mabey bridge

Logistic Support Bridge™

Built on the success of the Bailey Bridge

Logistic Support Bridge™

The Logistic Support Bridge™ (LSB) is the successor to the Bailey Bridge that revolutionised manoeuvre warfare during the Second World War. The product of decades of design development, this bridge offers a cost effective solution to modern line of communication and disaster relief needs.

The LSB™ is ideal for both military and humanitarian aid applications, principally to upgrade main supply routes to carry all types of military and aid vehicles.

Adapted from the Compact 200™, a standard, interchangeable steel bridging system designed for permanent and temporary applications, the LSB™ offers the same rapid build process with some special components to meet military requirements.

The modular design of the equipment means it can be constructed in a large number of different configurations.

Benefits

- → Capable of carrying a Main Battle Tank, up to Military Load Class (MLC) 80T, across a clear span of 60m
- → Can be built on greenfield sites with minimum preparation
- → Pre-engineered modular design
- → Rapidly deployed on military transport
- → Can be assembled by hand or using light plant
- → Easily dismantled and returned to stock after use
- → Transported in standard 6m (20ft) and 12m (40ft) ISO containers and on 6m DROPS/PLS 'flat racks'
- → Multiple spans possible using fixed piers or floating pontoons
- → Can be crane built or cantilever launched
- → Designed to be built on green field sites with minimal preparation, its grillage system and fully adjustable ramps permit swiftly erected crossings that will accommodate all types of traffic; military, construction or civilian.
- → Optional external pedestrian footwalks

Role

The prime role for the LSB™ is to upgrade main supply routes for use by the heaviest military vehicles.

It is designed to overbridge weakened, damaged or destroyed structures and new crossing sites.

NATO and world-wide military standard

Armed forces from around the world have deployed and trained on Compact 200™ and the LSB™, including: Afghanistan, Albania, Argentina, Australia, Austria, Belgium, Benin, Brazil, Bulgaria, Cambodia, Canada, Chile, Czech Republic, Denmark, Ecuador, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Japan, Lithuania, Macedonia, Malaysia, Nepal, Netherlands, Norway, Poland, Portugal, Romania, Sri Lanka, Slovakia, Slovenia, South Sudan, Spain, Sweden, Switzerland, Taiwan, Tanzania, Turkey, Venezuela, United Kingdom, United States.

Bailey Bridge history

The Bailey Bridge

In early 1941 Sir Donald Bailey designed, built and successfully tested the Bailey Bridge in only 3 months. Within a year it was in service with the British Army and so started this revolution in military bridging capability. It was first used operationally in late 1942 in North Africa and has been in use ever since. The Allies built 2500 Baileys during the Italy Campaign and a further 2000 during the advance to Berlin. General Eisenhower described the Bailey Bridge as one of the three most important engineering and technological achievements of WWII, along with radar and the heavy bomber.

Today

Mabey Bridge has continued the development of this truly superb system. Advances in design, testing techniques, digital innovation, steel technology and manufacturing, especially robotics, have been combined to deliver the world-beating LSB™ and its civil equivalent, the Compact 200™ – and now Digital Innovation offers superb training and operational support for the LSB™.

Economy of effort

The LSB™ is a far more effective system than the Bailey Bridge it succeeds. Like-for-like build spans see a 40% saving in weight, and a massive increase in the weight of vehicles that it can support.

For these reasons Mabey Bridge no longer manufactures Bailey components.

Comparison: Bailey – LSB™

Example: 13 bay, 39.62m span

Specification	Extra wide Bailey	LSB™
Length	39.62m	39.62m
Military Load Class	MLC80T/70W	MLC80T/110W
Number of panels	156	52
Number of transoms	54	14
Roadway width	4.2m	4.2m
Deck	Timber	Steel
Total weight	100t	58t

System description

The LSB™ is made up of standard Compact 200™ components with some special components to meet the military requirement.

Standard equipment includes:

Panels
These are the main structural components of the bridge trusses. They are welded items comprising top and bottom chords interconnected by vertical and diagonal bracing. The chords of each panel have male and female ends which allow panels to be pinned together to form the bridge span. There are two different panels, a standard panel and a high shear panel. The high shear panel is used at each end of the bridge when extra shear strength is required.

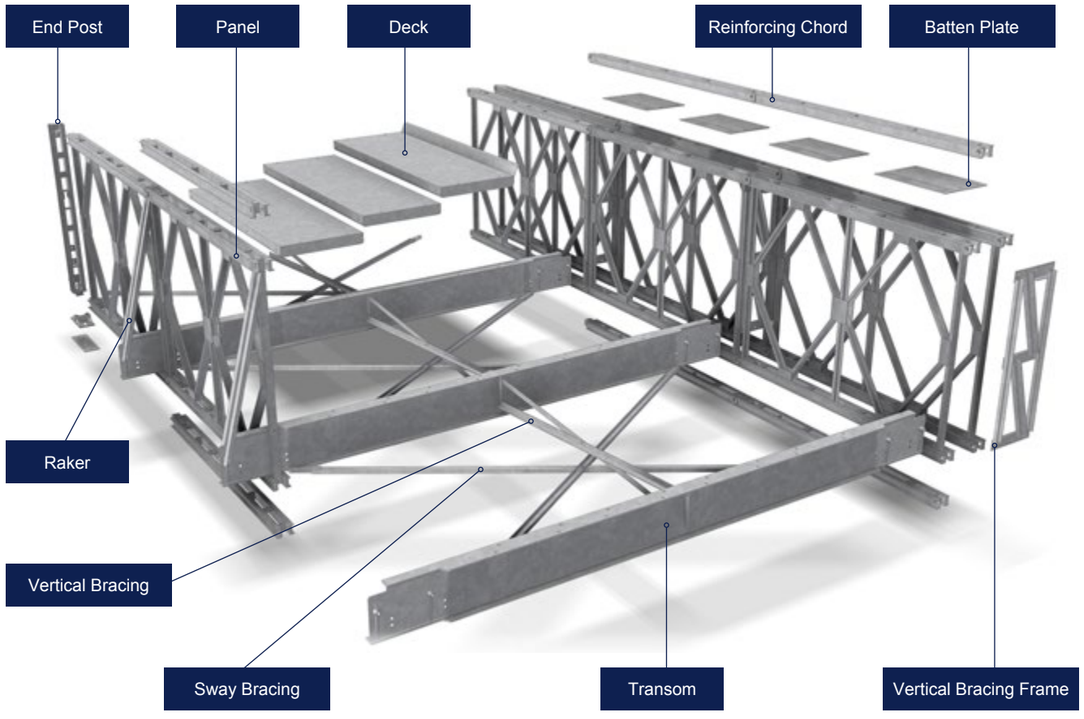
Chord Reinforcement
These are constructed in the same way as the chords of the bridge panels and are bolted to the panels to increase the bending capacity of the bridge.

