The World Leader in
Tactical Military Bridges

MGB

Medium Girder Bridge

MGB

Medium Girder Bridge

The WFEL Medium Girder Bridge (MGB) is a classic example of high quality precision military engineering that has stood the test of time.

In operation since 1971, over 500 MGB systems have been acquired by 38 armed forces worldwide. The MGB is constantly in use, and increasingly in demand, for both military and disaster relief operations.

Significantly enhanced since its initial design, today's MGB has multi-role capabilities. Component inter-changeability – on any bridge of any age – continues to make this one of the most versatile bridging systems available.

MGB units are light, easily transported, can be constructed by hand and adapted for most tactical bridging requirements. The system includes piers, pontoons and ferries, all engineered for deployment with minimum manpower.

Building blocks

The WFEL MGB is a modular, two girder bridging system with deck units providing a four metre wide roadway and optional walkway. The basic building units consist of seven precision-engineered lightweight alloy components.

Easy to assemble and lightweight, two of the units require six personnel to lift them while the other structural units each require four personnel. The deck and ramp units can be lifted by two.

MGBs are available in five different product configuration groups – Single Span, Multi-Span, Double Storey with Link Reinforcement Set (LRS), Floating and MACH (Mechanically Aided Construction by Hand).

The MGB can also be fitted with an optional reduced slope to provide a smoother entry and exit to and from the bridge.

Technical specifications for each type of MGB can be found on page 10.

Above: A 49m link reinforced MGB deployed in the aftermath of a natural disaster in India.

Single Span

MGB Single Span bridges can be constructed as either Single Storey, Double Storey or as a Double Storey with Link Reinforcement Set (see page 6). Different lengths can be created specific to the gap being crossed by varying the number of bays used. Each individual bay is 1.83 metres in length.

Construction

The Single Storey MGB bridge is constructed using top panels that are pinned together to create two girders. These girders are then joined at each end by a bankseat beam to create a rigid framework.

In the Double Storey MGB configuration, the girders are made up of top and bottom panels with junction panels and end taper panels forming the sloping end of the bridge.

Ramp, deck and kerb units complete the construction in both configurations. Additional walkways are available if required.

Launching

Single Span MGBs are launched using a centrally-mounted nose made from 3 metre sections. During launching, the bridge is supported by roller beams on the home bank and a single roller on the far bank.

Single Storey MGBs are launched using one roller beam supported on base plates while the Double Storey uses two.

Hydraulic jacks at each end of the roller beams lower and also level the bridge onto each bank after construction. It is possible to launch Single Storey MGBs over short gaps simply by pushing them off the near bank roller beam.

Clockwise from top: A Single Storey MGB; an MGB under construction; Double Storey MGB with a reduced end of slope.

Multi-Span

The Span Junction Set

The MGB Span Junction Set consists of span junction posts, pinned together at the top and connected by hydraulic articulators.

This gives MGB Double Storey bridges a Multi-Span capability and allows them to be constructed over supports that are either fixed or floating. The Multi-Span MGB can also be deployed using a mix of existing supports, pontoons, piers and the MGB Portable Pier Set.

MGB Portable Pier Set

The Portable Pier Set provides the MGB with its own two-legged pier that can be assembled during construction of the main bridge.

Each leg is built in three metre sections. Legs of up to 12 metres high can be used in water with current speeds up to 5.5m/sec (10 knots). For dry gaps, legs of up to 18 metres can be used. The two legs pass through housings at each end of the pier beams.

The MGB Portable Pier can be constructed independently after positioning in the river from a float or in a dry ravine or wadi.

MGB Double Storey Multi-Span Bridges

MGB Double Storey Multi-Spans consist of two or three span structures with a maximum load classification of 70 (T). The two span bridge can have a length of up to 51.5 metres while the three span can reach 76 metres.

Top: A three-span bridge using the Portable Pier Set.

MACH

The MACH (Mechanically Aided Construction by Hand) system reduces the size of build crews from 25 to 9 personnel.

By pre-fabricating MGB components into modules in a separate assembly area the bridge can be constructed using a suitable crane or HIAB vehicle.

