Chapter 6.
Class 60 Floating Bridge

Class 60 floating rafts and bridges consist of a deck constructed of flush surfaced steel-grid panels, supported by 24-ton pneumatic floats spaced 15 feet apart (center to center). Because of the weight of the individual components used to construct Class 60 bridges and rafts, these floating structures must be built using a 20-ton crane or a comparable lifting device. Class 60 equipment can provide the crossing force commander with rafts supporting MLC 70 traffic in currents up to 8 FPS and bridges capable of supporting MLC 65 traffic in currents up to 5 FPS. Proper military nomenclature for this set is the *Bridge, Floating Pneumatic Float, Class 60, Steel Superstructure.*

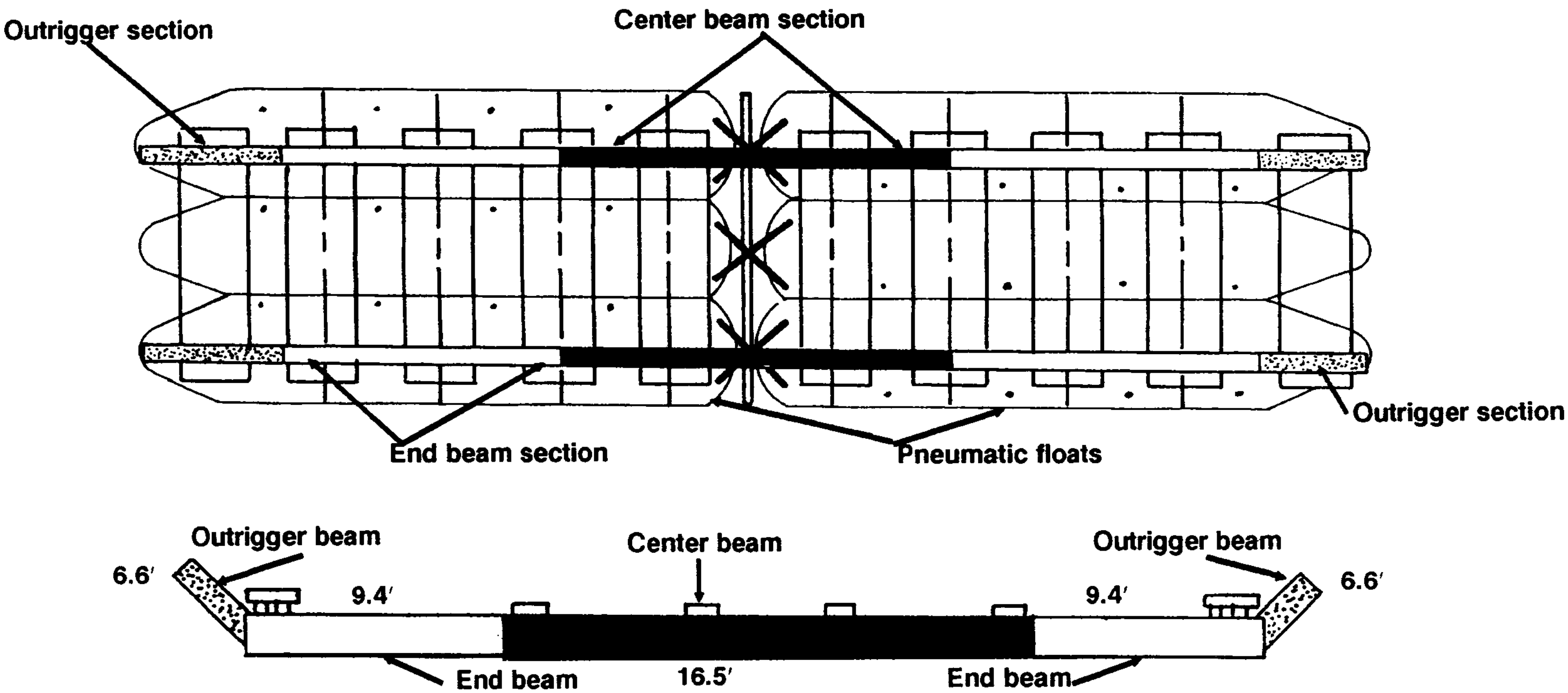
COMPONENTS
Substructure

The pneumatic float and saddle assembly used for construction of Class 60 rafts and bridges are the same as that available in the M4T6 equipment set. Refer to Chapter 5 for additional guidance relating to these components.

Superstructure

The bridge superstructure is made up of the components discussed in the following paragraphs.

Class 60 substructure



Class 60 Floating Bridge

Deck tread panels

Each deck tread panel consists of two 18- by 7.5-inch wide flange 50-pound stringers. The deck panel has an open-grid deck, welded to the top flanges of the two stringers. The stringers are braced by welded diaphragms. These panels are designed to rest on the saddle beams and are connected to adjoining bays by pins in the male and female end connections. One deck tread panel is approximately 17 feet long and weighs 4,160 pounds.

Deck filler panels

Each deck filler panel is approximately 14 feet 9.5 inches long and weighs 1,400 pounds. One deck filler panel is designed to rest between two deck tread panels.

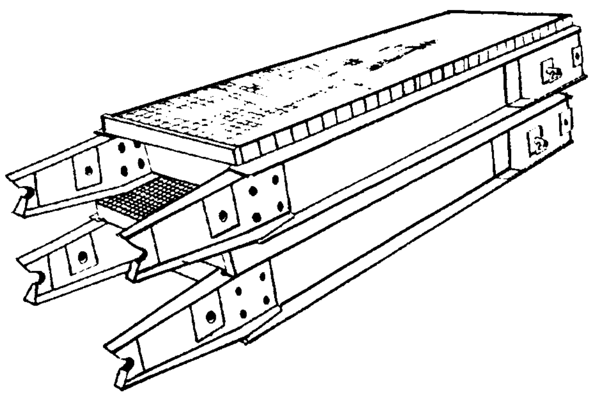
Curbs

Each set contains two types of curbing deck and short curbs. The deck curbs are a little over 14 feet long and weigh 325 pounds. These are placed along both sides of each bay of bridge. Short curbs are 5 feet 4 inches long and weigh 125 pounds. They are placed on both sides of ramps and short bays.

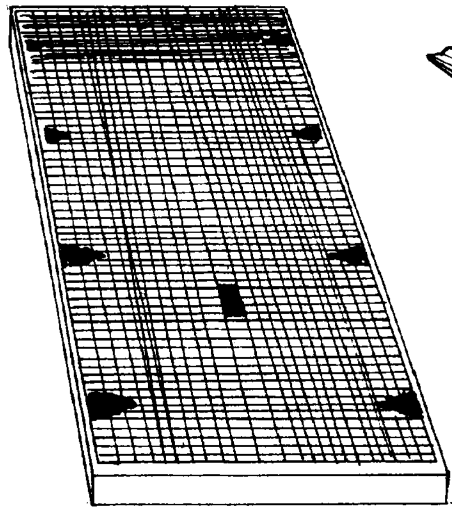
Ramp tread panels

The ramp tread panels are designed to provide an inclined approach to the raft or bridge. Each ramp panel is approximately *16* feet long and weighs 3,750 pounds. All ramp panels have female ends.

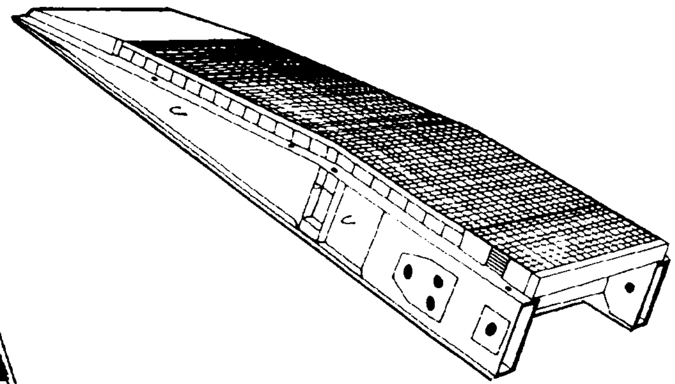
Deck tread panel



Deck filler panel



Ramp tread panel



Ramp filler panels

The ramp filler panel weighs approximately 1,180 pounds and is designed to rest between two ramp tread panels.

Short deck tread panels

Each short deck tread panel has an effective length of 5 feet 3 inches and weighs 1,660 pounds. These panels are used to construct short bays which are useful in adjusting the lengths of floating bridges. Short deck tread panels have two female ends and are connected to ramp tread panels by connector beams.

Connector beams

Connector beams weigh 495 pounds and are used to connect ramp tread panels to either short deck tread panels or ramp deck tread panels. This connection can form either a level connection or an incline of 10 degrees (up or down).

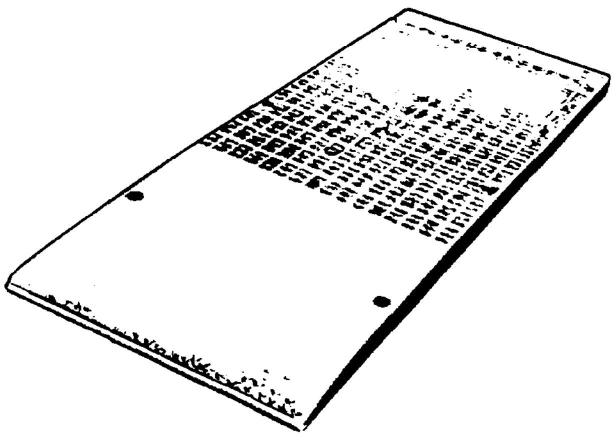
Short deck filler panels

Short deck filler panels are 5 feet 4 inches long and weigh 510 pounds. These panels rest between the short deck tread panels on short bays and on ramp bays.

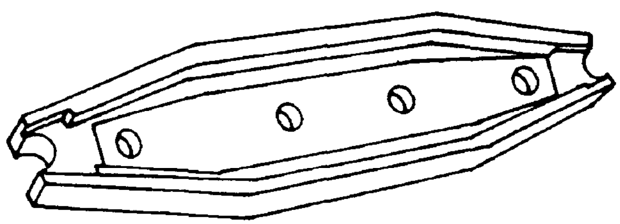
Cover plates

The two types of cover plates are tread and filler cover plates. One filler cover plate and two tread cover plates are placed over the joint between the bridge deck and the ramp bay.

