

Robishaw Engineering, Inc.

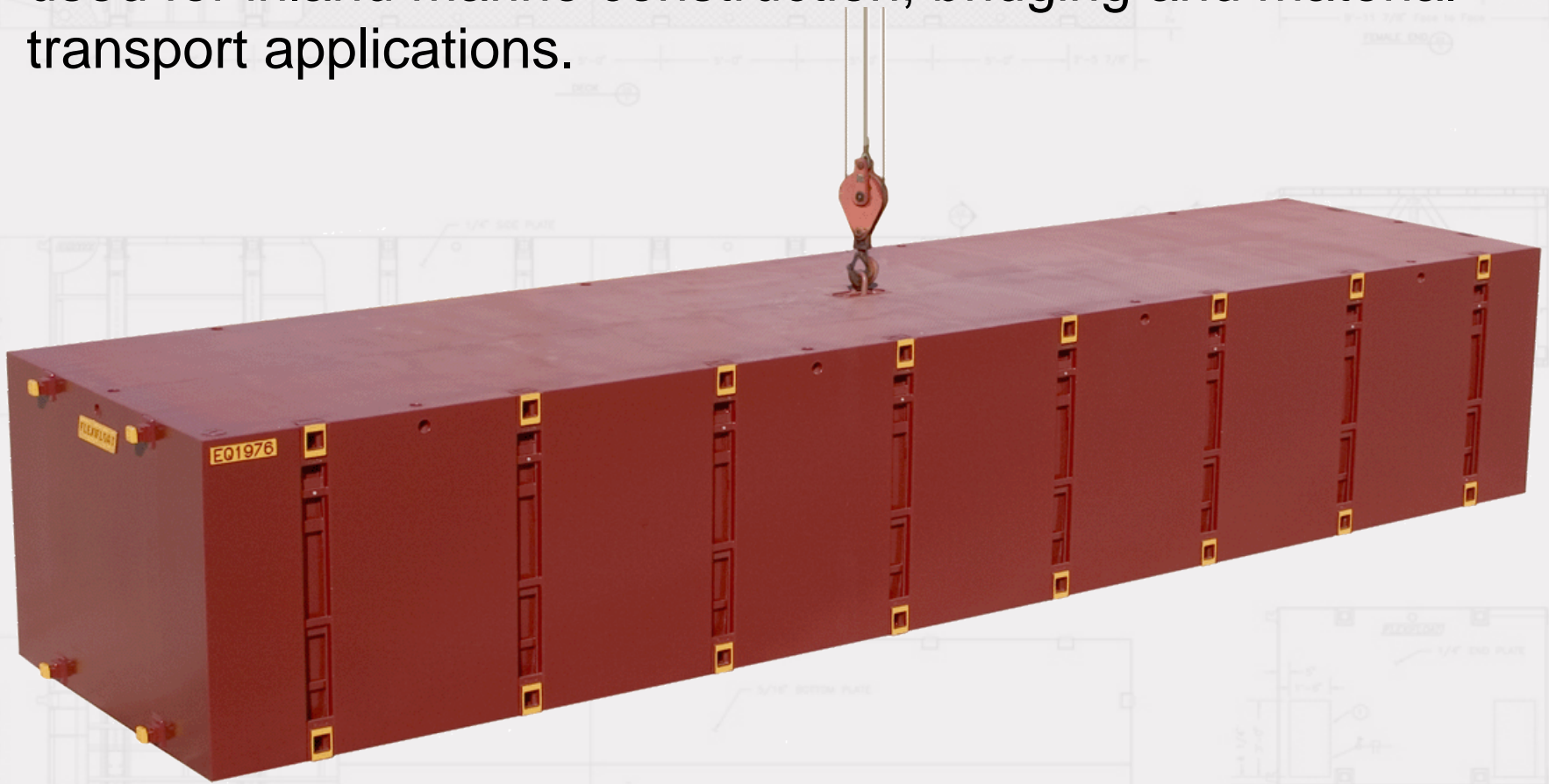
Flexifloat



CONSTRUCTION SYSTEMS

Justin R. Warren, P.E.
Applications Engineer

The **Flexifloat Construction System** is a combination of portable, interlocking modular barges and attachments used for inland marine construction, bridging and material transport applications.

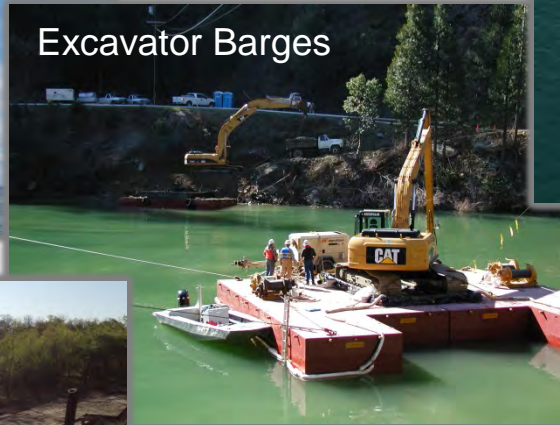


Flexifloat applications include...

Crane Barges



Excavator Barges



Dive Platforms



Transport Barges



Pump Platforms



Floating Bridges



Core Drilling Platforms



Applications are endless...

Pipeline Repair/Installation



Hovercraft



Oil Exploration



Floating Causeways



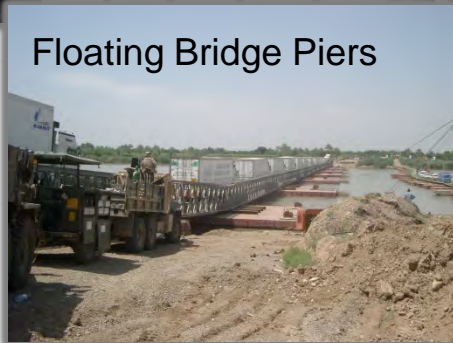
Self-Elevating Platforms



Dock Assemblies



Floating Bridge Piers



Ferry Terminals



The **Flexifloat Construction System** was invented by Alces Paul Robishaw in 1955.