MACHs use standard MGB components supplemented by special sections designed to assist mechanical handling. It can still be built by hand if the hydraulics are damaged.

1. Bridge module: Three top panels and three bottom panels joined by a MACH connecting post that is one quarter of the length of a single panel.

2. End of bridge module: Two top panels, one end taper panel and one junction panel, are joined with an end of bridge connecting panel.

3. Construction beam: The capsill roller beam and assemblies are made into complete units using baseplate retaining hooks and jack hoods.

4. Pallet system: Deck and ramp units are put into pallet loads. The base unit consists of four standard deck units fitted with lifting bars. Each complete load provides four bridge bays. The same base unit is also used to transport ramps.

Double Storey with Link Reinforcement Set (LRS)

Construction

The MGB Link Reinforcement Set (LRS) is made up of 3.66 metre long reinforcing links and shorter 1.83 metre links that are pinned together to form chains under each girder.

Suspended two metres beneath each bottom chord of the bridge, the chains are tensioned by pulling the reinforcing posts into the vertical position, creating a fully reinforced structure.

The LRS extends the capacity of an MGB to a maximum load classification of 60 (T) on spans of up to 49.4 metres.

Currently in use with many armed forces worldwide including the UK and U.S, the LRS is made from the same lightweight aluminium alloy as the principal components of the MGB. All LRS parts can be lifted by hand and transported on standard MGB pallets.

Build time

An LRS MGB takes roughly 30 minutes longer to build than an un-reinforced bridge of the same span. Eight additional personnel can install the reinforcement during the normal build process (see page 10).

Transport

MGB components can be transported in a variety of different loads – on dedicated MGB pallets, standard flatracks, underslung or any flatbed truck – ensuring that the bridge can be delivered rapidly to its point of deployment while using the least possible manpower.

Handrail

The MGB Handrail design provides both military and civilian drivers with increased awareness of roadway width. It consists of vertical connecting posts with longitudinal handrails that create a continuous barrier along the edge of the bridge.

Handrail components can be carried on a standard MGB pallet or unit transport.

Floating

Ferry

The MGB Floating Ferry consists of a Single Storey configuration with hydraulic powered landing bays. Powered pontoons provide both steering and thrust capabilities for the ferry.

MGB Ferries can be deployed rapidly and built by hand using standard MGB components. They have highly manoeuvrable load platforms, capable of crossing most water obstacles.

The landing bays include a hornbeam assembly with flip-over toe ramps, enabling fast embarkation of vehicles over bank heights of up to two metres.

MGB Ferries are available in three standard configurations for maximum load classifications of between 20 (T) to 60 (T). Additional MGB Pontoon piers can be used for higher load classes.

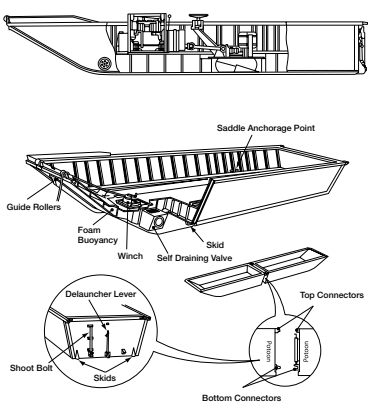


Diagram: The underside of the MGB pontoon is completely flat, allowing it to operate in shallow or obstructed waters.

The adaptation of the MGBs dry bridge components to a floating role – available in Single or Double Storey configurations – is perhaps the best example of its unique versatility.

Double Storey Floating MGBs provide landing bay spans of up to 26.5 metres and are suitable for conditions where the water level continually rises and falls.

Single Storey construction provides either floating bridges or ferries for a maximum load classification of up to 60 (T).

Standard MGB substructures are used to build either configuration and both can be carried on MGB Pontoons with Single Storey hinge bays or Double Storey Span Junction Sets to provide articulation.

MGB Pontoons

The MGB Pontoon is made from marine grade aluminium alloy.

Two pontoons are coupled back-to-back to create each pier and three piers make up one landing bay raft.

Powered pontoons are driven by diesel engines with a water jet propulsion unit.

Fully laden pontoons can operate in currents of up to 2.5m/sec (4.85 knots).

