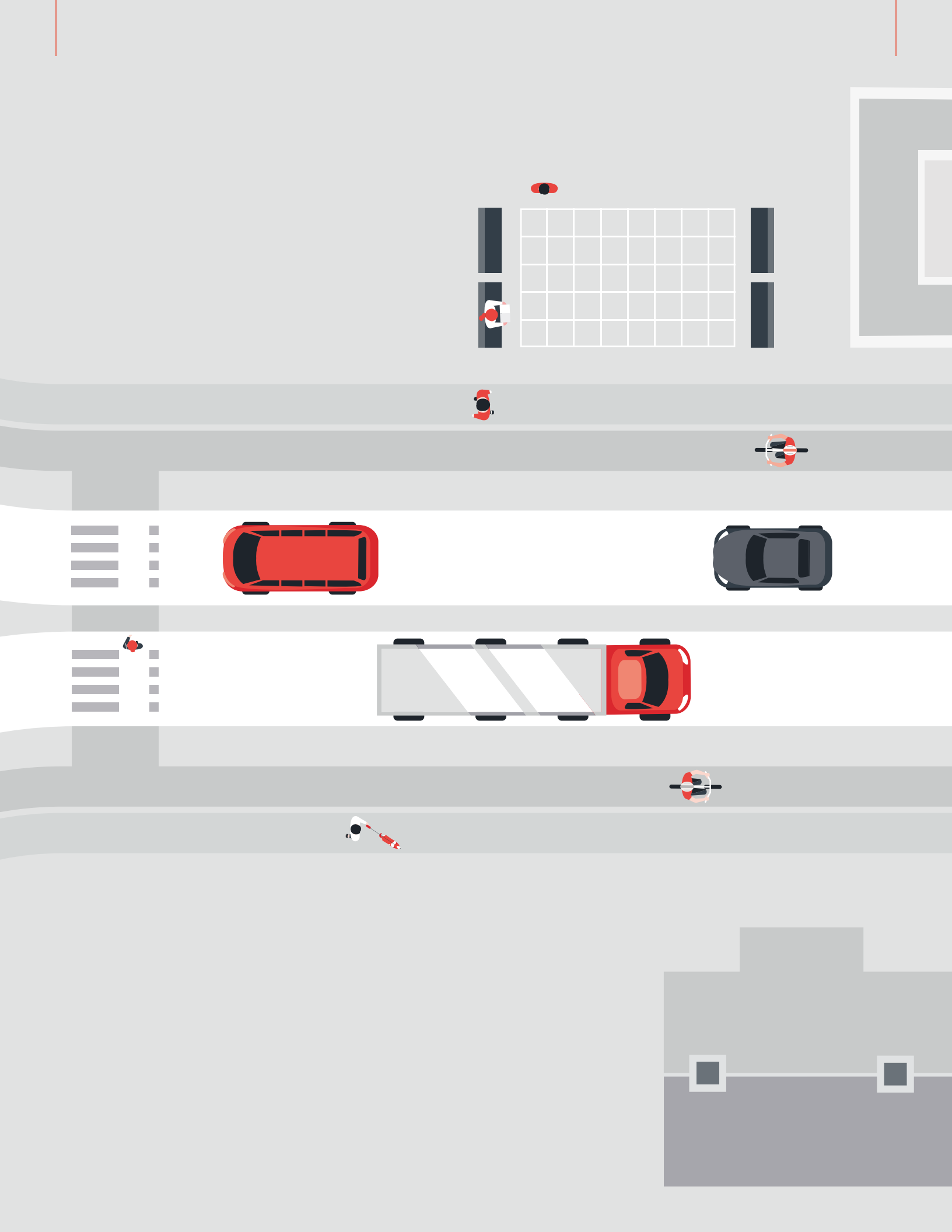




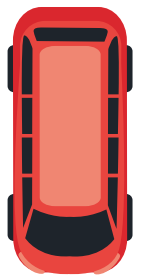
# VISION ZERO

*Setting a higher  
standard for  
road safety*





**Zero =** the only acceptable number of deaths and serious injuries in our worldwide road transportation system.



# Foreword



Eric Peissel, Global Director of Transport & Infrastructure

**Providing effective road safety throughout the world is a 21<sup>st</sup>-century imperative. Alarming numbers underline the need for a new approach: Approximately 1.3 million people die on the world's roads each year from traffic crashes; another 20 million to 50 million suffer non-fatal injuries.**

**No society should accept fatalities and serious injuries as inevitable consequences of mobility.**

All road traffic deaths are tragic. Under Vision Zero, acceptance of even one road fatality or serious injury is not an option. Whose death would be acceptable... a mother, a father, a sister, a brother, or a friend? This is the key question Vision Zero asks to drive forward diverse stakeholder support and efforts toward the greatest positive global impact.

Today, road traffic fatalities and injuries represent a major global public health issue; road crashes are impacting economies, costing countries throughout the world an estimated 3 percent of gross domestic product. Achieving a higher level of road safety—vital to global equity as well as the social wellbeing and optimal productivity of all countries—requires Vision Zero guidance for long-term positive impact. Vision Zero advocates collaborative localized and global efforts to support safety for everyone—toward the ultimate objective of zero road traffic fatalities and serious injuries.

**As we continue to advise clients with our best ideas for a better tomorrow, WSP will help towns, cities and countries reduce deaths and serious injuries on the world's roads today.**

Putting Vision Zero into practice demands a departure from traditional thinking about road safety, which has focused on perfecting human behavior. Instead of asking individuals to adapt to the road transport system, and thus assume complete responsibility for road safety, Vision Zero challenges system designers to adapt, as contextually needed, the road transport system to advance safety for all road users. This shared responsibility, with primary emphasis on system designers, underpins the Safe System approach.

Vision Zero also demands buy-in and continuous collaboration from a diverse group of people in public service and private industry who influence the design and function of the road transport system. Ultimate success requires broad stakeholder commitment to Vision Zero thinking and long-term implementation.

On a governmental level, public policy must also be aligned with Vision Zero. Sweden adopted Vision Zero in 1997 and has since reduced by approximately 50 percent the number of road fatalities. Similar Safe System initiatives in countries around the world have contributed significantly to road safety progress.

**A timely opportunity exists for Vision Zero to make widespread impact, as 75 percent of the world's urban infrastructure that is projected to exist in 2050 has yet to be built. WSP will continue to work with cities, states, provinces and countries to develop and implement Future Ready® transport infrastructure designed to bolster economies, advance equitable solutions and build sustainable societies.**

By setting challenging and achievable objectives, monitoring project results and sharing proven practices, we

will positively impact communities that have yet to realize Vision Zero's lifesaving potential.

At WSP, we look forward to further integrating Vision Zero into road infrastructure projects around the globe. With our diverse technical expertise and experience in planning, designing and maintaining transport infrastructure—strengthened by our global scope and localized presence as well as our commitment to ESG principles—we stand ready to help begin or continue your Vision Zero journey.

Thank you for taking the time to learn more about Vision Zero and our projects that advance Vision Zero in communities throughout the world.

If you are interested in speaking with us about working together, please contact the WSP team at: [vision-zero@wsp.com](mailto:vision-zero@wsp.com).

Numbers included throughout this foreword are sourced from the World Health Organization, the World Resources Institute, and the European Transport Safety Council.

Future Ready® is WSP's global innovation program that seeks to better understand the key trends in climate change, society, technology, and resources—and how they are impacting our world, locally and globally.

# What is Vision Zero?

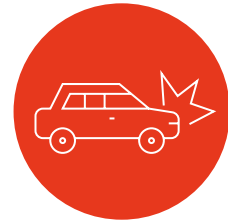
*Vision Zero is a concept that embraces a transformative mindset and approach to making all roads safe.*

## **Uncompromising Objective**

Vision Zero refuses to accept that fatalities and serious injuries are inevitable consequences of mobility on the world's roads.

Vision Zero aims to create a worldwide road traffic system where no human being is killed or seriously injured.





Approximately 1.3 million people die on the world's roads each year.<sup>1</sup>



More than half of road traffic deaths involve vulnerable road users (pedestrians, cyclists and motorcyclists).<sup>2</sup>



Another 20 million to 50 million people are seriously injured each year on the world's roads.



Road traffic injuries are the leading cause of death among people aged between 5 and 29 years old.

<sup>1</sup>The numbers relating to fatalities and serious injuries are estimates from the World Health Organization (WHO).

<sup>2</sup>Vulnerable road users are those road users most at risk in traffic, as they do not have an outside shield to protect them from the force of impact in a crash.

