Low Carbon Technology and Innovation

Supply Chain Webinar – National Highways RDP

Andrew Wilson – Supply Chain School

16 June 2022

Agenda

Low Carbon Technology and Innovation

Thursday 16 June 2022

1000h	Introduction and Welcome	Andrew Wilson, Supply Chain School
1005h	Delivering a low carbon / net zero strategy for highways	Dean Kerwick-Chrisp, National Highways
1015h	Low Carbon Footbridges	Tom Nicotra, Taziker
1035h	Low Carbon Plant & Equipment	James Barden, L-Lynch
1055h	Low Carbon Site Welfare Facilities	Andy Grayshon, Welfare Hire
1115h	Q&A / Discussion	
1130h	Close	

SUSTAINABILITY

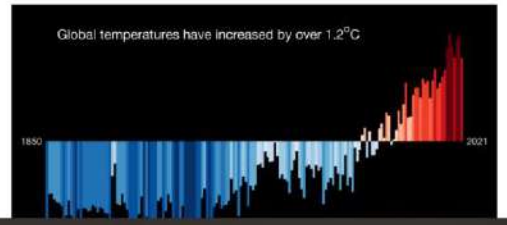
Energy and Carbon

Climate change is the biggest issue of our times and the built environment is one of the major contributors to carbon emissions.

Search our catalogue of FREE carbon and energy resources

Search All Learning

Climate change is the biggest issue of our time



The built environment is one of the major contributors to carbon emissions. Deep emissions cuts have to occur urgently if we are to avoid the worst effects of climate change.

An increasing global reliance on fossil fuels – alongside emissions from industrial processes, deforestation, and animal farming – has meant an accelerating rise in atmospheric greenhouse gas concentrations and global temperature over the past 200 years. This is resulting in climate breakdown: with more frequent and intense storms, droughts, wildfires, sea levels rising and devastating losses for people and nature across the world; delay in action will result in an increasingly uninhabitable world.

In order to avoid catastrophic impacts, the Intergovernmental Panel on Climate Change

SUPPLY CHAIN SUSTAINABILITY SCHOOL

national highways

Dean Kerwick-Chrisp

Head of Sustainable Development & Design
National Highways

Low Carbon Technology and Innovation Webinar

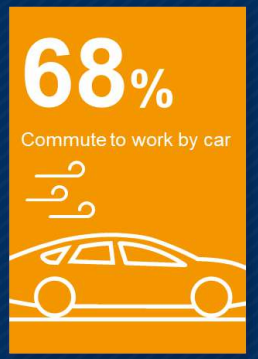
Net Zero Highways

Our 2030 – 2040 – 2050 plan

June 2022

Net zero highways: overview of our plan

- The strategic road network provides huge social and economic benefits to society
- Even with increased use of alternative transport, most journeys will still use SRN in 2050
- The SRN is central to a net zero economy and needs to be net zero



We published our Net Zero Plan in July 2021 to decarbonise the strategic road network

Net zero for our own operations by 2030, we will:

- reduce and decarbonise energy used to light and power our network
- transition our traffic officer fleet to electric vehicles
- reduce and decarbonise the energy used in our offices and other travel
- generate renewable power and plant more trees on our estate

Net zero for our maintenance and construction activities by 2040, we will:

- implement an accredited carbon management system
- support our supply chain to use net zero materials
- transition to net zero construction plant, cars, compounds and heavy vehicles on our sites
- build the first net zero road enhancement scheme

Net zero carbon travel on our roads by 2050, we will:

- support EV charging at service areas with energy storage and an EV demonstrator lounge
- launch a programme to improve coach travel and integrate a programme of modal shift into RP3
- have trained our traffic officers to recover EVs
- report to government on net zero HGV trials

These are just some of the highlights from our plan. You can read the full document online: Net zero highways - Highways England (nationalhighways.co.uk)

national highways

SUPPLY CHAIN SUSTAINABILITY SCHOOL

national highways

Tom Nicotra

Taziker

TAZIKER
Infrastructure Access Engineering Industrial

FRP Legacy Footbridge

2022 CN AWARDS FINALIST

Engineering Today, Protecting Tomorrow

Your Presenter

Tom Nicotra

Business Development Director – South

The FRP Legacy Footbridge

UK Wide Support

Regional strength for National delivery

With our offices and multi-disciplinary team located throughout the UK, we are ideally positioned to support our clients needs.

North West

Carlisle: Clifford Court, 10A Cooper Way, Parkhouse Rd, Carlisle CA3 0JG

Heywood: Unit C, Birch Business Park, Whittle Lane Heywood OL10 2SX

Horwich: 1 Lodge Bank, Crown Lane, Horwich, Bolton BL6 5HY

Chorley: Levens House, Ackhurst Business Park, Chorley PR7 1NY

Wales

Cardiff: T4, Capital Business Park, Parkway, Cardiff CF3 2PZ

Cardiff: Unit 3, Ffordd Pritchard, Llantrisant Business Park, Llantrisant, Pontyclun CF72 8LF

South West

Plymouth: Tamar Bridge Office, Pemros Road, St Budeaux, Plymouth PL5 1LP

Scotland

Glasgow: Transfer House, 65 Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride G75 0QF

Inverness: Site 6, Dalcross Industrial Estate, Inverness IV2 7XB

Livingston: Unit 6, Cawburn Works, Roman Camps, Broxburn EH52 5PJ

North East & Yorkshire

Middlesborough: 3 Ironmasters Park, Riverside Park Road, Middlesborough TS2 1UT

South East & Southern

Anglia: Units 9 & 10, Hill Farm, Ford End, Chelmsford CM3 1LH

London: Kemp House, 152 -160 City Road, London EC1V 2NX

Our Operations

Taziker is comprised of five key operations:

Infrastructure | Engineering Solutions | Environmental Engineering | Access Solutions | Industrial Services

Within these operations sit our multi-disciplinary specialist skills and capabilities including structural strengthening, scaffolding, encapsulation, protective coatings, fabrication, geotechnical engineering and more.

Taziker has been structured in this way to streamline support for our regional operations. This will ensure the business is in a strong position to meet both current and future demand and deliver maximum benefit and value to the client.