Transoms
These form the cross girders of the bridge, spanning between the panels and carrying the bridge deck. The transom is designed to accommodate MLC80T/110W.

Decks
The decks are 1.05m wide and are manufactured using robotic welding technology. They have a long fatigue life and the durbar finish is ideal for use by both wheeled and tracked vehicles.

Bracing
A variety of bracing members are used to connect panels to form the bridge trusses and to brace adjacent transoms in the bridge.

LSB™ parts



Special equipment includes:

Grillages and Ground Beams
Ground Beams and Grillages are provided with the LSB™ to enable construction on green-field sites of low ground-bearing capacity. The ground beams form an assembly that transmits all dead and live forces from the bridge into the ground.

For a 39m (MLC80T/110W) bridge, the ground bearing pressure is 200kN/m². The upper grillages are located on top of the ground beams and accommodate the bridge bearings as well as the head of the ramp transom. They can be used without ground beams for overbridging existing damaged or weakened structures.

Ramps
The slope or profile of the ramps can be adjusted to allow for the passage of a range of civilian and military vehicles.The length of a standard ramp at each end of the bridge is 13.5m. The ramps are bolted to the grillages and utilise standard deck units supported on special transoms. These transoms can be positioned with a special ramp post at a range of heights at 1cm increments. The interface between the ramp and the ground is a special toe ramp unit which is approximately 1.5m long.

Quality is our strength

Manufacture
The LSB™ is efficiently manufactured by Mabey Bridge at its UK factory using robot technologies, including automated welding to ensure consistency in production and to maintain complete interchangeability between components.

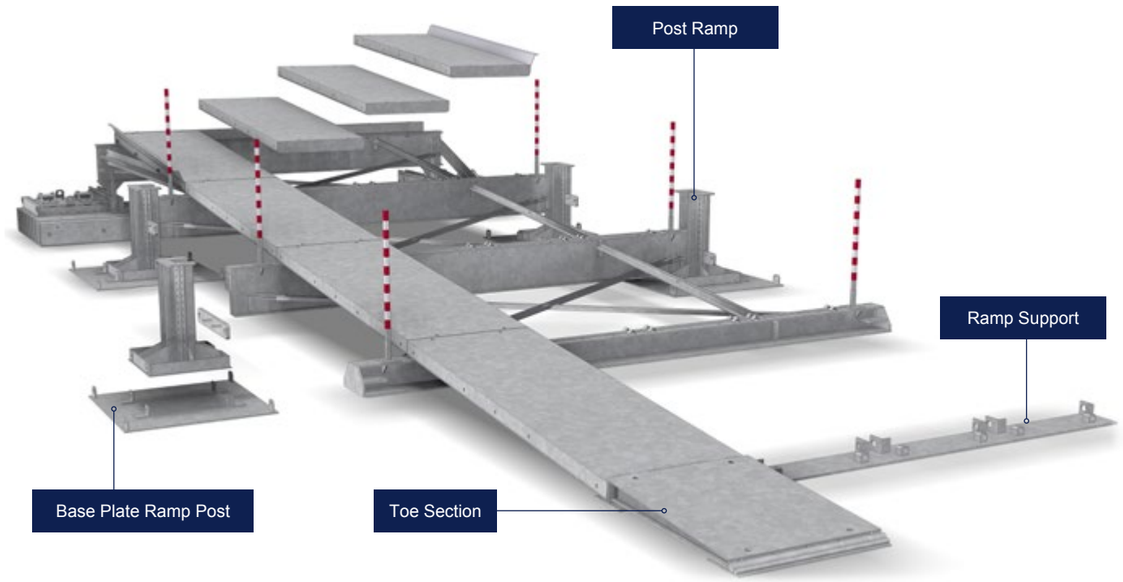
The steel used conforms to either British Standards (BS) or EuroNorm (EN) Specifications.

Mabey Bridge is accredited to standard ISO 9001.

Corrosion Protection
Structural components are hot-dip galvanised to International Standards (ISO). Bolts, nuts and screws are spun-galvanised to British Standards (BS).

Panel Pins are electroplated to British Standards (BS).

LSB™ ramp parts



Construction

The LSB™ can be constructed by the traditional cantilever launch method without the need for any intermediate support.

This is achieved by building a temporary skeletal structure, known as the launching nose, at the front of the bridge. The bridge bays are added incrementally from the rear and the whole structure is pushed on rollers across the gap. Bridge deck units may be stacked at the rear of the bridge to act as a counterweight. When the bridge has reached the desired position, the launching nose is dismantled and the bridge is jacked down onto its bearings. The launching nose is constructed as far as possible from standard bridge components.

Erection Tools

All connections are made on site using pins or bolts that are installed simply using hand tools. There are no connections requiring the use of pneumatic or electric powered equipment. There is no requirement for welding on site.