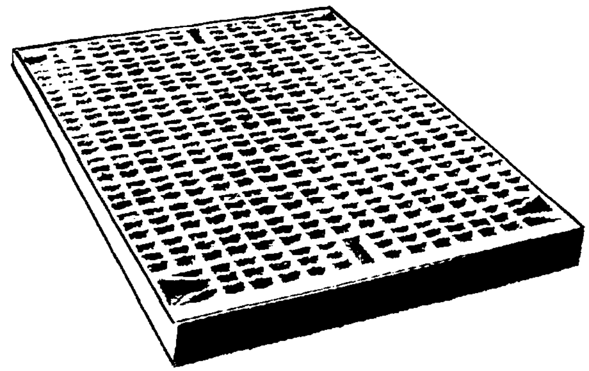
Ramp filler panel



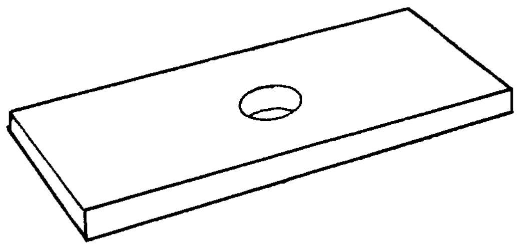
Connector beam



Short deck filler panel



Ramp stiffener stop bar



Ramp stiffeners

Ramp stiffeners are issued as part of the bridge set; however, under most conditions, they are not required or used in assembling the bridge. Ramp stiffeners add to deck efficiency but are needed only in situations in which abutment conditions are likely to bring about a major difference in settlement between two adjacent deck panels. Once used, the stiffener assembly cannot normally be reused because its members are bent when heavy loads cross the bridge. Where used, a ramp stiffener is installed transversely across each ramp bay. Two ramp stiffener sections are bolted together and placed through rectangular openings in the ramp tread panel stringers (at the shore end of the level part of the deck). The narrow end of the stiffener section is secured using a ramp stiffener stop bar and the wider end is secured with the ramp stop bracket.

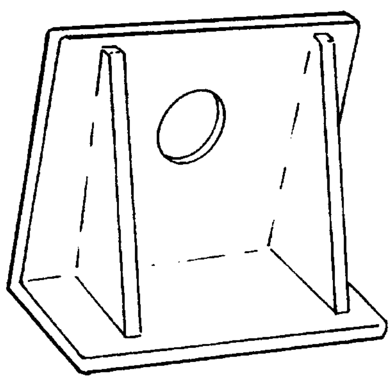
Anchorage set

The anchorage set provides all of the materials needed to anchor the Class 60 bridge in currents up to 11 FPS. Refer to Chapter 8 for additional information.

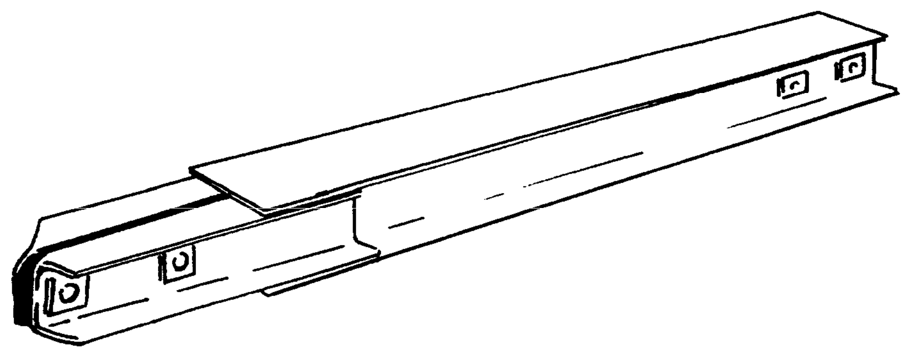
Allocation of Class 60 Equipment

Class 60 equipment is no longer authorized in active, reserve, or National Guard float bridge companies. All remaining Class 60 equipment is currently maintained in depot stocks. One set can be used to construct one floating bridge capable of spanning a 135-foot gap or one four-, five-, or six-bay raft.

Ramp stiffener stop bracket



Ramp stiffener section



Transportation and Loading of Class 60 Equipment

One set of Class 60 equipment is normally transported on a total of 13 bridge trucks. One bridge truck is required to transport each of the nine bays of bridge, including a 24-ton pneumatic float, saddle assembly, and deck components. Additionally, 1 truck is needed to carry each of the two ramp loads, 1 truck carries the erection equipment, and 1 truck carries the anchorage set. Each truck can be loaded as described in Table 21.

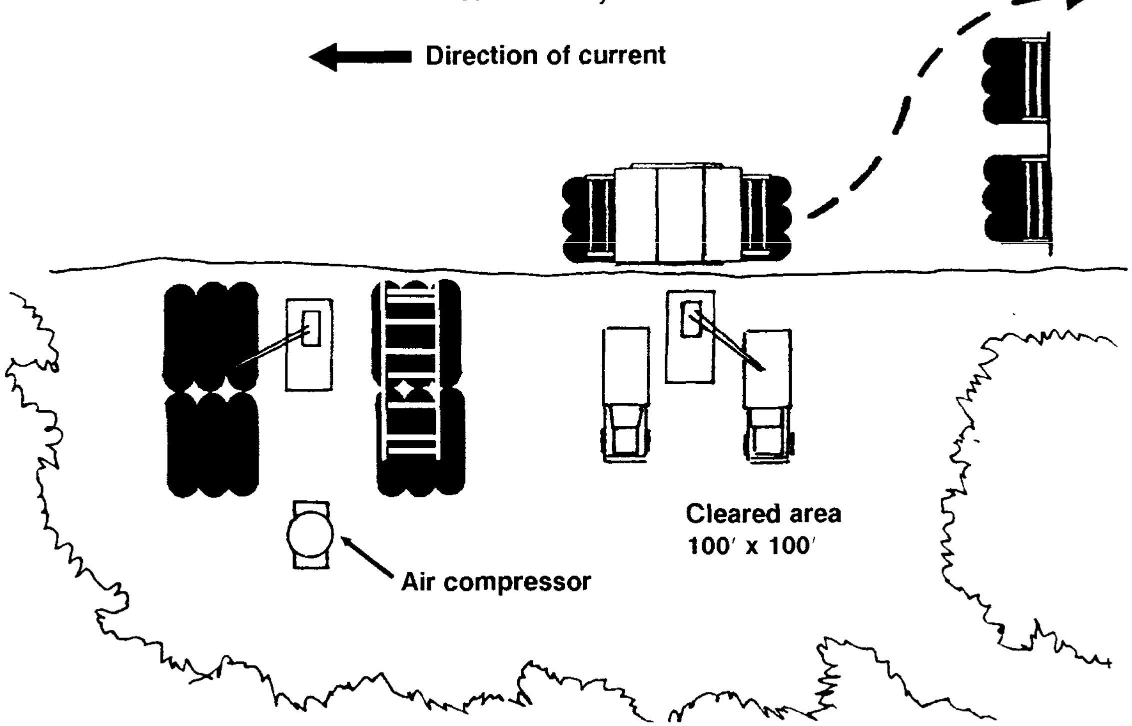
Considerations for Tactical Employment

Because of the considerable time and number of personnel required to construct Class 60 rafts and bridges, this equipment will probably not perform a major role in the rafting phase or even in the early stages of the bridging phase of a deliberate river crossing operation. Class 60 rafts may be needed in situations when sufficient ribbon or M4T6 assets are not available to swiftly cross the desired number of armored vehicles. As the crossing force commander secures the bridgehead area and prepares to move forward, consideration is made for removing the ribbon bridges to deploy them with the advancing forces. To sustain lines of communications, these ribbon bridges must be replaced with more permanent assets. Class 60 bridges, placed along MSRs might serve in this capacity. The major consideration in determining the location of such a bridge is the existence of a well-defined road network leading both to and from the bridge site. Other considerations include the availability of adequate assembly sites and sufficient depth of water at the bridge site. When planning to construct Class 60 rafts and bridges, also consider the availability of specialized equipment such as air compressors, cranes, and BEBs.

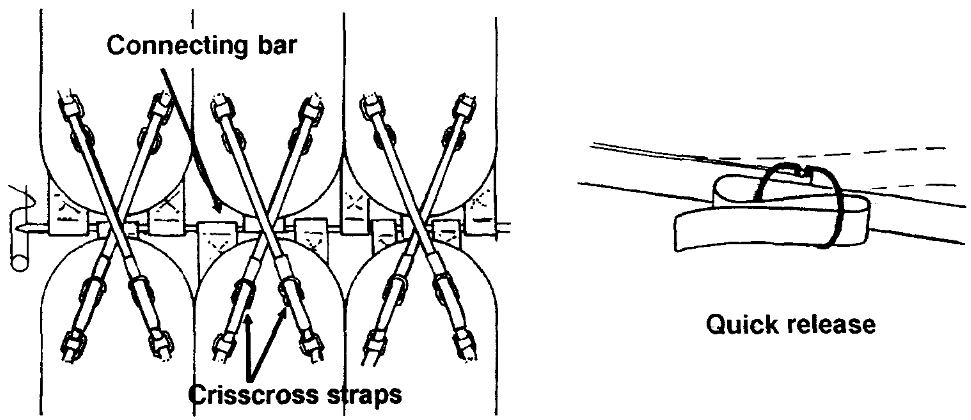
Table 21. Transportation of Class 60 equipment

Normal Bay Load (9 loads per set)		Ramp Load (2 loads per set)		Trestle and Anchorage Load (1 load per set)	
Components	**Quantity per load**	**Components**	**Quantity per load**	**Component**	**Quantity per load**
Anchor, kedge	1	Beam connector ramp	4	Hoist, chain, 5-ton	4 ea
Bag, canvas	1	Bolt, ramp stiffener	6	Holdfast w/19 pickets	12 ea
Bar, connecting	3	Bracket, raft	2	Rope, manila 3/4-inch	360 lb
Curb, deck	2	Curb, short	5	Rope, manila 1-inch	534 lb
Float, half, 12-ton	2	Panel, filler, ramp	1	Tower, cable anchor	2 ea
Panel, filler deck	1	Panel, ramp tread	2	Turnbuckle, 3/4-inch	12 ea
Panel, treadway	2	Panel, treadway short	1	Wire rope, 1/2-inch dia, 60 ft	8 ea
Pin, stringer connector	2	Panel, filler, short	2	Wire rope, 3/4-inch dia	160 ft
Positioner, deck panel	4	Pin, stringer connector	3	Wire rope, 1-inch, 5 ft long	2 ea
Post, handrail	8	Picket, steel	20	Wire rope, 1/2-inch dia	500 ft
Saddle assembly, complete	1	Plate, cover, filler	1		
		Plate, cover, treadway	2		
		Stiffener section, ramp	2		
		Stop bar, ramp, stiffener	1		
		Stop, bracket, ramp stiffener	2		

Float assembly site



Connection of half–floats



GENERAL CONSTRUCTION

Class 60 floats, because of their weight, are normally assembled with the use of at least one crane. Two cranes should be positioned at each assembly site for maximum efficiency in construction. The basic substructure of the Class 60 bridge or raft is the same as for M4T6 floating equipment and can be assembled in the same manner.

