STANDARD HIGHWAY BRIDGES

REIDsteel

we bridge the world

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BASEA British Airport Services & Equipment Association

BCSA

RQSC Registered Qualified Steelwork Contractor

SCI Member Steel Construction Institute

THE QUEEN'S AWARDS FOR ENTERPRISE:
INTERNATIONAL TRADE 2006, 2008, 2009

Front cover photo:

NEPAL, HIMALAYAS

The 96 metre span PILAUWA KHOLA RIVER bridge is about 200kms north east of Kathmandu and between Chainpur and Mamling in Eastern Nepal. Access is limited to a muddy track and then only in the dry season and until this bridge was built there was only a small pedestrian suspension bridge.

The 233 tonne steel structure was designed and made by *REIDsteel* so that it could all fit into ten 40ft containers which were shipped from the UK to Calcutta and thence by road to the site.

The site is about 90km from Lhotse and Everest and only 70km from Makalu, the fifth highest peak in the world (8463m).

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Standard Steel Through Truss Bridges

EFFECTIVE SPANS 25M TO 100M

The Carriageways are 2-lane. They are 7.3m wide between crash barriers.

They will have local Reinforced Concrete decks 0.25m thick, placed on our lost formwork decking with no propping needed. They can have 0.05m of surfacing.

They have three levels of steel crash barrier on both sides of the carriageways so that neither trucks nor their payloads can hit or damage the steel trusses.

The Bridge Decks are carried by 2 trusses at, and above, deck level. These two trusses are stabilised with a bracing system. For bridges above 40m span, this bracing is usually above the carriageway, between the trusses (a closed top through truss). Below 40m span, this bracing is usually from Raker members down to the transoms (open top through truss)

The bridge decks are cambered from side to side using pre-cambered steel transoms; and slightly cambered from end to end using the built in camber of the trusses.

There are two walkways, both outside the main trusses, 1.2m wide, with handrails outside. The pedestrian, handcart and cycle traffic using them is protected from the vehicle traffic by the crash rails and main trusses.

The decks of the walkways are local reinforced concrete 0.125m thick placed on our lost formwork decking.

The bridge steel is entirely bolted together using regular high strength tension and shear bolts. There are no friction grip bolts. Most of the main connections are end-plated. Adjustment is by means of steel packs which can be inserted between end plates.

The bridge steel is all in pieces which can easily be transported in 20ft or 40ft containers, or on regular road vehicles.

The bridges are designed to British Standard BS 5400 for 2 lanes of full highway loading, and for 30 units of HB loading, equivalent to an occasional 120 tonne truck. All the structural design is in house by *Reidsteel*.

All the steel work is hot dip galvanised 85microns, 610gm/m2, for long low maintenance life.

The bridges can be erected in-situ on a temporary causeway or on temporary jackable props; or may be built on the 'home bank' and Cantilever Launched across the gap. For the cantilever launch, a 'Launch Kit' is needed, consisting of sets of rollers, a steel 'launching nose' fitted to the leading edge of the bridge (and removed for re-use after launch), and come-along cable jacks.

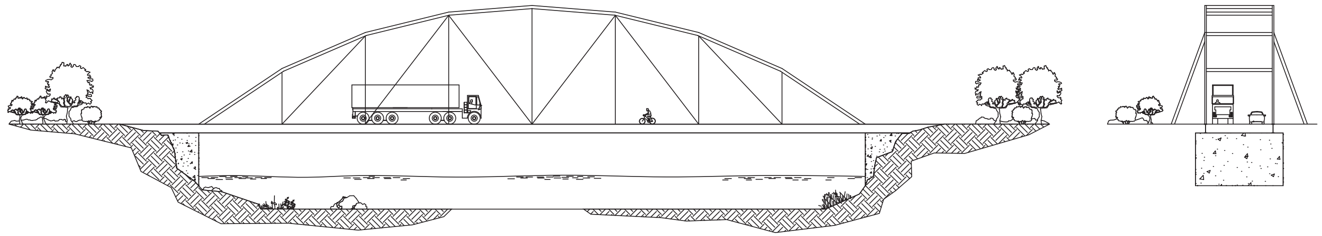
The bridges will sit on our elastomeric bearings on your abutments. Expansion joints for the roadway are provided at both ends.

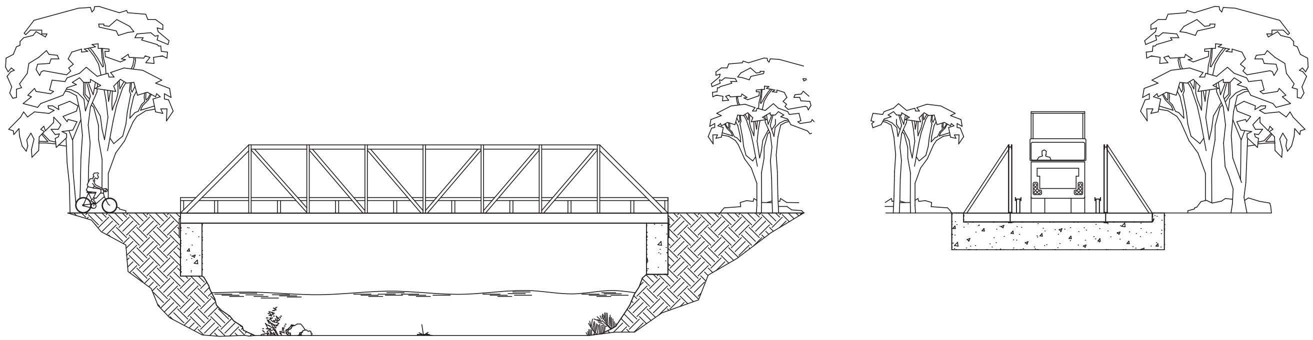
The bridges may be combined with other bridges to make multi-span crossings. Again the bridges can be built in-situ; or they can be cantilever launched. For multi-span bridges which are to be cantilever launched it is necessary to use a 'Link Kit' which consists of further sets of rollers, and further jacks, and a set of link steelwork which joins adjacent bridges during the launch and roll-out. As with the Launch Kits, the Link Kits can be used again and again. You will need one Link Kit for a 2-span bridge and 2 Link Kits for a 3-span bridge and so on.