## The risk of dying in a road traffic crash depends on where you live.<sup>3</sup>

Road traffic fatalities per 100,000 population

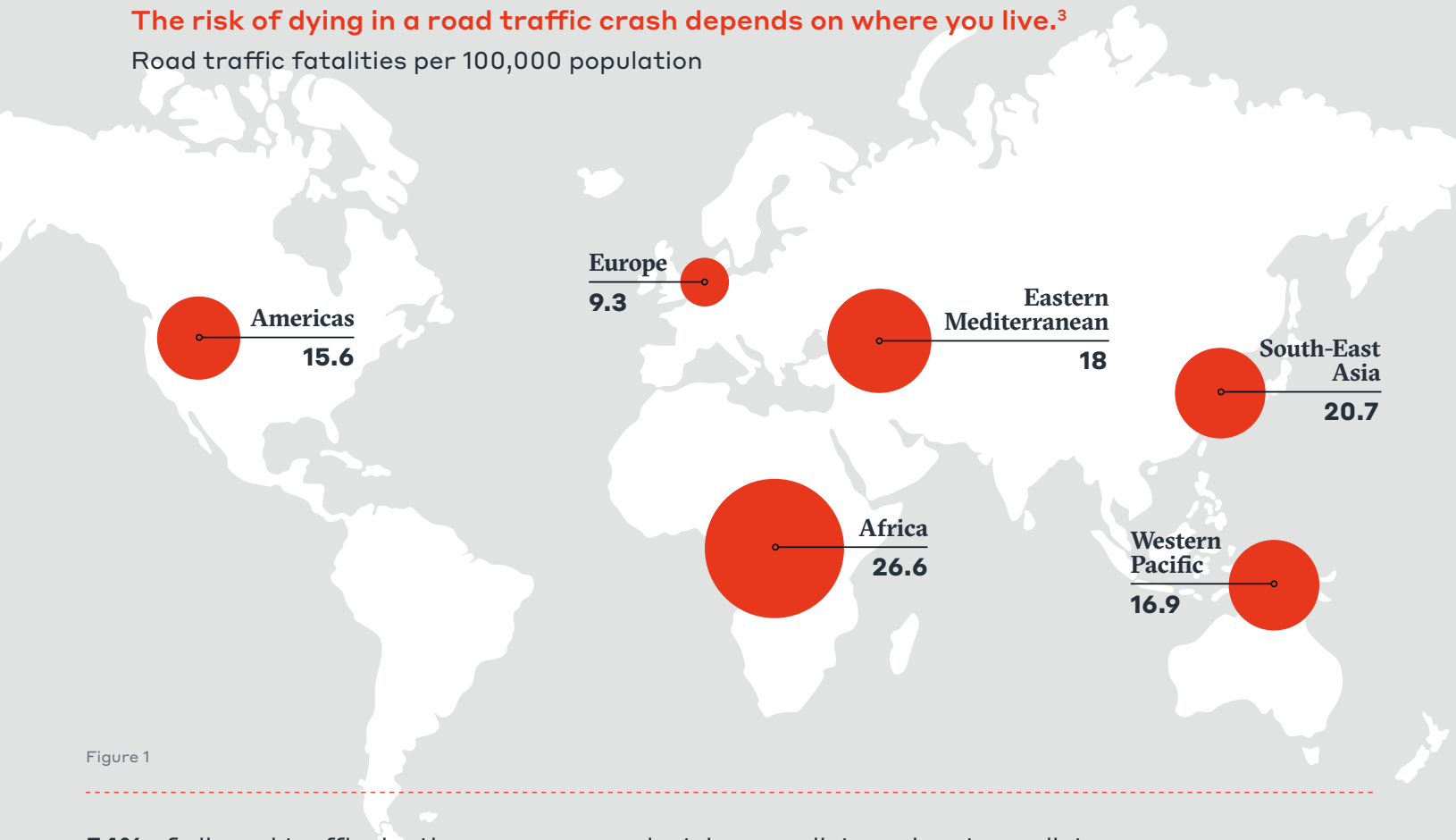


Figure 1

**54%** of all road traffic deaths are among pedestrians, cyclists and motorcyclists

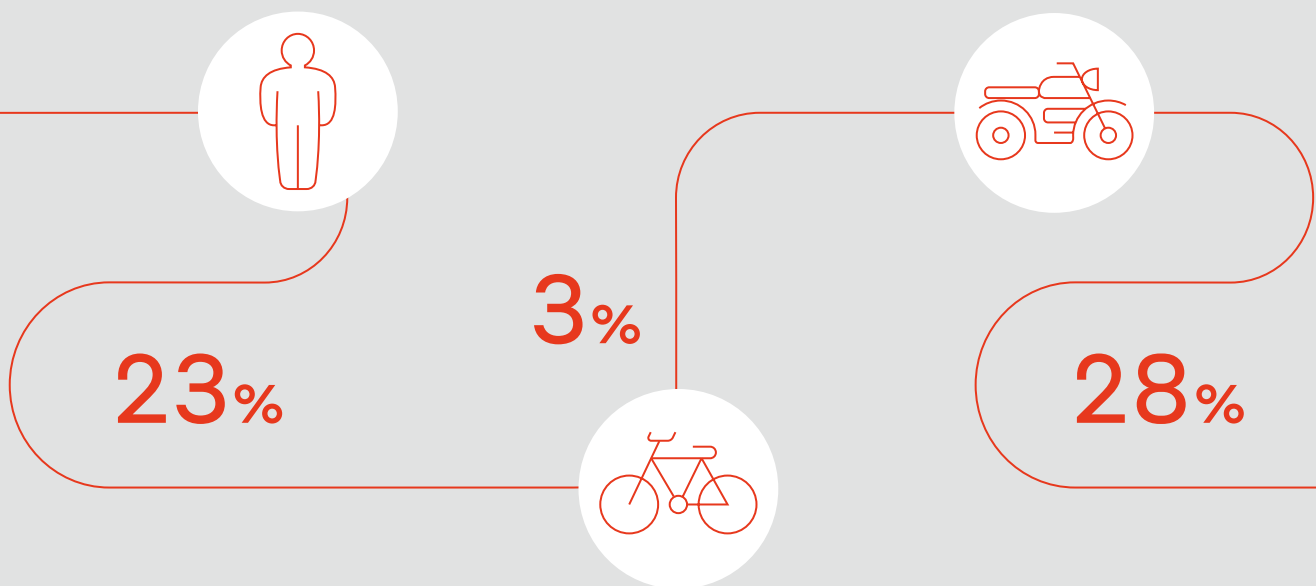


Figure 2

<sup>3</sup>Figures 1, 2 and 3 show rates and percentages from the World Health Organization's Global Status report on Road Safety, 2018. Figure 4 shows rates from the 2015 report.



Although low- and middle-income countries have 60% of the world's vehicles, they record 93% of the world's road traffic deaths.

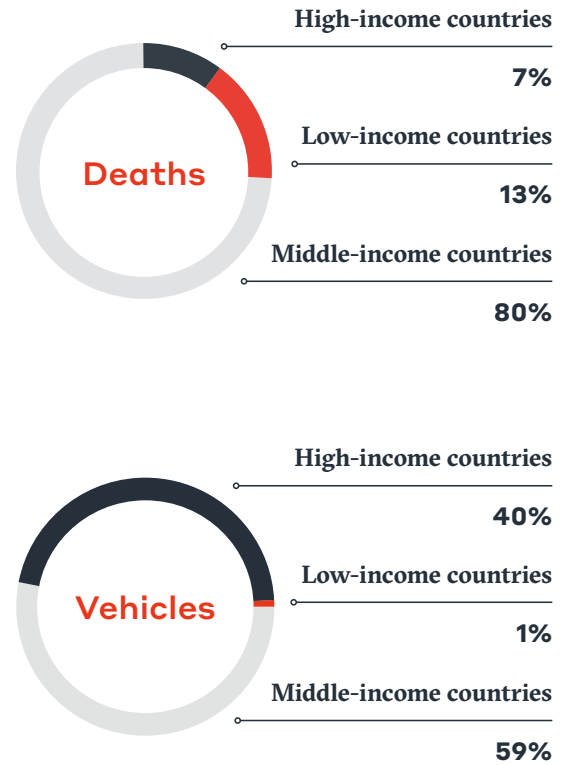


Figure 3

Low-income countries have the highest road traffic death rates.

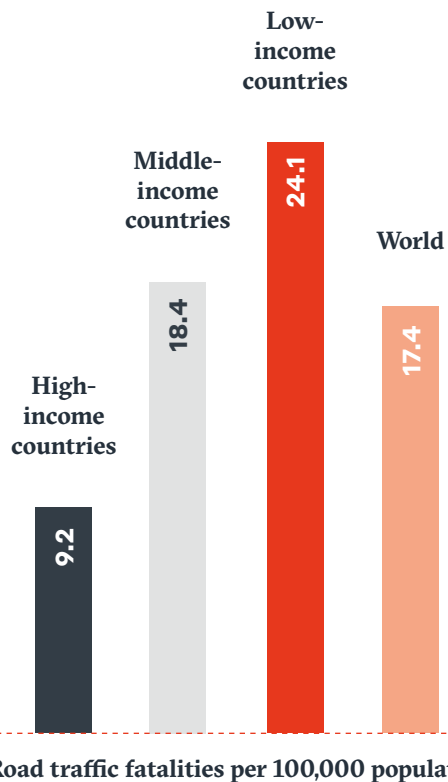


Figure 4

Country income status was determined based on data from the World Development indicators database, World Bank, March 2015. Data relate to 2013, whereby low-income = ≤ US\$ 1,045 per capita; middle income = US\$ 1,046 to US\$ 12,745; high income = ≥ US\$ 12,746.

## Paradigm Shift

	Traditional/Prevailing	Vision Zero
<b>Issue</b>	Preventing all crashes	Preventing fatalities and serious injuries
<b>Premise</b>	Deaths are inevitable	Deaths are preventable
<b>Focus</b>	Perfecting human behavior	Designing a road system that takes into account human error
<b>Responsibility</b>	Individual road users	Shared: road users and system designers

Figure 5

System designers are people who, in their professional work, influence the planning, design, operation and maintenance of the road transportation system. This diverse group includes policymakers, politicians/government officials, planners, engineers and road designers, vehicle manufacturers, and trauma and hospital care providers, plus any other provider and enforcer of the road transport system. Each contributes important knowledge and expertise to help make and keep roads safe.

### Holistic Approach

As long as we travel, we will never be able to prevent all crashes, because people will always make mistakes and misjudgments. If we try to create a system that relies on perfect human behavior, we will never succeed in reaching a minimum number of fatalities and severe injuries. Most crashes do not cause fatalities or serious injuries, thus a broad crash focus does not consider all the essential factors that affect the safety of our worldwide road system.

Vision Zero views road safety in the context of the entire road system, seeking to prevent crashes that are likely to result in fatalities and serious injuries. Vision Zero also seeks to reduce the negative impact when crashes do occur. From an infrastructure standpoint, underpinning road safety means addressing the impact of speed and designing roads holistically to account for the needs of all road users.

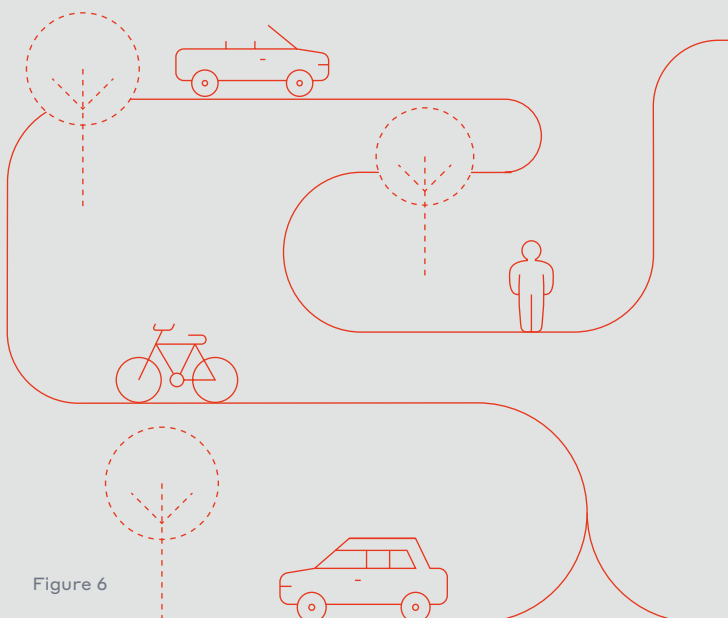


Figure 6

### The Safe System approach: accommodating human error

The Safe System approach to road safety ensures that in a crash impact energy remains below the thresholds likely to result in death or serious injury. It goes beyond establishing speed limits to managing interactions between the environment, infrastructure and physical vulnerability. Within this approach, speed limits are a complementary intervention to creating safer roads, roadsides and vehicles that together work to accommodate driver error. All parts of the system need to be strengthened—roads, roadsides, speed restrictions and vehicles—so that if one part of the system fails, other parts will still protect any person who is involved in a crash.

Source: Adapted from the World Health Organization's Global Status Report on Road Safety, 2015

## New Perspective

The United Nations has set a target of halving the number of global deaths and injuries from road traffic crashes between 2010 and 2020. This target is listed under goal No. 3—Ensure healthy lives and promote well-being for all at all ages—which is among the 17 UN Sustainable Development Goals. The European Union (EU) has adopted the Vision Zero approach and set a target of reducing fatalities by half between 2010 and 2020.

Several international organizations, including the World Health Organization (WHO), World Resources Institute (WRI), and the Organisation for Economic Co-operation and Development (OECD) have endorsed the Safe System approach to road safety.

