

BULLETIN

N° 2



CALGARY
2022



CANADA

VIRTUAL

XVI WORLD WINTER SERVICE AND ROAD RESILIENCE CONGRESS

ADAPTING TO A CHANGING WORLD

FEBRUARY 7-11, 2022



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*Cette publication est aussi
disponible en français sous
le titre XVI^e Congrès mondial
de la Viabilité hivernale et
de la Résilience routière.*

*Esta publicación también
está disponible en español
bajo el título : XVI Congreso
Mundial de Viabilidad Invernal y
Resiliencia de las Carreteras*

Cat. No. T22-244/2-2021E-PDF
ISBN 978-0-660-40028-0

Notice regarding photography:

The images were taken before
the introduction of the physical
distancing measures associated
with COVID-19.



ABOUT THE CONGRESS

The World Winter Service and Road Resilience Congress is a world-class event that builds on decades of PIARC experience, which brings together road experts and practitioners from across the globe. This will be the 16th edition of the International Winter Road Congress, which PIARC has held every four years since 1969.

Canada and the City of Calgary are proud to host this virtual international forum. Winter topics will be a major pillar of the Congress, such as traffic management, pavement conditions, de-icing agents, equipment, information to users, to name a few.

The Congress will also be more than that. In order to reflect the megatrends that impact the

road sector, PIARC and the Canadian Organizing Committee decided to broaden the themes to include resilience. Ensuring the resilience (without seasonal constraints) of roads and of transport services is indeed a priority for PIARC members, who are confronted with deteriorating infrastructure, budget constraints, adverse climate events, and rapidly evolving user expectations.

As a result, the XVI World Winter Service and Road Resilience Congress will be relevant for all countries!

WELCOME MESSAGES



PRESIDENT OF PIARC
Claude Van Rooten

On behalf of PIARC (World Road Association), I am particularly happy to invite you to participate in the XVI World Winter Service and Road Resilience Congress, organized with Transport Canada and the City of Calgary, which will take place virtually in February, Monday 7 to Friday 11, 2022.

The theme of the Congress, “*Adapting to a Changing World*”, is perfectly in tune with the strategic direction and with the objectives adopted by the Association, namely road administration, mobility, safety and sustainability, and resilient infrastructure.

After the first International Winter Road Congress, which took place in Berchtesgaden, Germany, in 1969, these PIARC Congresses have become an established landmark and a key event for all road experts to convene. Our 2022 Congress will be the first of the series to address two themes, namely winter service and road resilience, which will make it relevant for all countries. Since this event will take place virtually, it will also be more easily accessible.

Resilience is an overarching ambition for all aspects of road infrastructure and road transport, and it requires a comprehensive approach. This is why PIARC has published several reports on this topic in recent years, including our International Climate Change Adaptation Framework, which helps road systems and road infrastructure managers and owners address climate change. Resilience is a cross-cutting issue for PIARC, and several of our Committees are currently developing material.

Based on the wealth of knowledge developed by our Committees, and on the very high quality of the abstracts that were submitted to our international call for papers, I am confident that all aspects of winter service and of road resilience will be fully addressed in the presentations and discussions at the Congress.

On behalf of PIARC, I want to thank the Government of Canada, represented by Transport Canada, as well as the City of Calgary, for hosting this Congress. I invite everyone to join us in February 2022.

Claude Van Rooten
President PIARC



Photo: Ice skating near the ice castle on Lake Louise in Banff National Park.
Credit: Travel Alberta/Gerard Yunker



CO-CHAIR, CANADIAN ORGANIZING COMMITTEE
Chantal Lanthier

When Canada was selected as host country by the PIARC Council in 2017, none of us could have imagined how our world would change in 2020, and how COVID-19 would impact us as host country, and impact all of you as participants in PIARC's

XVI World Winter Service and Road Resilience Congress.

The Canadian Organizing Committee, comprising representatives from Transport Canada and the City of Calgary, has worked tirelessly with the PIARC General Secretariat to plan a Congress that is vibrant, interactive, inclusive, and retains the City of Calgary 'flavour' even in a virtual environment. This was especially important to us at a time when many people are experiencing 'Zoom fatigue'.

The virtual Congress does make it easier for you to attend, with no travel and hotel expenses. You can attend from anywhere!

We are also pleased to offer the Congress in three official languages—English, French, and Spanish. There will be simultaneous interpretation for plenary and technical sessions.

