BRIDGES

REVISION DATE: 15/12/2014

Spanning the world since 1919

Four times winner of the Queen's Award for Enterprise International Trade

FULLY CE COMPLIANT FOR EXECUTION CLASSES 1 TO 4 • ISO 9001:2008

REIDsteel

OVER 90 YEARS OF EXPERIENCE

Wherever the location, whatever the span . . .

Steel Bridges by REIDsteel

Established in 1919, REIDsteel have been fabricating steel bridges since the 1930s. We are certified to fabricate steelwork to **CE execution classes 1 to 4** and have **ISO 9001** for quality management.

What makes us unique is that we encompass everything from the design and detailing, through to fabrication, shipping and even the erection process itself.

Firstly, everything is carefully considered: the span, necessary clearance under the bridge, bridge usage and weight of traffic. We even check the area's meteorological and geological conditions for the level of extreme weather conditions, flooding and seismic activity.

Furthermore, the precise geographical location is also factored, as a bridge construction that is tight to a steep sided valley may require a different erection process or design type than one with flat or gently sloped areas on either side.

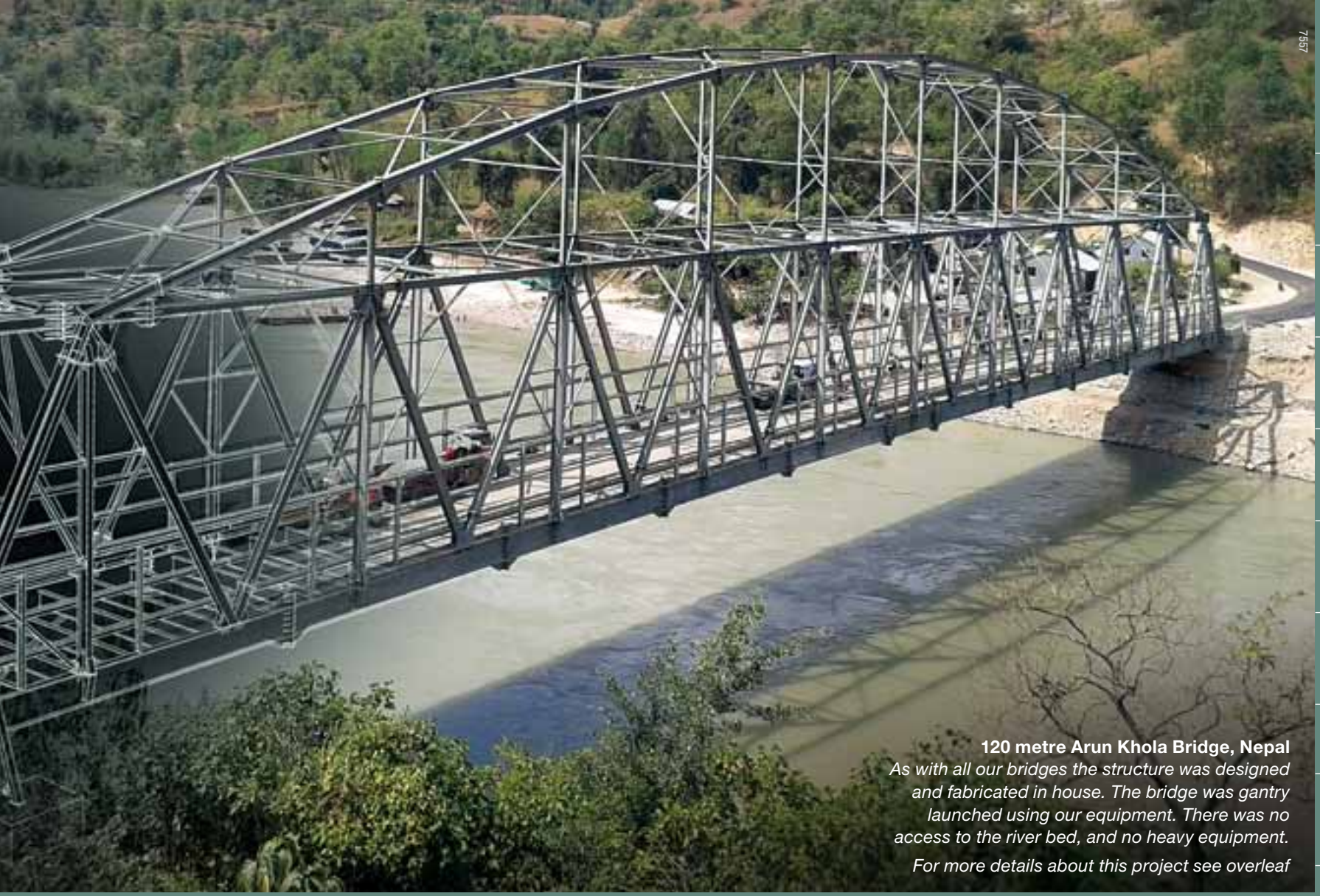
Once these details have been evaluated, we use bespoke in-house software which allows us to quote promptly and design a value engineered solution.

3D steelwork models created in our drawing office CAD system can upload data straight to our workshops on the same site. Should a fabricator have a question about a design, it can be easily and clearly discussed, one to one with the designer.

Once our workshops have completed fabrication, and after galvanising, everything needed to erect the REIDsteel bridge is carefully packed and delivered in shipping containers. Our export team has arranged shipping and erection of our steel structures to over a hundred countries, including some of the most remote and difficult to reach parts of the world.

This brochure showcases just a few of the bridges we have created. For more information about REIDsteel or any of our products visit: **www.reidsteel.com**

q u o t e • d e s i g n • d e



120 metre Arun Khola Bridge, Nepal
As with all our bridges the structure was designed and fabricated in house. The bridge was gantry launched using our equipment. There was no access to the river bed, and no heavy equipment.

For more details about this project see overleaf

t a i l • m a n u f a c t u r e • p a c k • d e l i v e r • b u i l d

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An Award Winning Project

The British Expertise International Awards Outstanding International Development Project Award

The UK supported the development and construction of these two bridges linking thousands of isolated communities in Eastern Nepal under the successful decade long Rural Access Programme.