Vision Zero in Sweden, Safe System in Australia and New Zealand, and Sustainable Safety in the Netherlands are interrelated approaches that view road safety from the same foundational principle: Human error is inevitable but traffic fatalities and serious injuries are not.<sup>4</sup>

Vision Zero builds on past and present successes to expand the framework of best road safety practices according to the Safe System model. Traditional approaches to road safety put the onus on individual road users to ensure their own safety. The Vision Zero paradigm is based on shared responsibility among road system stakeholders. Road users and system designers are responsible for the existence of a Safe System. While road users should always follow traffic laws and regulations, such as wearing seatbelts and obeying speed limits, system designers should take further measures, as needed, to prevent deaths and serious injuries from occurring. Vision Zero assigns the greatest responsibility to the system designers, to continuously ensure that roads—urban and rural—are safe for travel. >

### Shared Responsibility

**System designers** are ultimately responsible for the design, operation and use of the road transport system and are thereby responsible for the level of safety within the entire system.

**Road users** are responsible for following the rules for using the road transport system set by the system designers.

**If the road users fail** to obey these rules due to a lack of knowledge, acceptance or ability, or if injuries do occur, the system designers are required to take the necessary further steps to counteract people being killed or seriously injured.

Figure 7

Source: Adapted from the Swedish Transport Administration

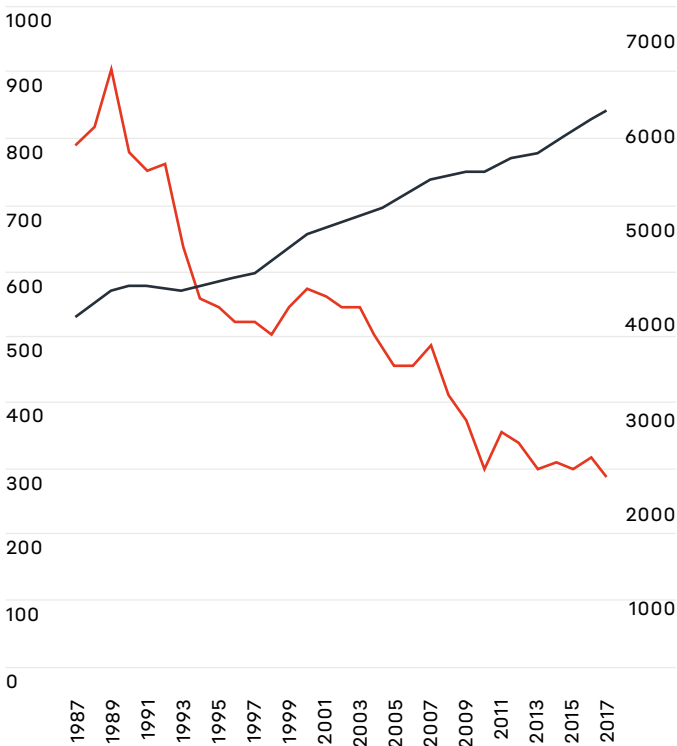
<sup>4</sup> Source: World Resources Institute (WRI)

# Safe Roads Support Increased Mobility

*Safe System road practices do not compromise mobility. On the contrary, increased mobility actually depends on effective road safety.*

Sweden and Australia demonstrate that when Safe System road practices are in place it is possible to decrease the number of fatalities despite an increase in the number of motor vehicles.<sup>5</sup>

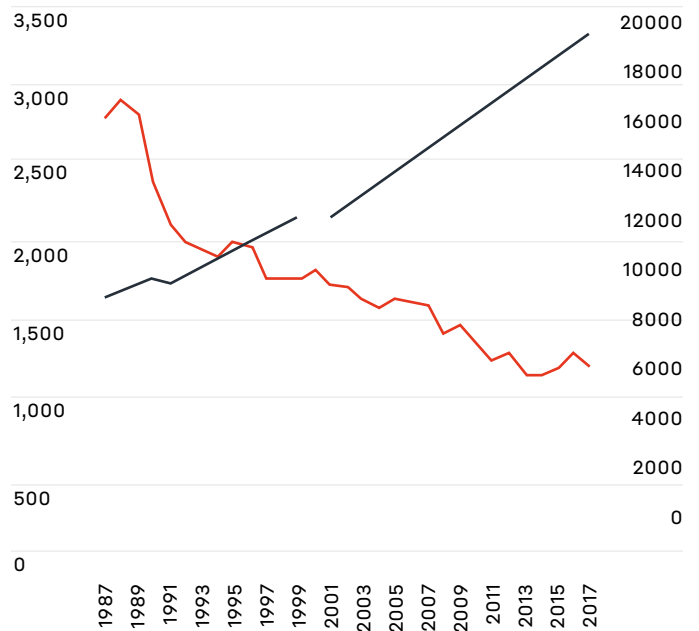
Fatalities in road traffic and Motor Vehicles in use<sup>6</sup> in Sweden 1987-2017



Fatalities Motor Vehicles (1,000)

Figure 8A  
Source: Swedish Transport Administration

Road Deaths and Registered Motor Vehicles in Australia 1987-2017



Road Deaths - Australia Motor Vehicles (per 1,000)

Figure 8B - Australia adopted the Safe System approach in the early 2000s.

Source: Bureau of Infrastructure, Transport and Regional Economics (BITRE), 2017, Road trauma Australia 2016 statistical summary, BITRE, Canberra ACT.

<sup>5</sup> Passenger vehicles, light commercial vehicles, heavy vehicles (including trucks and buses), motorcycles and heavy mopeds.

<sup>6</sup> "In use" in the Sweden has the same status as "registered" in Australia.

## ***The Swedish Parliament adopted Vision Zero in 1997.***

***Sweden has one of the world's lowest traffic-related fatality rates.***

***Sweden continues its journey toward eliminating fatalities and serious injuries in the road transport system.***

## **The Journey**

- Aligning policy with evidence-based practice is essential to move forward.
- Integral to the process of creating a Safe System is collaboration among system designers at different levels of government and private industry. Decision-makers must commit to Vision Zero and work together to ensure that recommended practices are applied to their community's road system.
- Monitoring and evaluation of performance is essential. Before-and-after studies and ongoing reviews of road safety policies, strategies, operation and performance are powerful tools to support this effort. Systematic sharing of proven practices is also critical to advance Vision Zero's progress in cities and countries around the world.

Inspired by Vision Zero, European countries are increasingly improving road safety. Among them are Portugal and Spain, which have reduced the number of fatalities by 60-plus percent between 2001 and 2017.<sup>7</sup>

Among the cities, large and small, that have begun their Vision Zero journeys are: New York and Orlando in the United States; Mexico City in Mexico; Blackpool, Liverpool and London in England; Edinburgh in Scotland; and Montreal and Quebec City in Canada.

According to the US-based organization Vision Zero Network, a Vision Zero city is one that meets the following minimum criteria:

- A clear goal of eliminating traffic fatalities and severe injuries has been set.
- The Mayor has publicly, officially committed to Vision Zero.
- A Vision Zero plan or strategy is in place, or the Mayor has committed to doing so with a clear time frame.
- Key city departments (including police, transportation and public health) are engaged. >

