	1.775	1.776	1.777	1.779	1.782	1.785	1.789	1.793	1.797	1.802	1.808	1.814	1.821
RM at 1deg = GMt.Disp.sin(1) tonne.m	2.902	3.270	3.690	3.690	3.708	3.745	3.799	3.872	3.963	4.073	4.200	4.346	4.510	4.693	4.893	5.112	5.349



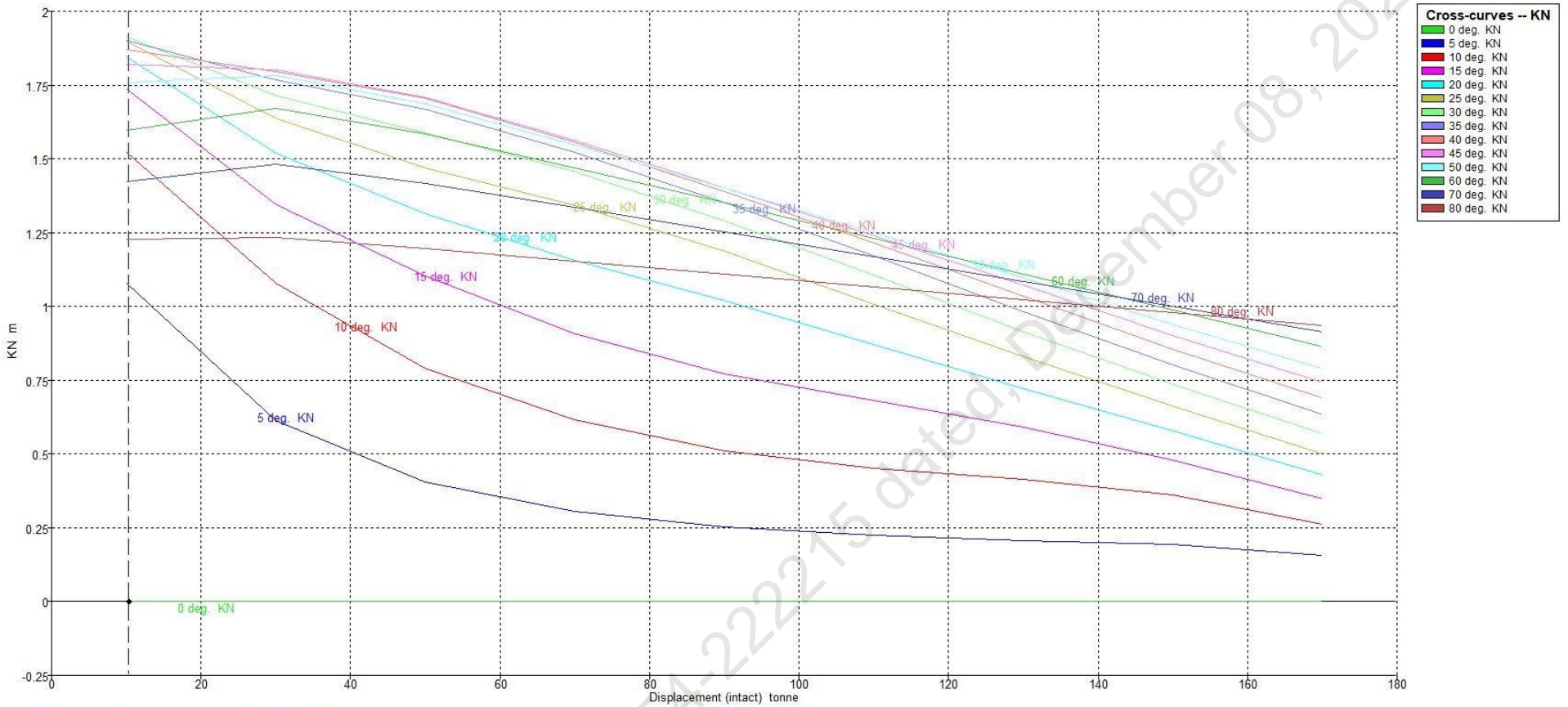
Draft = 0.000 m Displacement = 10.288 t

KN Calculation - patna-moored barge_R4

Case - Intact

Initial Trim = 0 m (+ve by stern)
Specific gravity = 1.025; (Density = 1.025 tonne/m^3)
VCG = 0 m; TCG = 0 m