Our work carries a ten year warranty.

UTILISATION:

A through-truss is probably the most economic bridge for spans 15m to 100m. The carriageway is only about 1.2m above the abutment. A cantilever launch is relatively simple as long as there is a run up equal to 110% of the span is available on the 'home' bank. Or the bridge can easily be built on a causeway in-situ during a dry season. The bridge is good for multiple spans. Note a through-truss bridge cannot be extended widthways, except by building another parallel bridge.





Standard Composite Beam Bridges

EFFECTIVE SPANS 10M TO 20M, UP TO 30M

The Carriageways are supported by pairs of beams at 1.7m centres. A carriageway may therefore be 5.1m overall wide, with 1.2m walkways both sides. The carriageways may be wider in increments of 3.4m; and may always be extended widthways in increments of 3.4m. There is an element of choice in the marked carriageway widths and the widths of the walkways. The minimum bridge will be single lane with a 4m marked roadway.

They will have local Reinforced Concrete decks 0.275m thick, placed on our lost formwork decking with no propping needed. They can have 0.05m of surfacing. The concrete will become composite with the steel via shear connectors.

They have steel crash barriers on both sides of the carriageways. The walkways will be outside the crash barriers and will have handrails on the outside. The Bridge Decks are carried by 2 or more pairs of beams below deck level. There is no steel above the deck other than barriers. Please note that the roadway will have to be at a height well above the flood level: as a guide the depth of the beams is about 6% of the span, and the roadway is above this truss.

The bridge decks are cambered from side to side by offsetting the beam heights; and slightly cambered from end to end using the built in camber of the beams. All spans are simply supported.

There are two walkways, both outside the main trusses, 1.2m wide, with handrails outside. The pedestrian, handcart and cycle traffic using them is protected from the vehicle traffic by the crash rails.

The decks of the walkways are local reinforced concrete 0.125m thick placed on our lost formwork decking.

The bridge steel is entirely bolted together using regular high strength tension and shear bolts. There are no friction grip bolts. Most of the main connections are end-plated. Adjustment is by means of steel packs which can be inserted between end plates.

The bridge steel is all in pieces which can easily be transported in 20ft or 40ft containers, or on regular road vehicles.

The bridges are designed to British Standard BS 5400 for any number of lanes of full highway loading, and for 30 units of HB loading, equivalent to an occasional 120 tonne truck. All the structural design is in house by *Reidsteel*.

All the steel work is hot dip galvanised 85microns, 610gm/m2, for long low maintenance life.

The bridges can be erected in-situ by simply lifting beams individually into position or may be built on the ‘home bank’ and Cantilever Launched in pairs across the gap. For the cantilever launch, a ‘Launch Kit’ is needed, consisting of sets of rollers, a steel ‘launching nose’ fitted to the leading edge of the pair of beams (and removed for re-use after launch), and come-along cable jacks.

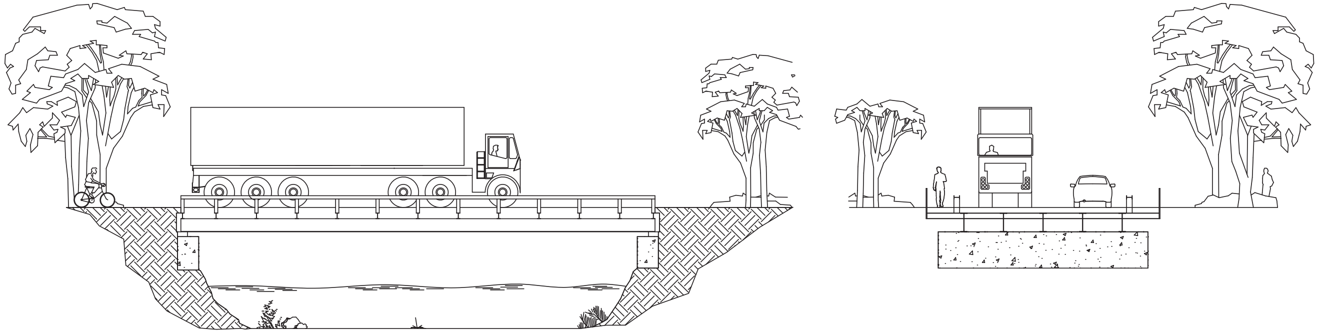
The bridges will sit on our elastomeric bearings on your abutments. Expansion joints for the roadway are provided at both ends.

