

THE LEGACY FOOTBRIDGE

A sustainable and cost-effective solution
suited to the local environment



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Introduction

Founded in 1969, Taziker is a multi-disciplinary engineering specialist delivering projects throughout the UK. We provide our expert knowledge and technical expertise to a variety of sectors including rail, highways, energy, defence and utilities.

Taziker are committed to building our organisation from within, through the continuous development, engagement and empowerment of our people. Together, we are team Taziker, working to responsibly regenerate and sustain our national infrastructure.

A Solution for the Rail Industry

With our decades of experience working in the rail industry, we understand the challenges that are faced in the sector such as safe pedestrian access over the railway. Additionally, our reputation as bridge specialists guarantees the client exceptional expertise providing invaluable knowledge and ability, which enables us to deliver the highest quality in our product and services.

We have sought to develop a solution that provides benefits to Network Rail, helps sustain the environment, and also puts passengers first. By bringing together different technologies, features, and materials, our engineers have designed an innovative footbridge that will revolutionise the industry.

Our Legacy Footbridge is designed with passengers, the environment and the client all in mind.



In-house Industry Expertise

// In 2020, Taziker was chosen by Network Rail to participate in their 'FRP Footbridge Innovation Programme'. This aimed to develop alternative pedestrian footbridge designs utilising Fibre Reinforced Polymer (FRP) materials for use on the rail network.

Prior to this we had already designed and manufactured a 14m full-sized prototype FRP footbridge for use in remote areas, allowing us to apply the lessons we learned from this prototype to Network Rail's Innovation Programme.

Taziker's solution for an FRP footbridge gives the industry a cost effective, quick to install, sustainable option to make the railway infrastructure a safer environment.

After reading about the number of accidents occurring on rail pedestrian crossings and the main blocker to prevent these occurrences was the cost of footbridge re-placements, I was inspired to develop a cost effective FRP footbridge solution that could replace pedestrian crossings and save lives. The result of our research and development is the Legacy Footbridge.

Matt Greenhalgh
Managing Director FRP Solutions



Matt Greenhalgh joined Taziker in 2009 to set up a specialist engineering division. Over the years, Matt has played a pivotal role in the delivery of many high-profile structural strengthening projects such as Royal Albert Bridge and Iron Bridge.

A respected engineer in the rail sector, Matt has over 30 years' experience working in the industry, and as well as bringing a wealth of technical expertise, he also has great passion for new engineering solutions; innovative ideas; and alternative options to steel such as FRP.

The Challenge

Around 2,250 of Network Rail's 6,000 level crossings are footpaths over the railway. These crossings pose a safety risk to pedestrians and cyclists therefore, the most logical action is for them to be replaced with footbridges to avoid unnecessary accidents.

With a vision to eliminate accidents at level crossings, Network Rail has made significant improvements in their management of level crossings, but accidents still inevitably occur.

Why aren't more footbridges being built?

Current footbridge designs are expensive to commission, disruptive to build and costly to maintain. Steel bridges are subject to rust and need regular painting, while concrete bridges require extensive foundations that don't meet Network Rail's high sustainability standards and decarbonisation goals. What's more, accessible footbridges with lifts have generally been

unreliable, prohibitively expensive and complex to install.

The rail network needs a footbridge solution that has the potential to improve safety; has a lower financial impact; minimises disruption to passengers during the installation process; is environmentally friendly; and provides 'access for all'.



Due to potential safety risks and delays to journeys, Andrew Haines, Network Rail Chief Executive, stated

"If we were to build the railway from scratch today, we wouldn't include level crossings."

The Solution

Taziker has designed the Legacy Footbridge to provide the rail industry with an all-encompassing, sustainable solution.

This innovative new footbridge is highly cost-effective, with a flexible, modular design that can be installed in just days, and modular lift options that make accessibility affordable and easy to achieve. By carefully considering the overall design, the structure can sit on existing foundations if required.

The Legacy Footbridge is an environmentally sustainable, low-carbon structure that is highly durable and requires little or no maintenance. It can be designed to suit any span and match any aesthetic, blending seamlessly with stations and locations nationwide.

- By using FRP we are committing to a better environment for the future.
- Lower costs are incurred in the installation and maintenance of the footbridge.
- We have minimised disruption to passengers by reducing the amount of time needed for site installation.
- All materials are sourced and manufactured in the UK, reducing our carbon footprint.
- Efficient and reliable mechanical lifts provide access for all.
- Greater safety is ensured for all pedestrians using the footbridge.

"A cost-effective, sustainable solution suited to the local environment"



The Legacy Vision Footbridge

Taziker has also designed an alternative style of the Legacy Footbridge with transparent lattice panels. This is called the Legacy Vision Footbridge.

