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(00 POI)

STUDENT HANDOUT

MEDIUM GIRDER BRIDGE

PURPOSE: The purpose of this period of instruction is to provide you with the knowledge and skills necessary to assemble, disassemble and identify the major components of the Medium Girder Bridge.

1. TERMINAL LEARNING OBJECTIVE (S):

a. Provided a bridge site, Medium Girder Bridge (MGB) set, a mission, engineer hand tools and references, assist in erecting a Medium Girder Bridge (MGB) to meet mission requirements while observing safety precautions per the references. (1371.02.28)

b. Provided a bridge site, Medium Girder Bridge (MGB) set, a mission, engineer hand tools and references, assist in retrieving a Medium Girder Bridge (MGB) to meet mission requirements while observing safety precautions per the references. (1371.02.29)

2. ENABLING LEARNING OBJECTIVE (S):

a. With the aid of references, state in writing, safety precautions employed in erecting the Medium Girder Bridge (MGB) per the references. (1371.02.28a)

b. With the aid of references, state in writing, the characteristics of the Medium Girder Bridge (MGB) by configuration, per the references. (1371.02.28b)

c. With the aid of references, identify in writing, the components of the Medium Girder Bridge (MGB) by configuration, per the references. (1371.02.28c)

d. With the aid of references, state in writing, the procedure for assembling Medium Girder Bridge (MGB) components per the references. (1371.02.28d)

e. With the aid of references and a scenario involving bridge bays, identify in writing, panel point positions per the references. (1371.02.28e)

f. With the aid of references, state in writing, the methods of grounding the Medium Girder Bridge (MGB) per the references. (1371.02.28f)

g. Provided a bridge site, Medium Girder Bridge (MGB) components, a mission, tools and references, as a member of a team, erect the Medium Girder Bridge (MGB) so that the MGB spans the gap per the references. (1371.02.28g)

h. Provided a bridge site, Medium Girder Bridge (MGB) components, a mission, tools and references, as a member of a team, retrieve the Medium Girder Bridge (MGB) so that the MGB is completely out of the gap per the references. (1371.02.29a)

OUTLINE

1. SAFETY PROCEDURES

WARNING* WARNING

a. MGB cannot be used when bridging requirements exceed the capabilities given in Table 1-1 of TM 08676A-10/1-1.

b. Death or severe injury to personnel and damage to equipment may result if personnel fail to observe safety precautions.

c. Never throw tools or MGB components. Damage to components and tools will occur which can cause accidents.

d. All members of a work party must be fully aware of what actions are to take place prior to start of action.

e. Death or injury to personnel will occur if extreme caution is not used when connecting bridge bays. Use correct lifting techniques and make sure of secure footing. Do not put fingers or hands into pinholes or between components being moved or connected.

f. Always use the access hole of the Landing roller pedestal (LRP) to operate the jack, keep hands and feet clear of the LRP base when operating the jack.

g. DO NOT use any METAL object to drive pins or shoot bolts, if a pin or shoot bolt has to be driven, use a rubber-nylon faced hammer or a block of wood.

h. Death or injury to personnel will occur if carrying bars are used to boom the bridge. Carrying bars can forcefully strike/crush personnel if the bridge were to run out of control.

i. Death or personal injury can result if the bridge is launched or delunched by hand. Launching/delunching by hand can result in personnel loosing control and the bridge crashing into the gap. When a bridge is to be launched or delunched, a vehicle must be used at all times.

j. Personnel must be down off the bridge and out of the bridge interior during booming, launching and delaunching.

k. Never raise or lower one end of the bridge unless the other end is fixed on locked rollers, on the ground or secured to a vehicle (when on capsill or front roller beams).

l. Exposure to hydraulic oil under pressure is hazardous. Exercise appropriate safeguards when working with the 15T and 20T jacks.

m. Do not perform maintenance on the equipment while traffic is on the bridge.

n. When using compressed air, wear safety goggles or glasses and ensure air blast is not directed toward another person.

o. Welding of steel MGB components can be done at Direct Support Maintenance level. Welding of Aluminum MGB components requires special skills; equipment and safety procedures to prevent risk of explosion and ensure structurally safe repair. Therefore welding of MGB components will only be done at Depot Maintenance.