With our dedicated resource and expertise throughout the UK and a proven track record for engineering excellence and innovation, this places Taziker as an ideal partner to support a wide variety of projects.

"Our organisational structure ensures Taziker is in a strong position to lead the way as a multi-disciplinary engineering and construction specialist and guarantees a sustained period of growth within the industry."

Steve Corcoran, CEO

Engineering Solutions

As a turnkey engineering and structural solutions provider, we specialise in the design, build, fabrication and installation of metallic and FRP structures.

With two dedicated in-house fabrication facilities in the North West, we can deliver large scale bespoke engineering projects to your specific requirements - from complex steel structures to heavy fabrication.

We have a strong history of working on bridges, and within our engineering division we continue to deliver bridge projects. Whether it's a bridge over water, road or rail - we will be on hand to provide the all-important structural strengthening and repairs that are required to extend the life of the structure.

If a new bridge is needed, we can complete a full design and build project, providing technical expertise, detailed designs, full fabrication and on-site installation.

Our skilled engineers provide technically advanced and innovative solutions within all sectors. We work collaboratively with our valued clients, discussing the project at all stages to provide the best solutions.

As part of our engineering capabilities, we also provide restoration and decorative repairs; stair, parapets and handrail fabrication and repairs; coded welding services; 3D modelling design; and FRP/GRP solutions.

We'll be sure to demonstrate excellence in engineering in every project we work on.

Infrastructure

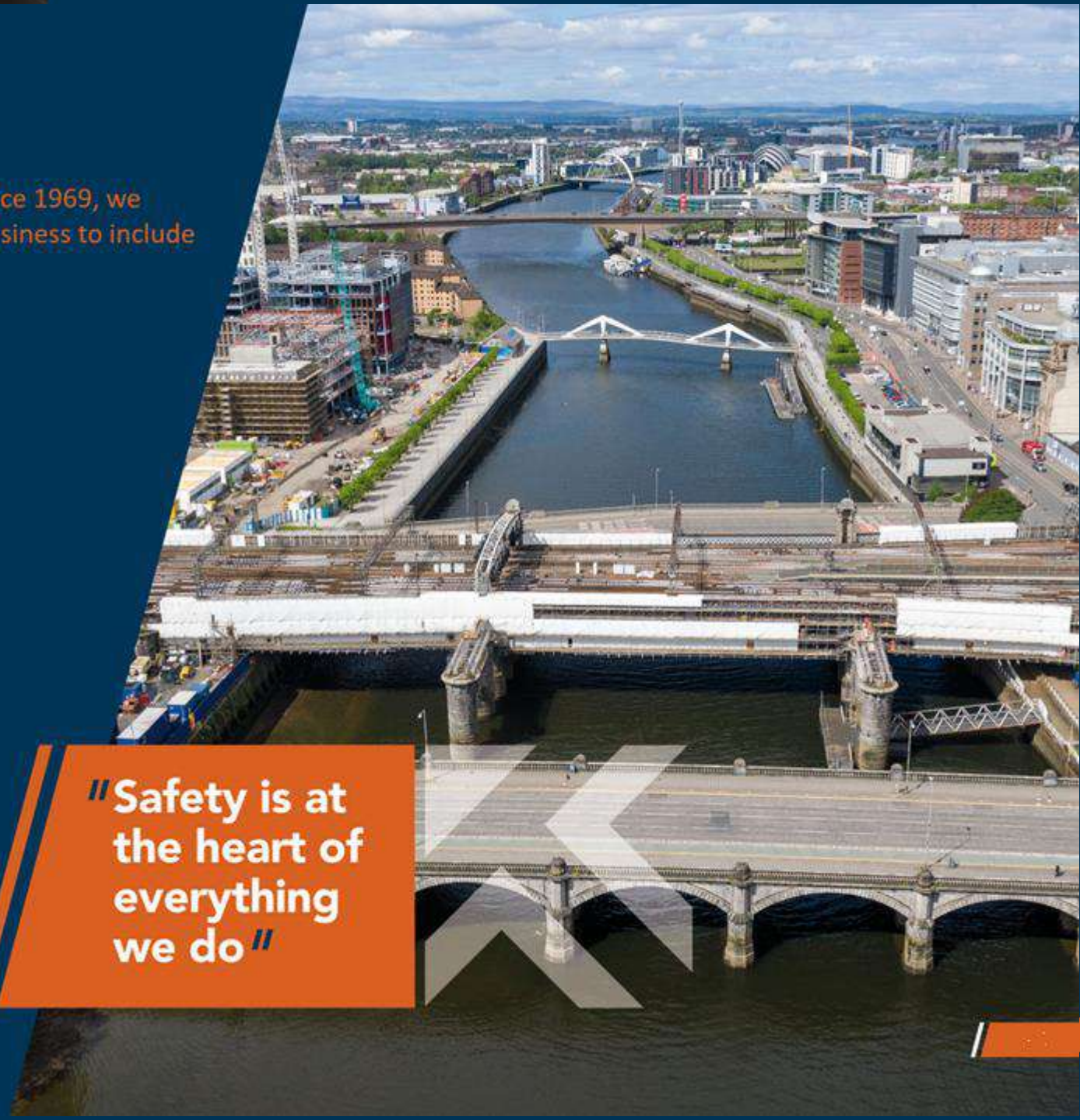
We have decades of experience in protecting UK infrastructure. Since 1969, we have been specialists in protective coatings and have grown our business to include additional services within our infrastructure division.

We secured our first major bridge painting scheme in 1984 as principal contractor on Tyne Bridge, and have worked on many landmark structures and iconic bridges throughout the UK since this time. With our expert knowledge and experience in surface preparation, protective coatings, structural strengthening and steelwork repairs, we are perfectly positioned to carry out large scale projects in these disciplines.

Our extensive work in the rail industry has given us the opportunity to expand our multi-disciplinary expertise into the structural refurbishment sector and allowed us to develop our own in-house mechanical and electrical capability.