The bridges may be combined with other bridges to make multi-span crossings. Again the bridges can be built in-situ; or they can be cantilever launched. For multi-span bridges which are to be cantilever launched it is necessary to use a ‘Link Kit’ which consists of further sets of rollers, and further jacks, and a set of link steelwork which joins adjacent bridges during the launch and roll-out. As with the Launch Kits, the Link Kits can be used again and again. You will need one Link Kit for a 2-span bridge and 2 Link Kits for a 3-span bridge and so on.

Our work carries a ten year warranty.

UTILISATION:

A composite beam bridge is economical for spans of 10m to 18m, though bridges up to about 30m are possible. A composite beam bridge can easily be expanded widthways. If through-truss or stayed bridges are not wanted for architectural reasons, composite beam bridges may be selected. It is easy to run services under the carriageway. It is relatively easy to cantilever launch as long as there is a run up on the home bank of about 110% of the span. Because only one pair of beams needs to be launched at one time, the launch process is simplified. The composite beam bridge is good for multiple spans. Note that the carriageway will be higher than the abutments by about 6% of the span, which may mean big embankment approaches.



FAR LEFT: Composite bridge, Nigeria. One of several multi-span complete bridges supplied by us on the Wawa-Kaima road.

LEFT: Continuous composite beam bridge, Maphutsaneng Bridge, on the Mohales Hoek-Mekaling road, Lesotho - Africa.

Standard Steel Over-Truss Bridges

EFFECTIVE SPANS 25M TO 100M

The Carriageways are supported by pairs of trusses at 1.7m centres. A carriageway may therefore be 5.1m overall wide, with 1.2m walkways both sides. The carriageways may be wider in increments of 3.4m; and may always be extended widthways in increments of 3.4m. There is an element of choice in the marked carriageway widths and the widths of the walkways. The minimum bridge will be single lane with a 4m marked roadway.

They will have local Reinforced Concrete decks 0.275m thick, placed on our lost formwork decking with no propping needed. They can have 0.05m of surfacing. The concrete will become composite with the steel via shear connectors.

They have steel crash barriers on both sides of the carriageways. The walkways will be outside the crash barriers and will have handrails on the outside. The Bridge Decks are carried by 2 or more pairs of trusses below deck level. There is no steel above the deck other than barriers. Please note that the roadway will have to be at a height well above the flood level: as a guide the depth of the trusses is about 8% of the span, and the roadway is above this truss.

The bridge decks are cambered from side to side using pre-cambered steel transoms; and slightly cambered from end to end using the built in camber of the trusses. All spans are simply supported.

There are two walkways, both outside the main trusses, 1.2m wide, with handrails outside. The pedestrian, handcart and cycle traffic using them is protected from the vehicle traffic by the crash rails.

The decks of the walkways are local reinforced concrete 0.125m thick placed on our lost formwork decking.

The bridge steel is entirely bolted together using regular high strength tension and shear bolts. There are no friction grip bolts. Most of the main connections are end-plated. Adjustment is by means of steel packs which can be inserted between end plates.

The bridge steel is all in pieces which can easily be transported in 20ft or 40ft containers, or on regular road vehicles.

The bridges are designed to British Standard BS 5400 for any number of lanes of full highway loading, and for 30 units of HB loading, equivalent to an occasional 120 tonne truck. All the structural design is in house by *Reidsteel*.

All the steel work is hot dip galvanised 85microns, 610gm/m2, for long low maintenance life.

The bridges can be erected in-situ on a temporary causeway or on temporary jackable props; or may be built on the 'home bank' and Cantilever Launched across the gap. For the cantilever launch, a 'Launch Kit' is needed, consisting of sets of rollers, a steel 'launching nose' fitted to the leading edge of the bridge (and removed for re-use after launch), and come-along cable jacks.

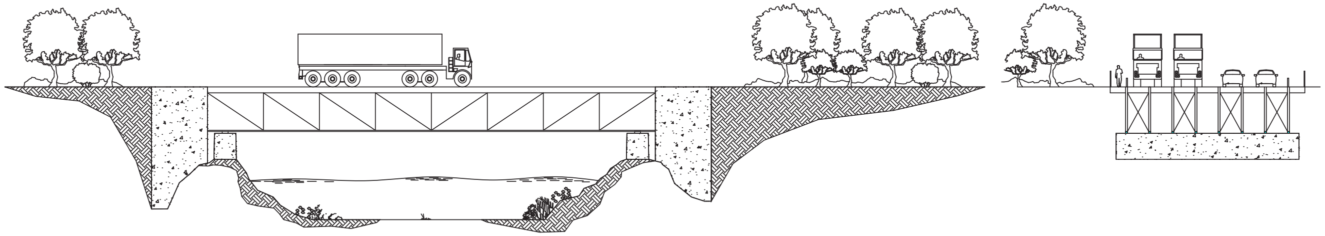
The bridges will sit on our elastomeric bearings on your abutments. Expansion joints for the roadway are provided at both ends.

The bridges may be combined with other bridges to make multi-span crossings. Again the bridges can be built in-situ; or they can be cantilever launched. For multi-span bridges which are to be cantilever launched it is necessary to use a 'Link Kit' which consists of further sets of rollers, and further jacks, and a set of link steelwork which joins adjacent bridges during the launch and roll-out. As with the Launch Kits, the Link Kits can be used again and again. You will need one Link Kit for a 2-span bridge and 2 Link Kits for a 3-span bridge and so on.

Our work carries a ten year warranty.