Assembly and Launching of Floats Using Two Cranes

An illustration of a typical float **assembly** and launch site is shown at left. The general sequence for construction is given below:

1. Two uninflated half-floats should be laid out stern to stern. These half-floats are connected by threading a connecting bar through the flaps on the bottom of each float and buckling the crisscross straps at the top of one half-float to the D-rings of the other.

2. Next, inflate the float, working from the stern to the bow. There are four compartments in each of the three tubes which make up each half-float. Each compartment should be filled to a pressure of 2 psi, using a 250 CFM air compressor, or the equivalent.

3. Once the floats are inflated, the saddle assembly crew can emplace the saddle assembly. When constructing Class 60 floats in this manner, the saddle assembly is normally carried to the river in a partially assembled configuration. This preassembled section is the same as the prepack described in Chapter 5, with the omission of the saddle adapters and stiffeners.

4. When loaded on the bridge truck, the end beam and outrigger beam sections are nested on top of the center beam section so that the crane can remove all five sections in one lift, placing the assembly on the center of the float. Once the prepack has been placed onto the inflated float, the end beam sections and outrigger sections are installed. If the saddle assembly is not preassembled in the reamer described above, it should be built by hand as explained in Chapter 5.

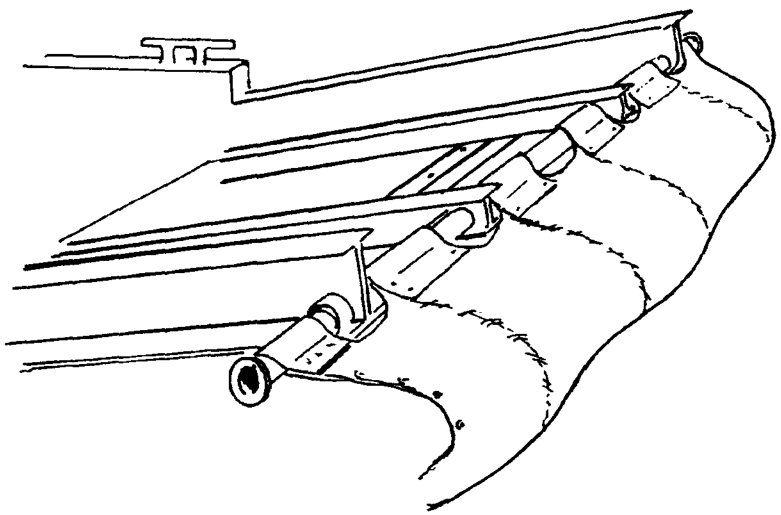
5. Once the saddle beams are in place, the two connecting bars are installed. Prior to installing one connecting bar to each end of the float, remove the guide pins from each of the outrigger beams. This will allow the beam to be raised or lowered as needed without great difficulty. Each connecting bar should be threaded through the outrigger beams and the holes provided in the bow end of the float. Push up on the ends of the float to reinstall the guide pins. All panels should be attached to the saddle beams at this time.

6. Secure all panels to the float. Run the straps attached to the outside of the float through the handle on the panel. Attach the straps below the outrigger panels to the outrigger beam. When possible, run all straps from the handle on the saddle panel through the handle on the saddle beam above it. Next, fold the strap in half and run it back through the D-ring on the float to provide a quick release.

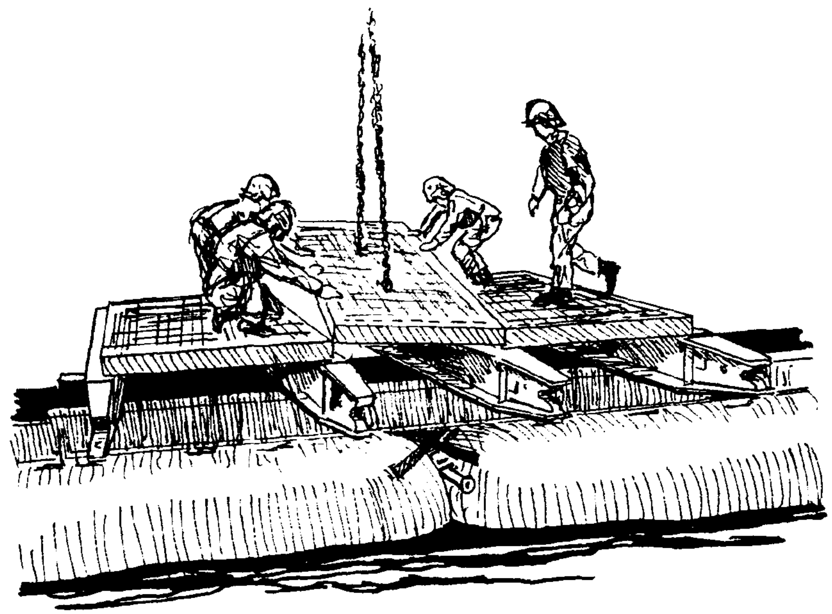
7. Once the float is completely assembled and two tag lines (ropes) are attached to the float, the float should be lifted by the crane and placed into the water. Once in the water, the float can be moved upstream to have the superstructure (deck) placed on it.

8. After the float is launched, the truck which carried the bay is positioned by the deck assembly site. The deck tread and filler panels are raised and positioned by the crane, using a chain sling with two legs and special hooks. These slings are included in the erection set.

Correct placement of end connector bar



Placement of filler panel



9. Position the deck tread panels against the sliding deck panel retainers on the saddle beams with the bottom lugs straddling the saddle beams. Drive the sliding retainers up tight on the stringer flanges and secure with safety pins. Place the tread panels with the male end towards the far shore to simplify the far shore connections.

10. Secure a filler panel to the inside of the deck panels with eight shouldered capscrews or bolts.

11. Secure curbs to the outside stringer on the deck panels with shouldered capscrews or bolts to complete the bay.

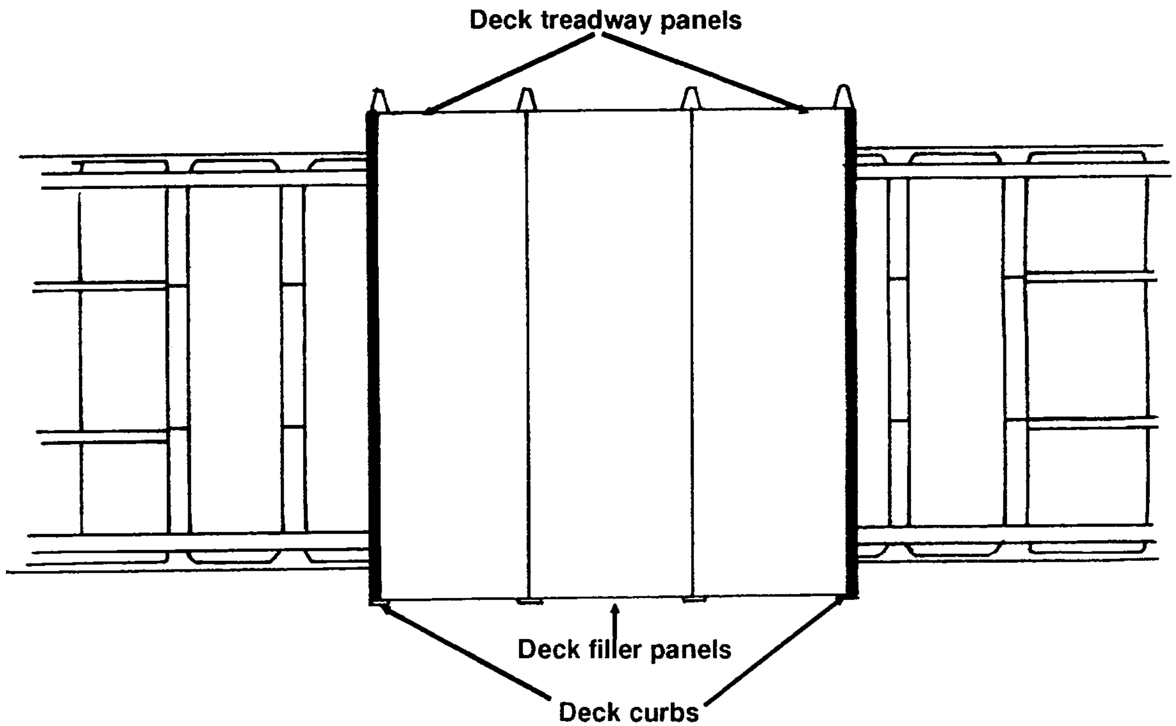
Expedient Methods of Bay Assembly

There are several means of assembling Class 60 floats when an insufficient number of cranes are available. These methods include the use of roller conveyors or float rollers, expedient lifting devices such as A-frames and gantry frames, and preinflation and transportation of completed Class 60 bays.