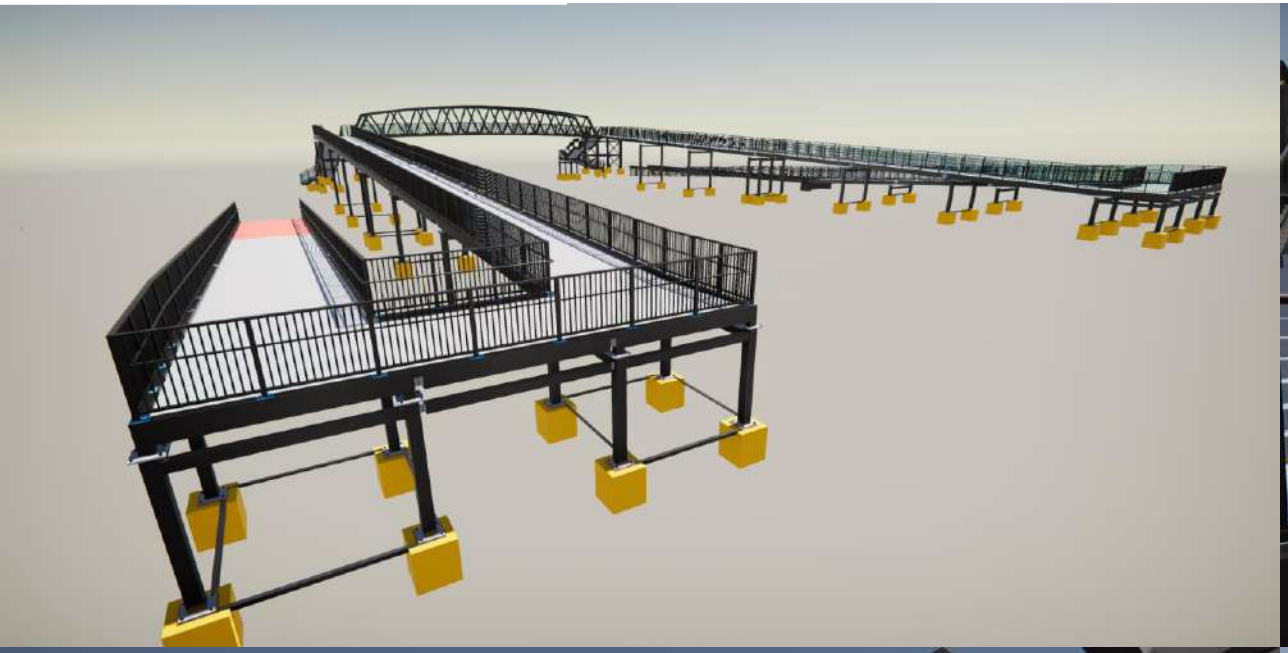
We strive to have close collaboration with clients throughout a project; building strong relationships with people and ensuring safety is at the heart of everything we do.

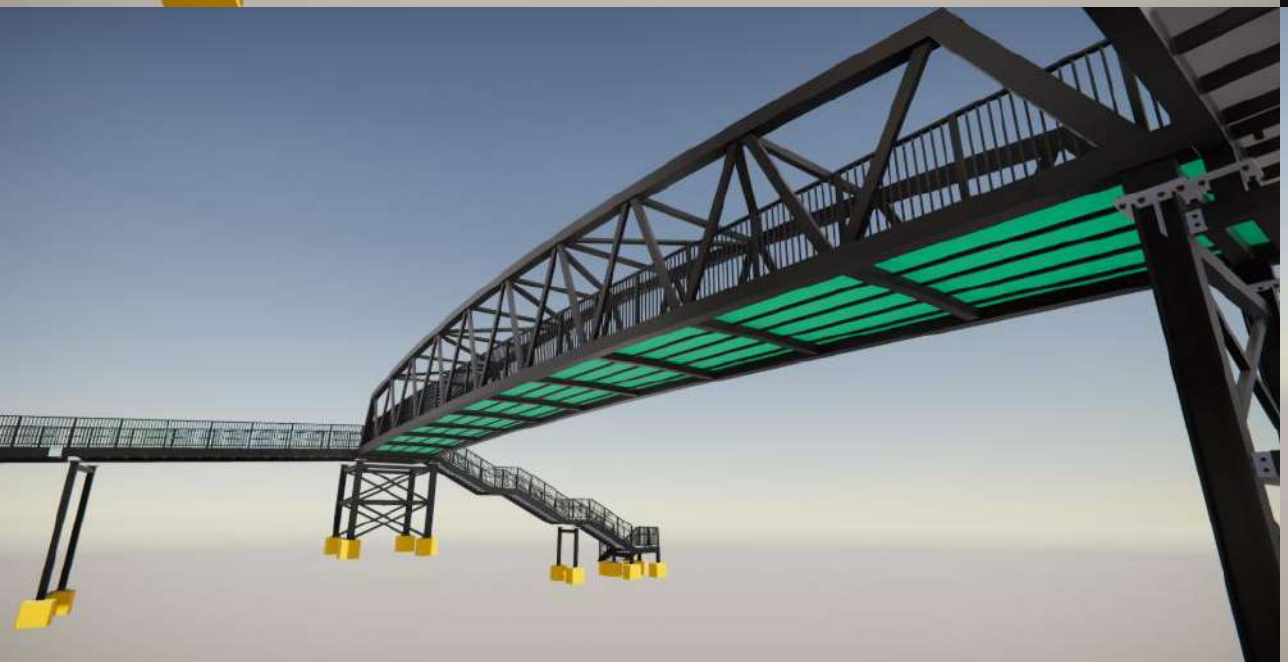
As a multi-discipline construction and engineering contractor, our clients receive a full-service offering from us and whatever the structure or scale, bridge or building - we have the skills, knowledge and experience to deliver.



"Safety is at the heart of everything we do"

Grange Footbridge A585 Windy Harbour-Kier





The Challenges

The network lacks accessible footbridges due to installation time and cost.

Accessible footbridges, with lifts, are prohibitively expensive and complex to install, leaving many passengers struggling.

All current footbridges are expensive to maintain.

