

STRATEGIC PLAN 2024–2027

PIARC – THE WORLD ROAD ASSOCIATION

STATEMENTS

PIARC, the World Road Association, is a non-profit organisation established in 1909 to improve international co-operation and to foster progress in the field of roads and road transport.

PIARC Strategic Plan 2024–2027 was drafted by the Strategic Planning Commission and the Strategic Planning Working Group. It was approved by the PIARC Council in September 2023.

More information is available about PIARC from its Website: http://www.piarc.org

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Foreword



The World Road Association (PIARC) has been at the forefront of promoting international cooperation and exchange of knowledge on issues relating to roads and road transport for over 100 years.

As we embark on PIARC's new four-year work cycle, the importance of roads and road transport in our global society has never been more apparent. Roads connect people, facilitate trade and commerce, and provide access to essential services. Sharing knowledge that improves road practices.

The Strategic Plan 2024–27 reflects further improvements introduced during the previous cycle. Those changes aim to better meet the expectations of the Association's members through mechanisms that make it easier to contribute to and access the results of the work.

The Strategic Plan is the result of an extensive consultation process with First Delegates, Technical Committee members and other organisations. This plan describes our organisational goals and our Work Plan deliverables assigned to the various bodies of the Association.

Our Strategic Plan for the next four years reaffirms our commitment to PIARC's vision and our mission. We will continue to bring together road agencies from all over the globe to share best practices, learn from each other's experiences, and work towards improving road infrastructure and transportation systems in our member countries.

The Strategic Plan confirms PIRAC's determination to remain the leading international forum for discussion and exchange on road construction, operation and administration.

I would like to thank all those who have contributed to this Strategic Plan and have help promote the vision and mission of PIARC.

Nazir ALLI

President of the World Road Association

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Introduction

PIARC - The World Road Association

The World Road Association is a non-profit organisation established in 1909 as the Permanent International Association of Road Congresses (PIARC).

The Association's broad aim is to promote international cooperation and the exchange of knowledge on roads, bridges and, tunnels including various issues related to road infrastructure and road transport. With more than 120 member countries, the World Road Association brings together governments from all over the globe. Its members represent all levels of economic development and every region in the world. In addition to national governments, the Association includes regional authorities, collective members, and individual members through its National Committees. The National Committees bring together the diverse expertise outside of formal government agencies/departments from a variety of sectors, such as academia, private sector that enhances the knowledge base of the Association.

The Strategic Plan

The World Road Association Strategic Plan directs all the activities of the Association.

The Strategic Plan is adopted by the PIARC Council on the recommendation of the Executive Committee for the purpose of setting goals and guiding the work of the Association over

a four-year cycle – 2024 to 2027. It sets out the issues that will be considered, strategies including the envisaged and, desired outcomes.

The Strategic Plan 2024–2027 includes the Vision, Mission and Values of the Association including the themes and, work plan for the 2024 – 2027 cycle.

The Strategic Plan has two Sections:

- **Section 1** describes the organisational goals, direct the work of the Commissions, technical committees and task forces, and the General Secretariat. This is where the Vision, Mission and Values of the Association are recorded.
- **Section 2** explains the road and road transport goals, which direct the work of the Technical Committees and Task Forces within the Strategic Themes.

Purpose

The purpose of the Strategic Plan is to:

1. Guide the work of PIARC by:
    a. Setting organisational goals and providing a way to assess performance in delivering on those goals
    b. Providing strategic orientation for the work of the Commissions, Task Forces and Technical Committees, including their respective working groups to align with the organisational goals
    c. Giving clear direction to the General Secretariat on priorities in delivering on organisational goals.

2. Guide the work of Technical Committees and Task Forces by:
    a. Identifying and describing strategic themes that outline the key broad areas of focus for PIARC's research and reports
    b. Outlining and establishing the technical committees, task forces, cross cutting committees and other committees for each strategic theme and the outcomes and outputs expected from each committee.
    c. Providing a review mechanism for the coordination of its activities and quality control of its products. This includes providing leadership in the work of PIARC.



Section 1

The World Road Association's strategic direction and organisational goals

PIARC's Vision, Mission and Values

Vision

The vision of the World Road Association is to become the world leader in the exchange of knowledge on roads and road transport policy and practices within the context of integrated and sustainable transport.

Mission

PIARC's mission is to serve all its members by:

- being a leading international forum for analysis and discussion of the full spectrum of transport issues related to roads and related transport
- identifying, developing, and disseminating best practice and giving better access to international information
- fully considering within its activities the needs of low and middle-income countries
- designing, producing, and promoting efficient tools for decision making on matters related to roads and related transport.

Values

PIARC should:

- provide responsive and quality service to all its members
- be open, objective, and impartial to foster peaceful dialogue for socioeconomic development
- promote sustainable, integrated, and sound economic solutions that respect the differing international road transport needs
- be gender inclusive and diverse
- as a meeting point for road organisations, be non-partisan and areligious.

Challenges

The road sector around the world faces more urgent challenges than ever before. These include responses to pandemics, responses to intensifying natural disasters and man-made disasters, and de-carbonisation of the road sector. Social and technological factors include automation of driving, the digital economy and use of alternative materials for the construction of road infrastructure.

This section describes external and internal challenges faced by the world's road sector. It also describes the challenges facing PIARC.

External Challenges to The Road Sector

External challenge 1 – responding to extreme weather events

Extreme weather conditions such as intense rainfall, heavy snowfall, high temperatures, droughts, with forest fires becoming more severe and frequent. These pose serious challenges to road management. Road administrators need to be prepared for disasters by providing road structures that are robust against disasters and road management systems that react quickly against disasters. From a planning perspective, disaster-resilient road networks and urban structures are required.

External challenge 2 – reducing greenhouse gases from the road sector

Road transport accounts for 75% of greenhouse gas emissions from all transport and is under strong pressure to reduce its emissions. The automotive industry has responded by developing low carbon emission vehicles and technologies that are not dependent on the use of fossil fuels. The road sector needs to enable the use of low carbon emission vehicles through road infrastructure planning and decisions, for example roadside charging infrastructure and electric roads. The road sector should also advance the use of alternative materials that are less detrimental to the environment. This includes the building of smart roads that ‘talk’ to the road user. In road operations advanced traffic guidance using big data is required to reduce traffic congestion. In planning for road use and development, there is increasingly a need to consider activities and infrastructure that strengthen cooperation with other modes.

External challenge 3 – adapting to the digital economy

The digital economy, which was accelerated by the COVID-19 pandemic, is causing major changes in the movement of people and goods. For example, the volume of freight services has increased. There is an increase in heavy vehicle traffic, and in suburban areas, there is a need to expand distribution bases. As people commute less, there are changes in commuter traffic congestion patterns.

External challenge 4 – responding to increased automation of driving

The automotive industry is rapidly increasing the automation of vehicles. Technical and institutional barriers still inhibit the spread of fully automated vehicles, but the spread of driving support technologies for lower levels of automation is rapid. The development of detailed road infrastructure information may be required to support the increased automation of vehicles. There may be a need for road infrastructure and traffic management systems to provide more accurate information to vehicles through road infrastructure and traffic management systems than when most vehicles were manual.

External challenge 5 – tackling worsening road traffic safety

In developed countries the number of traffic accident fatalities is on the decline. However, traffic safety problems in low and lower-middle income countries are unfortunately a major cause of injuries and fatalities The causes include the design of roads, poor enforcement of road regulations, the greater volume of traffic and the large number of old cars. There are also road infrastructure factors, such as a lack of inter-city motor-highways and inadequate separation of vehicles and pedestrians in urbanised areas. PIARC supports the UN Second Decade of Action for Road Safety (2021 – 2030).

External challenge 6 – securing mobility and safety of vulnerable road users

Roads are used by a variety of users including vulnerable users, who lack the ‘protective shell’ provided by motor vehicles. This includes pedestrians, particularly the young, elderly, and those with disabilities. There are also an emerging new group of vulnerable users with the increasing array of electric micromobility devices such as e-scooters, e-bicycles and e-monowheels.

External challenge 7 – seizing national-level infrastructure investment planning

Large-scale national infrastructure investment programs are underway in several member countries. Motives include serving the underserved areas, rebuilding economies that have been devastated by the COVID-19 pandemic, improving resilience to disasters, and creating more jobs. In these large-scale infrastructure investment plans, roads play an important role.

External challenge 8 – improving the image of the road sector and raising awareness of roads contribution to sustainable transport solutions

Roads represent about 80% of all inland transport in most cases, now and will continue to be for the foreseeable future. In many member countries roads also constitute the largest portion of its infrastructure asset base. However, the road sector is often regarded negatively as being responsible for greenhouse gas emissions and other pollutants. Roads and road vehicles are often viewed as competing with, rather than complementing or enabling other transport modes to provide environmentally sustainable end-to-end journeys.

The importance of roads in the movement of goods and people, active transport (such as cycling), and innovation is sometimes overlooked. Roads that are poorly maintained are less safe and emit more greenhouse gases than well maintained roads. The view of roads may lead decision makers to become disinterested leading to reduced investment in development, maintenance and research on roads and road assets. PIARC will continue to raise awareness on how roads can contribute to sustainable futures.

Internal Challenges to The Road Sector

Internal challenge 1 – increasing use of varying funding models for road investment

In member countries, large-scale infrastructure investment plans are underway. However, many member countries face the competing challenges of funding social and economic infrastructure. To meet these disparate needs the trend is to fund economic infrastructure through innovative funding models such as public private partnerships.

Internal challenge 2 – securing diverse workforce by creating an attractive and inclusive workplace

The construction sector has not enjoyed the image that it should as an attractive career. In many countries it is difficult to secure human resources for the road sector because construction work is seen as hard, messy, and dangerous.

The sector is generally male dominated and, in some countries, has difficulty in recruiting a gender diverse workforce. To create a more diverse and inclusive transport workforce is crucial for productivity, business and economic growth. To attract and retain women and other unrepresented groups to the transport workforce will also allow for better planning and designing of a more inclusive transport system that takes all road users into account.

To attract talented human resources to the road sector the workplace must be inclusive, and diversity and equity must be actively promoted. Work conditions including holidays and salaries must also evolve. At the same time, it is necessary to create meaningful projects that people from all walks of life want to work on.

Internal challenge 3 – improving productivity of road administrations driven by digital transformation

The workload of road administration bodies is increasing. Road administrations face increasingly sophisticated requests, such as cooperation with other modes. They also need to respond to natural disasters, which are becoming both more frequent and extreme. While the workload is increasing, road administration departments are being streamlined. Road administrative entities need to improve productivity through all means including digital transformation in order to face such multifaceted challenges.

Challenges for PIARC

PIARC challenge 1 – effective dissemination of information in line with rapidly changing media and communications context

PIARC responds quickly to road administration issues collecting and disseminating knowledge from experts around the world. However, dissemination channels are constantly evolving. Monitoring and evaluation are needed to ensure that PIARC is using the best communication tactics and tools to respond to members' needs.

PIARC challenge 2 – ensuring representative membership, inclusivity and diversity

PIARC is a global organisation. However, PIARC has not always had membership of its forums that fully reflect the diversity of the world's population. A more diverse organisation that communicates effectively on engagement opportunities for all and that enables women, members from all regions of the world and from low and lower-middle income countries to actively participate in all forums can make PIARC a stronger organisation. Language, cultural differences, some largely male forums and a lack of familiarity with the working of PIARC are all potential barriers to participation.

A diverse organisation that enables women, members from all regions of the world and from low and lower-middle income countries to actively participate in all forums will encourage a variety of perspectives and ideas to be shared, leading to innovation and better decision-making.

PIARC challenge 3 – engaging members and supporting volunteers to maximise the impact of their contribution to PIARC

PIARC is a member organisation largely driven by volunteers and supported by staff committed to the mission and vision of PIARC. Keeping volunteers and staff well informed, motivated and engaged is vital. PIARC will need a continued focus on sustainable support for member forums, involvement opportunities that contribute to professional development and public acknowledgment of volunteer contributions to deliver on our mission and vision.

PIARC challenge 4 – demonstrating value by bringing context-relevant knowledge to low and lower-middle income countries

There is limited participation by low and lower-middle income countries in PIARC activities. The topics and technologies addressed in Technical Committees and Task Forces do not always align with the priority topics and relevant technologies for low and lower-middle income organisations. PIARC is committed to reducing this gap.

Strategic Goals and Measures of Success

This Strategic Plan adopts four Strategic Goals and proposed measures to assess if we are meeting those goals. These goals are:

Goal 1



PIARC will have a growing and engaged membership.

Goal 2



PIARC will have a nimble, and responsive technical work program that meets the expectations of its membership and adapt to respond to challenges.

Goal 3



PIARC products will be useful, relevant and widely accessible.

Goal 4



PIARC will be a model global not-for-profit member-driven organisation.

Information about how PIARC will achieve those goals is contained in the table below.

PIARC's strategic goals aim to ensure that PIARC prioritises work that helps it deliver on its vision and mission, while being consistent with its values.

PIARC aims to be the world leader in the exchange of knowledge on all matters related to roads and road transport policy by providing tried and tested methodologies and tools to all members to improve roads and road related transport practice.

Our strategic goals and measures of success reflect our vision and mission. To that end we should:

- ensure that our government membership covers nations from all regions and levels of economic development
- tailor our reports, guidance and tools to the needs of our members, so they can be used by all member organisations and adapted for different climatic, geographic and regional needs
- create technical committees and task forces that are efficient, diverse, representative and produce timely, high-quality products for use by all members.

As a member organisation, our strategic goals should ensure PIARC:

- speaks to and for the majority of national road authorities and provides a range of materials that are widely used
- is agile and able to respond to change and adapt quickly to meet member needs
- is financially sustainable and has the resources to deliver on our mission and vision
- has an active and passionate volunteer base whose contribution is recognised and valued
- has committed and strategic leadership
- is committed to performance evaluation to advance its vision and mission.

Goal	How goal will be achieved	Proposed measures of success
 **Goal 1:** PIARC will have a growing and engaged membership.	The General Secretariat will work with Commissions to develop a membership engagement and expansion strategy and will report on its implementation to each Executive Committee meeting. PIARC will review its membership benefits and services to ensure they are attractive and add value for members, and update promotional materials accordingly. PIARC will promote the economic and decision-making benefits to Government members and National Committees of increasing the PIARC collective and individual membership in their countries. PIARC will enhance efforts to mobilise its extensive network of National Committees by catering to their varying needs in terms of support and activities. The General Secretariat will report annually on the proportion of national members by UN geographic region and by World Bank income classification level who are members of Task Forces and Technical Committees. The General Secretariat will also report on those member governments that are not represented on any PIARC forum. PIARC will monitor and report on the delivery of the Gender Inclusion and Diversity Strategy.	Government membership of PIARC increases. Collective and individual membership of PIARC increases. Member engagement increases both in terms of participation in activities and satisfaction, as measured through data monitoring and surveys. The Communication Commission will provide strategic advice to the General Secretariat to develop communications with National Committees to improve satisfaction rate by 2027. Government membership includes at least 60 percent of each World Bank country classification (high, upper-middle, lower-middle and low) and for each United Nations geographic region (Africa, Asia, Europe, Latin America and the Caribbean, Northern America, and Oceania). The diversity of membership in all parts of PIARC increases by age, gender, geographical location, and country income category.

Goal	How goal will be achieved	Proposed measures of success
 **Goal 2:** PIARC will have a nimble, and responsive technical work program that meets the expectations of its membership and adapt to respond to challenges.	PIARC will continue to convene technical committees and task forces of international experts, to analyse best practice and recent developments and produce reports. PIARC will organise knowledge sharing events, such as Congresses and international seminars, including in diverse low and lower-middle income countries. The Strategic Planning Commission will: • Develop a strategic planning calendar for the four-year cycle (including continuity between consecutive cycles) • Oversee development of the work program for the four-year cycle from the Strategic Plan, including: – Monitor implementation of the existing Strategic Plan and work program – Oversee the PIARC International Seminar program - ensuring a representative geographic spread, evaluating the program and producing recommendations – Propose revisions to the work program during the four-year cycle – Manage the Special Projects facility to ensure topics proposed are outside the Strategic Plan (Work Plan) • Revise the Strategic Plan for the next cycle and ensuring consultation, including: – Reviewing PIARC's structure – Commissions, Strategic Themes and Technical Committees – Planning and developing strategic direction and foresight sessions for the World Road Congress and the World Winter Service and Road Resilience Congress • Other projects and tasks as the Executive Committee assigns to the Commission from time to time (e.g. Organisational planning).	Reports and other outputs are delivered on time during the strategic cycle, reviewed by Strategic Theme Coordinators before publication, and released according to the communications plan. Dissemination results are monitored on an ongoing basis. Event attendance and satisfaction with events increases, as measured through data monitoring and customer surveys that allow segmentation based on demographics. Increased number of outputs tailored to decision-makers. Experts from low and lower-middle income countries find increased value in being involved in PIARC technical committees and task forces, as measured through surveys. The Strategic Planning Commission will continue to provide biannual reports on the implementation of PIARC's strategic plan.

Goal	How goal will be achieved	Proposed measures of success
 **Goal 3:** PIARC products will be useful, relevant and widely accessible.	The Communication Commission will lead an organisation-wide consultation on a communications strategy including in-depth audience analysis and key messages, along with recommendations on the best channels and formats. The Communication Commission will advise and support the General Secretariat on annual communications planning. This will allow for prioritisation of activities based on an analysis of required resources compared to capacity, value to members, and timeliness. The Communication Commission will advise and support the General Secretariat to develop knowledge translation tools for Task Forces and Technical Committees throughout the cycle (e.g. guidance on synthesizing knowledge in more executive formats for decision-makers). This could include strategic advice on targeted dissemination plans for selected outputs that have the greatest potential for international visibility. PIARC will leverage partnerships to scale up dissemination internationally, seeking high return opportunities for knowledge sharing with academia in particular. The General Secretariat will implement monitoring tools to better assess uptake of materials and understand preferred formats, as well as to track member engagement levels.	The General Secretariat will provide biannual progress reports on the implementation of PIARC's annual communications plan, under the oversight of the Communication Commission. Progress made on achieving the Communications Strategy's longer-term goals and objectives will be evaluated. Targeted dissemination plans are created for selected outputs that have the greatest potential for international visibility and results are closely monitored. PIARC products will be available in the three official languages and reflect a range of viewpoints. Co-operation and dissemination agreements are established with partners, focusing on key audiences, regions, topics or industries that are currently harder to reach. Demonstrate increased uptake of PIARC products among all members, particularly decision-makers.

Goal	How goal will be achieved	Proposed measures of success
 **Goal 4:** PIARC will be a model global not-for-profit member-driven organisation	The General Secretariat will support all PIARC bodies to the level determined by the Executive to ensure the contribution of volunteers and staff is maximised. A policy on enhanced virtual/hybrid participation will be developed, in consultation with the Commissions. Virtual forums will be designed to accommodate the differing time zones and level of technology available to all and make innovative use of interactive tools to boost engagement. The General Secretariat will routinely publish a rolling forward calendar on the PIARC website up to 12 months in advance with all Commission meetings, task force and technical committee meetings and special meetings. PIARC will ensure financial sustainability by increasing membership and revenue. The Finance Commission will prepare a rolling four-year business plan in order to meet the strategic and operational requirements. The plan will be cognisant of the cost of the projects (see goal 2) and of recommendations from the Executive Committee for organisational improvements. The Finance Commission will monitor and report on: • membership levels and fee payments • the use of the PIARC Special Fund by representatives from developing countries The Finance Commission will: • propose rules on financial assistance for: – the Committees, Working Groups and Task Forces – official representations • review budget proposals for the World Road Congress and World Winter Service and Road Resilience Congress, including Congress fees • review the budget allocated to communications based on communications strategy recommendations and benchmarking.	All members of all PIARC bodies can participate actively and fully, and can plan their attendance well in advance. Virtual spaces, hybrid working methods and virtual knowledge-sharing activities (webinars, online conferences, etc) are used and members indicate satisfaction with them. PIARC revenue remains above expenditure.

Other PIARC Strategies

PIARC Council and/or Executive Committee have endorsed other strategies that complement the Strategic Plan and help PIARC achieve our vision and mission. These are:

- Communications Strategy Goals and Objectives – Appendix 1
- National Committee Action Plan – Appendix 2
- Priorities For Gender Inclusion and Diversity for PIARC – Appendix 3

Monitoring Delivery of The Plan

The Strategic Planning Commission will continue to monitor and report to the Executive Committee on the delivery of Section 1 and Section 2 Work Plan over the life of the next four years. The Chair of the Strategic Planning Commission will report to the Executive Committee on overall progress on implementation on a biannual basis.



Section 2

The World Road Association's Work Plan

Main Structure

The Plan of Activities of the Strategic Plan 2024–2027 is made up of Strategic Themes that group related activities.

There are four Strategic Themes:



These four themes encapsulate the key issues facing road administrators and those involved in road construction, maintenance and operation.

Within these themes there are 20 Technical Committees and two Task Forces.

In addition, PIARC has established mechanisms to draw key issues together across the four Strategic Themes. PIARC has established the position of Theme Coordinator for Decarbonisation to draw together activities related to emissions reduction. We also have two Cross-cutting committees that help provide common terminology and comparable statistics.

The following sections provides information on:

- The importance of each Strategic Theme
- The Technical Committees and Task Forces within each of the four Strategic Themes
- The Terms of Reference for each Technical Committee and Task Force
- The activities/topics Technical Committee and Task Force as well as the planned deliverable and expected completion time for each topic/activity.

Strategic Theme 1 Road Administration 	Strategic Theme 2 Road Mobility 	Strategic Theme 3 Safety and Sustainability 	Strategic Theme 4 Resilient Infrastructure 
Technical Committees			
TC 1.1 Performance of Transport Administrations	TC 2.1 Roads for Accessibility and Mobility in Urban and Peri-urban Areas	TC 3.1 Road Safety	TC 4.1 Pavements
TC 1.2 Contribution of Roads to Economic and Social Development	TC 2.2 Roads for Equity, Accessibility and Mobility in Rural and Interurban Areas	TC 3.2 Winter Service	TC 4.2 Bridges
TC 1.3 Finance and Procurement	TC 2.3 Sustainable Freight	TC 3.3 Asset Management	TC 4.3 Earthworks
TC 1.4 Planning the Resilience of Road Networks - Climate Change and other Hazards	TC 2.4 Road Network Operations and ITS for Sustainability	TC 3.4 Environmental Impacts of Road Infrastructure and Transport	TC 4.4 Tunnels
TC 1.5 Disaster management	TC 2.5 Road infrastructure for Connected and Automated Mobility	TC 3.5 Road infrastructure for road transport decarbonization	TC 4.5 Decarbonization of road Construction and Road Maintenance
			TC 4.6 Road Design Standards
Task Forces			
TF 1.1 HDM-4 (postponed)			
Cross-cutting committees			
Terminology Committee			
Road Statistics Committee			

Strategic Theme 1 – Road Administration

Road administrators are responsible for ensuring that road and road related infrastructure is managed effectively and efficiently. This includes a wide range of tasks, from maintaining and improving road networks, to managing finance and procurement, to planning for the resilience of these networks in the face of climate change and other hazards.

Strategic Theme 1 Roads Administration responds to the key issues facing road administrators today and aims to provide information on how to address them.

Performance of transport administrations

Technical Committee 1.1 will progress issues related to Performance of Transport Administrations. One of the most critical issues facing road administrators is the performance of transport administrations. In order to ensure that the transportation infrastructure in your country is managed effectively and efficiently, it is essential to have robust systems in place to measure and monitor performance. This includes tracking metrics such as safety, reliability, and accessibility, as well as operational performance indicators such as travel times and congestion levels. By measuring and monitoring performance, road administrators can identify areas for improvement and take action to address them, ultimately improving the overall performance of the transportation system.

Contribution of roads to economic and social development

Technical Committee 1.2 will consider topics related to economic and social development. Roads play a critical role in connecting people to jobs, markets, and services, and are essential for economic growth and development. By investing in road infrastructure, road administrators can help to promote economic growth and social development, improving the lives of citizens across the country.

Finance and procurement for road agencies

Technical Committee 1.3 will undertake tasks related to road financing and procurement. Managing finance and procurement for road agencies can be a complex and challenging task. It is essential to ensure that resources are used effectively and efficiently, and that procurement processes are transparent and fair. By ensuring that finance and procurement are managed effectively, road administrators can ensure that resources are used to maximum effect, ultimately delivering better outcomes for citizens.

Planning the resilience of road networks – climate change and other hazards

Technical Committee 1.4 will consider issues related to the resilience of the road network. As climate change continues to have an increasingly significant impact on our world, it is essential that road administrators take steps to ensure the resilience of their networks. This requires careful planning and investment in resilient infrastructure, as well as ongoing monitoring and adaptation to changing conditions. By planning for the resilience of their networks, road administrators can ensure that their infrastructure is able to withstand the impacts of climate change and other hazards, ultimately improving safety and reliability for citizens.

Disaster management

Technical Committee 1.5 will progress topics related to improving the way road agencies manage during natural disasters. Disaster management is a critical issue facing road administrators. Natural disasters such as floods, landslides, and earthquakes can have a devastating impact on road networks, disrupting transportation and causing significant economic and social harm. By developing robust disaster management plans and investing in infrastructure designed to withstand these events, road administrators can help to mitigate the impact of disasters, ultimately improving the safety and resilience of their networks.

HDM – 4

Task Force 1.1 will consider how PIARC manages the future of Highway Development and Management Model (4) in conjunction with our partners and users of HDM – 4.



Technical Committee 1.1 – Performance of Transport Administrations

Overview

The arrival of the 4th Industrial Revolution and the rapid development and fusion of multiple disruptive and innovative technologies are changing the behaviour and the expectations of customers and stakeholders all over the world. At the same time demographic, economic, development, environmental, technological, and other trends are changing the demand for moving people and freight; the mobility options available to serve our customers; and the capacity of Transport Administrations to carry out their mission.

During the 2023-2027 Cycle, PIARC's Technical Committee (TC) 1.1 "Performance of Transport Administrations" explored topics on Customer Experience, Public Value Creation, Emerging and Disruptive Technologies, Workforce, and issues on Diversity, Equity, and Inclusiveness. One of the common threads identified among these topics was how Road and Transport Agencies will need to evolve in the future to address the challenges brought forward by the many externalities.

In the 2024-2027 cycle, TC 1.1 will extend their work through the umbrella topic of the "Transport Agency of the Future" with furthering the analysis of the following three (3) topics:

1.1.1 The Transport Agency of the Future

1.1.2 Public Value Creation by Transport Agencies

1.1.3 Strengthening Workforce Through Modernizing Skills, Enhancing Diversity, Equity, and Inclusion

Through the three areas of work identified above, TC 1.1 with support from PIARC's Communication Commission, will also investigate the cross-cutting issue of how road agencies can improve their image and standing with the public and stakeholders.

1.1.1 The transport agency of the future

Purpose: The purpose of this work is to investigate how the transport agency of the future must evolve to meet the changing customer needs, how to leverage technology and innovation, with highlights on different important aspects such as, role and function, changing and evolving transport agencies, business and operating models, addressing issues of equity, diversity, and inclusivity, addressing uncertainty, impact of digitalization including the impact of Artificial Intelligence (AI), and incorporating innovation at the organizational level, the efficient and high-performing agency. How do transport agencies enable effective engagement and dialog with the evolving stakeholder ecosystem and how do they work with other public and private entities to carry out this mission.