The Legacy Vision Footbridge provides a brighter experience for those travelling over the bridge due to these clear, see-through panels. This design maximises safety, views and daylight onto the footbridge, giving clear visibility of the route.

The parapet panels consist of two identical lattice panels with a clear polycarbonate sheet in-between. This creates a solid infill barrier to comply with safety regulations, whilst maintaining a traditional lattice aesthetic.

The Legacy Vision Footbridge can therefore reduce the feeling of claustrophobia and increase passive surveillance and the perception of security, as all people on the footbridge are visible to those on the footbridge and to those on the ground.

Additionally, the parapets can include triangular anti-climb coping to deter dangerous behaviour on the bridge, and the internal lattice panels, which secure the polycarbonate sheets, can be removed for cleaning or replacement easily and conveniently from the bridge deck.

"This design maximises safety, views and daylight onto the footbridge, giving clear visibility of the route."

Why is the Legacy Footbridge the Perfect Choice?

The Legacy Footbridge has a number of features which make it the ideal solution for use over the railway. One of these features is the use of fibre reinforced polymer (FRP).

Benefits of using FRP



Durable

FRP offers high durability and strength which means that little maintenance is required over the lifespan of the footbridge - giving whole life savings. It is anticipated that the lifespan of the Legacy Footbridge will be in excess of 100 years, with the National Composite Centre currently conducting testing to provide the industry with accurate life expectancy details for FRP materials.

With extremely high impact resistance, the footbridge elements will keep their shape and form even with heavy usage.



Cost Effective

By using FRP in the construction of the footbridge, costs can be kept to a minimum due to quick and easy modular installation, low material costs and little future maintenance.



Lightweight

The footbridge modules can be built and transported to site for safe and simple installation, with less need for heavy lifting on-site. Due to the lightweight nature of the FRP materials, transportation and crane emissions are reduced which results in a lower carbon footprint.



Quick and Easy Installation

This brings benefits to the railway due to limited disruption to passengers during the short possessions that are required for the installation. This also reduces the need for a full site compound, further minimising project costs.



High Strength

FRP has a high strength to weight ratio compared to metal, wood and concrete. This ensures that the Legacy Footbridge is resilient to damage and long lasting.



Non-conductive

Our Legacy Footbridge is ideal for use on railway lines with overhead line equipment (OLE) due to the FRP materials being non-conductive. This is a major safety benefit for users of the footbridge and passengers on the rail network. Furthermore, there is no need to install permanent earth bonding or carry out ongoing bond inspections.



Longevity

The Legacy Footbridge will stand the test of time as FRP is resistant to corrosion, rot, mildew, mould, and insects. A long-life expectancy gives the client peace of mind with regards to minimal future maintenance and the associated costs.



Additional features which make the Legacy Footbridge the perfect solution for the rail industry are the space-saving nature of the design and the proven fire resistance performance.



Fire Resistance Performance

The Legacy Footbridge is manufactured from a single source UK manufacturer in order to achieve a guaranteed high standard material that is produced with Scott Bader Crystic 370 for Class 1 resin for all pultruded sections and RTM formulation - Crystic PD9359PA.

To determine the fire resistance of the Legacy Footbridge, the structure was subjected to an ad hoc fire resistance test in general accordance with BS476-21: 1987 Section 7, for a duration of 20 minutes, whilst supporting an imposed load of 5kN/m².

The vertical deflection at the centre of the bridge was continuously measured during the test by a linear displacement transducer activated via a taut fine steel wire attached to the centre of the bridge. The maximum deflection recorded was 4.5mm, well below the limiting deflection of 213.5mm. The temperature of the unexposed face of the bridge was monitored by twenty-one K-type thermocouples. The furnace reached a maximum temperature around 1100 degrees Celsius, and the unexposed face reached temperatures ranging from 80-160 degrees Celsius, demonstrating its remarkable low thermal conductivity.

The results concluded that the bridge was found to achieve fire resistance class R20 with respect to loadbearing capacity, integrity, and insulation.



Efficient Use of Ground Space

The Legacy Footbridge is designed to occupy the smallest ground footprint possible without the need for any reduction to the recommended widths and clearance. This enables a new bridge to be installed in even the most restrictive of stations and locations.

This is further helped by the Legacy Footbridge being designed to make use of low impact foundations, such as helical piles.

Through a simplistic design and innovative techniques, the Legacy Footbridge is a great solution for any environment. By taking into consideration the potential immediate surroundings, such as station infrastructure or existing landscape, the new footbridge can be installed easily and efficiently without causing any negative impact.