International Development Secretary, Justine Greening, said: *"These bridges designed and fabricated in Christchurch are a fantastic example of British business and British support, making a real difference to some of thousands of people in Eastern Nepal. It is a life-line that will allow communities to work and trade, send their children to school, and be better able to access vital services like health care without relying on aid."*

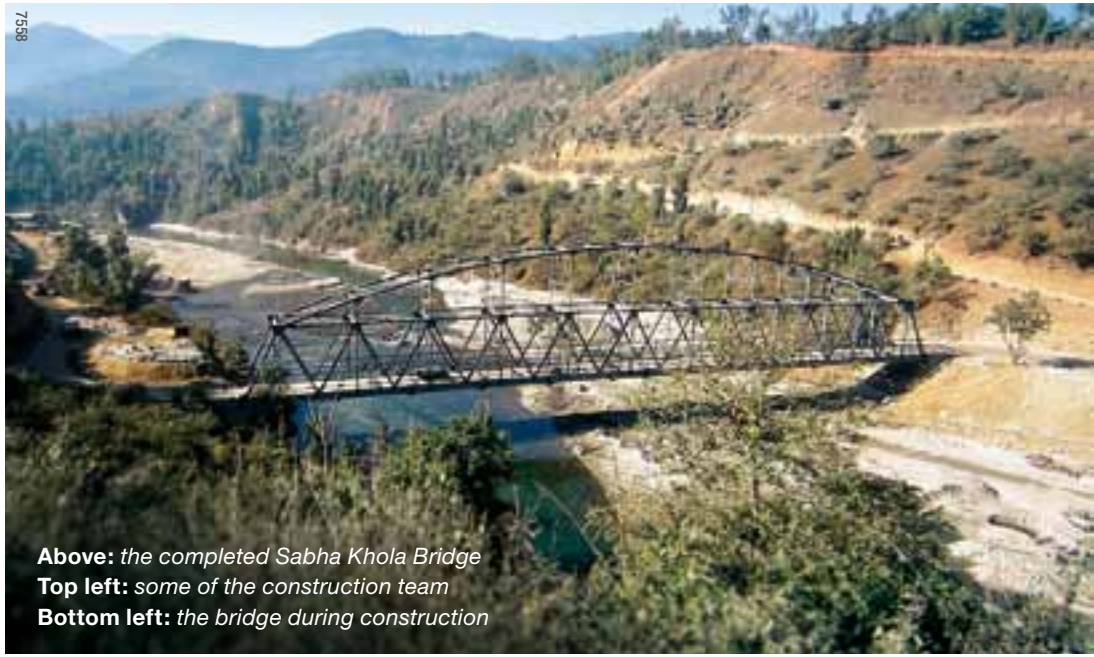
120 metre Sabha Khola Steel Truss Bridge

Steel Truss Bridge across the Sabha Khola River, Nepal

The Sabha Khola bridge provides essential all-weather access to the Arun 3 hydroelectric project site and enables disaster relief agencies to cross the river in the event of earthquakes or other disasters. Previously, the crossing of this seasonal river was only fordable by vehicles and pedestrians for approximately six months of the year.

By aiding infrastructure for the hydroelectric plant, Nepal will be better able to address its current capacity shortfall in electric power generation.

The bridge was opened to traffic in January 2013 after taking 12 months to construct from start of foundations to the bridge completion. It is an example of a successful transfer of technical skills between Tim Stiff, the UK Technical Assistance Consultant, and the Nepalese Contractors.



Above: *the completed Sabha Khola Bridge*
Top left: *some of the construction team*
Bottom left: *the bridge during construction*

Above and right: *images of the bridge during construction*
Bottom right: *the completed Arun Bridge*

120 metre Arun River Steel Truss Bridge

Cantilever launch construction over the Arun River, Leguwa, Nepal

This bridge over the Arun River provides all season access for 203,000 people and helps, in conjunction with the other UK funded projects in the district, to lift them out of poverty and reduce their reliance on aid in both the immediate district and the other six other districts directly served by the new crossing.

The Arun River is both fast flowing and full throughout the year, so a cantilever launch method for the erection of the steel truss was chosen. This required detailed consideration of the erection system to be built into the design and the bridge was cantilevered from both sides of the river with incremental erection of the truss facilitated by lifting the individual steel sections with gantry cranes supplied as part of the REIDsteel steelwork.

Local residents were hired where possible, and made a valuable contribution to the project. The construction was carried out by local contractor Kalika with Tim Stiff, the British Government agent, in attendance.

The bridge was opened to traffic in October 2013 with official inauguration in January 2014.

Standard Steel
Through Truss Bridges

Typical spans of 30m to 200m

★ *You can specify any dimension or load*

Good for . . .

Maximum clearance underneath the roadway

Building in situ or cantilever launch

Single or multiple spans

But . . .

Can only be widened by building another bridge

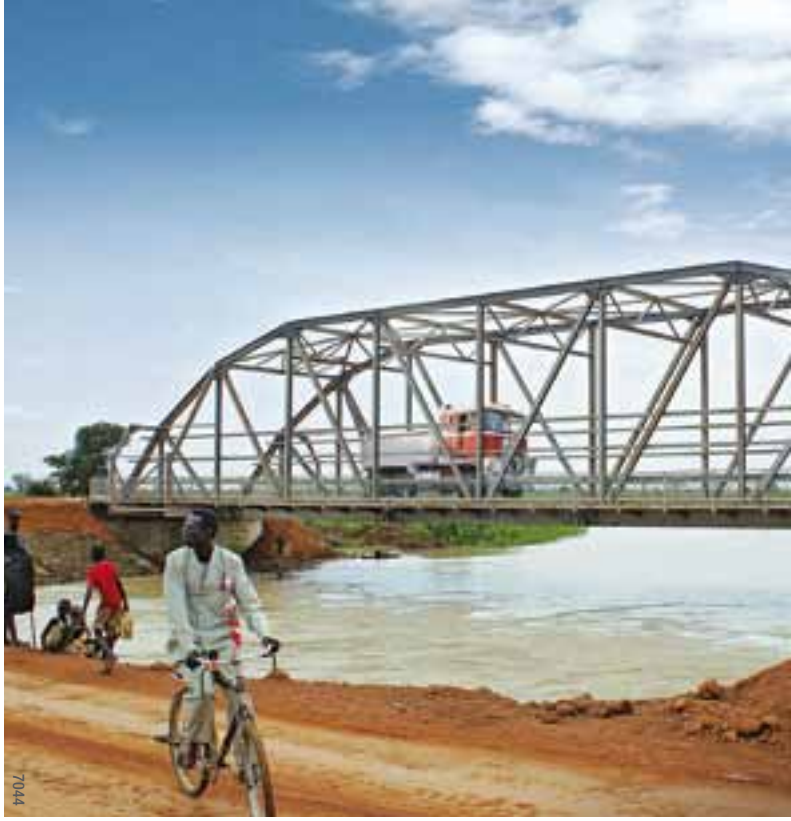
Carriageways

Carriageways are two lanes with a total width of 7.2m between the steel crash barriers which run along both sides. These barriers prevent trucks or their payload from hitting and damaging the bridge trusses and offer protection for people and their animals crossing the bridge.