Displacement (intact) tonne	Draft Amidships m	Trim (+ve by stern) m	LCG m	TCG m	Assumed VCG m	KN 0.0 deg.	KN 5.0 deg. Starb.	KN 10.0 deg. Starb.	KN 15.0 deg. Starb.	KN 20.0 deg. Starb.	KN 25.0 deg. Starb.	KN 30.0 deg. Starb.	KN 35.0 deg. Starb.	KN 40.0 deg. Starb.	KN 45.0 deg. Starb.	KN 50.0 deg. Starb.	KN 60.0 deg. Starb.	KN 70.0 deg. Starb.	KN 80.0 deg. Starb.
10.00	0.147	0.000	10.200	0.000	0.000	0.000	1.078	1.523	1.735	1.845	1.897	1.913	1.902	1.870	1.820	1.756	1.597	1.424	1.226
30.00	0.347	0.000	10.200	0.000	0.000	0.000	0.612	1.077	1.344	1.518	1.637	1.716	1.766	1.794	1.802	1.784	1.671	1.481	1.235
50.00	0.538	0.000	10.200	0.000	0.000	0.000	0.406	0.790	1.102	1.315	1.470	1.588	1.668	1.704	1.708	1.687	1.584	1.416	1.197
70.00	0.730	0.000	10.200	0.000	0.000	0.000	0.306	0.615	0.909	1.157	1.341	1.457	1.523	1.555	1.562	1.548	1.470	1.334	1.153
90.00	0.921	0.000	10.200	0.000	0.000	0.000	0.254	0.511	0.772	1.019	1.188	1.290	1.353	1.388	1.403	1.400	1.350	1.251	1.109
110.0	1.113	0.000	10.200	0.000	0.000	0.000	0.224	0.450	0.681	0.871	1.008	1.106	1.171	1.214	1.239	1.249	1.231	1.168	1.066
130.0	1.304	0.000	10.200	0.000	0.000	0.000	0.206	0.413	0.590	0.723	0.830	0.915	0.984	1.036	1.072	1.096	1.111	1.085	1.023
150.0	1.496	0.000	10.200	0.000	0.000	0.000	0.195	0.361	0.481	0.578	0.663	0.736	0.801	0.856	0.902	0.939	0.987	1.000	0.979
170.0	1.687	0.000	10.200	0.000	0.000	0.000	0.157	0.261	0.350	0.429	0.503	0.571	0.633	0.691	0.743	0.789	0.864	0.913	0.935



0 deg. KN = -0.000 m Displacement (intact) = 10.288 tonne

Equilibrium Calculation - patna-moored barge_R4

Loadcase 1 (without spuds)
Case - Intact
Free to Trim
Specific gravity = 1.025; (Density = 1.025 tonne/m^3)
Fluid analysis method: Use corrected VCG

Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Unit Volume m^3	Total Volume m^3	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m	FSM Type
Lightship	1	40.780	40.780			10.200	0.000	0.810	0.000	User Specified
Total Loadcase			40.780	0.000	0.000	10.200	0.000	0.810	0.000	
FS correction								0.000		
VCG fluid								0.810		

Draft Amidships m	0.450
Displacement t	40.78
Heel deg	0.0
Draft at FP m	0.450
Draft at AP m	0.450
Draft at LCF m	0.450
Trim (+ve by stern) m	0.000
WL Length m	20.400
Beam max extents on WL m	5.000
Wetted Area m^2	114.222
Waterpl. Area m^2	101.898
Prismatic coeff. (Cp)	0.999
Block coeff. (Cb)	0.867
Max Sect. area coeff. (Cm)	0.868
Waterpl. area coeff. (Cwp)	0.999
LCB from zero pt. (+ve fwd) m	10.200
LCF from zero pt. (+ve fwd) m	10.200
KB m	0.249
KG fluid m	0.810
BMt m	5.336
BML m	88.911
GMt corrected m	4.775
GML m	88.350
KMt m	5.585
KML m	89.160
Immersion (TPc) tonne/cm	1.044
MTc tonne.m	1.766
RM at 1deg = GMt.Disp.sin(1) tonne.m	3.398
Max deck inclination deg	0.0000
Trim angle (+ve by stern) deg	0.0000