1955 – First Flexifloat application was in Manila, UT by Associated Pipeline Contractors.

Model J Series Flexifloats (30' & 15' x 7.5' x 42")

1956 – Robishaw Engineering, Inc. is incorporated.

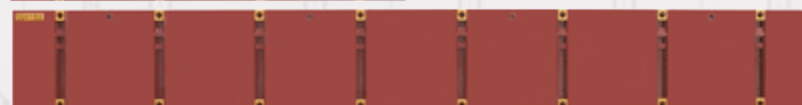
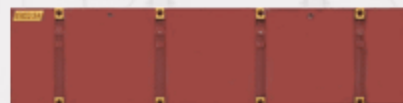
1959 – Robishaw began building the H50 Series Flexifloats (30' & 15' x 7.5' x 46")

1960 – Robishaw began building the S50 Series Flexifloats (40' & 20' x 10' x 5')

1968 – Robishaw began building the S70 Series Flexifloats (40' & 20' x 10' x 7')



Flexifloat pontoons are built in three “series” or hull depths with two standard lengths per series.



Series H-50 (3.8' Hull Depth)

Unit Width 7.5' / Length 15' & 30'

Series S-50 (5' Hull Depth)

Unit Width 10' / Length 20' & 40'

Series S-70 (7' Hull Depth)

Unit Width 10' / Length 20' & 40'

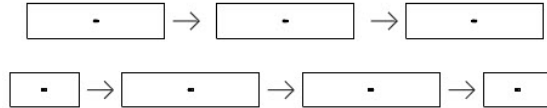
Flexifloat Assembly

Flexifloats are typically delivered to the jobsite by tractor trailer and unloaded using a crane. They are designed to be assembled in the water using ropes, 5' pry bar, & a sledge hammer.

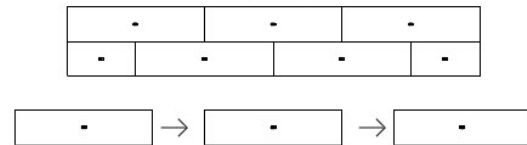


Flexifloat Assembly

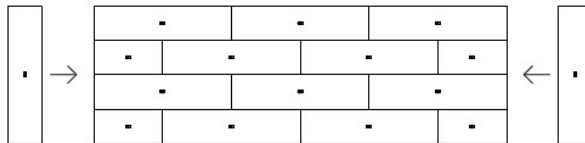
STEP 1: Assemble rows, locking floats end to end.



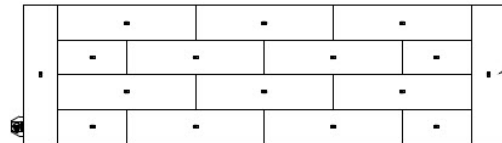
STEP 3: Assemble 3rd row, locking floats end to end.



STEP 5: When rows are complete, add end caps if applicable.



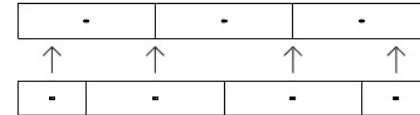
STEP 7: Add deck equipment once barge assembly is complete.



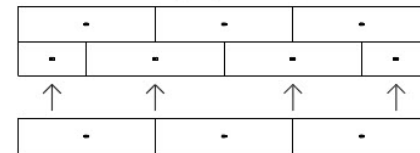
Configuration should look identical to the sketch provided by Robishaw Engineering.

Poorly configured assembly may not provide adequate lock strength.

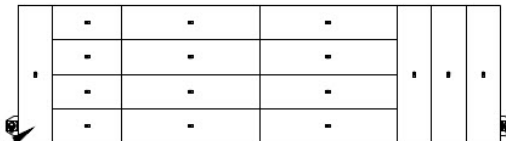
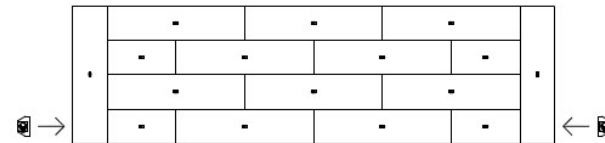
STEP 2: Assemble completed rows, locking floats side to side.



STEP 4: Continue adding required rows.



STEP 6: Add attachments once all floats are assembled.

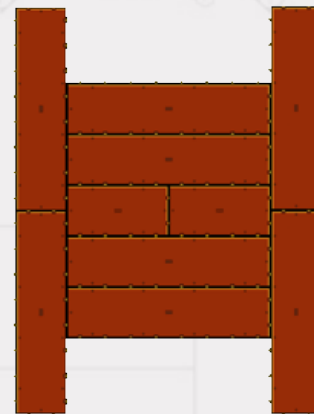
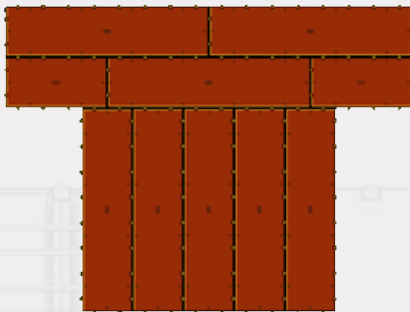
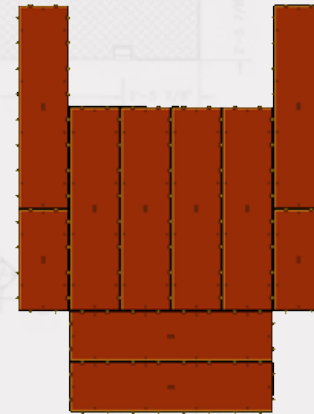
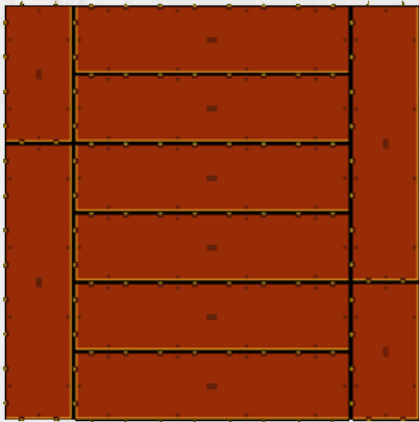


WARNING: The use of Flexifloat equipment requires competent personnel and the application of engineering principles. The improper use, operation, modification, maintenance or repair of Flexifloat equipment can be dangerous and result in property damage, injury or death. Contact Robishaw Engineering, Inc. (REI) or other qualified professional for assistance prior to use. REI offers its engineering services free of charge to all Flexifloat users. Equipment used on or with Flexifloat barges must have the manufacturer's approval for use in marine applications.