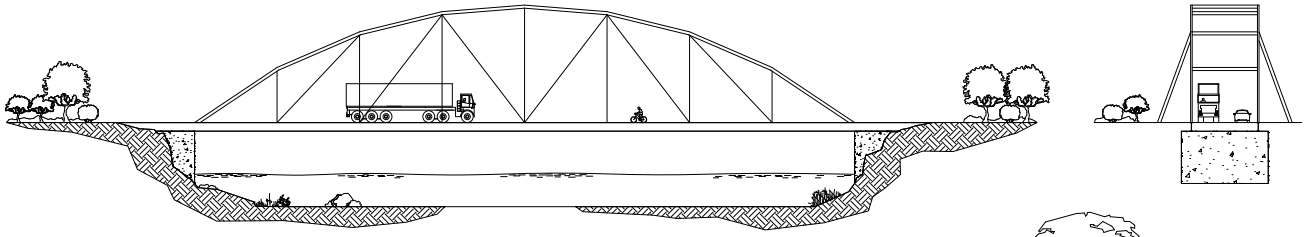
Decks

The decks are local reinforced concrete - 0.25m thick, placed on our lost formwork decking with no propping needed. They can have 0.05m of surfacing.

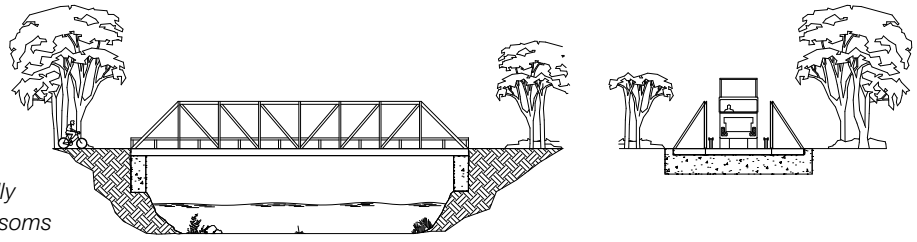
The bridge decks are carried by two trusses at, and above, deck level and stabilised with a bracing system.



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).



Closed Top Through Truss - *for bridges above 40m span the bracing is usually above the carriageway, between the trusses*



Open Top Through Truss
below 40m span, this bracing is usually from raker members down to the transoms

One of our 50 metre clearspan, two lane roadway bridges on the Aweil Road, Eyat, Sudan.

Protecting the pedestrians, protecting the vehicles and protecting the bridge.

*Old making way for the new . . .
50 metre span Reid bridge being launched in South Sudan by Terrain Services Ltd, Kampala.*

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.

Walkways

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 walkway decks are local reinforced concrete 0.125m thick placed on our lost formwork decking.

Erection

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.

Multi-Span

The bridges may be combined with other bridges to make multi-span crossings. The bridges can be built in-situ; or they can either be gantry launched from one end or 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 two span bridge and two Link Kits for a three span bridge and so on.

Standard Composite Beam Bridges

Typical spans of 10m to 24m (but larger spans are possible)

★ *You can specify any aspect of the bridge*

Good for . . .

- Easy widening
- Low visual impact
- Building in situ or cantilever launch
- Single or multiple spans

But . . .

- Become less cost effective as spans get longer compared with trussed bridges

Carriageways

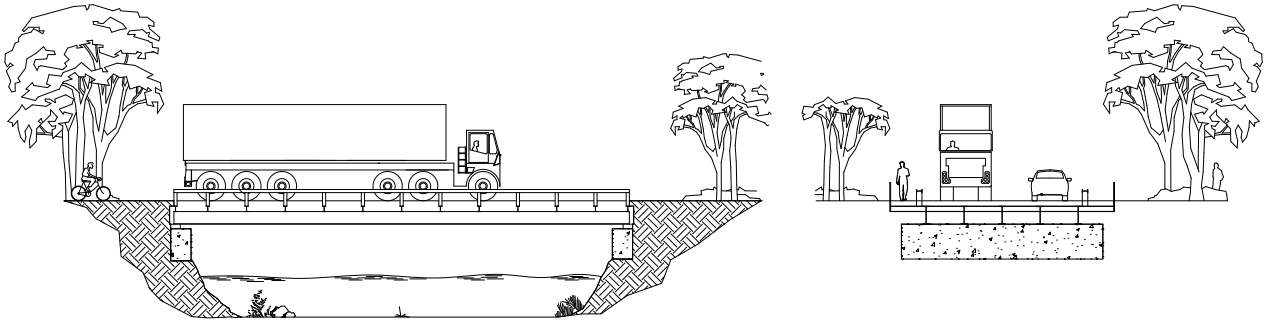
Carriageways are supported by pairs of beams at 1.7m centres. A carriageway may therefore be 5.1m overall wide, with 1.2m walkways both sides. The carriageways may be extended width ways in increments of 3.4m. There is an element of choice in the marked carriageway widths and the widths of the walkways.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

Decks

They will have local reinforced concrete decks 0.250m 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 bridge decks are carried by two 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.



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

Left: *Composite bridge, preparing to launch in South Sudan.*

Contractor and erector Terrain Services Ltd, Kampala

Walkways

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 averaging 0.125m thick placed on our lost formwork decking.

Erection

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.

Multi-span

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 two span bridge and two Link Kits for a three span bridge and so on.

Standard Steel
Over-Truss Bridges *(like beam bridges but for longer spans)*

Typical spans of 25m to 100m

★ *You can specify any aspect of the bridge to suit your needs*

Good for . . .

Easy widening

Building in situ or cantilever launch

Single or multiple spans

But . . .

Clearance under the trusses might mean higher approaches and bigger embankments

Carriageways

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 extended width ways 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.

Decks

The decks have local reinforced concrete 0.25m 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 two or more pairs of trusses below deck level. There is no steel above the deck other than barriers.