<sup>7</sup> European Transport Safety Council

## Vision Zero Can Make a Difference Throughout the World

Road fatalities per 100,000 inhabitants

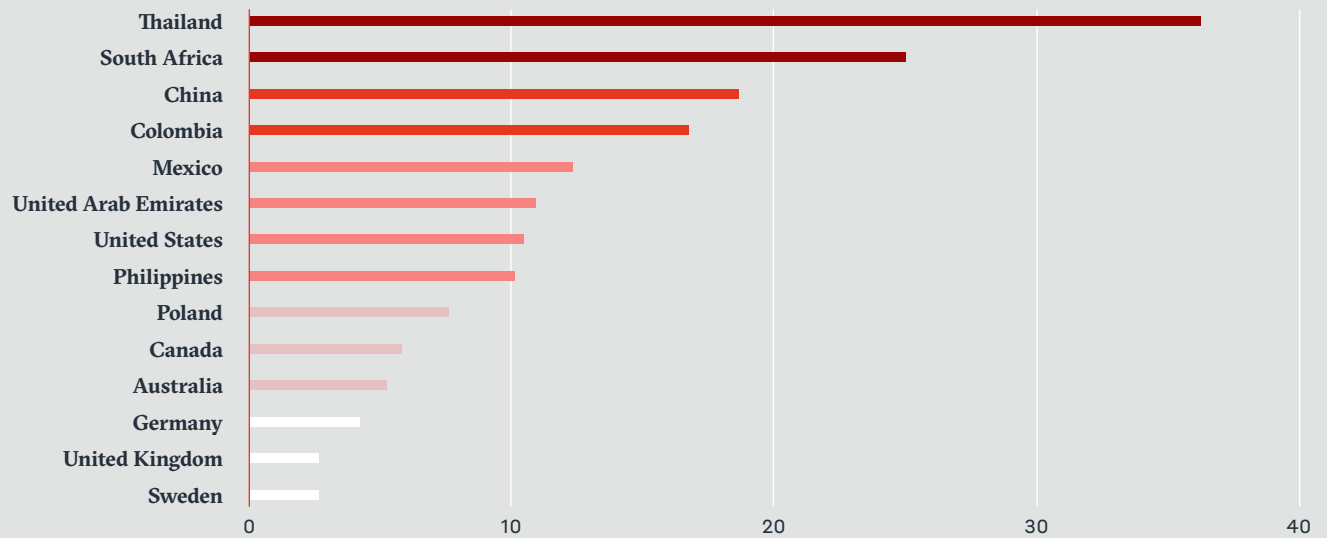
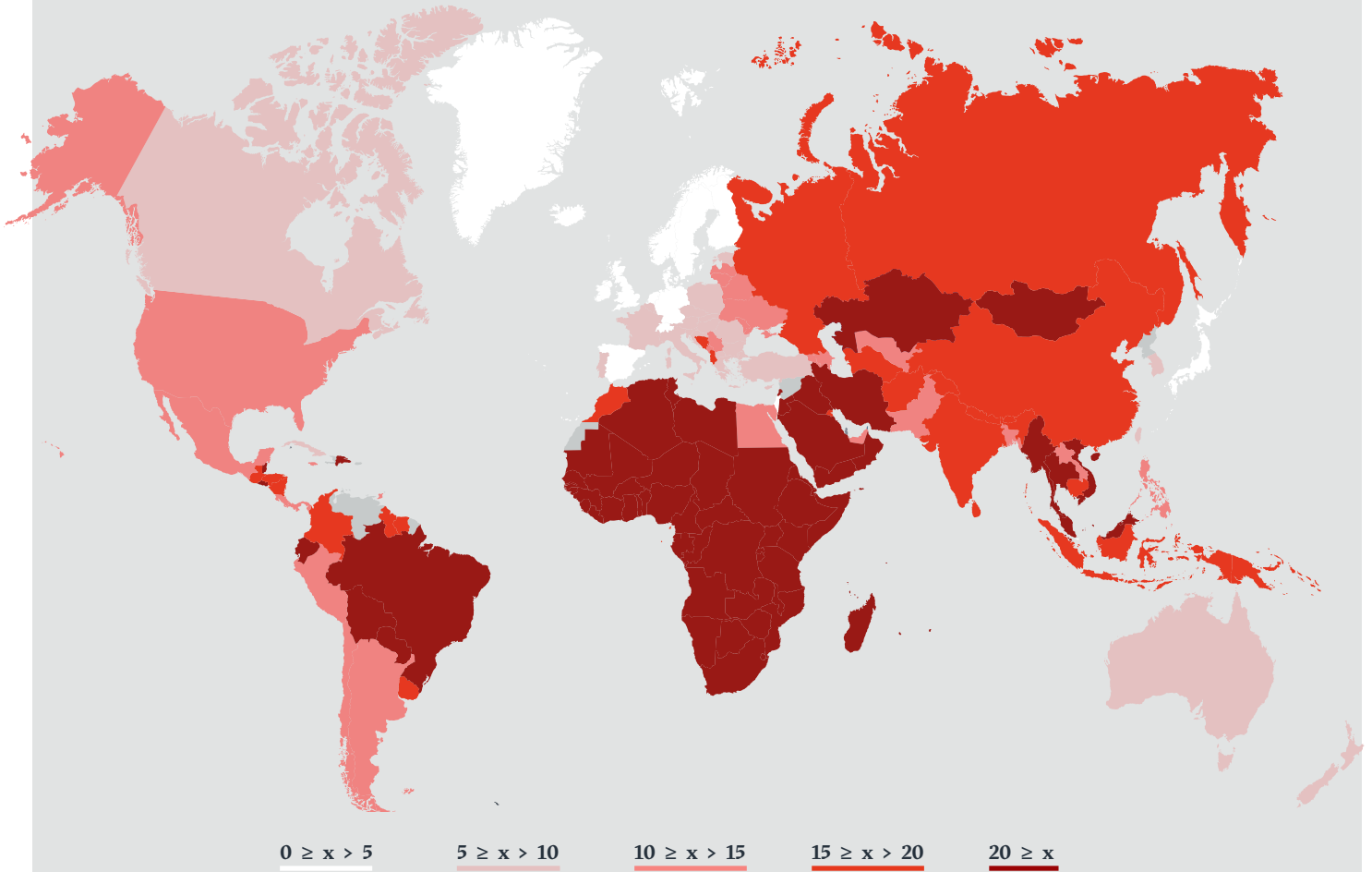
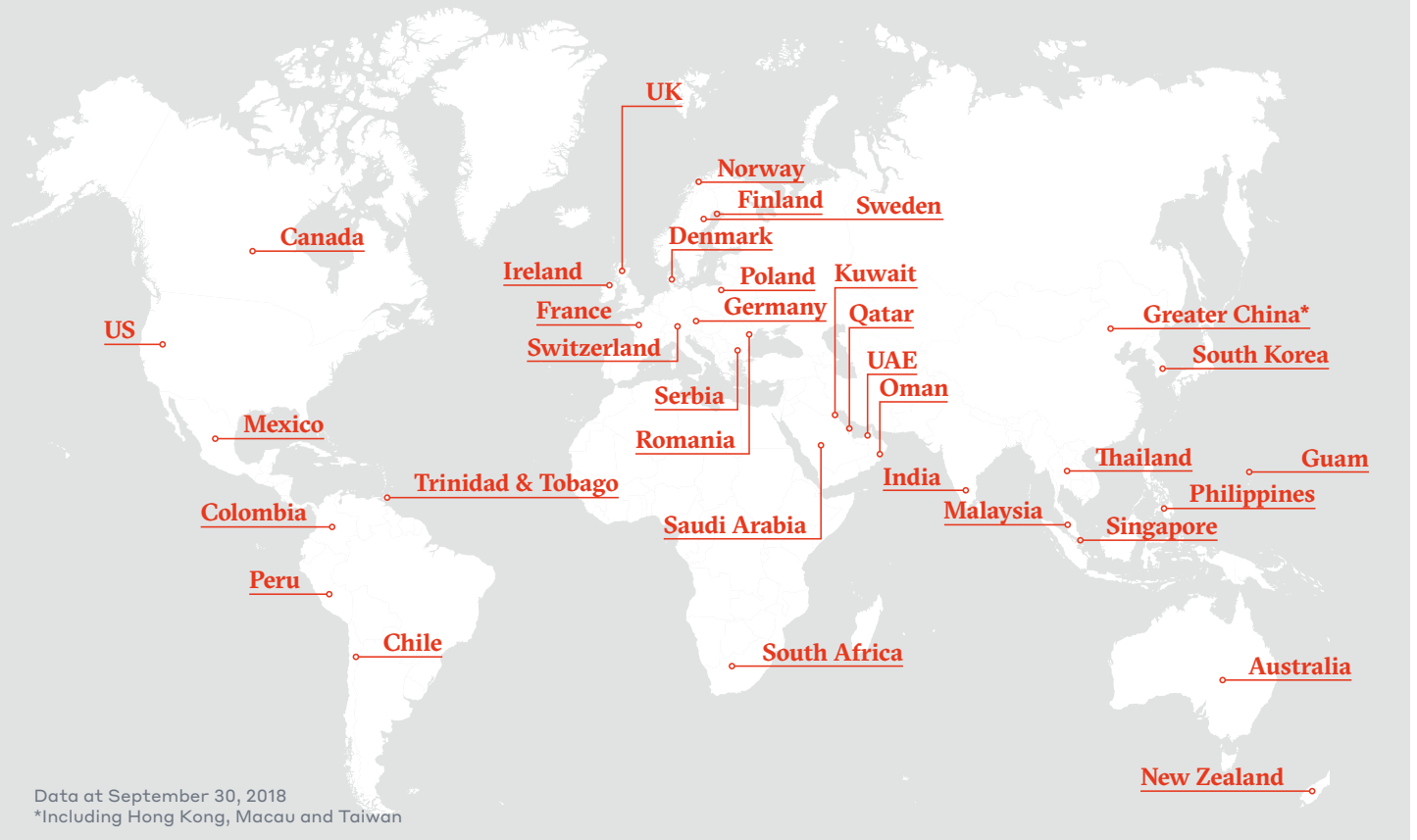


Figure 9 - Adapted from WHO 2013



**Geographical Reach: a close-to-client WSP perspective strengthened by an international understanding**

WSP can leverage the collaborative capability between our local specialists and international experts to advance Vision Zero efforts throughout the world—everywhere they are underway, anywhere they are planned.



Data at September 30, 2018  
 \*Including Hong Kong, Macau and Taiwan

# Case Studies

Here is a look at how WSP is advancing Vision Zero in communities throughout the world. Projects focus on action plans, audits, urban planning, speed management, and designing safe rural and urban roads and streets.