PROPERTY OF ROBISHAW ENGINEERING, INC.
This drawing is confidential and contains trade secrets and other information proprietary to us. Disclosure to you is expressly conditioned upon your assent that it is not to be copied, reproduced or exhibited to other parties, without consent, but it is to be used only with reference to contracts or proposals of this company. If or any copies thereof shall be returned promptly upon request.

Robishaw Engineering, Inc.
Houston, Texas 866.877.1766
www.flexifloat.com
Flexifloat Barge Assembly
DRAWN: JRW DATE: 05/12/16 SKETCH NO: Assembly 101

MODULAR CONFIGURATIONS



A variety of special purpose pontoons are available within each series.



End Rakes



Loading Ramps

Robishaw Engineering offers a variety of attachments for different Flexifloat applications.

- Winch Systems
- Holding Spuds
- Elevating Systems
- Ancillary Attachments



Excavator Barge Applications

Minimum information required for quote

- Size/Weight of excavator?
- Job Location?
- Water Depth?
- When are Flexifloats needed?
- How long are Flexifloats needed?

Komatsu 220 on S50



CAT 245 on S70



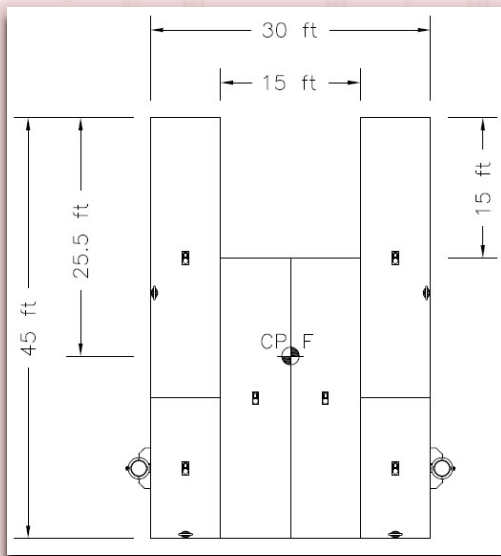
Volvo 380 on S70



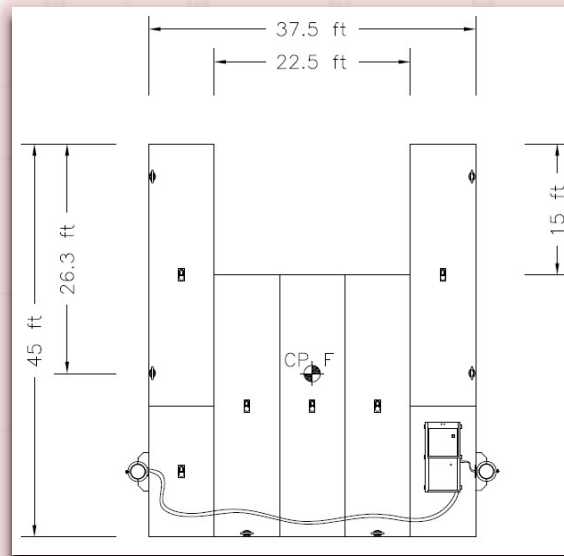
Common H50 barge assemblies for excavators.