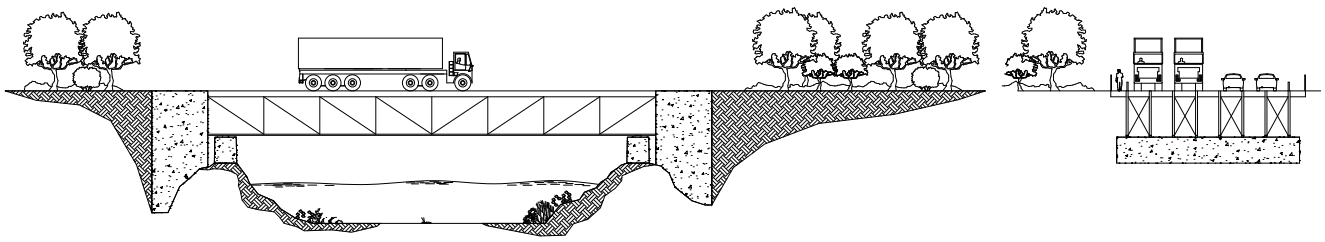
Please note that the roadway will have to be at a height well above the flood level: as a guide the depth of the trusses is about 8% of the span, and the roadway is above this truss.

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.

Walkways

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 walkway decks are local reinforced concrete 0.125m thick placed on our lost formwork decking.



Southern Highway, Belize

Erection

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.

Multi-span

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 two span bridge and two Link Kits for a three span bridge and so on.

Standard Steel
Stayed Bridges

Long spans up to 200m

★ *You can specify any configuration or load for your custom designed bridge*

Good for . . .

Where building in situ or cantilever launch is not possible

Where access to the far side is difficult

Where a big visual impact is required

But . . .

Can only be widened by building another bridge alongside

Carriageways

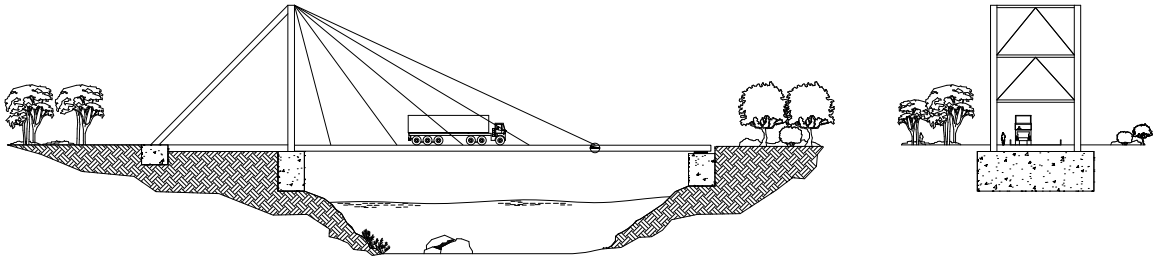
Carriageways are two lanes. They are 7.2m wide between crash barriers.

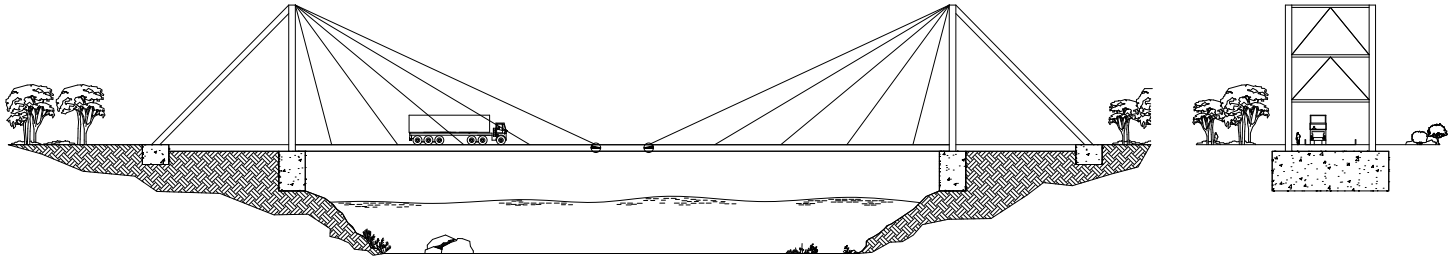
They will have local reinforced concrete decks 0.25m thick, placed on our lost formwork decking with no propping needed. They can have 0.05m of surfacing.

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.

Decks

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 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





64.8m REIDsteel bridge in Mauritius. Contractors BCE Erection by JTec

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.

Walkways

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 walkway decks are local reinforced concrete 0.125m thick placed on our lost formwork decking.

Single or double towers

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.

Modular, Relocatable Equipment Bridges
Steel decked and versatile design

Standard spans of 10m up to 40m in a 'shipping container friendly' format

Good for . . .

When you need to take them down and re-build elsewhere.

Keep some in stock for emergencies

Modular Design in 5m Sections

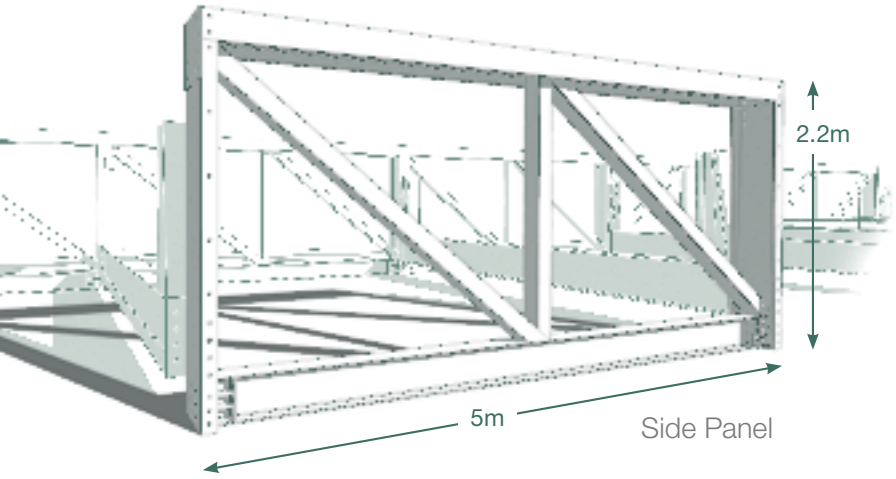
There is a frequent need for relocatable bridges. Our equipment bridge designs are to BS 5400/1978 with 25 units of HB (100 tonnes).