Preliminary research questions:

- Identifying key megatrends and process of addressing them
- Special attention to equity and inclusivity
- New modes and mobility trends including multimodality
- Business and operating models of the TA of the Future
- The Innovative Agency (Promote innovation / The Contribution of Transport Agencies Disruptive Technology and Service Models) [Innovation – How do you foster innovation, create a culture of innovation in Transport administrations?]
- Artificial Intelligence (AI) and Digitalization (Dx) for better efficiency of road organizations

Importance to roads agencies: This work is important to road and transport agencies as they are dealing with key issues and uncertainties that would reflect their future organizational development, function and form. Furthermore, the importance of this work ties directly to the delivery of the evolving mission of road and transport agencies and the shifting importance from hard infrastructure to user experience, and societal public value creation.

Audience: Road and transport agencies, customers and stakeholders, wider government and other public administration, researchers.

Deliverables: Technical report, round table discussions, seminar, workshop or conference, promotion at PIARC partner events.

Background to TC's work on this topic: See previous publications from TC 1.1 and TC A.1, including the Workshop organized by TC 1.1 on the Transport Administration of the Future as part of 27th WRC in Prague.

Low and lower-middle income countries: LMICs could directly contribute and benefit from the work as they are also dealing with key issues of uncertainty that would reflect their future organizational development, function and form.

Gender inclusion & diversity: Gender inclusion and diversity is integral to the work undertaken through this topic.

Potential duration: 4 years.

1.1.2 Public value creation by transport agencies

Purpose: The purpose of this work is to explore how the principles of public value can be considered by transport administrations as they redefine strategic frameworks to better represent a focus on more holistic societal expectations.

Preliminary research questions:



- What drivers should transport agencies consider in their strategic framework review that are linked to public value creation? Are there other drivers beyond resilience, sustainability, digitization, decarbonization, equity, accessibility, health, and security that agencies should consider in their strategic framework review linked to public value creation?
- How can Transport Agencies communicate the public value created and improve their overall image with the public?
- Can the use of customer experience in evaluating the implementation of new technologies contribute to increasing the acceptance of new technologies and increasing public value?
- Is there any evidence that links improved design and planning approaches that include more comprehensive engagement that improves public value creation?
- What would agencies need to change in their existing strategic frameworks in order to capture more holistic societal expectations?
- How can agencies measure their progress in these emerging areas?

Importance to roads agencies: This work is important to transport agencies because transport agencies should produce value and a net positive for society. The approach adopted should be aimed at improving outcomes in areas not traditionally measured by transportation. Many emerging measures are closely tied to diverse societal goals through a more comprehensive strategic framework.

Audience: The audience for this work is governments who are exploring public value creation. This would include transport agencies considering a review and update of their strategic framework to better reflect holistic societal values.

Deliverables: Technical report, round table discussions, seminar, workshop or conference, promotion at PIARC partner events.

Background to TC's work on this topic: See Measuring Customer Experience and Public Value Creation for Transport Administrations; PIARC TC 1.1 Technical Report 2023.

Low and lower-middle income countries: The breadth of issues and drivers for lower and lower-middle income countries will be similar to that of higher income countries. There is an opportunity to learn from LMICs who have been dealing with the broader issue of public value creation of transport infrastructure for several decades.

Gender inclusion & diversity: The pure nature of public value creation is inclusive. Gender inclusion and diversity are part of equity, which is a driver included in non-traditional transportation and holistic societal values.

Potential duration: 4 years.



1.1.3 Strengthening workforce through modernizing skills, enhancing diversity, equity and inclusion

Purpose: One of the most critical and universal issues facing not only transport agencies in the public sector but the entire transportation industry is the one of workforce shortage, diversity, equity, and inclusiveness. This topic includes the inter-related issues of talent management, new competencies required as a result of new technological disruptions taking place within the transportation sector, and identifying what makes an attractive employer. Building upon the work of TC 1.1 in the 2020-2023 cycle, the issue of strengthening the workforce through modernizing skills, enhancing diversity, equity, and inclusion will be further developed under the umbrella topic of the Transport Agency of the Future.

Preliminary research questions:

- How do we bring together the aspects of Customer Experience and Equity, Inclusiveness, and Diversity to ensure inclusive engagement?
- What can be done to promote diversity acceptance in the workplace, and deepen the analysis of equity and diversity broader than what was covered by the TC 1.1 in the 2020-2023 Cycle?
- How are Transport Agencies tackling the challenges and obstacles of the different dimensions of diversity (Ethnicity/Indigenous/Gender/Age/Disability/Sexual Orientation/Language) in the workplace (to further the initial work covered in previous cycles)?
- What are the prominent equity issues that LMICs have to deal with (to further the initial work covered in previous cycles).
- How can Transport Agencies become an “attractive employer” – how to attract competent human resources to the transportation sector. What tasks and future goals need to be embraced by Transport Administrations to build an exciting professional image that appeals to inquiring and creative minds?
- Are there skills, new and old, that are more important then others when technology evolves fast? Skills on big data? What are the skills effected by AI? Are there certain skills that are extra important for Workforce ability to adapt to change?
- The Agency with Skills and Capacity Fit for the Future - competencies and capabilities needed in the future. How can transport administrations deal with this?

Importance to roads agencies: This work is important to road agencies because the issues of workforce development, diversity, equity and inclusion are universal. The ability of transport agencies to meet the challenges faced in their respective environments rely heavily on the capacity and ability of their workforce to meet those challenges. The transformational and technological disruptions faced by the transport sector requires the continuous development of the workforce. Attracting, training, and retaining talent with the diverse skillset required is a challenge that transport and road agencies face universally, many times competing for the same talent with the private sector. Furthermore, public agencies have a responsibility to ensure that they create an environment that values diversity, equity, and inclusiveness.

Audience: Road and transport agencies, other government and other public administrators, but also the private stakeholders in the transport sector. Academia and researchers may also find interest in the work and findings.

Deliverables: Technical report, round table discussions, seminar, workshop or conference, promotion at PIARC partner events.

Background to TC's work on this topic: See previous publications from TC 1.1 including the Foresight sessions and Special project on gender and inclusion.

Low and lower-middle income countries: The breadth of issues and drivers for lower- and middle-income countries will be similar to that of higher income countries. There is an opportunity to learn from LMICs who have been dealing with the broader issue of workforce development, diversity, equity and inclusiveness and talent management.

Gender inclusion & diversity: This topic is about gender inclusion and diversity in the workforce.

Potential duration: 4 years.



Technical Committee 1.2 – Contribution of Roads to Economic and Social Development

Overview

For the Cycle 2024–2027, the Technical Committee 1.2 Contribution of Roads to Economic and Social Development will analyse three issues:

1. Summarizing the role of road investment in recent national-level infrastructure investment plans - contribution and impact of road to the national-level plans for de-carbonization
2. Understanding the changes in traffic demand caused by the digital economy, the post-pandemic economy and social context, defining the tools to describe and estimate them - special attention to the impact of the change of economy in LMIC countries
3. Broader economic and social impacts of road infrastructure, considering the effects of road construction and operation on social groups (equity), on economic systems, on gender inclusion.

The cross-cutting objective of TC 1.2 is to provide an up-to-date and comprehensive overview of trends, tools, best practices in investment planning and analysis of economic and social impacts of road infrastructure with a focus on decarbonisation, gender inclusion and social equity, impact of the change of economy in LMIC countries, importance of roads in achieving equitable and sustainable development.

1.2.1 Summarizing the role of road investment in recent national-level infrastructure investment plans - contribution and impact of road to the national-level plans for de-carbonization

Purpose: The main objective is to analyse the trend of road investments in recent years, analysing what has led to certain investment choices compared to other modes of transport. The aim of the work is also to analyse how the strategic objective of decarbonisation is reflected in the investment plans of road administrations evaluating the impact at national level.

Preliminary research questions:

- What is the current state of road investments in the world and what are the main challenges?
- How has the trend of investment changed in recent years compared to other modes of transport?
- Which are the reasons behind certain trends in investment in the transportation sector?
- Which are the corrective actions to be taken?
- How do road investments promote environmental sustainability and reduce greenhouse gas emissions?
- How to highlight the role of the road in the context of inclusiveness and social equity?



- How much the decarbonisation and therefore a reduced environmental impact of the roads can contribute to revaluate the road to put like priority in the investment plans.

Importance to roads agencies: Summarising the road investments of recent years at national level gives road agencies a clear view of the current situation, past performance and future challenges. We must have a revaluation of the road as a fundamental infrastructure for accessibility, for intermodality and co-modality.

The importance of the road must also be highlighted through the concept of capillarity, which facilitates transport and with the contribution of road sector to de-carbonization.

Audience: A summary of road investment in recent years at the national level can be useful to a wide range of actors, including government agencies, planners, businesses, local communities, transport organisations and the general public. It provides clear information on the state of road infrastructure and the progress made in investment, facilitating future planning, informed decision-making and understanding of the role of road infrastructure in society.

Deliverables: Technical report, round table discussions, seminar, workshop or conference, promotion at PIARC partner events.

Background to TC's work on this topic: The importance of the role of the road and the investments in the sector are topics previously addressed in other studies on PIARC products, such as "The contribution of road transport to the sustainability and economic development" of 2020 and "Carbon neutrality of the road sector" of 2022.

Low and lower-middle income countries: Road investments can contribute to economic development, accessibility and mobility of people and goods within LMIC countries. A summary of road investments can provide a useful overview to assess the effectiveness of policies and guide future efforts to improve road infrastructure in the LCIM countries.

Gender inclusion & diversity: A summary of road investments can help highlight the challenges and opportunities to improve gender equity in road infrastructure by ensuring fair access to services, increased safety.

Potential duration: 4 years.

1.2.2 Understanding the changes in traffic demand caused by the digital economy, the post-pandemic economy and social context, defining the tools to describe and estimate them - special attention to the impact of the change of economy in LMIC countries

Purpose: Changes in traffic demand caused by the digital economy, the post-pandemic economy and the economic and social context can be understood and estimated through different tools and methods. The accuracy of traffic demand estimates will depend on the quality of the available data and the complexity of the factors involved. Understanding changes in traffic demand and its economic implications requires a multidisciplinary approach combining quantitative and qualitative analysis, using a combination of appropriate tools and methods.



Preliminary research questions:

- Which are the impacts of the digital economy on road transport?
- What were the main impacts of the digital economy on the changes in demand for network traffic?
- How has user behaviour in using digital services changed during the pandemic and how has this affected traffic demand?
- What are the main challenges and opportunities emerging from the changing of the traffic demand caused by the digital economy and the post-pandemic situation?
- What is the impact of the adoption of digital technologies on traffic demand in LMIC countries?
- What are the opportunities for international collaboration to support LMIC countries in addressing changes in traffic demand caused related with digital economy?
- Which are positive and negative effects of the digital economy on the global economy and traffic demand?

Importance to roads agencies: The study of changes in traffic demand is crucial to enable road agencies to adapt to changing social and economic dynamics, improve traffic management, increase road safety and promote sustainability in infrastructure and transport management.

Audience: This work involves several actors and stakeholders who may be interested in the studies and results on the analysis of changes in traffic demand caused by the digital economy, the post-pandemic economy and the economic and social context, as well as transport agencies and road agencies, also urban authorities and urban planners, public transport operators, consulting and data analysis companies and political decision-makers.

Deliverables: Technical report, round table discussions, seminar, workshop or conference, promotion at PIARC partner events.

Background to TC's work on this topic: This topic has been addressed earlier in "Carbon Neutrality of the Road Sector" of 2022, particularly the theme of changes following the coronavirus pandemic. While references to the impact of the change of economy in LMIC countries are present in the PIARC work "The Contribution of Road Transport to Sustainability and Economic Development" of 2020.

Low and lower-middle income countries: LMIC countries face challenges and opportunities arising from changes in traffic demand related to the digital economy. The adoption of targeted policies and strategies can help maximize benefits and address challenges, fostering the equitable, sustainable and inclusive development of digital infrastructure and transport services in low- and middle-income countries.

Gender inclusion & diversity: The digital economy offers new opportunities for access to services and economic opportunities. Promoting equal access and inclusion in these opportunities is key to combating gender inequalities. Policies must also meet different needs and consider diversity not only by gender but also by age and social context.

Potential duration: 4 years.



1.2.3 Broader economic and social impacts of road infrastructure, considering the effects of road construction and operation on social groups (equity), on economic systems, on gender inclusion

Purpose: Understanding the economic impacts of road infrastructure is crucial for progress and growth. However, the impacts of road infrastructures go beyond the economic aspect since they can substantially influence different areas of society promoting social equity by ensuring access to essential services for disadvantaged communities.

The results of the study can guide the decisions of road agencies, policy makers and local governments. In addition, the study can provide a basis for public participation in identifying investments and the promotion of policies that promote accessibility, security and social inclusion in communities served by infrastructure.

Preliminary research questions:

- What are the economic effects of road infrastructure on national development and economic growth?
- How can road infrastructure promote social equity and access to services for disadvantaged communities?
- What is the impact of road infrastructure on local employment and economic opportunities?
- How can road infrastructure improve people's accessibility and mobility, especially for disadvantaged groups?
- What is the impact of road infrastructure on the environment, including noise, air and land use?
- How can road infrastructure be designed and managed in an environmentally sustainable way?
- What is the importance of public participation and consultation of local communities in the planning and design of road infrastructure?
- What are examples of good practice in integrating economic, social and environmental impacts into road infrastructure decisions?

Importance to roads agencies: This work aims to give road agencies a clear overview of the economic and social impacts of road infrastructure. This work should help road agencies to identify ways to better understand the needs and concerns of local communities. This is particularly important to ensure significant involvement and public participation in decision-making. When road agencies understand the social impacts of road infrastructure, they can collaborate with communities to minimize negative impacts and maximize benefits.

Finally, the study can provide road agencies with a basis for long-term planning and resource allocation. Understanding the economic and social impacts of road infrastructure allows agencies to assess the effectiveness of their activities and to achieve the maximum possible impact with available resources.

Audience: Key users who could benefit from this study include not only road agencies but also government agencies responsible for the planning and management of road infrastructure. These agencies can use the results of the study to make informed decisions about planning and resource allocation for road infrastructure. They may consider economic and social impacts in order to develop strategies and policies that promote sustainable development and fair distribution of infrastructure.

Companies and the private sector could be interested in this study to assess the economic impacts of road infrastructure on their activities and to identify investment opportunities.

Finally, local communities and residents interested in the impacts of road infrastructure on their daily lives could benefit from this study.

Deliverables: Technical report, round table discussions, seminar, workshop or conference, promotion at PIARC partner events.

Background to TC's work on this topic: This topic has been addressed earlier in a call for proposal: "Social equity and social accessibility of transport systems" of 2022 whose final report should be published for Prague Congress in October 2023.

Low and lower-middle income countries: Targeted planning of the infrastructure network supported by this type of study could have a significant impact on economic development, accessibility, social inclusion and environmental sustainability in the LMIC countries. It is important to carefully consider the effects of different infrastructure scenarios and to adopt approaches that promote fair, sustainable and inclusive development.

Gender inclusion & diversity: Link between road infrastructure and gender inclusion concerns fair and secure access, economic participation, addressing gender challenges and family roles, and the participation of women in infrastructure decisions. It is essential to include gender inclusion and equity in analyses of the economic and social impacts of road infrastructure.

Potential duration: 4 years.



Technical Committee 1.3 – Finance and Procurement

Overview

Road infrastructures financing and procurement is always a big area of investigation. They are both ambit where the traditional national systems have known few changes. However, even keeping unchanged these traditional models some improvements and developments are necessary.

For the next cycle the TC 1.3 aims to focus on the analysis of how classic road financing and procurement systems can present themselves in a more credible guise and in step with the epochal changes of recent years. The analysis therefore dwells on the level of transparency of the road projects, on the decarbonisation of the funding and finance of these projects, as well as, finally, on how to finance the ecological transition of the existing infrastructure.

The analysis will therefore look both at future projects (providing some ideas and suggestions) and at past projects which, precisely due to the intrinsic characteristics of road infrastructures, continue to be projects of the present.

The value of transparency and all the assessments and safeguards aimed at ensuring that the Road Projects and the related sources of funding are in line with the ecological transition will therefore be at the centre of the proposed Work Plan and related deliverables.

Finally, the idea behind the type of deliverables selected is to provide quick and impactful response on each of the topic analysed to improve the social media presence of PIARC and to enhance the contribution of each TC member contributing to the implementation of this Work Plan.

1.3.1 Transparency in road projects

Purpose: This topic is focused on detecting the degree of transparency in each phase of a Road Project (procurement, performance, maintenance). Sometimes agencies' officers are concerned about making public certain information which could lead to a screening on the way they exercised their functions.

The aim of this work is discovering how much transparency has been granted in the past in 2/3 major Road Projects and how much transparency we must target for a more efficient operation of Road Projects.

Furthermore, transparency is not only a mean to control the way a project is handled but it can be also a source of data, which have a great economic and strategic value.

This kind of work is important for PIARC as a medium to enhance knowledge related to PIARC strategic theme and expand the network with partnership work.



Importance to roads agencies: This work is important to the road agency/road industry because transparency is closely related to the accountability of an agency/authority awarding new projects.

Audience/users: This work has benefit for many stakeholders related to road infrastructure: governments/road agencies/concessionaires and also financial institution involved in the financing of Road Projects. Public (other stakeholder of road infrastructure) will be provided with data those are useful to raise their awareness and voice their concerns.

Deliverables: Guideline, workshop or conference, social media.

Low and lower-middle income countries: Presenting transparency as a value is a powerful message. Encouraging transparency and accountability in road infrastructure will make road infrastructure project more efficient because cost assurance can be enhanced. Low and lower-middle income countries with limited funds will get a lot of benefit with the implementation of this guideline.

Gender inclusion & diversity: This work will give benefit to stakeholders without background separation. People from various background will be involved in this work and the implementation of the output. Gender inclusion and diversity will be ensured in this work.

Potential duration: 12 months.

1.3.2 How to make funding and finance de-carbonized: case studies

Purpose: The purpose of this work is to introduce a particular approach of funding and financing in the road infrastructures sector.

Nowadays is all about e green and circular road infrastructure to achieve net zero GHG emissions. The EU Taxonomy on sustainable investment has provided clear indication on how financial institutions and investor can contribute to the net zero target.

Innovative funding and finance are important such as using alternative tariff models, coalitions of sponsors in terms of extending the global reach, and others. In addition, this work is significant for PIARC as one of the key areas of interest for PIARC is the development of a sustainable and low carbon transportation system.

Importance to roads agencies: This work is important to road agencies/road industry because it contributes to understanding how a classic infrastructure project can be seen as a good investment for green finance and therefore it can provide inputs to road agencies on the need to de-carbonize road projects.

Audience: This work will be used by a wide range of stakeholders that include investors, policymakers, financial institutions, project developers, NGOs, advocacy groups, researchers, and academics by providing access to successful strategies, improving financial performance, and promoting innovation and compliance with regulations.

Deliverables: Briefing note, podcast.



Low and lower-middle income countries: Sustainable Road Infrastructure funding and finance has been implemented in some organizations and countries. Encouraging implementation of this work will give best practices and successful ways to funding and financing green and circular infrastructures. Low and lower-middle income countries with limited funds will get a lot of benefit with the implementation of this guideline.

Gender inclusion & diversity: This work will give benefit to stakeholders without background separation. People from various backgrounds will be involved in this work and the implementation of the output. Gender inclusion and diversity will be accommodated in this work.

Potential duration: 8 months.

1.3.3 How to finance the ecological transition of road infrastructures

Purpose: This work looks at existing road infrastructures, built in a different economic and political context. The need for an ecological transition does not concern only future projects and investments but also all the existing assets. Can a road become greener? This work is important for PIARC to encourage environmental sustainability in existing road infrastructure and transport to its members and stakeholders.

Importance to roads agencies: This work is important to the road agency/road industry to fund environmentally sustainable road infrastructure projects. The transport sector will require $50 trillion of investment by 2040, and the investment gap is estimated at $10 trillion, according to the estimate by Global Infrastructure Outlook. Hence, several innovative green financing models could be used to fill that gap.

Audience: This work will benefit all stakeholders. The government will be able to develop regulatory frameworks and green finance instruments such as green loans or bonds, renewable energy equity financing, carbon credits, and public institutional equity investing. The industry and private sectors will have more financing sources to fund sustainable existing road infrastructure projects.

Deliverables: Article in Routes/Roads magazine, webinar, seminar, workshop or conference.

Low and lower-middle income countries: Low and lower-middle income countries sometimes are still characterised by old construction models which do not take into account the rapid evolution of technical standards towards a de-carbonized construction industry.

Gender inclusion & diversity: This work will give benefit to stakeholders without background separation. People from various background will be involved in this work and the implementation of the output. Gender inclusion and diversity will be accommodated in this work.

Potential duration: 18 months.



Technical Committee 1.4 – Planning the Resilience of Road Networks - Climate Change and Other Hazards

Overview

A road organisation is responsible for ensuring that the infrastructure provides service, and monitors the performance of the service being provided and restores the infrastructure damaged during extreme events. A road organisation is also responsible for maintaining the expected levels of service (LoS) of the infrastructure assets with the most effective technical and administrative interventions. The growing challenge of climatic as well as non-climatic natural hazards demands evolution of road organisations with appropriate resilience frameworks, both institutional and situational, to achieve the LoS expectation with acceptable deviations.

PIARC Technical Committee (TC) 1.4 “Planning the Resilience of Road Networks - Climate change and other hazards” in the 2024-2027 cycle will focus on Strategic, tactical, and applied planning aspects of enhancing resilience, such as methodologies and approaches for resilient network planning and road infrastructure designs, which reduce risk, are better prepared, more robust, and are able to respond and recover other hazard events. In this context, other hazards include extreme weather, natural threats (geotechnical), and pandemics related impacts. Chemical threats, cyber threats and terrorism are outside the scope of this Committee. This entails a global approach towards ensuring that infrastructure is less vulnerable and is able to adapt, transform and adopt lessons learned to increase the resilience of road infrastructure assets (pavements, bridges, drainage, slopes, etc).

Two topics for analysis are listed below. These topics will provide comprehensive guidance towards improving the resilience of road transportation assets, investments in future roads, and enhancing institutional resilience for improved road networks.

1.4.1 Development of a resilience framework for road networks – climate change and other hazards

1.4.2 Best practice in understanding organisational resilience for road networks

1.4.1 Development of a resilience framework for road networks – climate change and other hazards

Purpose: The purpose of the work to be developed by Technical Committee (TC) 1.4 is to extend the work undertaken in previous cycles covering resilience approaches for climate change and other hazards, and an updated version of the PIARC Climate Change Adaptation Framework for Road Infrastructure (2000-2023 cycle). The work of this cycle will involve development of a resilience framework (covering climate change and other hazards) based on the work of TC1.4 in the 2020–2023 cycle and will include the identification of medium to long term vulnerability and risk assessment methods that take into account both climatic and non-climatic risks. The work also includes identification and assessment of critical infrastructure, through examples such as case studies for the identification of critical assets as tools for adaptation to climate change and to increase the resilience of road networks. This Framework will therefore extend the Framework (2023) from a climate change to a framework covering changing hazard risks, climate hazards, natural hazards (geotechnical) and pandemics.

Preliminary research questions: The aim of this topic is to explore the effectiveness of a PIARC resilience framework for road networks, covering climate change and other hazards. The Framework will build upon the reports from the previous cycles. It will include a resilience framework, where other hazards refer to climate change, extreme weather and natural threats (geotechnical) and pandemics. It is noted that malevolent or man-made threats such as, cyber-security, cyber-physical, chemical impacts and terrorism events are outside the scope of this Committee.

The pertinent preliminary research questions are:

- How is the existence of different resilience frameworks (addressing climate and other hazards), impacting the optimisation of road network resilience performance? What are the effects, and opportunities for improvement?
- How to address the structural gaps, including uncertainties associated with pandemic related impacts, for effective integration of different road resilience frameworks?
- How to validate the new Resilience Framework for practitioner level application, confirming implementation outcomes (to be investigated) of the Climate Change Adaptation Framework 2023?
- How to address stakeholders' concerns relating resourcing, planning and financing aspects of implementing the proposed resilience framework?

Importance to roads agencies: This work is important to road organisations because it will provide a comprehensive process to guide improvements to the resilience of road transportation assets by addressing both climatic and non-climatic hazards as a holistic approach. It will help improve service levels of road organisations in the event of a hazard emergency with higher effectiveness and public confidence. The work will be flexible enough to enable application at both the national and local levels including LMICs. It is also relevant to assist in decision-making processes for road organisations with respect to climate change adaptation. It will provide case studies on the best practice methods on inclusion of non-climate hazards and changing probabilities in a vulnerability and risk assessment with a long-term horizon of assessment.

Audience: This work is intended to be used by road organisations, practitioners, consultants and academics.

Deliverables: article in Routes/Roads, webinar, seminar, workshop or conference, guideline (update and upgrade of the current International Climate Change Adaptation Framework for Road Infrastructure).

Background to TC's work on this topic: The International Climate Change Adaptation Framework for Road Infrastructure was initiated during the Strategic Plan Cycle 2012-2015 of the World Road Association. At its meeting in Bali, Indonesia, TC1.3 "Climate Change and Sustainability" developed a proposal for a 'special project' with the aim to create an international framework for climate change adaptation. In May 2014, the World Road Association launched a call for proposals for PIARC special projects. The idea of developing a framework to address climate change adaptation, which would be of practical use for road assets owners and managers, was supported. Accordingly, the International Climate Change Adaptation Framework for Roads was published and disseminated during the World Congress in Seoul, November 2015.

The PIARC International climate change adaptation framework for road infrastructure aims to guide road organisations through the process of increasing the resilience of their networks and assets and is designed to be applicable at any scale such as national, regional, local or asset specific level. It was designed to be of practical use for road owners and managers in high and low-middle income countries. The Framework is comprised of four main elements or stages, supported by a series of international case studies.

In the 2016-2019 cycle, tasks related to adaptation to climate change were assigned to Technical Committee E.1 Adaptation Strategies/Resilience. Working Group 2 had the task to formulate proposals for the refinement of the International Climate Change Adaptation Framework for Road Infrastructure, based on the case studies analysed by Working Group 1 and on findings from direct implementation of the Framework. The final report developed by TC E.1 WG2 summarises the results of the work on the refinement of the Framework.

Further to this work, in the 2020-2023 cycle, Working Group 1 investigated holistic approaches to climate change and other hazards resilience. Additionally, Working Group 2 aimed to provide an Update of the PIARC Climate Change Adaptation Framework. This updated Framework, taking on board the suggested refinements from the previous cycle, as well as the inclusion of new case studies and approaches and proposing a framework with a new structure and revised contents. The implementation of this framework needs to be investigated as part of the work for the development of the new Climate Change and Other Hazards framework to ensure its effective inclusion for road organisation's applicability.

In this 2024–2027 cycle, the outputs from WG1 and WG2 in the previous cycle will be used to develop an Resilience Framework – climate change and other hazards.