2. MEDIUM GIRDER BRIDGE (MGB)

A. Characteristics:

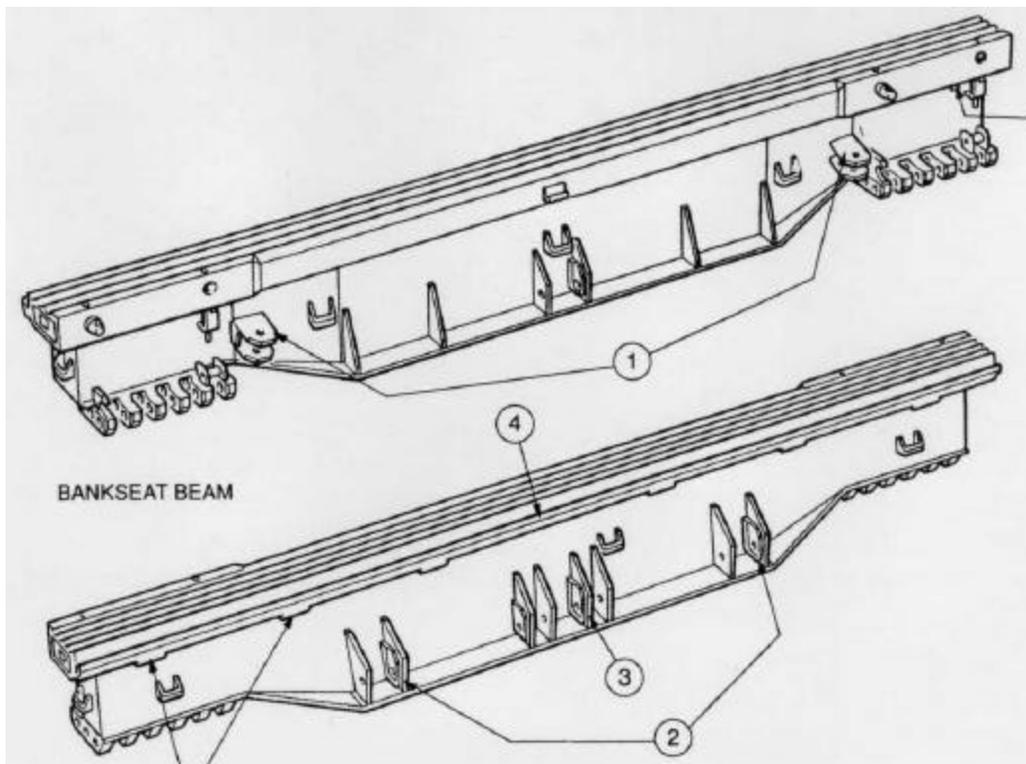
(1) General: The Medium Girder Bridge (MGB) is a two girder bridge with deck units fitted between the two longitudinal girders to provide a 13 feet 2 inch wide roadway. Bankseat beams connect the girders at each end and ramps connect to the bankseat beams to provide access. The bridge is made of a fine magnesium alloy designed to take 10,000, 70T military load class vehicle crossings.

(2) Configurations: The MGB can be built in three different configurations they are the Single Story which provides MLC 70 for bridging gaps up to 29 feet (5 bays). The Double Story without link reinforcement which provides MLC 70 up to gaps of 95.5 feet (12 bays) and the double Story with link reinforcement which will provide an MLC of 70 up to 151.5 feet (22 bays).

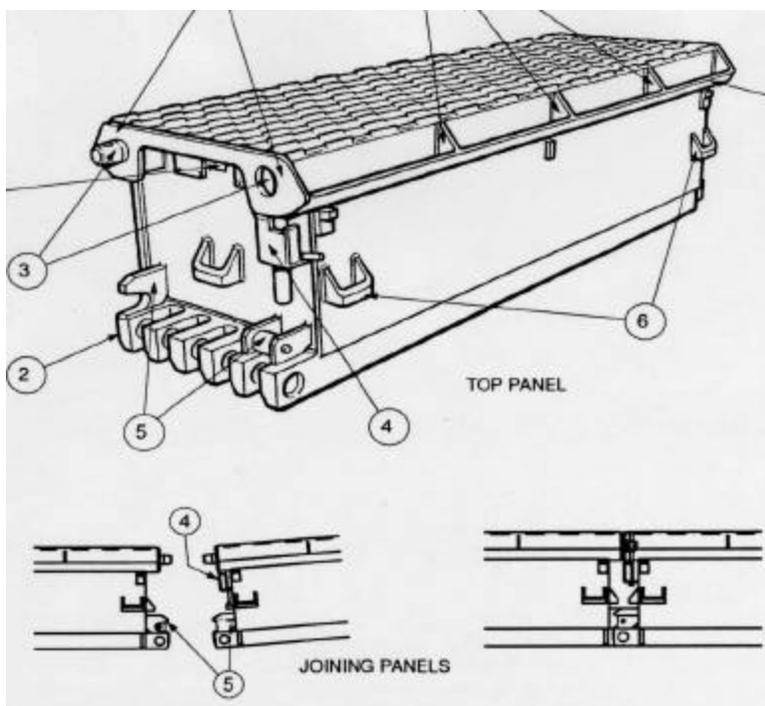
B. Components:

There are seven major components in the MGB set, 4 are used in single story construction and all seven are used in double story construction. The components are:

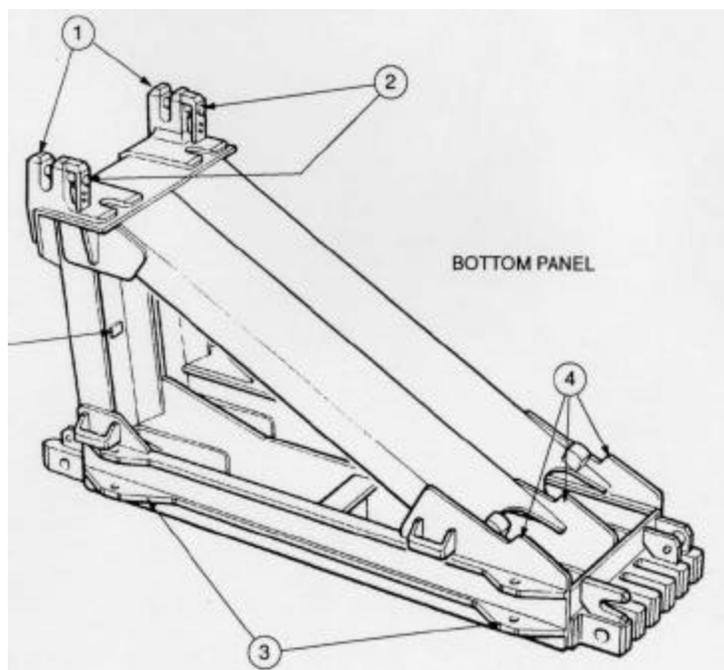
(1) Bankseat Beam - is used to keep the bridge girders properly spaced and provide connection for the ramp units. It requires 6 Marines to carry; it is 13' 3-1/2" long, 1 9-3/8" wide, and 1' 6" high and weighs 570 lbs.



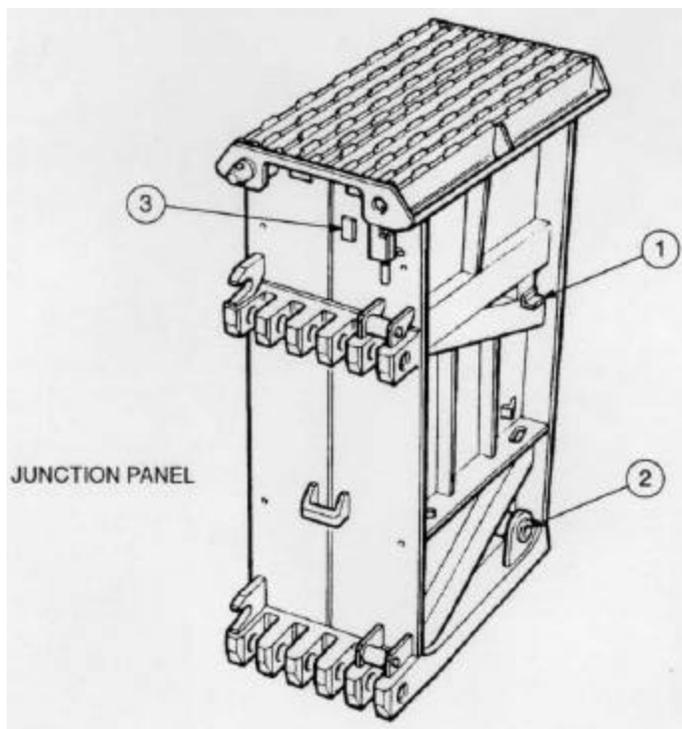
(2) Top Panel - is used to build the bridge girders. There are 7 panel points on each top panel; it is 6'4" long, 2' 1-3/8" wide, 1' 9-5/8" high, weight 385 lbs. It requires 4 Marines to carry.



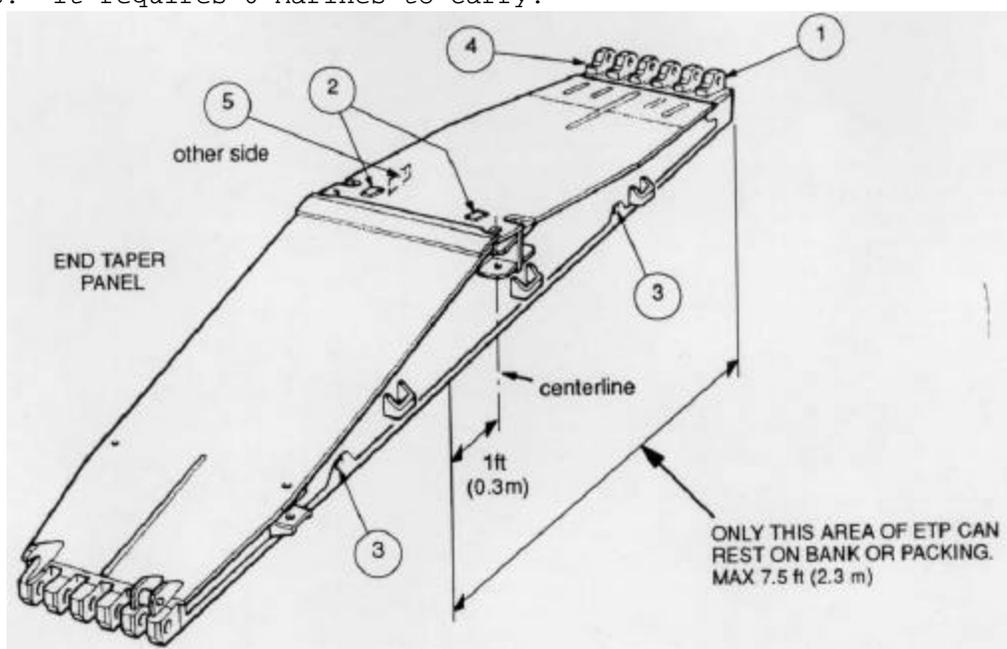
(3) Bottom Panel - is used as a brace for bridge girders. it is 6'5" long, 2' 3" wide, 3' 7-3/8" high, weight 435 lbs., and requires 4 Marines to carry.



