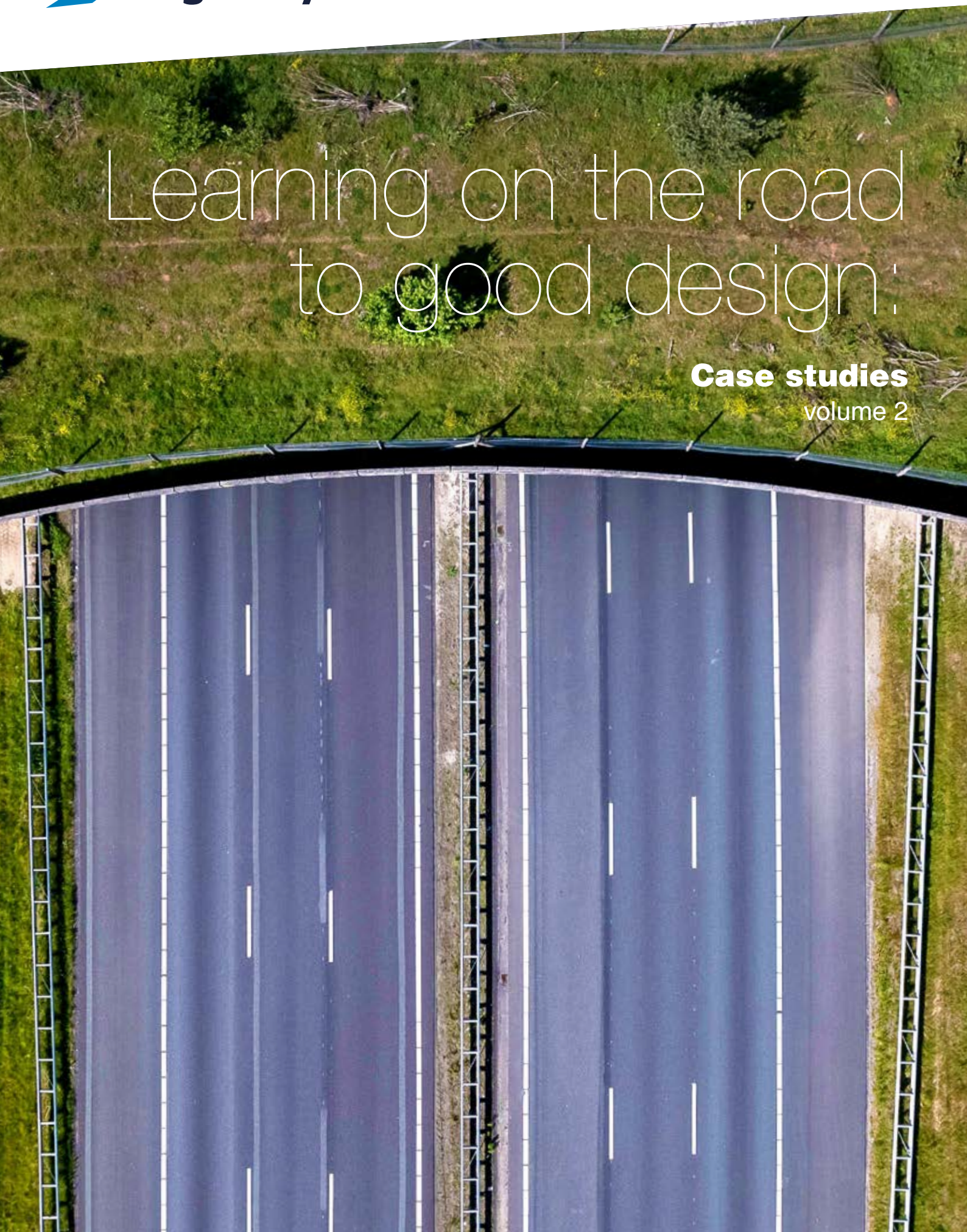
national highways



Learning on the road to good design:

Case studies

volume 2

Cover: A1 Green Bridge, Netherlands

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Foreword

Following the National Infrastructure Commission's publication of its four principles of good design in 2020, National Highways continues to strive for good design outcomes through its vision and the ten principles of ***The road to good design*** (2018).

The collected case studies in this second volume of ***Learning on the road to good design*** continue the work of the first, demonstrating the potential to deliver benefits to climate, people and places and to add value, through good road design. As with the first collection of case studies, the examples presented here are not all road projects, but there are connections and parallels of importance – for example, opportunities to enhance the landscape and provide new ways to discover it, to connect the road user to place, and to understand context such that we can make bold design decisions at the right time and place.

The case studies presented in this volume demonstrate how the ten principles run through every aspect of design, from the core objectives of a project right through to the very benefits it aims to achieve. Innovation is at the heart of good design – it provides all disciplines with the opportunity to push at the boundaries of their field and create new ways of working; and this does not just apply to major projects. As we move toward the Government's next road investment strategy, we have the opportunity to add value and maximise benefits across the network. Every project has its challenges, but these should not be seen as barriers to good design. In fact, good design happens when we innovate to overcome these challenges, and this is illustrated by the case studies in this document.

I hope this latest collection of case studies is useful to anyone involved in design along the strategic road network. The case studies have been selected with relevance to the network in mind, but it is important to remember that lessons can be found in projects that, at first glance, do not seem applicable. Good design is a process – an approach – as well as the thing you ultimately build. Though we always want to address the specific context of our own design, if you are in the process of developing a design vision for your project, or a set of design principles, a good place to start is exploring the precedents set by previous schemes – what did they achieve and how did they achieve it?

With the advice and challenge of our new Strategic Design Panel, I look forward to the progress we can make, and I look forward to a future collection of case studies that includes new success stories from here in the UK.

Mike Wilson
Chief Highways Engineer
and Chair of the Strategic Design Panel

Introduction

In 2022 National Highways published its first collection of case studies (Learning on the road to good design) illustrating the ten good design principles set out in The road to good design (2018) – National Highways' policy on good design. These ten principles continue to underpin National Highways' vision for a more inclusive, sustainable and resilient network. This document is the second such collection of case studies, once again with the purpose of providing real world examples of how the ten principles can be used to drive good design outcomes.

The aim of this document is both to provide evidence for the broad scope of opportunities available to a good design approach, and to inspire design teams working on and along the strategic road network to explore those opportunities further. The examples presented within this document seek to illustrate a wide range of circumstances, challenges and scales, from new strategic roads and road improvements to individual structures and roadside features. The collection also explores the opportunities for enhancement that frequently occur alongside the carriageway, and importantly, how these are designed to successfully maximise their benefits.

Many of the case studies included here address the issue of landscape integration and demonstrate an approach to minimising harm on the landscape not by having the finished project go unseen, but by complementing the landscape and adding to what makes it a desirable place to be. A successful design will often consider the perspective of the road user and how the road performs as a means to experience the landscape. Several of the case studies utilise innovative solutions that allow the landscape to remain connected, such that valued landscapes, natural areas and recreational routes remain accessible to local communities and habitats retain their integrity.

Consistency and simplicity are two themes that run through many of the case studies. Infrastructure, by its very nature, can be bold and visually striking, and when these attributes are handled well in the design, this leads to a strong sense of place – a piece of infrastructure becomes a journey-defining landmark. What is crucial to these examples is the marriage of a bold design that can meet the demands of scale, to a simple design that can be read and recognised easily at speed. While some examples consist of single landmark structures, alerting the traveller to a particular moment in the journey, others illustrate the use of a consistent design language across the project, through both its structures and the road geometry itself, lending the route a strong identity of its own.

Another key aspect of the case studies and what they demonstrate is the potential for infrastructure projects to unlock benefits for the people around them. In the case of strategic roads, the road itself often becomes the coordinating element that unites and literally connects these benefits together. A few examples include new sustainable transport links, better access to local amenities, better access to nature and landscape, new recreational resources and business opportunities, and the creation of new open spaces. The examples in this document utilise good design to ensure that the benefits of the scheme are maximised – attractive and useful paths, high-quality parks and places of recreation, and many more.

Good design is a holistic process. It involves all disciplines delivering their own individual objectives in such a way that the design can be pieced together to build a coherent vision. This vision is born of context – what can we create to meet the needs and opportunities of all those who have a stake in the project's success? This document ilustrates just a few ways in which this can be achieved.

Design principles reflected in each case study and type of project:

Case study	Design principle										Type				
	Safe and useful	Inclusive	Understandable	Fits in context	Restrained	Environmentally sustainable	Thorough	Innovative	Collaborative	Long-lasting	Bypass / new road	Public realm	Public art	Structure	Sustainable development
The Central Axis (N356), Netherlands	■	■	■	■	■		■	■		■	■			■	
The E6 Motorway, Sweden	■		■	■	■	■	■		■	■	■				
Brighton and Hove Bypass, UK	■		■	■	■	■	■	■		■	■				
A20 Folkestone-Dover Scheme, UK	■	■	■	■	■			■			■				
A27 East of Lewes, UK	■	■	■	■		■					■				■
Pacific Highway Upgrade, Australia	■		■	■		■			■	■	■		■	■	■
Harm van de Veen Ecoduct (Green Bridge), A1 Netherlands				■	■	■			■	■				■	■
Hallandsås Ecoduct, Sweden				■		■		■		■				■	
Heads of the Valleys (A465), Wales	■	■	■	■		■	■		■	■	■			■	
Atlantic Ocean Road, Route 64, Norway	■	■		■	■			■		■	■			■	
North Coast 500 (NC500), Scotland	■		■	■							■				
Blackburn Meadows Biomass Power Plant, UK		■	■	■		■	■	■						■	■
RAC Regional Control Centre, UK			■	■		■	■	■		■				■	
Bell Common Tunnel (M25), UK				■				■	■					■	
Boston Central Artery/Tunnel Project (The Big Dig), USA	■	■		■			■	■	■	■	■	■	■		
A9 Noise Barrier, Germany			■	■				■					■	■	■
Sighthill Bridge, Scotland	■	■	■	■			■	■				■		■	■
Roadway 140 Pedestrian and Bicycle Path, Sweden		■		■		■			■						■
The East Leeds Orbital Route (ELOR), UK	■	■	■	■	■	■	■				■			■	■
Castlefield Viaduct, UK	■	■	■	■		■	■	■	■	■		■		■	■
Caulfield to Dandenong Railway and Linear Park, Australia	■	■		■		■	■	■	■			■		■	
Buffalo Bayou Park, USA	■	■		■		■	■	■	■			■			■
Melbourne Gateway and Bolte Bridge, Australia			■					■					■		

The Central Axis (N356), Netherlands

Facts

Location Fryslân
Length 25 km
Client Province of Fryslân
Designer H+N+S Landschapsarchitecten, NEXT Architects
Year completed 2017

Description

This dual two-lane carriageway, built to relieve traffic within local villages and to enhance the accessibility of the province, passes through the sensitive Noardlike Fryske Wâlden National Landscape. Through a considered design approach, the road is not hidden, but is designed so that it complements the landscape setting.

The road is notably uncluttered, and a restrained planting scheme is focused on maintaining the distinct landscape pattern that is fundamental to the landscape's character. The experience of the road user is one of a regular rhythm of passing through open fields or wetlands, and the narrow field boundaries that separate them. Tree planting in the verge and central reservation connects the landscape pattern either side of the road corridor and allows the road user to interact with that pattern.

The connectivity of local communities is maintained through cycle/footbridges and underpasses, and the user experience of those routes is enhanced through the added ways to explore the landscape that they provide – cycle bridges climb through treetops and emerge, elevated, above the road and with views across the wider landscape. Avenue tree planting alongside cycle paths provides shade and helps to affect a transition in scale from the fast road to the slower, human scale of the path despite their proximity to each other.

The road architecture is coordinated, lending the road a strong identity. The structures are bold, yet restrained, using minimal materials and finishes, and complement the landscape through good design. Each structure is recognisable in relation to its function – cycle bridges have a particular design that is different to overbridges, for example.