Low and lower-middle income countries: This topic will identify the best practice (through case studies and critical discussion) of climate change adaptation and other hazard resilience activities for all countries including the low- and middle-income countries (LMICs) and will play a fundamental role in providing access to information about resilience measures and its dissemination among LMICs. This includes the identification of different data available to assess vulnerabilities and the different types of road assets in different countries and illustrating the needs of LMICs and other countries. TC1.4 will promote the representation of LMICs and will accommodate a platform for mutual knowledge exchange of practices among the member countries.

Gender inclusion & diversity: The access needs and travel patterns are often different for various vulnerable groups like woman, children and marginal communities. Both climatic and non-climatic hazards may have impact on their travel choices from time, cost, safety, security, cultural and other perspectives based on the context. The collective share of these groups is a greater part of the total travel demand, and hence consideration of the distribution and nature of their needs is very important for developing a socio-economically effective infrastructure resilience framework.

The formation of the working groups under Technical Committee 1.4 will, therefore, consider gender and diversity aspects, to the best possible, for getting appropriate inputs and feedbacks in formulating the frameworks.

Potential duration: It is expected that the research period will be 4 years.



1.4.2: Best practice in understanding organisational resilience for road networks

Purpose: A road network is a complex and dynamic system composed of many elements including the built infrastructure (roads, bridges, buildings and other assets). It is also necessary to take into account a set of components such as governance structures, operation, maintenance processes, national and international (cross border) regulatory frameworks, available technical, human or natural resources, as well as all the interdependencies of these elements with each other and with the network's external environment.

In this context, organisational resilience is essential to organise, resource, promote and maintain a sustainable activity, serving users and the necessary movement of goods, services and people. The purpose of the work to be developed by TC1.4 is to assess how resilience is understood, implemented, measured and evaluated in road organisations. This involves identification of institutional attributes that can make an organisation adaptive enough to respond to changes over time to address the climatic and non-climatic threats. This may include processes supportive to resilience in road management decision-making, existence of specific work units facilitating network resilience improvement in a road agency, flexibility of internal/external stakeholders engagement process to accommodate new ideas or best practices elsewhere with appropriate validation and so on. Once these organisational aspects have been identified, the work will identify common attributes and processes and different approaches used, such as: taking into account services provided by network providers and links with users (human factor and levels of service), consideration to functionalities of the network and resilience of road organisations as complex systems. This also includes identifying the relationships of road resilience within complex systems, including resilience at the network-wide level, arterial and asset levels.

The work will involve development of a survey to road organisations to better understand what "resilience" means for them, and how resilience is measured and implemented. It will then identify common approaches and best practices depending on the type of the road network.

Preliminary research questions: This topic addresses the "Strategic, tactical and applied planning aspects of enhancing resilience", such as methodologies and approaches for resilient network planning and road infrastructure designs, which reduce risk, are better prepared, more robust, and able to respond and recover from climate change risks. This entails a global approach towards ensuring that the infrastructure and the services it provides are less at risk and are able to adapt, transform and adopt lessons learned to increase the resilience of the road networks (pavements, bridges, drainage, slopes, etc).

The research works is to assess how resilience is understood, evaluated and considered by the road organisations, and to examine a range of different approaches used, such as: services provided and links with users (human factor and levels of service), functionality of the network for changing demand and risks, and resilience of the road organisations to address the needs as part of a complex system of governance. This also includes the identification of interoperable components within multifaceted systems, including resilience at the network-wide level, arterial and asset levels.

The preliminary research questions include:

- Why organisational resilience is important for a road agency to provide a resilient network? How the apparent absence impacts on the service?
- What are the main attributes for confirming organisational resilience of a road agency?



- How to dissect and interwin critical institutional and situational attributes for the development of a road organisation resilience framework with performing indicators?
- How to validate the developed road organisation resilience framework including answering to the stakeholders' concerns?

Importance to roads agencies: This work is important to road agencies/road industry because it will provide best practice in understanding of how to organize resilience of road transportation assets in the different organisational levels of the road authorities. It is relevant to assist in decision-making processes for road owners or managers with respect to providing an understanding of; What parameters/variables to use? What are the historical thresholds and what should be the future thresholds? How to use climate scenarios in the design and maintenance programs of infrastructure? What kind of indicators can be used to monitor the selected adaptation trajectories? This work will also investigate the economic issues relating to the cost of disruptions (possibly compared to the cost of inaction), the cost effectiveness of the measures taken, the residual risk costs as well as the return on investment of adaptation solutions.

These are important aspects of assessing resilience in road authorities.

Audience: This work is intended to be used by road organisations, practitioners, consultants and academics.

Deliverables: Technical report, case studies, survey, article in Routes/Roads magazine, webinar, seminar, workshop or conference.

Background to TC's work on this topic: In the PIARC cycle of 2020-2023, the TC1.4 Working Group 1 delivered a report titled "Uniform and holistic methodological approaches to climate change and other hazards". This presented the concept of holistic approach of resilience where wider impacts beyond assets across the whole network are considered for climate change as well as other hazards. Within this issue, there was reflection to resilient approaches such as risk management approaches, decision-making and uncertainties/deep uncertainties, as well as economic, social and environmental aspects of resilience management. This included consideration to the evaluation of resilience of road organisations for delivering resilient networks. Further work will be undertaken to explore this concept in this topic.

Low and lower-middle income countries: This topic will assess and identify the best practice (thorough case studies and critical discussion) of organisational resilience structures, resources and practices in all countries including low- and middle-income countries (LMICs) and will play a fundamental role in providing access to information about resilience measures and its dissemination among LMICs. TC1.4 will promote the representation of LMICs and will accommodate a platform for mutual knowledge exchange of practices between countries.

Gender inclusion & diversity: The access needs and travel patterns are often different for various vulnerable groups like woman, children and marginal communities. Both climatic and non-climatic hazards may have impact on their travel choices from time, cost, safety, security, cultural and other perspectives based on the context. The collective share of these groups is a greater part of the total travel demand, and hence consideration of the distribution and nature of their needs is very important for developing a socio-economically effective infrastructure resilience framework.

The formation of the working groups under TC1.4 will, therefore, consider gender and diversity aspects, to the best possible, for getting appropriate inputs and feedbacks in formulating the reports.

Potential duration: It is expected that the research period will be 4 years.



Technical Committee 1.5 – Disaster Management

Overview

In recent years, extreme weather conditions have emerged in many parts of the world, including higher temperatures, heavier rainfall, heavy snow fall, droughts, and forest fires. These extreme weather events are becoming more severe and frequent and there is concern that the effects may spread for a longer period of time. These hazards pose serious challenges to road management.

In an advanced supply chain, the process from the production and delivery of a product to the final customer relies on an efficient and dependable logistics infrastructure. Roads are one of the most basic modes of logistics, and even during disasters caused by extreme weather events, roads must always function to maintain the logistics process at all times. Roads also play a critical role in disaster response operations, ensuring access to impacted areas for rescue workers and the delivery of emergency supplies. Roads must stay functional at all times.

Therefore, road administrators need to be prepared for these extreme disasters by providing road infrastructures resilient against new magnitudes of disasters and also by developing robust road management systems that react quickly against disasters. In other words, road maintenance, improvement, and disaster mitigation is an investment in building a resilient society in the future.

PIARC TC1.5 “DISASTER MANAGEMENT” in the 2024-2027 cycle will focus on disaster management against “Extreme weather” and will work on exploring “Operational planning aspects of enhancing extreme weather resilience” under the three topics listed below. These topics will help guide investments in future roads.

1.5.1 Coping with extreme weather

1.5.2 Social resilience within communities and public authorities for extreme weather

1.5.3 Infrastructure resilience for supporting supply chain during extreme weather events

1.5.1 Coping with extreme weather

Purpose: The purpose of this research is to find out how we use our experience to better respond to and recover from disasters while also improving future resilience to extreme weather. In order to achieve this goal, this work will examine world-wide case studies to identify improvement strategies for responding to and coping with extreme weather disasters and building resilience into road networks. Case studies providing beneficial information with be included in an update to the PIARC Disaster Management Manual.



Preliminary research questions: This research works to analyse how road administrators expedite and improve recovery efforts to minimize impacts to transportation systems and society, also how past experience is used to improve future resilience by producing a show case demonstrating world-wide cases studies examining all aspects of successful mitigation, preparedness, response and recovery efforts specifically related to extreme weather.

This research will also identify a new initiative effort to regenerate and revitalize transportation infrastructure in the context of climate change adaptation and opportunities of evolving new mobility patterns (e.g. integrated, digitized, sustainable).

Additionally, work will include an update of the Disaster Management Manual to enhance case study contents (case studies collected in this research work) and develop French and Spanish versions of the Disaster Management Manual.

Importance to roads agencies: This work is important to road agencies/road industry because EC1) responding to extreme weather events is the first priority in the external challenges to the road sectors. This work will also contribute to EC8) Improving the image of the road sector and raising awareness of roads contribution to sustainable transport solutions.

Audience: This research will benefit both decision makers and practitioners related to disaster management to improve the resilience of road and road network systems, especially on extreme weather.

Deliverables: Technical report, case studies, high impact summary, articles in Routes/Roads, webinar, seminar, workshop or conference, manual.

Background to TC/s work on this topic: In the previous discussions of the Technical Committee, the management of extreme weather hazards has been an important topic in the discussion of a variety of challenges. In recent years, extreme weather-related disasters have become more severe and more frequent, making it necessary to study and share information specifically on this topic.

In addition, TC1.5 will explore the possibility of partnerships and collaboration with regional road-related organizations in collecting and sharing case studies in addressing this challenge.

Low and lower-middle income countries: This research will be of benefit to all countries impacted by extreme weather events. LMICs are mostly vulnerable to and impacted by the extreme weather events. This research will explore the possibility of collaborating with regional road associations to collect various case studies among the world.

Gender inclusion & diversity: Disaster management often treats drivers as a single category. Recently, not many, but certainly a growing number of studies have found on consideration for disaster vulnerable groups such as the elderly, infants, disabled, language minorities, or sometimes digitally challenged. TC1.5 will broadly consider issues related to "gender", “diversity” together with “vulnerable groups" and address new ways of disaster management that take gender, diversity, and vulnerable groups into consideration.

Potential duration: It is expected that the research period will be 4 years.



1.5.2 Social resilience within communities and public authorities to cope with extreme weather

Purpose: The purpose of this research is to identify the new activity of building social resilience within communities and public authorities in the area of road administration. This research is also expected to explore potential case studies in terms of social equity and decarbonization strategies in road disaster management.

Preliminary research questions: This research will analyse considerations for social resilience in disaster preparedness, mitigation, response and recovery. Social resilience, in the context of road administration, may refer to the collaboration between road managers, road users, communities and public authorities. Community preparedness activities such as education and training, along with involvement/input in response activities such as participating in drills and exercises will also be discussed in this work.

This research will also explore considerations for social equity in each disaster management phase. New efforts related to decarbonization strategies are also in target such as multi-functional infrastructure, debris/waste management, or reduction/recycling of disaster debris.

Additionally, this work includes an update of the Disaster Management Manual to enhance case study contents (case studies collected in this research work) and develop French and Spanish versions of the Disaster Management Manual.

Importance to roads agencies: This work is important to road agencies/road industry because EC1) responding to extreme weather events is the first priority in the external challenges to the road sectors. This work will also contribute to EC8) Improving the image of the road sector and raising awareness of roads contribution to sustainable transport solutions.

Audience: This research will benefit both decision makers and practitioners related to disaster management to improve the resilience of road and road network systems, especially on extreme weather.

Deliverables: Technical report, survey, high impact summary, articles in Routes/Roads, webinar, seminar, workshop or conference, manual.

Background to TC's work on this topic: Social resilience is currently one of the key topics in general disaster management. However, there is no intensive study in road disaster management field or our technical committee activities. Some new initiative case studies are displayed in the Disaster Management Manual. In addition, TC1.5 will explore the possibility of partnerships and collaboration with regional road-related organizations in collecting and sharing case studies in addressing this challenge.

Low and lower-middle income countries: "Public, private and civil society participation in disaster management" is one of the key messages of the Hyogo and Sendai frameworks for disaster reduction. The research document will be beneficial to LMICs to implement these frameworks in the road disaster management field. This research will explore the possibility of collaborating with regional road associations to collect various case studies among the world.

Gender inclusion & diversity: Disaster management often treats drivers as a single category. Recently, not many, but certainly a growing number of studies have found on consideration for disaster vulnerable groups such as the elderly, infants, disabled, language minorities, or sometimes digitally challenged.

TC1.5 will broadly consider issues related to "gender", “diversity” together with "vulnerable groups" and address new ways of disaster management that take gender, diversity, and vulnerable groups into consideration.

Potential duration: It is expected that the research period will be 4 years.

1.5.3 Infrastructure resilience for supporting supply chain during extreme weather events

Purpose: The purpose of this research is to share knowledge and experience in road preparation and operation to keep roads open during extreme weather events in order to support supply chain resilience. This research is also expected to explore digital technologies/tools for improving our disaster management capacity.

Preliminary research questions: This research will analyse recent considerations on continuity of operations planning and system redundancy by road administrators in order to keep roadways open at all times to support the supply chain. This study will cover the strategies, management tools and actions such as pre-designated alternate routing, managed asset use, ITS, incident management and quick clearance. Additionally, it will examine digital technologies/tools for expanding our disaster management capacity, improving situational awareness and increasing our ability to mitigate supply chain issues during extreme weather. This research will also explore a new disaster management initiative; creating resilient interconnections between transportation assets and other critical infrastructures.

Additionally, this work includes an update of the Disaster Management Manual to enhance case study contents (case studies collected in this research work) and develop French and Spanish versions of the Disaster Management Manual.

Importance to roads agencies: This work is important to road agencies/road industry because EC1) responding to extreme weather events is the first priority in the external challenges to the road sectors. This work will also contribute to EC8) Improving the image of the road sector and raising awareness of roads contribution to sustainable transport solutions.

Audience: This research will benefit both decision makers and practitioners related to disaster management to improve the resilience of road and road network systems, especially on extreme weather.

Deliverables: Technical report, survey, high impact summary, articles in Routes/Roads, webinar, seminar, workshop or conference, manual.

Background to TC’s work on this topic: Management of disasters caused by extreme weather has been a major topic of the previous cycles. Today, supply chain resilience has become one of the most important concerns in disaster management. Previous Technical Committees have not studied this subject as primary concern.

In addition, TC1.5 will explore the possibility of partnerships and collaboration with regional road-related organizations in collecting and sharing case studies in addressing this challenge.



Low and lower-middle income countries: This research works will be of benefit to all countries impacted by extreme weather events. LMICs are mostly vulnerable to and impacted by the extreme weather events. This research will explore the possibility of collaborating with regional road associations to collect various case studies among the world.

Gender inclusion & diversity: Disaster management often treats drivers as a single category. Recently, not many, but certainly a growing number of studies have found on consideration for disaster vulnerable groups such as the elderly, infants, disabled, language minorities, or sometimes digitally challenged.

TC1.5 will broadly consider issues related to "gender", “diversity” together with "vulnerable groups" and address new ways of disaster management that take gender, diversity, and vulnerable groups into consideration.

Potential duration: It is expected that the research period will be 4 years.

Task Force 1.1 – HDM-4

Purpose: The purpose of this task force is to contribute to the technical update of the HDM-4 tool. Therefore, the first step will be identifying goals for updating the tool, which might emerge from a first survey (e.g., among users and road agencies) and a state of art analysis.

Some examples of topics where technical modification could be necessary are:

- To improve environmental impact assessment and in particular the decarbonization aspect (e.g. possibility of importing data from other tools e.g. COPERT).
- Improve road safety impact assessment of interventions.
- Improve degradation modelling through the use of more flexible functional forms.

The TF could also, for some technical aspects, develop concise reports to indicate the methods and models that might be best suited to solve the highlighted deficiencies.

The task does not contribute to the development of the tools, which remains entrusted to external companies (HDM Global) with financial support from the World Bank.

Importance to roads agencies: Tools have been a reliable and homogeneous tool that large institutions (World Bank, Asian Development Bank, FCDO, etc.) have used to evaluate international cooperation projects and programs. However, to continue playing this role requires adaptation to new challenges and technical updating.



In addition, HDM-4 has always been a simple and not expensive tool for optimizing resource deployment in "small" road administrations (e.g., regional and local networks in industrialized countries or national networks in developing countries).

Audience: The task force's work should be aimed at identifying the methods and models to be implemented in the tools. The procedures and models will have to consider IT needs and, therefore, must be carried out in close synergy with the platform developers (users).

Deliverables: Technical report, survey, user guide.

The outcome of the task force will be a technical report identifying areas where engineering technical updates are needed. The report may also provide, based on the experience and knowledge of the components, some suggestions about methods and models that could be used and implemented in the new version of the tool to solve the technical issues highlighted.

Background to TC's work on this topic: The TF was not active in the past cycle and it will start in this cycle if the World Bank will decide to support the update/upgrade of HDM4 tool. The first delegates believe PIARC should not have an active role in the tools development but its role should be one of direction (identification of goals) and control.

Low and lower-middle income countries: The previous version already demonstrated the tool's usefulness for developing countries, but now the platform/tool is not current for technical and IT reasons.

Potential duration: The TF should end is work in two years but it may be support the company will develop the new version of HDM-4 in the remaining time until the end of cycle.



Planned Delivery of Strategic Theme 1: Road Administration

Topic/activity	2024				2025				2026				2027			
	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec
Technical Committee 1.1 Performance of Transport Administrations																
1.1.1 The transport agency of the future																
1.1.2 Public value creation by transport agencies																
1.1.3 Strengthening workforce through modernizing skills, enhancing diversity, equity and inclusion																
Technical Committee 1.2 Contribution of Roads to Economic and Social Development																
1.2.1 Summarizing the role of road investment in recent national-level infrastructure investment plans - contribution and impact of road to the national-level plans for de-carbonization																
1.2.2 Understanding the changes in traffic demand caused by the digital economy, the post-pandemic economy and social context, defining the tools to describe and estimate them - special attention to the impact of the change of economy in LMIC countries																
1.2.3 Broader economic and social impacts of road infrastructure, considering the effects of road construction and operation on social groups (equity), on economic systems, on gender inclusion																
Technical Committee 1.3 Finance and Procurement																
1.3.1 Transparency in road projects																
1.3.2 How to make funding and finance de-carbonized: case studies																
1.3.3 How to finance the ecological transition of road infrastructures																
Technical Committee 1.4 Planning the Resilience of Road Networks - Climate Change and Other Hazards																
1.4.1 Development of a resilience framework for road networks – climate change and other hazards																
1.4.2: Best practice in understanding organisational resilience for road networks																

Technical Committee 1.5 Disaster Management																
1.5.1 Coping with extreme weather																
1.5.2 Social resilience within communities and public authorities to cope with extreme weather																
1.5.3 Infrastructure resilience for supporting supply chain during extreme weather events																
Task Force 1.5 HDM - 4																
Task Force 1.1 – HDM-4																

Key: BN = Briefing Note, CS = Collection of case studies, LR = Literature review, SM = Seminar, SU = Survey, TR = Technical Report, MU = Manual Update



Strategic Theme 2 – Road Mobility

Mobility on roads is a crucial aspect of modern society, enabling people to access essential services, engage in economic activities, and connect with others. The way roads are designed, built, and managed has a significant impact on people's accessibility and mobility, safety, and the environment.

Strategic Theme 2 Road Mobility address five key issues related to mobility on roads and outline activities to address these issues.

Roads for accessibility and mobility in urban and peri-urban areas

Technical Committee 2.1 will consider issues related to roads for accessibility and mobility in urban and peri-urban areas. In urban centres and the urban fringe, cooperation between transport modes is essential to ensure accessibility and mobility. High occupancy lanes and urban vehicle access restrictions can help reduce congestion and improve air quality. Vulnerable road users, such as pedestrians and cyclists, should also be considered when designing roads to ensure their safety.

Roads for equity, accessibility, and mobility in rural and interurban areas

Technical Committee 2.2 will progress topics aimed at towards achieving equity in accessibility and mobility in rural and interurban areas. In rural areas, active modes of transport such as walking and cycling are essential for people's accessibility and mobility. We will explore ways to improve road safety in rural areas, increase accessibility, and promote sustainable mobility solutions that meet the needs of all road users, including people with disabilities.

This will involve promoting active modes of transport such as walking and cycling, improving accessibility and mobility in rural areas, and enhancing road safety in these regions.

Sustainable road freight

Technical Committee 2.3 will progress topics related to sustainable freight, which are critical for economic and social development. Sustainable road freight is essential to reduce greenhouse gas emissions and improve air quality. Electric and hybrid trucks can help reduce emissions, and logistics companies can optimize their routes to reduce fuel consumption. Technical Committee 2.3 will focus on topics promoting sustainable freight transport. This will involve developing efficient road infrastructure for freight transport and highlighting the economic and social benefits of this mode of transport.

Road network operations and ITS for sustainability

Technical Committee 2.4 will consider Road Network Operations and ITS for Sustainability. The use of new technologies can optimize the operation of the road network, improve safety, and reduce environmental impacts.

Road infrastructure for connected and automated mobility

Technical Committee 2.5 will consider topics related to Road Infrastructure for Connected and Automated Mobility. Connected and automated mobility is the future of transportation. Preparing roads for connected, cooperative and automated mobility and exploring the relationship between automated driving and infrastructure.



Technical Committee 2.1 – Roads for Accessibility and Mobility in Urban and Peri-Urban Areas

Overview

In the new Strategic Plan the TC 2.1 roads for accessibility and mobility in urban and peri-urban areas will start from the results obtained in the previous one with a specific focus on coordination with other TCs. The new title of the TC 2.1 underlines the three pillars of the TC's work: Roads, accessibility and mobility.

The first topic cooperation between transport modes in urban and peri-urban areas has the goal to ensure equity between urban and peri-urban areas through a better cooperation between transport modes and a new paradigm for road space and multimodal transit centre design. This topic will develop in cooperation and coordination with TC 2.2.

The second topic urban vehicle access regulations (UVARs) has the purpose to study different solution of urban vehicle access restrictions and regulations: low emission zones, pedestrian zones and congestion charging zones. The goal is to evaluate the effectiveness in terms of congestion mitigation also from the point of view of an integrated urban transportation plan, to analyse the benefits and potential neglected cost. This work will be made in coordination with zero/low emission zones treated in TC 3.4

Finally, the third topic Securing mobility of vulnerable road users in crowded street and for highly frequented infrastructures will focus on some arguments dealing with the specific aspects of safety in urban areas:

- vulnerable users facing public transport (bus, tram, etc.)
- new forms of mobility in crowded street and in district development
- traffic and crowd management for highly frequented infrastructures.

This topic it' s strictly connected with the TC 3.1 Road Safety and it should be done in relation with it.

2.1.1 Cooperation between transport modes in urban and peri-urban areas

Purpose: The purpose of this work is to start from the main aim of the TC activity proposal that will focus on roads for accessibility and mobility in urban and peri-urban areas. The goal is to reduce car traffic, congestion and greenhouse gas emission and to ensure equity between urban and peri-urban areas, through a better cooperation between transport modes and a new paradigm for road space and multimodal transit centre design. In cooperation and coordination with TC2.2

Preliminary research questions:

- What kind of accessibility/mobility problems are there in urban and peri-urban areas in relation with population density, location of urban services and availability of transport modes? Daily life services or commuting/schooling?
- To what spatial extent should urban services be made available at a certain level by means of providing transportation services?
- Is multimodal route attractive for trip makers compared with driving a car door-to-door? If so, on what conditions?
- What are the definitions for accessibility and mobility and formulas for comparison?
- What are the methods to evaluate solutions for a better cooperation between transport modes?

Importance to roads agencies: This work is important to road agencies and public administration both if you refer to external of internal challenges. Between the external challenges we could cite EC2 – reducing greenhouse gases from the road sector, and EC8 – improving the image of the road sector. Between the internal challenges this kind of work is connected to IC3 – Improving productivity of road administrations driven by digital transformation.

Audience: The work will be fruitful both for road agencies, practitioners and researchers. The cooperation between transport modes is the future for responding to extreme weather events but also for seizing national-level infrastructure investment planning for a better equity between all the citizens.

For road agencies the work could improve the effectiveness and the benefit of large-scale national infrastructure investment programs that are underway in several member countries. For practitioners and researchers, the work could increase the awareness on equity for the mobility solutions in urban and peri-urban areas. For all citizens the aim is to show how is possible to improve mobility and accessibility fairly, enabling all people to participate in socio-economic life.

Deliverables: Literature review, case studies, briefing note, seminar.

Background to TC's work on this topic: The previous technical committee have already worked on data collection and analysis of inhabitants' mobility daily needs and accessibility for an adequate level of urban and peri-urban mobility with the WG 2.1.1 Accessibility and mobility facing land use in urban and peri-urban development.

Very important references and background should be found also in the work that has made by the WG 2.1.2 Integrated transportation systems, multimodality on the issue "Identify good practices of optimization of road networks through better integration with other forms of transport (rail, active modes, etc.) in terms of efficiency, resilience and sustainability".

Low and lower-middle income countries: Equity is the keyword to take into account the low and lower-middle income countries. Mobility is one of the main needs of all the people from all over the world and the difference in the liveability of urban and peri-urban areas are strictly connected with the transport availability for all users.



Gender inclusion & diversity: Equity is also the keyword to take into account the gender inclusion and the diversity. Equity is a principle or concept that is often considered synonymous with fairness. It can be conceived socially, spatially, and procedurally. Equity recognizes that different people have different needs, particularly those belonging to disadvantaged groups, such as low-income earners, women, immigrants, older adults and children. Structurally, equity works to repair the damages imposed upon such groups, from factors including decades of disparate investment, redlining and displacement.

Potential duration: 36 months.

2.1.2 Urban vehicle access regulations (UVARs)

Purpose: The purpose of this work is to study different solution of urban vehicle access restrictions and regulations. Low emission zones, pedestrian zones and congestion charging zones are all examples of this kind of solutions.

The goal is to evaluate the effectiveness in terms of congestion mitigation also from the point of view of an integrated urban transportation plan, to analyse the benefits and potential neglected cost. It is noted that UVARs will be more effective if introduced along with alternative multimodal solutions.

This work will be made in coordination with zero/low emission zones treated in TC3.4.

Preliminary research questions: Many cities struggle with the balance of congestion, “liveability”, air pollution, noise levels, accessibility, damage to historic building and other pressures of urban life. The effects of these phenomena highlight the problematic reigning in urban areas across the World.

Is it possible to avoid the risk of creating a fragmented patchwork of urban areas with new 'border lines' across urban and peri-urban areas in metropolitan regions? In order to enable a wide use of UVARs without creating disproportionate barriers to mobility for citizens and goods, it’s important to study guidance for the development of harmonised UVARs.

Importance to roads agencies: This work is important for road agencies and municipalities. The growing number of schemes for Urban Vehicle Access Regulations (UVARs) within the World may create confusion for citizens and businesses. This topic is created to increase transparency and, where possible, support the effectiveness of existing approaches to UVARs. This work is important to road agencies and public administration both if you refer to external of internal challenges. Between the external challenges we could cite: EC22 – reducing greenhouse gases from the road sector and EC4 – responding to increased automation of driving. Between the internal challenges this kind of work is connected to IC1 – increasing use of varying funding models for road investment.