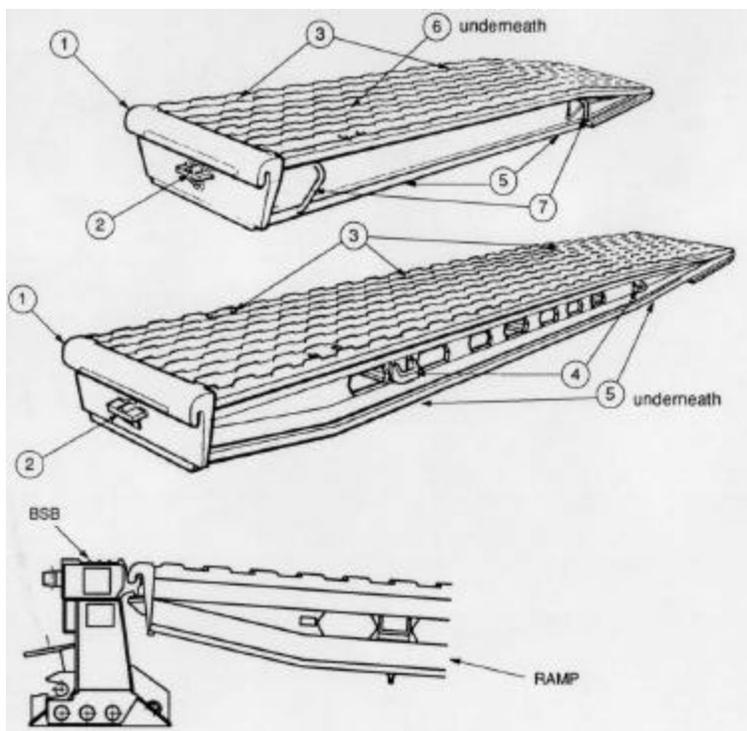
(4) Junction Panel - is used as a brace between the sloped and level part of a double story bridge. It is 5'3/4" high, 3' 5-1/2" long on top, 2' 2-3/4" long on the bottom, 2' 1-1/2" wide, weight 478 lbs. It requires 4 Marines to carry.



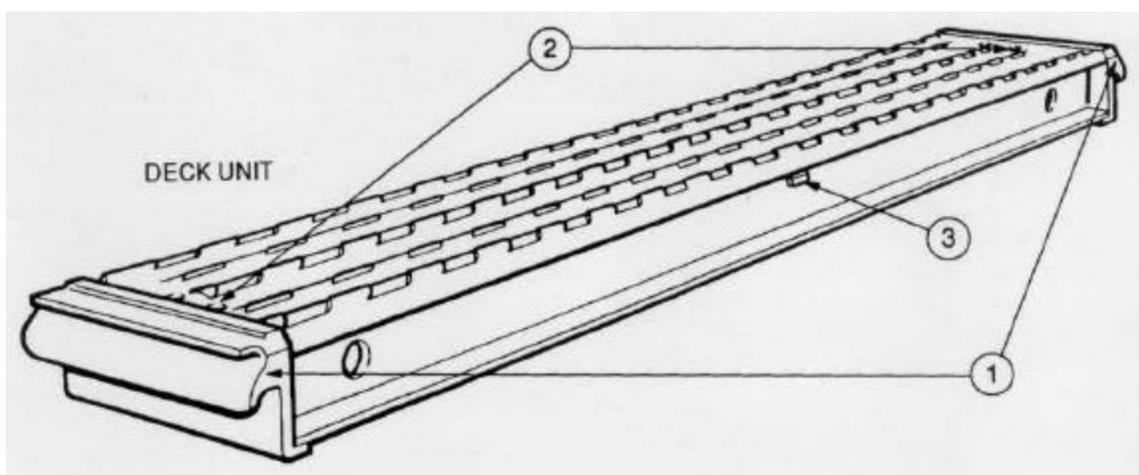
(5) End Taper Panel - is used as a bottom brace between the junction panel and bankseat beam. is 13' 2-5/8" long, 2'4" wide, 1'6" high, and weight 600 lbs. It requires 6 Marines to carry.



(6) Ramp Unit - Two types US. and UK. ramps. UK. or short ramp is a 4 Marines carry and US. or long ramps require 6 Marines to carry. UK. ramp is 264 lbs. and US. ramp is 400 lbs. Each type provides an approach to the bridge, 7 are required at each end. UK. ramps are used for single story only.



(7) Deck Unit - is 9'1" long, 1' 5-1/4" wide, 6-7/8" high, weight 163 lbs. it requires 2 Marines to carry. This component fills in the gap between girders. Four deck units are required per bay of bridge. In single story construction we only use the ramp unit, bankseat beam, top panel and deck unit.



(8) PINS: There are four types of pins that are commonly used in the construction of the Medium Girder Bridge.

(a)
used for:

(b)
used for:

(c)
used for:

(d)
used four

STUDENT NOTES:

3. Construction Sequence for an MGB

1. Erect Building Frame:

(a). Single Story Bridge:

(1) Roller Beam Location: The SS MGB requires only one Roller beam. It is placed .23 m in front of the F' peg when jack launching the bridge or .23 m behind the F' peg when push launching the bridge and is at 90 degree angle to the centerline and centered over the centerline.