UTILISATION:

An overtruss bridge is economical for spans of 25 to 100m. It is essential if the bridge is to have widthways extension. If through-truss or stayed bridges are not wanted for architectural reasons, over-truss bridges may be selected. It is easy to run services under the carriageway. It is relatively easy to cantilever launch as long as there is a run up on the home bank of about 110% of the span. Because only one pair of trusses needs to be launched at one time, the launch process is simplified. The over-truss bridge is good for multiple spans. Note that the carriageway will be higher than the abutments by about 8% of the span, which may mean big embankment approaches.



Standard Steel Stayed Bridges

EFFECTIVE SPANS 35-100M WITH ONE TOWER, 70-200M WITH TWO TOWERS

The Carriageways are 2-lane. They are 7.3m wide between crash barriers.

They will have local Reinforced Concrete decks 0.25m thick, placed on our lost formwork decking with no propping needed. They can have 0.05m of surfacing.

They have three levels of steel crash barrier on both sides of the carriageways so that neither trucks nor their payloads can hit or damage the steel stays.

The Bridge Decks are carried by a series of sloping stays from a tower at the ‘home’ end of the bridge; or from towers at both ends. Several stays at different angles go from the top of the tower down to the deck. These towers are stabilised with a bracing system between them above 6m clear of the carriageways. The bridge stay loads are resisted by stays on the land side of each tower going down to substantial anchor blocks

The bridge decks are cambered from side to side using pre-cambered steel transoms; and slightly cambered from end to end using the adjustment of the stays.

There are two walkways, both outside the main trusses, 1.2m wide, with handrails outside. The pedestrian, handcart and cycle traffic using them is protected from the vehicle traffic by the crash rails and main trusses.

The decks of the walkways are local reinforced concrete 0.125m thick placed on our lost formwork decking.

The bridge steel is entirely bolted together using regular high strength tension and shear bolts. There are no friction grip bolts. Most of the main connections are end-plated. Adjustment is by means of steel packs which can be inserted between end plates.

The bridge steel is all in pieces which can easily be transported in 20ft or 40ft containers, or on regular road vehicles.

The bridges are designed to British Standard BS 5400 for 2 lanes of full highway loading, and for 30 units of HB loading, equivalent to an occasional 120 tonne truck. All the structural design is in house by *Reidsteel*.

All the steel work is hot dip galvanised 85microns, 610gm/m2, for long low maintenance life.

There are two arrangements possible: either the towers and the anchor block are on one side only, with a stayed bridge stayed only from one side of the gap and with a short simply supported link at one end: or there can be towers and anchor blocks at both ends, with a simply supported link at the centre of the span. The first step is the erection of the abutments, anchor blocks, towers and back-stays. Then the first segment of deck is erected, and the first transoms bolted between them. A railway is built on these transoms, and on the railway an erection gantry. The erection gantry permits the addition of the steel stays and then further extensions of the bridge deck, and further stays.

For a bridge with towers at both sides, two erection gantries may be used at the same time.

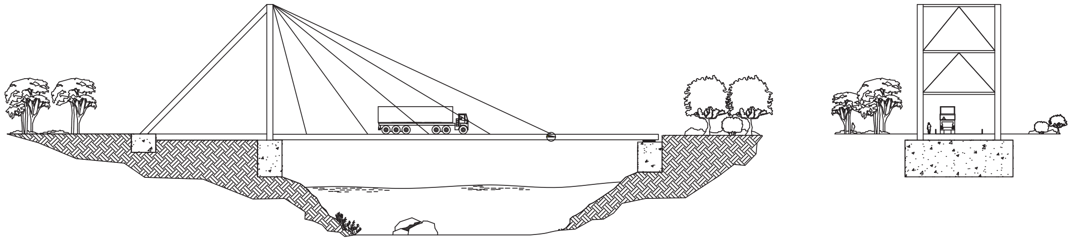
The bridges will sit on our steel bearings on your abutments. Expansion joints for the roadway are provided at both ends of the simply supported link section.

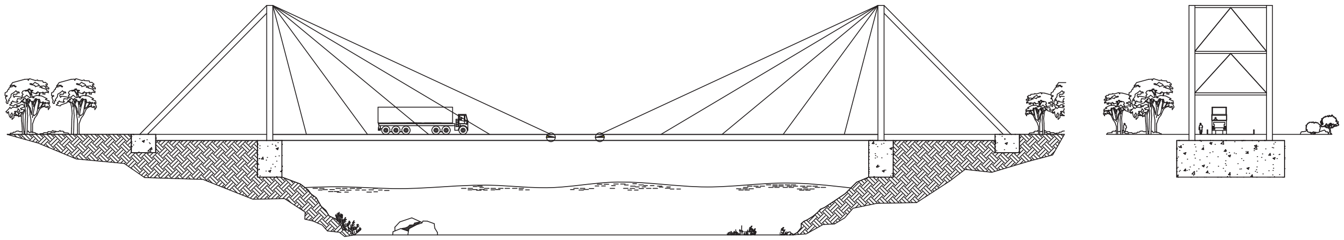
The erection gantries are re-usable on other bridges of the same span.

Our work carries a ten year warranty.

UTILISATION:

A Stayed Bridge is more expensive than a through truss bridge, but if it is not possible to get into the gap, (because of a deep canyon, or a fast flowing river); and if it is not possible to cantilever launch the bridge, (because there is not enough straight approach) or if the span is too big (greater than about 100m); or if it is not possible to access the far side with heavy loads and equipment); or even if there is a requirement for a big, visible structure: then a stayed bridge may be the right choice. Note that we still need about 35% of the main span at the home bank for a single-tower stayed bridge (18% of the span for a two-tower bridge). Of course a stayed bridge cannot be widened, other than building another one next to the first.