Example build times

	By hand	2x field crane	2x field crane
Span	30m	30m	40m
MLC	40T/40W	40T/40W	80T/110W
Truss construction	SSHRH+++	SSHRH+++	DSHR2H+++
Manpower	36 men, 4 NCOs	18 men, 4 NCOs	22 men, 4 NCOs
Time to build	9 hours	5 hours	10 hours
Approx. recovery time	14.5 hours	7.5 hours	15 hours

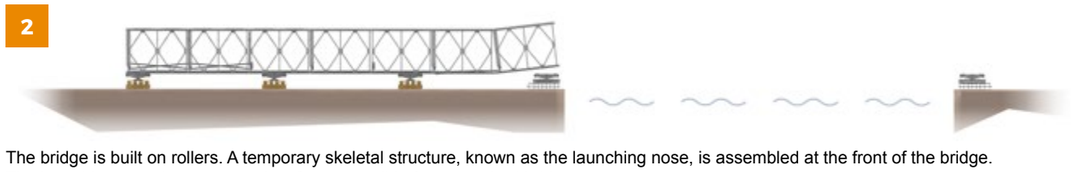
Notes:
25 Tonne mobile cranes, plus one in-service light or medium wheeled tractor.
Times exclude all setting out, levelling of rollers, assembly of ramps and fitting of footwalks.

Traditional launch method for the LSB™

1

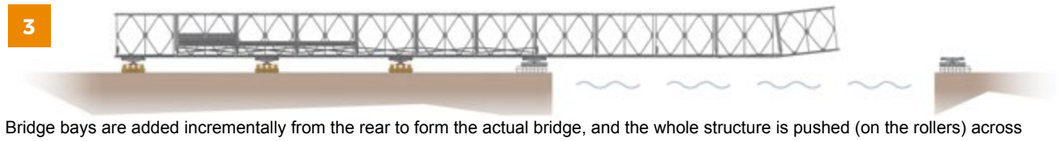
The Logistic Support Bridge™ is normally constructed by the traditional cantilever launch method without the need for any intermediate support. It is constructed on the `home bank'.

2



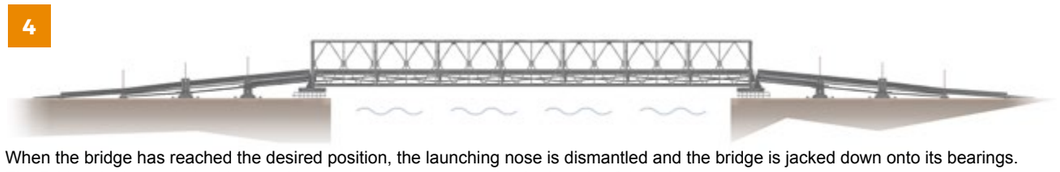
The bridge is built on rollers. A temporary skeletal structure, known as the launching nose, is assembled at the front of the bridge. The launching nose is constructed as far as possible from standard bridge components.

3



Bridge bays are added incrementally from the rear to form the actual bridge, and the whole structure is pushed (on the rollers) across the gap. The launch nose lands on `far bank' rollers, then the fully supported bridge is pushed across the gap. Bridge deck units may be stacked at the rear of the bridge to act as a counterweight.

4

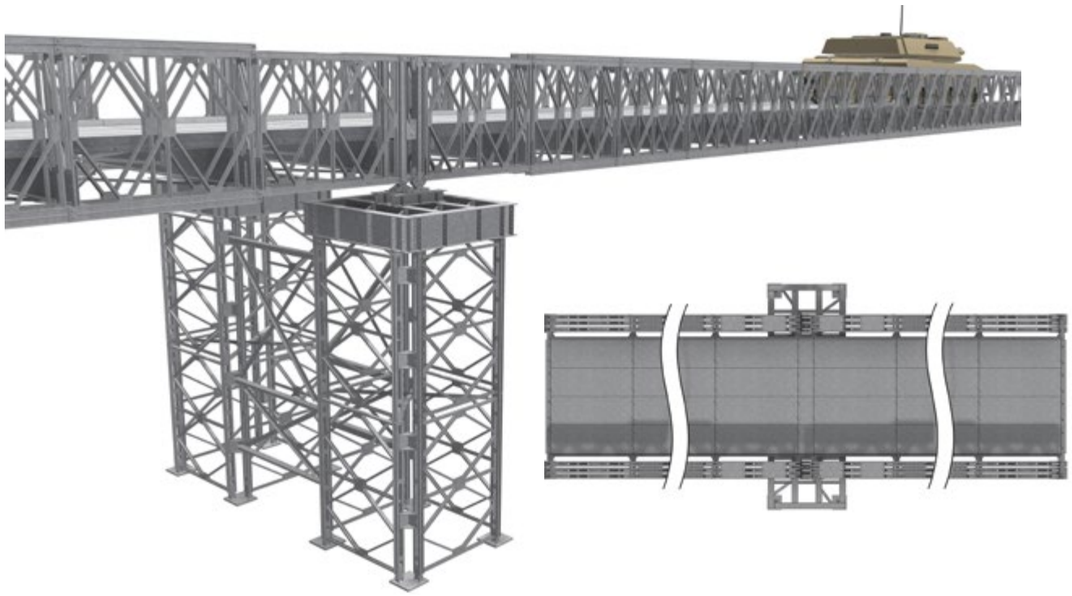


When the bridge has reached the desired position, the launching nose is dismantled and the bridge is jacked down onto its bearings. The Bridge decks are bolted into position and ramps constructed at both ends of the bridge.

Pier construction

The LSB™ has an almost limitless capacity to span gaps.

Using the existing piers, the LSB™ Pier Equipment, or floating pontoons, multi-span construction permits the crossing of the most challenging gaps. The pier is 10m high. Pontoons can be supplied in 40 foot or 20 foot sizes, the latter simplifying logistic handling due to its easy transportability.