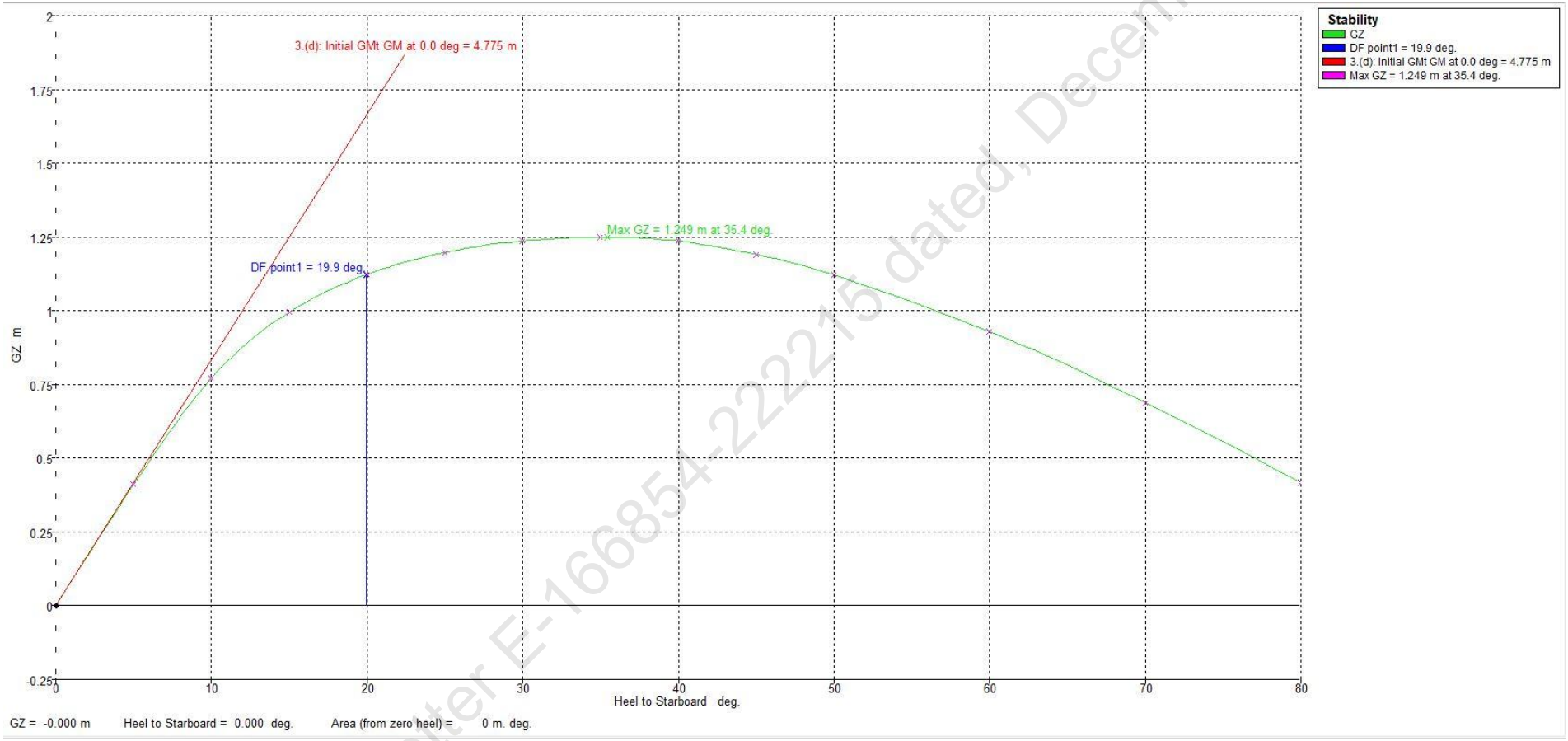
Key point	Type	Freeboard m
Margin Line (freeboard pos = 0 m)		1.224
Deck Edge (freeboard pos = 0 m)		1.3
DF point1	Downflooding point	0.75
DF point2	Downflooding point	0.75
DF point3	Downflooding point	0.75
DF point4	Downflooding point	0.75
DF point5	Downflooding point	0.75
DF point6	Downflooding point	0.75