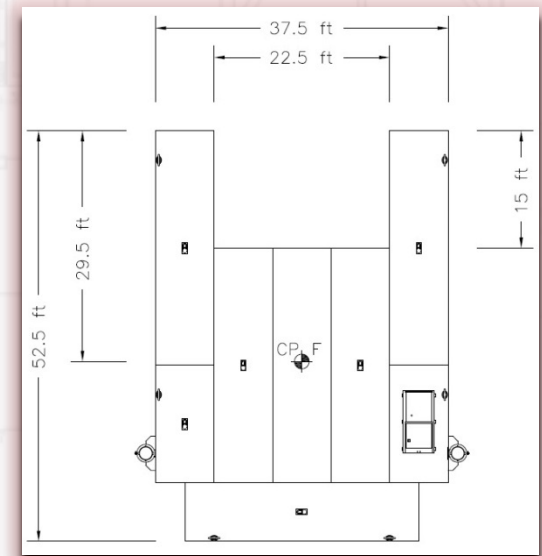
<35,000 lb. excavator



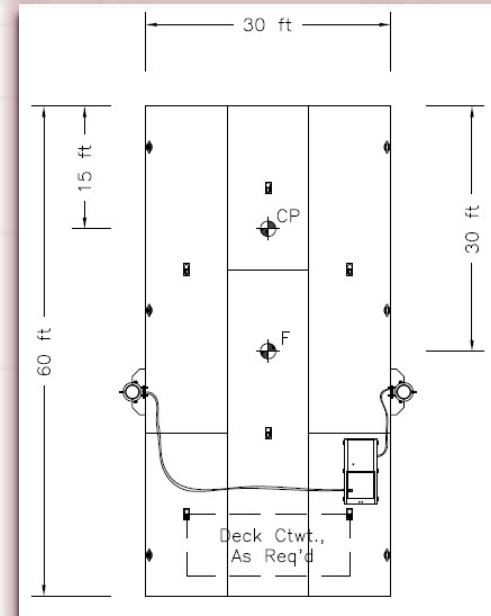
<50,000 lb. excavator



<80,000 lb. excavator



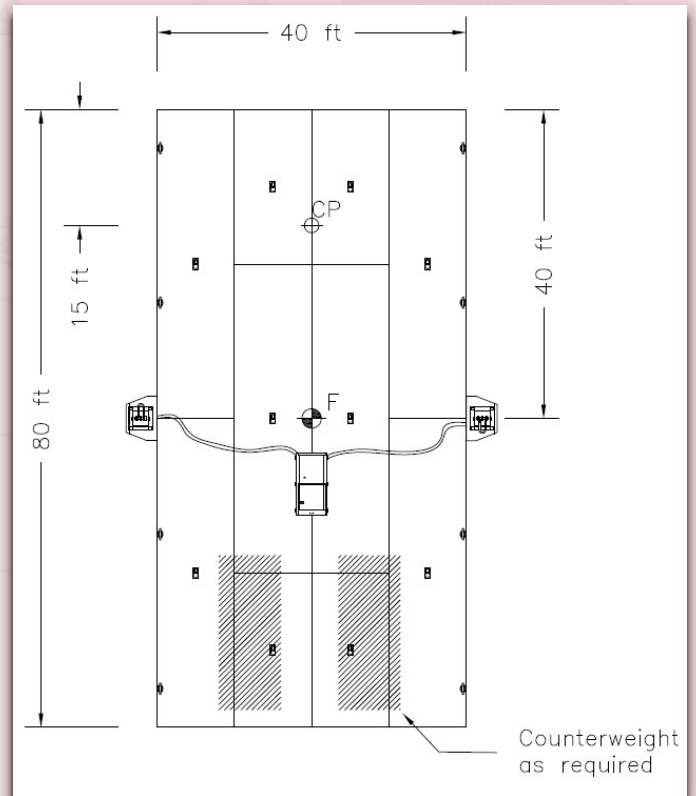
30' x 60' x 5' assembly recommended
for up to an 80,000 lb. excavator.



CAT 385 on S70



40' x 80' x 7' assembly recommended for an 180,000 lb. excavator.



Koehring 1166 Excavator on S70



Excavator Barge Assemblies

Link Belt Excavator with conveyor on S70



CAT 385 on S70

Crane Barge Applications

Minimum information required for quote

- Crane Capacity?
- Job Location?
- Water Depth?
- When are Flexifloats needed?
- How long are Flexifloats needed?



Capacities

H50s support up to 40 ton crawler cranes.

S50s support up to 110 ton crawler cranes.

S70s support up to 400 ton crawler cranes or 4100 Ringer cranes.

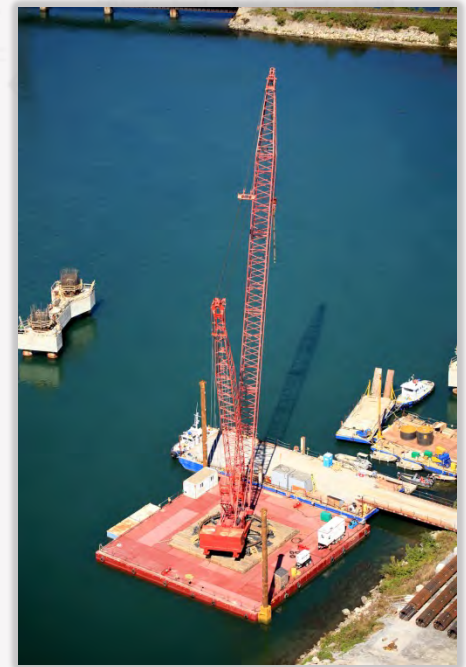
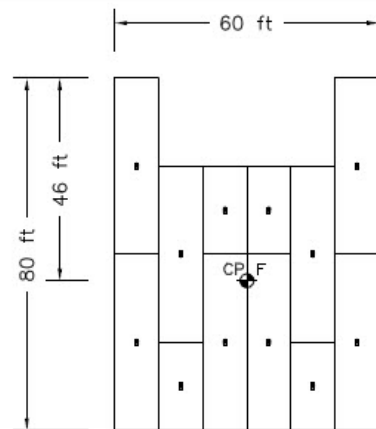


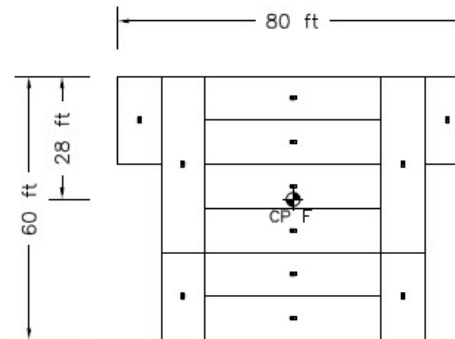
Diagram of a rectangular room with dimensions 120 ft by 50 ft. The room is divided into a grid of 4 rows and 3 columns. The total width is 120 ft, and the total height is 50 ft. A 25 ft segment is marked at the bottom left. Various symbols are placed within the grid cells, including a 'CP' symbol, a 'F' symbol, and a 'V' symbol. A small table icon is located in the bottom right cell.

Assembly 165-1



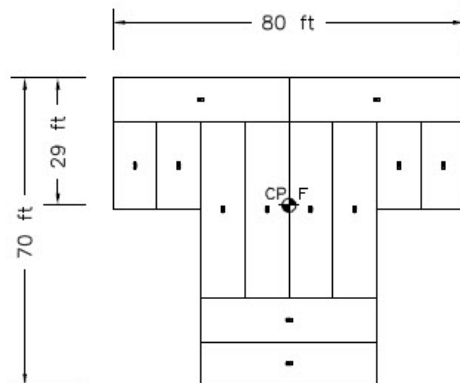
Trim 1.5° leaving 24 inches freeboard
List 1.9° leaving 26 inches freeboard

Assembly 165-2



Trim 2.1° leaving 26 inches freeboard
List 1.6° leaving 25 inches freeboard

Assembly 165-3



Trim 1.6° leaving 28 inches freeboard
List 1.7° leaving 24 inches freeboard

Crane: 165 ton Crawler

Working Weight	320,243 lbs.
Boom Length	150 ft.
Hook Load	72,000 lbs.
Working Radius	45 ft.