Standard Enquiry Form

PLEASE PHOTOCOPY, ONE FOR EACH BRIDGE

Type of Bridge	Quantity	Width between crash barriers	Span centres of abutments (please circle)	Clear height on carriageway	Loading HA, HB
Composite beam		7.30m	10, 12, 15, 18, 21, 25, 30	*not applicable*	HA + 30 units HB
Non-standard composite beam			*not applicable*		
Standard through truss		7.30m	30, 40, 50, 60, 70, 80, 90, 100	6.00m	HA + 30 units HB
Non-standard through truss					
Standard over truss		7.30m	25, 30, 40, 50, 60, 70, 80, 90, 100	*not applicable*	HA + 30 units HB
Non-standard over truss			*not applicable*		
Standard 2 Tower stayed		7.30m	70, 90, 110, 130, 160, 200	6.00m	HA + 30 units HB
Non standard 2 tower stayed					
Standard 1 tower stayed		7.30m	35, 45, 55, 65, 80, 100	6.00m	HA + 30 units HB
Non standard 1 tower stayed					

HELP! Please describe:

Name:

Company:

Number of Walkways	Width of Walkways (please indicate)	Number of Spans (please indicate)	Build Method	Protection
2	1.25m	1 – 10	Build in situ or cantilever launch	Hot dip galvanised
2	1.25m	1 – 10	Build in situ or cantilever launch	Hot dip galvanised
2	1.25m	1 – 10	Build in situ or cantilever launch	Hot dip galvanised
2	1.25m	*not applicable*	Build in situ or cantilever launch	Hot dip galvanised
2	1.25m	*not applicable*	Build in situ or cantilever launch	Hot dip galvanised

Address:

Email:

Scan and Email to **sales@reidsteel.co.uk** or fax to: **+44 1202 470103**

Standard Steel Decked Relocatable Bridges

EFFECTIVE SPANS 12M TO 90M

There is a frequent need for relocatable bridges. A concrete deck is not relocatable, so on these we use a thick (8mm) anti-skid galvanised steel deck. These deck panels are bolted to joists and are easily replaceable.

The joists span onto transoms which themselves span onto two trusses. These bridges are open top through trusses (OTTT) up to 30.5m; the longer ones are closed top through trusses (CTTT). The decks are 4.2m or 7.3 m wide between the crash barriers as a standard.

The design is for AASHTO loads HS 25; this is for a 41 ton truck but the safety factor would be sufficient for a truck of double that weight!

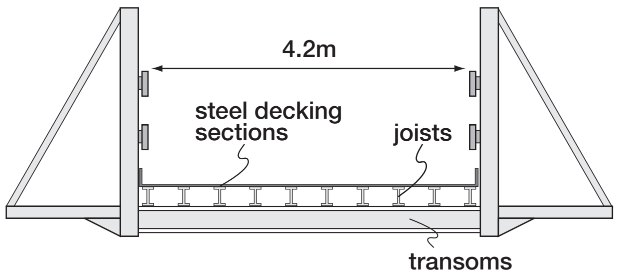
The bridges can be single span, or multispan on piers. As with our standard highway bridges, the trusses are protected by substantial steel crash rails at different levels (unlike many other emergency type bridges). These crash rails protect the trusses against the truck chassis and the payload higher above the roadway.

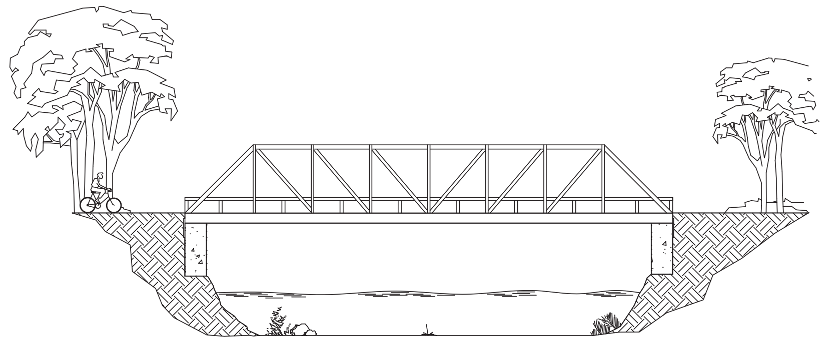
All the steel is hot dipped galvanised for long low maintenance life. The bridges have a small end to end camber. All of its component parts are containerised and the bridges can be built in situ or cantilever launched; launch kits are available with a nose, rollers and cable jacks. The standard bridges have no walkways.