Stability Calculation - patna-moored barge_R4

Heel to Starboard deg	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	60.0	70.0	80.0
GZ m	0.000	0.410	0.771	0.995	1.123	1.198	1.237	1.249	1.236	1.190	1.121	0.929	0.688	0.418
Area under GZ curve from zero heel m.deg	0.0000	1.0294	4.0242	8.4953	13.8190	19.6380	25.7366	31.962	38.1894	44.2639	50.0563	60.3351	68.4612	74.0031
Displacement t	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78	40.78
Draft at FP m	0.450	0.449	0.438	0.398	0.329	0.234	0.114	-0.035	-0.216	-0.426	-0.677	-1.390	-2.736	-6.622
Draft at AP m	0.450	0.449	0.438	0.398	0.329	0.234	0.114	-0.035	-0.216	-0.426	-0.677	-1.390	-2.736	-6.622
WL Length m	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400
Beam max extents on WL m	5.000	4.908	4.565	3.937	3.552	3.301	3.115	2.991	2.733	2.513	2.369	2.110	1.868	1.780
Wetted Area m^2	114.222	113.432	108.531	98.236	92.221	88.443	85.667	83.826	83.379	83.190	82.923	82.591	82.407	82.316
Waterpl. Area m^2	101.898	100.028	93.036	80.234	72.386	67.266	63.485	60.946	55.695	50.792	46.831	41.354	38.063	36.282
Prismatic coeff. (Cp)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Block coeff. (Cb)	0.867	0.731	0.590	0.569	0.558	0.551	0.550	0.553	0.592	0.637	0.656	0.714	0.807	0.875
LCB from zero pt. (+ve fwd) m	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200
LCF from zero pt. (+ve fwd) m	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200
Max deck inclination deg	0.0000	5.0000	10.0000	15.0000	20.0000	25.0000	30.0000	35.000	40.0000	45.000	50.000	60.000	70.0000	80.0000
Trim angle (+ve by stern) deg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Key point	Type	Immersion angle deg	Emergence angle deg
Margin Line (immersion pos = 19.164 m)		33.7	n/a
Deck Edge (immersion pos = 19.164 m)		36.1	n/a
DF point1	Downflooding point	19.9	0
DF point2	Downflooding point	19.9	0
DF point3	Downflooding point	19.9	0
DF point4	Downflooding point	Not immersed in positive range	0
DF point5	Downflooding point	Not immersed in positive range	0
DF point6	Downflooding point	Not immersed in positive range	0

Code	Criteria	Value	Units	Actual	Status	Margin %
Intact	3.(a)i: Angle of max GZ	15.0	deg	35.5	Pass	+136.33
Intact	3.(a)ii: Value of max. GZ	0.200	m	1.122	Pass	+461.00
Intact	3.(b): Angle of downflooding	15.0	deg	19.9	Pass	+32.91
Intact	3.(c): GZ area between limits	3.7278	m.deg	13.7488	Pass	+268.82
Intact	3.(d): Initial GMt	0.150	m	4.775	Pass	+3083.33



Stability Calculation - patna-moored barge_R4

Loadcase 2 (with spuds in upright position)

Damage Case - Intact

Free to Trim

Specific gravity = 1.025; (Density = 1.025 tonne/m^3)