Audience: The work will be fruitful both for road agencies, practitioners and researchers that are involved in Urban vehicle access regulations (UVARs). Is important to acknowledge the environmental, social and environmental objectives of these actions.

Deliverables: Literature review, seminar.

Low and lower-middle income countries: Urban vehicle access restrictions and regulations could have a direct impact on daily mobility needs. The deliverables should alleviate the possible impact of these kind of policies on people and citizens that live in low and lower-middle income countries.

Gender inclusion & diversity: Women generally have different trip chains, shorter trips close to home and other mobility characteristics. All these aspects should be included as a guidance for the Urban vehicle access regulations (UVARs) technical report.

Potential duration: 24 months.

2.1.3 Securing mobility of vulnerable road users in crowded streets and for highly frequented infrastructures

Purpose: This topic is recommended for the TC 3.1 Road Safety and it should be done in relation with it. Our work will focus on some arguments dealing with the specific aspects of safety in urban areas:

- vulnerable users facing public transport (bus, tram, etc.)
- new forms of mobility in crowded street
- traffic and crowd management for highly frequented infrastructures.

The purpose of this work is to evaluate new ways and new guidelines of improving secure and safe mobility for all vulnerable road users (including new mobilities) in some specific conditions.

More than half of the total number of victims in traffic are so called vulnerable road users: children, the elderly, pedestrians, users of a two-wheeler and of new forms of electrical so-called soft mobilities (e-scooters, e-bicycles, monowheel) which require a specific approach. Despite that, vulnerable road users receive only limited research and policy attention, both from developed countries and LMIC.

Up to now, there is a worldwide lack of methodical and practical support for the planning and handling of crowded situations and highly frequented infrastructures. TC 2.1 will therefore address all aspects that can contribute to a safe and efficient planning for and management of crowded situations and highly frequented infrastructures.

Importance to roads agencies: This work is important for road agencies and road administration because the systematically classified information could be used in a Design for All approach. In this vision, measures are not taken for the good of a specific group, but for the securing of vulnerable road users as a whole. The plan is to cross-check information in the Fact sheet on joint causal factors, quality needs and current policies. In this way one can possibly identify measures that are beneficial for more than one group. The efficiency and acceptance of measures in a policy program can be improved in this way.

It is important to draw concrete lessons from what has happened for the planning and implementation of future events and to provide the practice with new professional knowledge, guidelines and specifications. While evacuation and the dimension of emergency exits are regulated by ordinances in many countries around the world, standards for traffic management and crowd management to prevent disasters are largely lacking.

This work is important to road agencies and public administration both if you refer to external of internal challenges. Between the external challenges we could cite first of all: EC6) Securing mobility and safety of vulnerable road users but also EC5) Tackling worsening road traffic safety. Between the internal challenges this kind of work is connected to IC2) Securing diverse human resources by creating an attractive and inclusive workplace.

Audience: The work will be fruitful both for road agencies, practitioners and researchers that are involved in securing mobility of vulnerable road users. Is important to acknowledge the environmental, social and environmental objectives of these actions.

Deliverables: Literature review, seminar.

Low and lower-middle income countries: Mobility of vulnerable road users could have a direct impact on safety, security and accessibility especially for LMIC. The deliverables should all evaluate the possible impact of these kind of policies on people and citizens that live in low and lower-middle income countries.

Gender inclusion & diversity: Women and other group of users generally have different trip chains, shorter trips close to home and other mobility characteristics. All these aspects should be included as a guidance for the securing mobility technical report.

Potential duration: 18 months.

Technical Committee 2.2 – Roads for Equity, Accessibility and Mobility in Rural and Interurban Areas

Overview

Roads play a crucial role in promoting equity, accessibility in both rural and interurban areas. Within this context, there are two primary areas of emphasis: enhancing active modes of transportation and improving road safety for all users, as well as investigating technical solutions for both paved and unpaved roads.

The Technical Committee 2.2 Roads for equity and accessibility in rural and interurban areas is established to address the challenges associated with roads in rural and interurban areas. The committee aims to develop practical recommendations and initiatives that promote equitable access, sustainable mobility, and enhanced road safety.

TC2.2 will focus on two key topics:

- Topic 1: Enhancing Active Modes and Improving Road Safety for All Users:

Roads for equity and accessibility in rural and interurban areas require a focus on enhancing active modes of transportation and improving road safety for all users.

The committee will outline initiatives that promote walking, cycling, and other non-motorized modes of transportation. Additionally, the committee will focus on to improve road safety for all users, will analyse existing road safety measures and identify areas for improvement.

- Topic 2: Technical Solutions for Paved and Unpaved Roads:

The committee will focus on collecting and assessing technical solutions for both paved and unpaved roads in rural and interurban areas. This includes exploring innovative road construction materials, pavement solutions, and maintenance techniques that enhance road conditions, improve accessibility, and ensure safer transportation. The committee will prioritize cost-effective solutions that consider the specific requirements and resources available in each area.

The committee's work in both topics will foster the implementation of effective solutions by leveraging global best practices and experiences.

Recognizing the diverse contexts and challenges encountered by high-income countries (HIC) and low- and lower-middle income countries (LIMIC), the committee will take into account the distinct requirements of each group.

2.2.1 Accessibility and mobility in rural and interurban areas: enhancing active modes and improving road safety for all users

Purpose: The purpose of this topic is to address the challenges faced by rural and interurban areas in terms of accessibility and mobility, and to outline initiatives that promote active modes and improve road safety.

This topic is devoted to HIC and LIMIC. We aim to ensure a diverse range of perspectives and expertise from both HICs and LIMICs, acknowledging the valuable contributions that experts from all backgrounds can bring to the table.

Preliminary research questions:

- What are the key challenges and barriers to accessibility and mobility in rural and interurban areas, particularly in low and lower-middle income countries?
- How do the existing transportation infrastructure and services in rural and interurban areas impact accessibility and mobility for different user groups: women, VRUs, persons with disabilities?
- What are the specific safety challenges faced in rural and interurban areas, and how can road safety measures be enhanced to reduce accidents, injuries, and fatalities?
- What are the best practices and successful interventions implemented in other regions or countries to enhance accessibility and mobility in rural and interurban areas?
- We intend to attract experts from HICs who are knowledgeable in active modes and safety, while also ensuring that the needs and challenges of LIMICs are adequately addressed. We will look at the opportunity of having two subtopics one for HIC and another one for LIMIC. this is intended to facilitate focused discussions and actions tailored to the specific contexts and challenges faced by each group.

Importance to roads agencies: This work is important to road agencies/road industry because by improving accessibility and mobility, road agencies can enhance connectivity between rural and interurban areas and other urban centres. This connectivity is vital for social and economic development.

Road agencies are responsible for ensuring safe and efficient transportation and by addressing the specific challenges faced in rural and interurban areas, road agencies can contribute providing equal access to safe and sustainable transportation for all users.

Audience: The audience and users involved in the topic of accessibility and mobility in rural and interurban areas are diverse and include:

Road Agencies and Transportation Authorities, road engineers, community Organizations and Advocacy Groups (for road safety, walking, cycling, public transport,…) , researchers and Academics, public transportation operators,

It is crucial to engage and involving these various stakeholders for effective decision-making, collaboration, and implementation of initiatives that address the challenges and enhance accessibility and mobility in rural and interurban areas.

Deliverables: Case studies, briefing note, workshop or conference.

Background to TC's work on this topic: Nothing done in the previous cycle. We plan to collaborate with TC2.1 mobility in Urban areas, and with TC 3.1 on road safety.

Low and lower-middle income countries: LMICs countries face specific challenges related to transportation: higher rate of road, accidents, climate change impacts, disparities, limited resources...

Enhancing safe accessibility and mobility and promoting sustainable transportation mode such as walking, cycling and public transportation contribute to economic development and social inclusion of LMICs countries.

Gender inclusion & diversity: HIC and LMICs countries have significant rural populations that face barriers to access to essential services: education, healthcare, and employment opportunities.

Women and girls in rural areas may experience unique safety concerns and risks while using transportation system.

By improving accessibility and mobility, these countries can promote social inclusion and ensure that rural communities have equitable access to services and opportunities.

Potential duration: 2024–2027.

2.2.2 Technical solutions for paved and unpaved roads

Purpose: The purpose of this topic is to explore technical solutions for both paved and unpaved roads which improve road conditions, enhance accessibility, and ensure safer transportation for local communities.

This topic is devoted to HIC and LIMIC.

Rural areas in different countries face varying challenges and constraints. Collaborating between HICs and LMICs ensures that technical solutions take into account the specific needs and conditions of different regions.

Preliminary research questions:

- What are the existing challenges and issues associated with unpaved roads in rural areas?
- What technical solutions are currently available and proven effective for improving unpaved roads in similar rural contexts?
- What are the environmental considerations and potential impacts of implementing various technical solutions?
- Are there any innovative or context-specific technical solutions that can be explored to address the unique challenges of rural areas?

Importance to roads agencies: This work is important to road agencies/road industry because enhancing and maintaining road infrastructure is crucial for efficient transportation, economic development, and ensuring safe and accessible travel for vehicles and pedestrians.

Audience: The audience and users involved in this topic include:

Road Agencies and Transportation Authorities, road maintenance, civil engineers, researchers and academics, contractors and suppliers…

Deliverables: Case studies, briefing note, workshop or conference.

Background to TC's work on this topic: During the past cycle, TC2.2 organised a joint seminar with TC4.3 ''earthworks'' and we plan to continue our collaboration during the new cycle.

Low and lower-middle income countries: LMICs countries face specific challenges in terms of infrastructure development, socio-economic conditions and resource limitations.

Focus will be on: low cost solutions, define suitable materials and techniques using locally available material, community-Based Maintenance and identify good techniques for construction and maintenance

Gender inclusion & diversity: Many LMICs countries have significant rural populations that face barriers to access to essential services: education, healthcare, and employment opportunities.

Women and girls in rural areas may experience unique safety concerns and risks while using transportation system.

By improving accessibility and mobility, these countries can promote social inclusion and ensure that rural communities have equitable access to services and opportunities.

Potential duration: 2024–2027.

Technical Committee 2.3 – Sustainable Freight

Overview

Road freight transport remains essential for economic and social development in all countries. In the new context of climate change, high energy prices, scarcity of base resources and ageing infrastructure, TC 2.3 works will focus on the key factors that will enable an efficient and sustainable road freight transport. This means optimising land and road use for freight services and facilities, finding and enforcing the good compliance between vehicles and roads to minimize road wear while allowing more efficient freight vehicles and ensuring the right vehicle use the right road at the right time. Following previous cycle, the role and potential benefits of emerging technologies will be investigated and emphasis will be set on greening, considering all possible solutions to reduce road freight transport carbon footprint and other environmental nuisances, notably by seeking robust and energy efficient solutions. The question of road freight demand should also be addressed, as well as multimodal transport. A special attention will be paid to the contribution of women to transport, in LMIC but not only, and in particular to how it can improve road safety.

2.3.1 Efficient road infrastructure and operation for freight transport

Purpose: The purpose of this work is to highlight the specific benefits and needs that freight induces on road infrastructure in today's context, seeking compliance with economic, societal and environmental requirements. After recalling socio-economic grounds, the TC should focus on the various solutions, including emerging technologies, that are proposed to help road transport to efficiently contribute to a more sustainable freight transport system serving economic and social development.

Preliminary research questions: The output will not be a research publication. The following items should be addressed:

- dynamic use of road space
- freight facilities along roads as truck parking, truck control, truck lanes
- spatial planning and land use issues related to freight facilities
- road connectivity to multimodal/intermodal hubs
- compliance of heavy vehicles with road infrastructure and regulation
- direct and smart enforcement (weights and dimensions, vehicles, driving time, etc.)
- Intelligent Access for freight transport
- truck management
- impact of heavy commercial vehicles on road safety

- application of emerging technologies

Importance to roads agencies: This work is important to road authorities and agencies because many are facing ageing infrastructure, demands for allowing new freight vehicles and growing traffic and to expand the infrastructure lifetime. Road Freight Transport accounts largely for maintenance or development expenses, but can also contribute to economic development and wealth while providing revenues. It is therefore of the utmost importance to get a clear idea of the evolving needs of sustainable road freight and the new solutions that emerge in road use and design. Reducing the impact of heavy commercial vehicles on road safety is also a major concern to comply with a zero fatality on road target.

Audience: The target audience for this work will be road authorities, decision makers and technology providers.

Deliverables: Literature review, case studies, high impact summary, article in Routes/Roads magazine, seminar, workshop or conference.

Background to TC's work on this topic: During the previous cycle, a review of emerging technologies has been done and published. More specifically on overloading, important work was delivered to address the question of impact on road freight on infrastructure. Arusha's seminar highlighted the need for a better link of freight transport with socio-economic questions. The development of smart/direct enforcement appears also necessary to keep the efficiency and effectiveness of commercial vehicles' control in safe conditions and with an increasing volume of traffic. Emerging technologies and connected vehicles (V2V and V2I) allow new practices of smart enforcement which progressive implementation and harmonisation will be followed.

Low and lower-middle income countries: In many LMIC, freight transport remains key for bringing essential goods to the population. The availability of the road network and its ability to allow heavy goods vehicle is therefore critical. A specific seminar could be organised on this topic.

Gender inclusion & diversity: The workforce in road freight transport remains predominately male. However, there has been an increase in women truck drivers. There has also been limited participation from women in the road freight transport decision-making processes and stakeholder engagement practices. The work will highlight good practices or initiatives promoting women in freight transport.

Potential duration: Full cycle (4 years).

2.3.2 Greening of road freight

Purpose: The purpose of this work is to continue building upon the research initiated in the previous cycles to help the transport sector reduce its negative impact on the environment and climate. Consequently, it will address the question of the need for energy to transport goods, and the need for its reduction.

Preliminary research questions: The output will not be a research publication. The following topics should be addressed:

- Strategies to optimize freight transport by working on the demand for road transport (decoupling economic growth and road freight traffic growth)
- Requirements for road freight facilities and roads when using trucks with alternative drives
- Multimodal approaches using rail and ships in combination with road

- Finding robust and energy efficient solutions
- Assessing road freight transport emissions and factors to reduce them
- New status and cases of good practices

Electric Road System (ERS) will not be addressed in itself, but will be taken into account as one solution among others.

Importance to roads agencies: This work is important to road agencies because most of the current solution for a greener road transport require adapting road infrastructure (EV charging, ERS, heavier vehicles…) and the use of alternative modes in combination with roads.

Audience: The target audience for this work will be road authorities and agencies, decision makers and technology providers.

Deliverables: Literature review, case studies, high impact summary, article in Routes/Roads magazine, seminar, social media.

Background to TC's work on this topic: During the previous cycle, good practices and interesting innovations have been collected and a final report produced. But several domains as multimodality, among which are LMICs issues, could not be fully tackled.

Low and lower-middle income countries: Building a long-term resilient freight transport system in the context of climate change will require robust and low energy solutions. For many LMICs living under hard climate conditions and potentially lacking access to energy, the emergence of efficient solutions will provide more favourable outcomes. The TC could organise a seminar on this issue.

Gender inclusion & diversity: The contributions of women in many LMICs to transport are critical to the overall well-being of their livelihoods and economic conditions. Safety is a big concern for women in LMICs. Conducting outreach through surveys or listening sessions would contribute greatly to our TC's understanding of their transport needs and help to identify solutions of the greatest benefits. Putting forward such innovations could be an objective for the TC.

Potential duration: Full cycle (4 years)



Technical Committee 2.4 – Road Network Operations and ITS For Sustainability

Overview

2.4.1 Applications of new technologies and digital transformation concept to Road Network Operations

Purpose: The purpose of this work is to investigate the application of new technologies and digital transformation concept to Road Network Operations, identifying concrete applications for Road Operators and analyse the following aspects:

- The digitalization rate
- In what new technologies are used and how they can enhance road operations
- What are the opportunities identified and the challenged ahead for the ones that are putting in place digitalization processes
- How digital technology can improve the sustainability of road operations
- what is the impact of new mobility forms on the digitalization of operations (from MaaS to Digital Services)

Importance to roads agencies: This work is important to road agencies because many are facing the challenge of introducing digitisation to Road Network Operations and need references and best practices.

Digital technologies are changing the way people move and behave. The mobility ecosystems is more and more based on digital services and on demand and integrated transport. Address the digital transformation concept to road network operations can support roads agencies during the design and implementation of such projects, thanks to the reference and best practices this work will create. Application of new technologies is strictly linked to best practice sharing and knowledge exchange.

Audience: Road Agencies, Road Operators, Road Administrations with focus on the decision making process

Deliverables: Technical report, case studies, article in Routes/Roads, webinar, seminar, social media.

Background to TC's work on this topic: During the previous cycle some hints of this item have been investigate, such as:

- digitalization maturity rate with the word of COVID-19 Response Team on ITS (ref. Survey)
- investigation of new technologies with specific focus on Big Data and Machine Learning (Ref. Case Study Report)
- the role of innovation for LMICs (Ref. Briefing Note)



Last discussion within TC members highlights the need to focus more on this subject to expand it.

Low and lower-middle income countries: This work will be useful for LMICs because it will constitute a best practice report for technologies applications and a possible guidance for the same implementations.

Gender inclusion & diversity: Gender and other disparities in transport behaviour and usage underscore the need for inclusive and sustainable transport that enable everyone to move around in a safe, healthy and affordable way. Technology can be an ally in order to plan and deliver inclusive services based on sustainable choice, but it can also be an adversary.

The proper cover of this subject needs also to be guaranteed by a diverse group of TC members.

Potential duration: Full cycle.

2.4.2 Conceive ITS solutions for sustainable mobility

Purpose: The purpose of this work is to investigate how ITS technologies will continue to improve and evolve at a phenomenal rate, providing more services to the transport industry. The benefits of deploying ITS technologies could be significant, if a focused, systematic and

incremental approach is taken.

In this context ITS is the cornerstone of future transport and mobility policies, as:

- ITS can contribute to reduce carbon emissions by optimizing mobility management
- ITS can be of great help to manage congestions and increase safety along the network
- ITS can provide users with digital services that makes the transport system more inclusive and sustainable
- ITS development has a great social impact for communities and cities

Importance to roads agencies: This work is important to road agencies because there is a great lack of guidelines and standards to allow this evolution of ITS. ITS involve huge investments in different specialistic sectors (i.e. Information Technology, Telecommunications, Engineering) and examples of their application can be of great help.

Audience: Road Agencies, Road Operators, Road Administrations with focus on the decision making process.

Deliverables: Technical report, case studies, high impact summary, webinar, seminar, workshop or conference, social media.



Background to TC's work on this topic: During the previous cycle the links with sustainability and resilience popped up very frequently. With the evolution of ITS and C-ITS in digital infrastructure connected with everything this seems to be the natural evolution of the discussion.

Low and lower-middle income countries: This work will be useful for LMICs because it will constitute a best practice report for ITS applications and a possible guidance for the same implementations.

Gender inclusion & diversity: The proper cover of this subject needs also to be guaranteed by a diverse group of TC members.

Potential duration: Full cycle.

2.4.3 RNO and ITS development in LMICs: challenges and opportunities

Purpose: The purpose of this work is to analyse in order to better understand the rules for RNO and ITS development in Low Middle Income Countries.

In this context key aspects are:

- The role of new technologies and innovations for LMICs: what are the differences in processes and applications
- Consideration about sustainability in LMICs in relationship of the deployment of RNO and ITS systems
- Definition of challenges, benefit and opportunities for LMICs for the implementation of RNO and ITS systems
- Knowledge sharing and best practices exchange.

Importance to roads agencies: This work is important to road agencies because will include considerations that are purposely made in the context of LMICs.

Audience: Road Agencies, Road Operators, Road Administrations with focus on the decision-making process

Deliverables: Technical report, case studies, briefing note, seminar, social media, manual.

Background to TC's work on this topic: During the previous cycle the experience with LMICs the TC has done made us realize that a better understanding of the needs of LMICs leaders and decision makers is needed. They should have a voice of their own in this field.

Low and lower-middle income countries: This issue will be developed on purpose to address the needs, the challenges and the main benefit for LMICs. The conversation can be set.

Gender inclusion & diversity: The proper cover of this subject needs also to be guaranteed by a diverse group of TC members.

Potential duration: Full cycle.



Technical Committee 2.5 – Road Infrastructure for Connected and Automated Mobility

Overview

The ways of moving passengers and goods are changing rapidly in cities, metropolitan areas and rural areas not only due to the continued advancement of technology, including connectivity, cooperative and automated systems, but also because there is a need to increase utilization of the technology.

Road authorities and operators must be clear about the impact that this new mobility has on their current responsibilities and performance and prepare the necessary policies and safety standards for the future. Knowing what may happen, and the opportunities arising, and the demands required from the infrastructure by this new mobility will help road authorities and operators determine more efficient actions and investment decisions.

New scenarios and business models are evolving which require new architectures and ways of working. Decision makers need to consider this new environment to enable decarbonisation and improve safety and efficiency in the road and transport sector.

Three main topics have been identified for the Technical Committee to consider:

- Roads for connected, cooperative and automated mobility, considering both physical and digital infrastructure.
- Automated driving and infrastructure.
- Architectures, (including the role of managers and security issues) and business models for public authorities and road agencies (including partnerships with industry).

The reports developed by PIARC TF B.1 on connected vehicles, TF B.2 on automated vehicles, TF 2.1 on new mobility and its impact on road infrastructure, and the Special Project on smart road classification must be taken into account and provide a good starting point for the technical committee. Collaboration with TC2.4 has been identified as an essential activity.

2.5.1 Roads for connected, cooperative and automated mobility

Purpose: The purpose of this work is to identify the characteristics and functionalities that roads must provide to enable connected, cooperative and automated mobility. These characteristics and functionalities include both the physical infrastructure (signal, road markings, etc) and the digital road infrastructure(digital road signs, etc), studying the pros and cons of the different technologies available depending on the different scenarios and context.

Preliminary research questions:

- What physical requirements must a road to enable connected cooperative and automated mobility?
- What digital/connectivity requirements must a road to enable connected cooperative and automated mobility?

- What challenges and opportunities do connected, cooperative and automated mobility present for road authorities and operators?
- Regarding the legal and regulatory framework: What is the legal and regulatory situation (state of the art worldwide) associated with connected, cooperative and automated mobility infrastructure?
- Is there an intention to have standard requirements to accommodate all technologies? How can we avoid having an infrastructure for a specific technology?

Importance to roads agencies: This work should be important to road agencies/road industry because connected, cooperative and automated mobility is a reality that is growing in importance due to its contribution to improving road safety and enabling decarbonization and the efficiency of the transport system.

Road agencies are aware of this opportunity and must direct their policies and activities to successfully incorporate connected, cooperative and automated mobility. It is necessary to start thinking about it now and plan as they are working on infrastructure, taking a proactive approach rather than retrofitting when the technology is ready for deployment.

Road agencies might consider undertaking their own safety assessment of the technologies in their own context and environment to gain a clear understanding of what they are implementing (3rd party, information needed for insurance and liability reasons).

Audience: The first main audience of the work of the technical committee should be the members of the national committees, responsible for defining the national policies on roads and transport. But, the TC work should be of interest and useful for any technician who wants to know the state of the art, and the characteristics and performance of roads in relation to connected, cooperative and automated mobility.

Deliverables: Literature review, technical report, case studies, survey, high impact summary, article in Routes/Roads magazine, seminar, social media, session in an external conference.

Background to TC's work on this topic: The reports produced by PIARC TF B.1 on connected vehicles, TF B.2 on automated vehicles and TF 2.1 on new mobility and its impact on road infrastructure must be taken into account and can constitute a good starting point for the technical committee.

Low and lower-middle income countries: The conclusions and recommendations of the technical committee may be especially relevant for LMICs since they can acquire knowledge and experience prior to their interventions without the need to use their own resources, enabling more efficient investment.

Gender inclusion & diversity: The technical committee should take into account gender inclusion and diversity issues through three main channels:

- Collecting gender aggregated data to analyse when possible.
- Analysing gender and age group differences in connected, cooperative and automated mobility acceptance if disaggregated data are available.
- Considering differences between men and women in safety and security concerns when disaggregated data is available.

Potential duration: This topic will be covered during all the cycle 2024-2027.

2.5.2 Automated driving and infrastructure

Purpose: The purpose of this work is to:

- Identify the impact of automated driving on road infrastructure, and to consider what may be needed for the future.
- Identify the physical and the digital requirements.
- Identify the challenges and opportunities for road operators and administration due to automated driving.

Preliminary research questions:

- How will road networks need to evolve as a result of automated vehicles?
- Would a specific road network for automated driving be required?
- Regarding infrastructure adaptation: How should existing infrastructure be modified or upgraded to accommodate automated mobility? Are we going to have dedicated lanes for automated driving in the general road network?
- What are the physical/digital requirements in a road for automated driving?
- Regarding the appropriate Operational Design Domain (ODD): How to define and establish the appropriate ODD for different types of Automated Vehicles. This involves understanding the capabilities and limitations of AVs and identifying the conditions (e.g., road types, weather conditions, traffic density) under which they can operate safely.
- Is there an intention to standardise requirements to accommodate all technologies? How can we avoid having an infrastructure for a specific technology?

Importance to roads agencies: This work should be important to road agencies/road industry because automated driving is acquiring an important role due to its contribution to improving road safety, the goal of decarbonization and the efficiency of the transport system.

Road agencies are aware of this opportunity and must direct their policies and activities to successfully incorporate automated mobility, now or plan for the future.

Audience: The first main audience of the work of the technical committee should be the members of the national committees, responsible for defining the national policies on roads and transport. But the TC work should be of interest and useful for any technician who wants to know the state of the art and the characteristics and performance of roads in relation to connected, cooperative and automated mobility.

Deliverables: Literature review, technical report, case studies, survey, high impact summary, article in Routes/Roads magazine, seminar, social media.

Background to TC's work on this topic: The reports produced by PIARC TF B.1 on connected vehicles, TF B.2 on automated vehicles and TF 2.1 on new mobility and its impact on road infrastructure, and the Special Project on smart road classification will be taken into account, constituting a good starting point for the technical committee.

Low and lower-middle income countries: The conclusions and recommendations of the technical committee may be especially relevant for LMICs since they can acquire knowledge and experience prior to their interventions without the need to use their own economic resources, enabling more efficient investments.

Gender inclusion & diversity: The technical committee should take into account the gender inclusion and diversity issues through three main channels:

- Collecting gender aggregated data to analyse when possible.
- Analysing gender and age group differences in automated driving acceptance if disaggregated data are available.
- Considering differences between men and women in safety and security concerns when disaggregated data is available.

Potential duration: This topic will be covered during all the cycle 2024–2027.

2.5.3 Architectures and business models for public authorities and road agencies

Purpose: The purpose is to analyse the scope of architecture applied to road infrastructure for connected and automated mobility, considering first of all the different actors involved and their roles, starting from the design, planning and implementation of the architecture. In the analysis it is necessary to consider the different configurations of the domains where it will be applied, ranging from countries with different income levels, institutional aspects, local regulations, technological starting level or possible additional issues.

In the role of the architecture, it is necessary to include a specific analysis for security aspects, considering the implications that this aspect has on the correct development of the implementation and integration.