Weathering-steel clad cuttings and the curved concrete structure of the Hendrik Bulthuis Akwadukt creates a dramatic descent beneath the water of the Kromme Ee into a tightly enclosed tunnel. Across the scheme, the experience of going below ground and into cutting is markedly different to that of the open landscape – a descent from an open green landscape into a subterranean one of stratified greys, reds, and browns provides a new experience of the landscape that is available only to the road user, and wholly architectural.

Images **1. A world beneath:** The Hendrik Bulthuis Akwadukt makes a strong architectural statement, yet the landscape above remains consistent and connected. The road design enhances the landscape by emphasising and raising the user's experience of its characteristics.

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The E6 Motorway, Sweden

Facts

Location _____ Bohuslän
Length _____ 60 km
Client _____ Swedish Transport Administration
Designer _____ N/A
Year completed _____ 2015

Description

Northern Bohuslän offers a unique and ancient landscape, rich in variety and renowned for its beauty – a mosaic of coastal and rift landscape with several thousand years of agrarian history. The E6 Motorway was completed in 2015 and features design solutions that prioritise sustainability and respect for the landscape. Its alignment helps to provide the traveller with an understanding of the landscape whilst also offering important scenic views.

When planning the northernmost and final eight sections of the E6, the Swedish Transport Administration aimed to create a well-designed road that was well integrated into the Bohuslän landscape. An overarching vision was created so that the transitions between each of the eight sections was imperceptible once the road opened. From the Halland region in the south, all the way to the Norwegian border, the E6 has been recognised for its design quality and environmental outcomes.

As the Swedish Transport Administration was planning the final section, evaluations of earlier sections identified that the construction phase was crucial for ensuring high architectural quality. The department manager responsible for the section took responsibility for both landscape design and engineering. To address these topics in the project, he assembled a design team with expertise in both design and construction to supervise the entire process. With its broad specialist knowledge, the team provided valuable support at every stage and could develop creative solutions to a variety of design challenges.

The design team remained involved, from the initial planning phase of the project, up until the motorway was inaugurated. During the construction phase they visited the sites regularly and organised design training for all construction workers, to ensure everyone understood the design goals and vision. There was ongoing communication with construction management on-site, and the design team's training courses helped identify and resolve potential issues early. Participants would also submit suggestions for design improvements, many of which were implemented, leading to significant enhancements. When wrong decisions were made, project management – with support from the department manager – was willing to revisit and when necessary, redo parts of the work to achieve the design goals.

The E6 is illustrative of how a strong commitment to the design vision and goals leads to success. But it also shows how these goals must be nurtured though design and construction, through leadership, communication and collaboration.

Ten years after its completion, the E6 is still considered as state-of-the-art road architecture in Sweden.


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Images **1. The landscape's many ingredients:** The E6 provides the road user with a high degree of interaction with the landscape and its various characteristics. **2. The geometry of the landscape:** The road is integrated into the landscape through its geometry and architecture, and through the careful design of the verge as an extension of the landscape rather than an extension of the road. **3. Architecture of the road corridor:** The consideration towards design and landscape integration extends to the road's stopping places and rest stops. **4. Off the beaten track:** The road user's interaction with the landscape does not stop when they get out of the vehicle.

Brighton and Hove Bypass, UK

Facts

Location East Sussex
Length 15 km
Client Highways Agency
Designer Mouchel, Taylor Woodrow
Year completed 1996

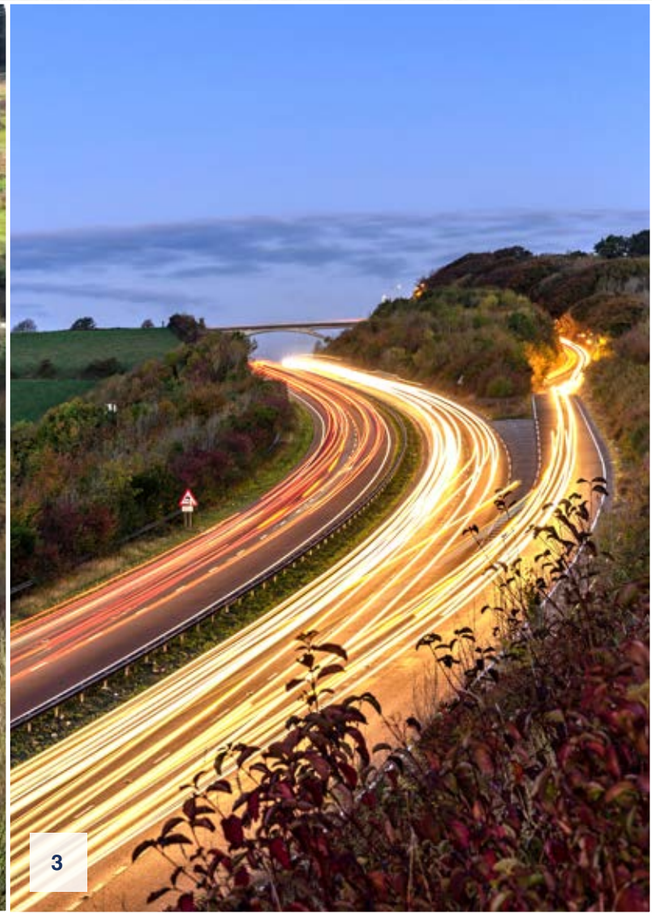
Description

The bypass, built in four sections, was built to relieve congestion in the Brighton and Hove urban areas and forms part of the coastal M27/A27 route that connects the major urban centres of Southampton, Portsmouth, Chichester, Arundel, Worthing, Brighton and Eastbourne. The all-purpose trunk road consists of dual two-lane carriageways, winding along the northern fringe of Brighton and Hove and marking the boundary at which the city interacts with the scenic upland landscape of the South Downs National Park.

The road provides a strong connection to place by allowing drivers to consistently interact with the characteristics of the South Downs landscape, be it through its views of the surrounding hills, coastline and adjacent urban areas, its geometry – which echoes the rolling landform - and through its geology, with large, open cutting-slopes of wildflower meadow revealing the chalk bedrock beneath. This mirroring of the landscape character in the design of the road minimises its landscape impact without the need for extensive visual screening.

A consistent winding geometry, both vertically and horizontally, and the sequence of views of the road up ahead, gives the bypass a coherent character and a progressive sense of movement that aligns with the scale of the surrounding landscape. Fluctuations in space between enclosure within cutting and the revealed, large-scale landscape of the National Park, interspersed with the eventful views of Brighton and Hove, the coastline, and the sea, provides the journey and the driver with sequential structure.

Along with the sea views, another important event provided by the bypass is its passing through the Southwick Hill Tunnel, which was constructed as part of the scheme. The creation of this 450-metre-long tunnel allowed for the preservation of Southwick Hill, and the preservation of a connected landscape corridor between the urban population of Southwick and their landscape setting - the South Downs. This connection includes access for the local community to a network of paths, including the Monarch's Way Long Distance Path, providing health and wellbeing benefits as well as access to the vantage point at Thundersbarrow Hill – a scheduled monument site and cultural asset that provides views over the Sussex Coastline.



Images **1. A journey through the landscape:** The bypass enters the Southwick Hill Tunnel at its western portal. Design solutions that maintain a connected landscape often result in a characterful road. **2. Where paths cross:** At its eastern portal, the accessible greenspace atop Southwick Hill can be seen. The connectivity and continuity of the landscape is maintained. **3. Ascents and descents:** The Ditchling Road Overbridge is an architectural feature that marks a peak in the landscape and in the experience of the road. The geometry of the road and its sense of movement is another way in which the road user can perceive the landscape.

A20 Folkestone-Dover Scheme, UK

Facts

Location Kent
Length 14 km
Client Department of Transport
Designer Mott MacDonald, Balfour Beatty Limited
Year completed 1993

Description

The A20 was constructed as part of a series of transport network improvements made in preparation for the completion of the Channel Tunnel. It connects the town and port of Dover to the Channel Tunnel Terminal at Folkestone, and to the wider road network.

The Folkestone-Dover scheme interacts closely with a sensitive landscape that tells many stories and contains many valued cultural features. In its journey from Folkestone to Dover, the scheme begins nestled beneath Castle Hill Scheduled Monument, in the distinct landscape of the Kent Downs Escarpment and Holywell Coombe; and ends amongst Scheduled Monuments at Western Heights and Dover Castle, beside the iconic White Cliffs of the Kent Coast. The scheme lies within the Kent Downs National Landscape for the majority of its length.

To the north of Folkestone the concrete-lined, twin-bore Roundhill Tunnel maintains the integrity of the Folkestone to Etchinghill Escarpment Site of Special Scientific Interest (SSSI) and the completeness of the escarpment as an important feature in the local landscape. It also allows the North Downs Way National Trail to maintain its route along the seaward-facing slope. The white-painted concrete of the tunnel mimics the white of the chalk through which it passes, while the split Holywell Viaduct is restrained in its design, allowing the Coombe's landscape to pass through beneath it, with minimal visual severance.

The road-user experience has a clear structure, with three character areas bookended by the dramatic emergence from the Roundhill Tunnel onto the Holywell Viaduct, with expansive views over Folkestone, in the west, and the reveal of the sea view during a winding descent down to the Port of Dover in the east. The change in character – from the verdant Alkham Valley within the Downs, to the steep cuttings through its peaks, and then the snaking, descending path tucked behind Dover's White Cliffs, is experienced by the road user through the change in landscape – its views, landform, degree of enclosure, and the plant life present in the verge.

National Cycle Network Route 2 runs alongside the road through its White Cliffs portion and is carried over the road via a shared-use bridge at Aycliffe, connecting the community to this recreational resource with all its health and wellbeing benefits, and providing sustainable travel to Dover and Folkestone.

Images **1. A sense of arrival:** The road provides a dramatic descent to the iconic landscape at Dover, and for those arriving at the port, the winding road is the traveller's first interaction with the undulating landscapes of Southern England. **2. Simple lines:** The viaduct structure allows Holywell Coombe to remain visually connected to Castle Hill above.

A27 East of Lewes, UK

Facts

Location East Sussex
Length 15 km
Client National Highways
Designer Stantec
Year completed 2023

Description

The section of the A27 between the towns of Lewes and Polegate has historically suffered from congestion, poor reliability in terms of journey times, a poor safety record, and a lack of alternative routes. The area has also suffered from poor pedestrian and cycling connectivity both across the road, with a lack of safe crossing opportunities, and east-west along it. As a result, local businesses were suffering, accessibility into the neighbouring South Downs National Park was made more difficult, and the user experience and public opinion of the road was poor.

The East of Lewes Scheme sought to address these issues by improving traffic flow, both through geometric changes such as junction improvements to reduce bottlenecks and carriageway widening to allow the overtaking of slower-moving road users, but also by physically separating users such as cyclists and horse riders from the carriageway through approximately 12 km of improved cycling and pedestrian provision. This has resulted in safer journeys for all users and a much greater capacity for cycling and walking along the route.

A continuous, 3m wide shared-use path now provides a user-friendly and safer experience for all, allowing cyclists, pedestrians, and horse riders to immerse themselves into the existing landscape, separated from vehicles. Weaving in and out of the adjacent landscape, the cycle lanes run parallel to the road, segregated with varied hedgerows, trees and grasslands throughout. As a result, users can now safely navigate the establishing wildlife habitats as part of the scheme, with greater access and views into the South Downs National Park.

The scheme lies within an area of flooding, and so new ponds were required to add capacity for flood water storage. The opportunity was taken to provide greater ecological value through these in addition to the vegetated buffers between the road and shared path. As a result, a linear corridor of ecological enhancements has been created through a landscape that is otherwise predominantly open and arable, with some isolated woodlands and parkland.