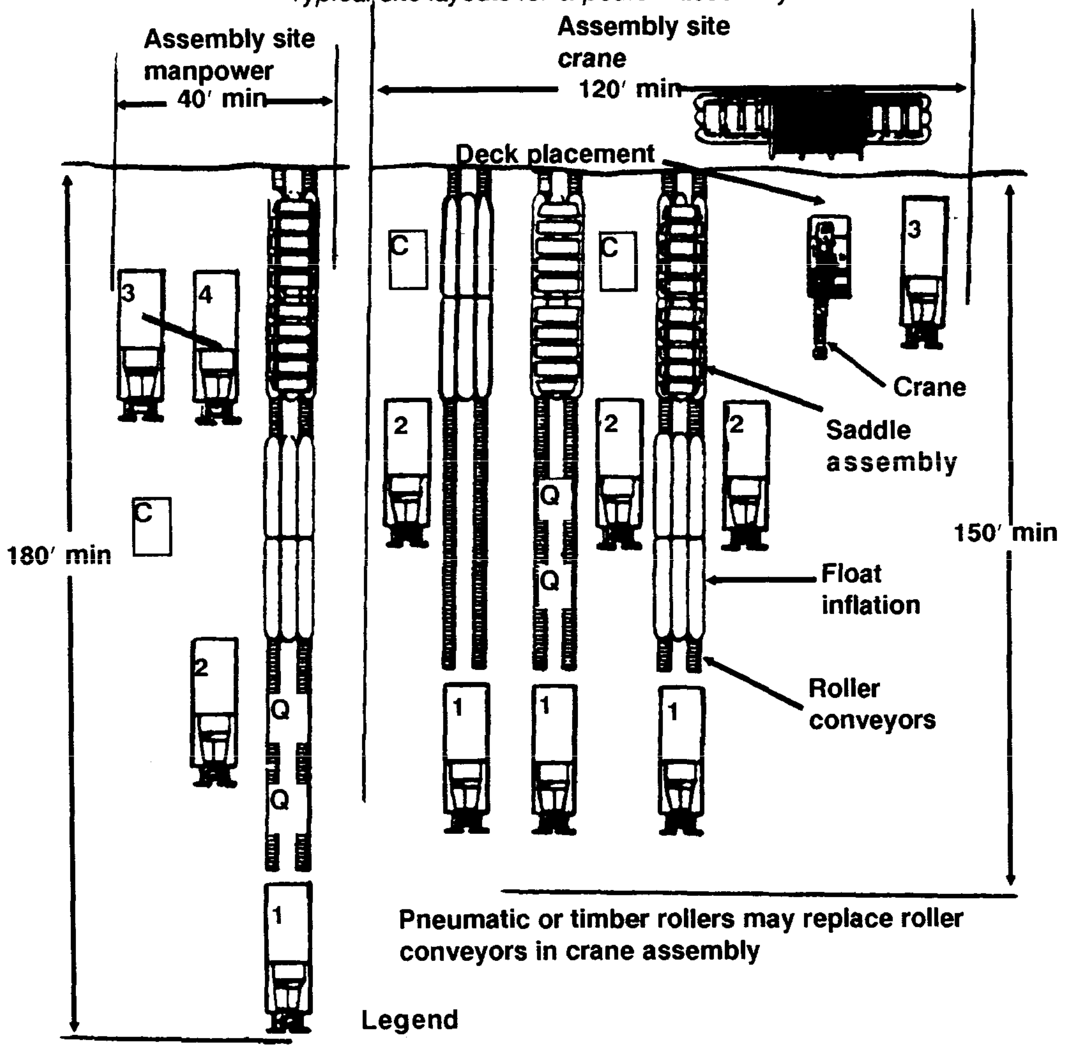
Uses of roller conveyors or float rollers

Roller conveyors. The same type of roller conveyor that is used in depots and warehouses can be useful in moving floats across a beach. The standard roller conveyor is a 10-foot aluminum roller section which weighs about 70 pounds. Steel rollers are also fairly common. These steel roller conveyors normally weigh about 165 pounds. Two possible uses for roller conveyors when establishing a Class 60 float construction and launch site are shown.

Completed bay



Typical site layouts for expedient assembly



Legend

1 Completely loaded truck
2 Truck with saddle assembly and superstructure
3 Truck with superstructure
4 *This station may operate with the M62 wrecker, a gantry frame, or a truck with front-mounted A-fram*
[C] Compressor, 250 CFM
[Q] Rolled float

Float rollers. Use the same pneumatic float rollers described in Chapter 5 in launching Class 60 floats. Round poles, 6 to 8 inches in diameter and approximately 10 feet in length, can be fitted with plank treads and used in the same manner.

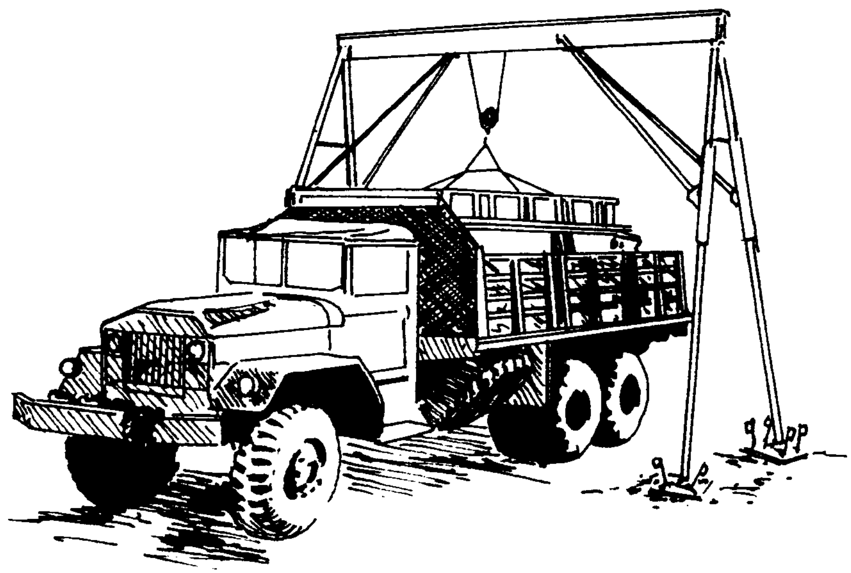
Expedient lifting devices

The use of expediently constructed lifting devices is limited only by the materials available and the imagination of the bridge crew. The standard Army 5-ton wrecker has readily installed outriggers, a hydraulically controlled boom of 18 feet maximum reach, a rear winch with a 45,000-pound capacity, and a front winch with a 20,000-pound capacity. A-frames can be constructed for any military vehicle using components of a bridge trestle arrangement. Gantry frames like the one shown on page 78 can also be used to place deck on a float.

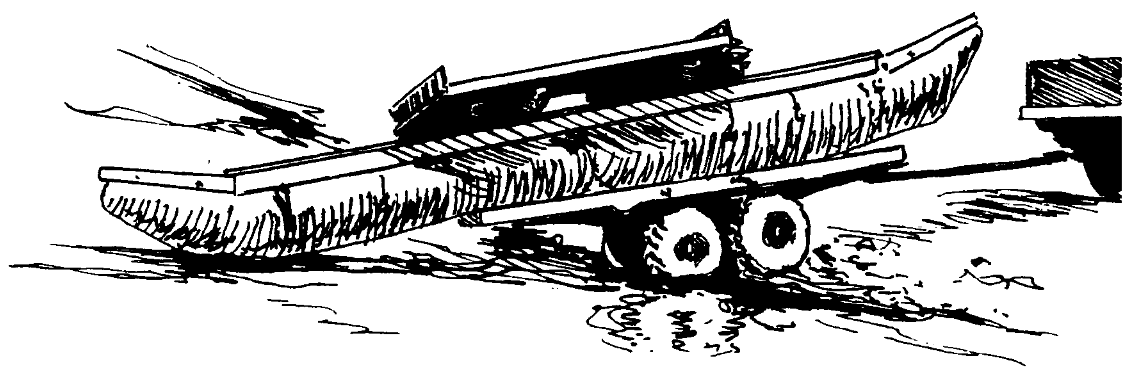
Preinflation and transportation of preassembled bridge bays

It is possible to preinflate and assemble Class 60 floats in the equipment park and transport these bays to the river using the bridge transporter or low-bed trailers. When using a trailer to launch Class 60 bays, rollers should be attached to the trailer bed to simplify the launch procedures. Floats that are loaded onto trailers must be securely tied or chained in place prior to transportation.

Use of a gantry frame



Trailer launch of completed Class 60 float



Connection of Bays

The connection of Class 60 bays is a relatively simple process.

1. The members of the bay connecting crew first pull the two bays into position, using tag lines.

2. The bays may need to be aligned prior to connection. This alignment is accomplished with a spacer gage. Lugs welded to the end of the spacer gage hook into the handles in the saddle beam end sections and position the floats accurately in relation to each other. Spacer gages can be locally fabricated as shown on page 79.

3. Once the floats are properly spaced, the male ends of the deck tread panels of one float can be inserted into the female ends of the other. Prior to connection, the interior pin on the female end of each deck tread panel should be installed and secured with a safety pin to act as a guide pin. Once the panels are aligned, they can be secured with a second connecting pin.

CLASS 60 RAFTING OPERATIONS

Raft Design Criteria

Class 60 rafts can be constructed using either a normal or reinforced configuration. Each raft provides a roadway width of 13.5 feet and when fully loaded, has a draft of about 29 inches. The primary considerations when deciding upon the type of raft to construct include the desired MLC of the raft and the required load space. One set of Class 60 equipment can provide the crossing force commander with sufficient materials to construct one four-, five-, or six–bay raft. The capabilities of each of these are given in Table 22.

Table 22. Class 60 raft capabilities

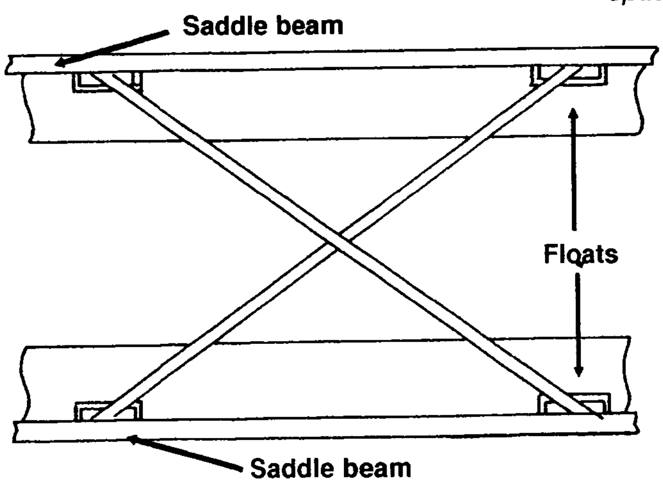
Type of raft	Load space	Classification (wheel/track) based upon current velocity					
		0–3 FPS	5 FPS	7 FPS	8 FPS	9 FPS	11 FPS
Four–float normal	51 ft	40/45	40/45	40/45	35/40	35/40	25/30
Five–float normal	66 ft	50/55	50/55	50/55	45/50	40/45	30/35
Five–float reinforced with 4 deck bays	51 ft	55/60	55/60	50/55	50/55	45/50	35/40
Five–float reinforced with 3 deck bays and 1 short bay	43 ft 9 in	60/65	60/65	55/60	55/60	50/55	45/50
Six–float reinforced	54 ft	65/75	65/75	65/75	60/70	60/65	50/55