Otherwise, and regarding horizontal issues, it is convenient to carry out an analysis of the options for business models for connected and automated mobility with a focus on public authorities. The work will consider the current existing models, current and future trends, and other relevant aspects. such as income levels, current state of technology, possibility of evolution and development, and advantages/disadvantages of model changes. The options for partnerships will also be addressed.

Preliminary research questions:

- Can common/unified architecture elements for connected and autonomous mobility be established?
- How are the roles in the different phases of the architecture distributed in order to achieve a correct development?
- How are responsibilities distributed, taking into account the profile of the managers?
- How to take security aspects into account in the architecture?
- What are the aspects to consider in the analysis and proposals on business models for public authorities?



- Is it possible to define business model standards or an adaptation / change procedure related to connected and autonomous mobility?
- How can the field of partnerships be approached from an integral point of view?
- What implication do the possibilities of partnerships have in terms of the automotive sector?

Importance to roads agencies: This topic may have relevance for road agencies because the architecture phase is one of the most critical aspects in the consideration of Road infrastructure for Connected and Automated mobility. In addition, the development and application of business models represents an aspect that is fully related to the responsibilities inherent to functions carried out by road agencies. The integration of partnerships with industry also represents another aspect to consider and its conclusions and results obtained can provide added value to these agencies. An useful source of information would be a compilation of: good practices, success stories, experiences implemented and problems detected for possible analysis, assessment, identification of similarities or aspects for improvement.

Audience: The first main audience of the work of the technical committee should be the members of the national committees, responsible for defining the national policies on roads and transport. The architecture aspect and business models arising can involve a relevant number of actors, agents, and stakeholders, it will therefore be of interest to share the results with the different stakeholders.

Deliverables: Literature review, technical report, case studies, survey, high impact summary, article in Routes/Roads magazine, webinar, seminar, social media, session in an external conference.

Background to TC's work on this topic: The reports produced by PIARC TF B.1 on connected vehicles, TF B.2 on automated vehicles and TF 2.1 on new mobility and its impact on road infrastructure must be taken into account and can constitute a good starting point for the technical committee.

In this topic, the relationship with other TCs will be relevant.

Low and lower-middle income countries: The conclusions and recommendations of the technical committee may be especially relevant for LMICs since the information related to architectural aspects and the business models can be studied, analysed and projected prior to the possible investment to be made and based on the shared experience.

Gender inclusion & diversity: The technical committee should take into account the gender inclusion and diversity issues through three main channels:

- Consideration of gender inclusion & diversity in the business model and prior to decision making.
- Consideration of specific gender inclusion & diversity issues can be especially critical in the architecture phase, and should therefore be given special consideration throughout the entire treatment phase.
- Compilation of previous experiences in other business models

Potential duration: This topic will be covered during all the cycle 2024–2027.



Planned Delivery of Strategic Theme 2 – Road Mobility

Topic/activity	2024				2025				2026				2027			
	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec
Technical Committee 2.1 Roads for Accessibility and Mobility in Urban and Peri-Urban Areas																
2.1.1 Cooperation between transport modes in urban and peri-urban areas																
2.1.2 Urban vehicle access regulations (UVARs)																
2.1.3 Securing mobility of vulnerable road users in crowded streets and for highly frequented infrastructures																
Technical Committee 2.2 Roads for Equity, Accessibility and Mobility in Rural and Interurban Areas																
2.2.1 Accessibility and mobility in rural and interurban areas: enhancing active modes and improving road safety for all users																
2.2.2 Technical solutions for paved and unpaved roads																
Technical Committee 2.3 Sustainable Freight																
2.3.1 Efficient road infrastructure and operation for freight transport																
2.3.2 Greening of road freight																
Technical Committee 2.4 Road Network Operations and ITS for Sustainability																
2.4.1 Applications of new technologies and digital transformation concept to Road Network Operations																
2.4.2 Conceive ITS solutions for sustainable mobility																
2.4.3 RNO and ITS development in LMICs: challenges and opportunities																
2.4.4 Update of online ITS manual																
Technical Committee 2.5 Road Infrastructure for Connected and Automated Mobility																
2.5.1 Roads for connected, cooperative and automated mobility																
2.5.2 Automated driving and infrastructure																
2.5.3 Architectures and business models for public authorities and road agencies																

Key: BN = Briefing Note, CS = Collection of case studies, LR = Literature review, SM = Seminar, SU = Survey, TR = Technical Report, MU = Manual Update

Strategic Theme 3 – Safety and Sustainability

Road safety and sustainability are important issues that need to be addressed in road operations. There are several key areas that need to be considered in order to ensure that roads are safe and sustainable for all users. Road safety and sustainability are important issues to be addressed in road operations. Approximately 1.35 million people lose their lives while driving, cycling, or walking on the road every year. Another 50 million are seriously injured, and many are left permanently disabled as a result. Roads have significant sustainability issues, including environmental impacts, such as air pollution and climate change, and impacts on ecosystems. Road safety is also a critical sustainability issue, with the loss of life and productivity costing countries productive opportunities.

Strategic Theme 3 Safety and Sustainability, addresses issues that are integral to planning, design, construction, operation, maintenance, and use of the road system. The five key issues for this committee are addressed by this Strategic Theme.

Road safety

Technical Committee 3.1 will progress matters related to road safety. The safety of vulnerable road users, including cyclists and pedestrians, is a significant concern. Low-income and developing countries face unique road safety challenges, with 90% of road traffic fatalities occurring in these countries.

Winter service

Technical Committee 3.2 will work on issues relevant to countries that experience very cold weather and have unique challenges when it comes to road operations. Staffing for seasonal work such as snow ploughing, and ice clearing is essential to ensure that roads remain safe and passable. Additionally, maintenance of roads in very cold climates is important to prevent damage from freezing and thawing cycles.

Asset management

Technical Committee 3.3 will progress issues related to road infrastructure asset management. This will include the use of BIM (Building Information Modelling) and digitalisation of road standards. Each of these can help improve road asset management. The Committee will consider innovative approaches to manage ageing road structures such as bridges, culverts, and tunnels is essential to ensure their continued safety and usability.

Environmental impacts of road infrastructure and transport

Technical Committee 3.4 will work on issues relevant to the environmental effects of road infrastructure This will include work on biodiversity can be affected by the construction of new roads, while air and noise pollution can result from increased traffic. The Committee will also address measures such as zero/low emission zones can help mitigate environmental impacts.

Road infrastructure and operations for road transport decarbonisation

Technical Committee 3.5 will progress issues related to decarbonisation of road transport which are essential in the fight against climate change. They will consider how there can be a reduction in emissions the use of zero emission vehicles, as well as strategies such as pricing and business models that encourage their adoption. The Committee will also consider charging infrastructure and electric road systems.



Technical Committee 3.1 – Road Safety

Overview

Fatal and Serious Crashes continue to be a problem for countries of all sizes. Countries are working to effectively address locations that are experiencing or have risk factors that are likely to lead to crashes. This cycle is intended to provide key resources for safety practitioner. As vulnerable road users are an important part of the transport system, and efforts to address the safety of these individuals is critical to the success of any safety program. WG1 will address this issue. The Safe System Approach is now widely accepted, however, low- and middle-income countries are experiencing greater difficulties in securing funding, developing the knowledge base, and in understanding the first steps towards Safe System Implementation. This gap will be assigned to WG2. Road safety requires the assessment of safety data, such as crash information, roadway geometrics, roadside conditions, and human factors to be able to effectively select strategies to reduce crash potential, a report will be developed by WG3. The Road Safety Manual is a premier PIARC online reference to safety professionals. Updating and providing requested materials is important to those using this reference. In this cycle, the effort will also incorporate parts of the PIARC 1st Edition worksheets and tools by WG4.

3.1.1 Securing the Safety of Vulnerable Road Users

Purpose: The purpose of this work is to address the safety of vulnerable road users (VRU). Vulnerable road users are over represented in fatal and serious crashes in many countries. This is particularly true for LMICs where walking, biking, and motorized two wheels are a primary means of travel. The goal of this work will be to develop a technical report that assess the scope of VRU issues for countries at all income levels. The report will focus on the individual problems, needs, and strategies that can be used to address the safety outcomes of each category of VRU. In doing so, the document will serve a critical need in road safety.

Preliminary research questions: The main purpose of the research is to:

- Understand the scale and scope of safety issues for each category of VRU across countries at all income levels.
- To evaluate how VRU safety is being accounted for by identifying key issues and concerns. Including, for example, VRUs with disabilities and different age groups.
- To provide methods for identifying needs and potential solutions to address VRU safety.
- To provide example of practical solutions used to address the needs of VRU safety.

Importance to roads agencies: This work is important to road agencies/road industry because crashes involving VRUs continue to be a major concern for countries at all income levels. By understanding how to assess and address these needs VRU is enhanced

Audience: The work is intended for countries at all income levels. The document is intended to be used by decision makers and safety practitioners responsible for transportation safety. The technical report should serve a reference of best practices that informs and guides decision making.

Deliverables: Technical report, provide information for Road Safety Manual.

Background to TC's work on this topic:

• Vulnerable Road Users: Diagnosis of Design and Operational Safety Problems and Potential Countermeasures

• Addressing Road Safety Worldwide: Vulnerable Road Users, Human Factors & RS in LMIC

• Proceedings of the PIARC International Seminar on: "Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures"

• Review of Global Road Safety Audit Guidelines with Specific Consideration for Low and Middle Income Countries

• Road Safety Catalogue of Case Studies

Low and lower-middle income countries: VRU crashes disproportionately occur in LMIC countries. These crashes result from lack of adequate infrastructure and benefit would occur from increased understanding.

Gender inclusion & diversity: In some countries, the security of women who are walking and biking is problematic which in turn can result in safety related issues. This topic is likely to be addressed as part of this effort. In addition, younger and elderly individuals are also disproportionately injured, and this consideration will also be addressed.

Potential duration: 30 months.

3.1.2 Safe System in Low and Lower-Middle Income Countries

Purpose: The purpose of this work is to provide knowledge regarding the application of the Safe System Approach in LMICs entering or progressing through the early stages of implementation. Implementing the Safe System Approach requires a commitment by countries to consider how to provide for road safety management, safe roads, safe vehicles, safe road user behaviour, and Safe Post Crash Care. LMICs will differ in their ability to implement the safe system and this work intends to provide a framework, guidance, and potential actions as countries evolve through beginning and emerging stages of implementation.

Preliminary research questions: The main purpose of the research is to

- Review existing literature on the Safe System in low and lower-middle income countries
- To develop an approach with provides a foundational understanding of the safe system and considerations at the early stages of implementation.
- To develop a framework and guidance for growth within the safe system with special consideration of LMICs
- Provide examples of early-stage implementation by LMICs



Importance to roads agencies: This work is important to road agencies/road industry because the Safe System Approach has been successful globally in reducing fatalities and serious injuries. This effort intends to provide knowledge and assistance towards Safe System Implementation at the LMIC level.

Audience: The work is intended for LMIC countries at all income levels. It is directed towards road authorities with the responsibly for road infrastructure planning, design, and operations. The technical report should provide a framework and guidance on early-stage implementation.

Deliverables: Technical report, information will be used to update the Road Safety Manual.

Background to TC's work on this topic:

PIARC Road Safety Manual

Road Infrastructure a Key Building Block for a Safe System

Safe System Roads and Roundabouts For Motorcycles

Low and lower-middle income countries: The intent of this effort is to specifically address Safe System Approach issues in LMICs.

Gender inclusion & diversity: The Safe System Approach focus on the need to address all road users. Past practices focused on vehicle safety. By addressing vulnerable road users, you are dealing with people less like to be able travel by car or vehicle. These are often lower income men and women, minority populations, and the youngest and oldest road users.

Potential duration: 24 months.

3.1.3 Diagnosing Road Safety Problems and Opportunities

Purpose: The purpose of this work is to provide knowledge on diagnosing road safety problems through analysis of the factors contributing to crashes. To be effective in preventing and reducing fatalities and serious injuries transportation agency must be able to assess safety data and from that data select appropriate strategies that will lead to fatal and serious crash reduction. This activity is important for all countries regardless of income level. This effort will provide a stepwise process for understanding and addressing contributing factors to crashes and crash outcomes.

Preliminary research questions: The main purpose of the research is to

- Review existing literature on the diagnosing road safety problems including those at at-grade railroad grade crossing.
- How to consider different safety data in assessing potential contributing factors.
- Provide a foundational understanding and method for performing a diagnostic assessment of road safety problems and selecting appropriate interventions.

- Provide examples of diagnosing road safety problems, selecting, and implementing interventions.

Importance to roads agencies: This work is important to road agencies/road industry as the ability to identify, diagnose, and address road safety problems is a fundamental need within the road safety profession. Doing so ensures that selected interventions will return on investment in terms of reducing and preventing road safety problems.

Audience: The work is intended for countries at all income levels. The document is intended to be used by decision makers and safety practitioners responsible for transportation safety. The technical report should serve as a reference for those addressing road safety problems.

Deliverables: Technical report

Background to TC's work on this topic:

- Vulnerable road users: Diagnosis of design and operational safety problem and potential countermeasures.
- Road Safety Audit Guidelines for safety checks of new road projects
- Road Safety Evaluations Based on Human Factors Method
- Road Safety Manual

Low and lower-middle income countries: A fundamental concern of LMICs is to identify and diagnose road safety problems and how they might be addressed to reduce fatal and serious injury crashes. In doing so, they ensure that there will be a return on investment for the scarce funding available.

Gender inclusion & diversity: Road safety is an issue for all people regardless of race, gender, or income level. Motor vehicle crashes disproportionally also affect those most vulnerable in the population. This effort will be directed in a manner that also considers socioeconomic and demographic factors as potential contributing factors to crashes.

Potential duration: 40 months.

3.1.4 Update of the Road Safety Manual

Purpose: The purpose of this work is to update the Road Safety Manual (RSM) and to incorporate components (e.g. worksheets and tools) of the 2003 1st Edition of the RSM technical content. The report will focus on performing a minor update of the 2023 RSM, bringing new material from the 2024–2027 work groups and incorporating select relevant worksheets and tools.

Preliminary research questions: The main purpose of the research is to

- Evaluate the 2003 1st Edition RSM for materials to include in the next update. Including practices and procedures to supplement the RSM at-grade railroad crossing section.
- Update worksheets or tools as necessary and incorporate into the online document.

- Update the current 2023 online version with new material.
- Publish the new RSM.

Importance to roads agencies: This work is important to road agencies/road industry as transportation agencies benefit from understanding the Safe System Approach in single agency oriented document. The RSM is a well used and relevant document of PIARC. Maintaining and updating the document keeps it relevant and useful be road agencies. Adding new technical materials will assist agencies with simple easy to use tools.

Audience: The work is intended for countries at all income levels. The document is intended to be used by decision makers and safety practitioners responsible for transportation safety. The technical report should serve as a reference of the Safe System Approach that informs and guides decision making.

Deliverables: Manual.

Background to TC's work on this topic:

- PIARC Road Safety Manual 1st Edition 2003
- PIARC Road Safety Manual
- PIARC Exchange Knowledge Sharing Campaign

Low and lower-middle income countries: The Road Safety Manual is a valuable document for LMICs. It is free, online, and relevant. The Manual provides significant information for LMICs.

Gender inclusion & diversity: The RSM recognizes all road users needs, and the future edition will incorporate equity related issues.

Potential duration: 48 months.

Technical Committee 3.2 – Winter Service

Overview

Slippery roads due to snow or ice accidents that are more frequent and heavy snowfalls might even cut the road connection of whole valleys from the outside. Thus, winter service plays a major role for traffic safety during the cold period of the year. To provide valuable information for road authorities TC 3.2 is working on serval Issues with the Winter Congress being the most important one. To share information worldwide the Snow and Ice Databook is going to be updated. One might think spreading salt and ploughing snow is a rather simple task the methods and equipment is under ongoing development to achieve better results. Using different modes of transport in urban areas has its own requirements on winter service. A new issue deals with the lack of skill and resources for winter service, TC 3.2 will have a look at that.

3.2.1 Skill and resources for winter service

Purpose: The purpose of this work is to find solutions on how to deal with shortage of skilled winter service personal. Winter weather has no regular working hours and is not predictable for longer periods.

Importance to roads agencies: This work is important to road agencies/road industry because they need skilled workforce that can deal with weather events at any time and provide safe roads.

Audience: Decision makers might be interested to find solutions to this problem others might have already found.

Deliverables: Case studies, briefing note,

Background to TC's work on this topic: This is a relatively new problem for this TC and no work has been done before on that issue.

Low and lower-middle income countries: -

Gender inclusion & diversity:

Potential duration: This will be part in the second half of the cycle.

3.2.2 Integration of new technologies in winter services

Purpose: The purpose of this work is to gather information about the newest technologies and strategies used in winter service. Also, research projects could find a place in the report. The collection of different approaches makes it much easier to see how one can improve the own winter service.

Preliminary research questions: General description of state of the art of the existing technologies and new technologies for winter service. Expected technology to be used in winter service in the future. Make a projection on what could be automated or connected equipment for winter service in the future.

Importance to roads agencies: Based in a deep research on worldwide use of new technologies on winter service, the report could give some examples of tests or studies to these topics. Based on the experience of the past cycles many countries often have very extensive research projects and practical experience in a very specific field of winter service. The knowledge exchange provided with this item helps other countries to adopt successful projects much quicker**.**

Audience: This work is mainly for operational winter service personal and decision makers.

Deliverables: Technical report, survey.

Background to TC's work on this topic: These kinds of reports have already been done by the TC. The impact was that methods like pre-wetted salt and brine or strategies like preventive spreading are now success stories all over the world.

Low and lower-middle income countries: Some technologies, such as the use of brine, are better and cheaper to use if one knows how to use them correctly. Extensive and expensive research has already been done, the outcome is part of the report.

Gender inclusion & diversity: As a very technical report with focus on mechanical or chemical topics it is not likely to relate to gender and diversity aspects. If there such aspects appear the report they will be highlighted.

Potential duration: It will take the whole cycle to finish the final report. A draft or preview will be shown at the Winter Congress 2026.

3.2.3 Update of the Snow and Ice Data Book

Purpose: The purpose of this work is to update the Snow and Ice Data Book 2022 with the case studies and main findings. To establish the Snow and Ice Data Book (SIDB) as a current resource of winter service in different countries for knowledge transfer globally. To develop an online version of SIDB (manual or similar).

Importance to roads agencies: This work is important to road agencies/road industry because the Snow and Ice Databook (SIDB) as a PIARC product contains general information about winter maintenance from many different countries which makes it a very good resource for comparisons or finding of new ideas. Therefore, it should be established as a current resource for knowledge transfer globally and been updated.

Audience: Experts, decision makers who want to see how other countries deal with winter service in comparable or maybe even wors climate conditions.

Deliverables: Snow and Ice Databook.

Background to TC's work on this topic: The Snow and Ice Databook is a regular issue in every cycle. Due to the long update cycles with asking for all countries for material, and then assembly it to a report, publish as a pdf on the website takes time.

Therefore, the possibility to update the SIDB from pdf to an online version, which could be updated more easily, should be developed and introduced during the period. This also means the inclusion of an interactive format to facilitate use by members of PIARC.

Low and lower-middle income countries: The Snow and Ice Databook delivers many use cases from around the world. It might help to find efficient solutions without development and research.

Gender inclusion & diversity: -

Potential duration: English version should be finished with the Winter Congress 2026.

3.2.4 Preparation of the 2026 International Winter Congress

Purpose: The purpose of this work is to prepare several (around half) of the Technical Session at the next Winter Congress 2026. In addition, it would be appreciated to collaborate in Foresight Session and/or Workshops, as well as contribute to the Proceedings.

Importance to roads agencies: This work is important to road agencies/road industry because the 2026 International Congress will gather winter service experts from all over the world. Its objective will be share knowledge and exchange ideas on the latest development and challenges that winter road services are facing.

Audience: Congress participants.

Deliverables: Sessions at the congress.

Background to TC's work on this topic: This is the main part of the work for TC 3.2 in the first half of each cycle.

Low and lower-middle income countries: -

Gender inclusion & diversity: -

Potential duration: Start of the Cycle until Congress 2026 proceedings are finished.

3.2.5 Winter maintenance in urban areas

Purpose: The purpose of this work is to gather information about the newest technologies and strategies used in winter service in urban areas. The collection of different approaches makes it much easier to see how one can improve the own winter service.

Preliminary research questions: Cities and urban areas with significant winter weather events experience unique challenges when it comes to delivering winter services to the traveling public. Even if regular snowfalls can be handled, extreme snowfalls need special preparations and actions. What are good use cases to deal with winter events in urban areas?

Importance to roads agencies: Based in a deep research on worldwide use of new technologies on winter service, the report could give some examples of tests or studies to these topics. Not only winter service is impacted also road design plays a large part in operational winter service in winter.

Audience: This work is mainly for operational winter service personnel and decision makers.

Deliverables: Case studies, survey, briefing note, workshop or conference.

Background to TC's work on this topic: This has been part of the last two cycles and was good accepted and also had good numbers of papers on this topic at the last two winter congresses.

Low and lower-middle income countries: Some technologies, such as the use of brine, are better and cheaper to use if one knows how to use them correctly. Extensive and expensive research has already been done, the outcome is part of the report.

Gender inclusion & diversity: Different aspects of traffic planning and modes of transportation affect diversity. If such topics appear in the report they will be highlighted.

Potential duration: This will start with the cycle with the main working period during the second half and end with the cycle. A draft will be presented at the Winter Congress 2026.

Technical Committee 3.3 – Asset Management

Overview

Good asset management is fundamental to every road authority to ensure it can effectively manage its assets through the asset lifecycle. Asset management requires the ability to balance cost, risk and performance. PIARC TC 3.3 is looking to further improve the collective understanding of asset management with a view to more effective management of assets to optimise asset performance. The first stream of work will investigate how digital technologies can improve an asset manager's understanding of the asset base, its condition and its predicted performance. The second stream of work will continue to build upon the body of knowledge on the use of risk and resilience analysis metrics. The third stream of work will look to identify successful approaches for renewal and rejuvenation of ageing infrastructure. Where relevant, case studies developed through the aforementioned work streams will be incorporated within updates to the Road Asset Management Manual. TC3.3 is also aiming to organise an international conference for road asset management to share learnings from the committee's work activities.

3.3.1 Leveraging Technology to Improve Asset Management Practice

Purpose: The purpose of this work is to investigate how digital technologies can improve the way asset management is undertaken. Included within the scope of this work are Building Information Modelling, data science and visualisation approaches, the use of big data, artificial intelligence applications and automated data collection methods to improve asset management. .

Importance to roads agencies: This work is important to road agencies/road industry because emerging technologies, data collection and analysis approaches are fast impacting the way road owners and operators are managing their road network assets. These innovations can help organisations make more effective investment decisions considering the condition, performance and level of service over the whole life-cycle of the assets.

Audience: The outcomes of this activity will benefit road owners and operators, consultants, and road personnel and contractors responsible for the maintenance and operation of road networks.

Deliverables: Technical Report, article in Routes/Roads magazine, manual.

Background to TC's work on this topic: This activity builds on the results of the work of TC 3.3. working group 1 Innovative approaches for asset management systems over the 2020-23 cycle. The TC produced the report "BIM and Digitalization in Asset Management" and a Seminar on "BIM and Asset Management" that can provide the initial background information for this topic.

Low and lower-middle income countries: This activity is important for low and lower-middle income countries as many of them are improving their data on their key assets and can benefit from guidelines and lesson learned from successful case studies.

Gender inclusion & diversity: No clear link with gender and diversity aspects.

Potential duration: 2 years.

3.3.2 Measures for reducing risks and improving the resilience of road networks

Purpose: The purpose of this work is to continue to build the body of knowledge on the use of risk and reliance analysis metrics and tools for managing transportation assets. This can help increase the resilience of road networks to climate change and other stressors.

Importance to roads agencies: It is important to expand current approaches in asset management decision making to incorporate risk- and resilience-based approaches, in the face of various threats to transportation infrastructure. Proven approaches can help road asset managers best focus risk and resilience aspects to enhance road preservation and renewal decisions.

Audience: The outcomes of this activity will benefit road owners and operators, consultants, and road personnel and contractors responsible for the maintenance and operation of road networks.

Deliverables: Technical Report.

Background to TC's work on this topic: This activity builds on the results of the work of TC 3.3. working group 2 Measures for improving resilience of road network, which produced the report "Measures to improve resilience of road network", which presents case studies and lessons learned from practice.

Low and lower-middle income countries: This activity is important for low and lower-middle income countries as it can provide guidance to the road asset managers on how to focus their resilience efforts to enhance decision making.

Gender inclusion & diversity: No clear link with gender and diversity aspects.

Potential duration: 2 years.

3.3.3 Renewal and rejuvenation of aging infrastructure

Purpose: The purpose of this work is to continue to identify successful approaches for considering the renewal and rejuvenation of aging infrastructure managing transportation assets in asset management.

Importance to roads agencies: As road infrastructure networks have been in service for a long time and they are being subject to increasing demands imposed by emerging vehicle technologies, more severe climatic events, e-commerce, and increased user expectations, it is important that agencies consider these factors while programming investments in their asset management plans.

Audience: The outcomes of this activity will benefit road owners and operators, consultants, and road personnel and contractors responsible for the maintenance and operation of road networks.

Deliverables: Technical report, Manual.

Background to TC's work on this topic: This activity continues the work of TC 3.3. working group 3 Renewal and Rejuvenation of Aging Infrastructure, which produced the report "Renewal and Rejuvenation of Aging Infrastructure", which presents case studies and lessons learned from practice.

Low and lower-middle income countries: This activity is important for low and lower middle income countries as it can provide guidance to the road asset managers on how to focus their transportation infrastructure renewal and rejuvenation efforts to enhance decision making.

Gender inclusion & diversity: No clear link with gender and diversity aspects.

Potential duration: 2 years.

3.3.4 Update the content of the Road Asset Management Manual

Purpose: The purpose of this work is to continue to update the content of the Road Asset Management Manual. Update will include increasing the number of case studies and include additional sections based on the knowledge gained through the other TC 3.3 activities.

Importance to roads agencies: Asset Management provides a practical and effective approach to maintain the most valuable assets road organizations. The PIARC Asset Management manual provides advice on how asset management principles may be used to support a more efficient approach to maintain road infrastructure assets, and on the implementation and continuous development of road infrastructure asset management.

Audience: The outcomes of this activity will benefit road owners and operators, consultants, and road personnel and contractors responsible for the maintenance and operation of road networks.

Deliverables: Case studies, manual.

Background to TC's work on this topic: This activity continues the work of TC 3.3. working group 4 Update of PIARC Road Asset Management Manual.

Low and lower-middle income countries: This activity is important for low and lower-middle income countries as many of them are considering adopting or enhancing road asset management approaches. The manual builds on the progress made on asset management from several countries, and provides case studies of successful practices to document the lesson learned and experience gained in implementing asset management.

Gender inclusion & diversity: No clear link with gender and diversity aspects.

Potential duration: 4 years.



Technical Committee 3.4 – Environmental Sustainability of Road Infrastructure and Transport

Overview

Various strategies have been developed and implemented in different countries to limit the impact on air pollution of areas with heavy road traffic, including ZEZ/LEZ, on which feedback is beginning to be available. Traffic noise problems also occur along major roads, which generally have high traffic volumes, while recurrent noise is a major health hazard for local residents.