We are proud of our nation and all that Canada has to offer international visitors, and are disappointed that we are not able to welcome you to Canada and meet you in person. However, we are confident that offering a virtual Congress is the right approach due to the ongoing pandemic, with variants of COVID-19 erupting unexpectedly, the uncertainty of vaccine supply around the world, and the associated economic repercussions being felt in nations.

We look forward to meeting you virtually in February 2022!

Chantal Lanthier
Co-Chair, Canadian Organizing Committee
Acting Director General,
Transportation and Infrastructure Programs
Transport Canada



MAYOR OF CALGARY
Naheed K. Nenshi

PIARC has made the wise decision to host the XVI World Winter Service and Road Resilience Congress through a virtual digital platform in 2022 to ensure everyone can participate safely in this event. While I'm disappointed that we won't be able to host in person, Calgary remains proud to be the host city for 2022. We've learned over the past year how to be creative and make meaningful connections virtually, and we'll take those learnings to ensure you feel the Calgary spirit, no matter how many miles away you may be. We look forward to discussing and sharing the latest knowledge on winter service, resiliency, and transportation with experts from around the globe.

Welcome, all delegates and participants to the 2022 XVI World Winter Service and Road Resilience Congress. I hope that when we can all travel again, you will be able to visit Calgary, this wonderful place I call home. I know you will enjoy everything about it as much as I do.

Sincerely,

Naheed K. Nenshi
Mayor of Calgary



**SEE YOU
IN CALGARY
VIRTUALLY!**



CONGRESS PROGRAM

INTRODUCTION

The overall theme for the Congress is **Adapting to a Changing World**. This theme brings together the elements of climate change; technological change such as connected and automated vehicles, impacts of cyber security, new methods in winter service; regulatory change as we adapt to these new technologies; societal change as fewer people use public transportation or their vehicles because they work at home; and mid-to long-term changes in budgeting and planning as nations adapt to COVID-19 and the changed world in which we live.

Adapting to a Changing World also means adapting the Calgary Congress to a virtual format. The Congress program is being planned to accommodate multiple time zones as participants will be attending from all around the world at different times throughout the day. More information on time zones can be found in the Practical Information section of this bulletin.



There are many benefits to attending a virtual Congress:

- Easy access from anywhere
- Lower registration fee
- No transportation or hotel expenses
- Flexible schedule
- Discussion forums available 'on demand'

The Congress will begin with the official opening ceremony on February 7. The ceremony will be followed by the start of the technical sessions, foresight sessions, poster sessions, special projects sessions, and the exhibition. Technical, foresight, and poster sessions continue on February 8. The highlight of the day will be the Ministers' Session. February 9 and 10 will have keynote sessions on both days in addition to the technical, foresight, and poster sessions. Technical, foresight, and poster sessions will continue on February 11 followed by the closing ceremony. We are adding a Mayors' Session to the program, which will be held on February 9. Please note that the program is subject to change.

Details for Ministers' and Mayors' Sessions are still being finalized; they will likely include subjects at national and local levels.

PROGRAM-AT-A-GLANCE*

DATE	EVENT
Monday February 7	Opening Ceremony
	Technical/Foresight/Poster Sessions
	Networking sessions
	Exhibition/Partnership Program
Tuesday February 8	Technical/Foresight/Poster Sessions
	Ministers' Session
	Networking sessions
	Exhibition/Partnership Program
Wednesday February 9	Technical/Foresight/Poster Sessions
	Mayors' Session
	Keynote Session
	Networking sessions
	Exhibition/Partnership Program
Thursday February 10	Technical/Foresight/Poster Sessions
	Keynote Session
	Networking Sessions
	Exhibition/Partnership Program
	Technical Visits
Friday February 11	Technical/Foresight/Poster Sessions
	Exhibition/Partnership Program
	Technical Visits
	Closing Ceremony

* program subject to change



Photo: Dogsledding in Spray Valley Provincial Park with the Northern Lights above.
Credit: Travel Alberta/Sean Thomson

TECHNICAL SESSIONS/TOPICS

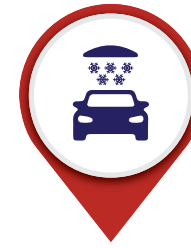
The extensive technical program consists of 60 sessions under the two complementary program themes of Winter Service and Resilience, and the Foresight Sessions. Most sessions will last 90 minutes.

Technical Sessions will present case studies, research results and/or practical experiences identified through the PIARC international call for papers, which is structured around 15 topics.

The sessions will also showcase the work of PIARC Committees and Task Forces.