“Safety is at the heart of everything we do”

TAZIKER
Infrastructure Access Engineering Industrial

The Challenges

Current concrete and steel bridge designs have a large carbon footprint.

Building new footbridges with concrete or steel does not meet Network Rail's high standards and goals for decarbonisation.

Consciously working to improve our impact on the environment

TAZIKER
Infrastructure Access Engineering Industrial

The Challenges

Every year people are tragically losing their lives on level crossings on the UK rail network.

Footbridge alternatives at these locations would significantly mitigate unnecessary injuries and the disastrous preventable loss of life.

Teen killed on track where footbridge promised for 20 years.

Evie Wright's family described her as a 'typical teenager' who was 'happy' and 'loved life'.

Evie Wright died at the Corondale crossing in Weston-super-Mare.

A popular schoolgirl died after being hit by a train on a level crossing just yards away from where a footbridge has been planned for two decades.
Evie Wright, 15, was walking home to Kemp Way in Weston-Super-Mare on March 6, 2018, when she stepped out on to the Corondale Road crossing.
Train driver Simon Knight slammed on the emergency brake but tragically could not avoid hitting the much-loved teenager.

Today (February 14) an inquest into Evie's death at Avon Coroners Court heard she died of multiple injuries.

The Worle School pupil loved sports and was described as a happy, loving girl and a 'typical teenager', playing music, and always dancing around the house.

Family pays heartbreaking tribute to 15-year-old Evie, killed by train

TAZIKER
Infrastructure Access Engineering Industrial

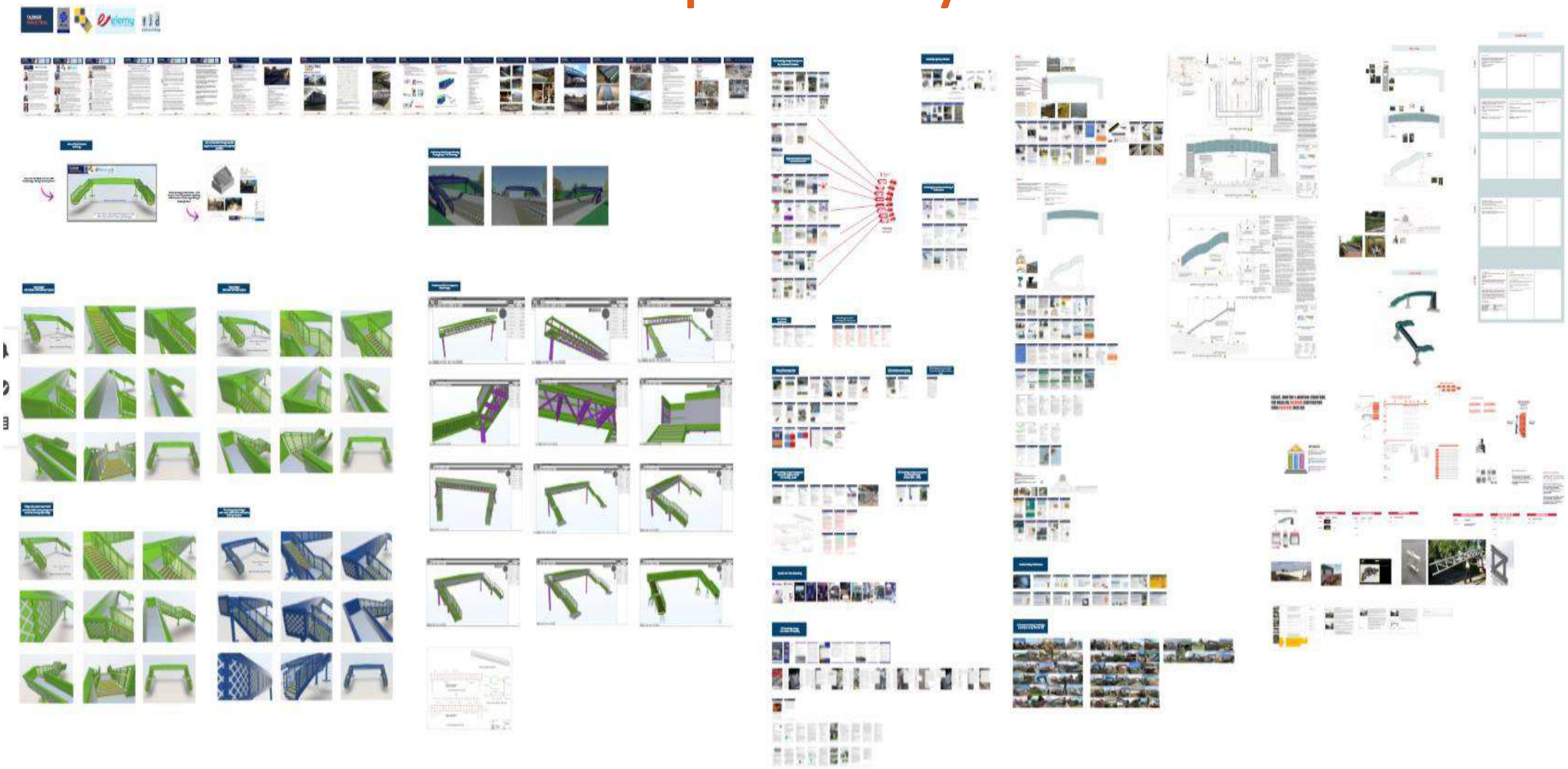
There is a clear need for more footbridges,

So why aren't more being built?