Barge:

Total Displacement	960,043 lbs.
Hull Weight	336,000 lbs.
Deck & Working Load	624,043 lbs.
Average Draft	46 in.
Average Freeboard	38 in.
Overtopping Moment	2,153,666 ft-lbs.

Series S-70 Equipment

8 Quadrafloats, 40 ft. x 10 ft. x 7 ft.
4 Duofloats, 20 ft. x 10 ft. x 7 ft.

CP - Centerpin of Machine
F - Center of Flotation

Flexifloat
CONSTRUCTION SYSTEMS

WARNING: The use of Flexifloat equipment requires competent personnel and the application of engineering principles. The improper use, operation, modification, maintenance or repair of Flexifloat equipment can be dangerous and result in property damage, injury or death. Contact Robishaw Engineering, Inc. (REI) or other qualified professional for assistance prior to use. REI offers its engineering services free of charge to all Flexifloat users. Equipment used on or with Flexifloat barges must have the manufacturer's approval for use in marine applications.

PROPERTY OF ROBISHAW ENGINEERING, INC.

This drawing is confidential and contains trade secrets and other information proprietary to us. Disclosure to you is expressly conditioned upon your assent that it is not to be copied, reproduced or exhibited to other parties, without consent, but is to be used only with reference to contracts or proposals of this company. It or any copies thereof shall be returned promptly upon request.

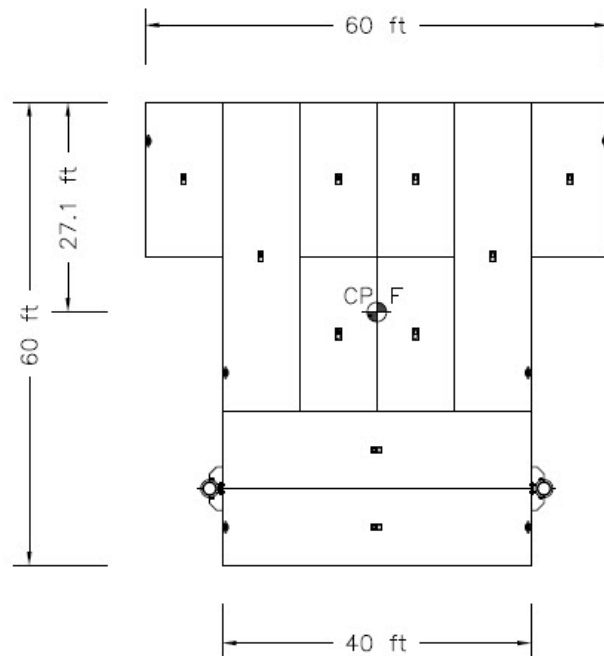
Robishaw Engineering, Inc.

www.flexifloat.com

Houston, Texas

800.877.1706

Flexifloat 165-ton Static Stability Publication



Series S-50 Equipment

- 4 Quadrafloats, 40' x 10' x 5'
- 6 Duofloats, 20' x 10' x 5'
- 2 Spud Wells, 20" round
- 2 Spuds, 20" rd. x 40'
- 6 Deck Cleats

CP — Centerpin of Machine
F — Center of Flotation

Crane: Link Belt 218 HSL Crawler

Working Weight	185,254 lbs.
Boom Length	100 ft.
Hook Load	14,300 lbs.
Working Radius	100 ft.

Barge:

Total Displacement	490,554 lbs.
Hull Weight	196,200 lbs.
Deck & Working Load	294,354 lbs.
Average Draft	34 in.
Average Freeboard	26 in.

Trim 0.9 degrees
leaving 21 inches freeboard

List 1.5 degrees
leaving 17 inches freeboard

Overturning Moment 827,971 ft-lbs

STATIC STABILITY ANALYSIS VALID ONLY FOR
FLEXIFLOATS MANUFACTURED AND APPROVED
BY ROBISHAW ENGINEERING, INC.

Robishaw Engineering, Inc.

www.flexifloat.com

Houston, Texas

800.877.1706

Flexifloat Spud Barge Assembly

DRAWN: JRW

DATE: 05/10/16

SKETCH NO: PDG-5314AE

WARNING: The use of Flexifloat equipment requires competent personnel and the application of engineering principles. The improper use, operation, modification, maintenance or repair of Flexifloat equipment can be dangerous and result in property damage, injury or death. Contact Robishaw Engineering, Inc. (RE) or other qualified professional for assistance prior to use. RE offers its engineering services free of charge to all Flexifloat users. Equipment used on or with Flexifloat barges must have the manufacturer's approval for use in marine applications.

PROPERTY OF ROBISHAW ENGINEERING, INC.

This drawing is confidential and contains trade secrets and other information proprietary to us. Disclosure to you is expressly conditioned upon your assent that it is not to be copied, reproduced or exhibited to other parties, without consent, but is to be used only with reference to contracts or proposals of this company. It or any copies thereof shall be returned promptly upon request.

The background of the slide is a light gray architectural floor plan. It shows a large rectangular area with a grid of lines, likely representing a building's layout. There are various dimensions and labels scattered throughout, such as "10'-0\"/>

Flexifloat



CONSTRUCTION SYSTEMS

Questions?