Assembly Times

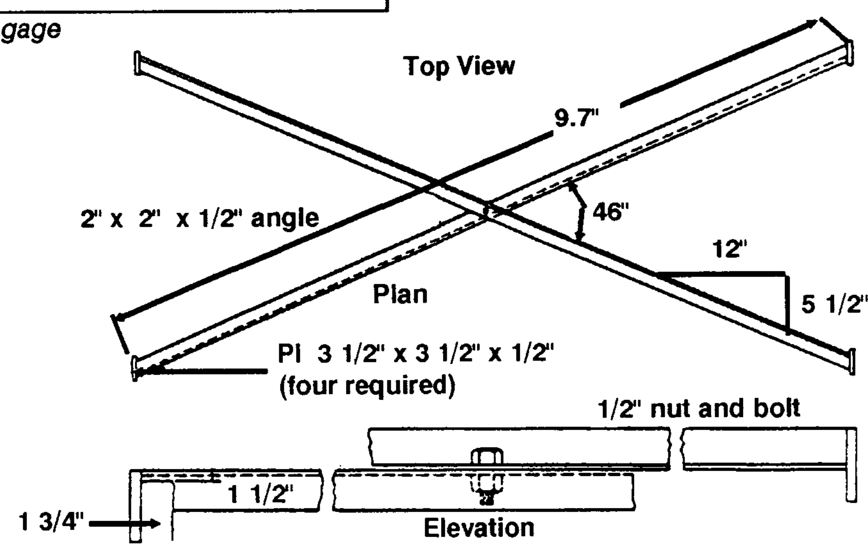
The US Army currently has little experience in the construction of Class 60 rafts. It is extremely difficult to provide an accurate estimate of the time required for construction. As a planning figure, at least 3 hours should be provided for the assembly of Class 60 rafts under ideal conditions.

Equipment Requirements

All assembly sites for the construction of Class 60 rafts should be equipped with at least one 250 CFM air compressor, two BEBs, and two 20-ton capacity cranes. If two cranes are not available, the floats can be constructed by hand and launched using roller conveyors or float rollers. One crane must be available at each site to lift the deck components and place them onto the completed floats.



Spacer gage



Load Space

The available load space on each type of Class 60 raft is shown in Table 22. Only the deck bays are loaded. Vehicles are not placed on the raft's ramps.

EXAMPLE: How much load space is available on a five-float reinforced Class 60 raft constructed with three normal deck bays and one short deck bay?

SOLUTION: Refer to Table 22. The five-float reinforced Class 60 raft with three normal deck bays and one short deck bay has approximately 43 feet 9 inches of available load space.

Classification Of Class 60 Rafts

The classification of Class 60 rafts is based upon the current velocity of the river at the rafting site. Table 22 provides the wheel and track classification of each type of Class 60 raft.

EXAMPLE: What is the classifiation of a four-float normal Class 60 raft operating in a current velocity of 5 FPS?

SOLUTION: Refer to Table 22. A four-float normal Class 60 raft can carry wheeled vehicles with an MLC of 40 or less and tracked vehicles with a classification of 45 or less (in a current of 5 FPS).

Required Number of Boats

Class 60 rafts are always propelled with BEBs tied off in a conventional configuration. The Class 60 raft is propelled through a trestle column hung across the sterns of two floats and lashed to the saddle beam cleats as shown in the figure. The number of boats needed to propel these rafts is based upon the velocity of the river. Table 23 shows the number of 27-foot BEBs required to push Class 60 rafts under varying current conditions. At this time, no formal tests have been conducted using the BEB-SD to propel Class 60 rafts.

Connection of a 27-foot BEB to a Class 60 raft

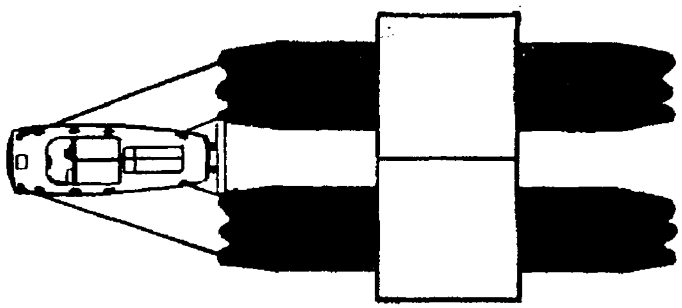


Table 23. BEB requirements for Class 60 rafting operations

Type of raft	Number of BEBs required for raft propulsion (based on current velocity)					
	0–3 FPS	5 FPS	7 FPS	8 FPS	9 FPS	11 FPS
Four–float normal	1	1	2	2	3	4
Five–float normal	1	1	2	3	4	5
Five–float reinforced with 4 deck bays	1	1	2	3	4	5
Five–float reinforced with 3 deck bays and 1 short bay	1	1	2	3	4	5
Six–float reinforced	1	1	2	3	4	6

Notes.
1. This table is based upon use of the 27–foot BEB.
2. Boats are tied to the raft in the conventional configuration.

Construction Of Class 60 Rafts

Organization for assembly

Under normal conditions, one combat engineer platoon can construct one Class 60 raft, under the supervision of at least one bridge sergeant. It is recommended that personnel be assigned to assembly parties as shown in Table 24. The duties of each crew are generally described as follows:

Float assembly. Each float assembly crew is divided into an inflation crew and a saddle assembly crew.

Inflation. This crew unloads the half-pontons from the truck, removes the carrying case, inflates the floats, connects the float straps, and threads the connecting bar between the floats.

Saddle assenbly. This crew assists in unloading the saddle assembly, places the preassembled section on the inflated float, places and connects the end beams and outrigger beams, and threads the bow and stern connecting rods.

Table 24. Assembly parties for Class 60 raft construction

Crew name	Number of crews	Crew size	
		NCO	EM
Float assembly	2	1	9
Raft assembly	1	1	12

Note.
These crew assignments do not include the crews for the required BEBs or the crane operators.

Raft assembly. This crew positions the truck containing the deck and then places the deck on the floating supports.

Construction of Class 60 normal rafts

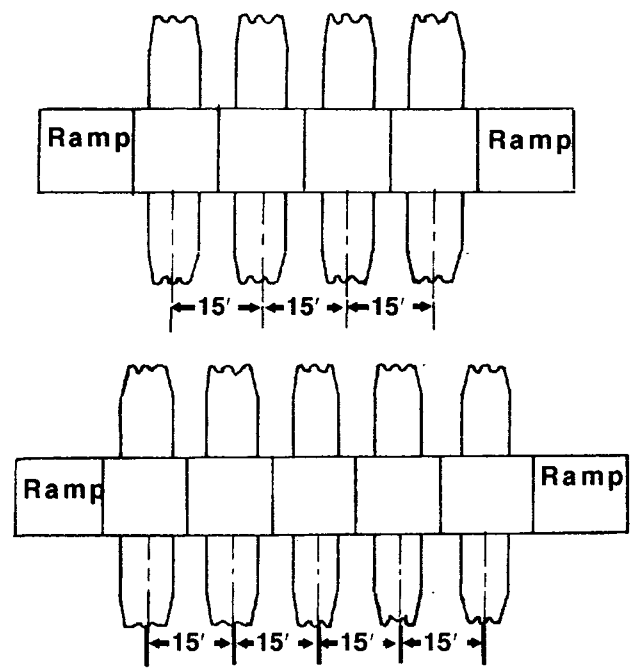
Normal rafts are all constructed in the same manner. Each normal raft consists of a number of normal deck bays spaced 15 feet apart with a ramp connected to each end. The construction sequence for a four-float normal raft is provided below

1. The first two floats are constructed and launched. Once these floats are in the water, the raft assembly crew can place the deck on each of these floats and connect the two floats together.
2. Configure the third float launched as a ramp bay. It is assembled from two ramp tread panels, one ramp filler panel, one short deck filler panel, and four short deck curbs. The ramp filler panel covers the sloping part of the ramp and the short filler panel covers the level part. (See figure on page 82.)
3. Using two connector beams, attach the third float (the ramp bay) to the far shore side of the two floats that were previously connected. Deflate the float which supports the ramp bay and remove it, leaving an overhang on the far shore side of the raft.

Class 60 normal rafts

Normal four–float raft

Normal five–float raft



This overhang will keep the near shore end of the raft slightly elevated which will simplify the positioning of subsequent floats.

4. Once the far shore ramp is connected, add the fourth normal deck bay to the near shore side of the raft.

5. Assemble a ramp bay using the float which was removed from beneath the far shore ramp. Attach this bay to the near shore end of the raft.

6. Attach ramp control brackets.

7. Deflate and remove the float supporting the near shore ramp.

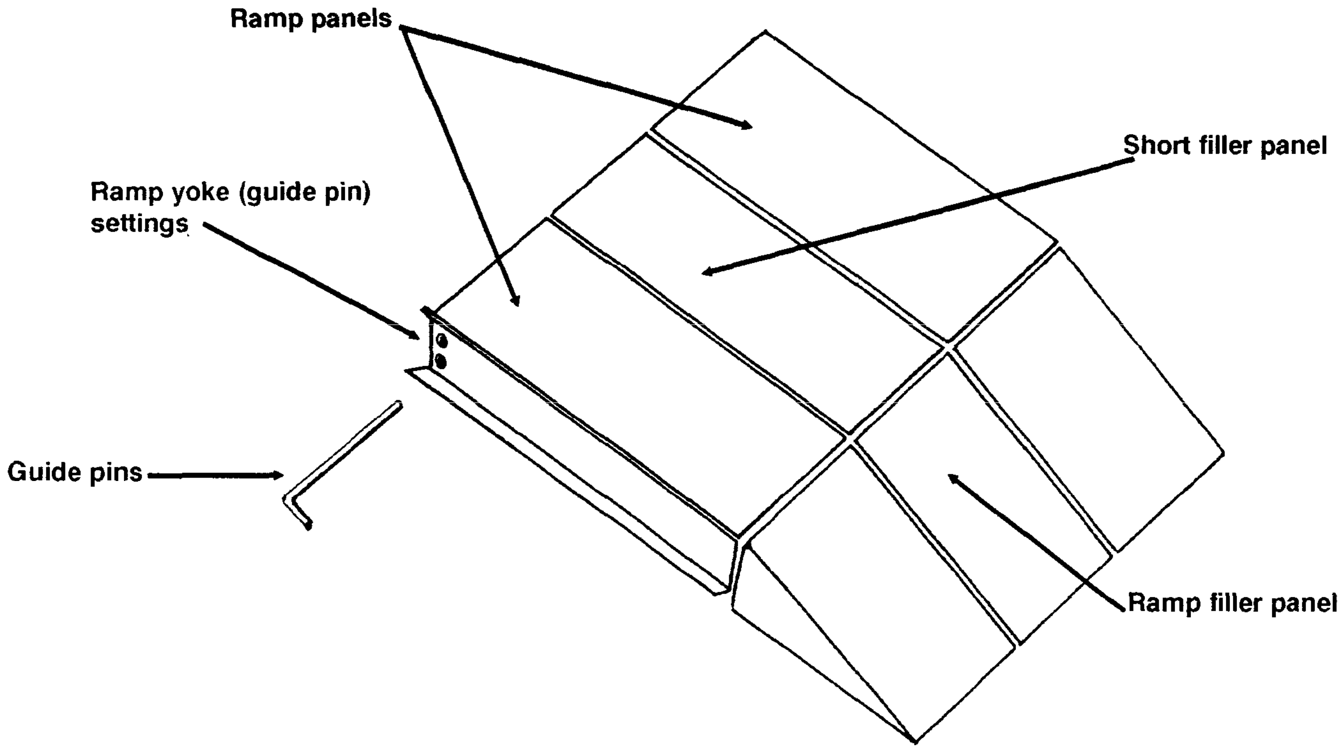
8. Attach the required number of BEBs and install the ramp yokes (guide pins) prior to loading traffic across the ramps.