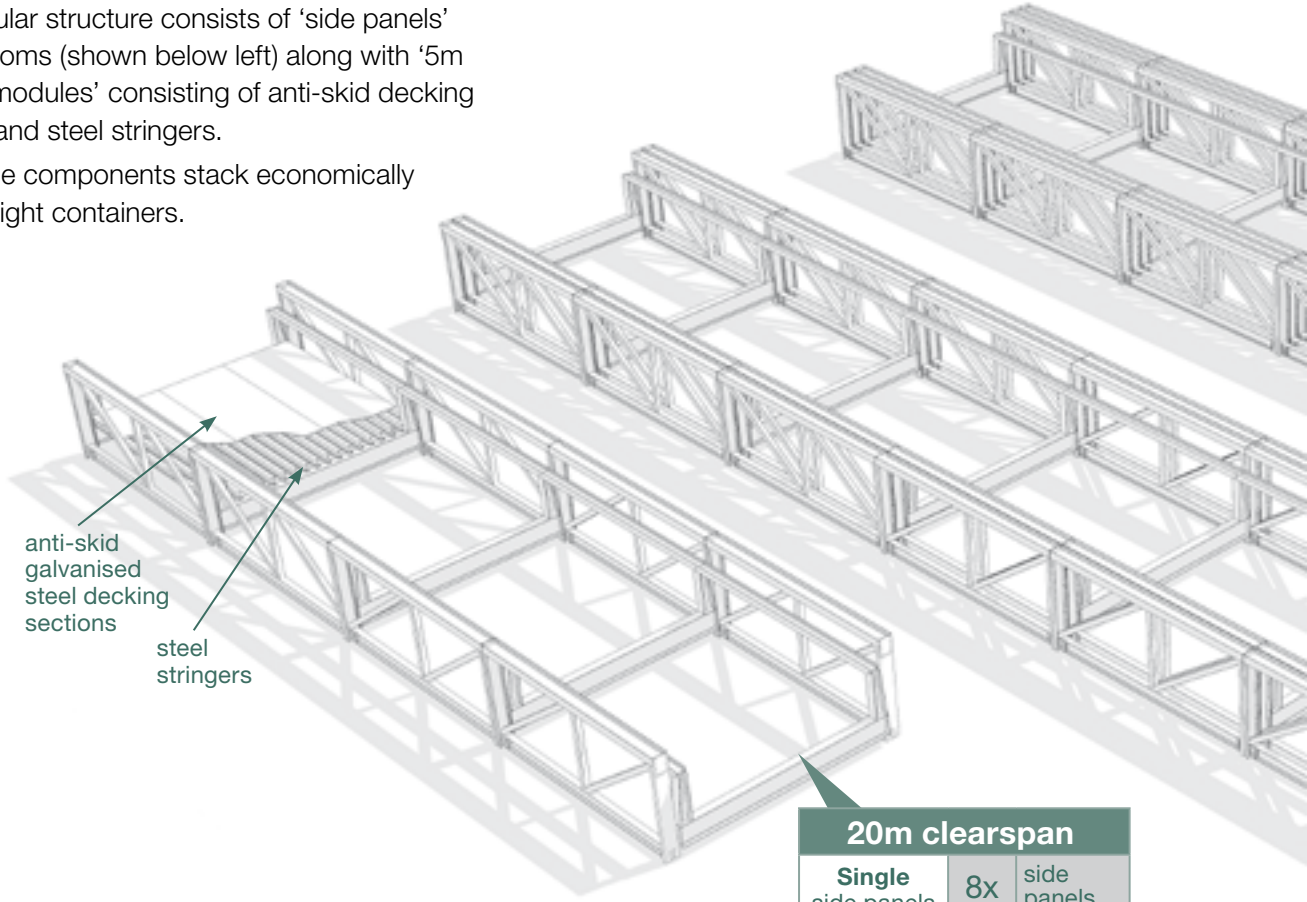
The modular structure consists of 'side panels' and transoms (shown below left) along with '5m decking modules' consisting of anti-skid decking sections and steel stringers.

The bridge components stack economically in 20ft freight containers.

Decks

We use a thick anti-skid galvanised steel deck. These deck panels are bolted to stringers/joists and are easily replaceable.





20m clearspan		
Single side panels on each side	8x	side panels
	4x	decking modules

Crash Rails

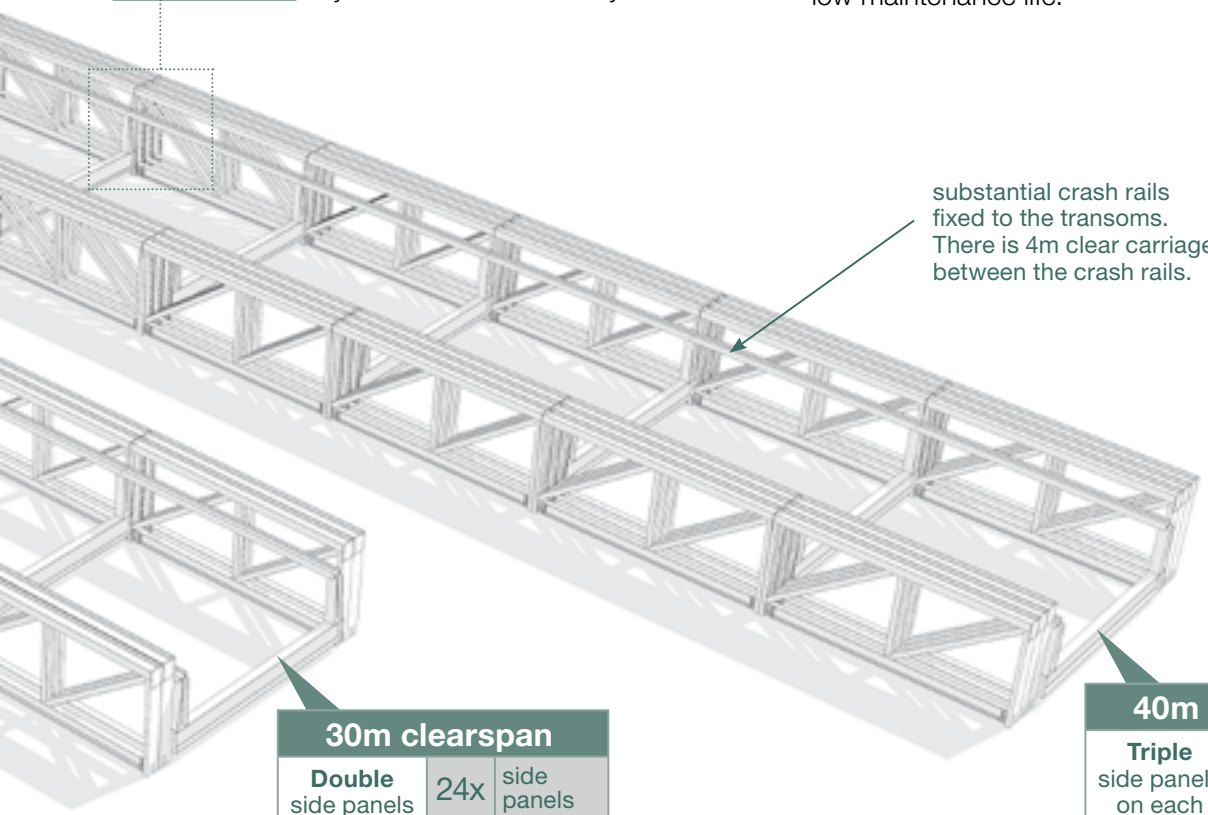
As with our standard highway bridges, the trusses are protected by substantial steel crash rails at 0.8m above the deck. These crash rails protect the trusses against collision by the chassis of a heavy truck.