Transportation

For ease of transportation and storage the MGB pontoon is of an open topped construction that allows for the ‘nesting’ of pontoons.

They can be launched using suitable non-dedicated vehicles fitted with a demountable rack structure making them compatible with modern military materiel handling systems.

Single Storey Floating MGB

The Single Storey Floating MGB is built in a continuous construction from one site allowing one bay of the bridge to be added every 30 seconds.

Launching is made simple and steady by deploying a winch cable across the gap at the front of the bridge.

Double Storey Floating MGB

With landing bays up to 26.5 metres long, the Double Storey Floating MGB can cope with extreme bank heights of up to five metres. These lengthy landing bays also suit conditions where the water is very shallow, close to the bank or where the bank is marshy.

Double Storey Floating MGBs use fewer pontoons than Single Storey and can be built in either Multi-Span or continuous form depending on the length of the crossing:

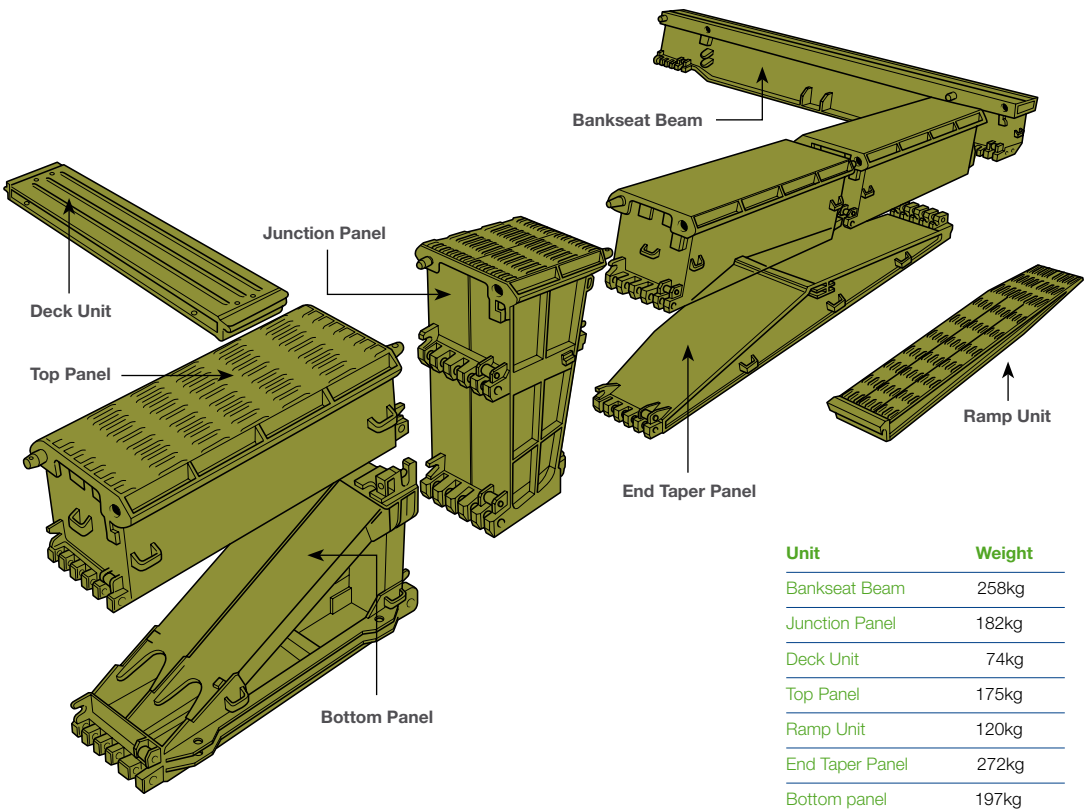
- Two spans for gaps of 31.1 metres to 51.5 metres.
- Three spans for gaps of 51.5 metres to 76 metres.
- Bridges greater than 76 metres can be built using three spans with intermediate pontoon piers placed at intervals in the centre section of the crossing. This creates a highly economical and long floating bridge that requires only Span Junction Sets at the landing bays.