Foresight Sessions are co-organized with international and regional organizations which are partners of PIARC. They aim at consolidating the global outreach of the Congress as the major global forum of discussion and exchange for winter service and road resilience.

WINTER SERVICE THEME



TOPIC 1: Extreme winter situations in cold climate areas

During extreme winter events, standard response plans may no longer be valid. These events can have significant consequences for society. In many countries there are roads in areas with extreme conditions such as mountain passes requiring convoys, roads in open areas exposed to snow drift and roads vulnerable to avalanches. But extreme weather conditions can also happen anywhere; examples include heavy snowfall, freezing rain, extreme cold, fast changing weather conditions, fast increasing temperature and melting snow which can cause landslides or flooding.

How can road agencies cope with these challenges and plan to act accordingly to emergency situations regarding:

- Organization
- Management
- Equipment
- Contracts
- Information
- Transportation of dangerous goods



TOPIC 2: Effect of climate change on winter service

Winter service is dominated by climate and local weather events. How will climate change affect winter conditions and how will it affect winter services? How can winter service organizations respond considering a benefit/cost analysis? What are appropriate planning periods and opportunities for technology development, new or updated strategies, and quality control of performance necessary to respond to climate change? This topic might include:

- Methodological approach to climate change and how to simulate its evolution
- Taking into account the increased variability in weather events; their occurrence and strength
- Impact of climate change on “winter road climatology”
- Operations’ solutions to meet climate change
- Changes required in organization, workforce, equipment and materials (to meet the needs from more extreme events)



TOPIC 3: Road weather information

MDSS (maintenance decision support system), ITS and use of mobile data are the new tools to assist in delivering winter service operations and providing information to the public. Presentations will be made on innovations, technology and information related to decision-making such as:

- Policies and management of road weather data
- Integration of road weather information with predicted traffic, planned maintenance, anticipated incidents, etc.
- Using assembled weather forecasts (confidence interval, probabilities) to better manage the risk and the cost of a decision
- Using road weather information to improve road condition forecasts
- Using road weather information to enhance infrastructure resilience
- Using road weather information to model and forecast surface transportation and weather events
- Using road weather and surface condition data collection, including big data approach (mobile data, etc.)



TOPIC 4: New technologies and methods in winter service

Winter service evolves over the years with ongoing development and research. This topic covers all subjects concerning innovation in techniques and technologies in winter service.

Techniques

- Application of de-icers and anti-icers
- Improvement in the use of abrasives
- Snow and ice clearance procedures and methodologies
- Sustainable and adaptive maintenance procedures
- Protection against snowdrifts and avalanches

Technologies

- New snow and ice clearing equipment
- Automation of snow and ice control
- New or alternative chemicals or materials
- Route selection and optimisation
- Specifications and standardisation of equipment and materials
- Measurement of residual winter chemicals
- Sustainable products or equipment



TOPIC 5: Winter maintenance management

Administration of winter service activities involves the planning and organization of many functions of road agencies and requires significant resources. Winter service is part of the operational strategy of Road Administrations. The policies and tools these administrations use in its management are the subject of this topic.

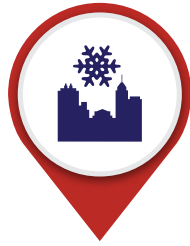
- Strategic planning and organization policies
- Definition and measurement of Levels of Service
- Regulations relating to the use of roads (example: use of winter tires)
- Cost/benefit analysis
- Sustainability considerations in winter service planning
- Professional training
- Outsourcing/Contracting winter service
- Interaction with road users/customers
- Performance management



TOPIC 6: Road user communications and connected and autonomous vehicles during winter

This topic will look at what winter information the general public want and need to know, and the best platforms to use to ensure the information can be delivered clearly and efficiently using both manual input and information being received and sent from connected vehicles. Also, what are the effects winter conditions will have on connected and autonomous vehicles; and the effect of connected and autonomous vehicles on winter service?

- What information do travelers need to know?
- What are the best and safest platforms to use to get the information in the public domain?
- How can information from the public be used to assist winter decisions and operations?
- How can connected vehicles assist with live information from the roads?
- How is it best to send information and current conditions to connected vehicles?
- What impact do snow and ice have on the safe use of autonomous vehicles?