Walkways

The standard equipment bridges have no walkways, but they can be added if required.

Protection

All the steel is hot dipped galvanised for long low maintenance life.



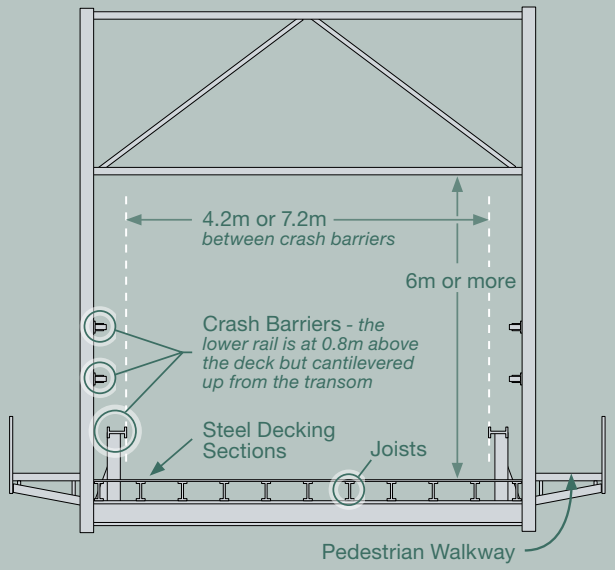
30m clearspan		
Double side panels on each side	24x	side panels
	6x	decking modules

40m clearspan		
Triple side panels on each side	48x	side panels
	8x	decking modules

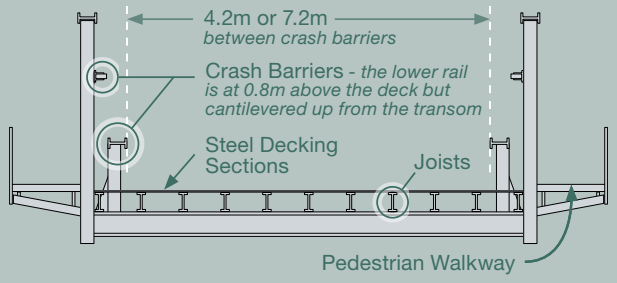
The Non-Modular Alternative

In addition to our equipment bridges, any of our other bridge types can be fitted with a steel deck to make them relocatable.

Closed Top Through Truss (CTTT)



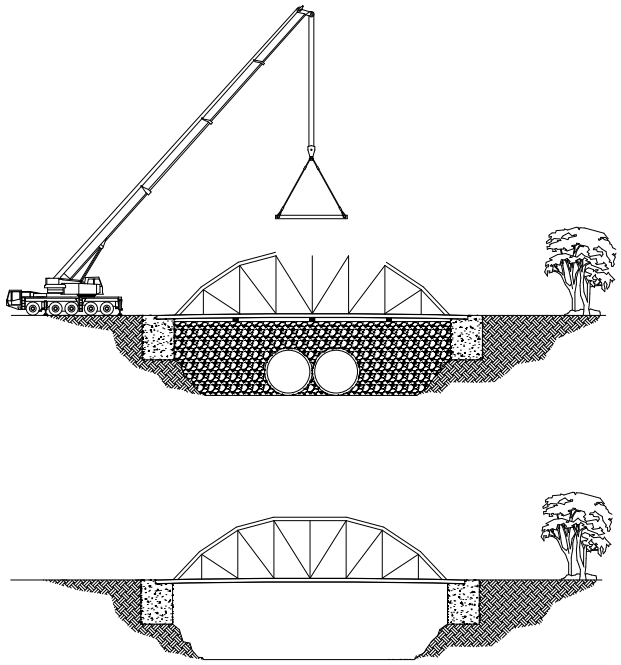
Open Top Through Truss (OTTT)



Basic Construction Techniques In Steel Bridge Building

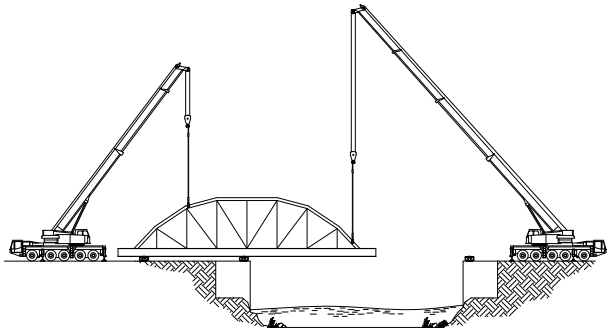
Through Truss - A

The easiest construction technique is in situ during the dry season, over causeway and culverts. We advise building the bridge slightly higher in the middle by leaving small gaps in the top chord, which close when the causeway is removed.