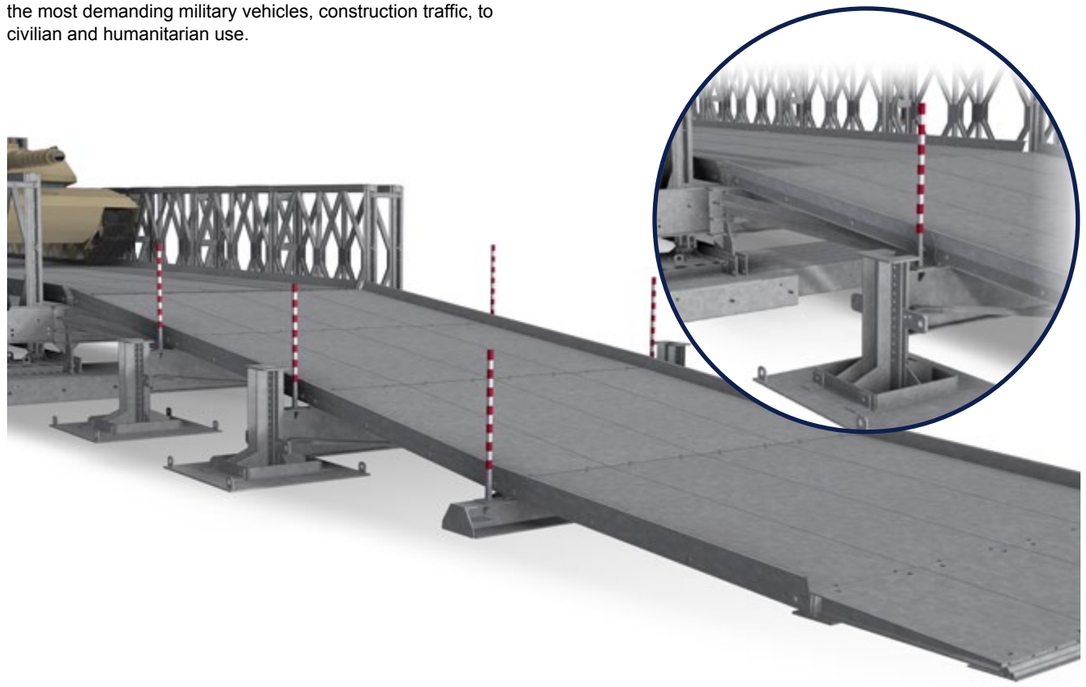


LSB™ Pier in Iraq

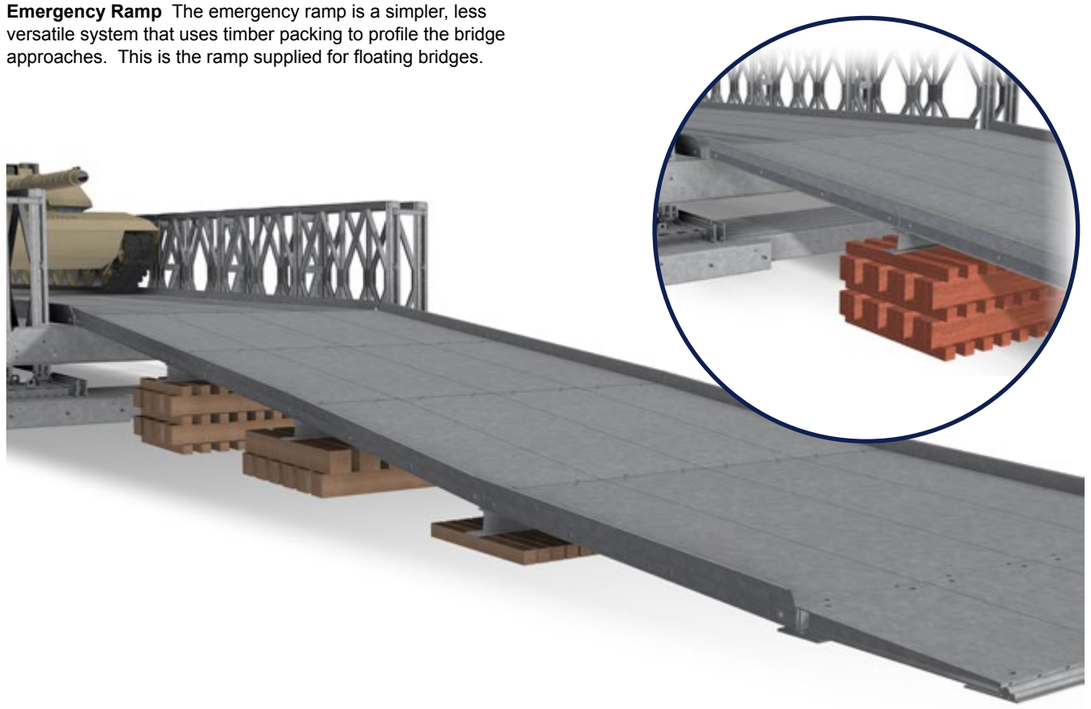
Floating LSB™ with pontoons in Iraq

Ramp options

Mabey Bridge's unique fully adjustable ramp is designed for use on greenfield sites with poor ground conditions. The ramp profile can be adjusted so as to permit all forms of traffic to cross, from the most demanding military vehicles, construction traffic, to civilian and humanitarian use.



Emergency Ramp The emergency ramp is a simpler, less versatile system that uses timber packing to profile the bridge approaches. This is the ramp supplied for floating bridges.



LSB™ Logistic Support

The LSB™ is easily moved with standard military transportation.

Strategic Lift

LSB™ sets can be delivered by land, sea, or by air. Components can be packed in ISO containers, on pallets or as loose deck or air cargo.

Tactical Movement

Bridge components can be transported to and from site in a variety of ways:

- On 6m (20ft) rigid trucks
- On 12m (40ft) flatbed trailers
- On DROPS/PLS type flat racks on suitable in-service vehicles
- In 6m (20ft) or 12m (40ft) ISO containers
- In railway wagons: NATO STANAG 2832B Rail Gauge GIC and Rail Gauge W6A
- As underslung loads by helicopter

Typical tie-down schemes and container loads are described in the *User Manual.*

Immediate Spares

All equipment sets are supplied with immediate spares to cover on site losses for items such as nuts, bolts, panel pins and clips.

NATO Support and Procurement Agency (NSPA)

All components are NATO codified and spares can be ordered by NATO Stock Number through the NSPA e-procurement portal.

Repair Policy

Although it is possible to carry out field repairs to major components, the recommended Repair Policy is Repair by Replacement.