Current footbridge designs are:

- Expensive to commission
- Disruptive to build
- Costly to maintain
- Need regular painting
- Subject to rust and rot
- Not built to last without regular and routine maintenance

From Concept to Reality



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

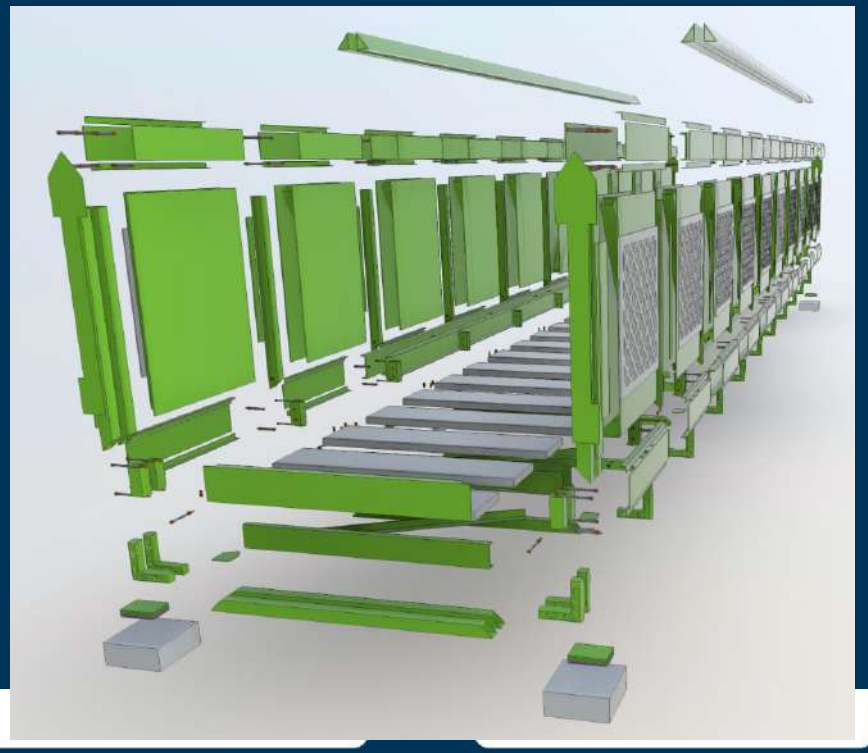
- Cost-effective
- Flexible, modular design
- Off site modular construction
- Quick to install in just days
- Environmentally sustainable
- Long lasting with low maintenance
- A traditional aesthetic
- Non-conductive for use with OLE
- Also available as an AFA footbridge with easy to install modular lift units
- All RAL colour combinations are available

Taziker specialise in delivering project innovation

TAZIKER
Infrastructure Access Engineering Industrial

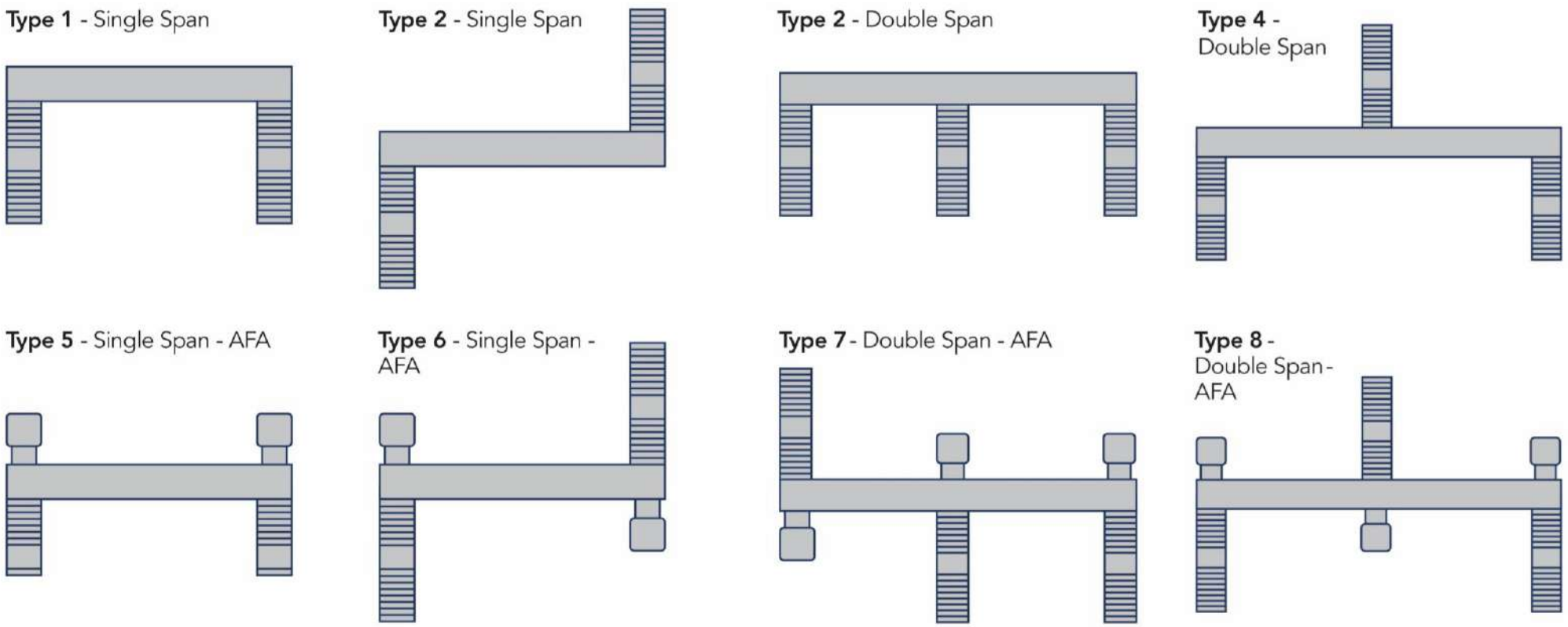
Legacy Footbridge

The Taziker design and unique connection details/solutions which makes up the Legacy Footbridge is unique and protected by our intellectual property.



The Legacy Footbridge fits any location

Two design ranges allow for 12m to 20m spans and 21m to 35m spans



The Legacy Footbridge design allows flexibility and practically to suit all locations. Options are available with or without roofs.

Protective Coating System 100-year coating design life

How do we achieve this?