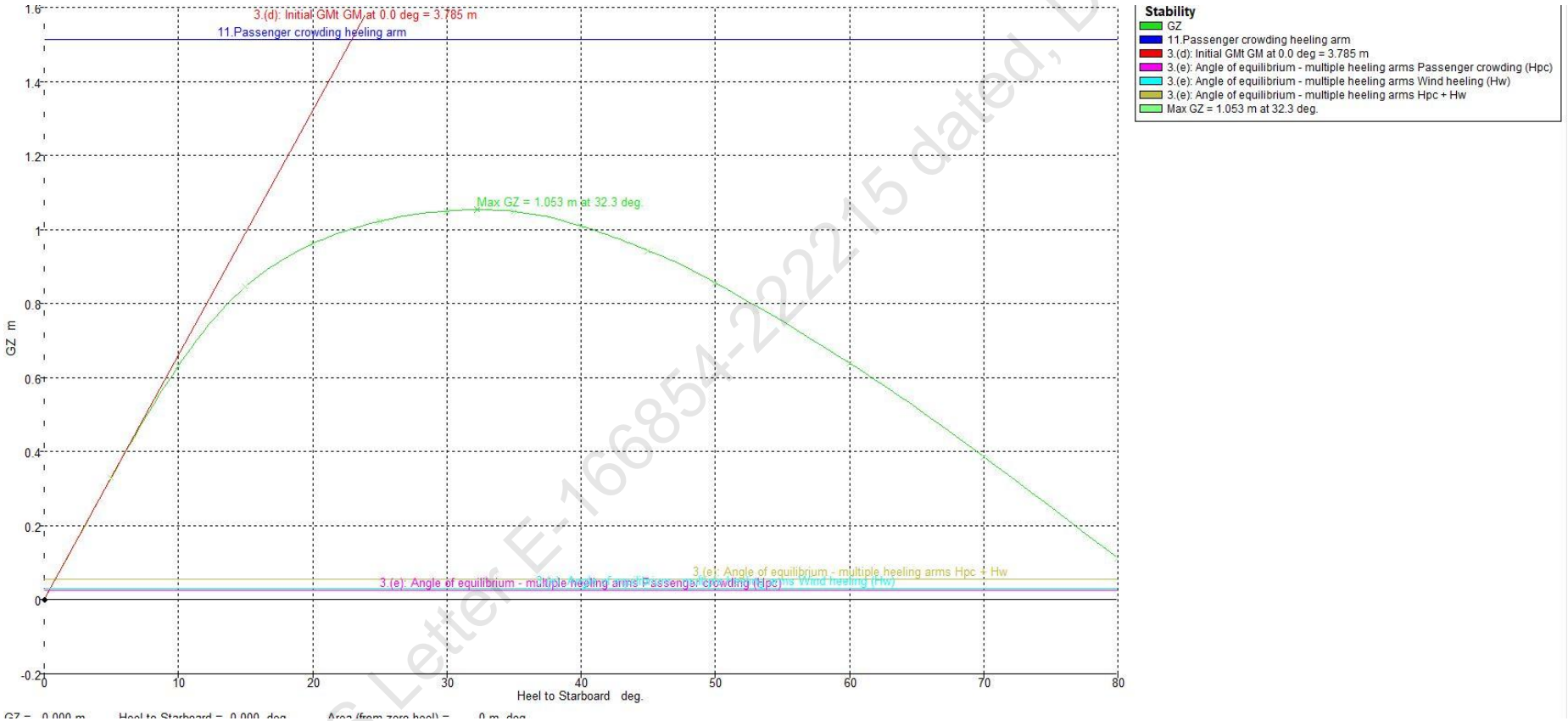
Fluid analysis method: Use corrected VCG

Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Unit Volume m^3	Total Volume m^3	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m	FSM Type
Lightship	1	40.780	40.780			10.200	0.000	0.810	0.000	User Specified
spuds	4	1.600	6.400			10.200	0.000	3.000	0.000	User Specified
Total Loadcase			47.180	0.000	0.000	10.200	0.000	1.107	0.000	
FS correction								0.000		
VCG fluid								1.107		

Heel to Starboard deg	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	60.0	70.0	80.0
GZ m	0.000	0.330	0.632	0.846	0.961	1.023	1.050	1.049	1.010	0.943	0.856	0.640	0.386	0.112
Area under GZ curve from zero heel m.deg	0.0000	0.8277	3.2564	6.9944	11.5433	16.5188	21.7117	26.9721	32.1356	37.0255	41.5366	49.0433	54.2032	56.7015
Displacement t	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18	47.18
Draft at FP m	0.511	0.511	0.504	0.476	0.417	0.333	0.224	0.088	-0.070	-0.252	-0.471	-1.090	-2.259	-5.635
Draft at AP m	0.511	0.511	0.504	0.476	0.417	0.333	0.224	0.088	-0.070	-0.252	-0.471	-1.090	-2.259	-5.635
WL Length m	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400	20.400
Beam max extents on WL m	5.000	4.966	4.830	4.188	3.778	3.511	3.335	3.060	2.744	2.505	2.320	2.049	1.886	1.798
Wetted Area m^2	117.333	116.965	115.865	105.388	98.989	94.975	92.390	91.139	90.909	90.752	90.639	90.305	90.124	90.032
Waterpl. Area m^2	101.898	101.20	98.429	85.349	77.000	71.558	67.958	62.366	55.927	51.047	47.282	41.758	38.435	36.637
Prismatic coeff. (Cp)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Block coeff. (Cb)	0.883	0.750	0.592	0.570	0.559	0.553	0.549	0.576	0.625	0.671	0.701	0.762	0.821	0.882
LCB from zero pt. (+ve fwd) m	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200
LCF from zero pt. (+ve fwd) m	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200
Max deck inclination deg	0.0000	5.0000	10.000	15.0000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	60.000	70.0000	80.0000
Trim angle (+ve by stern) deg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Key point	Type	Immersion angle deg	Emergence angle deg
Margin Line (immersion pos = 19.164 m)		30.2	n/a
Deck Edge (immersion pos = 19.164 m)		32.5	n/a