Adaptable to Your Requirements

With the additional features that are offered with the Legacy Footbridge, the client and users are ensured reliability and safety. We provide long-lasting, practical features that are efficient to install. These can be adapted based on the location to best suit the surroundings and existing infrastructure.

Deck and Stair Treads

The Legacy Footbridge deck and stair treads have an impressive anti-slip finish. Strong and resilient, the flooring ensures a safe walking experience.

Made from glass reinforced polyester (GRP) substrate, the deck and stair treads contain a near-diamond-hard aggregate with a design life of 30 years. We provide this type of deck and stair treads as standard on the Legacy Footbridge to ensure a long life and greater safety to pedestrians.



Security Lighting

The Legacy Footbridge will be equipped with low energy lighting to provide additional safety for the public.

There are numerous lighting options available to best suit the environment and aesthetic of the local area. Our discreet lighting is designed to achieve the required lighting levels whilst minimising light pollution and we also offer motion sensor lighting which can be powered by solar or wind and backed up with battery power. Recessed units will be used to increase resilience to damage and ensure longevity.

CCTV

To ensure safety for the public, we can offer CCTV options. Commonly used to detect or deter criminal activity, CCTV can give peace of mind to pedestrians in remote locations.

The cameras can be positioned in a location suited to the environment allowing the main span and the stairways to be monitored for reasons such as public safety or vandalism.



Foundations

The Legacy Footbridge can sit on existing foundations due to the compact and practical design. If a replacement footbridge is being considered on the rail network, it is a simple process to install the Legacy Footbridge on the existing foundations to negate this cost.

If foundations need installing, our FRP footbridge can be supported using traditional concrete options, or concrete free micro-pile foundations. These concrete free innovative solutions reduce dependency on high-carbon concrete for a reduced carbon footprint.

Taziker can provide various types of concrete free foundations and will complete a technical assessment to provide suitable recommendations for the client.

The installation process for concrete free foundations is highly practical, taking considerably less time than typical concrete foundations. This means there is much less disruption to the rail network, putting passenger first by limiting delays to journeys.

There's no requirement for heavy plant on site to install and only small handheld equipment is



needed. Concrete foundations require significant timely excavations and then waiting time for curing and drying - with added weather concerns. Concrete free foundations will be ready for the immediate installation of the structure!

Concrete free foundations are 80% quicker to install and 60% cheaper than concrete foundations.

The sustainable benefits, reduced cost and efficient installation process make concrete free foundations the ideal solution for the Legacy Footbridge.

CONCRETE FREE FOUNDATIONS ARE 80% QUICKER & 60% CHEAPER THAN CONCRETE FOUNDATIONS

" Protecting the environment is at the forefront of people's minds. By using FRP, Taziker is providing an innovative solution to reduce environmental impact towards net zero carbon maintenance and construction. "



Sustainability at its core



Lightweight

Reducing transportation emissions, less need for heavy lifting on-site



UK sourced materials

Further reducing transportation emissions



Low waste

Little waste generated during production, virtually none on site



Stronger structures

Less dead weight structural material is required, saving resources



Durability

Long lifespan durability reduces materials consumption and emissions in the future

reduced carbon footprint



Resistance

Resists corrosion, rot, mildew, mold, insects without the use of toxic chemicals



Concrete-free

Innovative foundation solutions reduce dependency on high-carbon concrete



Minimal site set up

Reduces the impact on the local environment

Accessibility

The Legacy Footbridge has been developed with an option to include lifts within the design, giving the rail industry a complete access for all (AFA) solution.

With Network Rail's long term safety vision being 'no accidents at level crossings' and their obligations under the Equality Act 2010 to improve access for disabled passengers – we have provided a trustworthy solution for crossing the railway tracks. In addition to providing disabled access, there is also a responsibility to provide safe access for those with luggage, children or pushchairs - and the Legacy Footbridge lifts provide safe travel for all.



Access for All

The modular lift units have been purpose built to fit seamlessly with our footbridge.

Easy to transport to site, the lifts are delivered as fully completed modular units. They are lifted into position as a complete unit and lowered onto pre-installed foundations for rapid installation.

The lift has a robust curved door with minimum moving parts compared to existing sliding door designs. This has proved to be highly reliable. The units provide easy maintenance with durable mechanisms and easy access to key components. Redundant drive motors ensure that if the main motor fails, control automatically transfers to the redundant drive – removing the potential for breakdowns. An added benefit to the lift design is their Uninterrupted Power Source (UPS) which is included in case of a power cut in the area.

They can be maintained from ground level, within the lift, or remotely via video playback, and are fully trackable via dial-up or mobile broadband connections.