LSB™ Sets

The LSB™ capability is organised into Bridge Sets to provide a balanced stock of bridging that can be used for a wide range of uses with maximum efficiency.

Described in detail in the following pages, the LSB™ system consists of:

The Standard Bridge Set

Contains all the components required to construct any bridge span up to 39m that is able to sustain any design loading up to MLC80T/110W (or MLC 120T/150W). Two standard bridge sets, when added together, will provide all components required to construct any bridge span up to 51m for the same loading.

The Long Span Set

Contains all the components required, which when added to the components of two Standard Bridge Sets, are sufficient to construct any bridge span up to 60m and able to sustain any design loading up to MLC80T.

The Launching and Erection Set

Contains all components required to construct and install, by cantilever launch, any bridge with a span of up to 39m. Two launching and erection sets when added together, will provide all components required to launch any bridge with a span of up to 60m.

The Ramp

Contains all components required to construct adjustable ramps, inclusive of grillage supports and ground beams, for use on a green field site.

The Fixed Pier Set

Contains all components required to construct a pier up to 10m high that is able to support two adjacent bridge spans.

The Floating Pier

Floating LSB™ uses 20 foot and/or 40 foot pontoons to cross wide wet gaps.

The Span Junction Set

One Span Junction Set will provide all components to enable two 39m bridge spans to be connected together. Two Span Junction Sets will provide all components to enable two 60m bridge spans to be connected together.

The Footwalk Set

Contains all components required to construct a 1m wide footwalk.

LSB™ Stock Module

Operationally, the challenge is to ensure that the Military Engineer has optimal versatility when planning for gap or obstacle crossing operations.

The LSB™ Stock Module has been developed to allow the Sapper Commander the flexibility to swiftly deliver robust lines of communication crossings.
The Stock Module comprises the equipment listed in the table.

A few of the construction options are shown in the graphics.

Two Stock Modules offer even more possibilities.

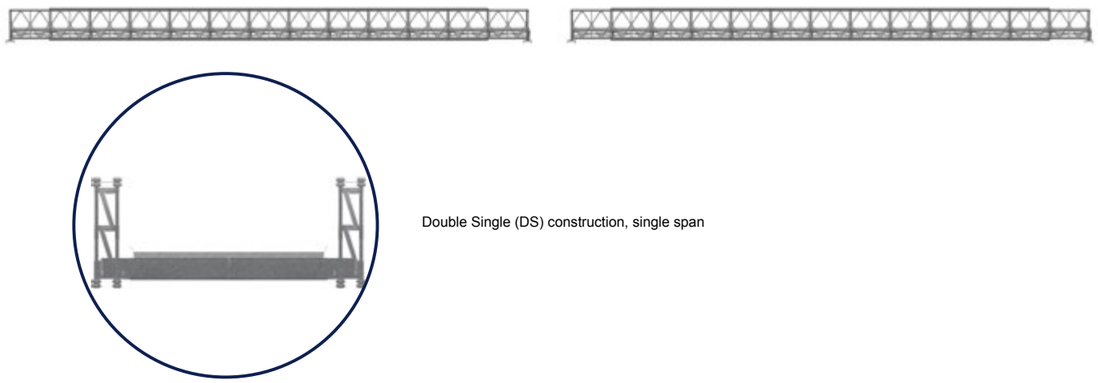
Options

Options	No. bridges	Length	Number of Spans	Suitable for loads		
				MLC80T	MLC70W	MLC110W
A	2	39m each	One	■	■	■
B	1	50m	One	■	■	■
C	1	60m	One	■	■	
D	1	79m	Two	■	■	■

Note:
The maximum capabilities of a stock module depicted are for bridges without footwalks fitted.

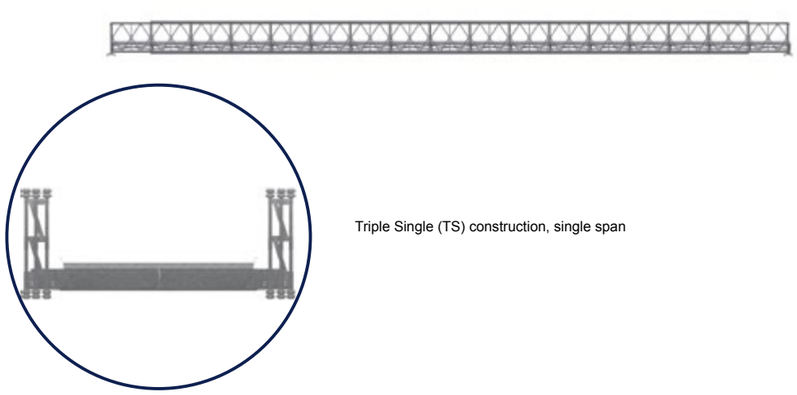
Capabilities of one LSB Stock Module

A Two separate 39m (13 bay) span bridges (DSHR2H+++) for MLC80T/110W



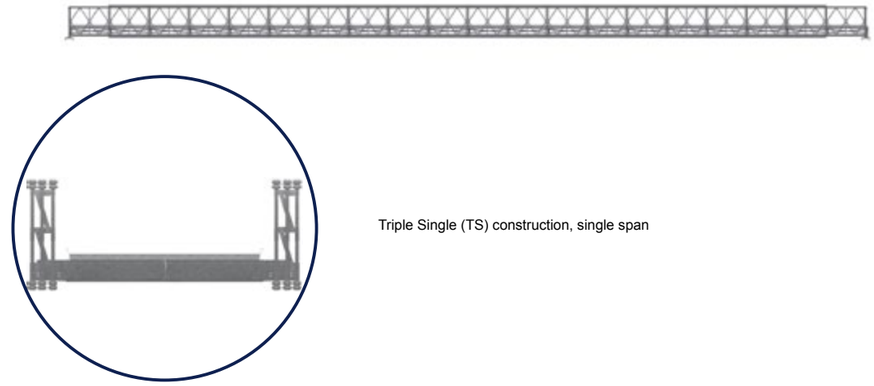
Double Single (DS) construction, single span