## 1

### Toward a Vision Zero Action Plan

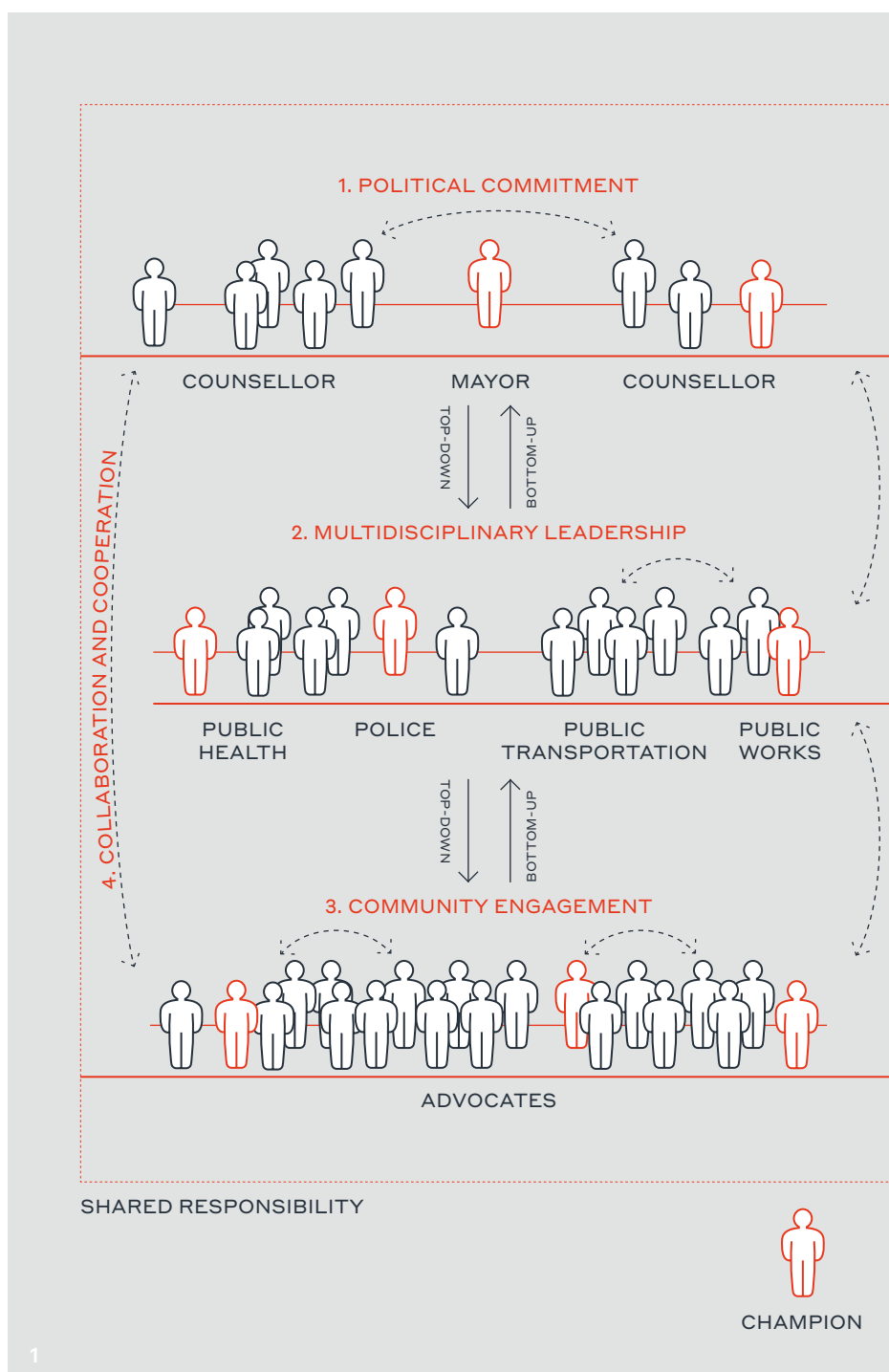
**LOCATION**  
CANADA

**CLIENT**  
CITY OF MONTREAL

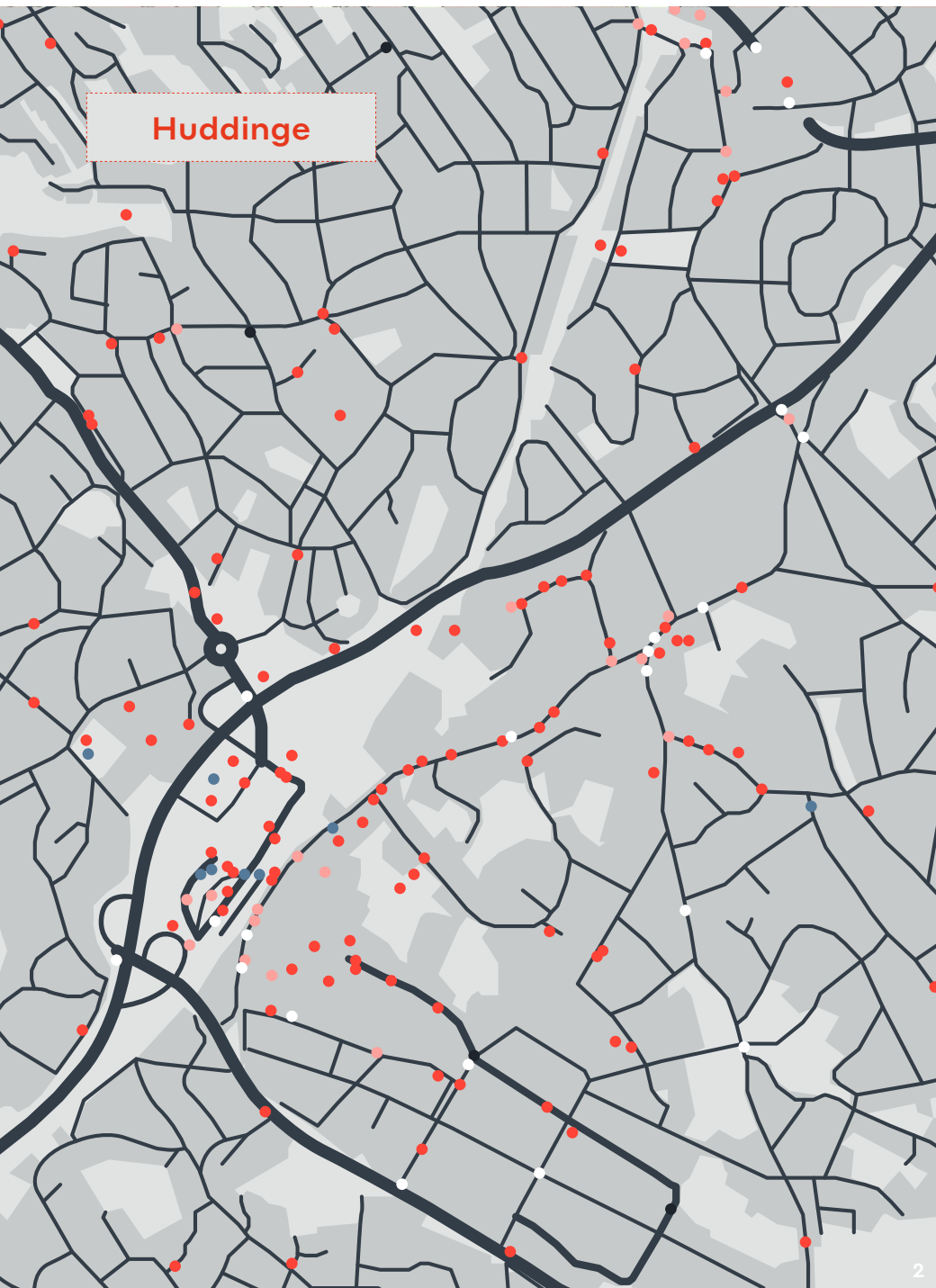
The project started in 2016 as a technical study to assess where the City of Montreal was standing in comparison with Vision Zero cities in North America. Three months into the study, the Mayor publicly announced Montreal was adopting Vision Zero. The conclusion of the study supported the decision to embrace Vision Zero with achievable, yet challenging targets.

The technical study was comprised of three parts. First, a synthesis of the required components of Vision Zero was made based on a literature review and 10 case studies. Second, the current situation in the city of Montreal was established through meetings with key stakeholders (including the public health department, police department and public transportation agency), leading to a safety evaluation of Montreal's road network for each component of Vision Zero previously identified. Third, recommendations were made by comparing the results of the first two parts of the study, which, in collaboration with City staff, were then prioritized according to current opportunities in the city.

Once the technical study was completed, WSP supported the City toward the development of a Vision Zero Action Plan for Montreal.







## 2

## Road Safety Strategy and Action Plan for Huddinge

**LOCATION**  
SWEDEN

**CLIENT**  
HUDDINGE MUNICIPALITY

Huddinge, a suburban municipality south of Stockholm with about 100,000 residents, needed a road safety strategy and an action plan in order to plan and manage road safety work—and thus fulfill its commitment to Vision Zero. Huddinge's traffic plan states an objective to increase sustainable travel, such as walking, cycling and public transport. Bringing about a road infrastructure environment that supports walking and cycling required a special initiative to implement road safety treatments for vulnerable road users.

WSP worked together with Huddinge Municipality regarding the road safety strategy and action plan. The strategy includes an analysis of the current situation and the establishment of road safety targets and measures.

WSP's advice was based on road safety research and Vision Zero best practices, plus local statistics regarding road traffic injuries and fatalities. Based on this data, the targets in the strategy focus on vulnerable road users, especially children, moped drivers (who are mostly teenagers) and elderly people. The action plan maps and prioritizes actions based on the location of schools and other places the young and elderly often visit, the safety of pedestrian and bike crossings, and speed regulations.



3



4

### 3 Direction Zero

**LOCATION**  
AUSTRALIA

**CLIENT**  
EASTERN METROPOLITAN  
REGIONAL COUNCIL

Perth's Eastern Region contains a mix of transport infrastructure along with major commercial, industrial and residential activities that generate large amounts of traffic.

WSP provided assistance and advice to the Eastern Metropolitan Regional Council to prepare and subsequently update their 2015-2018 Regional Road Safety Plan.

The development of the Regional Road Safety Plan was an identified action from the Regional Integrated Transport Strategy 2014-2016, and the plan is consistent with other strategic documents such as Western Australia's Towards Zero Road Safety Strategy 2008-2020, the national Road Safety Strategy 2011-2020, and the Main Roads WA Road Safety Strategy 2011-2015: The Road Towards Zero.

Work included defining the region's vision to "support, assist and advocate for the development of a fatality and serious injury free road network in Perth's Eastern Region" as well as setting objectives, priorities and outcomes, with a number of stated key performance indicators. Key focus areas of the plan included actions relating to safe roads and roadsides, safe speeds, safe road use and safe vehicles as well as road safety planning and governance.



### 4

### Road Safety Strategy and Action Plan

**LOCATION**  
REPUBLIC OF KIRIBATI

**CLIENT**  
MINISTRY OF PUBLIC WORKS AND  
UTILITIES, GOVERNMENT OF KIRIBATI

WSP's Australian road safety specialists reviewed all relevant background information with respect to previous work undertaken in order to identify and develop a set of practical recommendations that could be incorporated into the Government of Kiribati's overarching Road Safety Strategy and the development of a 2015-2017 Road Safety Action Plan (RSAP).

The consultancy services were required to progress existing work that had been undertaken in order to finalize the draft National Road Safety Strategy (NRSS) as well as to modify the supporting draft RSAP to better target and provide realistic actions over the first 12-24 months of the Strategy. As such, the RSAP needed to include clear and specific implementation programs, reflecting local capacity and available resources.

Client guidance included the need to focus on four major issues and an additional three elements. The seven areas identified were: leadership and capacity building; speed management; public transport (mini-bus) passenger safety; road safety school education; vehicle registration and driver licensing; the development of a crash data system; and drinking and driving.

The image shows a new footpath being constructed as part of the upgrade to the road network.

## 5

## Bay Area Vision Zero Action Plan and BAYVIZ System

**LOCATION**  
UNITED STATES

**CLIENT**  
METROPOLITAN TRANSPORTATION  
COMMISSION, SAN FRANCISCO BAY  
AREA, CALIFORNIA

In 2020, the Metropolitan Transportation Commission (MTC) adopted a Vision Zero policy and created a Vision Zero working group to help the region eliminate traffic fatalities and serious injuries. Data, policy initiatives, and technical assistance form the main pillars of MTC's Vision Zero efforts. WSP helped MTC to develop the Bay Area Vision Zero Data System (BAYVIZ) and the Bay Area Vision Zero Action Plan in partnership with technology firm mySidewalk.

BAYVIZ is a data-driven resource to help MTC stakeholders plan for Vision Zero implementation within a selected area of interest. Powered by software developed by mySidewalk, BAYVIZ uses a relational database of crash data, roadway attribute data, and demographic information to tell a story about safety needs within a boundary selected by an end user. Any agency in the Bay Area can use BAYVIZ to create an on-demand dashboard for a specific sub-area that immediately gives them actionable insights into safety issues in their area of interest.

Using BAYVIZ as the foundation of the data analysis, WSP developed the Bay Area Vision Zero Action Plan. This document includes a comprehensive literature review, a review of current safety practices in the Bay Area, and in-depth data analysis of region-wide safety data. The data analysis included a robust systemic analysis, highlighting which roadway features and land-use contexts most contributed to elevated crash risk. This analysis was used to inform challenge-area identification, countermeasures selection, and action steps.

## 6

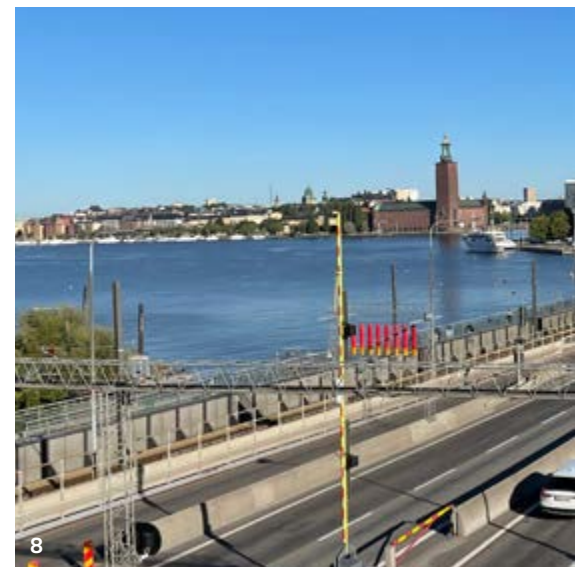
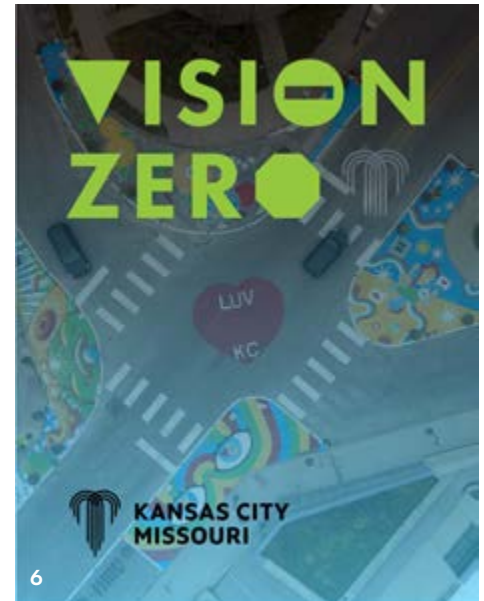
## Kansas City Vision Zero Action Plan

**LOCATION**  
UNITED STATES

**CLIENT**  
CITY OF KANSAS CITY, MISSOURI

Kansas City made a commitment to eliminate traffic deaths by 2030 by City Council resolution. This resolution noted the need for a Vision Zero Action Plan to guide all aspects of traffic safety in the city. Kansas City has among the highest rates of fatal traffic crashes of any similarly sized city in the United States. The city also has a long history of racial segregation and disinvestment in minority neighborhoods. Improving equity in Kansas City is a major focus today and was a major focus of this plan.