Engineered for Lasting Performance

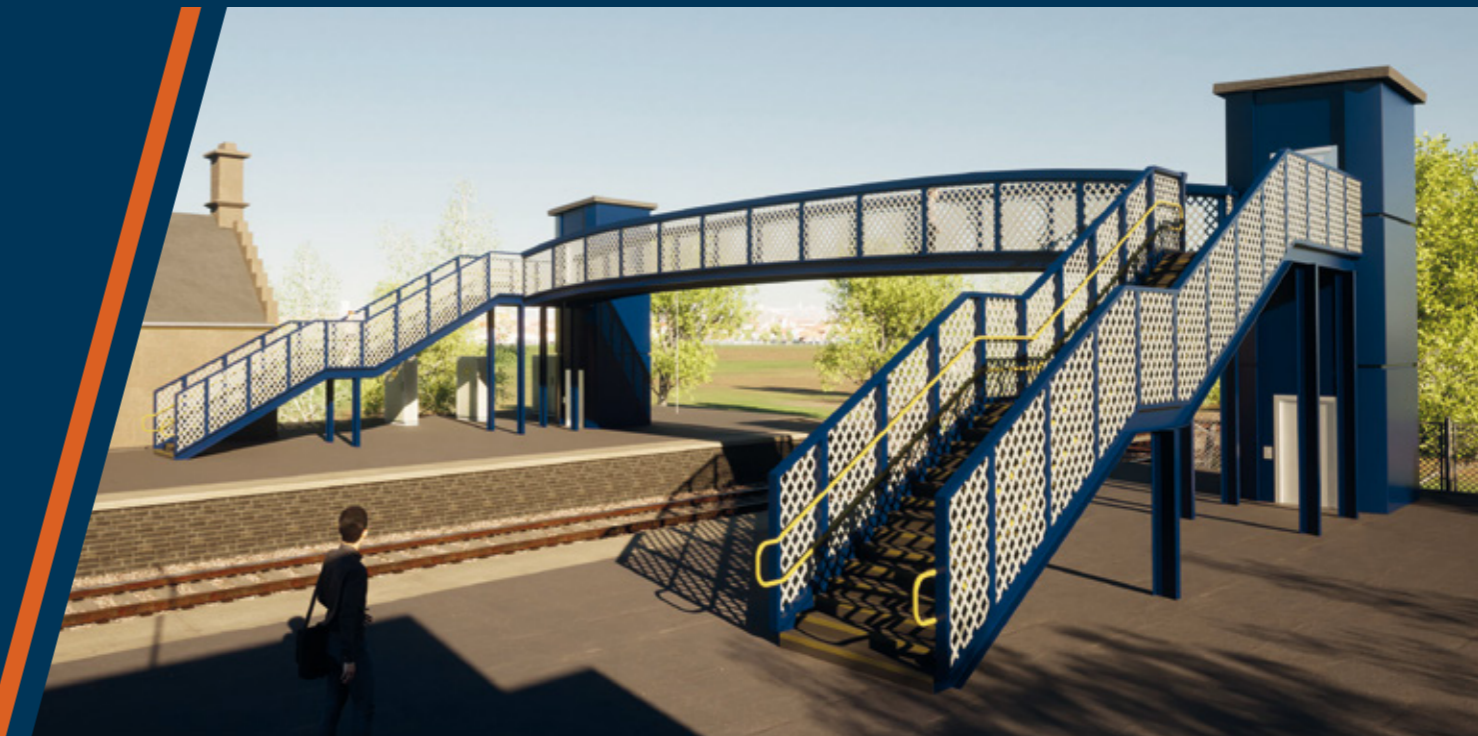
The lift unit uses a proven certified lift door controller with 3D detection light strips to protect users. The main mechanism is designed for in excess of 15 million cycles and has undergone extensive testing, using automated devices to impede closure

"If lifts are not viable for your project, we can provide an option for ramps to be considered and integrated into the design."

Designed for User Convenience

The lift units are designed to provide easy access for all with a wide door opening suitable for a wheelchair, and generous internal width to allow for wheelchair rotation. Each lift includes a full light panel in the car roof, rain canopy above the entrance and an intercom for emergencies.

The Legacy Footbridge solution with lifts included provides an accessible route across the railway, which is obstacle free, easy to use and useable by everyone.



In the details

Efficient Mass Manufacturing

Pultruded sections of FRP are manufactured in bulk quantities with all materials cut and drilled by CNC equipment, guaranteeing both accuracy and speed of manufacture. The resulting components can easily be stacked and stored ready for use in the same way as steel structural sections would be.