Self-Elevating Platform (SEP) Applications

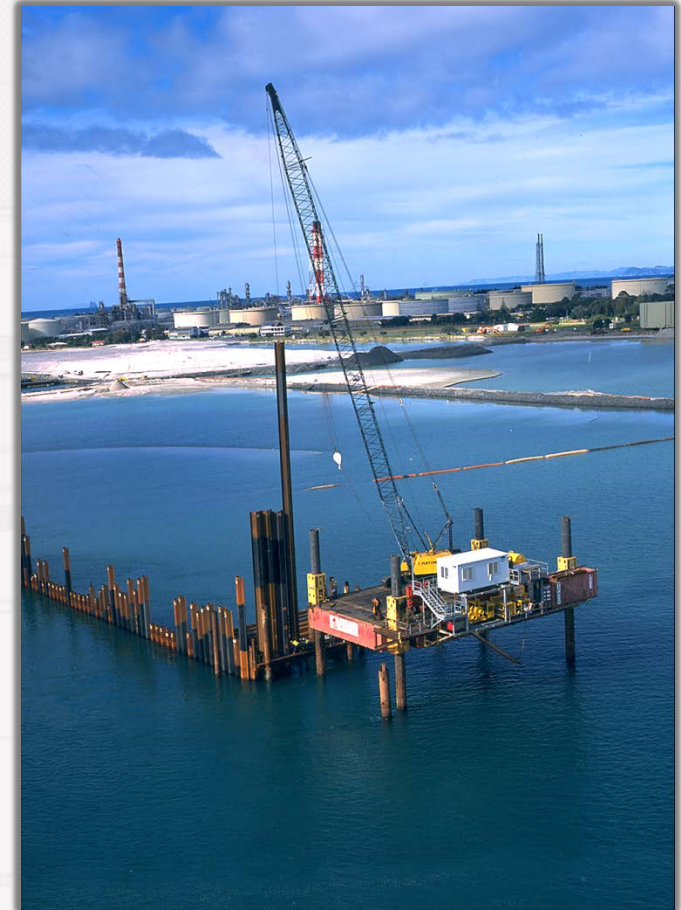
Flexifloat SEP

S70 Series only

Support up to a 100 ton capacity crane.

For purchase only from Robishaw Engineering.

Standard 36" Dia. Columns at 80' length.



Flexifloat Advantages

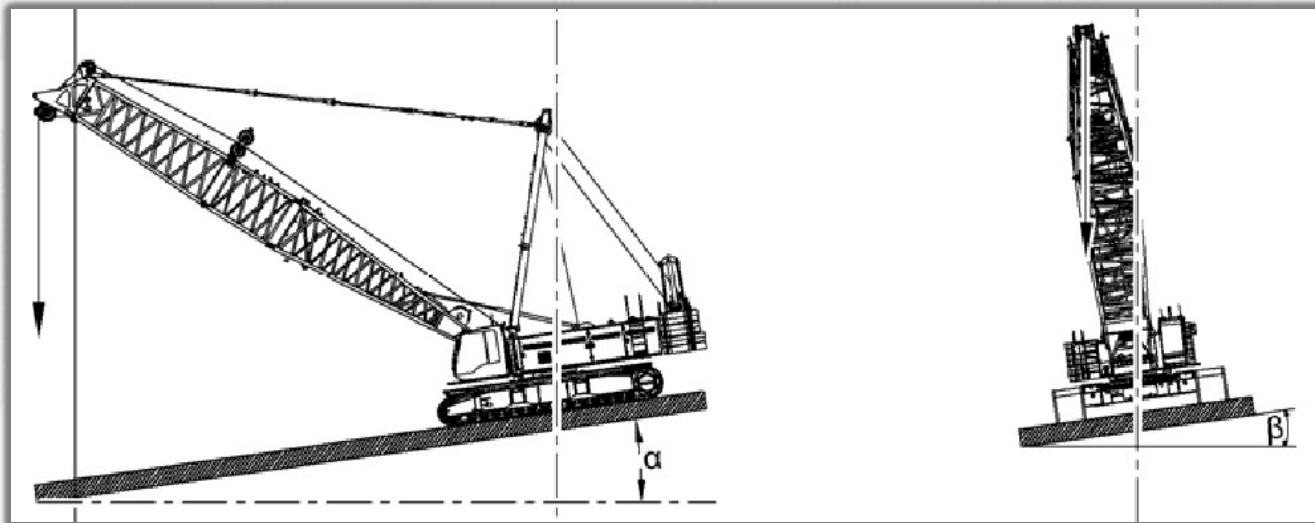
- Flexifloats are primarily used in waters not accessible to conventional barges.
- Flexifloats can be configured to fit inside jobsite constraints.
- Configuration can be used to move center of flotation.
- *Possible to use 360 degree ground charts on Flexifloats.
- * Must be approved by crane manufacturer.



Barge List vs Machine List

α = Barge list (inclination) refers to the angle that the barge is out of level with horizontal. Barge inclination will cause machine trim, but will not cause machine list if barge inclination is in the same direction as the crane boom.

β = Machine list, as defined by Manitowoc Engineering Co., describes a side to side out of level condition which normally effects the crane capacity rating and is measured by the angle between horizontal and a line drawn through the centerline of the boom hinge pins.