WSP led the effort to develop a comprehensive Vision Zero Action Plan, drawing on over a year of public engagement efforts directed toward traffic safety and mobility in the city. The Action Plan included an extensive data analysis effort that looked at the relationship between traffic crashes and race, land use context, roadway operations, and roadway features. One major finding from this effort was in the relationship between traffic congestion and severe crashes. As traffic congestion on streets decreased, fatal and serious injury crashes increased. This finding helped support countermeasures targeted at reducing roadway capacity to provide for transit, bicycle, and pedestrian facilities. The Action Plan included a detailed description of focus areas, most importantly speed and equity, a list of core safety principles to incorporate into all aspects of City decision making, and a detailed list of action steps related to policy, procedure, education, enforcement, and engineering.



## 7

## Building Support for Vision Zero

**LOCATION**  
UNITED STATES

**CLIENT**  
STAKEHOLDERS IN THE STATE OF TEXAS: GOVERNMENT (STATE, COUNTY, LOCAL) AND METROPOLITAN PLANNING ORGANIZATIONS

In an effort to reduce fatalities and serious injuries in Texas—which has the highest number of fatal car crashes of any US state—several communities have passed resolutions to adopt Vision Zero (VZ) or have gone further and developed comprehensive VZ plans. This represents only a handful of the hundreds of municipalities and metropolitan planning organizations across the state. A non-profit organization initiated Texas' first statewide VZ Summit in May 2022, bringing together local leaders, community advocates, engineers, planners and educators to discuss how to build support for VZ, how to get started, strategies for outreach and analysis, and success stories from individuals and agencies who have helped Texas communities start on the path toward VZ.

WSP was asked to help coordinate the summit, drawing on our safety experience and VZ efforts elsewhere via bi-weekly planning calls in addition to session-specific meetings. This model—blending keynote speeches, panel discussions, short presentations, and breakout sessions—may help other communities begin their VZ efforts. The entire summit was live-streamed, allowing for greater participation beyond people who could physically attend. This inclusive approach, key to VZ, expands the reach to participants who have physical or financial challenges that may hinder attendance in-person. Participants were encouraged to report on their VZ efforts—to share their successes and promote strategies which other agencies could benefit from adopting.

This summit laid the foundation for future VZ efforts across Texas. The summit will move around the state to better include local participation. Other states could implement this model, proving that change toward VZ does not need to start at the top—any group can advocate for change.



## 8

## Stockholm Vision Zero Program

**LOCATION**  
SWEDEN

**CLIENT**  
THE CITY OF STOCKHOLM,  
DEPARTMENT OF TRANSPORT

WSP prepared the basis for updating Stockholm's traffic safety program. The report included recommendations to achieve the goals of Vision Zero and connect targets to the global sustainability goals/2030 Agenda. Suggestions regarding focus areas and different kinds of measures were presented. The report presented how the city can manage, adjust and follow up systematically.

A review of the Vision Zero program established in Sweden and international Vision Zero programs inspired this effort; input was also obtained from research and development. In addition to the considerations traditionally included in a Vision Zero program, an analysis of trends and targets that have affected or can affect road safety were included—among them climate change, resource utilization and digitization. The analysis included recommendations regarding how to follow up on these trends and their impacts and how to reach targets. Recommendations were made regarding how Stockholm's Vision Zero program can be linked to sustainable travel and global sustainability goals such as social sustainability.





## 9

## E18 Norrtälje-Kapellskär

LOCATION  
SWEDEN

CLIENT  
SWEDISH TRANSPORT ADMINISTRATION

The E18 between Norrtälje and Kapellskär is one of the main heavy vehicle routes connecting Norway, Sweden, Finland and the Baltic States. It is the only remaining section of the highway between Oslo (Norway) and the port in Kapellskär that has not been upgraded to freeway standard.

While road safety issues currently exist, especially when ships depart or arrive at the port in Kapellskär, the existing traffic volumes do not warrant the design and construction of a freeway-standard road. The new highway will consist of an innovative 2+1 design with two lanes in one direction and one lane in the other, alternating every few kilometres (and separated by a safety barrier).

The project will be delivered through a design-build contract wherein WSP assumes the client's role as supervisors and technical experts for all disciplines. As part of this undertaking, WSP provided advice and support to the Swedish Transport Administration—recommending which results from the audits should bring about changes in the design (from concept design until early operating). WSP also recommended the most effective design.

The image shows the road during the construction of the 2+1 design.

## 10

## E45 Dorotea

LOCATION  
SWEDEN

CLIENT  
SWEDISH ROAD ADMINISTRATION

In the small town of Dorotea, the E45 serves not only as the main corridor for long-distance (interregional) traffic but also as the primary commercial and retail street of the town. While traffic volumes are not particularly high, there is a high percentage of long and heavy vehicles. In addition, the main street is narrow and passes close to schools and shops. As such, it is not considered a safe or pleasant environment for vulnerable road users. Safety problems associated with this road are not limited to the town site itself; they also exist when approaching the urban area from both directions.

WSP is carrying out the detailed design for the project, which involves creating safer conditions for cyclists and pedestrians when travelling along and crossing the E45 in Dorotea.

As the E45 belongs to the Trans-European Transport Network, a mandatory independent road safety audit must be conducted during the detailed design phase. The audit is being carried out by authorized WSP staff working in a different office in Sweden from the design team to provide an independent audit.

The recommendations in the audit include: providing safer conditions for vulnerable road users such as a different location for a pedestrian crossing; modifying intersection designs to better accommodate local traffic; incorporating safer railings; and highlighting the town border for approaching traffic.

The image shows the current road running through the town with the school in the background (left).

## 11

## E6 Freeway Interchange Rebbelberga

LOCATION  
SWEDEN

CLIENT  
SWEDISH TRANSPORT ADMINISTRATION

The E6 in the southeast of Sweden is one of the main heavy vehicle routes connecting Denmark, Sweden and Norway. The Rebbelberga interchange, close to Ängelholm, needed upgrading due to insufficient capacity. The new interchange includes a grade-separated roundabout above the freeway, replacing the old interchange that had included one bridge.

WSP carried out all design phases and monitored the project during the construction phase.

As the E6 is a part of the Trans-European Transport Network, the project included a road safety audit process which started with a road safety impact assessment. The impact assessment was conducted by WSP professionals from a separate location in Sweden to provide an independent assessment.

New knowledge from a WSP-conducted research project regarding interchanges and grade-separated roundabouts informed the assessment process, thereby supporting a new design and road safety improvement.

In the road safety impact assessment, WSP recommended a design for the roundabout with an embankment that would prevent cars from driving into the middle (a hole, where the straight bridge had previously existed) and down to the freeway below. The new design includes landscaping that is not only aesthetically pleasing but also clearly indicates the roundabout.

The image shows the overlaying roundabout in the freeway at the Rebbelberga intersection after construction.



10



11

## 12

## National Speed Management Plan

**LOCATION**  
UNITED KINGDOM

**CLIENT**  
TRANSPORT SCOTLAND

WSP's road safety specialists were appointed by Transport Scotland (in 2019) to update the guidance used to set speed limits on trunk roads and (in 2021) to develop a national speed management plan for Scotland.

Transport Scotland sets speed limits on trunk roads using the established guidance *Speed Limit Review – The Assessment Process*, which was published in 2012. Applying the guidance has reduced speed limits on some sections of trunk roads. In areas where speed limits were not reduced, Transport Scotland has often received objections from stakeholders and local interest groups.

WSP is recommending the integration of various tools into the guidance to align with key Scottish Government policies. To support Scotland's climate emergency policy, we proposed including the Department for Environment Food and Rural Affairs' Emissions Factors Toolkit, to document the carbon emissions for each speed limit. The Government's policy on active travel has been accounted for by using the Walking Route Assessment Tool to consider the existing active travel infrastructure. These tools advance the community characteristics that WSP has developed to inform the consideration of speed limits within small rural communities.

WSP development of the National Speed Management Plan will support Scotland's Road Safety Framework to 2030. Our literature review, extensive client consultation, global collaboration within WSP, and collision/speed analysis have informed our understanding of the baseline conditions of speed management across Scotland and around the world.

From our work, we have identified speed management initiatives that will support a national policy and the journey to Vision Zero. WSP has appraised these initiatives against the effect on road safety framework challenges, casualty reduction targets, the Scottish Transport Analysis Guide and WSP's Future Ready® considerations.

## 13

## Redevelopment of Barkarby

**LOCATION**  
SWEDEN

**CLIENT**  
JÄRFÄLLA MUNICIPALITY

The Barkarby shopping district, close to a new city development for 50,000 inhabitants, is currently planned for car travel. The existing layout—with unclear, confusing and unsafe street design for all road users—makes it difficult for residents from nearby urban areas to go shopping by bicycle or bus, or as pedestrians..

The project involved two phases. In the first phase, WSP carried out a feasibility study focused on treatments to enhance road safety, improving bus access and solving the traffic jams in the busiest areas. To improve safety and accessibility for all road users, WSP sketched a design that included several roundabouts, changing one car lane to a bicycle lane, and minor changes in the street layout. Microsimulation modelling showed that, despite one less lane, accessibility for cars and buses would increase thanks to the roundabouts. A win-win situation.

As property owners had expressed an interest in pursuing residential developments, phase two involved preparation for a master plan. Toward this end, WSP created a new layout that will make it possible to transform the shopping area into a livable city, step by step, with improved road safety.

The image shows a potentially dangerous scenario for pedestrians when crossing the multi-lane street and the lack of cycling facilities.







14



15

## 14

## Safe Bus Stops for Children

**LOCATION**  
SWEDEN

**CLIENT**  
VÄRMÖ MUNICIPALITY

The Värmdö municipality, situated in the Stockholm archipelago, has a growing population in the countryside villages. The municipality, which incurs an extra expense to provide school buses, wanted to know if it is possible for the children to use public transport instead.

This project entailed creating methods for inventory, evaluation and classification of public bus stops. After developing safety criteria, WSP performed an on-site inventory with a Geographic Information System (GIS) tool that WSP developed for this purpose. Road safety when walking along the road, the possibility for pedestrians to safely cross the road, and the safety at the stops were all evaluated and classified as good, acceptable or insufficient for children of different ages.

The project was delivered, in addition to a report and tables, in the form of a GIS database where the municipality can add attributes or change the content if conditions change.

The classification method is now used by the municipality administration when developing school travel road designs and actions that need to be taken to improve safety at public bus stops. The classification of the bus stops ensures all children are treated equally, regardless of their social and economic status.

The image shows a bus stop that is "good" for children who are waiting, as the waiting area is separated from the running traffic by a curbstone and the bus stop width; but the quality is "insufficient" for crossing the road (high-speed traffic and inadequate sight length).