Above: A tank crossing a floating MGB.

"The build was delayed several times by traffic congestion from the 3rd Infantry Division that was moving towards Baghdad. The night was without natural illumination. Soldiers were navigating with night vision goggles and the limited number of chem-lights. Twice, chemical alerts put soldiers in MOPP 4 conditions for 45 minutes each time. All the time the unit was also building a Medium Girder Bridge... which was emplaced by dawn."

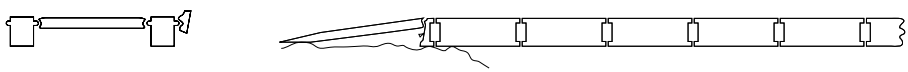
Cpt. Steven J. Thompson, Commander, 299th Engineer Company (Multi-Role Bridge), U.S. Armed Forces on crossing the Euphrates River during the battle for Objective Peach.

Technical specification

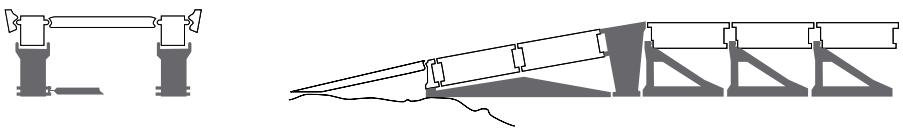


Unit	Weight
Bankseat Beam	258kg
Junction Panel	182kg
Deck Unit	74kg
Top Panel	175kg
Ramp Unit	120kg
End Taper Panel	272kg
Bottom panel	197kg

Single Storey bridge configuration

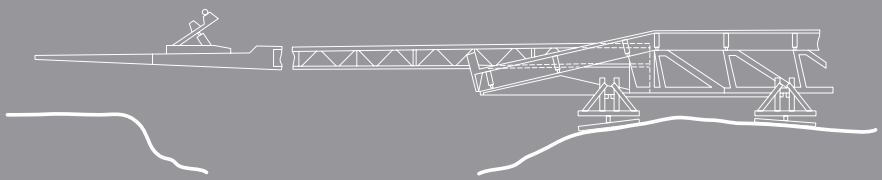


Double Storey bridge configuration



Launch sequence showing use of MGB launching nose

1. Landing roller carried to far bank



2. Launching roller supporting launching nose

3. Touch down on far bank, still on rollers

4. Jack down

	Single Storey		Double Storey		Double Storey LRS	
Maximum Load Classification	Span (metres)	Bridge weight (tonnes)	Span (metres)	Bridge weight (tonnes)	Span (metres)	Bridge weight (tonnes)
70	9.8	5.8	31.1	21.3	42.0	30.9
60	9.8	5.8	31.1	21.3	49.4	–
50	9.8	5.8	34.8	23.8	–	–
40	11.6	6.6	38.5	26.1	–	–
30	15.2	8.0	42.0	28.4	–	–
20	19.0	9.5	47.6	31.3	–	–

Personnel	Bridge length, type and class			Best time (minutes)		Planning time (minutes)	
	Length	Type	Class	Day	Night	Day	Night
1+8	9.8m	Single Storey	70	12	35	30	45
1+16	22.5m	Single Storey	16	40	65	60	75
1+24	31m	Double Storey	70	40	70	75	120
2+32	49.4m	Double Storey LRS	60	86	–	180	210
1+32	51.5m	Double Storey 2 Span	70	150	–	240	–
3+40	76m	Double Storey 3 Span	60	360	–	480	–

The World Leader
in Tactical
Military Bridges

WFEL Limited
Heaton Chapel
Stockport, Cheshire
SK4 5BB England

Tel: +44 (0)161 975 5700
Fax: +44 (0)161 431 3575

info@wfel.com
www.wfel.com

About WFEL

WFEL has supplied equipment and support to 39 armed forces across the world for over four decades. Our expertise – built on nearly a century of engineering excellence and innovation – ranges from concept design to full scale production of rapidly-deployable, modern bridging systems for use in military and disaster relief scenarios. We also provide a full package of value-added support services including training, inspection, maintenance, repairs and spares both in the field and at our UK-based engineering site in Heaton Chapel, Stockport.