Advanced Vitreflon700HB fluoropolymer paints by A&I Coatings

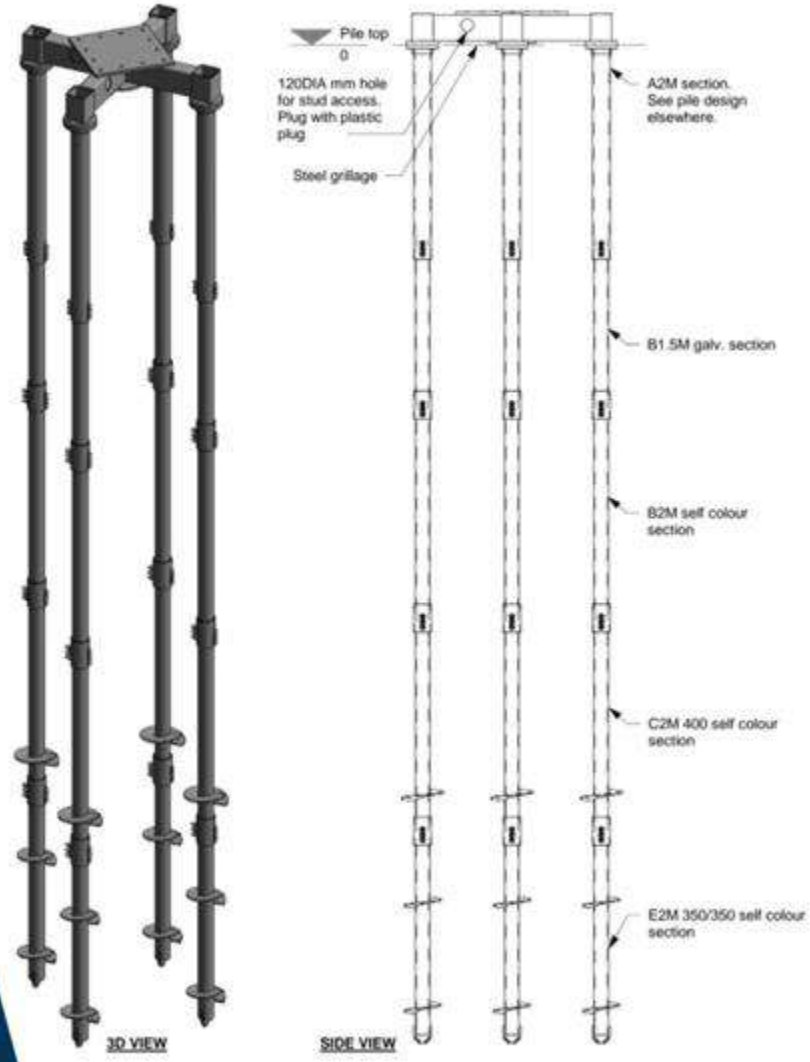
- Coating life expectancy: 100 years
- Manufacturer's Warranty Period: 40 years
- Confidence level on durability:
  - Case studies reflecting 35 years field service with Fluoropolymer Technology
  - 48,000 hrs accelerated weathering with UVB (equivalent to over 200 years' service exposure)
  - Adhesion testing, coating to substrate, after 21,000 hours accelerated weathering (equivalent to over 100 years' service exposure)

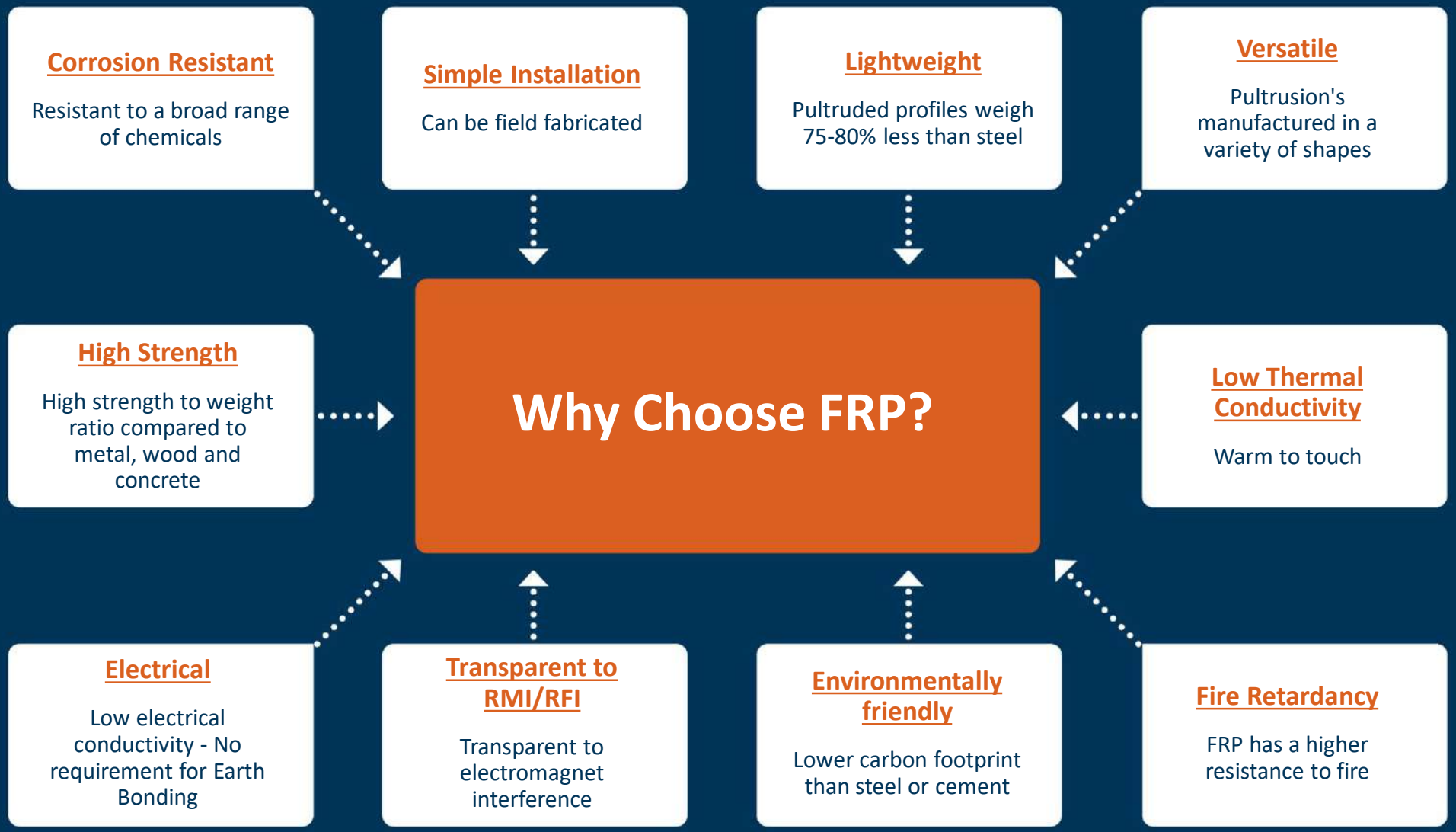
Micropile technology

RapidRoot Foundation Solution for the Tubular Post Support Design Option.