The various air quality and noise mitigation measures are an essential element of environmental sustainability around roads, and therefore need to be studied and improved in both developed and middle-income countries. The problem of noise can also be significant near railway tracks.

The fragmentation of wildlife habitats by road projects poses a threat to animal species. The survival of individuals of these species is jeopardized when they cannot have a sufficiently large territory to feed, reproduce or perform behaviours inherent in their species. In such cases, wildlife crossings are needed to establish a connection between the parts of the habitat on either side of the road. These wildlife crossings must be adapted to be easily used by each target species, according to its own characteristics, whether it is a large or small mammal, a reptile or an amphibian. To design and optimise these facilities, studies are needed to share best practices.

3.4.1 Air pollution mitigation and zero/low emission zones

Purpose: Air pollution problems are often observed near roads in urban areas, where, apart from vehicles, numerous sources of emissions such as factories, offices and residential buildings are concentrated.

In order to reduce this air pollution, various strategies have been developed and implemented in different countries, including the ZEZ/LEZ, for which feedback is available.

The work of this committee will consist of assessing the effectiveness of the various mitigation measures, in particular that of the ZEZ/LEZ.

Preliminary research questions:

- Investigate and assess how road administration implement operational mitigation measures.
- Provide feedback on the experience of the zero/low emission zones and evaluate these measures in the different contexts in which they have been introduced.
- Innovative and sustainable eco-infrastructure solutions for roads and streets could also be a part of this topic.

Importance to roads agencies: This work is important to road agencies/road industry because air pollution is responsible for many deaths and mitigating it is a major challenge for road agencies.

Audience: Road agencies, civil engineers.

Deliverables: Technical report, seminar, terminology and data publication.

Background to TC's work on this topic: The work carried out will be based on the work of the previous 3.4 Committee, its achievements and its various publications, but also on the new elements that have become available in this field since the end of 2023.

Low and lower-middle income countries: LIMICs are particularly vulnerable to this risk, and the need for sustainable development makes this work particularly important for them.

Potential duration: 4 years.

3.4.2 Noise pollution

Purpose: Traffic noise problems occur along main roads which generally have a high volume of traffic, including a number of lorries and heavy-duty trucks, and which have many residential properties in their vicinity. Road traffic noise consists mainly of engine noise, intake air noise, exhaust noise, wind noise and tyre rubbing noise on the road, all of which are considered to be sources of road traffic noise. The problem of noise can also be significant near railway tracks.

Preliminary research questions:

- Evaluate improvements of pavement design, construction and maintenance, and review novel surface treatments to optimize acoustic performance.
- Evaluate possible improvements of railway design, construction and maintenance.
- Maintain the noise data base.
- Study the best practices in decision-making procedures for selecting protection methods and measures.

Importance to roads agencies: This work is important to road agencies/road industry because traffic noise is responsible for damage to the health of local residents and is a major issue for road development projects.

Audience: Road agencies, civil engineers, town planners.

Deliverables: Technical report, case studies, high impact summary, seminar, managed software application (noise database).

Background to TC's work on this topic: The work carried out will be based on the work of the previous 3.4 Committee, its achievements and its various publications, but also on the new elements that have become available in this field since the end of 2023.

Low and lower-middle income countries: LIMICs are particularly vulnerable to this risk, and the need for sustainable development makes this work particularly important for them.

Potential duration: 4 years.

3.4.3 Road and road transport impact on wildlife and biodiversity

Purpose: Wildlife habitats fragmented by road projects pose a threat to animal species. The survival of individuals of these species is jeopardized when they cannot have a sufficiently large territory to feed, reproduce or perform behaviours inherent in their species. In such cases, wildlife crossings are needed to establish a connection between the parts of the habitat on either side of the road. These wildlife crossings must be adapted to be easily used by each target species, according to its own characteristics, whether it is a large or small mammal, a reptile or an amphibian.

Preliminary research questions:

- Innovative and sustainable eco-infrastructure solutions for streets, roads and highways.
- Identify how road projects affect wildlife habitats and their connectivity.
- Evaluate the efficiency of corridor designs and their role in ecological habitat connectivity.

Importance to roads agencies: This work is important to road agencies/road industry because it enables them to understand the impact of road project on wildlife habitats and their connectivity and consider this topic in future projects.

Audience: Road agencies, civil engineers

Deliverables: Technical report, case studies, high impact summary, seminar, managed software application (noise database).

Background to TC's work on this topic: The work carried out will be based on the work of the previous 3.4 Committee, its achievements and its various publications, but also on the new elements that have become available in this field since the end of 2023.

Low and lower-middle income countries: LIMICs are particularly vulnerable to this risk, and the need for sustainable development makes this work particularly important for them.

Potential duration: 4 years.

Technical Committee 3.5 – Road Infrastructure for Road Transport Decarbonisation

Overview

On-road freight and passenger transport represent over 75% of global inland transport and must decarbonize to achieve the goals of The Paris Agreement. TC 3.5 will share information from road agencies to accelerate deployment of best practices and avoid missteps by sharing lessons learned.

There are today a number of solutions for diminishing the carbon footprint from road transports. All solutions have their pros and cons and the needs differ among the nations. All solutions have their different energy, cost and socioeconomics challenges and it is important to understand these differences and how to face them.

The purpose of this TC includes sharing knowledge on the modern technologies and policy consideration to introduce electric roads.

There is also needs to produce more green energy among the nations, and the road sector has the possibility to contribute to the energy production by deploying smart energy solution on and along the roads. It is important to learn more about these possibilities.

TC 3.5 could play a leading role in exchanging knowledge and experience in decarbonization globally. Countries should be invited to share knowledge and experiences from their planned or conducted Research and Development projects as well as from demonstrators. Findings from these activities should be continually logged and extensive summaries from the reports will be translated into English and discussed inside the TC in order to produce a collection of case studies, a briefing note and a technical report on decarbonisation.

3.5.1 Study national strategies and policies for decarbonisation of the road passenger and freight transport sector and their objectives and deployment plans

Purpose: On-road freight and passenger transport represent over 75% of global inland transport and must decarbonize to achieve the goals of The Paris Agreement. TC 3.5 will share information from road agencies and give analysis to accelerate deployment of best practices and avoid missteps by sharing lessons learned.

Preliminary research questions:

- What policies and strategies are road agencies using to decarbonize transportation?
- What policies/strategies have been tried in different countries?
- What approaches have worked and why?
- What approaches have not worked and why?

Importance to roads agencies: Transport is one of the biggest sources of carbon pollution globally and road agencies have a role to play in reducing carbon pollution to avoid a climate crisis. All road transport stakeholders need to accelerate plans for reducing CO2. International cooperation and earning about nations' policies, strategies, and deployment plans are critical to achieve global carbon reduction targets.

Audience: This work will benefit for decision makers at road agencies across the world by increasing knowledge about how other nations are working on this important topic. Audience will be central/local governments and both public and private road agencies.

Deliverables: Literature review, technical report, case studies, survey, briefing note, seminar.

Low and lower-middle income countries: This work will help LMI countries learn from successful projects in high-income countries and help them avoid potentially costly mistakes made elsewhere. Sharing lower cost and/or lower-technology solutions can benefit all countries to support global learning.

Gender inclusion & diversity: This work will affect both men and women.

Potential duration: Ongoing during 4 years with part delivery after 2 years.

3.5.2 Study Electric Road Systems (ERS) to decarbonize the road transport sector

Study technical ERS solutions and impacts to environment, operating costs, safety, maintenance, and evaluate business cases and the policies and strategies needed for large scale deployment.

Purpose: Multiple ERS technologies have been studied since 2010 to power supply and recharge the batteries of electric vehicles while they are driving. ERS technologies have costs and benefits and are evolving rapidly as get closer to large-scale commercial deployment. It is important to analyse how electric road systems could be introduced and how they will change the road sector. TC 3.5 will share knowledge on technologies and policies for electric roads.

Importance to roads agencies: ERS will impact assets, safety, regulation, maintenance, operation, billing systems, vehicle manufacturers, automotive suppliers, etc. It is important to public and private road agencies for freight passenger vehicles and operators.

Audience: This work will benefit road agency decision makers around the world by increasing knowledge about work on this topic. Audiences include central/local governments, public and private road agencies, and fleet operators.

Deliverables: Literature review, technical report, case studies, survey, article in Routes/Roads, briefing note, seminar, workshop or conference.

Background to TC's work on this topic: The results from PIARC TF 2.2. Electric road systems.



Low and lower-middle income countries: Today, this technology is mainly developed in High-Income Countries but decarbonization needs are global and other countries will need to implement effective solutions to reduce carbon pollution. Deliverables will include consideration of technology development and deployment in LMI countries.

Gender inclusion & diversity: No gender or diversity exclusion identified on this topic.

Potential duration: Ongoing during 4 years with part delivery after 2 years.

3.5.3 Study solutions to decarbonize the road transport sector with a focus on road users, including technology solutions

E.g., static or dynamic charging, hydrogen, battery swapping) and financial dis/incentives (e.g., road pricing models).

Purpose: The purpose of this item is to share knowledge bout modern trends for 1) providing vehicle fuelling on the roadside or at road related facilities, such as service areas. “Fuelling” includes electricity and other lower carbon fuels like hydrogen, CNG, and e-fuels. And 2) prioritizing low emission vehicles such as tolling policy in the toll roads, tariff policy of parking facilities.

Importance to roads agencies: This work is important to road agencies because nations are struggling to analyse and deploy technologies to decarbonize road transport and develop effective pricing strategies to support both economic and climate change goals. This work can highlight costs and benefits of different policy and technology strategies that have been successful globally.

Audience: This work will help stakeholders and decision makers identify the best solutions for the country or community. Audience will be central/local governments and both public and private road agencies.

Deliverables: Literature review, technical report, case studies, survey, briefing note, seminar.

Low and lower-middle income countries: This work will be useful to LMI countries in the same way for all nations since increased knowledge will help in future decision making.

Gender inclusion & diversity: This this work will relate to or incorporate gender and diversity aspects.

Potential duration: Ongoing during 4 years with part delivery after 2 years.

3.5.4 Study solutions for alternative energy production and sources in the road sector, including solar panels and wind turbines along road

Purpose: There is a need of producing more green energy among the nations and the road sector have the possibility to contribute to the energy production by deploy smart energy solution on and along the roads. It is important to learn more about these possibilities. These practices contain alternative energy sources for vehicles used in road patrol, maintenance. They also contain generating power within the rights of roads such as solar panels installed on the road-side slope.

Importance to roads agencies: This work is important for road agencies/road industry because an increased electrification of societies across the world will lead to an increased need of more production of green energy and different stakeholders within the road transport sector have the possibility to produce energy for their own use and some already also sell energy. Some remote areas can also have grid challenges to deliver power to road facilities and therefore production of energy can be of extra interest. There are innovations in particular technologies used in road patrol and maintenance such as electrification of vehicles, power free road lighting etc. Road agencies should introduce such technologies to their equipment and practice.

Audience: This work will benefit for decision makers within the road transport systems across the world by getting increased knowledge how nations work with this important topic. Audience will be both public and private road agencies. Various positions in road agencies will be interested including headquarters and local branches.

Deliverables: Literature review, technical report, case studies, survey, briefing note, seminar.

Background to TC's work on this topic: The work will be in collaboration with TC1.3 (greening public procurement).

Low and lower-middle income countries: This work will be useful to low and lower-middle income countries in the same way for all nations since increased knowledge will help in future decision making. If countries with grid challenges can produce their own energy for their road transport system by using smart solutions must be of great interest.

Gender inclusion & diversity: This work will affect both men and women.

Potential duration: Ongoing during 4 years with part delivery after 2 years.



Planned Delivery of Strategic Theme 3: Safety and Sustainability

Topic/activity	2024				2025				2026				2027			
	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec
Technical Committee 3.1 Road Safety																
3.1.1 Securing the Safety of Vulnerable Road Users																
3.1.2 Safe System in Low and Lower-Middle Income Countries																
3.1.3 Diagnosing Road Safety Problems and Opportunities																
3.1.4 Update of the Road Safety Manual																
Technical Committee 3.2 Winter Service																
3.2.1 Skill and resources for winter service																
3.2.2 Integration of new technologies in winter services																
3.2.3 Update of the Snow and Ice Data Book																
3.2.4 Preparation of the 2026 International Winter Congress																
3.2.5 Winter maintenance in urban areas																
Technical Committee 3.3 Asset Management																
3.3.1 Better asset management with BIM and digitalization																
3.3.2 Innovative approaches for asset management data collection and analysis																
3.3.3 Measures for reducing risks and improving the resilience of road networks																
3.3.4 Renewal and rejuvenation of aging infrastructure																
3.3.5 Update the content of the Road Asset Management Manual																
3.3.6 International Road (or Transportation) Asset Management Conference																
Technical Committee 3.4 Environmental Sustainability of Road Infrastructure and Transport																
3.4.1 Road and road transport impact on biodiversity																
3.4.2 Zero/low emission zones																

3.4.3 Innovative and sustainable eco-infrastructure solutions for roads and streets																
3.4.4 Archaeology																
Technical Committee 3.5 Road Infrastructure for Road Transport Decarbonisation																
3.5.1 Study nations strategies and policies for decarbonisation of the road passenger and freight transport sector and their objectives and deployment plans																
3.5.2 Study Electric Road Systems (ERS) to decarbonize the road transport sector.																
3.5.3 Study solutions to decarbonize the road transport sector with a focus on road users, including technology solutions																
3.5.4 Study solutions for alternative energy production and sources in the road sector, including solar panels and wind turbines along road																

Key: BN = Briefing Note, CS = Collection of case studies, LR = Literature review, SM = Seminar, SU = Survey, TR = Technical Report, MU = Manual Update

Strategic Theme 4 – Resilient Infrastructure

Resilient road infrastructure is essential for ensuring the safety and reliability of our transportation systems. Building and maintaining roads that are able to withstand natural hazards and other challenges, we can help ensure that people are able to travel safely and efficiently.

Strategic Theme 4 Resilient Infrastructure responds to the key infrastructure issues aims to provide information on how to address them.

Pavements

Technical Committee 4.1 will address issues related to mitigating and managing the resilience of pavements due to climatic events, use as well as natural deterioration.

Bridges

Technical Committee 4.2 will consider issues related to ensuring safe and reliable bridges to maintain the connectivity of transportation systems and ensuring the safety of road users. This will include innovative approaches to withstanding natural hazards as well as improved inspection and maintenance approaches.

Earthworks

Technical Committee 4.3 will address issues related to embankments, cuttings and retaining walls that provide support and stability to the road system.

Tunnels

Technical Committee 4.4 will address issues related to the construction, operation and use of tunnels.

Decarbonisation of road construction and road maintenance

Technical Committee 4.5 will address issues related to the construction and maintenance of roads and other transportation infrastructure in order to reduce greenhouse gas emissions. Decarbonisation efforts, such as the use of low-carbon materials and the adoption of sustainable construction practices, can reduce the carbon footprint of road construction and maintenance, making transportation systems more resilient to the impacts of climate change.

Technical Committee 4.1 – Pavements

Overview

During the 2024-2027 cycle TC 4.1 will focus on pavements and road surface characteristics.

The four-yearly SURF symposium will celebrate its 10th symposium in 2026. The monitoring of surface characteristics has been a topic in former cycles. Previous reports focused mainly on condition survey measurements. This cycle a technical report will describe how surface measurements (and possibly other measurements) can be used in the quality assessment of new pavements. The wearing course, including surface treatments, are being designed more for their functional properties such as low noise, high friction, drainability or even for their aesthetic properties. A report will discuss these solutions.

A cross-cutting theme for ST4 is the reduction of carbon footprint. TC 4.1 will contribute to this task with a report on carbon calculators for pavements and case studies on how to reduce the carbon footprint during the construction of the pavement and/or its use. Pavements in urban areas get more and more attention, albeit for fighting heat island effects or for providing a surface for “new” types of vehicles and other road users. A collection of case studies will illustrate this topic. Finally, a report on low-cost pavements, which was started two cycles ago, will be finalized.

4.1.1 Road monitoring for quality control of new pavements: technical report

Purpose: The purpose of this work is to give an overview of how the quality of newly constructed pavements is monitored. The main focus will be on surface characteristics (evenness, skid resistance, noise, texture, bearing capacity, …), but other destructive and non-destructive techniques can be included. There can be made a distinction between traditional contracts and long-term contracts (PPP or concessions).

It could also include approval limits for the new pavement, divided into requirements for new pavements and for maintenance treatments. Innovative evaluation techniques can be covered in some case studies.

Importance to roads agencies: This work is important to road agencies/road industry because it will give a state of the art on how to evaluate the quality of road construction.

Audience: Road agencies and/or road owners involved in building or rehabilitating pavements. Knowledge of the starting condition of a pavement can give an indication of future maintenance needs, and can be a valuable input for the asset management process.

Deliverables: Technical report.

Background to TC’s work on this topic: In former cycles, different reports were published to monitor the road: in the PIARC cycles 2012-2015 and 2016-2019 two reports were published on road monitoring with traditional means, followed in the cycle 2020-2023 by a report on road monitoring using Big Data. These reports mainly focus on network survey, but some of these techniques can also be used for quality acceptance.

Low and lower-middle income countries: This report is valuable for all countries, including LMIC.

Gender inclusion & diversity: Not relevant.

Potential duration: 3 years.

4.1.2 Functional wearing courses and surface treatments

Purpose: The purpose of this work is to give an overview of different techniques to improve the functional properties (evenness, noise, ...) of the wearing course of both asphalt and concrete pavements. These techniques can be surface treatments (grinding, grooving, milling, …) or (thin) overlays. Special attention should go to techniques to reduce the road/tyre noise of different pavements (concrete, asphalt, mastic asphalt, ...).

Importance to roads agencies: This work is important to road agencies/road industry because these techniques can be a cost-effective way to improve the functional properties of a pavement.

Audience: Road agencies who want to know more about surface treatments.

Deliverables: Technical report.

Background to TC's work on this topic: A Collection of Case Studies on innovative maintenance was published during the 2020-2023 cycle which contained several surface treatments.

Low and lower-middle income countries: Relevant for all countries using asphalt or concrete pavements.

Gender inclusion & diversity: Not relevant.

Potential duration: 2 years.

4.1.3 Reducing carbon footprint for pavements

Purpose: The purpose of this work is to update the report on Carbon Footprint which was published two cycles ago. Since then, new tools, new techniques or strategies have appeared. The report can also include measures to reduce emissions during paving, from a health point of view.

A collection of case studies could collect case studies on techniques to reduce the carbon footprint, e.g. different ways of producing warm asphalt, use of alternative binders for asphalt or concrete mixes, ...

Importance to roads agencies: This work is important to road agencies/road industry because the older report needs updating, and because sustainability aspects related to pavements become more and more important.

Audience: Road agencies who want to have an overview of which tools and techniques are available and how to use them in their tendering and construction process.

Deliverables: Literature review, case studies.

Background to TC's work on this topic: Report on Carbon Footprint (cycle 2016-2019) and High Impact Summary based on this report (cycle 2020-2023).

Low and lower-middle income countries: Relevant to all countries, although it's probably mostly used in HIC at the moment.

Gender inclusion & diversity: Not relevant.

Potential duration: 2 years.

4.1.4 Pavements for urban areas

Purpose: The purpose of this work is to give examples of urban pavements. These days, pavements In urban areas require new/other requirements. E.g. the use of new vehicles (incl. different (electrical) personal transportation such as steps, segway, ...), taking into account water buffering or fighting heat island effects for resilience reasons, constructions to charge electrical vehicles while driving, etc.

Importance to roads agencies: This work is important to road agencies/road industry because it's an aspect which so far has not been addressed by PIARC and which becomes more important.

Audience: Mainly for road owners who want to get some possible ideas on different aspects of new pavement uses.

Deliverables: Case studies.

Low and lower-middle income countries: Relevant for all countries.

Gender inclusion & diversity: The safety aspect of road use can be an aspect.

Potential duration: 2 years.

4.1.5 Low-cost pavements

Purpose: The purpose of this work is to evaluate available technologies and practices for better sustainability and management of pavements.

Audience: Road owners.

Deliverables: Technical report

Background to TC's work on this topic: This work was started during the 2019-2022 cycle, but wasn't finished. However, the report is about 90% ready.

Low and lower-middle income countries: This report on best practices can be applied in all countries, with special consideration of low and middle income countries.

Gender inclusion & diversity: Not relevant.

Potential duration: 1 year.

4.1.6 10th Symposium on Pavement Surface Characteristics (SURF 2026)

Purpose: The purpose of this work is to organise the 10th SURF symposium. A host country has to be found, the TC functions as the scientific committee. SURF will be organised in 2026, the host country choses the period (usually in the period April-May or September-October).

Importance to roads agencies: This work is important to road agencies/road industry because it gives a state of the art on surface characteristics, including academic and ongoing research information.

Audience: Road agencies, road researchers, universities.

Deliverables: Symposium.

Background to TC's work on this topic: Every four years a SURF symposium has been organised. The 9th SURF was in 2022 in Milano, Italy.

Low and lower-middle income countries: Less relevant.

Gender inclusion & diversity: Not relevant.

Potential duration: 2 years.

Technical Committee 4.2 – Bridges

Overview

In 2024, bridge owners and managers are faced with a growing number of challenges. Bridges are aging and often subject to more severe operating conditions and environments than had been envisioned during their design. In addition, some design approaches or design codes currently in use of yesterday are limited in how they can accommodate or adapt for these challenges. New causes of deterioration or damage appear almost routinely in many countries and require vigilant attention from managers, especially when the design of structures or routes are not redundant. This is often the case for the causes of deterioration and damage that effect post-tensioned grouted duct bridges. As such, this topic will be a particular focus in this cycle.

Recent advancements in the digital world and the development of new technologies offer new opportunities to address these challenges. The Technical Committee will also study how the digitization of bridge monitoring and management methods can help bridge managers better understand the condition of their bridges. With the lack of human resources the industry continues to face, more focus will be on the use of technology to help manage bridges.

In addition, this cycle will include work based on the principle of bridge redundancy with a view on improving resiliency. This work could bring new approaches for bridge design and management that facilitate risk-based actions or activities. The adaptability of the infrastructure to emerging and severe conditions (including those linked to climate change) is also a vital issue.

The interest shown in the previous cycle on the work regarding forensic engineering justifies the continued collection and sharing of case studies and the lessons learned from the failures they document. The Technical Committee believes that transparency and the sharing of knowledge is critical to maintaining reliability and safety.

Finally, the members of the Technical Committee will not lose sight of the great challenge: the fight against climate change. Close collaboration is planned with Technical Committee 4.5 in order to supply its work on the decarbonization of infrastructure.

4.2.1 Digital transformation for bridge inspection and management (including monitoring data analyse)

Purpose: The purpose of this issue is to identify, evaluate and compare digital technologies and methods, for surveying, collecting information on, evaluating and monitoring bridges (including Monitoring, AI, big data analyse…) to better manage and maintain the bridges stock.

Importance to roads agencies: This work is important for public authorities and bridge managers because in a context of ageing bridges, the pressure on structures is increasing, in particular, due to the consequences of climate change and the pressures on public finances, bridges managers need more than ever to find new tools and/or new methods to maintain or increase the safety, quality and reliability of bridges management. Digital solutions to help managers are already numerous and managers are often caught off guard when faced with these choices. This work should help inform them about the solution and help them choose what meets their needs.

Audience: Road authorities, bridge engineers, academics.

Deliverables: Technical report, case studies, seminar.

Background to TC's work on this topic: This is an original topic for TC.

Low and lower-middle income countries: The LLMIC have the same needs to seek solutions to improve the safety, sustainability, resilience and reliability of their points as other countries.

Gender inclusion & diversity: Not applicable.

Potential duration: 2,5 years for Case studies collections and 4 years for full report.

4.2.2 Management and monitoring of post-tensioned grouted duct bridges

Purpose: The purpose of the work is to (1) evaluate the methodologies and technologies used for the condition assessment of external or internal grouted P/T tendons, and (2) identify the details that should be incorporated in new construction or reparation to facilitate the use and to increase the durability of those methodologies and technologies.

Importance to roads agencies: This work is important to road agencies/road industry because of the number of failures observed during the last years around the world.

Audience: Bridges engineers, technical staff.

Deliverables: Technical report, case studies, workshop or conference.

Background to TC's work on this topic: Full report on 2000 on this topic: PIARC . 1 . 11.08.B - 2000

Low and lower-middle income countries: Collect case studies in LMIC is possible.

Gender inclusion & diversity: Not applicable.

Potential duration: 2.5 years for case studies collection and 4 years for technical report.

4.2.3 Requirements and evaluation methods for structural redundancy of road bridges

Purpose: The purpose of this work is to explore the concept of structural redundancy regarding the resilience of the infrastructure. Structural redundancy is a theoretical concept which need to be include in bridge design and to be detailed in its practical dimensions. On the other hand, it can be particularly interesting to know the existing redundancy of existing bridges in order to avoid unnecessary future retrofitting interventions that could be expensive for the bridges owners.

Preliminary research questions: Redundancy and ultimately resilience can be found in many aspects. Questions arise about the availability of bridges, socio-economic influences and the cost-effectiveness of measures.

Here are aspects to be considered from the redundancy in design of new bridges as well as overdesigning in order to anticipate the future needs (for example platooning, traffic increase, material degradation). Furthermore, the modification of existing bridges for increasing redundancy should be taken into account.

Importance to roads agencies: Especially against the background of climate change and ageing of materials, it is important for all road authorities to align their bridge infrastructure in such a way that availability is given. This work is important because the way we will build and maintain in future our bridge stock will change.

Audience: It is expected that engineers as well as road authorities will benefit from the issue. The engineer might find information about the design, wether a manager of road infrastructure might get information for future decisions of maintenance in total.

Deliverables: Technical report, article in Routes/Roads magazine.

Background to TC's work on this topic: The work of this committee in the last cycle (2020-2023) related to climate change can be used as a background information.

Low and lower-middle income countries: It is expected that this issue will lead to participation especially of LMIC as LMIC did call for "building strong new bridges".

Gender inclusion & diversity: Gender inclusion and diversity are not applicable to this issue.

Potential duration: It is currently expected that the committee will collect information during the first half of the 2024-2027 cycle and publish them in a technical report and in an article for the Routes/Roads magazine during the second half of the cycle.

4.2.4 Forensic engineering case studies

Purpose: The purpose of this work is to continue the collection of case studies on forensic engineering initiated during the 2020-2023 cycle, in order to build and feed a global clearinghouse or database on bridge failures. The goal is to create a recurring exchange of lessons learned from failures within the bridge engineering community in order to avoid their reoccurrence.

Importance to roads agencies: This work is important to road agencies/road industry because bridge failures can include fatalities or serious injuries and will result in a loss of mobility for emergency services, the traveling public, and freight that supports regional economic health.

Audience: It is expected that bridge engineers will be the primary users of the work to continue their learning and development in addition to preventing a reoccurrence of similar failures. The work will also be available to universities who might use it to identify research priorities or as an instructional aid. Finally, the work may be used by administrators to justify the development or use of funding to address known safety issues.

Deliverables: Case studies.