The popular shared route has improved accessibility between the villages and towns along the A27 such as Firle and Glynde, while also providing numerous crossing opportunities and a footbridge over the Cuckmere River (named Rampion Bridge by the local community), reducing the severance of residents from the South Downs landscape and Dark Skies Reserve, and the local businesses that form the setting to their homes. The scheme recognises that good accessibility is an issue of the user getting from A to B without unwanted difficulty, whilst also being an activity to be enjoyed for its own sake.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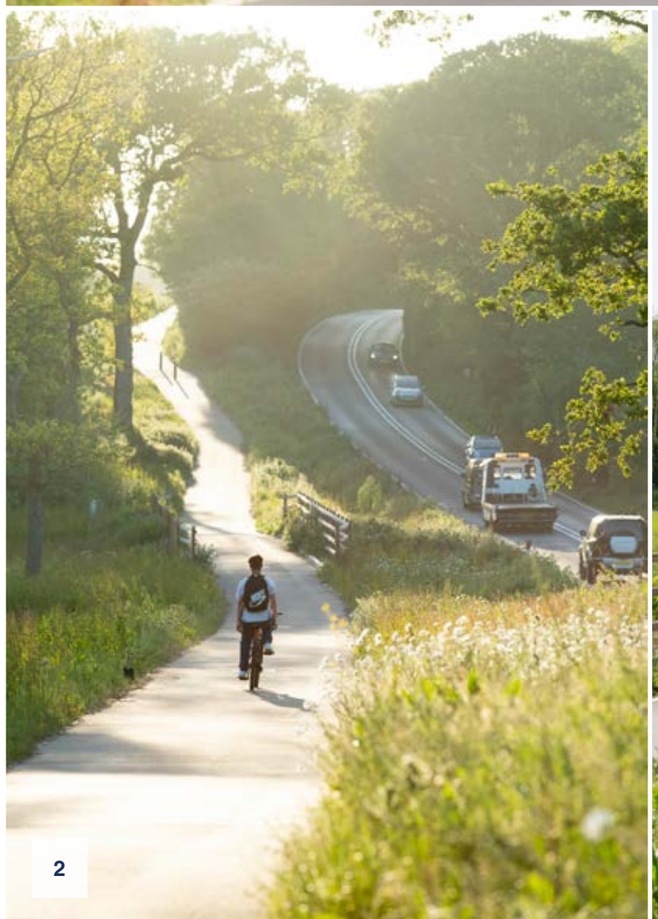
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Images **1. The open road:** The new shared-use path provides health and wellbeing benefits precisely because it is attractive and useful to its users. **2. Connectivity for all:** The transport corridor provides connectivity for the road user, pedestrians, cyclists, and for nature. Through good design, these varied functions complement one another. **3. Here we are:** The route allows users to connect with the South Downs Landscape and its wider setting.

Pacific Highway Upgrade, Australia

Facts

Location _____ New South Wales
Length _____ 657 km
Client _____ Transport for New South Wales
Designer _____ Various
Year completed _____ N/A

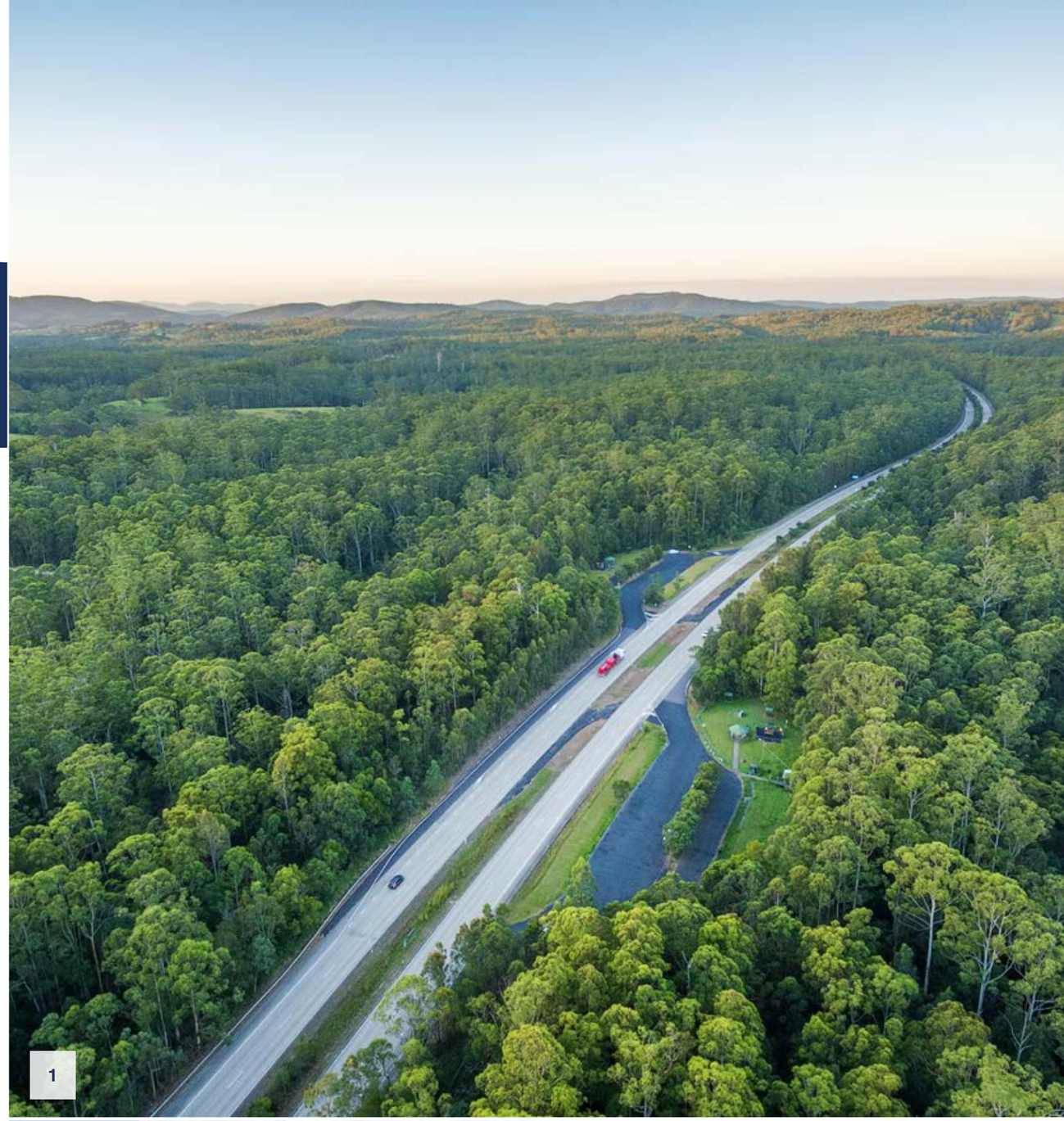
Description

The Pacific Highway is an iconic Australian road, connecting the cities of Sydney and Brisbane to the towns, villages and landscapes between, benefiting business, tourism, visitors, residents and commuters. The Pacific Highway Upgrade Project, in progress since 1996, has involved the provision of dual two-lane carriageways along the road through New South Wales, in addition to approximately 600 new bridges, numerous new and redesigned interchanges, new rest areas, and the bypassing of 30+ towns and villages. The project has resulted in a safer road, with shorter journey times, and has improved business efficiency through the accommodation of higher-capacity haulage vehicles along the route.

The project has been delivered in sections, facilitating a context-specific approach to design and community involvement. Sections are treated as locally specific design projects, with a route narrative concept and art strategy that responds to place and is developed in collaboration with the local community. This approach recognises the value in providing communities the opportunity to shape their environment. Art trails on barriers and at rest stops are used to celebrate the route narrative as part of the communities' present; here, heritage is being used to shape the project, not just to preserve the past. Co-design processes were used to help with route selection, options testing, and design finish – such as the use of transparent noise barriers to maintain a visual connection between place and the road user.

As the route passes through numerous National Parks – large and distinct landscapes of forest, open farmland, coastline and river valley – the road is well immersed in that landscape, with vegetated central reserves mirroring the surrounding landscape and the verge all but invisible, such that the landscape runs right up to the road edge. Simple clutter-free bridges avoid the severing of landscapes and views. The structures merge seamlessly from road to bridge, maintaining a consistency in road geometry that contributes to the Highway's simplicity – allowing the road to complement the landscape rather than detract from it.

The project provides a variety of species-specific connectivity measures, such as culverts and mammal ledges, rope crossings, glider poles (to assist gliding possums) and habitat underpasses, and 10,000 acres of land is now managed as secured compensation habitat.



Images **1. One step at a time:** A journey is given structure by the landscape features, structures, decision points, and rest stops along it. **2. One continuous line:** The simplicity and consistency of the road design minimises its impact on the landscape. **3. What the landscape can provide:** Integration with the landscape means using those elements that are suited to it to form your design language.

Harm van de Veen Ecoduct (Green Bridge), A1, Netherlands

Facts

Location Kootwijk, Gelderland
Length 50 m
Client The Dutch Road and Transport Authority
Designer ZJA
Year completed 1998

Description

The A1 passes through De Hoge Veluwe National Park, a significant core area in the Netherlands' National Ecological Network (NEN). The Harm van de Veen Ecoduct was built as one of several green bridges to reconnect the ecology of the National Park across the A1, helping to build resilience in the natural communities that inhabit it.

While multi-functional connections are valuable where space is tight, the focus of the Harm van de Veen Ecoduct is on functional connectivity, whereby the design is suited wholly to the preferences of the target users – in this case the wildlife within the National Park. The hourglass shape of the bridge and the placement of planting is designed to guide fauna toward the crossing whilst minimising any visual interaction with the road and its moving traffic. The bridge provides a consistency of habitat through landform and vegetation, but also through aspects such as visual setting, noise, scent, colour, shelter and cover - the presence of the bridge is mostly concealed from those crossing it. While recreational walking is popular in the National Park, such routes avoid the Ecoduct and are instead, carried across the A1 via separate overbridges.

Aided by an expansive central reservation, the road-user experiences this area of the A1 as a wide woodland clearing of rough grassland and low scrub surrounded by woodland-edge trees. The green bridge adds to the sense of enclosure by carrying treelines across the road corridor.

The bridge design allows the central reservation to seamlessly pass over the bridge deck as a continuous vegetated landform. The integration of the bridge design with the large central reservation diminishes the structure's scale, allowing the woodland setting to dictate the road-user's sense of place over and above the road infrastructure.

The presence of the bridge as a man-made structure is minimised – the curved span and the rounded concrete parapets combine with the vegetated bridge deck for a consistent, naturalised style. A simple post and wire fence upon the bridge parapet allows the vegetation on the bridge deck to show through.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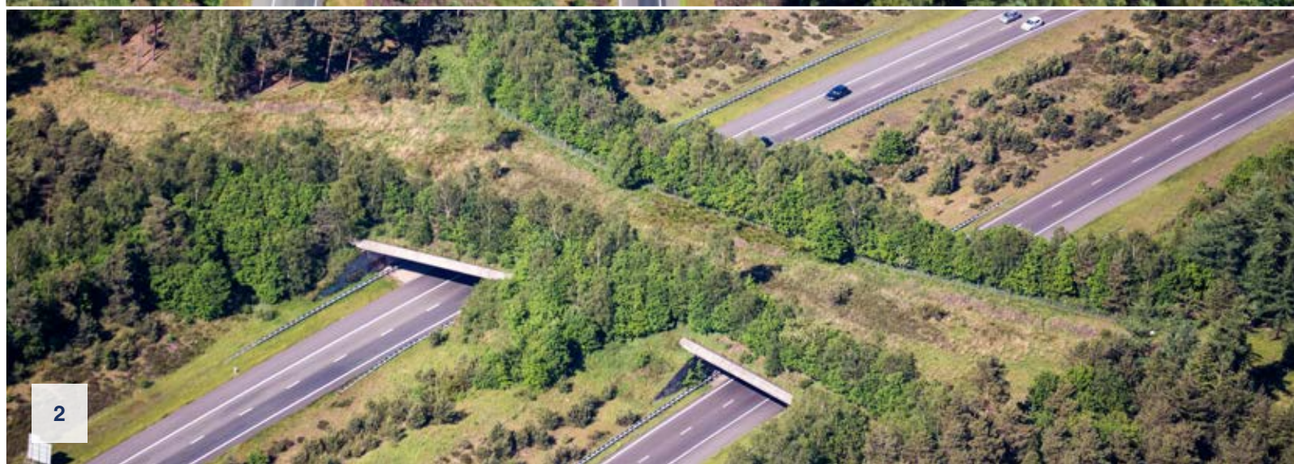
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Images **1. Space for nature:** While it is tempting to reach for all the possible quantifable benefits of a project, a design vision will encourage restraint and coherence in design so that benefits are delivered successfully. **2. In the woods:** The use of planting to obscure the highway from those crossing it has another benefit – it integrates the bridge into the landscape. To the road user, the sense of being immersed in woodland is enhanced.