One variation of the above procedure is to launch all four floats, and construct four normal bays. After connecting these bays, use the crane to emplace the ramp tread panels on the near and then the far shore ends of the raft. Although this method of assembly is a simpler process, connection of the ramps can be difficult and time consuming.

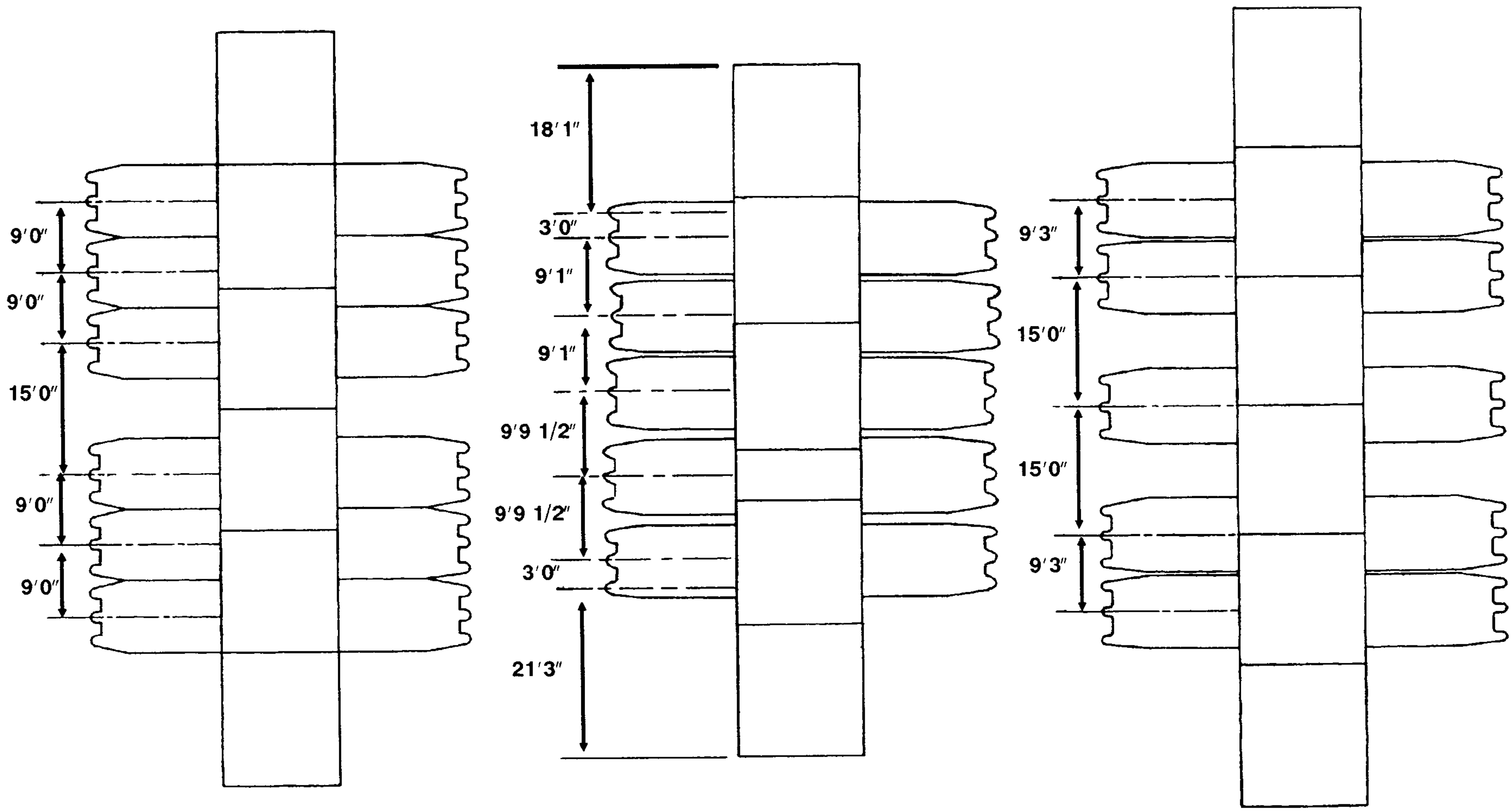
Construction of Class 60 reinforced rafts

Refer to the figure on page 83. The most commonly constructed Class 60 raft is a five-float reinforced raft constructed with three normal deck bays and one short deck bay. This raft is constructed as shown in the figure on page 84.

Superstructure components of the Class 60 ramp bay



Class 60 reinforced rafts

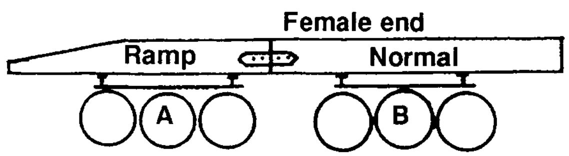


Six-float reinforced raft

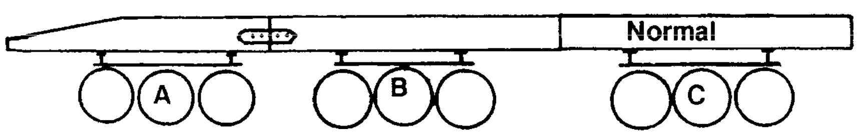
Five-float reinforced raft with three deck panels and one short bay

Raft with 4 deck panels

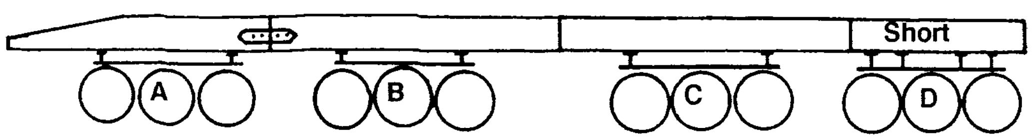
Construction of a five–float reinforced raft



Raft ramp connected to normal bay



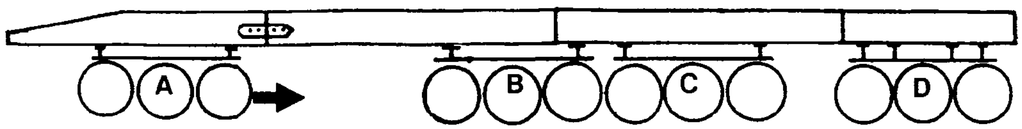
Raft ramp and two normal bays connected



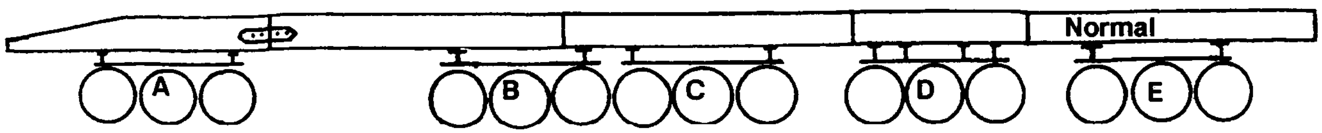
Raft ramp and two normal and one short bay connected

Note. Extra supports are added under the short bay.

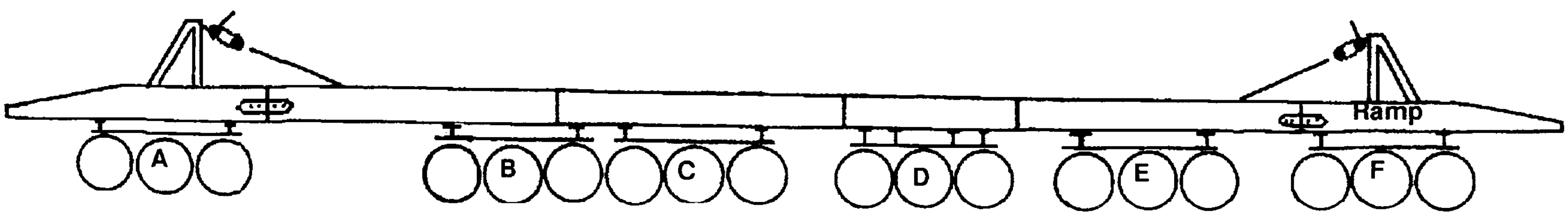
Construction of a five–float reinforced float (continued)



Float B is disconnected, deflated, and moved next to float C where it is inflated and reconnected.