(2) Roller Beam Components: The single story roller beam is construction using the single story Base Plate and fixed support. If height adjustments are required the will be made by placing Packing under the base plates.

(b) Double Story MGB:

(1) Roller Beam Location: The DS MGB requires the use of two roller beams. The Front Roller Beam (FRB) is placed three feet from the edge of the gap and is at 90-degree angle to the centerline and centered over the centerline. The Rear Roller Beam (RRB) is placed fifteen feet behind the FRB, squared to the FRB and centered over the centerline. The measurements from gap to FRB and FRB to RRB will be center to center measurements.

(2) Roller Beam Components: Both the FRB and RRB are constructed the same. Using a two Double Story Base Plate. An adjustable support will sit on each base plate, in between the two adjustable supports you place the Frame Cross girder which will space and maintain the distance between the adjustable supports. The Roller Beam is placed in the center of both adjustable supports. One jack seat is positioned in each Adj. Support.

(c) Double Story with Link Reinforcement MGB:

(1) Roller Beam location: This type of construction requires Three roller Beams. The first Roller beam is the Capsill Roller Beam (CRB) this is placed Nine feet from the edge of the gap at a 90-degree angle to the Centerline and centered on the centerline. The FRB is positioned thirty feet behind the CRB and is squared to the CRB. The RRB is placed fifteen feet behind the FRB and is squared to the FRB.

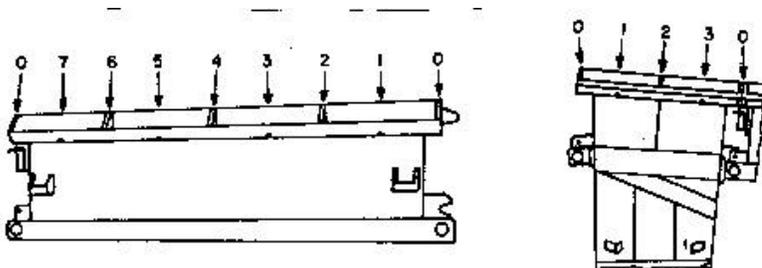
(2) Roller beam Components: The CRB is built using all the Components form the DS roller beams except in place of the normal Roller beam you will use a Capsill roller beam and two Rocking Rollers. The FRB and RRB remain the same as in Double Story construction.

2. Construct End Of Bridge and First Bay

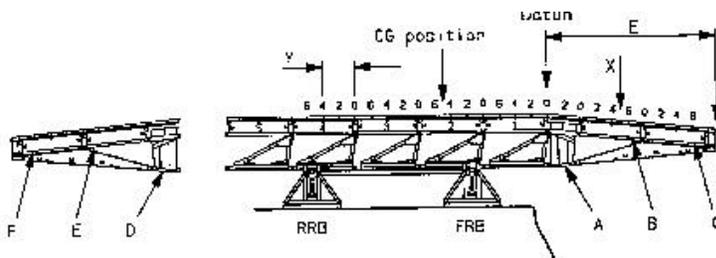
(a) Panel point codes

(1) Bay panel Points: Top panels in the bays of bridge are numbered 1, 2, 3, 4, etc., starting with the top panel next to the far bank junction panel and are read from the far shore End of bridge to the near shore end of bridge.

(2) Panel Points: Panel point codes start at the far shore end of each top panels in the bridge bays, this is panel point 0. From this point, the deck spacers are panel points 2, 4, and 6. Panel points 1, 3, 5, and 7 are the drain holes halfway between each deck spacer. The deck spacer at the rear of the top panel becomes panel point 0 for the next top panel.



(3) The junction panels and top panels in the ends of bridge are lettered A, B, and C (far bank end of bridge) and D, E, and F (near end of bridge). the panel points (1, 2, 3, 4, etc.) run down from the junction panel to the bankseat beam.



CG is at 2p5
 Bridge boomed to 4pE
 Distance Y = 4pp

X is described as 8p5
 Junction between A and B is 3p0
 L = End of bridge

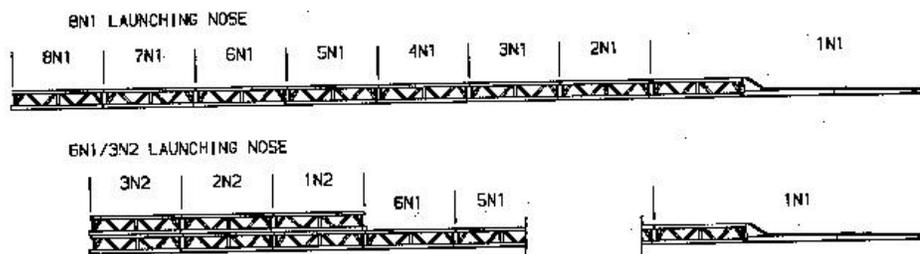
(4) Panel points are important for bridge construction because, while you are building the bridge they tell you what point to BOOM and LAUNCH the bridge too.