Hallandsås Ecoduct, Sweden

Facts

Location _____ Scania
Length _____ 31 m
Client _____ Swedish Transport Administration
Designer _____ Tyréns; Veidekke
Year completed _____ 2021

Description

The E6 Motorway runs along the west coast of Sweden from Trelleborg in the south to the Norwegian border at Svinesund. Connecting the provinces of Scania and Halland, it ascends the northernmost of the Scanian Ridges – reaching an elevation of 226 metres above sea level. The northern slope is one of the steepest highway segments in Sweden; with an inclination of 6-7%, it has caused significant issues for heavy vehicles during the winter months.

Through a series of expansions, the E6 was widened to accommodate three lanes along its uphill sections. As a result, the fenced motorway cuts through the ridge, creating a significant barrier to animals attempting to cross the road corridor.

To mitigate the severance caused by the motorway, the Swedish Transport Administration decided to build a large passage in the form of an ecoduct, entirely dedicated to nature, and with a focus on wildlife. The project was completed in October 2021 and was constructed as a 40-metre-wide bridge located at a cutting in the middle of the ridge. Its location was determined based on engineering details, ecology, and adaptation to the existing landscape.

The design of the bridge was informed by site conditions and the surrounding landscape, as well as the need to facilitate traffic during construction. The bridge design provides road users with the experience of driving through a tunnel in the landscape. The solution made it possible to preserve much of the surrounding vegetation, whilst allowing new vegetation to be planted both on top and around the bridge.

Instead of traditional wooden anti-glare panels, the project used stacked stone-filled gabions to form its boundary fence line. This type of wall has a significantly longer life expectancy than the wooden panels, and since rocks could be sourced locally, material costs and transportation were reduced. The selection of rounded, light-coloured stones was made such that the structure would complement the landscape setting. The walls also have the benefit of serving as potential habitats for small animals such as reptiles and insects.

The completed project has become a striking landmark for drivers and a reminder of the landscape that the road cuts through. For wildlife, it fulfils its purpose: allowing animals to move along the ridge once again. The Ecoduct was one of four nominees for the Swedish Transport Administration's Architecture Award in 2023.

Images **1. A vital connection:** The Ecoduct restores important connectivity across a much larger habitat. **2. The landscape above and beyond:** The structure provides a new way for the road user to interact with the landscape. **3. A place for nature:** The structure's focus on nature means that various species can cross without fear of interaction with people or human infrastructure. **4. A landmark in the landscape:** The use of local stone has provided the Ecoduct with a distinct façade that ties into its setting.

Heads of the Valleys (A465), Wales

Facts

Location _____ South Wales
Length _____ 38 km
Client _____ Welsh Government
Designer _____ AtkinsRéalis/Jacobs JV, RPS and Knight Architects
Year completed _____ Ongoing

Description

The Heads of the Valleys Road provides an east-west route through South Wales and is regarded as a key component for the economic revival of the Valleys Region.

The dualling of the Gilwern to Brynmawr section follows the River Clydach in Monmouthshire, passing sites of historical and landscape value. The design of the road includes many areas of exposed rock face and stone-faced retaining walls of significant size, affirming the connection between place and heritage to the road user.

The section is notable for its structures – the Jack Williams Gateway Bridge is an architectural showpiece, though the textured concrete retaining wall that passes underneath the bridge is its equal in making a visual impression and adding gravitas to the location. A pair of thin, linear footbridges at Clydach form simple, uncluttered, clean lines, while the Gilwern Green Bridge connects the landscape of the Monmouthshire and Brecon Canal to its neighbouring hillside, helping to maintain a consistency in the setting.

The dualling of the Hirwaun to Dowlais Top section involved extensive works including the significant disturbance of residential, suburban environments. Engagement with stakeholders and the local community led to new off-road connections in the National Cycle Network, safer routes for school walks, and footbridges to improve connectivity.

A programme aimed at young people aged 17-21 used presentations, workshops and site visits to promote science and technology subjects and design-related careers.

Project-level design principles were adopted early, enabling the section's design to be organised around context-specific intentions. These principles included the minimising of impact and loss upon certain habitats, enhanced connectivity of the project's ecology to the surrounding landscape, achieving an earthworks balance, minimised lighting, simple, elegant structures, and the mitigation of flood risk and water quality impacts.

The section's landscape approach included restrained planting in upland locations to allow views out into the dramatic landscape, and the enhancement of junctions as gateways to the Brecon Beacons National Park. These measures came from a good understanding of context.

Images **1. Landscape-scale change:** Large projects have the potential to unlock change that benefits local communities and visitors, such as improving connectivity and celebrating the landscape that forms the setting to their lives. **2. Design language:** A consistency of materials unifies the road architecture giving the road an identity based in good design. **3. A landmark for the people:** After consultation with the local community, the Jack Williams Gateway Bridge was named in honour of the local awardee of the Victoria Cross. **4. Clarity of vision:** The footbridges at Clydach deliver on a clear, bold concept.

Atlantic Ocean Road, Route 64, Norway

Facts

Location More og Romsdal County
Length 8 km
Client Norwegian Public Roads Administration
Designer 3RW, Jakob Røssvik, Smedsvig Landskapsarkitekter AS
Year completed 1989

Description

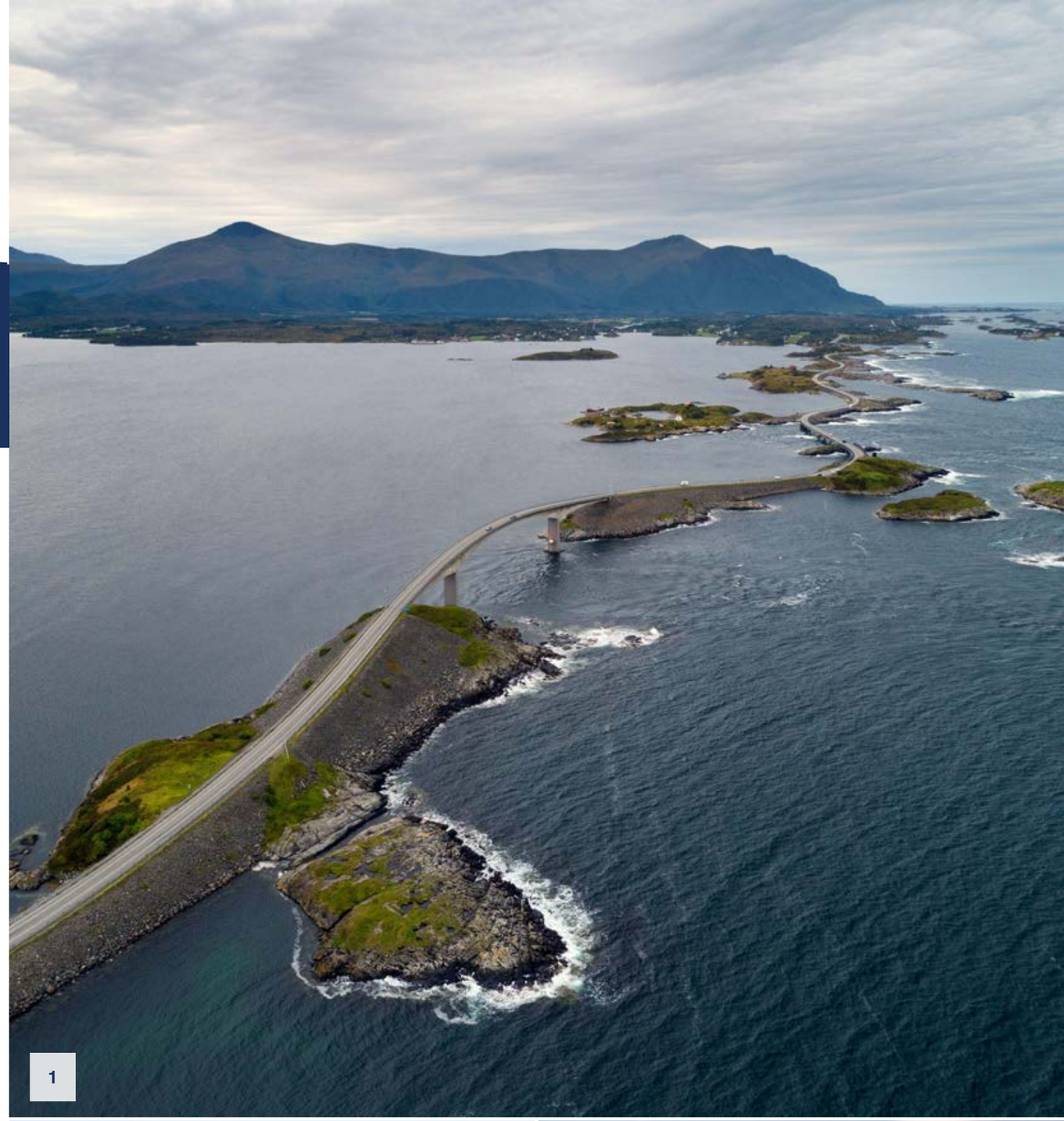
Connecting the villages of Vevang and Kårvåg via eight bridge crossings and numerous small islands and islets on Norway's Atlantic coastline, the Atlantic Ocean Road, renowned and valued for its vivid user experience, is part of the larger Atlantic Road Scenic Route.

Rather than a simple crossing, from one section of the mainland to another, the road is a series of interactions – a vivid contrast between crossings that sit low down near the water's surface, to high bridge crossings with wide views over the surrounding landand seascape. The experience of movement is pervasive, with steep ascents, descents, and a twisting alignment, with long views often afforded of the road up ahead. Exposure to the elements is a very real aspect of the user experience.

The 260-metre long Storseisundet Bridge is the highlight of the journey. The distinctive twisting shape of the large bridge is glimpsed from afar, building a route narrative in which the road user approaches this dramatic point of the journey. The bridge's steep incline provides an unsettling kinaesthetic experience as it climbs into the sky, and at the apex there is a pervasive sense of exposure and scale, with views of the open ocean to the horizon. A consistent post and rail barrier maintains that exposure.

The road design allows natural characteristics to shine through – the winding geometry avoids an urbanising effect, with the road appearing as a ribbon laid over the natural terrain. The road's structures are formed of simple shapes and the colour scheme matches the greys of the surrounding landscape. Where the road is on embankment, these are formed by bare rock aggregate and rock armour, the texture of which is distinct from the bare rock of the surrounding islands – the engineered components complement the landscape rather than attempting to imitate it.

The road provides the organising structure around which many recreational amenities have been added for visitors. These have become part of the road corridor. Architectural viewpoints, walkways and rest stops are a typical feature of Norway's Scenic Routes, while the Atlantic Road provides opportunities for water sports, fishing, boating, cycling, walking and nature-watching.



Images **1. Exposed to the elements:** The road does not shy away from its difficult setting, exposing road users to the unsettling scale of the ocean landscape. **2. This is no streetscape:** Despite having a significant presence and adding linear connectivity to an overtly natural landscape, the road's uncluttered design and winding geometry avoids an urbanising effect. **3. Heightened awareness:** The vivid experiences open to the road user match the picturesque scale of the surrounding landscape.

North Coast 500 (NC500), Scotland

Facts

Location Northern Scottish Highlands
Length 516 miles (830 km)
Client North Highland Initiative
Designer N/A
Year completed 2015

Description

The North Coast 500 is a connected route of numerous A-Roads, mostly of single-lane size, that join to form a 500-mile circuit around the coast of the Northern Scottish Highlands. Created to help stimulate the economy of the region through tourism, via visitor revenue and job creation, the route uses the city of Inverness – 'the Gateway to the Highlands' – as its base and from here, is connected to the wider road network of Scotland.