## 15

## Long-Term Regional Cycling Strategies

**LOCATION**  
AUSTRALIA

**CLIENT**  
DEPARTMENT OF TRANSPORT  
(WESTERN AUSTRALIA)

In 2017, WSP was commissioned to develop long-term cycling strategies for the Bunbury–Wellington, Leeuwin–Naturaliste, Warren–Blackwood and Greater Geraldton subregions. The projects, which are ongoing, have involved collaboration with local governments, regional development commissions and other government and non-government stakeholders. The resulting strategies set out a number of long-term, aspirational cycling routes aimed at improving quality of life in regional areas, with a strong focus on identifying interregional connections and cycle-tourism opportunities.

In developing these strategies, extensive consultation was undertaken with key stakeholders and the local community. The consultation has helped refine the overarching aims and objectives of the strategy, as well as clarify the community's expectations in terms of where key routes are most needed and the requirements of different user groups.

To inform the planning process, WSP undertook a thorough desktop review of existing cycling routes, existing cycling demand and historical crash data.

A key component of these projects has been the development of a clear and coherent route hierarchy. The route hierarchy is based on the "8 to 80" design philosophy—meaning that all future cycling routes should be suitable for people from 8 through to 80 years old. It is based on the idea that if you plan a cycling network which meets the needs of these people then it is likely to be suitable for cyclists of all ages and abilities.

## 16

## Christchurch Cycle Network Planning

**LOCATION**  
NEW ZEALAND

**CLIENT**  
CHRISTCHURCH CITY COUNCIL

WSP was appointed to undertake planning, community consultation, design and delivery for a number of city-wide Major Cycleway Routes (MCRs) throughout Christchurch City. Over a two-year period, our team was responsible for delivering the planning and design aspects of over NZ\$150 million of capital investment in new cycleways.

As part of this project, WSP undertook a Safety Audit Network Functionality (SANF) review of major cycleway routes throughout Christchurch. This process involved combining a safety audit with an assessment to understand the influence that facility type has on a person's tendency to cycle.

The project received a "biking to the future" award from the New Zealand Transport Agency at the 2016 National Walking and Cycle Conference.

One of the major takeaways of this project was the power of photomontage cross-sections. Visualizations (like that shown) were key to informing the public how the project will impact their neighbourhood, and instrumental in gaining community support.





17

## New Jersey Complete Streets Design Guide

**LOCATION**  
UNITED STATES

**CLIENT**  
NEW JERSEY DEPARTMENT  
OF TRANSPORTATION

Complete Streets are designed to meet the needs of all users, promoting communities where people can travel safely and where walking, biking and riding transit are promoted by street and community design. Building on prior work preparing and implementing statewide training programs on Complete Streets, the New Jersey Complete Streets Design Guide presents treatments and techniques for designing “complete streets” in a variety of settings. The goal is to enhance a street’s safety, mobility, access and vitality by informing all projects that impact the public right-of-way, including the construction of new streets and improvements to existing streets.

Although New Jersey is not a Vision Zero state, much of the guidance provided in the New Jersey Complete Streets Design Guide aligns with the goals and objectives of Vision Zero. Guidance is aimed toward creating a safer environment for all street users, with a focus on vulnerable users, including people walking, biking, and those with mobility challenges. In great part, the focus is on designs that will help eliminate crashes that cause fatalities and serious injuries in our transportation system.

The WSP team included a multidisciplinary group of experts who provided detailed guidance in each subject area. Our industry-leading visualization specialists developed three-dimensional renderings of Complete Streets design concepts and elements. The team developed a group of common street typologies in New Jersey and demonstrated how various Complete Streets treatments could be applied within those contexts.



18

## St. Peters Road Intersection: An Innovative Design Approach

**LOCATION**  
CANADA

**CLIENT**  
PRINCE EDWARD ISLAND DEPARTMENT  
OF TRANSPORTATION AND  
INFRASTRUCTURE

An innovative intersection design was necessary to address road safety and operational concerns at the St. Peters Road intersection on the Trans-Canada Highway in Charlottetown, Prince Edward Island (P.E.I.). After analyzing numerous intersection improvement and grade separation alternatives, the P.E.I. Department of Transportation and Infrastructure in association with WSP in Canada concluded that a partial displaced-left-turn (DLT) intersection configuration was the best solution.

Canada’s Road Safety Strategy 2025 and its Toward Zero vision of making Canada’s roads the safest in the world provide proven and promising best practices from around the world to address key road safety risk contributing factors. Although these best practices include intersection treatments such as jug handles, median U-turns and a selection of low-cost intersection improvement options, the inventory does not include the DLT configuration. This innovative intersection alternative is promoted by the United States Federal Highway Administration and has been used with great success by numerous state departments of transportation. Although new to Canada, the DLT is recognized in the 2017 Transportation Association of Canada’s Geometric Design Guide for its operational and safety benefits.

## 19

## Inverness Intersection: Bicycles and Car Traffic

LOCATION  
SWEDEN

CLIENT  
THE CITY OF DANDERYD

The Inverness intersection, located adjacent to the E18 freeway and part of a main transit route for buses and bicycles to Stockholm, was perceived as unsafe and unclear. The municipality wanted help in developing proposals for traffic-safety-enhancing measures, especially concerning the relationship between car traffic and bicycle traffic on the regional transit cycle path that passes the site.

The assignment was extended to also include a new access ramp to the freeway from a nearby bus terminal.

The project included several challenges:

- Crowded area with a lot of traffic in an important access point to Stockholm from the north
- Bus traffic and traffic on E18 should not be negatively affected by the measures
- The accessibility of bicycle traffic must not be restricted on the regional cycle path
- Technical constraints, including bridges, the freeway, and adjacent buildings
- Children and young people cross to school, so safety is especially important

A digital citizen dialogue was carried out with the help of an app where road users could leave comments linked to a geographical point. The dialogue generated helpful feedback. The views were compiled and answered; several of the ideas were further investigated, and WSP designed alternative measures toward determination of the solution, which was a new layout of the intersection including more space for vulnerable road users and traffic signals.

## 20

## Digital Billboards in City Streets

LOCATION  
SWEDEN

CLIENT  
CITY OF STOCKHOLM

New LCD technology has led to increasing demand for advertising in city streets. It is known from studies that advertising along highways may be a safety risk, but the safety risk in city streets is unknown. Therefore, the City of Stockholm carried out (2013-2015) research with moving advertisements on digital billboards in the city downtown to see if they pose a safety risk.

The WSP study was unusual as the content in the billboards was controlled during the studies and technical lighting data was tested for the purpose of its effect on road safety.

The WSP evaluation began by measuring brightness, glare and contrast. Thereafter, observations by car drivers and cyclists were carried out. Since distraction is a well-known risk, studies intended to measure whether the road users might be distracted by the advertisements. The car observations included test drivers of different ages in both daylight and darkness. The studies with cyclists were made at two bicycle paths where cyclists' head and eye movements were noted when they passed the advertising boards. These studies were done in daylight and darkness. The content in the billboards was controlled during the observations so that they alternately showed calm and more animated advertising.

The assignment also included an international literature review and interviews with road safety experts in other countries.

WSP delivered a main report with sub-reports that describe the different evaluation methods as well as a guideline for permitting LED advertising in streets.

## 21

## Developing a New District in Stockholm

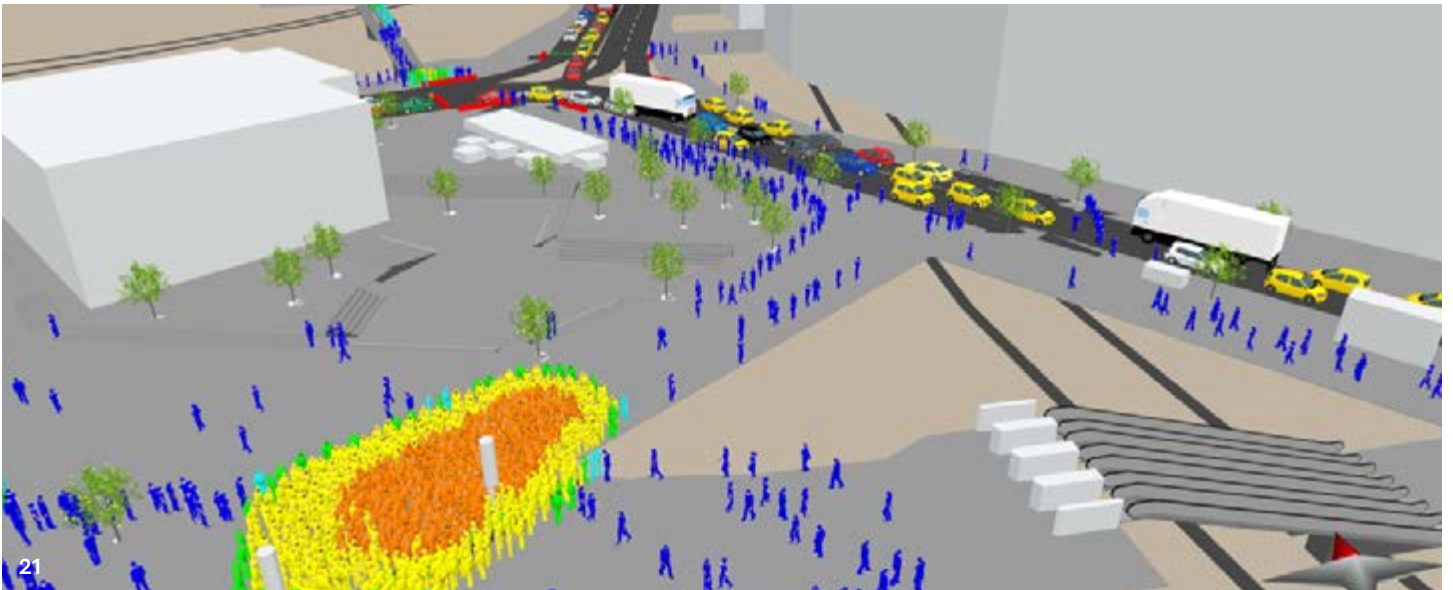
LOCATION  
SWEDEN

CLIENT  
CITY OF STOCKHOLM

The slaughterhouse area is under redevelopment in Stockholm, transforming the old district to a city district containing offices, culture, shopping, schools, residences and a new subway station. WSP is responsible for all traffic analysis in the district and the surroundings. The district is adjacent to a district with several large arenas; the largest hosts up to 45,000 visitors.

WSP (among other tasks) is performing pedestrian simulations before and after large events and a traffic safety analysis and audit. The traffic analysis contains four parts: analysis of crash statistics, investigation of existing conditions, audit of the new layout from a daily-life perspective, and an audit of the new layout together with the pedestrian analysis before and after large events. The analysis of crash statistics showed that a large portion of the personal injuries occurs during ordinary daily life, with peaks in mornings, lunch time and end of working days. Most personal injuries have been from pedestrians falls, but conflicts between different road users in intersections have also resulted in injuries. Before and after events, some personal injuries were related to congestion.

The review of the new layout considered daily-life risks and risks in connection to events. For the latter, the pedestrian simulations of different layout alternatives made it possible to identify possible risks and to suggest changes in the layout, such as capacity and design of pedestrian crossings, and also to give the city advice regarding choices between alternatives.