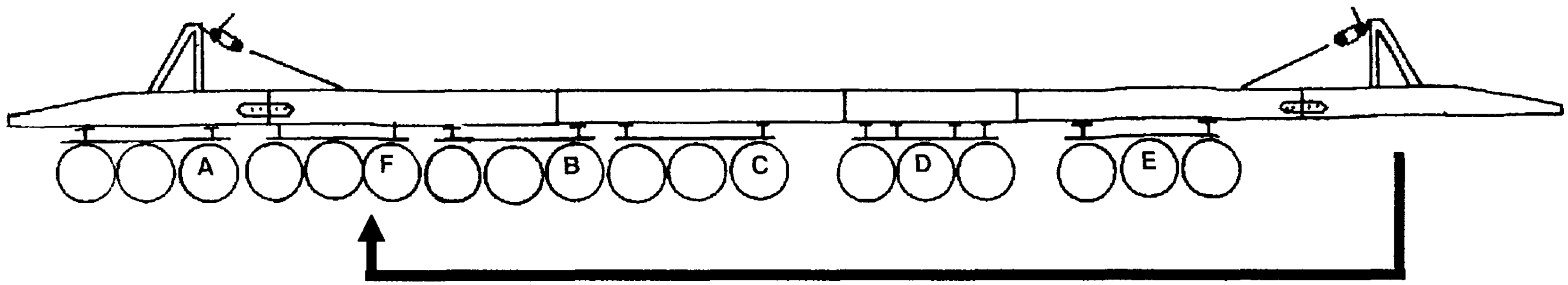


Addition of one normal bay

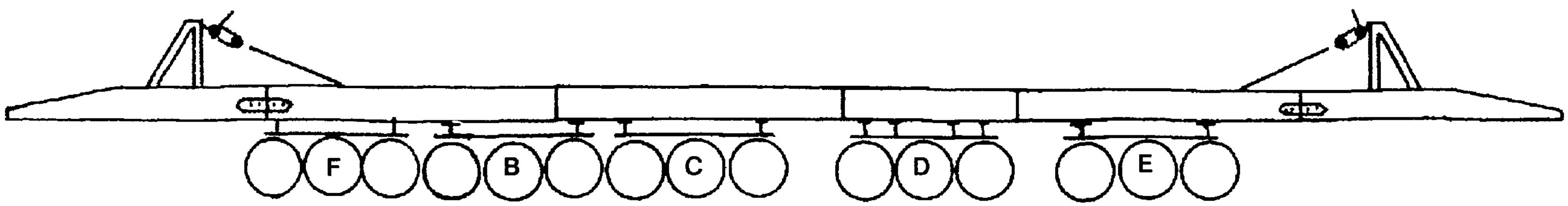


Addition of one ramp bay
Note. The attached counterbalancing cables will be used to raise the ramps. This will aid in float removal.

Construction of a five–float reinforced raft (continued)



Float F is deflated, disconnected from the ramp, and moved next to float B where it is inflated and connected to the normal panels.



Float A is deflated, disconnected, and removed from the raft. It can either be set off to the side as a backup float or disassembled and put back onto the transporter. The counterbalancing cables will be used to raise and lower the ramps at the raft sites.

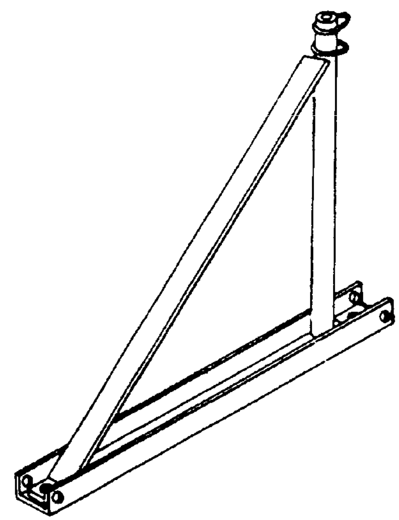
Ramp control expedients

When rafting, it is often necessary for the raft crew to adjust the angle of inclination of the ramps. To do this, bolt an expedient ramp control bracket to the outer stringer of each ramp deck panel. When the tops of these brackets are connected by cables, or are fastened to some point on the deck panel stringers by chain hoists, this arrangement permits the raft to be propelled with the ramp bays approximately level, but not pinned at the level position. When using this expedient, securely bolt the filler panels on the sloped portion of the ramps in place to prevent any spreading or binding of the ramp bays. When loading or unloading the raft, adjust and pin the ramps in a suitable position using the ramp yokes (guide pins). There are two methods of controlling this ramp adjustment—manual and mechanical.

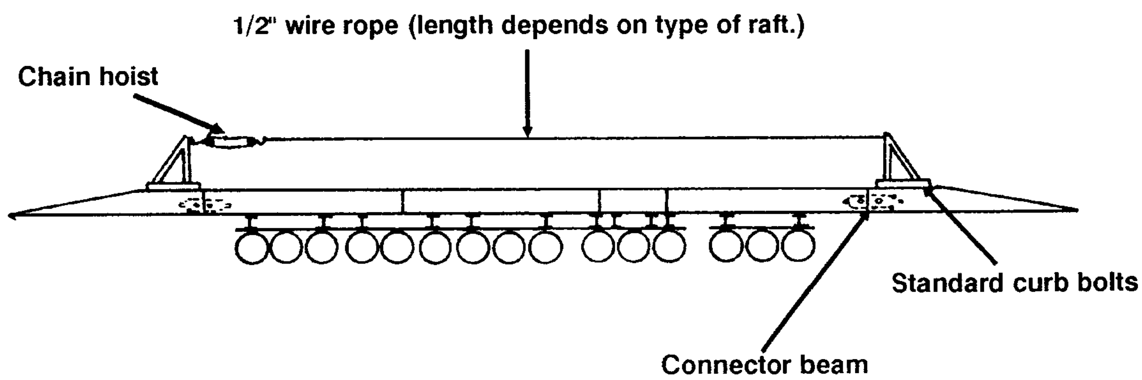
Manual. This method requires that connector beams be installed at both ends of the raft, between the last deck bay and the ramps, to permit a hinged connection at each end. The rafting brackets should be connected with 1/2-inch cable and a chain hoist. The chain hoist is then used to counterbalance both ramps. When properly counterbalanced, the weight of one or two soldiers on the outer end of a ramp is adequate to move either ramp downward far enough to pin the shoreward ramp in the desired position.

Mechanical. In this method, a chain hoist and a length of 1/2-inch cable is used to connect each bracket to one of the lifting eyes on a deck tread panel. This method, as shown in the figure on page 88, permits independent adjustment of

Ramp control bracket



Manual adjustment of raft ramps



Mechanical adjustment of raft ramps

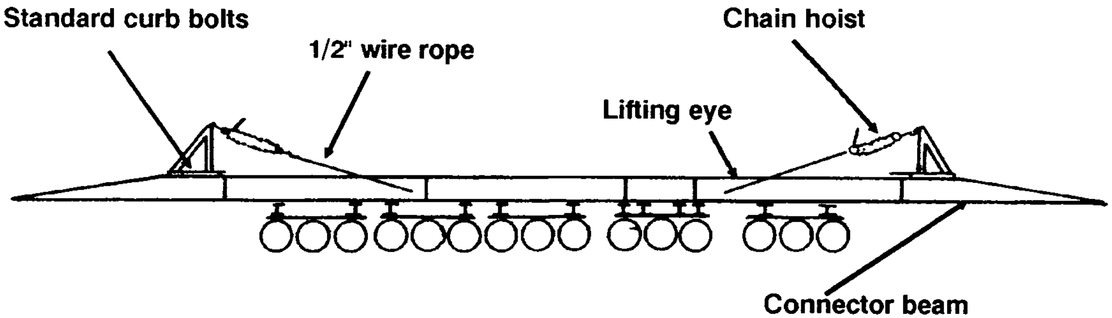


Table 25. Manpower, equipment, and construction times for Class 60 bridges

Personnel and equipment requirements	Bridge lengths		
	0–250 ft	250–525 ft	525–1,000 ft
Number of assembly sites	2	3–5	6
Manpower (Cbt Engr Companies)	1	2	5
Air compressors	2	3–5	6
Cranes (optimum)	4	10	12
Bridge erection boats	4	10	12
Bridge sets	2	5	8
Assembly time	3 hr	3–5 hr	5–8 hr

each ramp or permits omission of the connector beams at one end of the raft (if that ramp requires no adjustment due to shore conditions).

CLASS 60 BRIDGING OPERATIONS

Class 60 Bridge Design Criteria

Class 60 bridges, unlike M4T6 bridges, are constructed only in a normal configuration. These normal bridges can be built with a reinforced end span, if desired, to increase the ability of the bridge to cross heavy traffic. Normal bridges must be constructed with a reinforced end span if vehicles larger than MLC 55 are expected to cross the bridge. The required classification of the bridge is obviously most critical. Additional considerations include the quantity of Class 60 equipment needed to bridge a given gap, required assembly time, the number of assembly sites required, and the crew size needed for the construction of the bridge.

Determining Float Requirements

The number of floats needed to construct a bridge will vary with the width of the gap and the type of end span (normal or reinforced) to be constructed.

Class 60 bridges with normal end spans

The number of floats needed is determined using the following formula

$$\text{Number of floats} = \frac{(\text{Gap (ft)})}{15} \times 1.1$$

OR

$$\text{Number of floats} = \left(\frac{\text{Gap (m)}}{4.6}\right) \times 1.1$$

Table 26. Classification of Class 60 floating spans

Type of crossing	Classification (wheel/track) based upon current velocity					
	0–3 FPS	5 FPS	7 FPS	8 FPS	9 FPS	11 FPS
Normal[1]	60/65	55/65	45/55	40/50	35/45	22/25
Caution[2]	65/70	62/67	56/61	52/56	45/49	34/37
Risk[3]	75/79	72/77	67/72	62/67	57/62	46/60

Notes.

1. A normal crossing is based upon–
   Maximum vehicle speed of 25 mph.
   Minimum vehicle spacing 100 feet.
   No sudden stopping or accelerating on the bridge.
2. A caution crossing is based upon–
   Maximum vehicle speed of 8 mph.
   Minimum vehicle spacing 150 feet.
   No stopping, accelerating, or shifting gears on the bridge.
   Vehicles must stay within 12 inches of the bridge centerline.
3. A risk crossing is based upon–
   Maximum vehicle speed of 3 mph.
   One vehicle on the bridge at a time.
   No stopping, accelerating, or shifting gears on the bridge.
   Vehicles must have a ground guide and stay within 9 inches of the bridge centerline.

EXAMPLE: How many floats are required to construct a Class 60 bridge with a normal end span across a 500-foot gap?

SOLUTION:

$$\text{Number of floats} = \frac{(500)}{15} \times 1.1 = 33.33 \times 1.1$$

Number of floats = 36.67, so round up to 37 floats

Class 60 bridges with reinforced end spans

The number of floats needed is determined using the following formula:

$$\text{Number of floats} = \left(\frac{(\text{Gap (ft)})}{15} + 2 \right) \times 1.1$$

OR

$$\text{Number of floats} = \left(\frac{(\text{Gap (m)})}{4.6} + 2 \right) \times 1.1$$

Note. The two floats added are used to construct the reinforced end spans (one extra float in each end span).