The route passes through iconic locations such as John O'Groats and the site of Dounreay nuclear establishment, though the route takes in such a range of landscapes and features that it is almost misleading to highlight individual features over others.

The route is best understood as an interactive medium through which visitors can experience the landscape. The route has its own dedicated website and interactive map, branded merchandise, and membership scheme. A large number of experiences are on offer: heritage sites, iconic landscapes, wellbeing activities, nature-watching, outdoor sports, access to dark skies, wild camping, and varied accommodation, to name a few. The road provides the organising structure around which visitors can create their own personal experiences and this includes dividing the route into six regions with distinct experiential offerings, and the promotion of themed itineraries. Places, features and experiences off the main route are promoted as part of the route corridor, as are different modes of transport including walking, cycling and passenger services.

The route's small roads allow the user to experience the landscape via the character of the road, with winding roads through rugged open moorland, long straights through expansive pastoral fields, and breathtaking loch-side drives. Enclosed bays, isolated hamlets, wooded hill climbs, and glimpses of distant mountains punctuate the journey, as do numerous crossings that include the Kylesku Bridge (A894) at Loch Gleann Dubh, a restrained structure that maintains the curved geometry of its connecting road, and the Dornoch Firth Bridge (A9), that again, through its simplicity of design, maintains the open, horizontal dominance of the surrounding landscape.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Images **1. Access to the landscape:** The region is abundant with scenic landscapes, historic features, activities and cultural attractions. The road provides a way to access these. **2. Journeys and destinations:** The road allows visitors to structure a trip to one or several destinations with accompanying stops, activities and accommodation.

Blackburn Meadows Biomass Power Plant, UK

Facts

Location _____ Sheffield
Length _____ N/A
Client _____ e.on
Designer _____ BDP (Building Design Partnership)
Year completed _____ 2015

Description

The Tinsley Viaduct is a defining moment within the narrative journey of the M1. The double-decked structure carries the motorway above the A631, between Sheffield and Rotherham, with the viaduct and the two roundabouts at either end – Meadowhall and Tinsley – in their entirety forming the Meadowhall Interchange (M1 Junction 34). Passing over the viaduct, the road user is both exposed to the experience of elevation and sustained, complex views over the surrounding industrial and commercial landscape, through Meadowhall and the River Don Valley. This strong connection to place is reinforced by the dramatic reveal of these views at either end of the viaduct.

Within this context, the Blackburn Meadows Biomass Power Plant provides the focal point needed to ground this important section of the M1 in a memorable, iconographic landmark. Sited within the Don Valley, aganst a backdrop of wooded slopes, the Plant provides simplicity and high contrast in its colour and form, and clarity of design when observed by road users passing at speed. Dark grey structures of simple shape provide the undertone to the showpiece of the design – the translucent orange boiler house, which uses both natural and internal lighting to highlight its presence in the landscape (the internal lighting is calibrated to minimise energy consumption). The design motif is used sparingly and is only repeated in smaller scale at the nearby visitor's centre – an educational resource that allows the public to engage with the infrastructure.

The Power Plant both connects Sheffield to the M1 and celebrates the presence of the infrastructure within the M1 Corridor – this in itself was a response to context. The site was formerly occupied by Blackburn Meadows Power Plant and its iconic cooling towers colloquially known as the 'Sheffield Sisters' (demolished in 2008). In their seventy years, the towers became a highly valued landmark with a strong relationship to the motorway. Their scale and proximity to the road left a vivid memory in passers-by. The new Biomass Power Plant fills the void that was left by these towers in the landscape of community, identity and place.

The River Don Valley is dominated by industrial structures and land use through Blackburn Meadows, yet a semi-natural green corridor is emerging. The nearby Blackburn Meadows Nature Reserve was formed from redundant components of the local sewage treatment works, and at the new Biomass Power Plant, new wetlands have been created alongside green roofs. Through responding to the large-scale context, the Plant is helping to restore and reconnect the biodiversity of this area.

Images **1. Simple, bold shapes:** The architecture of the power plant makes use of simple form and high contrast to create a striking visual feature that is easily recognised by the passing road user. The design makes use of ecology and green infrastructure enhancements such that these provide a visual contrast with the power plant's design. **2. Memory of place:** The loss of the Blackburn Meadows Cooling Towers in 2008 left a gap along the journey in the minds of many road users - the new Biomass Power Plant reoccupies that gap in the route narrative. Rather than trying to imitate the design of the former structure, the new power station is an echo of its visual prominence in the landscape. **3. Grammar and punctuation:** A design language, like any language, is about communication and legibility. Good design provides structure to the information a person receives from their environment.

RAC Regional Control Centre, UK

Facts

Location _____ Bradley Stoke, Bristol
Length _____ N/A
Client _____ RAC Motoring Services
Designer _____ Grimshaw Architects
Year completed _____ 1994

Description

The Control Centre is located at one of the most important network interchanges in the UK, where the east-west M4 crosses the north-south M5 to the north of Bristol. The office building, which is easily recognised due to its 35 m high Central Viewing Room, staircase, and prominent company logos, is a distinct rounded triangular shape with a glazed, sloping exterior and 60 m tall mast.

The building has been designed as a part of the road corridor – the road is setting. The large degree of visual connectivity between the building and road provides an active edge to the road, much like how a shop frontage benefits the vibrancy of a street. The outward looking character of the design – the glass and the raised viewing room – celebrates the identity of the company and its role in the motorway ecosystem. The rounded shapes of the building façades harmonise with the sweeping curves of the motorway geometry – the building echoes the corridor's dynamic character.

The site planning places the building up against the road, such that it has a strong presence and contributes to the identity of the interchange. Landmark features are particularly valuable when they occur at decision points along the road network, helping drivers to recognise where they are along their journey.

The building makes use of the real opportunity for striking architecture in the otherwise homogenous commercial and industrial landscapes that typically border motorways – mitigating the low sense of place that can arise in those environments with architecture that is instantly recognisable to those travelling at speed.

Considered planning helps to mitigate the effects of the adjacent motorway on the building's environs. The building is sunk into the ground, helping to screen it from the surrounding noise, and abundant vegetation screens views of traffic at ground level and softens the site considerably. The planted elements within and connected to the site are effective green infrastructure, providing noise and heat mitigation, as well as tranquillity, well-being, and access-to-nature benefits to its workers, exemplified by a sunken garden space that is separated from the busy road corridor by the Control Centre Building itself.

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Images **1. Interlocking shapes:** Through site planning and design the Control Centre has a strong relationship with the road that echoes the organisation's identity. **2. Decision space:** Easily recognisable landmarks are useful to the road user and can draw attention to upcoming decisions and manoeuvres. **3. Design space:** Sections of the strategic road network where landscape sensitivity may be low are opportunities to enhance sense of place through creative design decisions.

Bell Common Tunnel (M25), UK

Facts

Location Essex
Length 500 m
Client Department of Transport, Highways Agency
Designer G. Maunsell and Partners, Costain
Year completed 1984 (refurbished in 2009)

Description

This cut-and-cover tunnel was built as part of the creation of the M25 London Orbital Motorway to reduce the environmental impact of the motorway as it passes between the market town of Epping, and Epping Forest, a significant landscape feature consisting of accessible woodland, parkland and heathland.

Atop the tunnel, Bell Common connects the town to the forest, allowing it to function as a major part of the community's identity, providing a distinct setting and sense of place whilst also providing important recreational and wellbeing benefits. The connectivity provided by the tunnel allows the passing of several recreational paths without the need to interact with the motorway.

Bell Common Cricket Ground sits above the M25 Motorway upon the Bell Common Tunnel. The cricket club is a valued cultural site and was cleared during the five years of construction before being reinstated as part of the project. For those travelling to Epping from the Forest, the cricket club is the gateway feature marking the entrance to the town, a function that is allowed to continue due to the tunnel.

The tunnel structure is clad in dark colours, which helps it recede next to adjacent woodland and tree planting when seen from viewpoints along the M25. Tunnel maintenance structures are integrated into the tunnel structure and are clad in greens and browns to integrate them into the wooded setting.

Despite its size, the tunnel's impact on its setting is successfully limited. Through the use of colour, planting, and integration with the landscape pattern, the surrounding landscape remains consistent in character, such that tunnel's presence is not easily discerned. In turn, this means the impact of the motorway itself is mitigated by the tunnel.

Users of the M25 enjoy the closeness of Epping Forest south of the motorway, lending the westbound passage through the tunnel a sense of arrival at a recognisable natural feature.

Images **1. The social network:** Maintaining and enhancing the integrity of the landscape may include the protection of valued community assets and their settings. **2. A contrast of scales and use:** The large scale of the road and its fast-moving traffic may be a direct conflict with the human scale of adjacent land-uses. Good design should negotiate this contrast in scales.

Boston Central Artery / Tunnel Project (The Big Dig), USA

Facts

Location Boston, Massachusetts
Length N/A
Client Massachusetts Turnpike Authority
Designer Bechtel/Parsons Brinckerhoff, Fred Salvucci
Year completed 2007

Description

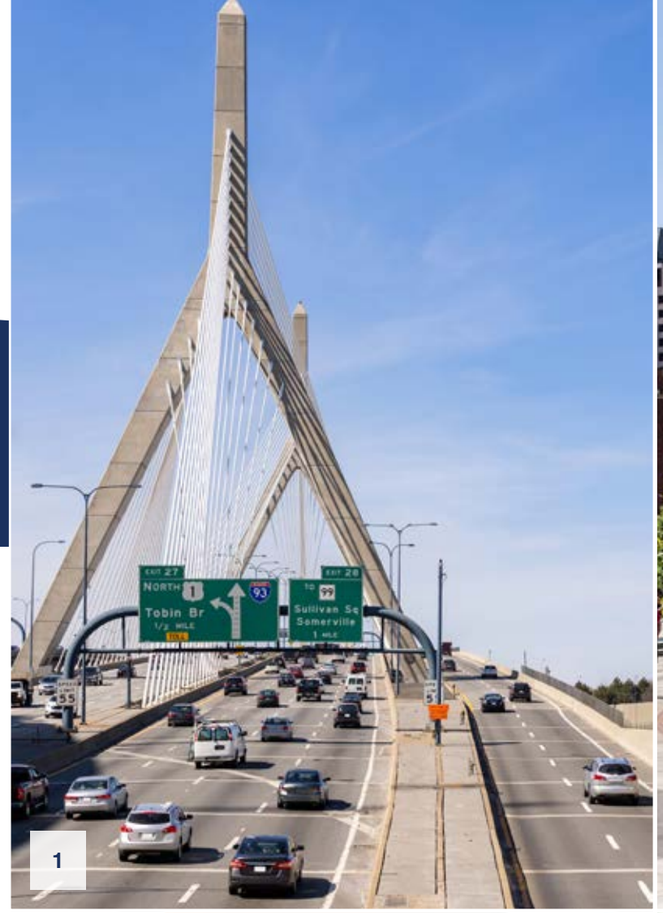
This transformational project to tunnel the Central Artery (I-93) through Downtown Boston and thereby remove an elevated six-lane highway from the heart of the city was driven by a vision for a more connected and thriving city.

The former Central Artery was outdated in its design and suffered from poor traffic flow, bad driving behaviours, and a high rate of accidents. It also severed communities and divided the city, cutting it off from its landscape setting – the Charles River Waterfront. The project vision was one that focussed on the benefits of removing the structure to the city's people, neighbourhoods, and communities; a vision that maintained its vigilance through a fraught, complex, and much constrained design and construction process, lasting 35 years from conception to completion.

Not only did the project involve creating a new tunnel beneath the city (and beneath the still-active Central Artery), it also included a new bridge crossing over the Charles River to Cambridge, a tunnelled crossing of the Fort Point Channel to Boston Logan International Airport, and four new interchanges of notable complexity – all significant projects in their own right.