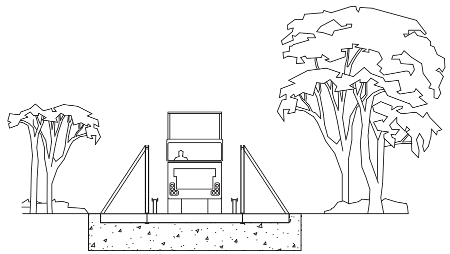
Range of Standard Steel Decked Relocatable Bridges

Span	Type	Width	Load	Launch Kit
12.9m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 1
15.24m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 1
18.29m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 2
21.34m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 2
24.38m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 3
27.43m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 3
30.48m	OTTT	4.2m/7.3m	AASHTO to HS 25	Type 3
40.4m / 50.4m / 60.4m	CTTT	4.2m/7.3m	AASHTO to HS 25	Type 4
70.5m / 80.5m / 90.5m	CTTT	4.2m/7.3m	AASHTO to HS 25	Type 4

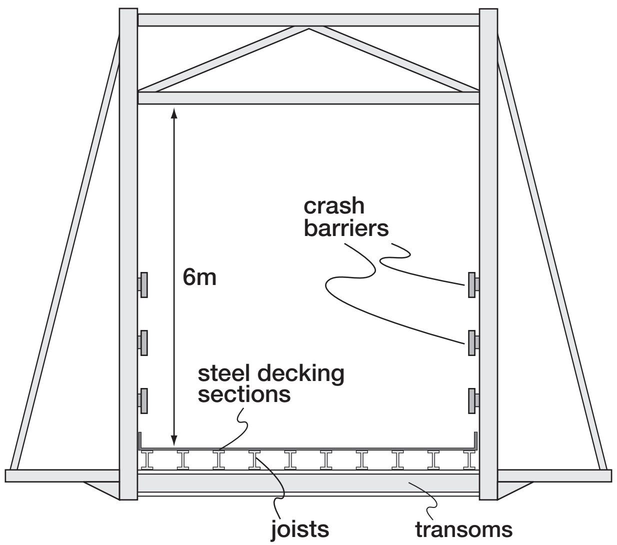
Open Top Through Truss

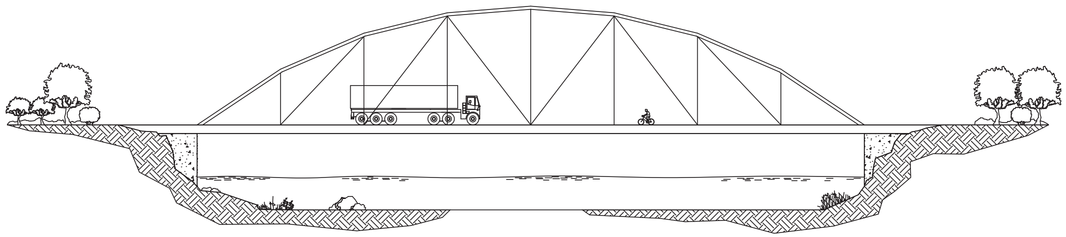


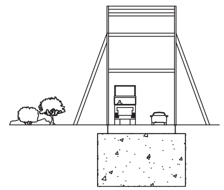


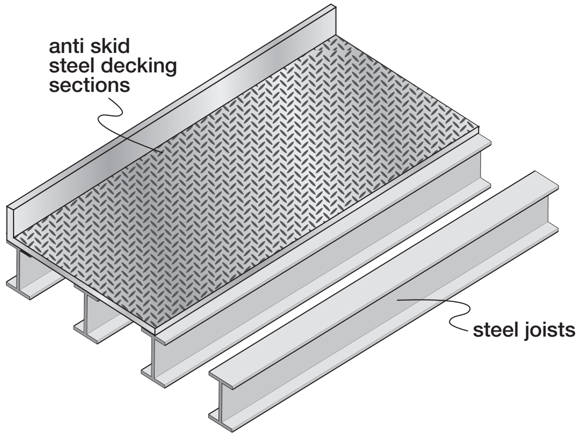


Closed Top Through Truss









Glossary

STEEL BRIDGE TERMINOLOGY

AASHTO: The American Association of State Highway Organisations, the body which sets the bridge loading codes in the US. The AASHTO codes are used in many other places.

Abutments: The structures in the ground at either end of the gap of the bridge which carry the vertical and horizontal loads from the steel bridge structure.

Bailey Bridge: is a portable pre-fabricated truss bridge and is based on a design by Sir Donald Bailey, of Christchurch, during the Second World War. 'Bailey' is now made in lighter form for sale to the civil temporary bridge market. See equipment bridging below.

Beam Bridge: Bridges where beams, usually underneath but sometimes on the sides, carry the loads across the span. Beam Bridges can be single span, or multi-span, or continuous multi-span. The deck spans between the beams; or between transom beams which themselves span between the beams. The Bridge Decking can be reinforced concrete poured onto lost-decking formwork; or can be precast panels bolted or grouted into place; or can be steel durbar decking.

Bearings: The fastenings at the places where the main load carrying members (beams or trusses) touch down on the abutments or piers. These are usually intended to allow some movement, including rotation and expansion or contraction. They may be elastomeric, made of hard elastic compressible flexible material bonded to steel plates above and below, or they may be real steel pins, able to rotate but not move horizontally. Alternatively they could be Steel Bridge Rollers, allowing large horizontal movements in one plane.

Bridge Decking: The deck is the surface on the bridge on which traffic can move. The best sort of deck is reinforced concrete. Such decks are usually about 0.25m deep and are heavily reinforced to resist shear and movement between the main beams or the transoms. Such decks are best poured directly onto 'lost formwork'. However reinforced concrete decks are more difficult to remove if the bridge is temporary, or to be re-located. Alternatives are to lock on specially made precast concrete planks; or to use steel decking panels.

BS5400: This is the British Standard for design and construction of Steel Highway and Railway Bridges. The British Standards are widely accepted throughout the world.