B One 51m (17 bay) span bridge (TSHR3H++) for MLC80T/110W



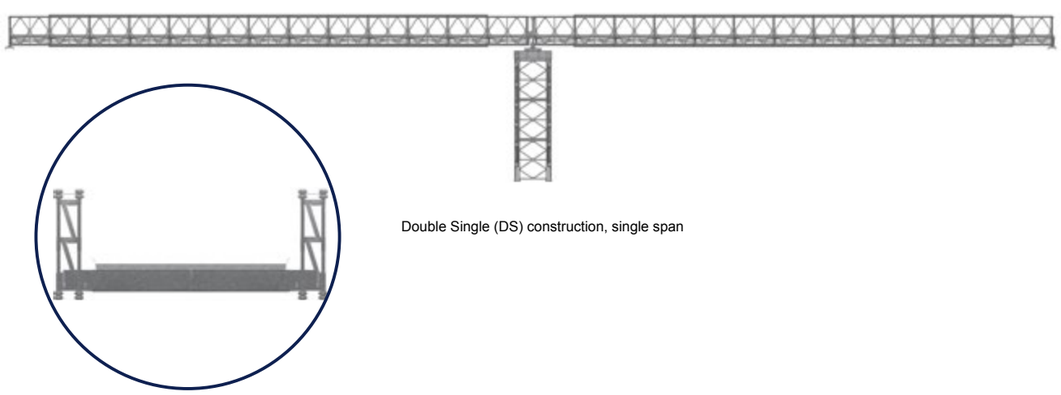
Triple Single (TS) construction, single span

C One 60m (20 bay) span bridge (TSHR3H++) for MLC80T/70W



Triple Single (TS) construction, single span

D One bridge of 79m overall length comprising of two 39m (13 bay) spans (DSHR2H+++) joined with span junction equipment and supported by a 10m pier for MLC80T/110W



Double Single (DS) construction, single span

Training Support

Course design

Mabey Bridge offers a fully comprehensive set of options for LSB™ training. Our cadre of ex-military instructors will customise packages for the training audience. A comprehensive package to introduce the LSB™ as a new capability might include:

- **Military instructor training**
- **Design training**
- **Construction training**
- **Inspection and maintenance of the equipment**

Manuals

Comprehensive manuals are available including:

- **Basic design information**
- **Operating instructions**
- **Parts identification**
- **Inspection, maintenance and repair**

Manuals contain safety warnings and advice for every stage of construction.

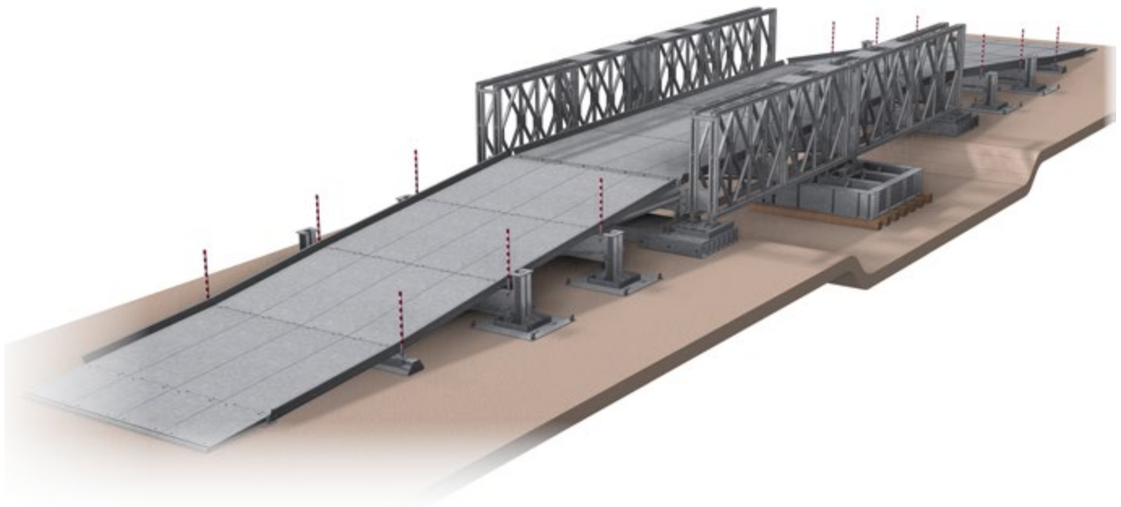
Technical Support

Although the User Manual is fully comprehensive, Mabey Bridge offers an engineering and training advice service for technical or training enquiries, on a reach-back basis.

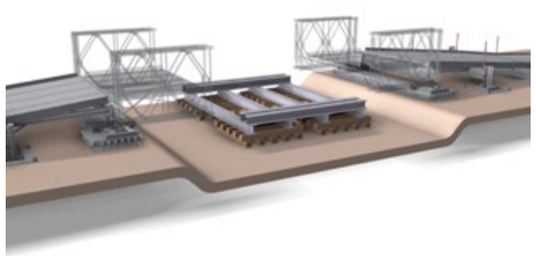
LSB™ Training Module

The training module is a highly cost effective way of training troops with the minimum of equipment. Ideally placed on a back door training facility or in barracks, all the skill sets required to build and strip an LSB can be rehearsed, without the need to handle large amounts of equipment.

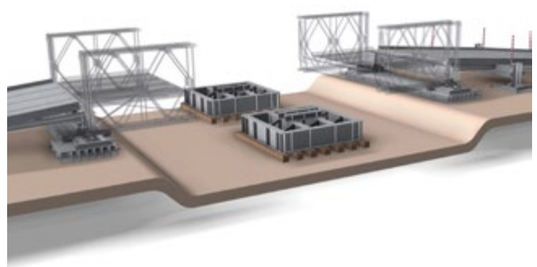
Pier caps or simulated pontoons are available, to ensure that the training audience develops construction proficiency. A time-efficient trainer, it is ideal for regular, reserve or civil defence units and combats the problem of skill fade very effectively.