Loading Equipment

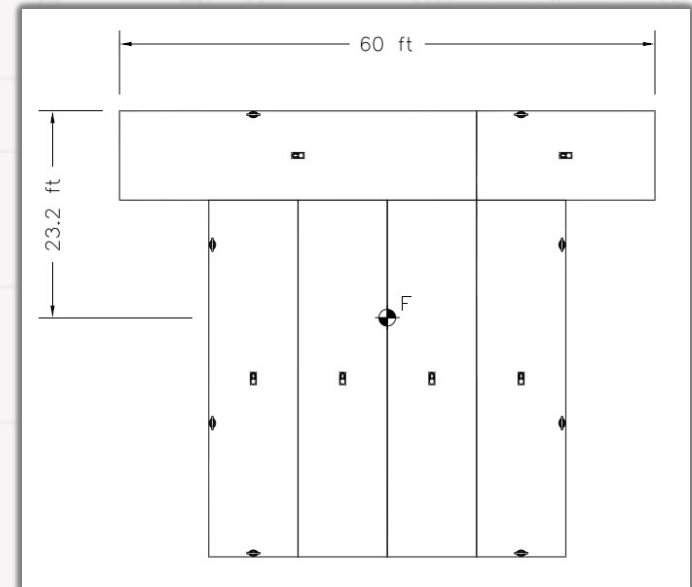
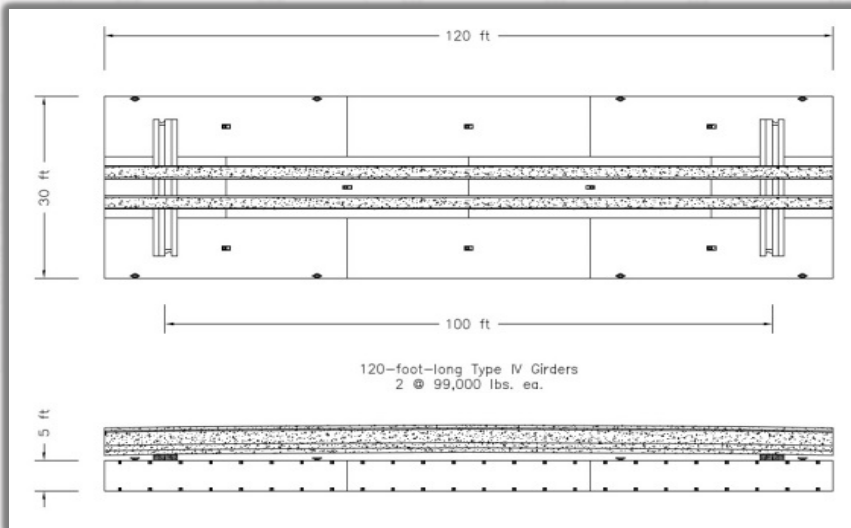
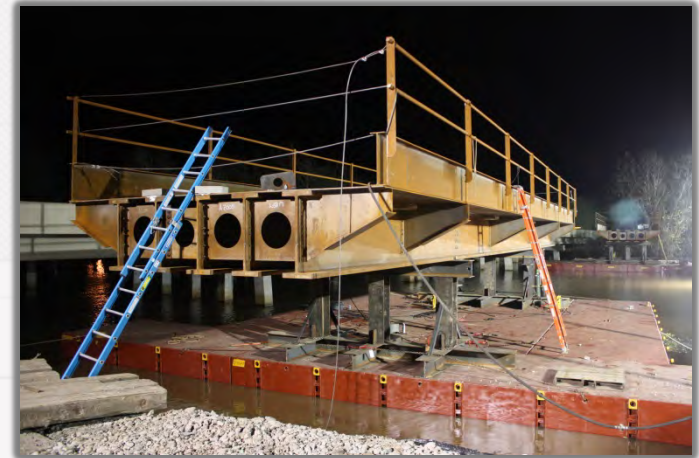
Lower spuds & tie assembly securely to shore. Lay appropriate matting across shore to barge transition.



Transport Barge Applications

Information required for quote

- Load on deck?
- Estimated CG of load in X, Y, & Z axis?
- How must load be supported?
- How is load being added and removed?
- Job Location?
- Water Depth?
- When are Flexifloats needed?
- How long are Flexifloats needed?

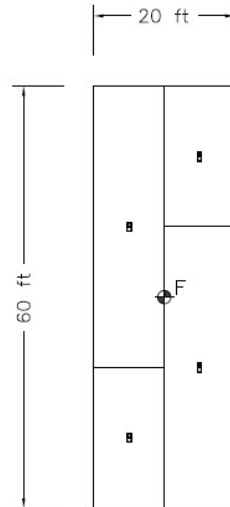


Barge Stability Comparison

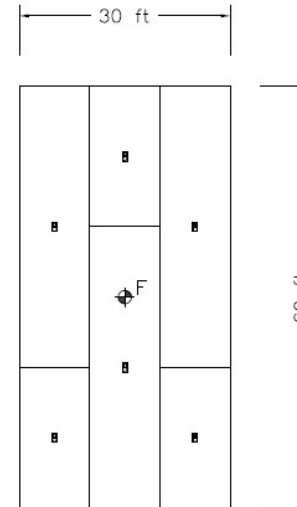
Series S-50 Equipment
2 Quadrafloats, 40' x 10' x 5'
2 Duofloats, 20' x 10' x 5'

Buoyancy Characteristics	
Deck Load (lbs.)	Draft (in.)
4,000	14
28,900	18
66,400	24
103,800	30
141,200	36

*fresh water @ 62.4 lbs/ft³



VS



Series S-50 Equipment
3 Quadrafloats, 40' x 10' x 5'
3 Duofloats, 20' x 10' x 5'

Buoyancy Characteristics	
Deck Load (lbs.)	Draft (in.)
5,900	14
43,400	18
99,500	24
155,700	30
211,900	36

*fresh water @ 62.4 lbs/ft³

STABILITY CHARACTERISTICS

Load = 100,000 lbs.
Location @ pt. F
Vertical CG = 3 ft. above deck

Draft = 29 in.
Moment to Trim 1 Degree = 378,427 ft. lbs.
Moment to List 1 Degree = 29,885 ft. lbs.

1 degree trim results in 6 in. change
freeboard @ bow
1 degree list results in 2 in. change
freeboard @ side

STABILITY CHARACTERISTICS

Load = 100,000 lbs.
Location @ pt. F
Vertical CG = 3 ft. above deck

Draft = 24 in.
Moment to Trim 1 Degree = 572,680 ft. lbs.
Moment to List 1 Degree = 131,556 ft. lbs.

1 degree trim results in 6 in. change
freeboard @ bow
1 degree list results in 3 in. change
freeboard @ side

F — Center of Flotation

WARNING: The use of Flexifloat equipment requires competent personnel and the application of engineering principles. The improper use, operation, modification, maintenance or repair of Flexifloat equipment can be dangerous and result in property damage, injury or death. Contact Robishaw Engineering, Inc. (REI) or other qualified professional for assistance prior to use. REI offers its engineering services free of charge to all Flexifloat users. Equipment used on or with Flexifloat barges must have the manufacturer's approval for use in marine applications.