As a result of the project, a city-wide improvement in air quality has been recorded and commuter journeys through Downtown Boston have been reduced to a few minutes, representing time and cost savings for residents and businesses. As part of the environmental compensation for the scheme numerous shoreline enhancements were made as part of the project, including the creation of Paul Revere Park, beside the new, and now iconic, cable-stayed Leonard P. Zakim Bunker Hill Bridge. Excavated material from the project construction was used to cap landfill sites in the local area, and this notably included the waste site of Spectacle Island, which was restored to a nature-friendly accessible site as part of the project and is now a popular destination for Bostonians as part of the Boston Harbor Islands National Recreation Area.

By burying the former Central Artery, the project unlocked a corridor of city open space for public realm improvements. The formerly concrete-dominated, shadowy space has now been replaced by the Rose Fitzgerald Kennedy Greenway – 17 acres of parks, open space and light development that reconnects the city and provides a much-improved setting for communities and businesses.



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Images **1. The image of the city:** The Big Dig removed a structure that reflected poorly on the city and added a new iconic silhouette over the Charles River. **2. On your doorstep:** All design that affects the landscape affects the ways in which people are able to interact with that landscape. Good design addresses the landscape as an environment for people and nature, to which the geometry of infrastructure is contributory. **3. A place to rest:** The transformation of Downtown Boston from a busy, congested transport corridor to a connected open space represents a clear benefit to the health and wellbeing of city residents and the prosperity of local businesses. **4. A walk in the park:** The benefits of infrastructure are better realised when the design considers how people will positively interact with the completed project. **5. Next up:** Building variation into a design provides structure and helps to maximise the potential benefits and their accessibility. Along the Greenway, varied spaces provide varied benefits – no visitor or resident is exactly alike and each is likely to have there own favoured way of exploring the park.

A9 Noise Barrier, Germany

Facts

Location _____ Munich
Length _____ 3 km
Client _____ State of Bavaria
Designer _____ SSF Ingenieure
Year completed _____ 2005

Description

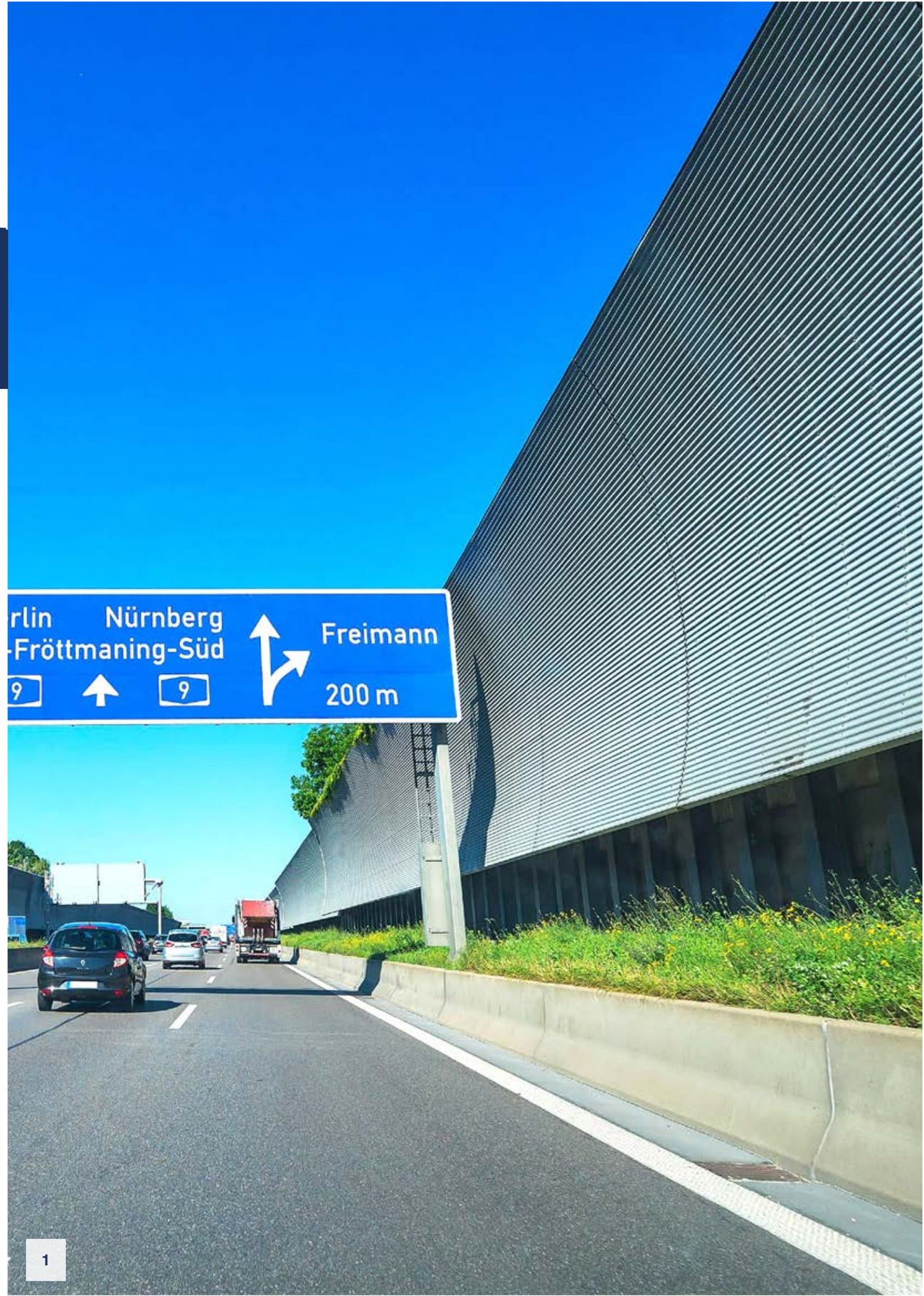
The noise barrier lies along both sides of the A9 as it passes through the residential area of Kleinlappen in Munich's urban fringe. The curved structure, up to nine metres tall in places, is made of precast concrete units clad with textured aluminium panels, forming a consistent enclosing edge to the road corridor.

The structure is sculpturally distinct and provides a vivid experience for the road user travelling to or from the city centre. In this respect, it serves the road user well that the noise barrier is limited in length and not used throughout the A9 – it is a distinct moment in the journey with a bold aesthetic.

Small hints at the verdant urban environment beyond the road corridor help soften the dominance of hard materials and the visual separation from the adjacent landscape. In places, transparent sections at driver-level allow natural light in and views out, of adjacent landscape and vegetation. At the A9's exit and entrance points, the architecture of the barrier changes – breaks in the continuous façade provide momentary views of the leafy urban streets beyond, while climbing plants scramble over a changed barrier – the high, curved panels replaced with vertical mesh.

The presence of the barrier simplifies the road in views from the surrounding landscape, removing intrusive elements such as moving traffic and gantries from sight. As such, the land use of the surrounding streets and spaces is not inhibited by the restrictions that would otherwise be placed upon them by the impacts of traffic noise and views of the busy road infrastructure.

The barrier, as an architectural structure, maintains the integrity of the surrounding urban environment, as if it were an additional building that provides an edge to local streets and footways. In places, climbers have been allowed to grow on the external face of the barrier, softening its appearance, and providing a greener setting to adjacent streets. The barrier's design enables the large road to act as an integrated part of the city's architecture – the road corridor is not hidden; it is designed as if it were any other piece of architecture.



Images **1. The road is a place:** Where connectivity between the road and the landscape is restricted, there is more imperative for the road to become a place itself. The architecture of the road includes all its components and infrastructure. Distinctive designs installed as part of an overarching design strategy add identity and structure to a route.

Sighthill Bridge, Scotland

Facts

Location _____ Glasgow
Length _____ 75 m
Client _____ Glasgow City Council
Designer _____ BAM Nuttall Ltd, Jacobs
Year completed _____ 2023

Description

Sighthill Bridge forms a crucial connection between Glasgow City Centre and the Sighthill Transformational Regeneration Area, mitigating the long-standing severance of the city's north due to the M8 Motorway.

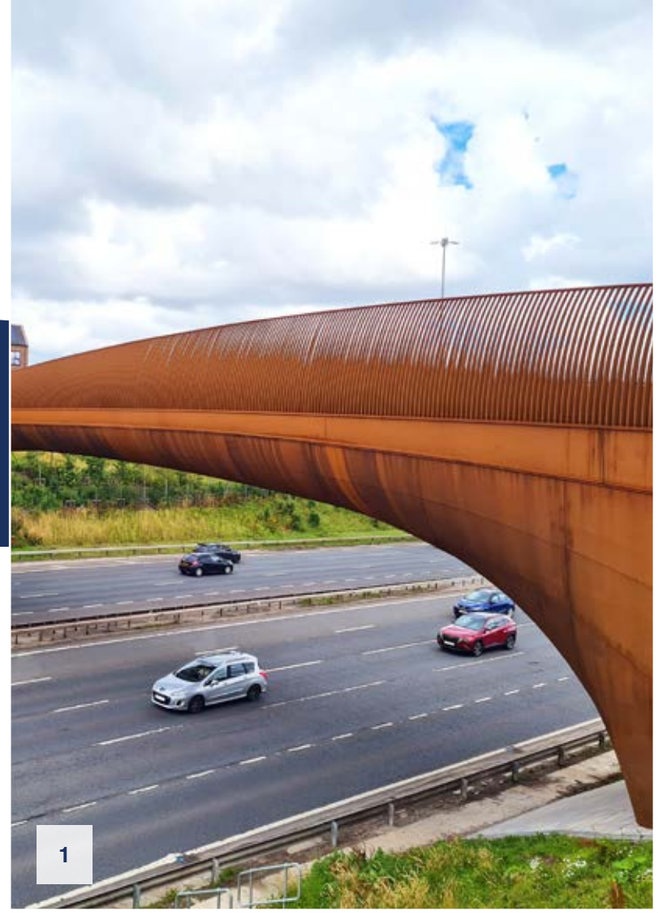
The bridge has been designed as a continuation of the Sighthill Development's public realm – it is paved like a street, with ornamental planting beds, informal sculptural seating, and a varied width that responds to active and passive use. The user is encouraged to spend time there, and the design facilitates that; this was embedded early in the crossing's 'street-in-the-sky' concept.

Public spaces at both ends of the bridge, along with the bridge itself, combine to form a consistent design language with the Sighthill Development, in colour, materials, lighting and street furniture.

A 210 m long ramp on the bridge's southern end provides access to the crossing for walking, cycling, and wheelchairs, encouraging active travel into Glasgow Centre, and out to the National Cycle Network and the Forth and Clyde Canal. However, the bridge does more than this to enhance accessibility – the crossing provides an environment that is attractive to use due to its experiential qualities – its security, variety, views, and planting. Smooth pathways provide a pleasant experience for cyclists and wheelchairs, lighting and high visibility provide security, and the ramp's continuous low stone wall provides rest at any point during the ascent.

Sinew Gardens (the public space to the south) and Sighthill Bridge combine to form a strong narrative structure of arriving at and entering the Sighthill Development. Sinew Gardens is a landscape to be explored, with a clear goal – the peak at the top of the ascent. A combined ramp and stairs approach form the central feature, providing a variety of ways to experience the space through elevation, direction, movement, rest, and interaction with planting, the motorway, and the city. Following the climb, the bridge itself forms a vivid and singular gateway to the neighbourhood.

The design does much to enhance the local environment. The bridge is simple in form, bold, and uncluttered, and this gives it a strong identity. Its distinctive shape and colour have helped it to become a city landmark. Sinew Gardens provides a much-needed accessible greenspace for local workers. The design activates the neighbouring student accommodation building by aligning with its geometry and colour scheme, and uses tree planting to break up the less interesting façades that overlook the space.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Images **1. Boldness of design:** Vivid shapes and colours can be key to making an impact where road users pass at speed. **2. A wealth of experience:** The ramp and stairs of Sinew Gardens allow and encourage the visitor to explore the space. **3. Access for all:** The diverse ways in which the space and bridge can be accessed keeps them vibrant and embraced as community assets. **4. You've reached the top:** The design of Sinew Gardens celebrates both the view at the top of the slope and the climb to achieve it. The design works hard to activate the entire space, providing variety to the user and a strong relationship to the surrounding buildings.