Background to TC's work on this topic: As stated in the Purpose, this is an effort to continue the work started during the 2020–2023 cycle. That work resulted in the report titled "Forensic Engineering for Structural Failures." The report provides a valuable reference or primer for those conducting a forensic investigation, but there was deemed significant additional value in sharing the case studies which all contained relevant lessons learned.

Low and lower-middle income countries: It is expected that LMIC will benefit from the continued exchange of lessons learned from bridge failures. In addition, it will provide an example to those that may be reluctant to share information on failures as they can be perceived as a sign of incompetence.

Gender inclusion & diversity: Gender inclusion and diversity are not applicable to this issue.

Potential duration: It is currently expected that the committee will collect additional case studies at the beginning of the 2024–2027 cycle and publish them at mid cycle.

4.2.5 Low Carbon Materials

Purpose:

Importance to roads agencies:

Audience:

Deliverables:

Background to TC's work on this topic:



Low and lower-middle income countries:

Gender inclusion & diversity:

Potential duration:

Technical Committee 4.3 – Earthworks

Overview

TC 4.3 Earthworks worked on the resilience of Earth Structures during the 2022–2023 PIARC Work Cycle. We emphasised the need to manage these assets and schedule minor works and maintenance during the life cycle of all infrastructure. We identified that Earth Structures, although normally the largest part of the highway infrastructure, with greater impact from a natural hazard, also receive the least attention in terms of Asset Management. This explains the first output we want to focus on during this 2023-2027 PIARC work cycle. It will detail best practice of our members for earth structure asset management, with a case study report and full report.

The second output is based on the urgent need to reduce our impact on climate changes. Our TC will gather the main ideas to reduce greenhouse gasses production during earthworks, from design to construction and maintenance with the aim of achieving net-zero, in a full report. From 2015, our Technical Committee drafted an Earthworks Manual, a useful document for LMIC or any country without any specific earthworks recommendations or guides. The remaining action is to complete production of the following four booklets:

- 2C – Earthworks Projects: including project design, geotechnical investigations, geometrical constraints, etc.
- 2D – Earthworks Realisation: describing earthworks material, planning quality and goals for both companies and contract managers, etc.
- 2F – Unpaved Roads: design and works.
- 2G – Innovative methods and techniques: the place and need for innovation in the future.

4.3.1 Earth structures asset management

Purpose: The purpose of this workstream is to compile a technical and practical document for infrastructure owners, focusing on maintenance, monitoring, inspection and minor works, they should develop specifically for Resilient Earth Structures.

Importance to roads agencies: This work is important to road agencies/road industry as Climate Change is having a priority impact on Earth Structures.

Audience: Stakeholders could use the results of this work. It should have a benefit on the cost of repairing earth structures considering a resilient and global strategy of maintenance, reducing numbers and/or intensity of unexpected events due to natural hazards.

Deliverables: Technical report, case studies, additions to the asset management online manual, seminar.

Background to TC's work on this topic: The background of this topic was discussed during 2020–2023 PIARC Cycle, in WG1 Resilience and WG2 Innovations.

Low and lower-middle income countries: LMIC should find recommendations for earth structures management, as well as HMIC.

Gender inclusion & diversity: Not relevant.

Potential duration: 3 years for the Case Studies - 4 years for the Full Report.

4.3.2 Earthworks Manual

Purpose: The purpose of this workstream is to continue drafting, and complete, the Earthworks Manual, booklets 2C-Earthworks Projects, 2D-Earthwork Realisation, 2F-Unpaved Roads and 2G-Innovation.

Importance to roads agencies: This work is important to road agencies/road industry in countries without a suitable in country guide or research institute in Geotechnical Engineering.

Audience: Stakeholder, private companies, consulting engineers in LMIC will use the results of this work.

Deliverables: Seminar, additions to the Earthworks Manual.

Background to TC's work on this topic: This work follows the previous PIARC work cycle since 2015. The existing Earthworks Manual is partly completed in the previous cycles in Genesis and preambles, General considerations, 2A-Materials, 2B-Treatment of materials and 2E-Environmental aspects.

Low and lower-middle income countries: LMIC are the main target audience and should find recommendations for earth structures design, building and management useful.

Gender inclusion & diversity: Not relevant.

Potential duration: 4 years.

4.3.3 De-carbonization of earthworks – construction and maintenance

Purpose: The purpose of this workstream is to identify the origin of the GHG emission in Earthworks, and the way the domain could reduce GHG, highlighting the best practice in decarbonisation techniques and/or innovation needs.

Importance to roads agencies: This work is important to road agencies/road industry that want to improve their practises and reduce their environmental impact.

Audience: Stakeholders, private companies, consulting engineers that want to reduce their environmental impact on climate change.

Deliverables: Survey, seminar, provide a paper to TC4.5 focused on Earthworks.

Background to TC's work on this topic: This topic is a new topic and should provide inputs for TC4.5 full report.

Low and lower-middle income countries: LMIC should be interested in these documents potentially if are considering a net zero carbon agenda as far as they are concerned by these topics.

Gender inclusion & diversity: Not relevant.

Potential duration: 2.5 years.

Technical Committee 4.4 – Tunnels

Overview

TC4.4 will address the new cross-cutting topic of sustainability by focussing on the operation and maintenance of road tunnels. New aspects regarding reduction of energy consumption and use of renewable energy sources for tunnel operation will be the focus of this work. Operating and ensuring the safety of users is a major challenge for owners and operators of road tunnels. The new topic of digitalization of Road Tunnel Design and Management will address digital approaches which could help operators in their tasks related to safe and efficient infrastructure operation and management. Further work of TC 4.4 will focus on active modes of transport (pedestrians, cyclists) in road tunnels which are increasing in many cities but also on rural roads. The very fast developments in the area of vehicles powered by New Energy Carriers (NEC) like electric vehicles, hydrogen, etc. will be further investigated based on the successful work already done in the 2020–2023 work cycle. Other topics to be addressed by TC4.4 in the 2024–2027 work cycle are the organisation of the 3rd International Conference on Tunnels and the dissemination and possible further update of the DG-QRAM risk assessment software for the transport of dangerous goods in tunnels (depending on available funding). The results of all the work will then also be incorporated into the further development of the Road Tunnels Manual.

4.4.1 Sustainability of tunnel operation: new approaches

Purpose: The purpose of this work is to update an existing report “First steps to a sustainable approach (2017R02EN) with new aspects regarding reduction of energy consumption and use of renewable energy sources for tunnel operation. The topic of sustainability is fast evolving and has an major impact for road tunnel operators.

Preliminary research questions:

- Energy efficiency and sufficiency (e.g. ventilation, lighting) including self-supplying of energy at tunnels,
- Monitoring of energy consumption,
- Impact of thresholds on energy consumption (e.g. required air quality, lighting level),
- Tools and methods for assessing the sustainability in the planning & design phase (LCA, SD indicators),
- Tools and methods for constraining operation and maintenance cost in both soft and hard aspects; eg. the former is to set the frequency of daily/ periodical inspection,
- Lifetime related design and optimization of tunnel equipment, operation & maintenance, condition monitoring of tunnel equipment,
- Reduction of operational costs.

Importance to roads agencies: This work is important to road agencies/road industry because the operation of existing and new road tunnels in a sustainable way plays a very important role due to the increase in energy prices in the recent years and the objective of CO2 reduction in order to fight climate change.

Audience: This work is important for road agencies and operators of road tunnels in particular.

Deliverables: Technical report, case studies, briefing note.

Background to TC’s work on this topic: Existing report “First steps to a sustainable approach (2017R02EN)” which should be updated

Low and lower-middle income countries: The topic of sustainability is important for HIC as well as LMIC. LMIC are in particular affected by high energy prizes.

Gender inclusion & diversity: Not appropriate for this topic.

Potential duration: 42 months for the production of three deliverables (case study, briefing note and report). The briefing note will serve as input for TC4.5. The detailed planning will be produced in the work plan of the WG1 group from the start of the next cycle.

4.4.2 Impact of the development of active modes of transport (walking, cycling, wheelchairs) in road tunnels

Purpose: The purpose of this work is to summarize international experiences and good practices regarding pedestrians (including reduced mobility users, e.g. in wheelchairs) and cyclists in road tunnels.

Preliminary research questions:

- Roadway sharing issues (coexistence of road traffic (including buses) and cycles, road traffic and cycles and pedestrians) / separate tubes,
- Geometric considerations, necessary cross sections, design aspects,
- Possibilities for retrofitting of existing road tunnels regarding active modes of transport,
- Safety measures to protect road users (like pedestrians, cyclists, reduced mobility users e.g. using wheelchairs) including evacuation issues, smoke ventilation strategies and air quality issues (sanitary ventilation),
- Intermodal aspects (e.g. bus stops in underground facilities)
- Impact on risks for safety and how to take them into account in risk analyses and in the safety documentation.

Importance to roads agencies: This work is important to road agencies/road industry because the use of cycles has increased in urban areas in particular in a number of countries, as a result of environmental concern and/or political decisions.

Audience: This work is important for road agencies and operators of road tunnels in particular.

Deliverables: Technical report, case studies.

Background to TC's work on this topic: Existing report "General Principles to Improve Accessibility for Persons with Reduced Mobility in Road Tunnels (2019R20EN)".

Low and lower-middle income countries: The topic is very relevant for LMIC because they have a high percentage of road users using active modes of transport.

Gender inclusion & diversity: Regarding reduced mobility users a special focus will be on pregnant women and families with small children.

Potential duration: 36 months.

4.4.3: Digitalization of road tunnel design and management

Purpose: The purpose of this work is to investigate the impact of the Digital Transformation on different aspects of road tunnel design, operation, safety and maintenance/inspection.

Preliminary research questions:

- Digitalization of operation, maintenance and inspection (e.g. IoT sensors for tunnel equipment like e.g. emergency call stations),
- Handling and digitalization of data from new ways of inspecting tunnels, such as the use of drones and robots
- Project development using BIM methodology and experiences acquired,
- Digital twins for life cycle management, the support of fast and smooth commissioning of a new or renovated tunnel and its equipment or the use of digital twins in the training of tunnel control centre staff, first responders and stakeholder's management,
- Centralization of documentation and easy access,

Importance to roads agencies: This work is important to road agencies/road industry because it could reduce design and operating costs and could as well increases availability and resilience of the tunnel.

Audience: This work is important for road agencies and operators of road tunnels in particular.

Deliverables: Case studies, survey, briefing note, workshop or conference.

Background to TC's work on this topic: No existing technical reports dealing with this topic in particular. Similar topics already addressed include "Improving Road Tunnel Resilience, Considering Safety and Availability", "Introduction to the RAMS Concept for Road Tunnel Operation" and "Improving safety in road tunnels through real-time communication with users".

Low and lower-middle income countries:

Gender inclusion & diversity: Not appropriate for this topic.

Potential duration: 42 months.

4.4.4 Tunnel operation and safety issues related to the usage of new energy carriers (NEC) in road vehicles

Purpose: The purpose of this work is to further investigate this fast emerging topic by collecting and sharing international experiences. There are some relevant open questions after the work done in the 2020-23 work cycle which should be addressed in the 2024-2027 work cycle.

Preliminary research questions:

- Incidents with NEC vehicles, collection of data internationally, probability of incidents,
- Intervention / incident management, implications of incidents (e.g. with busses),
- Impact of NEC powered HGV vehicles,
- Impact of NEC vehicles on existing regulation,
- New developments in battery technologies, e-fuels (hydrogen, synthetic fuels) vehicles,
- Pollution and health impact during burning,
- Technologies / solutions to recognize / detect NEC vehicles.

Importance to roads agencies: Due to the currently still small number of NEC vehicles on the roads, there is still far too little experience with problems with these vehicles - especially commercial vehicles - in road tunnels. The expected results of the work within the WG will foster the knowledge base for safe operation and incident management of road tunnels.

Audience: Tunnel operators shall have a better base for decisions how to operate tunnels and how to handle incidents with NEC vehicles. Engineers will benefit from a broader knowledge base concerning important design parameters for ventilation and safety systems.

Deliverables: Technical report, case studies, workshop or conference.

Background to TC's work on this topic: Joint (online) workshop with ITA Cosuf in October 2021, Collection of Case Studies Report 2022R05EN "Impact of New Propulsion Technologies On-Road Tunnel Operations and Safety", Technical Report 2023RXXEN (in preparation).

Low and lower-middle income countries: Developments and experience from NEC vehicle influences on road tunnel operation and safety, which is currently collected in high-income countries will be collected, analysed and processed in order to provide a solid data base for use in low- and middle-income countries.

Gender inclusion & diversity: Not appropriate for this topic.

Potential duration: 42 months.

4.4.5 Update of the Road Tunnel Manual

Purpose: To further update the online Road Tunnel Manual (RTM).

Preliminary research questions:

- Who are the users of the RTM? What are their experiences/feedback? What is missing and what could be improved?
- Include outputs from 2020-2023 work cycle and first outputs of 2024-2027 work cycle.
- Translation of the RTM in other languages than EN, ES and FR if there is support by national volunteers.

Importance to roads agencies: This work is important to road agencies/road industry because they are the users of the RTM.

Audience: Road operators, designers, planners, etc.

Deliverables: Survey, webinar, manual.

Background to TC's work on this topic: In the 2020–2023 work cycle: Update of the RTM with new pages on civil works, preparing and uploading of the French version of the RTM, update of content regarding reports from 2016–2019 work cycle.

Low and lower-middle income countries: The online RTM is of particular interest for LMIC, because it is huge resource containing all PIARC knowledge on tunnels. The RTM is especially aimed at helping LMIC with a low tunnel culture / low knowledge about tunnels.

Gender inclusion & diversity:

Potential duration: 45 months.

4.4.6 Preparation of the 3rd International Conference on Road Tunnel Operation and Safety

Purpose: To prepare the next International Conference on Tunnels.

Importance to roads agencies: This work is important to road agencies/road industry because they will participate in the conference.

Audience: Road tunnel operators, Safety Officers, Tunnel Managers, designers and planners, engineering companies, etc.

Deliverables: Article in Routes/Roads magazine, workshop or conference.

Background to TC's work on this topic: The 2nd International Conference on tunnels was organized in Granada / Spain in October 2022.

Low and lower-middle income countries: LMIC will also participate in the Conference. Special focus will be on topics relevant for LMIC. Lower registration rates will be offered for participants from LMIC.

Gender inclusion & diversity: Selection of Session Chairs & Co-Chairs and presenters will also consider gender and diversity aspects.

Potential duration: 45 months.

4.4.7 Dissemination and possible update of DG-QRAM

Purpose: The purpose of this work is to

- Organise further training sessions with users of the DGQRAM software,
- Collect feedback of users of Version 4.10,
- Implement improvement tasks within phase 3 (continuation of phase 2 from last cycle, depending on funding),
- If relevant (enough improvement tasks implemented within phase 3), organise a Worldwide Webinar to share the advances in the software with users,
- Possible release of a new updated software version (depending on funding).

Importance to roads agencies: Numerous road agencies are using the DGQRAM software and/or have set up risk analysis methodologies that are based on this software. They recommend or require that these analysis are included in the safety documentation of operating tunnel bodies or, at least justify some of its content. The improvements make the software more accurate or more user friendly (reducing risk of mistakes) which enhance the quality of the risk analyses.

Audience: The improvements make the software more accurate or more user friendly which of course interest users. Moreover, this is the only available software dedicated to risk of dangerous goods transport on roads.

Deliverables: Survey, webinar, managed software application.

Background to TC's work on this topic: The DGQRAM software was update to version 4.10 in the 2020–2023 work cycle. A worldwide webinar was organized and training sessions took place.

Low and lower-middle income countries: LMIC are also users of the DGQRAM software.

Gender inclusion & diversity: Not appropriate for this topic.

Potential duration: 45 months.

Technical Committee 4.5 – Decarbonisation of Road Construction and Road Maintenance

Overview

The work of TC 4.5 will aim at five topics: improving logistical and technological decarbonization efficiency of road construction projects, new technologies for the measurement and inspection of road decarbonization initiatives, decarbonizing road construction project logistics, decarbonization of construction and maintenance equipment, carbon calculators. Issues will include the real-world impact on decarbonization of road construction and maintenance at all stages of road projects. The work will focus on the identification of the issues that have a carbon impact in projects during the road construction and maintenance phase. Identification and assessment of logistical and technological inefficiencies of projects and a proposal for mitigating these problems will be made on the basis of case study analysis as well as literature studies and surveys. An important issue in terms of assessing the effects of decarbonization will be the work on identifying decarbonization indicators and measures based on best practice analysis. An important element of the work will also be to identify logistical issues related to the provision of materials, the type of equipment and technology required for a road construction project in view of carbon emissions. The work will also result in identifying carbon calculators and determining the feasibility of building a PIARC calculator with AI. The results of the work in the form of briefing notes and other PIARC documents will go not only to LMICs, but also to countries that are starting or have not yet started decarbonization activities.

4.5.1 Improving logistical and technological decarbonization efficiency of road construction projects and maintenance

Purpose:

- Identify logistical and technological road construction and operational inefficiencies in current road projects, taking into account the materials used and their processing technologies;
- Assess the impact of identified inefficiencies on decarbonization;
- Propose measures to mitigate the impact of identified inefficiencies.
- Incorporate outputs from other TCs including within ST4.

Preliminary research questions: The analyses will be based on selected and completed projects from different countries that are able to prepare such data and should answer the questions:

- What decarbonisation solutions were used?
- What decarbonisation features (such as materials or components, and their processing technolgies) were included in the designs (for various road infrastructure types and assets i.e. tunnels, bridges, structures, pavements, furniture etc) during the construction phase?
- What decarbonisation features were included in the designs during the maintenance phase?
- Are the recommended decarbonisation measures measured and are they consistent with the objectives?

- What recommendations can be introduced into the design stage on the basis of the projects analyzed with regard to reduction of the carbon footprint for pavements, decarbonisation of earthworks (construction and maintenance), sustainable operation of tunnels in terms of the new approach?

Importance to roads agencies: This work is important for road agencies and the road industry as it provides an briefing note of logistical and technological roadway construction and operational decarbonization practices in the context of actual projects. Through the case-study approach, agencies may be able to implement corrective actions in their portfolio of pending projects.

Audience: The Briefing note will benefit both the road administration and the road industry. It will allow them to position their design intentions in relation to good practice projects. The examples analysed will also inspire action.

Deliverables: Technical report, workshop or conference, social media, guideline including the collected information from all TCs in the scope of ST4. Contribution to Symposium SURF organized by TC 4.1.

Background to TC's work on this topic: Carbon Neutrality of the Road Sector. A PIARC special project. 2023. Results of TC 4.1's work on the topic "Reducing the carbon footprint for pavements" in the form of a Literature review and Case studies – expected completion by TC 4.1 end 2024. Results of TC 4.4's work on the topic "4.4.1: Sustainability of tunnel operation: new approaches" in the form of Briefing note.

Low and lower-middle income countries: The work will be dedicated not only to LMICs but also to countries with little or no decarbonisation efforts. The results of the work will give the best current examples (good practices) implemented by countries with a high decarbonisation approach.

Gender inclusion & diversity: The work does not directly relate to gender and diversity aspects. It will, however, indirectly relate to these effects when analysing projects. Reducing the carbon footprint from construction and maintenance should have an impact on improving the lives of people including women children on a reginal and global scale.

Potential duration: 2024–2026.

4.5.2 New technologies for the measurement and inspection of road decarbonization initiatives

Purpose: The aim of this work is to identify technology and best practice that allows road managers to assess whether their decarbonisation targets are being met. This work will also identify decarbonisation indicators and measures based on literature analysis and practical applications in PIARC countries(including national guidelines).

Preliminary research questions:

The work should answer questions on:

- What are the new carbon measurement and control technologies for all road-related activities?

- How are the new measurement and inspection technologies applied?
- What are the methods for inspecting the carbon footprint during road design, construction and maintenance?
- What indicators and measures of decarbonisation are used in the literature and national guidelines?

Importance to roads agencies: This work is important to road agencies and road industry because it will point to new measurement and inspection methods of decarbonisation. It will also enable the assessment of decarbonisation targets for the measures and indicators set.

Audience: The audience of the work will be the road administration and road industry as well as experts assessing the degree of decarbonisation. The benefit will be to be able to identify new measurement and inspection technologies in projects, taking into account the indicators and measures identified.

Deliverables: Literature review, case studies, survey, briefing note, workshop or conference, social media.

Background to TC's work on this topic: Carbon Neutrality of the Road Sector. A PIARC special project. 2023. REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment and amending Regulation (EU) 2019/2088.

Low and lower-middle income countries: The work should enable the selection of the type of decarbonisation measurement and inspection tecchnology for LMICs countries. It should also allow the selection of the best measures and indicators to use depending on the sophistication of the decarbonisation approach.

Gender inclusion & diversity: The work does not directly address gender and diversity aspects. However, it will indirectly relate to identifying the effects of decarbonisation and will indirectly improve the lives of people, including women and children, regionally and globally.

Potential duration: 2024–2027.

4.5.3 Decarbonizing road construction project logistics

Purpose: The purpose of this work is to identify the issues of planning, coordinating and overseeing all activities related to the provision of materials, equipment and labour required for a road construction project in terms of carbon emissions. Road construction logistical topics such as the impact of design choices on hauling distances, routes and equipment mobilization

Preliminary research questions:

The work should answer questions on:

- What part of the project's impact on carbon emissions during the construction and maintenance phases may be directly linked to logistical constraints?
- What role did design choices play in logistical constraints impacting carbon emissions?

- What role does supervision and coordination of construction and maintenance of the project play with carbon emissions?
- How do we link issues of timeliness, cost and quality of work during construction with carbon emissions?

Importance to roads agencies: This work is important to road agencies/road industry because it will point to new measurement and inspection methods of decarbonisation. It will also enable the assessment of decarbonisation targets for the measures and indicators set.

Audience: This work is important to road agencies/road industry because it points out the most important issues concerning logistics during road construction and maintenance in terms of carbon emissions. It also points to the possibility of linking issues of timeliness, cost and quality of work during construction with carbon emissions.

Deliverables: Literature review, case studies, survey, briefing note, workshop or conference, social media, guideline.

Background to TC's work on this topic: Carbon Neutrality of the Road Sector. A PIARC special project. 2023.

Low and lower-middle income countries: The work should make it possible to identify the best solutions and good practices for the logistics of road construction projects in terms of carbon emissions. LMICs will be able to incorporate selected solutions into their practice, depending on the level of sophistication of their carbon footprint analyses.

Gender inclusion & diversity: The work will have gender and diversity implications, as in many cases poor project logistics will expose people to increased carbon emissions. This may affect women and children in particular.

Potential duration: 2024–2027.

4.5.4 Decarbonization of construction and maintenance equipment

Purpose: The aim of this work is to identify decarbonisation opportunities depending on the type of equipment (ordinary and special equipment) and the associated categories of works. The work also refers to the possibilities to limit construction and maintenance activities, i.e. electrification, low and zero emission vehicles (electric, hydrogen) and the use of alternative fuels (renewable diesel, etc.).

Preliminary research questions:

The work should answer questions on:

- What is the impact on carbon emissions of equipment during construction?
- What is the impact on carbon emissions of equipment under maintenance?
- What is the carbon impact of disposing of equipment after use?

- What is the carbon footprint of the various work groups, mainly earthworks?
- What opportunities exist to reduce carbon emissions and effectively decarbonise construction equipment?

Importance to roads agencies: This work is important to road agencies and road industry because it will point to new measurement and inspection methods of decarbonisation. It will also enable the assessment of decarbonisation targets for the measures and indicators set.

Audience: This work is important for road agencies and companies in the road industry as it will identify the main decarbonisation issues when carrying out works. It will also enable an assessment of decarbonisation opportunities when using different types of construction equipment.

Deliverables: Literature review, case studies, survey, briefing note, workshop or conference, social media, guideline.

Background to TC's work on this topic: Carbon Neutrality of the Road Sector. A PIARC special project. 2023.

Low and lower-middle income countries: The work should allow the identification of best solutions and good practices in the selection of construction equipment. It should also identify the least carbon-intensive technologies for various technologies including earthworks.

Gender inclusion & diversity: The work has no direct gender and diversity implications. There will be an indirect impact on people when works are carried out in residential areas.

Potential duration: 2024–2027.

4.5.5 Carbon calculators

Purpose: The purpose of this topic is to carry out a study of digital tools to compare carbon analyses at different stages of the project lifecycle. The result will be a gap analysis and recommendations based on context. The aim is also to prepare assumptions for a digital tool to determine carbon emissions across the project lifecycle.

Preliminary research questions:

The work should answer questions on:

- What elements should be included in the emissions calculator (materials and their processing, equipment and machinery and their operation, logistics in construction and maintenance)?
- What project lifecycle digital carbon emission calculator tools are currently available?
- What role should carbon calculators play in business cases, performance requirements, contract management and third-party assurance?
- What metrics do available tools provide, and which metrics appear to be missing (gap analysis)?

- What are potential applications of AI for the calculator?
- What are the proposed performance specifications and what are the target groups for the PIARC calculator?
- What are the minimum technical and financial requirements (requirements assessment) to build a PIARC calculator?

Importance to roads agencies: This work is important for road agencies and the road industry as it will highlight the capabilities of existing carbon calculators. It will also enable PIARC to assess the feasibility of the calculator and provide assumptions for its implementation and use of AI.

Audience: The audience of the work will be both road agencies and road companies. PIARC will be the recipient of the studies on the development of its own calculator.

Deliverables: Literature review, technical report, case studies, article in Routes/Roads, briefing note, podcast, workshop or conference, social media, guideline. Depending on the development of artificial intelligence, it may be possible to create a simple system analysing carbon emissions in a different form than existing calculators based solely on computational algorithms. The manual will include the collected information from all TCs in the scope of ST4.

Background to TC's work on this topic: Carbon Neutrality of the Road Sector. A PIARC special project. 2023.

Low and lower-middle income countries: LMICs as well as countries which are not very advanced in decarbonisation will be given an overview of digital tools which can be used in the road sector. If the PIARC calculator is developed, they will be able to use it under certain conditions.

Gender inclusion & diversity: The outcome of the work (carbon calculator) will in future enable remote working from home for those caring for children and for people with special requirements such as partial or full immobility.

Potential duration: 2024–2027.

Technical Committee 4.6 – Road Design Standards

Overview

Strategies/Objectives description in 2024-2027 Strategic Plan:

- Development of a database of guidelines for road design standards, for comparisons of applicable standards, and for recommending their use in other countries, mainly LMIC.
- Providing road administrations belonging to PIARC with a basis for improving and homogenization their road geometry design standards.
- Identification of changes in road design standards with constant updating of trends in road design related to the change in mobility and the emergence of new technologies.
- Assessing the use of BIM in design by evaluating examples of its use in projects from different countries.
- Presentation of BIM standards in design at various stages of design documentation.
- Recommendations for using BIM in ejecting based on the experience gained.

The work carried out under Task Force 4.1 will be a continuation of the work carried out as part of the 2020–2023 cycle. The works will include also a review of works carried out by other TCs on BIM in asset management.

4.6.1 Database of road design standards

Purpose: The purpose of this work is to analyse:

- Collection of road design guidelines from many countries (based on survey in PIARC member countries), taking into account the LMIC,
- Preparation of a database of road design standards,
- Comparison of significant differences between the guidelines in the indicated design criteria.