Training Module: Two span LSB™ with hamper beam assemblies in double single (DS) configuration, with adjustable ramps



Training Module: Two span LSB™ with floating pontoon



Training Module: Two span LSB™ with hamper beam

Digital Training Support

Mabey Bridge's Digital Team excels in the field of training innovation. Highly-experienced, our experts have exploited the digital domain in support of the military customer. All applications are designed to be user-friendly, with a simple interface and intuitive functionality.

Digital Training Aid (DTA)

Optimised for laptops and tablets, the DTA has been developed to simplify and enhance the LSB™ training experience. Using high-fidelity graphics, video sequences and carefully developed text, it offers a step improvement over traditional teaching methods. Pre-course study is simplified, parts recognition made easy and design requirements, build sequences and pier construction are all readily understood. Care and maintenance is covered too. It is available in multiple languages.

Configurator

Mabey Bridge's Configurator allows the swift design of bridges through the input of a simple data set requirement. In addition, it will list the stores requirement for any particular bridge, an invaluable and quick-to-execute check for operational tasks. This application can easily be loaded onto the same IT platform as the DTA.

Virtual Reality (VR)

VR exploits the 3-dimensional computer-generated domain to immerse the trainee in the LSB™ environment. It is possible to walk around a bridge, examine it from all angles, including from underneath, interrogate the names of parts, and see the completed product or the bridge in various states of construction.

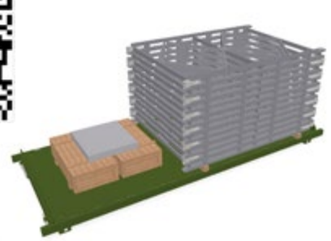
Augmented Reality (AR)

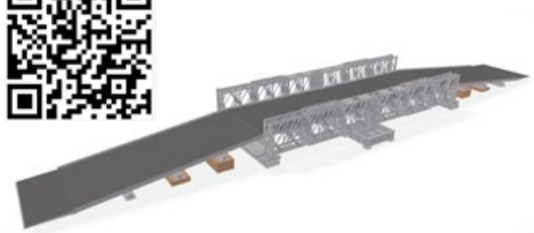
AR uses a mobile device App to scan a QR code that permits the trainee to view a bridge in 3D in mid-air. The 3D image can be turned and viewed from all angles.Try it now!

To view our bridges in Augmented Reality

1. Download and launch the **FREE** Augment app
2. Fill the screen with the QR codes below and **SCAN**
3. Experience the magic of **AUGMENTED REALITY**

AUGMENT





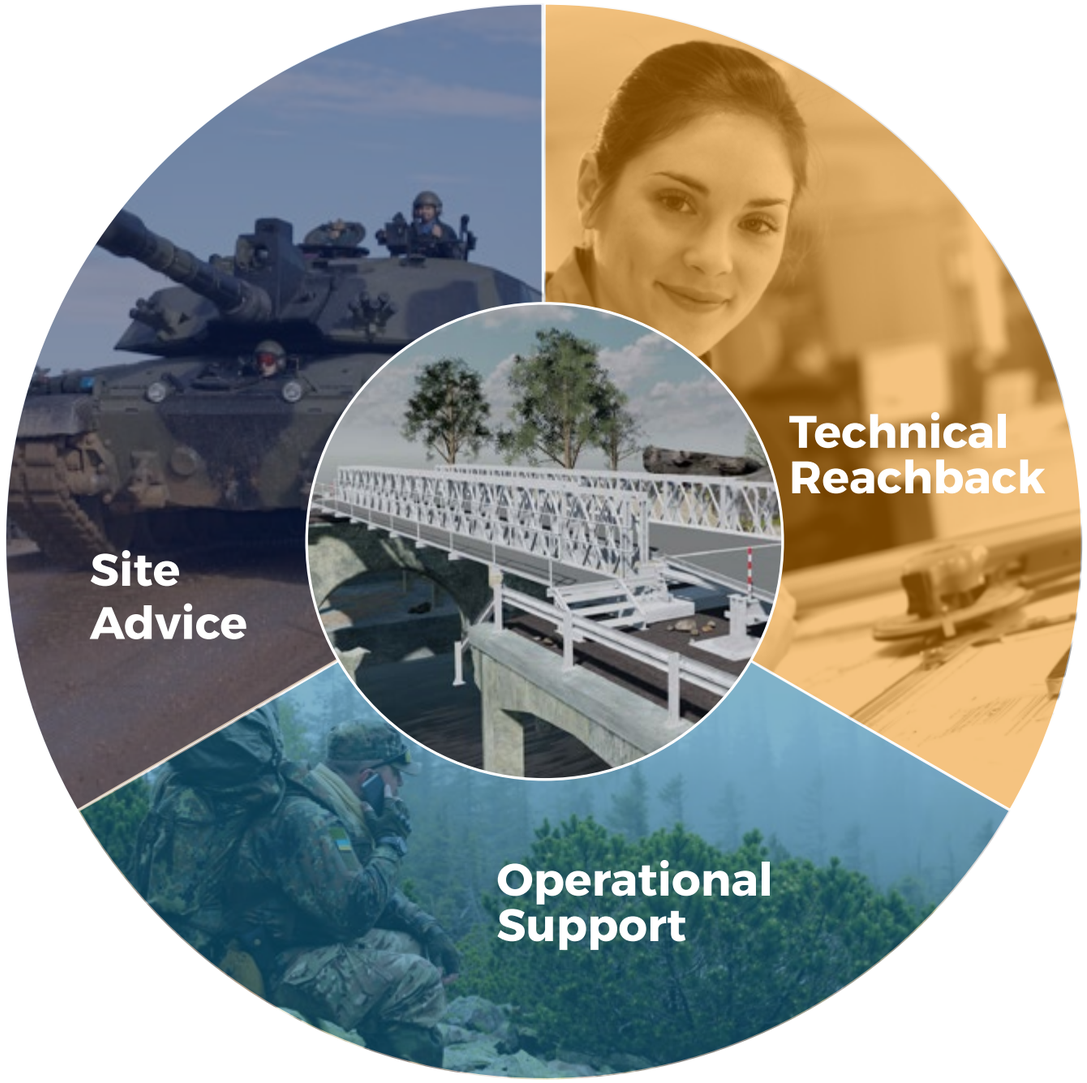
Mabey Bridge Operational and Emergency Support

Site advice

Mabey Bridge has a team of highly-experienced site advisors, many with strong military credentials. Mabey Bridge will consider closely any request for the short-notice deployment of a site advisor in support of operations using the LSB™.