PROPERTY OF ROBISHAW ENGINEERING, INC.
This drawing is confidential and contains trade secrets and other information proprietary to us. Disclosure to you is expressly conditioned upon your assent that it is not to be copied, reproduced or related to other parties, without consent, but is to be used only with reference to contracts or proposals of this company. If or any copies thereof shall be returned promptly upon request.

Robishaw Engineering, Inc.

www.flexifloat.com Houston, Texas 800.877.1706

Flexifloat Barge Assembly Comparison

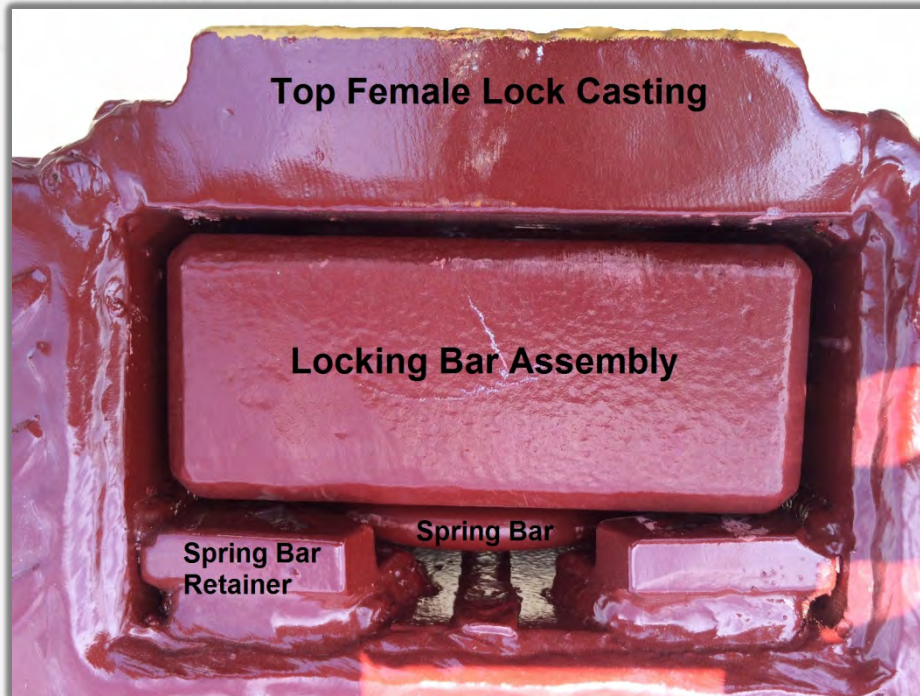
DRAWN: JRW DATE: 06/02/16 SKETCH NO: REI-001

Flexifloat transport assemblies have been used to support up to 3,000 tons.

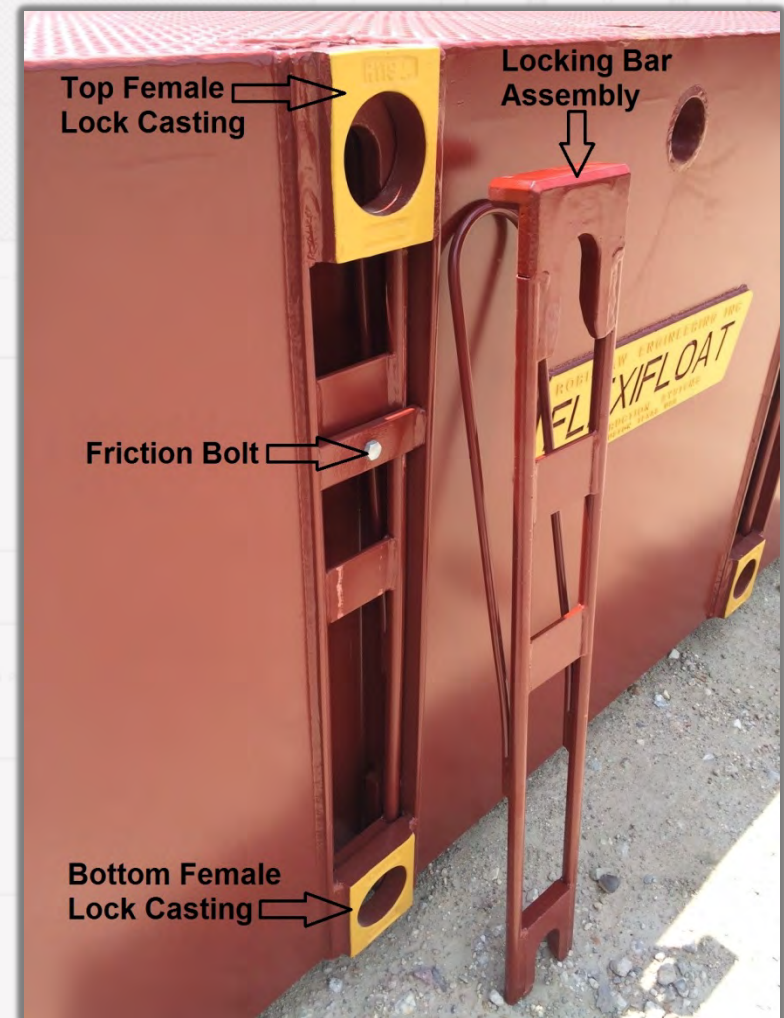


Anatomy of a Flexifloat Lock

Top View of Lock



Side View of Lock



Raising A Flexifloat Lock



Adjusting a locking bar



The background of the image is a light gray architectural floor plan. It shows a large rectangular area with a grid of lines, likely representing a building's footprint. There are various dimensions and labels scattered throughout, such as "10'-0\"/>

Flexifloat



CONSTRUCTION SYSTEMS