Camber: This is the upward curve across the roadway, or along the length of the bridge. Camber is needed to ensure that a bridge deck drains to the sides (or to one side) and does not pond water; there is also a matter of appearance: the bridge deck looks better if it has a slight upward curve along the length, even though this does not affect the strength or durability of the bridge. Unless there is a good reason, bridges should not sag by more than about 1/800 of the span. Packing may be used to get the correct camber. Transoms may be pre-curved to get the side to side camber. Multi-span bridges should not produce sharp 'valleys' between spans.

Carriageway: That part of the Deck that includes all traffic lanes, hard shoulders, hard strips, and marker strips. The carriageway width is the distance between raised kerbs, if there are any. If there are not, it is the distance inside the guard rails or barriers or safety fences, less the required set back of 0.6m.

Composite Beam: A steel beam, which has concrete decking above it, and which is connected to the concrete by shear connectors, which cause the steel and the concrete to act together. Normally the steel will carry the wet weight of the concrete, but when this has set, the two materials will share the load, the concrete mostly acting in compression.

Crash Barriers: These are steel structures designed to prevent vehicles from damaging the bridge if they hit the load carrying members; or to stop vehicles from driving off the edge of the bridge; or to make it harder for vehicles to hit pedestrian traffic on the walk ways.

Diaphragm Beams: Steel beams between the main beams which help to share loads between the main beams, and even out deflections.

Durbar Decking: This is a type of steel Bridge Decking with a raised profile giving anti-skid properties while still self draining and can be used for walkways or roadways. Often such plates are made into welded panels which can be manually lifted into place and bolted to beams or transoms.

Equipment Bridging: This is pre-engineered bridging, usually from an original military design. Such bridges are made from an assembly of large numbers of standard parts, including panels, transoms, rakers, decking. These bridges are an excellent emergency bridge, and should be held in stock to replace bridges damaged by floods or accidents or explosions. However, they are unsuitable for permanent road bridges: they sag, they rattle, they are too narrow, they do not have crash rails and they are expensive. They should only be used for emergency, and should be taken down and stored for re-use as soon as a proper Road Bridge can be built.

Far Bank: The side of the gap to which the bridge spans from the home bank.

Freeboard Bridges: often cross rivers, and the bridge deck should be at some height above the expected flood level.

Gabions: Big baskets of galvanised steel wire, which hold rocks together to stabilise embankments and to reduce erosion.

Gap: The distance between abutments.

Hand Rails: These are rails to prevent people from falling off the bridge. They are 1.1m high, and either have vertical rails at 0.11m centres, or infill panels, to make it harder for children to climb them.

Heavy Vehicle Loading: Most standard loadings allow for an exceptional heavy vehicle. For example a vehicle with 4 axles, each weighing 25 tonnes, at a variety of different spacings, may be applied to a lane of a bridge; the HA loading would be applied to other lanes and other parts of the lane. British Standards would call this 25 units of HB loading.

Highway Bridges: Bridges which carry main road traffic.

Home Bank: The side of the gap on which construction of the bridge takes place.

Knife Edge Load: In standard loadings, as well as the uniform load, a single line load of about 10 tonnes is applied at one point anywhere along the lane on that span. British Standards call this HA loading, when used with the lane loading.

Industrial Bridges: Industrial processes often need bridges, to carry services, utilities, conveyors or products within, or to and from, industrial plant. *REIDsteel* can provide these, as part of the building contract or separately.

Lane Loading: The loading is applied as a uniform load to each traffic lane. For this purpose, roadways less than 5m count as one lane, from 5m to 7.5m as 2-lane, from 7.5m to 10.95m as 3-lane, 10.95m to 14.6m as 4-lane, 14.6m to 18.25m as 5-lane. Do not forget that the roadway is 1m less than the distance between barriers. British standards call this HA loading, when used with the Knife edge load.

Military Bridge Classification: Often shown on bridges by a yellow disc, the classification roughly corresponds to the weight of the truck. In some cases, 2 numbers are shown: one with a W, the other with a T. This means Wheeled or Tracked loads.

Navigable Height: Some bridges go over rivers used by boats or ships. The clear height needed over the reasonably expected high tide or flood levels is the Navigable Height.

Pedestrian Bridges: Bridges designed mainly for walking traffic, though such bridges are likely to carry cyclists and light motor cycles as well. Such bridges may have stairs and may have ramps. Stairs have to be of the ‘public’ type with goings of 290mm and even risers of not more than 187mm, and should self drain. Ramps are essential for disabled access and have slopes of 1 in 12; individual slopes should not be more than 10m long between level resting places, and need to be at least 1.2m wide.

Piers: The structures into the ground between the abutments, in the gap, which carry intermediate spans of a multi-span bridge.

Pipe Bridges: Bridges are often needed to carry water or sewage or other utilities across rivers or roads or railways. These utilities can of course be carried on any *REIDsteel* bridge, or bridges may be specifically designed and constructed for the job.

Rip-Rap: The use of large lumps of rock to reduce erosion of the embankment of the roadway.

Road Bridges, Feeder Road Bridges: Bridges designed for minor roads. But the loadings for these are likely to be the same as Highway bridges, especially in remote areas.

Road Way: This is the area marked out for vehicles to use the bridge.

Shear Connector: These are steel studs which are fixed to the steel beams and around which the concrete deck is poured. They have the effect of making a shear bond between the steel and the concrete, making the two materials act together to resist loads and reduce deflections. They may be pre-welded to the beams using a stud welder, or may be in the form of nuts and bolts which can be fixed on site.