22

## 22 E22 2+1 Rural Road

LOCATION  
SWEDEN

CLIENT  
SWEDISH TRANSPORT ADMINISTRATION

E22 is a 14-kilometre-long road with high volumes of heavy vehicles travelling to and from a nearby port. The road is the only option for slow farming vehicles and cyclists, and it passes close to a school in one town.

The new highway will have a 2+1 design with a barrier in the middle (as seen in the image) and new grade-separated interchanges. In addition to the highway, the project involves alternative roads for slow vehicles, paths for cyclists and pedestrians, and connecting roads. Vulnerable road users and local traffic will be able to cross under or over the highway. In the town, there will be much less traffic, especially from heavy vehicles and thus better possibilities to implement traffic-calming treatments.

WSP has developed both the early-planning and the draft-design documents.

As the E22 is a part of the Trans-European Transport Network, the early planning included a road safety impact assessment. WSP also conducted the mandatory road safety audit for the draft-design stage.

## 23

### Bloor Street Bikeway Pilot

LOCATION  
CANADA

CLIENT  
CITY OF TORONTO

The City of Toronto initiated a pilot project for cycling facilities on a 2.4-kilometre segment of Bloor Street in 2015.

Some of the challenges involved in this project included the narrow width of the roadway, frequent intersections and a high density of commercial, residential and cultural land uses. The goal of the pilot project was to provide an improved cycling environment without undertaking any roadway reconstruction work.

WSP was retained to help the City engage the community, develop a suitable design and support the City through the Council approval process.

Drawing on input received from the community, fieldwork and an analysis of safety implications and appropriate countermeasures, WSP recommended a context-sensitive design option that included a bike lane protected by parked vehicles on one side of the street, and a buffered bike lane (separated by bollards) on the other. Working with City staff, WSP identified where parking, loading zones and turn lanes should be located on each block in order to minimize risks for all road users. This approach helped strike a balance between creating a more comfortable cycling experience and maintaining adequate levels of parking as well as mitigating negative traffic implications.

## 24

## Coromandel Motorcycle Loop

**LOCATION**  
NEW ZEALAND

**CLIENT**  
NZ TRANSPORT AGENCY

The Coromandel Peninsula is located on the North Island of New Zealand to the east of Auckland. It has a road network that is popular with motorcyclists due to the number of curves and the possibility of undertaking loop rides in the area.

The Coromandel loops have a high number of motorcycle crashes with 44% resulting in fatal or serious injuries on the northern loop and 36% on the southern loop. This compares with 18% overall on the rural state highway network in New Zealand. Typical key contributory factors for motorcycle crashes on the two routes are loss of control on bends, speed and poor handling, and road factors.

WSP (along with its client and input from Mackie Research) undertook two studies, one that looked at the northern loop and the other at the southern loop. Three key focus areas were identified: keeping riders on their motorcycles; ensuring hazards are removed, reduced or protected in case riders crash; and considering measures to reduce emergency response times. The outcome was a series of recommendations to improve road safety for motorcyclists. These included perceptual countermeasures using pavement markings and the development of systems—such as improved cell phone coverage and rescue helicopter landing pads—to reduce the elapsed time from the occurrence of an incident to medical assistance being provided.



## 25

## West Coast Drive Cycleway

**LOCATION**  
AUSTRALIA

**CLIENT**  
DEPARTMENT OF TRANSPORT  
(WESTERN AUSTRALIA)

In 2016 WSP was commissioned to develop concept designs for a new cycleway along West Coast Drive—a scenic north-south route along the Indian Ocean in the northern suburbs of Perth, Western Australia. The objectives of the project included improving the area's livability and vibrancy by encouraging more people to choose active modes of transport.

The design process involved the identification of a range of Local Area Traffic Management (LATM) measures aimed at reducing average vehicle speeds and traffic volumes, making conditions safer for vulnerable road users. The preferred design involved the separation of motor vehicles, pedestrians and cyclists, and incorporated a number of changes to on-street parking, bus stops and pedestrian crossing facilities. Achieving favourable urban design outcomes was also a key driver of this project.

West Coast Drive Cycleway demonstrated WSP's ability to work collaboratively with government agencies and advocacy groups, balancing the needs of different users. An important aspect of this project was the preparation of several architectural visualizations which helped communicate the proposed designs to key stakeholders.

## 26

## Vasagatan Complete Street

**LOCATION**  
SWEDEN

**CLIENT**  
CITY OF STOCKHOLM TRAFFIC  
ADMINISTRATION

Vasagatan is one of the main streets in downtown Stockholm, where there are many hotels, office buildings, restaurants and the Central Station with commuter and long-distance trains and buses. The street is also a commuter path for cyclists. To encourage cycling, the City decided to increase the accessibility for cyclists. Enhanced road safety was also a target.

Property owners in the area were eager to improve accessibility for both pedestrians and cyclists, as well as increase the street's attractiveness; they offered to contribute to the funding of a more comprehensive redesign than the city's budget allowed, with better-quality materials, wider sidewalks and more trees.

For the feasibility study, WSP mobilized an experienced multidisciplinary team of street designers, landscape architects, and urban and traffic planners, including cycling and road safety experts, to present two alternative layouts for the street: a "good enough" option within the city's budget, and a higher-end alternative that required the additional funding from the property owners. WSP used Light Detection and Ranging (LiDAR) technology, virtual reality and sketching to create perspectives that presented the designs to politicians and property owners when preparing funding decisions. The City and the property owners decided to create the higher-end alternative.

The reconstruction of the city street was completed in 2020.

## 27

## Armour Road Complete Street Plan

**LOCATION**  
UNITED STATES

**CLIENT**  
CITY OF NORTH KANSAS CITY, MISSOURI

Armour Road is the main commercial street in North Kansas City running through the historic downtown. It was also a street that had a history of crashes and acted as a barrier to walking and biking in the city. The Armour Road Complete Street Plan, managed by WSP, was designed to facilitate a safer and more inviting environment for all users, to spur economic development, and beautify the corridor.

The planning project included a robust public involvement campaign utilizing innovative techniques including holding the final public meeting in a "pop-up" parklet and a protected bike lane demonstration utilizing temporary marking materials, potted plants, and delineators. As a result of the successful planning project and public involvement, there was significant public and political momentum to move forward with implementation.

WSP took the conceptual layout from the plan to full construction documents. Construction included repurposing vehicle lanes to make space for a protected bike lane along the length of the corridor, pedestrian crossing improvements, landscaping, and streetscaping elements. A follow-up study found that the complete street improvements led to a significant reduction in traffic crashes and travel time and a significant increase in walking and biking on the street.

This project received the 2019 Award for Innovation from the Missouri Municipal League and the 2020 Award for Outstanding Implementation from the American Planning Association Missouri Chapter.





28

## Clark Avenue MultiModal Transportation Corridor Retrofit Project

LOCATION  
CANADA

CLIENT  
CITY OF VAUGHAN, ONTARIO, CANADA

The Clark Avenue project involved a comprehensive set of improvements to enhance all travel modes in the City of Vaughan, Ontario, Canada. This included the addition of 4.5 kilometres of new in-boulevard cycling facilities. The project was implemented within the existing right-of-way by narrowing vehicle travel lanes, shifting the curbs inward, and implementing side-inlet catch basins. The resulting corridor provides improved mobility and safety for all street users.

Lane narrowing and reduced turning radii resulted in significant technical benefits which in turn realized substantial cost savings and facilitated rapid implementation:

- 1.8 m total average pavement width narrowing, which increased boulevard space by 8,100 m
- Decreased operating speeds by up to 20km/hr closer to posted speed limits while operational improvements maintained overall motorist travel times
- Minimized impacts to existing trees along the corridor, avoiding the removal of 42 mature trees
- Eliminated conflicts with over 60 existing utility poles
- Reduced pedestrian and cyclist crossing distances

The project included improvements at 16 signalized intersections—with protected intersection elements at major intersections—that decreased risk exposure and improved comfort for people walking and biking. Additionally, piloting of “no right turns on red” signage, advance left-turning signals and a seven-second leading pedestrian interval at two regional intersections were undertaken separately by York Region.



## 29

## Vine Street Roundabout Corridor

LOCATION  
UNITED STATES

CLIENT  
CITY OF HAYS, KANSAS

The North Vine Street Corridor Study re-envisioned the gateway corridor to Hays, Kansas off of Interstate 70. The area—having a history of serious injury crashes—had been the focus of over 20 years of study, with no solutions developed. The corridor has a complex mix of frontage roads, closely spaced intersections, uncontrolled intersections, and a lack of pedestrian and bicycle access. WSP conducted an extensive corridor study to analyze safety, evaluate traffic operations using microsimulation modelling, and analyze bicycle, pedestrian, truck, and business access along the corridor.

An innovative roundabout corridor concept was developed focused on developing an access-managed roundabout corridor. The roundabout corridor includes four two-lane roundabouts with one “peanut”-shaped roundabout at a challenging closely spaced intersection with a severe crash history. The concept also includes extensive improvements to bicycle and pedestrian access and access management throughout.

The project construction was completed in 2021. Since completion, the City of Hays has noted that traffic flows better, and none of the crashes that have occurred on the corridor have resulted in an injury or death.

This project received the 2022 International Excellence in Transportation Award, Traffic Engineering Category, from the Institute of Transportation Engineers, and the 2021 Outstanding Engineering Achievement Award from the Kansas Society of Professional Engineers (KSPE) Smoky Valley Chapter.

## 30

## Bicyclists and Right-turning Heavy Vehicles

LOCATION  
SWEDEN

CLIENT  
CITY OF STOCKHOLM

The City of Stockholm wanted to know if crashes between bicyclists and right-turning heavy vehicles could be prevented by a design where the bicyclists at the right-turn bypass the traffic signal (so-called, protected or Dutch design) or whether there are other designs that could reduce the risk for these—not seldomly fatal—crashes. A requirement was that the designs should not increase other risks, e.g., between cyclists and pedestrians. The project included conflict studies and/or behavioral studies in four major intersections in downtown Stockholm, an international review, and an analysis of crash reports.

The project found that the proposed intersection design would not reduce the risk of serious crashes between cyclists and right-turning heavy vehicles as the crashes occur when the cyclists are moving straight forward and motor vehicles are turning. Therefore, the cyclists would not be safer with a free turn. This was confirmed in the international review. Free turns also increased the risk for crashes with pedestrians. The protected/Dutch configuration was previously more common in Sweden but has often been replaced in major intersections by separate signal phases, bike boxes, and/or setback stop-lines.

The project resulted in general guidelines and recommendations for intersection design. This study also showed the importance of reviewing and testing designs before large-scale implementation in the traffic environment.

# About WSP

WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. We design lasting solutions in the Transportation & Infrastructure, Property & Buildings, Earth & Environment, Power & Energy, Resources and Industry sectors, as well as offering strategic advisory services. Our talented people around the globe engineer projects that will help societies grow for lifetimes to come.



## OUR GUIDING PRINCIPLES

**We value our people and our reputation.**

**We are locally dedicated with international scale.**

**We are future-focused and challenge the status quo.**

**We foster collaboration in everything we do.**

**We have an empowering culture and hold ourselves accountable.**



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Can we trace horizons,  
hold true to our ambitions,  
*and hold ourselves  
accountable?*

**What if we can?**



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