Roadway 140 Pedestrian and Bicycle Path, Sweden

Facts

Location _____ The Island of Gotland
Length _____ 7 km
Client _____ Swedish Transport Administration
Designer _____ Sweco; Nybergs Entreprenad
Year completed _____ 2021

Description

Along the heavily congested Roadway 140, between Västergarn and Klintehamn on Gotland's west coast, pedestrian and cycling access was previously non-existent. A new path for pedestrians and cyclists was built, connecting existing provisions, to form a safe and accessible route for both residents and visitors.

The path passes along the coast through a landscape with ecological, cultural, and visual sensitivities. It also passes adjacent to small-scale residential areas. The integration of the path into the context was a primary focus for the project and was central to its siting as well as its design. To minimise encroachment onto adjacent properties and valuable vegetation, the existing road was realigned in two locations to make room for the new path.

Along the roads on the Island of Gotland there is a distinctive roadside flora with a great biodiversity due to the unique soil type. An important aspect in the project was to preserve the roadside flora and promote biodiversity along the road. By reusing existing soil with its seedbank, the natural flora along the sides of the new path has been reestablished.

With good integration throughout the scenic yet vulnerable landscape, the new pedestrian and cycle path is now a natural part of the surroundings and an experience to journey along. Within the project two wooden bridges have also been constructed. The bridges have been given a restrained design and colouration that is respectful to the surrounding landscape.

The project was characterised by a good and continuous dialogue between different technical areas within the design team, as well as between designer, client, and contractor. The project was nominated for the Swedish Transport Administration's Architecture Award (2021) for the care given to the landscape and how the project exemplified a good cooperative process that created the right conditions for high quality landscape architecture.


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Images **1. Experience the landscape:** The cycle path offers views over the scenic yet vulnerable landscape. **2. Roadside flora in bloom:** Gotland's distinctive roadside flora is preserved and continues to bloom along the new roadsides. **3. Integrated within the landscape:** The siting in plan and profile has been integrated within the landscape.

The East Leeds Orbital Route (ELOR), UK

Facts

Location _____ Leeds
Length _____ 7 km
Client _____ Leeds City Council
Designer _____ AtkinsRéalis; Knight Architects
Year completed _____ 2022

Description

The East Leeds Orbital Route provides a crucial north-south link from the M1 to the east of Leeds, helping to unlock development and stimulate economic growth in a deprived part of the city.

The key to the success of the Orbital Route is that it was approached as a multifunctional infrastructure project, within which nature, the landscape, people, and the road coexist with equal importance. Just as important is that these four elements were understood and treated as one project, not as a collection of unrelated individual objectives.

Through a series of accessible and attractive active travel routes totalling 14 km in length, the Orbital Route promotes the use of several varied greenspaces and viewpoints throughout the landscape. Pocket parks, outdoor gyms, and play spaces provide more recreational value along these routes, as does access and exploration of the new habitats, such as species-rich grasslands, ecology ponds and wetlands.

The project's multifunctional approach is reflected in the careful consideration of an appropriate site boundary for the project. This boundary was informed by the needs and potential benefits of nature, the landscape, people, and the road. As such, the final scheme was integrated into the setting by strengthening the landscape pattern using hedgerows, the planting of trees and woodland blocks, and the careful design of landform.

The result of this approach is that the East Leeds Orbital Route can almost be viewed as a new accessible greenspace – one that serves multiple users (including road users), provides recreational value, and allows them to explore the city's landscape setting.

Other aspects of the design are important to its success. The integration of the road into the landscape is helped greatly by the lack of clutter along the carriageway and the highway elements are designed with consistency and simplicity in mind. The verge and adjacent earthworks are often indistinguishable from the surroundings, reducing impacts on the receiving landscape and improving the experience of the road user as a traveler and observer. This successful integration of road into landscape minimises the road's impact on an adjacent remnant World War 1 filling factory at Barnbow.

The design language used for the Orbital Route's structures is consistent and restrained, with weathering steel providing a highlight of orange colour that complements the otherwise dominant green of open fields and grasslands. Low-fertility embankments also provide visual interest and seasonal variety along the road corridor.

Reflecting the scheme's successful design, the project was a finalist in the 2023 Landscape Institute Awards.


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Images **1. All manner of movement:** The project treats the Orbital Route as a movement corridor for all users. While the approach to different users may vary in scale and design solution, all users are encouraged to engage with the landscape setting through the design. **2. A landscape project:** The smallest land-take possible does not necessarily lead to the least impact on the receiving environment. Designing infrastructure as a landscape project first helps to maximise benefits and avoid harm. **3. Clarity of vision:** A consistant design language allows all elements of the design to sit together without visual intrusion. Though elements associated with the road are in plain sight, the clear presence of the road does not impede the use of the landscape by other users.

Castlefield Viaduct, UK

Facts

Location Greater Manchester
Length 330 m
Client National Trust
Designer Twelve Architects and Masterplanners (Phase 1) and BDP (Vision)
Year completed 2023

Description

Built in 1892 in the heart of Manchester, and left unused since 1969, the Castlefield Viaduct is a 330 m long Grade II Listed structure whose maintenance was inherited by National Highways as part of the Historic Railways Estate. The viaduct is an important component of the local cityscape in Manchester's historic Castlefield District; its striking Victorian design evident in its latticed steel girders, cast iron piers, and revivalist architectural details.

The National Trust's Castlefield Viaduct project, working with the National Highways Historical Railways Estate Team, local authorities, communities and businesses, has created a vision to allow people to re-engage with the structure, repurposing it as a free-to-access, elevated linear park through Manchester City Centre, connecting Castlefield, Trafford, and Pomona Island, connecting walkers and cyclists to cultural sites, and providing an accessible space for visitors.

For Phase 1 of the project, running from summer 2022 to the end of 2024, 150 m of the viaduct has been converted into a temporary urban 'sky garden', and has been used to test ideas and share them with visitors. The raised walkway is partially enclosed such that there is a sense of shelter and separation from the surrounding city, whilst still allowing the elevated views-out that give the viaduct its strong amenity value. Visitors are able to experience varying planting plots – including those developed by partner organisations – such as a sensory garden and an urban forest. Planting has been inspired by the species that colonised the structure during its disuse, and a section called 'the naked viaduct' has been left in its existing condition from that period. The gardens have been managed for their value to wildlife, and Phase 1 includes rainwater harvesting and biodiversity monitoring, such that lessons can be learnt at this early stage, to inform future design. Using materials such as aggregates local to Manchester, blue and red bricks mirroring those that are already a part of the viaduct structure, stone mirroring Salford's cityscape and lattice-patterned timber and steel features echoing the viaduct's key characteristics, the design has sensitively integrated into its architectural context.

The Vision for Castleford Viaduct will guide the development of its design beyond Phase 1. The Vision identifies crucial pillars for the success of the project and divides the viaduct into seven character areas, each with specific experiential outcomes for the visitor and the design principles that are intended to achieve these. The development of this clear vision will ensure the finished design is coherent yet not homogenous, enabling the visitor to explore and recognise the changing design as they travel from one end of the park to the other.


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Images **1. The architecture of industry:** The viaduct is a vivid monument to the city's industrial and railway heritage. **2. The scenic route:** The viaduct connects various locations within Manchester's city centre via a secluded green pathway. **3. Reclaimed by nature:** Sections of the park simulate the process and aesthetic of nature recolonising the viaduct, such as along areas of bare gravel, encouraging diverse flora through low fertility. **4. Hanging gardens amongst steel and iron:** Material choices complement the industrial architecture and are used to highlight the pleasing contrast of industry against green foliage and informal planting.

Caulfield to Dandenong Railway and Linear Park, Australia

Facts

Location _____ Melbourne
Length _____ 16 km
Client _____ Level Crossing Removal Authority
Designer _____ ASPECT Studios; Cox Architecture
Year completed _____ 2018

Description

The Caulfield to Dandenong Railway and Linear Park was created as part of Melbourne's Level Crossing Removal Project, one of the city's key steps toward supporting growth through infrastructure.

In recent years, Melbourne's significant population growth has increased pressure on the city's existing infrastructure, with worsening congestion associated with the railways. Level-crossings have been increasingly eliminated throughout the city to increase the capacity of the city's rail network whilst freeing-up space for the public realm.

Colloquially referred to as the 'Sky Rail' and the 'Underline', the Caulfield to Dandenong Railway and Linear Park has responded to both the societal and infrastructural needs of the area. Through elevating three sections of the railway and utilising the space underneath, the project created 22 hectares of new public space in the form of three linear parks: the Caulfield to Hughesdale, the Clayton, and the Noble Linear Parks. These parks provide amenities such as multi-purpose sports courts, playgrounds, dog parks, skating areas, bouldering and climbing, and open grassed picnic areas to be enjoyed by residents throughout the year.

The innovative design approach – elevating the railway and creating public space beneath – has effectively reconnected areas that were previously severed by the route. The result is a railway provision that is integrated into and contributes toward the architectural quality of the urban realm. The linear park and its network of new cycling and pedestrian routes now act as the unifying element that connects the various residential and commercial areas along its length.

The bold design palette helps to imbue the publicly accessible spaces with an inclusive, safe, and recreational setting for the variety of activities on offer. The use of colourful tiles, poured surfaces, and coloured paint on the viaduct piers emphasises the role of these spaces as something quite different from the surrounding infrastructure.

This is not to say that the thread of the design is to cast off its context. The elevated railway structure is an active part of the design – as water flows down from the railway, it follows the curves of the piers, feeding into a passive irrigation system. This system provides water for almost 4,200 trees throughout the scheme. The viaduct can be utilised all year around by those beneath for shade and shelter, furthering the usefulness of the linear park to its visitors.

The Caulfield to Dandenong railway project has demonstrated how infrastructure can be shaped around societal needs for greenspace and cultural hubs.

Images **1. A public realm full of usable space:** The minimal footprint of the elevated railway structure allows the public realm beneath to thrive and avoids 'lost' space. **2. A roof over our heads:** The railway structure acts as a partial canopy, providing the trail beneath with shelter, shade, and a subtle experience of enclosure. **3. A social space:** The linear park brings together a range of activities and people. **4. Your own little bubble:** While connected, the public realm also consists of smaller pocket spaces that allow people to rest or escape.

Buffalo Bayou Park, USA

Facts

Location _____ Houston, Texas
Size _____ 65 hectares
Client _____ Buffalo Bayou Partnership; Harris County Flood Control District
Designer _____ SWA
Year completed _____ 2015

Description

The Buffalo Bayou Park project is a multifunctional solution to a previously derelict section of the meandering Buffalo Bayou in Downtown Houston, Texas.

Formerly secondary to the existing freeways crossing the contaminated body of water below, Buffalo Bayou Park now serves as critical flood infrastructure, and as an asset to health and wellbeing, and to the cultural vibrancy of the city.