Code	Criteria	Value	Units	Actual	Status	Margin %
Intact	3.(a)i: Angle of max GZ	15.0	deg	32.3	Pass	+115.20
Intact	3.(a)ii: Value of max. GZ	0.200	m	1.053	Pass	+426.50
Intact	3.(b): Angle of downflooding	15.0	deg		Immersion angle not valid.	
Intact	3.(c): GZ area between limits	3.1513	m.deg	24.1104	Pass	+665.10
Intact	3.(d): Initial GMt	0.150	m	3.785	Pass	+2423.33
Intact	3.(e): Angle of equilibrium - multiple heeling arms				Pass	
	Passenger crowding (Hpc)	10.0	deg	0.4	Pass	+96.21
	Wind heeling (Hw)	10.0	deg	0.5	Pass	+95.25
	Hpc + Hw	12.0	deg	0.9	Pass	+92.88



TANK SOUNDINGS ARE NOT PART OF APPROVAL

Tank Calibration

Trim: 0 m; Heel: 0 deg to starboard

Tank Name	Sounding	Ullage	% Full	Capacity	Capacity	LCG	TCG	VCG	FSM
	m	m		m^3	tonne	m	m	m	tonne.m
1P(void)	1.85	0	100	34.035	34.886	3.9	-1.214	0.931	0
	1.838	0.012	99.9	34.001	34.851	3.9	-1.215	0.93	0.088
	1.718	0.132	95	32.333	33.142	3.9	-1.226	0.887	10.409
	1.63	0.22	90	30.632	31.397	3.9	-1.225	0.844	10.409
	1.543	0.307	85	28.93	29.653	3.9	-1.223	0.8	10.409
	1.456	0.394	80	27.228	27.909	3.9	-1.221	0.756	10.409
	1.369	0.481	75	25.526	26.164	3.9	-1.219	0.712	10.409
	1.281	0.569	70	23.825	24.42	3.9	-1.217	0.669	10.409
	1.194	0.656	65	22.123	22.676	3.9	-1.215	0.625	10.409
	1.107	0.743	60	20.421	20.932	3.9	-1.212	0.581	10.409
	1.02	0.83	55	18.719	19.187	3.9	-1.208	0.537	10.409
	0.932	0.918	50	17.018	17.443	3.9	-1.204	0.493	10.409
	0.845	1.005	45	15.316	15.699	3.9	-1.199	0.449	10.409
	0.758	1.092	40	13.614	13.954	3.9	-1.193	0.405	10.409
	0.67	1.18	35	11.912	12.21	3.9	-1.184	0.361	10.409
	0.583	1.267	30	10.211	10.466	3.9	-1.174	0.317	10.409
	0.496	1.354	25	8.509	8.721	3.9	-1.158	0.273	10.409
	0.409	1.441	20	6.807	6.977	3.9	-1.135	0.228	10.409
	0.321	1.529	15	5.105	5.233	3.9	-1.098	0.182	10.053
	0.231	1.619	10	3.404	3.489	3.9	-1.04	0.134	8.995
	0.138	1.712	5	1.702	1.744	3.9	-0.913	0.084	7.977
	0.009	1.841	0.1	0.034	0.035	3.9	-0.244	0.005	0.121
	0	1.85	0	0	0	3.9	-0.2	0	0
1S(void)	1.85	0	100	34.033	34.884	3.901	1.214	0.931	0
	1.838	0.012	99.9	33.999	34.849	3.901	1.215	0.93	0.088
	1.718	0.132	95	32.331	33.14	3.901	1.226	0.887	10.409
	1.63	0.22	90	30.63	31.395	3.901	1.225	0.844	10.409
	1.543	0.307	85	28.928	29.651	3.901	1.223	0.8	10.409
	1.456	0.394	80	27.226	27.907	3.901	1.221	0.756	10.409
	1.369	0.481	75	25.525	26.163	3.901	1.219	0.712	10.409
	1.281	0.569	70	23.823	24.419	3.901	1.217	0.669	10.409