Span: The length of any bridge segment between its structural supports. There may be one, two, or several spans within a gap.

Stayed Bridges: Bridges which have the roadway supported at intervals by stays, steel members fixed to the bridge beams at road level, to high up on a tower. The stays may be cables, or rods, or steel beam of column sections bolted together. The towers are then stayed back into large counterweights. There may be towers at both ends of the gap or at one end only.

Steel Beams: Steel members of an I shape, which can resist bending, carry tension and compression and shear loads.

Steel Columns: Like steel beams, but a squat H shape, which are better at carrying compression loads.

Steel Packing: Steel packing may be inserted between the joints of the steel members to ensure the correct shape and camber.

Steel Plate Web Girders: Like large I beams, but made of flat steel plates welded together, then having stiffeners welded into them to keep them the right shape. They may be suitable for major road crossings, especially as continuous beams; but not suitable for export as it is not possible to transport them.

Steel Round Tubes: Hollow round tubes suitable for compression loads.

Steel Square or Rectangular Box Sections: Hollow tubes rolled into square or rectangular shapes, suitable for carrying compression loads; and useful for detailing purposes on handrails etc.

Suspension Bridge: A suspension bridge has its deck supported at intervals by cables on either side, hanging in a catenary (or nearly a parabolic) form from towers at either end of the gap. The towers are then restrained by similar cable ties going back to large counterweights in the ground, outside the gap. The cables are usually multi-strand wires bundled together, and need substantial equipment on site to spin them. (A suspension bridge is similar to a Steel Cable Stayed Bridge (see above) except that the suspension cables are smooth curves, rather than a number of straight stays).

Traffic Lanes: These are the lanes marked out for traffic on the roadway. There may be one or more lanes. Lanes should not be less than 2.5m and not more than 3.65m.

Transoms: Steel beams which span under the roadway and carry the loads of the roadway to the trusses or beams.

Truss Bridges: Bridges where trusses carry the loads across the span. The roadway may go through, between the trusses (a through-truss bridge) or over the trusses (an over-truss bridge, sometimes referred to as an under-truss bridge).

Truss: Large structures of triangulated steel members which can carry loads aver a span.

Viaduct: A bridge carrying a road or railway.

Wing-Walls: The walls either side of abutments which retain the embankment of the roadway and help prevent erosion.

Company Profile

Founded in 1919 by Colonel John Reid, *REIDsteel* is still family owned and occupies a 4 acre site at Christchurch in Dorset, England.

REIDsteel have been making steel bridges since the 1930s. We have shipped bridges all over the World: from Central and South America, to Africa, the Middle East, Asia, Russia and Europe. At *REIDsteel*, we are able to design, manufacture, ship and erect almost every type of steel bridge, including beam bridges, over truss bridges, through truss bridges, bow-string bridges, cable stayed bridges and pedestrian bridges. Our bridges are designed and made to British Standard 5400 Highway Bridge Loading Specification, and we have vast experience and knowledge in construction in remote regions, tropical climates, and earthquake and hurricane design.

One company covers all

What makes *REIDsteel* so unique is that we cover everything from the design to the erection process itself, all within our 4 acre site in Christchurch.

We have our own unique computer software which has been developed by us for us, which allows us to design and price a building or bridge in minutes rather than months. The machines in our works use the latest CAM systems which have been programmed just metres away in our drawing office. If one of our workmen has a question about a design, they can walk straight up to our offices and ask the designer himself. Using different companies to do different jobs creates a lot of confusion, wastes time and money, and causes endless arguments. With *REIDsteel*, one company is responsible for everything.

From design to erection in 3 months

Choosing *REIDsteel* to construct your steel bridge allows it to go from design to construction within 3 months, and be in use and fully functional within 6 months. *REIDsteel* also make all types of industrial and commercial buildings, including aircraft hangars. Going from architect to engineer to contractor means it could be a year or even longer just to get to the manufacturing stage. This traditional route will usually involve using more than one contractor - one for the frame, one for cladding, one for windows, one for doors etc. At *REIDsteel* we can supply all of the accessories needed for the complete structure without the fuss.

Made to the highest standards by an ‘A’ rated company

At *REIDsteel* we use Corus Steel rolled to British Standards, which is used by us almost exclusively. We are registered Qualified Steelwork Contractors, having been subjected to a Capability and Capacity AUDIT by the British Constructional Steel Association, which takes into account our assets, plant, skills, experience, turnover, financial status, contract references, product and public liability insurances etc. We received an A rating (highest), which qualifies us to design and make every form of structural steelwork, from multi-span bridges to the largest aircraft hangars to the lightest architectural work. We have received the Queens Award for Enterprise four times, in 1985, 2006, 2008 and 2009. This is the highest honour that can be bestowed on a UK company.

REIDsteel through truss highway bridges have two lane roadways so that even large lorries can be driven on either side with plenty of space to spare. There are three lines of heavy duty steel protector bars on each side of the carriageway to prevent collisions with the main steelwork.
◄ ▼

Hot dipped galvanised steelwork ensures superb protection and long life.
◄

REIDsteel's own specially designed and made bridge launch rollers. ►

THE BRIDGE BUILDERS
*Rollo Reid, Technical Director of REIDsteel (far right) with the team from **Kalika** of Kathmandu, who erected this bridge.*

REIDsteel

we bridge the world

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