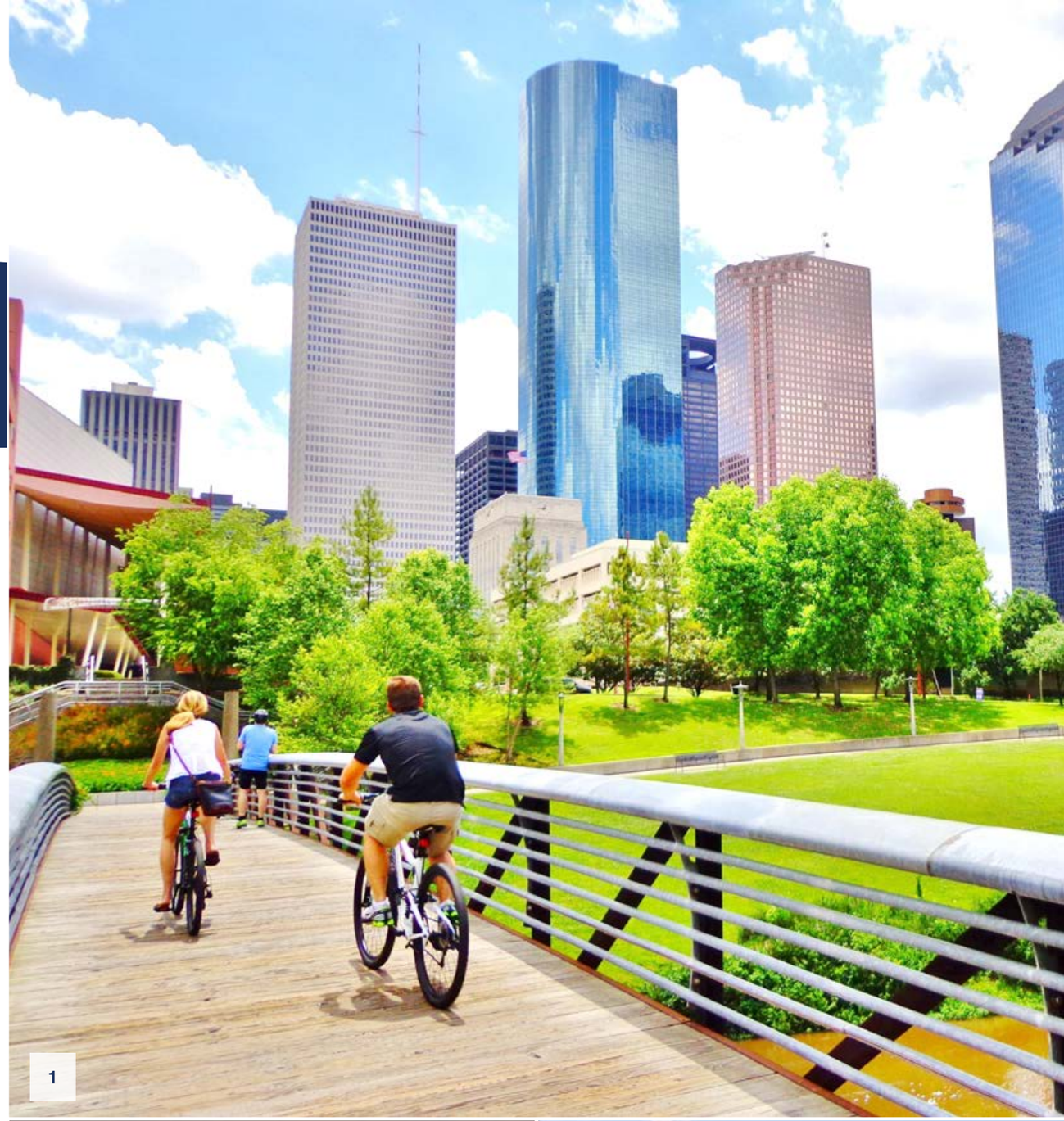
The reactivation of the derelict spaces underneath the tangled freeway infrastructure, including pedestrian and cycling connectivity throughout, has established Buffalo Bayou Park as an attractive destination. Now, 44,000 households are within a 10-minute walk, and half a million people can reach the park within a 30-minute bike ride. Features such as new pedestrian bridges, skating, sculptures, fountains, memorials, picnic areas, amphitheatres, restaurants, volleyball areas and bike rentals have created a space where communities can gather, explore, and be active.

During the project's progress in developing the site, a former underground reservoir was rediscovered. Identified as a structure with heritage value, the space was repurposed as an accessible art space, and with its distinct engineered aesthetic and experiential qualities, is now a memorable and vivid highlight for visitors.

The project included extensive re-grading of the park to improve waterside access, increase floodwater conveyance, reduce erosion of the Bayou banks, and highlight key vistas and ecological enhancements throughout. The utilisation of recycled concrete-filled gabion baskets along the bayou bank has provided ground stability whilst simultaneously enhancing the meandering curves of the Bayou. This approach has further created a porous foundation for over 300,000 native riparian trees and coastal prairie plants, replacing the weeds and bare soils of the former derelict site.

By selecting trees and plants that are native to the coastal prairie region, habitats such as riparian woodlands, grasslands and wetlands were created, providing further value to wildlife. The scheme has additionally contributed towards the natural filtering of contaminants in the Bayou, enhancing surrounding ecosystems and creating leisure opportunities, such as canoeing.

Contextually, the site has strengthened the large green infrastructure corridor from Memorial Park, to the city centre. Buffalo Bayou Park illustrates the value of space around existing infrastructure for implementing innovative, contextually sensitive, and multi-functional landscapes. Additionally, it serves as a model for integrating accessible greenspace with flood management and ecological restoration.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Images **1. Space to breathe:** The space created at the heart of the city provides a multitude of benefits. **2. Beauty in the unique:** Good design embraces the opportunity to utilise the striking visual forms and considerable scale of infrastructure to create unique and memorable places. **3. An integrated cityscape:** The project brings together contrasting components of the cityscape, eliminating the conflicts between them.

Melbourne Gateway and Bolte Bridge, Australia

Facts

Location Melbourne
Size N/A
Client Transurban CityLink Ltd
Designer Denton Corker Marshall
Year completed 1999

Description

The CityLink Project involved the creation of major ring roads around the city of Melbourne to alleviate congestion within the city centre. Along the main route between Melbourne Airport and the city centre a series of gateway features were designed in the form of the Melbourne Gateway and Bolte Bridge.

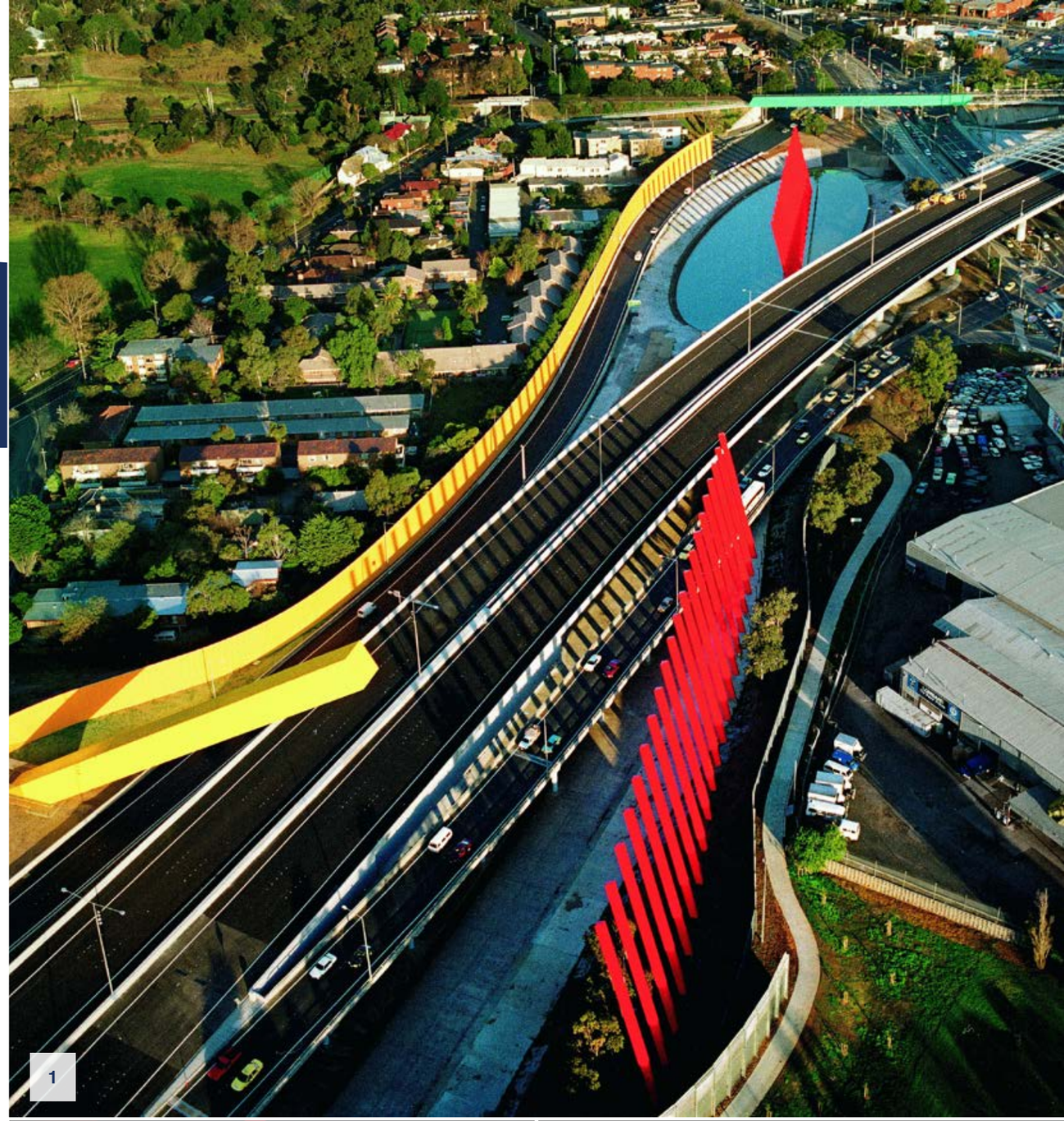
The Melbourne Gateway combines the function of a noise barrier with large-scale public art. The curved noise barrier is integrated into a sinuous tunnel structure known as the 'Sound Tube'. The Sound Tube has been designed specifically for the effect it has on the road user. The fluctuation of space, from enclosed to emerging into the landscape once again, reinforces the perception that this point in the journey is one of transition – from one place to another. The unusual scale of the structure strengthens this experience simply by attracting and holding the road user's attention. The playing-out of this attention-grabbing moment of the road-user's journey results in the structure's more mundane function – to prevent noise pollution – passing by unnoticed.

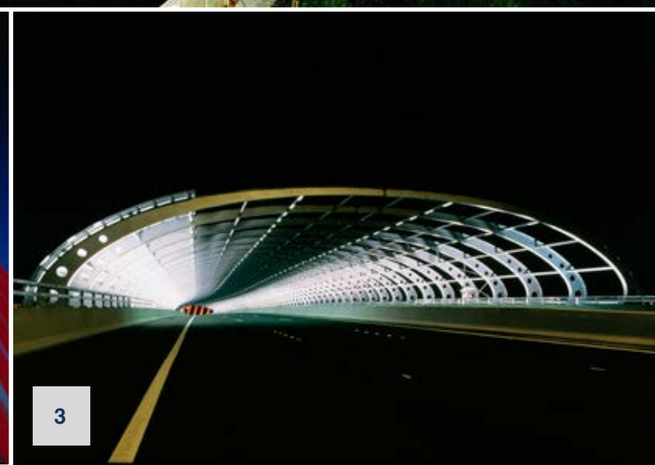
For travelers entering the city from the airport, the Sound Tube is preceded by another large feature. As southbound drivers approach the city, and begin to see glimpses of the city skyline, a large, vividly yellow, raised gateway, in the form of a leaning cuboid pillar, appears on the road ahead. As the road user gets closer, a sinuous, solid yellow wall is seen at the base of the gateway.

Just as this unusual form begins to resolve and become clearer, a contrasting feature of equal scale appears on the opposite side of the road. A line of leaning red columns emerges from a roadside treeline, crossing the carriageway and ending up within the watercourse of the Moonee Ponds Creek.

The vision for the Melbourne Gateway was for an abstract, brightly coloured and dramatic urban sculpture, designed to be read at speed. The completed project was awarded both a Special Jury Award and Commendation for Urban Design by the Australian Institute of Architects.

As the southbound driver continues toward Melbourne City Centre along the CityLink M2 they must cross the Yarra River and the Bolte Bridge. The Bridge's two 140m tall piers repeat the cuboid motif of the sculptures at the Melbourne Gateway, as well as the use of dramatic scale such that the feature is of sufficient prominence to the fast-moving road user. Here, the piers are not brightly coloured, but grey, repeating the forms of the tall city buildings that dominate views from the crossing. The bridge and its piers are transformed by lighting at night, itself becoming a feature of the city skyline.





Images **1. From one place to another:** While the landscape itself may often provide the road user with a sense of place, at times there are opportunities to strengthen the perception of change along a journey through road architecture. **2. Vivid contrast:** The heightening of contrast is often directly related to the identity of a road and the perception of change along it. **3. A multitude of functions:** Good design is about delivering multiple functions, including user experience, in a coherent design solution.

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