Preliminary research questions: The analyses will be conducted based on selected road design standards (selected aspects) from different countries that are able to prepare data and should answer the questions:

- What aspects of road design standards are most important?
- What are the extreme cases, is it possible to create one guideline?
- Is there a possibility of transferability of road design standards to other countries?

- What are PIARC's recommendations for the most important geometric elements of road design?

Importance to roads agencies: This work is important for road agencies and the road industry as it provides an overview of road design standards. Based on this work it will be possible to compare the most important design criteria and transfer knowledge in road design mainly to the LMIC.

Audience: The deliverable will benefit both the road authority and road designers. It will allow them to compare the best practice from road design standards as well as transfer knowledge between different countries.

Deliverables: Case studies, survey, workshop or conference, social media.

Background to TC's work on this topic: PIARC Literature Review, State of the Art, Road Design Standards. Task Force 4.1 Road Design Standards, 2022 in 2022

Low and lower-middle income countries: The work will be dedicated not only to LMICs but also to other countries in which road design standards are developed. However, the results should have a high level of transferability the best current standards in road design to LIMC.

Gender inclusion & diversity: The work does not directly relate to gender and diversity aspects. Developing road design standards should have an impact on improving traffic conditions and the road safety of people on a regional and global scale.

Potential duration: 2024–2027.

4.6.2 BIM for design

Purpose: The purpose of this work is to analyse:

- A collection of case studies from BIM implementation in road design,
- Comparison of BIM standards for various stage of the project, countries and recommendations for application.

Preliminary research questions: The analyses will be conducted based on examples of BIM applications in design from different countries and should answer the questions:

- What is the level of BIM application in design for various stages of projects?
- What are the plans to introduce BIM in design in various countries?
- Are there any templates for them, depending on the stage of design documentation?

Importance to roads agencies: This work is important for road agencies and the road industry because provides a review of case studies for application BIM in road design. Based on this work it will be possible to compare and recommend standards for BIM in road design.

Audience: The deliverable will benefit the road authority, road designers, and the road industry. It will allow them to recognize problems of BIM application in different countries, as well as compare them and transfer knowledge between different countries.

Deliverables: Case studies, survey, workshop or conference, social media.

Background to TC's work on this topic: BIM PIARC reports related to asset management.

Low and lower-middle income countries: The work will be dedicated not only to LMICs but also to other countries in which BIM standards in design are developed. The results should help to take a decision during BIM introduction to design in LIMC.

Gender inclusion & diversity: The work does not directly relate to gender and diversity aspects.

Potential duration: 2024–2027.

Planned delivery of strategic theme 4: resilient infrastructure

Topic/activity	2024				2025				2026				2027			
	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec
Technical Committee 4.1 Pavements																
4.1.1 Road monitoring for quality control of new pavements: technical report	■	■	■	■	■	■	■	■	■	■	■	■				
4.1.2 Functional wearing courses and surface treatments					■	■	■	■	■	■	■	■				
4.1.3 Reducing carbon footprint for pavements	■	■	■	■	■	■	■	■								
4.1.4 Pavements for urban areas							■	■	■	■	■	■	■	■		
4.1.5 Low-cost pavements	■	■	■	■												
4.1.6 10th Symposium on Pavement Surface Characteristics (SURF 2026)							■	■	■	■	■	■				
Technical Committee 4.2 Bridges																
4.2.1 Digital transformation for bridge inspection and management																
4.2.2 Management and monitoring of post-tensioned grouted duct bridges																
4.2.3 Requirements and evaluation methods for structural redundancy of road bridges																
4.2.4 Forensic engineering case studies																
Technical Committee 4.3 Earthworks																
4.3.1 Earth structures asset management																
4.3.2 Earthworks Manual																
4.3.3 De-carbonization of earthworks – construction and maintenance																
Technical Committee 4.4 Tunnels																
4.4.1 Sustainability of tunnel operation: new approaches																
4.4.2 Impact of the development of active modes of transport (walking, cycling, wheelchairs) in road tunnels																
4.4.3 Digitalization of road tunnel design and management																
4.4.4 Tunnel operation and safety issues related to the usage of new energy carriers (NEC) in road vehicles																

4.4.5 Update of the Road Tunnel Manual																
4.4.6 Preparation of the 3rd International Conference on Road Tunnel Operation and Safety																
4.4.7 Dissemination and possible update of DG-QRAM																
Technical Committee 4.5 Decarbonisation or Road Construction and Road Maintenance																
4.5.1 Improving logistical and technological decarbonization efficiency of road construction projects and maintenance																
4.5.2 New technologies for the measurement and inspection of road decarbonization initiatives																
4.5.3 Decarbonizing road construction project logistics																
4.5.4 Decarbonization of construction and maintenance equipment																
4.5.5 Carbon calculators																
Task Force 4.1 Road Design Standards																
TF 4.1.1 Database of road design standards																
TF 4.1.2 BIM for design																

Key: BN = Briefing Note, CS = Collection of case studies, LR = Literature review, SM = Seminar, SU = Survey, TR = Technical Report, MU = Manual Update

Cross Cutting Committees

Terminology Committee

Updating the World Road Association Dictionary

Purpose:

- Update and upgrade the existing version of the web-based Road Dictionary in each of the current languages.
- Increase the number of languages of translation of the Road Dictionary in liaison with World Road Association member countries.
- Improve the management of the web-based Road Dictionary and keep adapted to potential developments of the website of the World Road Association (including the development of an app for the use of the Dictionary on tablets and smartphones if resources are available)
- Encourage coordination with Technical Committees and Task Forces of PIARC to analyse new needs to collect technical words and definitions.

Description: In 1931, the first edition of the 'Technical Dictionary of Road Terms' was published in six languages (Danish, English, French, German, Italian, and Spanish). The World Road Association has continued working on terminology ever since. In 2007, the eight edition was released in five languages (English, French, German, Portuguese, and Spanish).

The multilingual terminology database can be accessed on-line for making term searches and searches per theme, and the results can be displayed simultaneously in three languages.

This database is constantly updated by the PIARC Committee on Terminology, thanks to contributions from all PIARC Technical Committees. This coordination with other Technical Committees of PIARC is a key point for the next Cycle. In order this to be achieved, information should flow between committees. Thus, Committee on Terminology will be able to collect and analyse technical words and definitions, and afterwards, be included in World Road Association Dictionary.

Each line of the Dictionary provides the following information: the term, its definition (or a reference to the main term related to the concept involved), the term's code and its translation into the other languages, always set out in the same order.

This dictionary has been compiled in alphabetical order, as customary in dictionaries or glossaries. At the end of the dictionary a nomenclature with a logical methodical classification is presented, followed by the codes of all terms recorded.

The on-line Road Dictionary is far more comprehensive than the printed version; moreover, it is regularly updated. It offers you to search for one word or part of a word in one language and to obtain the results simultaneously in other languages, including the search language. Grammatical attributes, synonyms and their geographical origins, terminology classification and any illustration shown with the general term are displayed immediately.

The languages available on the Internet since January 2016 are: Arabic, Czech, Chinese, Croatian, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Icelandic, Italian, Japanese, Norwegian, Persian, Portuguese, Romanian, Russian, Serbian, Slovenian, Spanish, Swedish, Ukrainian and Vietnamese. However, the input of equivalent terms is improvable because it is still incomplete in most of these languages.

Thanks to the interactivity provided by the Internet, everybody is invited to suggest the addition, amendment or deletion of a term directly on the website. Thus, with the involvement of PIARC's Technical Committees and everyone's contributions, this collective work will become a most valuable tool for both experts and the general public.

A more intensive promotion of the Road Dictionary as a PIARC flagship product would be very important, both within the Association (including for the translation of its technical reports, manuals, other publications and reference documents) and outside it.

Committee on Terminology will focus on promoting the inclusion of specialized glossaries in the reports and manuals developed by the Technical Committees and on the use of these glossaries. Develop an app for smartphones and tablets, and the possibility of creating and printing personalized lexicons with baskets of words or themes, would be a great improvement for this Committee.

Deliverables: Upgrade and update the web-based Road Dictionary.

Potential Duration: project completed June 2027.

Road Statistics Committee

Production of Databook comprising statistical data of key quantitative indicators and non-statistical data with vital information about qualitative indicators, through updating and upgrading PIARC Databook of Roads and Road Transport.

Purpose: The purpose of this work is to

- Enable an international comparison of road statistics among the countries on the same definition and requirements, thereby allowing us to accurately gauge maturity of roads and road transport of each country for road experts and road administration departments.
- Provide statistical data as well as the outcome of their analysis for road administration departments of member countries who conduct quantitative research and make an objective assessment of actions based on such data analysis when formulating the road policies and measures.

Importance to roads agencies: This work is important to road agencies because they need to:

- Make an international comparison of road statistics among the countries on the same definition and requirements, thereby allowing us to accurately gauge maturity of roads and road transport of each country for road experts and road administration departments.
- Have statistical data as well as the outcome of their analysis for road administration departments of member countries who conduct quantitative research and make an objective assessment of actions based on such data analysis when formulating the road policies and measures.

Audience: The road experts and researchers will use PIARC Databook of Roads and Road Transport when they make an international comparison of road statistics among the countries on the same definition and requirements, thereby allowing them to accurately gauge maturity of roads and road transport of each country, and the road administration departments will conduct quantitative research and make an objective assessment of their actions by using the Databook when formulating the road policies and measures.

Deliverables: Terminology and data publication.

Background to TC's work on this topic: PIARC Databook of Roads and Road Transport 2020-2023 as an output of this Committee for the last working cycle.

Low and lower-middle income countries: Road administration departments of LMICs may have much room of improvements in their administration and use more PIARC Databook of Roads and Road Transport as reference when formulating the road policies and measures.

Potential duration: This Committee could be standing to regularly update and upgrade the Databook as its output.

Outsourced Projects

The Council at its meeting held on September 30, 2023 took note of the presentation made by the Vice-Chair of the Strategic Planning Commission and endorsed the analysis of possible new Outsourced Projects, summary of which is shown below. SPC will finalize its details to be presented at the Executive Committee meeting in April 2024 for its approval.

Background

- PIARC has to produce very good materials for very important themes, examples of which are disaster management, decarbonization, automated driving, PPP etc.
- Burdens on members of such TCs would be heavy because they have to treat multifold items.
- If non-essential tasks such as literature reviews, high-impact summary, surveys are contracted-out, it will enhance the quality of materials and be much help to members.
- Member countries are likely to have particularly high interest in such matters and want information.

Outline of the Projects

- New system of funding survey on specific theme(s).
- Survey here are literature review, high impact summary, survey as defined in the Blue Guide of PIARC.
- The theme should be authorized by ExCom at the beginning of every 4 year cycle, as very important theme(s) within the Strategic Plan.
- The output of the work is incorporated in the related TC/TFs' work during the 4 year cycle.
- The work is contracted out to the relevant organization such as consultants or universities.
- Funding is called for member countries.

To be finalized

- Possible modification of the name of the project in view of avoiding confusion with Special Projects and other existing groups, giving audience clear image of its output, giving impression that this is investment worthy.
- Theme(s) for the next cycle.
- Institutional matters (amendment of Blue Guide etc.)
- Defining standard procedure

Possible schedule

2024	March	SPC to finalize details (possible modification of the name, theme(s) of the next cycle, institutional matters, standard procedures)

	April	ExCom to approve the details
	May	GS to call for funding
	August	Related TC/TFs finalize draft TORs for consultants / universities
	September	ExCom to approve TORs for consultants / universities
		GS to call for consultants / universities
2025	January	SPC & related TC/TFs to finalize selection of consultants / universities
	February	GS to finalize contract
		Beginning of consulting work

Appendix A Communications Strategy Goals and Objectives

Goal 1 – Value-added benefits for diverse members

A diversity of government members find benefits and services attractive and understand the value-add, National Committees are mobilised, and both contribute by promoting PIARC collective and individual membership in their countries.

Objective 1.1: Update promotional products for all membership categories and tailor them to priority target audiences, so that members are aware of benefits and services and perceive them as attractive and offering value.

Objective 1.2: Better inform National Committees (NCs) and diversify communications tactics to build capacity and incentivize leadership as ways to reach higher satisfaction with PIARC support to NCs; reduce the number of inactives; and contribute to membership growth and diversity.

Objective 1.3: Raise awareness of the diversities in PIARC membership that are mirrored in technical committees, task forces and governance structures and implement inclusive communications tools to engage all regions, language and age groups, thereby encouraging further diversification of membership.

Goal 2 – Agile work program for engaged members

Members and partners are aware of ways to influence PIARC's rolling programme and use existing mechanisms more, resulting in enhanced reputation for having an agile, member-led work program that is relevant for regions around the world.

Objective 2.1: Regularly inform members, partners and road transport professionals about PIARC's adaptable, rolling work programme, using key messages crafted to demonstrate responsiveness to their knowledge needs, an understanding of varying regional priorities, and timely generation of practice-oriented guidance on cutting-edge topics.

Objective 2.2: Formalize annual communications planning processes for prioritisation and sequencing of activities based on capacity, value to members and potential to reach target audiences.

Goal 3 – Practice-oriented knowledge for informed decision-makers

PIARC is recognized for offering practice-oriented, actionable recommendations in formats appropriate to a range of key players, including practitioners and decision-makers from all regions.

Objective 3.1: Advise technical committees and task forces to gradually increase their capacity to produce outputs and deploy communications tactics that yield impact in decision-making circles, choosing from a varied toolbox that favours executive publication formats (e.g., fact sheets, policy briefs, etc.).

Objective 3.2: Demonstrate responsiveness to members' needs by putting in place best practice monitoring and evaluation methods for communications activities that will allow PIARC to assess uptake of materials, understand preferred formats and adjust based on member engagement levels.

Goal 4 – Expanded outreach to knowledge users

There is greater awareness of the practice-oriented knowledge developed by PIARC and of its relevance for academia and training organisations.

Objective 4.1: Leverage partnerships at the national and regional levels to scale up dissemination, seeking high return opportunities for knowledge sharing and application including reaching academics and students through partner organisations better positioned with this audience.

Objective 4.2: Release forward-looking publications grounded in practice that clearly identify problems to be resolved in the future and emerging issues to be researched, containing data or cases that are used and cited in academic research as aided by effective digital marketing.

Goal 5 – Participatory governance in the virtual era

Members are informed of the many opportunities to engage in the governance of the Association, participate more thanks to well-publicized virtual/hybrid arrangements favourable to lesser represented regions, perceive an openness to a diversity of views and feel involved.

Objective 5.1: Promote events that attract new, diverse participants, and make innovative use of interactive virtual tools to boost engagement and contribute to PIARC's profile as a global model non-profit organization.

Objective 5.2: Collaborate on the formulation of a policy on enhanced virtual and hybrid participation, with a view to advising hosts and facilitators on offering accessible and engaging meeting formats, and publicize such a policy if and when established by PIARC leadership.

Objective 5.3: Inform members of opportunities to engage in PIARC governance, update working methods to improve user experience and foster inclusive internal communication that celebrates member involvement.

Appendix B National Committee Action Plan

B.1 National Committees Basic Premises

- PIARC National Committees (NCs) mobilize the national road transport community.
- They promote the dissemination of National and International scale best practices at a national level.
- There are currently 49 National Committees in 50 countries. The updated list is available at https://www.piarc.org/en/PIARC-Association-Roads-and-Road-Transportation/PIARC-National-Committees
- The Action Plan was presented in Prague on April 19, 2022.

Three courses of action for NCs:

- **RELATIONS BETWEEN NCs**
- **RELATIONS BETWEEN GS AND ALL ASSOCIATE AREAS**
- **NATIONAL ACTIVITIES AND INTERNAL AFFAIRS**

B.2 RELATIONS BETWEEN NCs

Actions to be taken:

- Hold Online sessions every year in every language, prior to the Executive Committee meeting on 1st semester of the year.
- Keep up with the annual statutory meeting, adopting a format for the agenda of discussions and decisions.
- Update the “National Committee Creation Manual”, in all 3 languages.

B.3 RELATIONS BETWEEN THE GS AND ALL ASSOCIATE AREAS

Actions to be taken together with General Secretariat (GS):

- Involve the NCs in the organization of each of Piarc's actions (working group, events of the technical committees, etc.).
- Provide feedback to the Representative of the National Committees on the reports that the National Committees send to the General Secretariat, on a quarterly basis .
- Improve the coordination of the work, between First Delegates and National Committees.

B.4 NATIONAL ACTIVITIES AND INTERNAL AFFAIRS

Actions to be taken:

- Identify and analyse the interests, objectives and needs of the NCs
- Create a set of good practice tools for National Committees.
- Greater dissemination of NCs activities, in the "Routes/Roads" newsletter, social media, etc.

Appendix C Strategy on Gender Inclusion and Diversity

This Strategy was adopted by the PIARC Council in November 2022, with gender inclusion and diversity is confirmed as a value for PIARC. This is a summary of the original strategy.

C.1 Part One - Background and Context

The Promotion of Gender Inclusion and Diversity Team (PGIDT) was assigned as a permanent group to the PIARC Executive Committee in April 2021. PGIDT has two objectives:

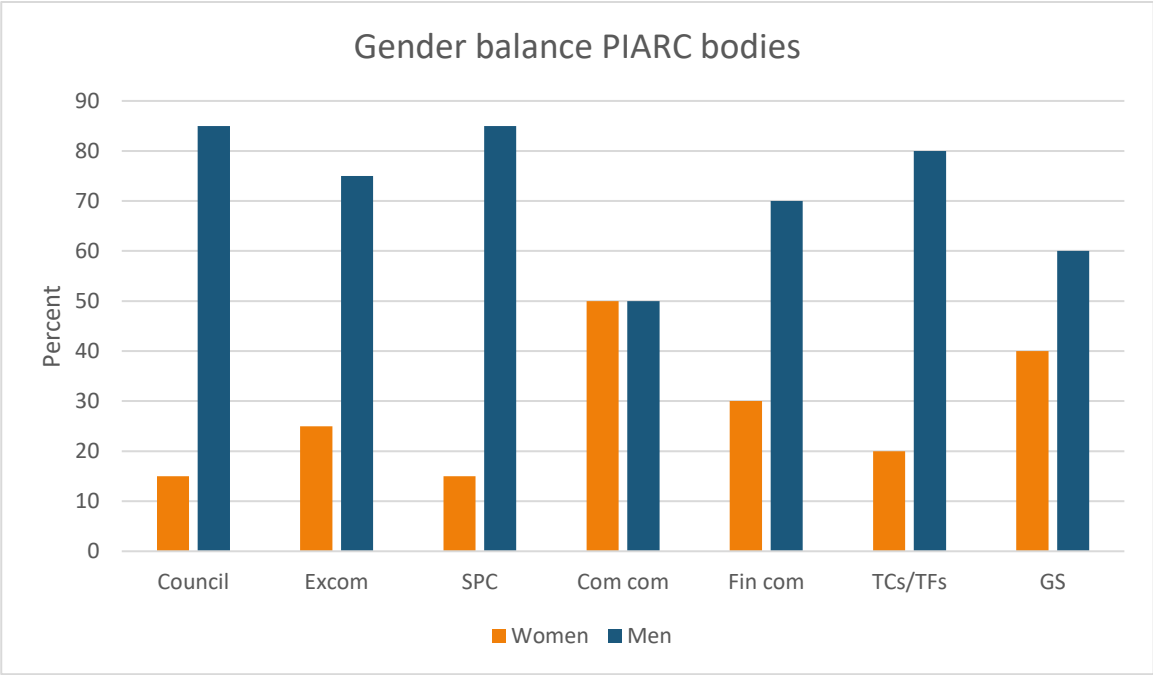
1. to consider the long-term strategy for gender inclusion and diversity for PIARC at Council level
2. whilst implementing quick actions to improve gender inclusion and diversity that do not require Council approval.

Transport is not gender neutral. Women's travel patterns and needs have been evidentially proven in many countries to differ from men's. An inclusive transport system that meets the needs of all users must therefore consider women in transport as users, experts, and leaders.

The strategy applies to both consideration of and improving gender inclusion and diversity within PIARC as an organisation and PIARC products.

C.1.1 The case for improving gender diversity and inclusion within PIARC

Demographic data collected by PGIDT in 2021 shows within PIARC that there is an overall gender imbalance across all PIARC bodies, notwithstanding the Communications Commission (Comcom) and the General Secretariat (GS).



This gender imbalance continues in PIARC events, with congress having stronger male participation; and in PIARC products with higher male participation and authorship across seminars, workshops, webinars and articles in the in-house 'Routes/Roads' magazine.

PGIDT conducted a gender attitudinal survey for all members in May 2022 to assess experiences and attitudes about gender inclusion. 120 responses from members were received. The responses were analysed by an independent researcher with the Transport Research Board (TRB) International Coordinating Council (ICC). More men than women responded to the survey, which reflects PIARC's gender make-up.

Whist it was noted that PIARC supports gender and inclusion by providing a platform for constant conversation on gender disparities; clear opportunities for professional interaction between PIARC decision-making bodies and junior employees through mentorship programmes; and encouraging change to support more women serving on technical committees, there are key areas for improvement.

Key areas to improve equality between men and women were suggested as:

- PIARC's organisation of webinars, panels and seminars to include more female views, participants, and speakers.
- PIARC should necessitate change to increase diversity in high-profile positions in member country agencies.

- PIARC should focus on improving diversity in the engineering-focused membership in particular as engineering fields have long suffered from a lack of gender diversity.

PIARC leadership should ensure increased awareness by:

- Encouraging forward-thinking through international education programs and training;
- Providing non-monetary incentives for member agencies to appoint more women to their technical groups; and
- Incorporating the gender perspective in technical documents and practices.

This survey was informative in providing the direction of the strategy.

C.1.2 Definitions

PGIDT has modelled definitions after those used by the United Nations (UN) since they are already well established.

- ‘Gender’ refers to social attributes and opportunities associated with being male and female and the relationships between women/men/girls/boys in their varying configurations. Gender determines what is expected, allowed and valued in a woman or a man in a given context.
- ‘Gender equality’ refers to the equal rights, responsibilities and opportunities of women/men/girls/boys. Equality does not mean that women/men will become the same but that rights, responsibilities, and opportunities will not depend on if you are a male or female.
- ‘Gender equity’ is the process of being fair to women/men/girls/boys and the equality of outcomes and results. It refers to differential treatment that is fair and positively addresses a bias or disadvantage due to gender roles/norms or differences between the sexes.
- ‘Diversity’ refers to the variety of experiences, cultures, and physical attributes that include but are not limited to race, language, sexual orientation, age, culture, socioeconomic status, gender, religion, ability, experience, and including these people.
- ‘Inclusion’ is the practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalised, such as those who have physical or mental disabilities and members of minority groups.
- ‘Direct discrimination’ in the gender context, refers to different treatment explicitly based on the ground of sex and gender difference.
- ‘Indirect discrimination’ refers to criteria that is formally gender neutral but in practice has a disproportionately negative impact on women in a gender context.
- ‘Conscious bias’ refers to biased attitudes that you are aware of.
- ‘Unconscious bias’ refers to biased attitudes operating outside of your awareness.

C.2 Part Two - The Strategy: Strategic Priorities & Core Value

Core Value:

PIARC shall strive to be an organisation that reflects the diversity of users of the road transport system and of the workforce in all its activities and outputs, and in which all should feel included.

There are three strategic priorities to improve gender diversity and inclusion within PIARC:

1. Raise awareness,
2. Create an inclusive culture,
3. Consideration of gender in technical products.

C.2.1 Strategic Priority 1: raise awareness

This has three key objectives.

1. To work globally with Partners to highlight the importance and adoption of gender inclusion and diversity (GID) within the roads section. Actions to deliver this are to communicate and promote activities for International Women's Day, International Women in Engineering Day and explore establishing a International Women in Transport Day. Furthermore, any partnerships PIARC enters into with external organisations should include gender inclusion as part of the agreement to seek out sharing best practice.
2. To increase understanding and awareness of PIARC members of the importance of GID. Actions to deliver this are development and delivery of learning materials, including training, to support skills and knowledge in this area. To develop comms (webpage, webinars and social media) to reflect the Strategy and showcase PIARC role models who support this Value. To continue the gender survey on an annual or biannual basis. To develop materials about the status of gender inclusion in PIARC that can be used by members to raise awareness.
3. To profile and celebrate good practice of GID within PIARC and in the global roads section. Actions to deliver this are to institute a prize category to celebrate and highlight good gender inclusion practices in PIARC's bodies; to deliver live sessions and networking events at the World Roads Congress on gender inclusion and diversity, and to highlight role modes within PIARC and externally.

C.2.2 Strategic Priority 2: Create an inclusive culture in PIARC

1. To achieve gender balance at all PIARC events. Action to deliver this is to update the Member's Guide ('Blue guide') to support the objective and keep members informed.
2. To create an inclusive culture through inclusive language. Action to deliver this is to develop and adopt inclusive language guidelines and templates for use across the organisation, ensuring alignment to UN guidelines. To develop language to encourage national committees to make more diverse appointments to PIARC bodies.
3. To develop a set of behaviours that reflect the GID core value. Action to deliver this will be to identify the behaviours that support and sustain the core value, with consideration of developing a PIARC Code of Conduct to support professional and ethical behaviours.
4. To aspire to increase gender balance in all parts of the organisation. Actions to deliver this are to ensure the call for nominations for TC/TF to be clear on aspiration for improved gender balance. A target that by 2027 all different bodies of PIARC should be at least 40:60 female to male; to deliver towards 50:50 by 2030 (with the exception of council where 40:60 remains the target for 2030); please see the 'Aspirations' section below.

C.2.3 Strategic Priority 3: Technical practice

1. PIARC reports and products should reflect the diversity of road transport users. Actions to deliver this are GID aspects to be considered when developing new Terms of Reference for PIARC TCs and TFs, and drafting and publishing technical products to ensure consideration of GID also. This does not mean that all TORs and products should contain GID perspectives, but consideration is required so justification for non-inclusion can be provided.
2. Ensure PIARC technical reports and products are produced by a gender inclusive team. By broadening the diversity of TCs (see 2.4), there should be a lead/liaison in every TC for GID to be considered.

C.3 Part three - Monitoring and measuring progress

The PGIDT will monitor and update the objectives at each PGIDT meeting and develop an annual progress report to be presented to Council.

C.3.1 Aspirations

These aspirations are not binding targets and do not apply at the level of national nominations, or any specific group or part of the organisation (for example an individual Technical Committee). Progress towards these aspirations is an indicator of success in implementing the strategy and will facilitate more informed decisions on whether additional action is needed.

PIARC Body	2022 Figures*	2024-2027 Cycle	2028-2031 Cycle
1. Council	15/85 (49/305)	30/70	40/60
2. Excomm	20/80 (5/20)	40/60	50/50
3. Commissions	30/70 (19/47)	40/60	50/50
4. TC/TF	20/80 (245/952)	40/60	50/50
5. TC/TF Chairs	15/85 (3/18)	40/60	50/50
6. TC/TF Sec	25/75 (15/47)	40/60	50/50
7. GS	60/40 (10/6)	50/50	50/50

***Figures shown as percentage of women/men (actual numbers of women/men in brackets).**

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