	1.194	0.656	65	22.121	22.674	3.901	1.215	0.625	10.409
	1.107	0.743	60	20.42	20.93	3.901	1.212	0.581	10.409
	1.02	0.83	55	18.718	19.186	3.901	1.208	0.537	10.409
	0.932	0.918	50	17.016	17.442	3.901	1.204	0.493	10.409
	0.845	1.005	45	15.315	15.698	3.901	1.199	0.449	10.409
	0.758	1.092	40	13.613	13.953	3.901	1.193	0.405	10.409
	0.67	1.18	35	11.912	12.209	3.901	1.184	0.361	10.409
	0.583	1.267	30	10.21	10.465	3.901	1.174	0.317	10.409
	0.496	1.354	25	8.508	8.721	3.901	1.158	0.273	10.409
	0.409	1.441	20	6.807	6.977	3.901	1.135	0.228	10.409
	0.321	1.529	15	5.105	5.233	3.901	1.098	0.182	10.053
	0.231	1.619	10	3.403	3.488	3.901	1.04	0.134	8.995
	0.138	1.712	5	1.702	1.744	3.901	0.913	0.084	7.977
	0.009	1.841	0.1	0.034	0.035	3.901	0.244	0.005	0.121
	0	1.85	0	0	0	3.901	0.2	0	0
2P(void)	1.85	0	100	20.857	21.378	10.2	-1.214	0.931	0
	1.838	0.012	99.9	20.836	21.357	10.2	-1.215	0.93	0.054
	1.718	0.132	95	19.814	20.31	10.2	-1.226	0.887	6.38
	1.63	0.22	90	18.771	19.241	10.2	-1.225	0.844	6.379
	1.543	0.307	85	17.728	18.172	10.2	-1.223	0.8	6.379
	1.456	0.394	80	16.686	17.103	10.2	-1.221	0.756	6.379
	1.369	0.481	75	15.643	16.034	10.2	-1.219	0.712	6.379
	1.281	0.569	70	14.6	14.965	10.2	-1.217	0.669	6.379
	1.194	0.656	65	13.557	13.896	10.2	-1.215	0.625	6.379
	1.107	0.743	60	12.514	12.827	10.2	-1.212	0.581	6.379
	1.02	0.83	55	11.471	11.758	10.2	-1.208	0.537	6.379
	0.932	0.918	50	10.429	10.689	10.2	-1.204	0.493	6.379
	0.845	1.005	45	9.386	9.62	10.2	-1.199	0.449	6.379
	0.758	1.092	40	8.343	8.551	10.2	-1.193	0.405	6.379
	0.67	1.18	35	7.3	7.482	10.2	-1.184	0.361	6.379
	0.583	1.267	30	6.257	6.414	10.2	-1.174	0.317	6.379
	0.496	1.354	25	5.214	5.345	10.2	-1.158	0.273	6.379
	0.409	1.441	20	4.171	4.276	10.2	-1.135	0.228	6.379
	0.321	1.529	15	3.129	3.207	10.2	-1.098	0.182	6.161
	0.231	1.619	10	2.086	2.138	10.2	-1.04	0.134	5.512
	0.138	1.712	5	1.043	1.069	10.2	-0.913	0.084	4.888

TANK SOUNDINGS ARE NOT PART OF APPROVAL

	0.009	1.841	0.1	0.021	0.021	10.2	-0.244	0.005	0.074
	0	1.85	0	0	0	10.2	-0.2	0	0
2S(void)	1.85	0	100	20.857	21.378	10.2	1.214	0.931	0
	1.838	0.012	99.9	20.836	21.357	10.2	1.215	0.93	0.054
	1.718	0.132	95	19.814	20.31	10.2	1.226	0.887	6.38
	1.63	0.22	90	18.771	19.241	10.2	1.225	0.844	6.379
	1.543	0.307	85	17.728	18.172	10.2	1.223	0.8	6.379
	1.456	0.394	80	16.686	17.103	10.2	1.221	0.756	6.379
	1.369	0.481	75	15.643	16.034	10.2	1.219	0.712	6.379
	1.281	0.569	70	14.6	14.965	10.2	1.217	0.669	6.379
	1.194	0.656	65	13.557	13.896	10.2	1.215	0.625	6.379
	1.107	0.743	60	12.514	12.827	10.2	1.212	0.581	6.379
	1.02	0.83	55	11.471	11.758	10.2	1.208	0.537	6.379
	0.932	0.918	50	10.429	10.689	10.2	1.204	0.493	6.379
	0.845	1.005	45	9.386	9.62	10.2	1.199	0.449	6.379
	0.758	1.092	40	8.343	8.551	10.2	1.193	0.405	6.379
	0.67	1.18	35	7.3	7.482	10.2	1.184	0.361	6.379
	0.583	1.267	30	6.257	6.414	10.2	1.174	0.317	6.379
	0.496	1.354	25	5.214	5.345	10.2	1.158	0.273	6.379
	0.409	1.441	20	4.171	4.276	10.2	1.135	0.228	6.379
	0.321	1.529	15	3.129	3.207	10.2	1.098	0.182	6.161
	0.231	1.619	10	2.086	2.138	10.2	1.04	0.134	5.512
	0.138	1.712	5	1.043	1.069	10.2	0.913	0.084	4.888
	0.009	1.841	0.1	0.021	0.021	10.2	0.244	0.005	0.074
	0	1.85	0	0	0	10.2	0.2	0	0
3P(void)	1.85	0	100	34.035	34.886	16.5	-1.214	0.931	0
	1.838	0.012	99.9	34.001	34.851	16.5	-1.215	0.93	0.088
	1.718	0.132	95	32.333	33.142	16.5	-1.226	0.887	10.409
	1.63	0.22	90	30.632	31.397	16.5	-1.225	0.844	10.409
	1.543	0.307	85	28.93	29.653	16.5	-1.223	0.8	10.409
	1.456	0.394	80	27.228	27.909	16.5	-1.221	0.756	10.409
	1.369	0.481	75	25.526	26.164	16.5	-1.219	0.712	10.409
	1.281	0.569	70	23.825	24.42	16.5	-1.217	0.669	10.409
	1.194	0.656	65	22.123	22.676	16.5	-1.215	0.625	10.409
	1.107	0.743	60	20.421	20.932	16.5	-1.212	0.581	10.409