Fast, cost-effective foundations

- Concrete free foundations are quicker and easier to install
- Suitable for RapidRoot and Screwfast Helical Piles
- Can be installed behind Vortok Barriers during normal working hours
- Up to 80% faster to install with no weather delays and no curing time
- Up to 60% cheaper than concrete foundations




Corrosion Resistant
Resistant to a broad range of chemicals
Simple Installation
Can be field fabricated
Lightweight
Pultruded profiles weigh 75-80% less than steel
Versatile
Pultrusion's manufactured in a variety of shapes
High Strength
High strength to weight ratio compared to metal, wood and concrete
Why Choose FRP?
Low Thermal Conductivity
Warm to touch
Electrical
Low electrical conductivity - No requirement for Earth Bonding
Transparent to RMI/RFI
Transparent to electromagnet interference
Environmentally friendly
Lower carbon footprint than steel or cement
Fire Retardancy
FRP has a higher resistance to fire

The FRP Legacy Footbridge…

never looks out of place, timeless design

- Can be designed to match the local environment
- Sympathetic styles help to achieve local community support
- Finishes can be used to create heritage-type structures
- Range of architectural features, including lattice panels, available to blend seamlessly with existing structures and stations

Millom Footbridge

Strathbungo Footbridge

Settle Station Footbridge

Saves time and money…

- **Simplified foundation design** – due to significantly reduced weight.
- **Easy delivery** – with pre-assembled sections and modular lift units delivered by road and rail
- **Rapid deployment** – foundations in 3-4 days, installation in one weekend
- **Modular lift units** – Plug and Play modular lift units can be installed in a fraction of the normal time

Costs are cut across the installation with:

- No extensive site compounds
- No installation of access roads
- Reduced need for power and facilities on site
- No need to reinstate the site
- Concrete-free foundations don’t require wet trades

Benefits - Whole life cost saving of circa £2.3M

Whole Life Cost Allowing for at Today's Prices					
Structure Reference MVL3-10a					
Year	**Description**	**Weathering Grade/ Mild Steel Option**		**FRP Option**	**Capex Saving**
0	Design and Construction	£744,702.00		£713,192.00	£31,510.00
	Maintenance Cost Based on 2021 Cost + 2.5% Per Year	**Maintenance painting costs**	**Steel Repairs**	**Maintenance Cost Based on 2021 Cost + 2.5% Per Year**	
25	25 Year Major Maintenance – Grit Blast & Paint	£171,828.97	£17,182.90	£0.00	
50	25 Year Major Maintenance – Grit Blast & Paint	£318,561.30	£31,856.13	£0.00	
75	25 Year Major Maintenance – Grit Blast & Paint	£590,594.83	£59,059.48	£0.00	
100	25 Year Major Maintenance – Grit Blast & Paint	£1,094,929.81	£109,492.98	£806,790.38	
120	Earth Bonding Inspections based on £1,000 @ Year 2021	£734,325.99		£0.00	
	Theoretical End of Structures Design Life				
					SAVING
	Whole life cost	**£3,872,534.39**		**£1,519,982.38**	**£2,352,552.00**

Sustainability at its core

FRP Footbridges have a 58% lower carbon footprint than similar concrete or steel bridges.

Lightweight

Low waste

UK sourced materials

reduced carbon footprint

Concrete-free

Stronger structures

Durability

Minimal site set up

Resistance

Calculating Embodied Carbon Examples

We looked at two different examples where we compared the use of FRP against the use of weathering grade / mild steel within footbridge. These are two footbridges in the Greater Manchester area.

Description	Weight (Kg)
MVL3-10a – Weathering grade and mild steel option	31,541
MVL3 – 10a FRP material option	23,632
MVL3-18 – Weathering grade and mild steel option	12,168
MVL3-18 – FRP material option	9,431

Calculated weights for both FRP and steel footbridge option.

Embodied Carbon – Calculation Option

Description	Weight (Kg)	Embodied Carbon Coefficient (KgCO2/Kg)	Embodied Carbon (tCO2)	Embodied Carbon Save by FRP Option
MVL3-10a – Weathering grade and mild steel option	31,541	2.425	76.49	
MVL3 – 10a FRP material option	23,632	1.23	29.07	**47.42**
MVL3-18 – Weathering grade and mild steel option	12,168	2.425	29.51	
MVL3-18 – FRP material option	9,431	1.23	11.60	**17.91**

Using values from CIRIA-C779-Fibre-Reinforced-Polymer-FRP-bridges-guidance-for-designers" for FRP. i.e. FRP Embodied Carbon = 1.23Kg/CO2/Kg

Using a value halfway between EPD Spartan UK Ltd and Arcelor Mittal Europe values for Embodied Carbon in Steel. i.e. Steel Embodied Carbon = 2.425 KgCO2/Kg.