EXAMPLE: How many floats are required to construct a Class 60 bridge with a reinforced end span across a 500-foot gap?

SOLUTION:

$$\text{Number of floats} = \left(\frac{(500)}{15} + 2 \right) \times 1.1 =$$

38.86 floats, so roundup to 39 total floats.

Personnel and Equipment Requirements

Table 25 on page 88 shows the manpower and equipment required for construction of Class 60 bridges in varied lengths.

Assembly Times for Class 60 Bridges

The US Army has little experience in the construction of Class 60 bridges. Table 25 shows the estimated assembly times and recommended crew sizes for varying lengths of Class 60 bridges. The times shown are for daylight construction under ideal conditions. Construction times should be increased by 50 percent for assembly at night.

EXAMPLE: What size unit is needed to construct a Class 60 bridge across a 500-foot gap? How long would construction of this bridge take at night?

SOLUTION: Refer to Table 25. Two companies should be used to construct this bridge. The construction time given is approximately 5 hours (this is for daylight construction). Adding 50 percent for night assembly, the required construction time is determined to be 7.5 hours.

Table 27. End span classification

Type of crossing	Classification based upon type and length of span							
	Reinforced end span					Normal end span		
	15 ft	20 ft	25 ft	30 ft	35 ft	15 ft	20 ft	25 ft
Normal	65	65	55	50	45	55	50	45
Caution	70	60	60	55	50	60	55	50
Risk	80	75	70	65	60	70	65	60

Notes.

1. See notes 1–3, Table 26, for descriptions of normal, risk, and caution crossings.
2. Length of span is measured from the abutment (or trestle) to the first saddle beam.
3. The level of the deck at the abutment sill must not be more than 6 inches above nor more than 12 inches below the level of the deck at the first floating section (with no load).
4. The first floating support should be placed in a position where there is at least 3 feet of water.

Classification of Class 60 Bridges

Bridge classifications are based upon the classification of the floating bridge itself and the classification of the bridge's end span. The classification of the floating span for various currents is given in Table 26 on page 89. Table 27 shows the classification of the different end spans which can be constructed. In determining the actual bridge classification, a comparison should be made between the classification of the floating span and that of the end span that must be constructed to complete the bridge. The lower classification of the two becomes the overall bridge classification.

EXAMPLE: What is the classification of a Class 60 bridge constructed at a site where the river's current flows at 5 FPS and the bridge is constructed with two 15-foot normal end spans? (Assume a normal crossing.)

SOLUTION: Refer to Table 26. The classification of the floating span in a current of 5 FPS is MLC 55 for wheeled vehicles and MLC 65 for tracked vehicles.

Refer to Table 27. The classification of a 15-foot normal end span is MLC 55 for both wheeled and tracked vehicles.

Comparing the classifications of the floating span and the end span, the final classification of the bridge is determined to be MLC 55 for wheeled vehicles and MLC 55 for tracked vehicles.

Construction of Class 60 Bridges

Class 60 bridges are normally constructed using the successive raft method, that is, floating rafts are assembled at each launch site and are moved upstream to the bridge centerline.

Construction requirements

Assembly crews. The crews shown in Table 28 on page 91 are recommended for the construction of Class 60 bridges.

Construction of end sections. The Class 60 floating bridge is normally assembled from near shore to far shore. The number of raft assembly sites available and the width of the river may affect this decision. If raft assembly sites are limited, it may be better to assemble from the far shore to the near shore to permit use of the near shore abutment area as a raft assembly site. FOr very wide river, it maybe preferable to assemble the bridge from both shores to the middle of the bridge span. Position the first floating support at a location where the water is at least 3 feet deep.

Normal. To construct a 15-foot nornal end section, launch three floats. Construct three normal bridge bays (using two deck panels, one filler panel, and two deck curbs on each bay)(. Connect the bays and position them at the bridge centerline. Using a crane, attach two ramp panels to the first normal bay. Complete the end section by adding one short filler panel, one ramp filler panel, and four short curbs. Anchor the end section using two approach guys.

Reinforced. The reinforced end section is normally used for Class 60 bridges because of the increased classification it provideds. The procedures for constructing the end section are as follows:

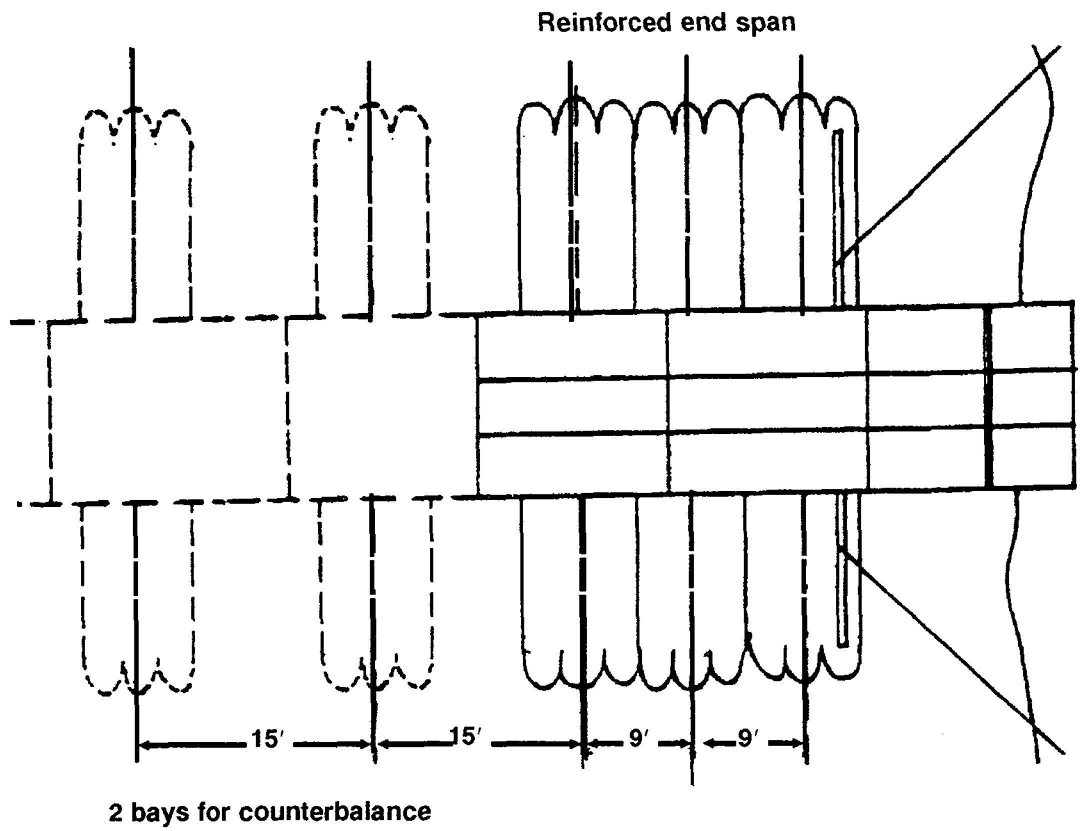
1. Construct and launch three floats as previously described. Tie the floats flush against one another, using ropes attached to the mooring cleats on the end beams.

2. Use a crane to lift the top deck panel off the bottom deck panel while they are still on the truck. Guide the female end of the top deck tread panel into the male end of the bottom deck tread panel, using tag lines. Pin the sections together and secure them with safety pins.
3. Remove and reposition the Class 60 lifting chains to enable the crane operator to lift the connected sections.

Note. The sections can also be connected on the ground.

4. Center the connected panels over the three floats (on the downstream side) using the tag lines to help control the sections. Lower the sections, aligning them with the sliding retainer lugs on the downstream side of the center beams, and secure them im place.
5. Repeat the preceding steps for laying another two-panel section, on the upstream side of the float.
6. After the second two-panel section has been secured, set each filler panel in place individually. Bolt each filler panel in place with eight bolts and emplace the curbs. This completes the reinforced end section.
7. Two normal bays must be attached to the reinforced end section prior to adding the ramp tread panels. First, a BEB is tied to a normal bay or to two connected normal bays. Then the bay(s) are taken to the reinforced end section.
8. The sections are connected by inserting the male end of deck panel on the reinforced end section to the female end of the first normal bay. The vertical and hydraulic aligning tools may be required to aid in alignment of these additional bays.

Reinforced 15-foot end span



Construction of the floating span. Once the near sjore end section is completed, construction of the bridge itself may begin. Rafts consisitng of two normal deck bays are assembled at the launch sites and carried upstream to the bridge centerline. All connections are made by the bridge assembly crew. Once the span is completed, the far shore end section is constructed in the same manner as the near shore end section. At a typical site, a bulldozer blade may be used to set the far shore ramp on its abutment. If a crane is used for positioning the ramp at the far shore, the near shore crane can cross over and operate from the partially completed bridge. The ramp bay can bear on the abutment sill at any point in the length of the

Table 28. Class 60 bridge construction crews

Type crew	Number of crews	Crew size NCO	Crew size EM
Assembly site crews:[1]			
Float assembly	2	1	9
Deck panel placing	1	1	6
Raft assembly	1	1	8
Bridge centerline crews:			
Anchorage	1	1	12
Trestle [2]	1	1	8
Bridge construction	1	1	10

Notes.

1. These assembly site crews are required for each assembly. Crew sizes do not include boat or crane operators/assistant operators.

2. If trestles are not required, use these personnel for anchorage and bridge construction, as needed.

ramp, so that a precise adjustment of bridge length is not necessary. However, the length of bearing must be at least 18 inches, to prevent the ramp bay from slipping off the abutment under traffic. In closing the bridge, if the final gap between the far shore end section and the first bay of the floating span is less than 15 feet, a short deck bay may be constructed and emplaced. Install cover plates over the joint between the bridge and ramp.

Fixed connections. If the length of the floating connection from the abutment sill to the nearest saddle beam exceeds 15 feet, the class of the end connection must be reduced, or an intermediate fixed support must be added to reduce the span length. If frequent or major changes are expected in the water level, give the ramp joint a freed support of adjustable height, and hinge the joint by ommitting the yoke (guide) pins. In either case, use cribbing to provide this fixed support, whenever possible. When cribbing cannot be used, the trestle crew must install trestle arrangements to provide the desired classification. Construct these trestles IAW Chapter 10.

MAINTENANCE OF CLASS 60 RAFTS AND BRIDGES

Operational Maintenance

Class 60 bridges and rafts are maintained in the same manner as M4T6 equipment. See Chapter 5, page 68.