	1.02	0.83	55	18.719	19.187	16.5	-1.208	0.537	10.409
	0.932	0.918	50	17.018	17.443	16.5	-1.204	0.493	10.409
	0.845	1.005	45	15.316	15.699	16.5	-1.199	0.449	10.409
	0.758	1.092	40	13.614	13.954	16.5	-1.193	0.405	10.409
	0.67	1.18	35	11.912	12.21	16.5	-1.184	0.361	10.409
	0.583	1.267	30	10.211	10.466	16.5	-1.174	0.317	10.409
	0.496	1.354	25	8.509	8.721	16.5	-1.158	0.273	10.409
	0.409	1.441	20	6.807	6.977	16.5	-1.135	0.228	10.409
	0.321	1.529	15	5.105	5.233	16.5	-1.098	0.182	10.053
	0.231	1.619	10	3.404	3.489	16.5	-1.04	0.134	8.995
	0.138	1.712	5	1.702	1.744	16.5	-0.913	0.084	7.977
	0.009	1.841	0.1	0.034	0.035	16.5	-0.244	0.005	0.121
	0	1.85	0	0	0	16.5	-0.2	0	0
3S(void)	1.85	0	100	34.035	34.886	16.5	1.214	0.931	0
	1.838	0.012	99.9	34.001	34.851	16.5	1.215	0.93	0.088
	1.718	0.132	95	32.333	33.142	16.5	1.226	0.887	10.409
	1.63	0.22	90	30.632	31.397	16.5	1.225	0.844	10.409
	1.543	0.307	85	28.93	29.653	16.5	1.223	0.8	10.409
	1.456	0.394	80	27.228	27.909	16.5	1.221	0.756	10.409
	1.369	0.481	75	25.526	26.164	16.5	1.219	0.712	10.409
	1.281	0.569	70	23.825	24.42	16.5	1.217	0.669	10.409
	1.194	0.656	65	22.123	22.676	16.5	1.215	0.625	10.409
	1.107	0.743	60	20.421	20.932	16.5	1.212	0.581	10.409
	1.02	0.83	55	18.719	19.187	16.5	1.208	0.537	10.409
	0.932	0.918	50	17.018	17.443	16.5	1.204	0.493	10.409
	0.845	1.005	45	15.316	15.699	16.5	1.199	0.449	10.409
	0.758	1.092	40	13.614	13.954	16.5	1.193	0.405	10.409
	0.67	1.18	35	11.912	12.21	16.5	1.184	0.361	10.409
	0.583	1.267	30	10.211	10.466	16.5	1.174	0.317	10.409
	0.496	1.354	25	8.509	8.721	16.5	1.158	0.273	10.409
	0.409	1.441	20	6.807	6.977	16.5	1.135	0.228	10.409
	0.321	1.529	15	5.105	5.233	16.5	1.098	0.182	10.053
	0.231	1.619	10	3.404	3.489	16.5	1.04	0.134	8.995
	0.138	1.712	5	1.702	1.744	16.5	0.913	0.084	7.977
	0.009	1.841	0.1	0.034	0.035	16.5	0.244	0.005	0.121
	0	1.85	0	0	0	16.5	0.2	0	0