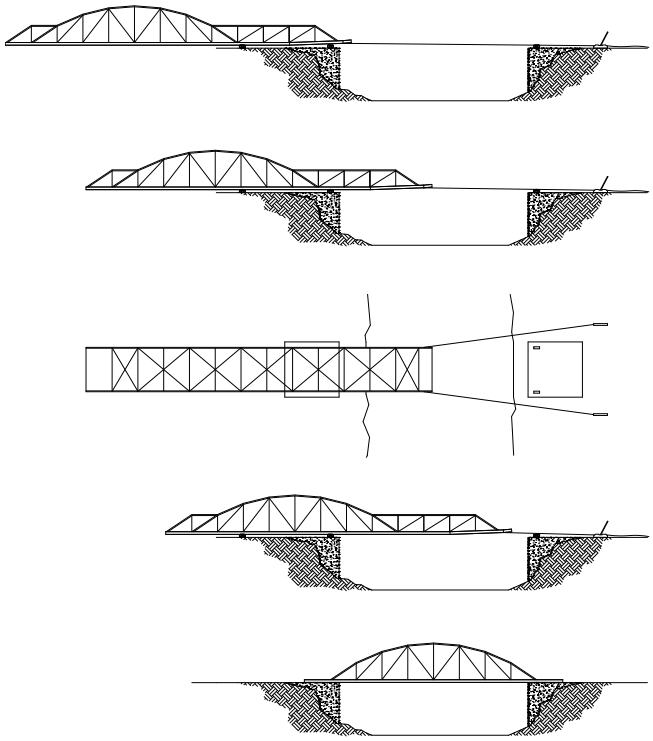
Through Truss - B

Truss built in situ on home bank, then craned to half way. The entire bridge is then lifted into position with large cranes on both banks. Good for small, light bridges when large cranes are also available.



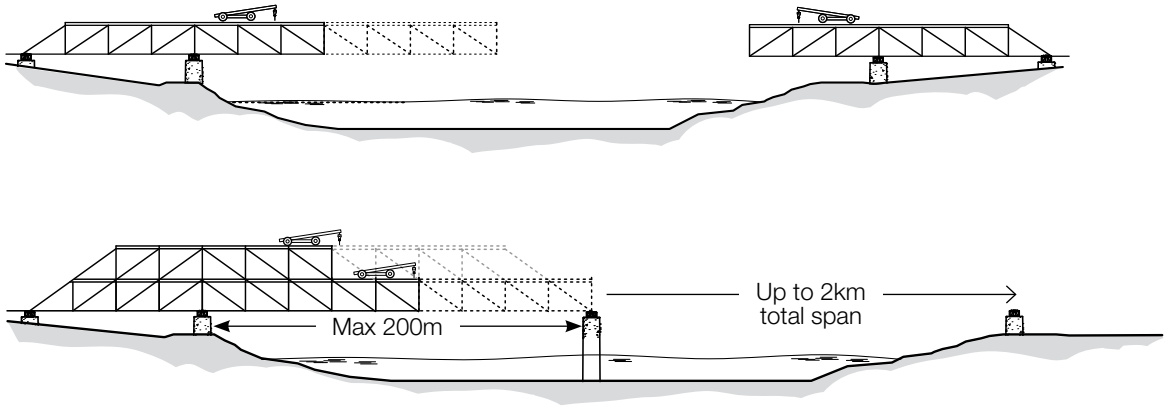
Through Truss - C

Roller launch method. The bridge is constructed in situ and then jacked across the span using rollers and cantilever technique. A temporary nose section is used this is removed once the bridge is in place.



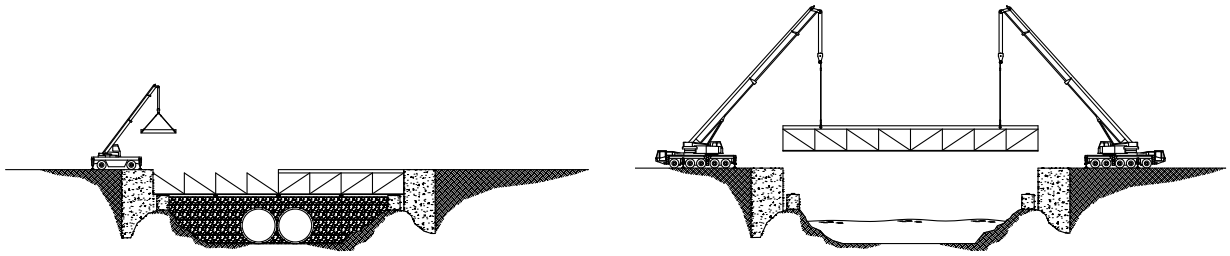
Single or Multi Span Gantry Launched

The end spans, or the erection gantries, are erected first. Then our cranes on our rails run forward and backward building out. The members are rolled out on trolleys on rails.



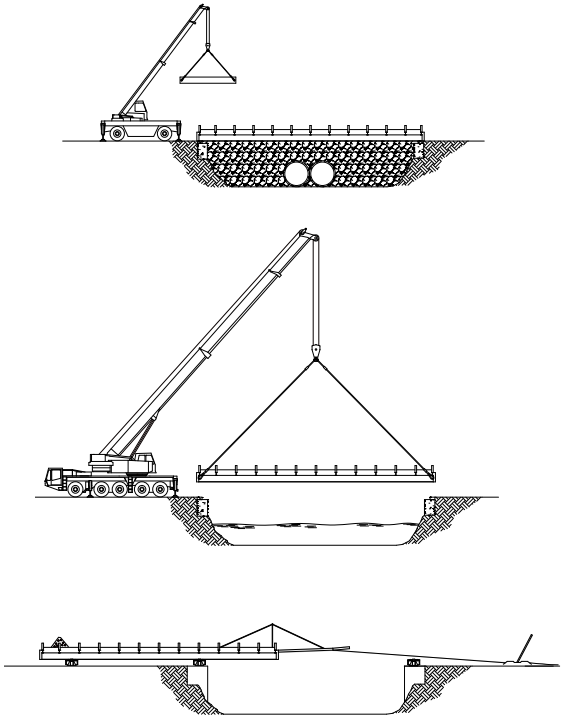
Over Truss - A & B

A: The easiest construction technique is in situ during the dry season, over causeway and culverts, or **B:** two to three beams can often be lifted in, singly or joined in pairs, by cranes on each bank.



Composite Beam

The easiest construction technique is in situ during the dry season, over causeway and culverts. Beams can often be lifted in, single or joined in pairs, by one crane from one side or beams can be joined in pairs then roller launched or cantilever launched; then jacked down into place. Once in position it simply remains to bolt in remainder of the cross beams, add flashings, add rebar and then pour concrete finish and cure.



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

We are registered Qualified Steelwork Contractors, receiving an A rating (the highest possible) from 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.