(5) BOOMING: This is the movement of the Medium Girder Bridge to a predetermined panel position that ensures that the center of gravity (CG) is between the front rollerbeam and the rear rollerbeam. Booming points are always read at the rear rollerbeam.

3. Assemble and install launch nose.

1. Launching Nose Code: The launching nose is coded in the build procedures and building tables as follows.

(a) The light launching nose front, light launching nose rear, and first launching nose heavy (total length 30 ft) are coded 1N1. The second launching nose heavy (10-ft) is coded 2N1, the third 3N1 and so on. When the nose configuration changes to two tiers (double story), the first double story is coded 1N2, the second 2N2 and the third 3N2.

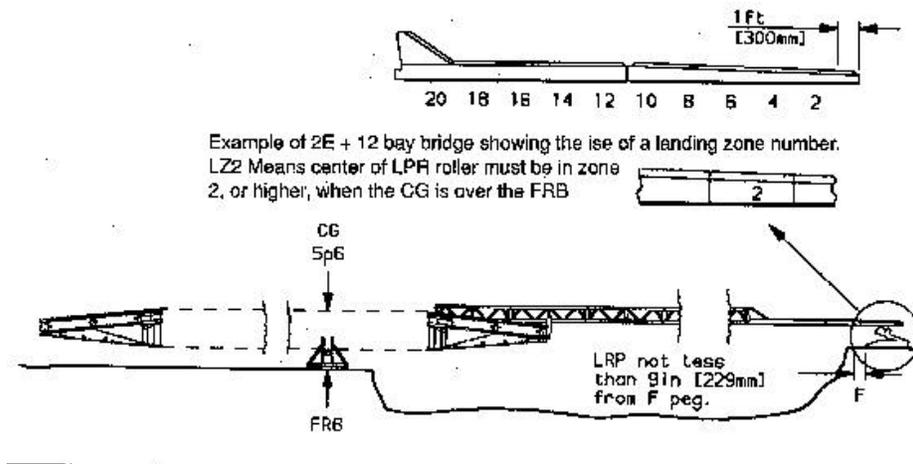


4. Assemble Bridge

(a) LAUNCHING: Launching occurs when the center of gravity (CG) panel point, i.e. (2p6) is positioned over or forward (gap side) of the front rollerbeam, FRB, (or capsill rollerbeam, CRB, for linked reinforced bridges). Once the CG panel point passes the front rollerbeam all further launch positions are read over the FRB or CRB.

(b) Landing Zone Number:

(1) The building tables and build procedures include a landing zone number to ensure correct location of the landing roller pedestal under the launching nose. The light launching nose is considered as divided into twenty equal zones, each 1 ft (300 mm) in length. During building or delaunching, the landing roller pedestal must be positioned not less than 9 in (229 mm) from the F peg, and at this time the LZ number is checked for correct position over the landing roller pedestal roller. The landing zone number should be that given or HIGHER. Never less than that given in the tables.



5. Set bridge on the deck:

(a) There are two methods that are used to set an MGB on the deck once the Near Shore Bankseat beam is .5 meters from the FRB, Using fifteen ton Jacks or using the Davit System.

(1) 15-Ton Jacks: Two jack posts are placed on the near shore Bankseat Beam and pinned with a Launchnose pin. The double story base plates from the RRB are placed under the jack posts and jack supports are connected to the base plates. Using the 15-ton jack placed in the jack support and lifting on the jack post, lift the bridge until the FRB can be pulled from under the bridge. Once the FRB is removed put cribbage under the bridge and lower the bridge until it rests on the cribbage. Reset your jacks lift the bridge and remove Cribbing as allowable. continue this process until there is the required cribbage or the bridge is on the deck.

(2) Davit System: Used for all Bridges over 18 Bays in length

STUDENT NOTES:

4. CONSTRUCTION PROCEDURES FOR PRACTICAL APPLICATION 3 BAY DS MGB

A. Erecting Building Frame

(1) Put four building frame baseplates in place. Distance from FRB to RRB is 15 feet. The distance from the edge of the gap to FRB is a minimum of 3 feet.

(2) Put and hold a roller beam adjustable support on each-of-the front baseplates.

(3) Hook a building frame cross girder on front adjustable supports.

(4) Push shoot bolts through each cross girder and support brackets.

(5) Hold a roller beam adjustable support on each of the rear baseplates.

(6) Hook a building frame cross girder on rear adjustable supports then push shoot bolts through each cross girder and support bracket.

(7) Put a Jack seat over support pins or lower rail in each adjustable support.

(8) Put a 15-Ton Jack on each Jack seat.

(9) Raise jackhood on each end of front roller beam and put roller beam between front adjustable support posts.

(10) Make sure jack hoods are on jack head.

(11) Raise jackhood on each end of roller beam and put rear roller beam between rear adjustable support posts.

(12) Make sure jack hoods are on jack heads.

(13) Turn the front or rear adjustable support leveling screws into the baseplate sockets so that the adjustable support is vertical. Allow 1/4-inch space between screw and socket so that the support may rock back and forth on the pivot.

B. Assembling a 3 BAY Double Story Bridge

(1) Place a top panel parallel with the centerline approximately 9 feet behind the FRB. Place a piece of 6 x 6 grillage on the top panel.