Harnessing the Latest Technology

By using advanced computer software packages, we can calibrate and modify footbridge models quickly and easily to various sizes. This gives you the ability to specify a bespoke footbridge of any required length and width.

Reduced Installation Time

The reduction of installation time was a prime consideration in the design of the Legacy Footbridge. Taziker has eliminated the need for extensive site compounds with power and facilities, with no need for the installation of access roads or reinstatement of the site on completion of the works.

The design includes a number of time-saving innovations:

- **Simplified foundations** – the reduced overall weight of FRP, when compared with steel structures, means we can make use of existing technologies to save installation time on site. The design uses concrete-free micro pile systems, which can be installed behind barriers during normal working hours.
- **Rapid deployment** – these systems allow the foundations for a typical Legacy footbridge to be installed within 3 to 4 days and ready for immediate installation of the bridge. These concrete-free foundations are the most carbon-friendly solution available and do not require wet trades on site.
- **Simple delivery** – the Legacy Footbridge can be delivered to site in pre-assembled sections with modular lift units. These can arrive by road, or even by rail, making use of standard RRV and road rail cranes.

The Legacy FRP footbridge is installed in days, with fewer possessions and less passenger disruption.

- The Legacy Footbridge can be installed within a single ROTR weekend possession.
- The “plug and play” design of the lift units enables them to be added within a second ROTR weekend possession (with an extra day for foundation installation).
- Foundations can be installed outside of ROTR possessions, during normal working hours behind barriers.



A Footbridge for the Future, Designed to Fit the Past

To fit with rural locations or historic stations, the Legacy Footbridge is designed with a traditional aesthetic, keeping the local environment in mind.

Due to the compact design, the footbridge can fit onto existing foundations as well as bringing space-saving benefits when limited land is available.

A Lasting Legacy

Virtually maintenance free with a low life cost cycle.

Warm to touch for a more pleasant user experience in the colder months.

The footbridge does not need permanent earth bonding when used on lines with OLE, saving significant design, installation and ongoing inspection costs.

Quicker and easier to install reducing disruption for passengers and freight.

Quality Assured

With the Taziker FRP Legacy Footbridge, quality is assured at every stage, from materials and manufacturing, to enduring performance.

- **UK manufacturing**
Allows bespoke and longer lengths to be manufactured.
- **Colour range**
Can be produced in any RAL colour to match to the environment into which the bridge will be installed.
- **Quality guaranteed**
All profiles are produced to EN13706 E23 standard using a ISO9001 certificated and controlled processes.
- **Fire resistance**
All FRP materials are manufactured in accordance with EN ISO 11925-2 and EN13823. The Legacy Footbridge structural deck is manufactured and assembled in accordance with BS 476-21:1987 Section 7 fire resistance to achieve R20.
- **Long life**
Accelerated life-testing has demonstrated that FRP can last beyond 120 years.

The Legacy Footbridge meets all the requirements for an affordable, deliverable and sustainable footbridge for the UK rail network.

Get quality you can count on with the Legacy FRP Footbridge.

Awards

The Taziker Legacy Footbridge has been shortlisted for a number of prestigious awards and most notably received the 'Highly Commended' status at the CN Awards 2022 in the Best Innovation category.

Our FRP footbridge development was shortlisted for 'Innovation of the Year (Contractor)' the CN Specialists Awards in both 2021 and 2022, as well as in the Composites UK Industry Awards 2022 in the category of Innovation in Composite Manufacture.



Technical Services

At Taziker, we have industry experts who have in-depth, critical knowledge and extensive experience in all corners of the rail industry. We can provide early contractor involvement on a project to aid the client during the planning process, as well as offer advice on conservation techniques for historic structures.

As a Principal Contractor (PC) for Network Rail, Taziker can take on packages of work directly, while consistently demonstrating our suitability and acting with the highest level of safety standards. We have considerable experience of problem solving and determining the best, and most cost-effective methodologies for all our clients. This includes providing help and support before, during and after a project. We can also provide alternative solutions to steel through our experience of working with composite materials.

For our Legacy Footbridge, our technical helpline is available, and any queries, guidance, or updates will be

answered to by our in-house experts. Our full technical advisory team will be there to ensure effective communication between all parties; this will enable a thorough understanding of what additional features the Legacy Footbridge can include in order to best cater to your needs. Our in-house expertise maximises efficiency and ensures quality whilst minimising time and costs.

Taziker can provide a reliable solution for an easy to install, long-lasting, cost-effective, sustainable footbridge that provides passengers with safety, security and accessibility.

"Taziker has an in-depth insight into the demands of the rail network in terms of safety, performance and economics"



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