Technical Reachback

Operational Deployments and Emergency Situations demand reliable technical support. Mabey Bridge understands that the LSB™ will often be used where success depends on the timely construction of its bridging. Mabey Bridge will respond swiftly to technical requests in support of the Logistic Support Bridge™.



Design Engineering and Construction

The LSB™ use of standard components makes for a straight-forward site reconnaissance, design and construction process.

Key engineering design, construction, build area requirements and build time tables are shown below for the more common build requirements.

Span construction table
Without footwalks

Bays	Metres	MLC40 Civilian	MLC60 Miltary	MLC80 T Military	MLC110 W Military
5	15.24	SSH	SSH+	DSH	DSH
6	18.29	SSH+	SSHRH+	DSH	DSH
7	21.34	SSHRH+	SSHRH++	DSH	DSH
8	24.38	SSHRH++	SSHRH++	DSHR1H++	DSHR1H++
9	27.43	SSHRH++	DSH	DSHR1H++	DSHR1H++
10	30.48	SSHRH+++	DSHR1H+	DSHR1H++	DSHR2H++
11	33.53	DSH	DSHR1H++	DSHR1H+++	DSHR2H++
12	36.58	DSHR1H++	DSHR1H++	DSHR2H+	DSHR2H+++
13	39.62	DSHR1H++	DSHR1H+++	DSHR2H++	DSHR2H+++
14	42.67	DSHR1H++	DSHR2H+	DSHR2H++	TSHR2H++
15	45.72	DSHR2H+	DSHR2H+	DSHR2H++	TSHR3H+
16	48.77	DSHR2H+	DSHR2H++	TSHR2H++	TSHR3H++
17	51.82	DSHR2H++	TSHR2H	TSHR2H++	(TSHR3H++@C)
18	54.86	TSHR2H+	TSHR2H+	TSHR3H+	–
19	57.91	TSHR3H	TSHR3H	TSHR3H++	–
20	60.96	TSHR3H	TSHR3H+	(TSHR3H++@C)	–

Notes:

1. '+/++/+++' indicates the number of High Shear Panels required at each end of the span
2. Configurations marked @C are caution crossings, only one vehicle of maximum weight on bridge at a time

Minimum construction area for conventional cantilever launches

Bridge length (Bays)	Configurations	Launch nose length (Bays)	Minimum construction area (m)	Sets of construction rollers
5	5 SS/SSR/DS	4	24.25	2
6	6SS+/SSR+/DS	4	24.25	2
7	SSR+/SSR++/DS	5	24.25	2
8	SSR++/DSR1++	5	24.25	2
9	SSR++/DS/DSR1++	6	30.36	3
10	SSR+++/DSR1+/DSR1++/DSR2++	7	31.86	3
11	DS/DSR1++/DSR1+++/DSR2++	7	31.86	3
12	DSR1++/DSR2+/DSR2++/	8	33.528	3
13	DSR1++/DSR1+++/DSR2++/DSR2++++	8	39.62	4
14	DSR1++/DSR2+/DSR2++/TSR2++	9	39.62	4
15	DSR2+/DSR2++/TSR3+	9	39.62	4
16	DSR2+/DSR2++/TSR2++/TSR3++	10	39.62	4
17	DSR2+/TSR2/TSR2++/TSR3++@C	11	45.72	5
18	TSR2+/TSR3+	11	45.72	5
19	TSR3/TSR3++	12	48.77	5
20	TSR3/TSR3+/TSR3++@C	13	48.77	5

Notes:

1. Construction area includes roller layout, space to assemble bridge and sufficient room for a crane and pushing vehicle

Estimated installation times

Bays	Span/length Metres	Feet	Configuration MLC80(T)/70(W)	Timing (hours)	Configuration MLC110(W) 80(T)	Timing (hours)
5	15.24	50	DSH	8	DSH	8
6	18.29	60	DSH	9	DSH	9
7	21.34	70	DSH	10	DSH	10
8	24.38	80	DSHR1H++	13	DSHR1H++	13
9	27.43	90	DSHR1H++	14	DSHR1H++	14
10	30.48	100	DSHR1H++	15	DSHR2H++	15
11	33.53	110	DSHR1H+++	16	DSHR2H++	16
12	36.58	120	DSHR2H+	17	DSHR2H+++	17
13	39.62	130	DSHR2H++	18	DSHR2H+++	18
14	42.67	140	DSHR2H++	19	TSHR2H++	24
15	45.72	150	DSHR2H++	20	TSHR3H+	28
16	48.77	160	TSHR2H++	28	TSHR3H++	30
17	51.82	170	TSHR2H++	30	TSHR3H++@C	32
18	54.86	180	TSHR3H+	32	–	–
19	57.91	190	TSHR3H++	34	–	–
20	60.96	200	TSHR3H+++@C	36	–	–

Notes:

1. All timings based on site construction times or interpolated for some configurations
2. Working Parties: 1 commander and 14 soldiers working, in shifts not exceeding 8 hours
3. Plant and Equipment: Construction machinery is 1 crane, minimum capacity 25 tonnes and 1 tracked excavator
4. Timings are accurate to within +/-10%

About Mabey Bridge

Mabey Bridge is a leading international provider of high-quality modular bridging solutions. We specialise in rapid-build, pre-engineered modular steel bridges to enable accelerated bridge construction in urban and rural areas. We also deliver bridging solutions for the construction, oil and gas, and mining sectors, as well as for specialist military applications, humanitarian emergencies and disaster relief.

Mabey Bridge is based in Gloucestershire, UK and has supplied modular bridging solutions to over 150 countries worldwide.

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