Additionally, We have received the Queens Award for Enterprise four times. This is the most elevated honour that can be bestowed on a UK company.

We use only the highest quality steel, and our bridges are designed and constructed to British Standard 5400 Highway Bridge Loading Specification for two lanes of full highway loading, and for 30 units of HB loading, equivalent to an occasional 120 tonne truck.

The bridge steel is fabricated in pieces which can easily be transported in 20ft or 40ft containers, or on regular road vehicles. The structure is entirely bolted together using regular high strength tension and shear bolts. The main connections are end-plated and adjustment is by means of steel packs which can be inserted between end plates.

All the steel work is hot dip galvanised (85microns, 610gm/m^2), for long low maintenance life.

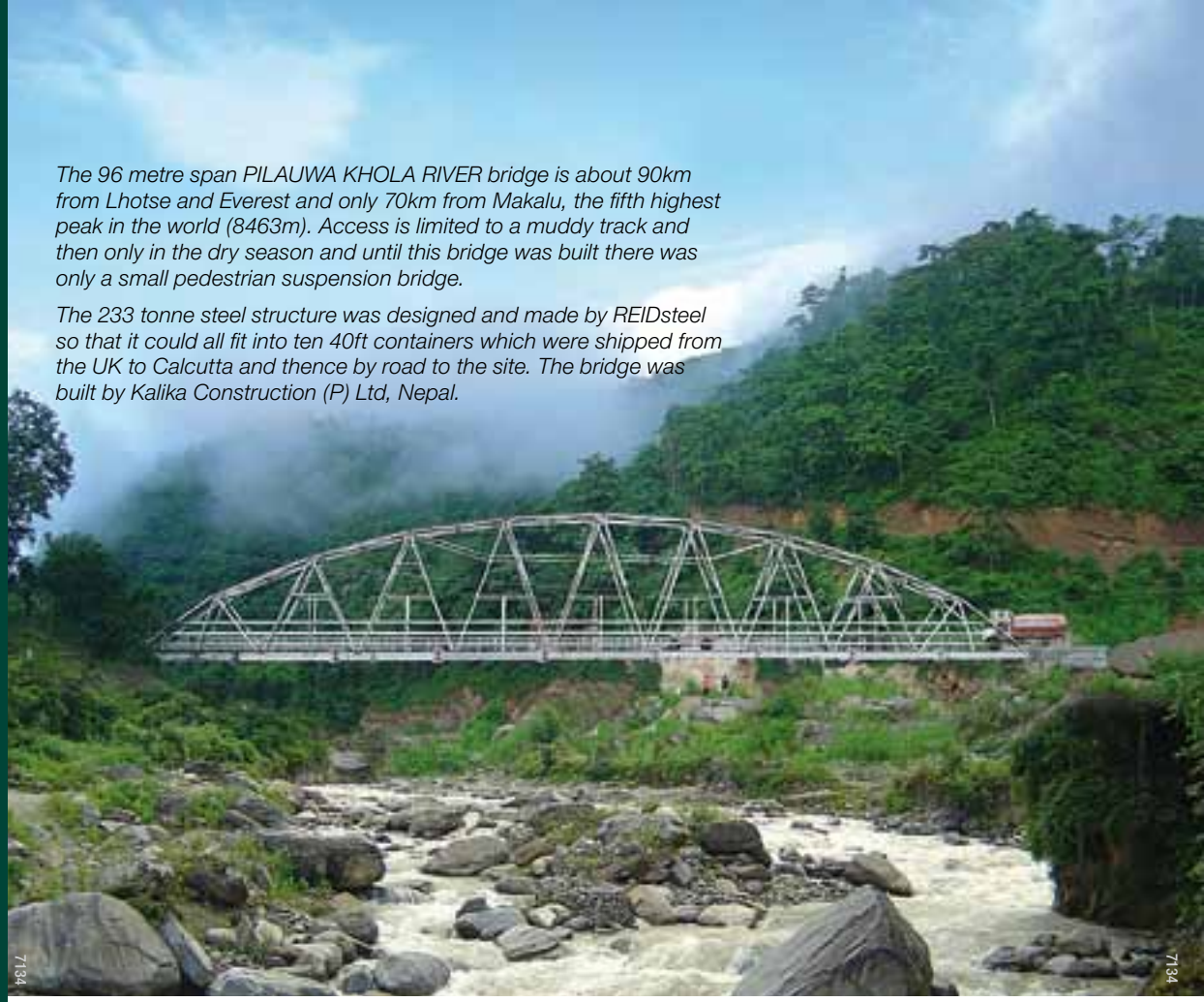
Our work carries a ten year warranty.

Fully certified to CE mark fabricated steelwork to execution classes 1 to 4 ISO 9001 QMS

Four times winner of the Queen's Award for Enterprise International Trade

The 96 metre span PILAUWA KHOLA RIVER bridge is about 90km from Lhotse and Everest and only 70km from Makalu, the fifth highest peak in the world (8463m). 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 bridge was built by Kalika Construction (P) Ltd, Nepal.



50m bridge, Sudan

Twin 30m span bridge, Sudan

Sabha Khola bridge, Nepal

Pedestrian bridge, Nigeria

Above & right
Boca del Rio bridge, Belize

Bottom row from left to right:

Bridge parts being fabricated at our works in Christchurch, Dorset.

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

Hot dipped galvanised steelwork ensures superb protection and long life.

Steel bridge components being containerised at our works.

A pedestrian bridge being part-constructed at our works ready for despatch.

The Pilauwa Khola Bridge Builders: *Rollo Reid, Technical Director of REIDsteel (far right) with the team from Kalika of Kathmandu, who erected this bridge.*

In addition to our **steel bridges**, we are also experts in the design and build of the following:

- **Aircraft hangars & hangar doors**
- **Industrial and warehouse buildings**
- **Commercial and office buildings**
- **Retail superstores**
- **Waste processing and recycling buildings**
- **Car parks**
- **Grandstands & stadia**
- **Reservoir covers**
- **HVM security gates and barriers**
- **Commercial glazing and solar shading**

REIDsteel

JOHN REID & SONS (STRUCSTEEL) LTD

Strucsteel House, Reid Street,
Christchurch, Dorset BH23 2BT England

Telephone: + 44 (0) 1202 48 33 33
Facsimile: + 44 (0) 1202 47 01 03
E-mail: sales@reidsteel.co.uk

Website: **REIDsteel.com**

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