(2) Lay End taper panels on the FRB and piece of grillage that was placed on the top panel in step one.

(3) Adjust the wood grillage so that it will not be in the way when the junction panel is attached to the end taper panel (end of paper panel extends behind the wood).

(4) Carry BSB into position in front of FRB and align it with end taper panels.

(5) Place guide (panel) pins into middle panel pin holes on bankseat beam allowing approximately 3 to 5 inches of the pins to extend on the outside.

(6) Lift BSB onto End taper panels seating the guide pins in the guide pin recession at the end taper panels.

(7) Connect BSB to End taper panels by inserting panel pins through jaws of BSB and End taper panels (1st hole on BSB).

(8) Pin first top panel to BSB. Lock shoot bolts and push panel pin through jaws.

(9) Put panel pin behind brackets on end taper panel to keep top panels from binding.

(10) Pin second top panel to first top panel, shoot bolts first.

(11) Pin junction panel to top panel and taper panel.

(a) Fit dowels into dowel slots.

(b) Push shoot bolts through dowel holes. Lock shoot bolts.

(c) Push down and in on rear of junction panel to push junction panel jaws into jaws of end taper panel.

(d) Push panel pin through lower jaws.

(e) Push on back of junction panel (near top) to line up upper jaws.

(f) Push panel pin through upper jaws.

(g) Pull panel pin between end taper panel and first top panel. The front end of the bridge (EOB) has been built.

(12) Pin bay #1 top panel to junction panel.

(13) Pin bay #1 bottom panel to top panel and junction panel. Close shoot bolts in top jaws of bottom panel.

(14) Bay #1 of the bridge is complete, (Note) It is important to use a headless panel pin to connect the Top Panel to Junction panel to be able to do a far bank disassembly.

(15) Push the rear roller beam under bay #1 (panel position 1P4). Jack up and remove top panels and packing from under the end taper panels. Adjust the RRB so that rear of bridge is not so high that crewmembers cannot lift and fit top panels during construction of next bay.

NOTE: The NCOIC and side party leaders must monitor the height of the rear of the bridge to prevent difficulty in lifting top panels into place.

(16) Lock rollers on front and rear roller beams.

(17) Put retainers on all pins in bay #1.

(38) Pin sway brace to BSB and end taper panel. Place retainers on pins.

NOTE: From this point on, put retainers on all pins after they are put in place and are seated except; beginning with bay two, panel pins holding top panels together need not be pinned because bottom panel jaws will prevent panel pin from moving.

NOTE: Adjacent sway braces cannot be parallel, they must be staggered.

(19) Put extended Jack with Jack handle in landing roller pedestal and put close landing roller pedestal and landing roller in front of front roller beam.

(20) Pin nose roller to bankseat beam.

(a) Hook nose roller on BSB.

(b) Push launching nose pin through bracket and bottom of nose roller. Nose roller is in place

(21) Fit nose cross girder post to junction panel.

NOTE: Use headless panel pin to connect nose girder posts to junction panels and place retainers on both ends of the pin.

(22) Pin nose cross girder to post at correct height and put retainer on captive pin.

(23) Pin top and bottom panels of bay #2 to bay #1.

(24) Pin top and bottom panels of bay #3 to bay #2.

(25) Pin front and rear section of light nose unit together.

(26) Place front end of light nose unit on nose roller and rear end of nose cross girder.

(27) Place rear of nose unit about 2 feet behind the nose cross girder.

(28) Pin first heavy nose unit to end of light nose unit.

- (29) Raise nose catch handle on nose cross girder.
- (30) Push nose forward 5 feet.
- (31) Put landing roller pedestal and landing roller on front of nose.

NOTE: A cargo strap is placed around the pedestal and nose to keep it secured to the nose.

(32) Raise nose catch and push nose forward 1 nose unit (10 feet). Rear of heavy nose unit is about 2 feet behind nose cross girder.

- (33) Pin second heavy nose unit to first heavy nose unit.
 - (a) Fit dowels into dowel slots and lock shoot bolts.
 - (b) Push nose pin through jaws.

(34) Lift nose catch handle and push nose forward 10 feet.

(35) Push panel pin through nose roller holes and launching nose to prevent the nose from moving to front or rear.

NOTE: Do not remove this pin until a new nose section is attached and the nose crew has "hands on" the nose to prevent it from rolling.

(36) Pin third and fourth units in place.

NOTE: Repeat steps 28 through 36 for each nose unit.

WARNING: Failure to have the launching nose fully extended will cause the light launching nose section to fail. The second from last launching nose heavy section must be pinned to the launching nose roller so that approximately one foot of the last launching nose heavy section extends to the rear of the launching nose girder.

(37) Pin sway braces in bays #1 through #3.

NOTE: Installation of sway braces should never lag more than 3 bays behind end of bridge to prevent difficulty in pinning sway braces.

(38) Pin Junction panels to ends of bay #3.

(39) Pin front end of taper panels to junction panels. Lower free end to ground.

(40) Check cross level of rear roller beam. If necessary, jack up low end to get rear end level.

(41) Put rear bankseat beam on ground behind bridge.