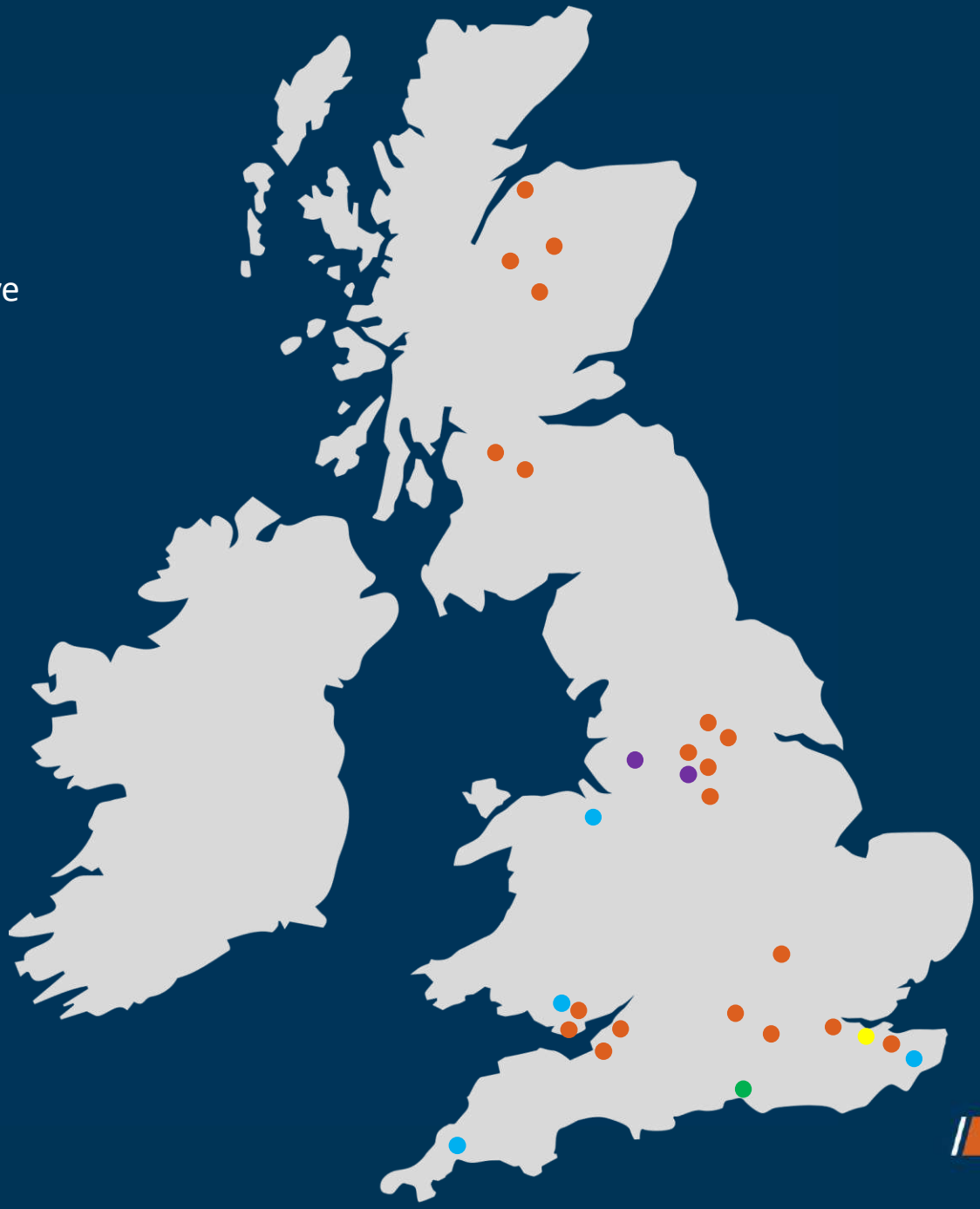
Additional Information on GRP/ FRP Environmental Impact

- Glass fibre production requires 75% less energy than steel production.
- The curing process is exothermic (gives off heat), meaning that the energy consumption per unit produced is extremely low.
- Glass fibre structures are 75% lighter than steel. As a result, 50% less energy is required for transport and assembly.
- GRP's CO_2 equivalent is less than half that of a concrete bridge and approximately a third of the CO_2 equivalent for a steel bridge.
- Hardly any harmful by-products are created during production. Pultrusion takes place in a fully closed process that minimises the evaporation of volatile compounds.
- The production of basic resins and fibre roving's does not have the same negative environmental impact as that of metals such as steel or Aluminium. The resin used to make GRP is derived from a by-product of refined crude oil.
- No environmentally harmful finishing operations, such as hot-dip galvanising or painting in the case of steel, or other preservation methods such as those used for wood, are required to guarantee the service life of a GRP product.
- GRP is 100% recyclable and can be reused in many different applications. (Source: www.compositesuk.co.uk)

Story so far….

The map to the right displays the locations of the various jobs that have been looked at and quoted/in the process of quoting for.

- **4 Single Source Awards- Innovation & Cost**
- **1 competitive tender award**



- Location of Footbridges Tendered
- Order or commitment received from Network Rail
- Framework Tender Submitted
- Provisional design for Legacy Bridge option
- Order or commitment received from Northern Rail

Ashurst Station

Woldingham Station

Whyteleafe South Station

The Future - Legacy Footbridge

Working with Network Rail to replace instead of repair We are in discussions with NR about writing the use of the innovative Legacy FRP Footbridge into his CP7 Plan where existing footbridges will be replaced instead of repaired.

Legacy Vision Bridge We are currently developing a lighter and more cost effective version of the legacy bridge aimed at highway and local authority market. Working with a leading RDP Delivery Contractor to obtain funding from the HA to look at a 20M highways bridge.

FRP – OTX & OLE Supports We have tendered for the design and fabrication of a trial OTX Structure for cabling over the railway.

FRP Gantries We are in early discussions with TFL about FRP Road Gantries

Low Carbon Plant

James Barden
L-Lynch

Low Carbon Technologies

Plant

Electric Plant

Hybrid Plant

- Investment
- Procurement Plans
- Future Development

Alternative Fuels

- HVO
- Hydrogen
- Electrification

Eco Driver Training

- Correct selection of Machine Mode
- Reduction in Idling
- Correct Start Up/Shut Down Procedure

Thank you for listening

Any feedback or questions?

Low Carbon Welfare / Site Facilities

Andy Grayshon
Welfare Hire

SUPPLY CHAIN SUSTAINABILITY SCHOOL

national highways

Q & A

Thank you

For further information:

www.supplychainschool.co.uk

andrew.wilson@supplychainschool.co.uk