(42) Pin one top panel on the rear of both junction panels.

(43) Pin a pair of top panels onto bankseat beam.

(44) Lift BSB and panels together, then pin these panels to the panels on the bridge.

(45) Insert panel pin in center hole of BSB jaws (right hand panel pulled out about 3 inches, then pin end taper panels to BSB and top panels.

NOTE: Ensure bridge is level, place sway brace under each end taper panel and lift up both at the same time using away brace as levers.

(46) Pin a sway brace between end taper panels.

(47) Check position to make sure the launching nose will clear far bank by a height of at least 1-foot. If necessary, raise or lower front roller beam.

(48) Pin push bar to rear of BSB and connect the push bar to the front bumper of the truck.

(49) Unlock rollers and push bridge forward until the LLN is touching the far shore.

(50) Remove landing roller pedestal from LLN and configure it by placing fully extended Jack under Jack hood. Place LRP at prescribed landing zone according to TM-08676A-10/1-1.

NOTE: The front BSB should end up at F peg.

(51) Make sure that landing roller pedestal is parallel with the nose. If not, straighten landing roller pedestal. Make sure that nose is on landing roller.

(52) Unlock rollers and push bridge forward until it reaches the F peg or near side bankseat beam reaches FRB, (whichever occurs first), and then lock rollers.

NOTE: Guide nose during first 20 feet to make sure landing roller is stable, and that jerking of the nose caused by movement does not allow it to jump off the roller.

(53) Remove nose units as they cross the landing roller pedestal.

CAUTION: Always have at least one-half of the next nose unit extended past the landing roller before removing a unit.

(54) Remove the rear roller beam after the nose reaches maximum deflection (bridge now supported by the front roller beam and the LRP.)

(55) Lower landing roller pedestal until far shore BSB is on ground.

- (56) Take push bar off BSB and truck. Move truck back
- (57) Pull landing roller pedestal from under nose.
- (58) Pull panel pin from nose roller.
- (59) Lift nose catch handle and pull remaining nose units from bridge.

NOTE: Always leave three sections of LNH on the bridge (to be removed at one time). Move the landing roller pedestal approximately six feet in front of the BSB. Remove the front section and pull remaining nose forward until they can be removed.

- (60) Pull pin holding nose roller to BSB and take nose roller from BSB.
- (61) Pull retainers from nose girder and lift girder.
- (62) Pull captive pins from nose cross girder and lift girder.
- (63) Take nose cross girder from bridge and then take off nose cross girder posts.

NOTE: There are three methods to lower home end of bridge, the Jack method, the davit system and utilizing a crane. For more information reference TM 08676A-10/1-1.

- (64) If jacking the bridge down, put a Jack under each outside end of BSB.
 - (a) Pin Jack posts to outside of home BSB.
 - (b) Pin 2 Jack supports to baseplates.
 - (c) Put baseplates with jack supports in position under jack post.
 - (d) Put jacks in jack supports.
 - (e) Put jack post jack brackets over head of jacks.
 - (f) Jack end of bridge up to limit of jack.
- (65) Place cribbing under bridge. Lower jacks until bridge rests on cribbing, reseal jack brackets.
- (66) Jack bridge up enough to clear roller beam. Place packing within 3 inches of bottom card of end taper panels.
- (67) Lift roller beam off jacks and push in jack hood lock pins.
- (68) Take jack from adjustable supports and lower jack hood.
- (69) Slide roller beam from supports.

(70) Pull shoot bolts on adjustable support, lift up-roller beam cross girder and-remove adjustable supports.

(71) Hold roller beam supports and take out building frame cross girder.

(72) Remove adjustable support baseplates and jack bridge down as far as jacks will go (stopping on packing before jack is completely closed).

(73) Reposition jack hoods so that jack must be raised enough so that when lowered the bridge will be grounded before the jack is fully closed.

NOTE: Pack up under the end taper panels during lowering operation and remove packing 3 inches at a time (in case of Jack failure it will not damage bridge).

(74) Take off jacks, baseplates, and Jack posts.

(75) Pin last sway brace to end taper panel and bankseat beam.

(a) At this point, the bridge is launched and sitting on the near and far shore banks. The only thing left in constructing the bridge is to install the end ramps, deck panels, curbs, bridge markers, and bridge class signs. This is called dressing the bridge.

C. Retrieving the MGB. To get the bridge back you simply reverse the erection procedure and pull the bridge back. In accordance with TM-08676A-10/1-1.

D. Launch Techniques

(1) PUSH LAUNCH. The simplest and preferred launch method is push launch.

***** NOTE: PUSH LAUNCHES ARE NO LONGER PERFORMED FOR TRAINING OR DEMONSTRATION PURPOSE.**

(2) THE BRIDGE CAN BE PUSH LAUNCHED IF:

(a) It is operationally necessary.

(b) It's a single story bridge, consisting of 5 bays or less.

(c) There is no packing under the roller beam.

(d) The ground onto which the bridge is to be launched on the near bank is soft or sandbags are used to cushion the launch.

(e) The bridge must be Jack launched if any of the above requirements for launch are not met.

STUDENT REFERENCES:

TM-08676A-10/1-1 Operators Manuel For Bridge, Medium Girder