TOPIC 7: Winter service in urban areas

Maintenance of the urban network can vary from major highways to dead-end roads where space is very limited. Most people live in cities and many do not use personal transportation. Multimodal transport is common in most cities; snow and ice in winter has an impact on different types of transport and their connections. Due to the intense use of urban areas the environment of these areas is exposed to winter service operations. This topic might include:

- Optimization and minimization of the routes for winter service vehicles
- Treatment methods, materials and vehicles for winter service on different types of bicycle facilities, sidewalks and pedestrian areas or cluttered areas
- Accessibility for those with reduced mobility (e.g. tactile paving) during winter events

- Equipment and layout of urban areas, what to do with the snow: store, remove, or thaw?
- Accounting for winter weather during the planning/scoping phase of roads
- Solutions to ploughing different surfaces without disadvantaging any transport mode
- How to manage different responsibilities and regulations
- How to define a standard and best practice in cities also for multimodal transport (public transport, pedestrian, bicycle, bus, car)
- Methods and technologies for environmentally friendly winter service
- Snow falling from roofs/bridges, etc.

RESILIENCE THEME

Road networks and road transport systems are exposed to various threats that affect their operations and structural integrity. This includes climate change, natural or man-made disasters, extreme weather events, pandemics, together with challenges resulting from aging infrastructure, increased or heavier traffic, use of non-standard equipment on roads, etc. Road authorities and other organisations need to design and implement

policies, strategies, holistic methodologies/ frameworks and actions to increase the resilience of the road transport system. Resilience is the ability to prepare, respond, recover and adapt from such threats. Such strategies and policies need to enhance resilience of road systems during the design, construction, maintenance and operations of roads.



TOPIC 8: Best practices for increasing resilience in road networks

This topic seeks to identify best practices that increase the resilience of the road transportation system to all threats/ hazards, including:

- climate change and extreme weather
- aging infrastructure
- natural disasters
- man-made disasters
- cyber-physical threats

We encourage submissions that address the assessment of resilience, implementation of actions to increase resilience, as well as identification of the economic, social and environmental aspects of resilience management, and the cost-effectiveness of proven adaptation strategies.

This also includes the development of climate change adaptation frameworks for road infrastructure and identification of methodologies for risk management and data requirements (e.g. innovative practices in terms of acquiring, processing and sharing forecasting data and risk analysis, as well as the development of platforms integrating geographic information systems -GIS- and asset management systems). Vulnerability assessments, prioritising risks, developing and selecting adaptation responses and strategies, and decision making may consider new and innovative methodological approaches, in particular criticality assessment, and adaptation pathways.

Best practices should focus on resilience, with special attention to actions that help to prepare, respond, recover and adapt to future threats/hazards.



Photo: Calgary downtown in the evening at sunset
Credit: S. hutterstock



TOPIC 9: Disaster and Risk Management

Countries that experience disastrous situations acquire unique management knowledge and develop tailored countermeasure technologies based on their experiences. As societies diversify, disaster damage changes as society changes. Therefore, the type of technology necessary to manage disastrous situations needs to continually adapt as the needs of road users and of the society change. Current trends in the management of disastrous events pay more attention to the quality of the management. Various available data/information can be easily collected and provided between road administrators and road users. While the traditional disaster management approach prioritizes making infrastructure safe, the interaction with the public and other organizations is key for producing better results. New or updated managing approaches and techniques are welcome.

This topic will deal with:

- Application of advanced information and communication technology
- Application of user or third-party based data/information such as big data
- Communication with road users using social network technology
- Technology for reducing disruption time in disastrous events such as emergency measures or emergency procurement system
- Disaster, risk, and resilient management approach considering social impact and financial resilience
- Promotion of coordination and cooperation with road related organizations on disaster management
- Case studies of good practice of the management of disastrous events



TOPIC 10: Improving resilience of Road Network Operations through ITS and new technologies

When disruptions happen the ability of road operators to deliver information properly to road users may be compromised and the efficiency of road operations may be jeopardized. Hazards occurring along the network (like winter extreme situations or high impact events for example) can be a challenge for many Road Operators in terms of ensuring the viability of the road, and therefore the mobility of people and goods along the network itself.

New technologies offer new possibilities to engage with road users and avoid disruptions, such as:

- Connectivity (i.e. V2X) secures a faster transmission of data than ever before, allowing road operators to fast track road operations
- Big data and advanced analytics (i.e. machine learning and AI) allow road operators to perform better especially in times of crisis and emergencies, ensuring better information in a sensible short period together with better decision-making processes
- New methods of data collection (i.e. probe data) complement the panel of information in order to provide customized services to users

This topic includes how data collection, use of new technologies and analysis represent for road operators valuable assets in order to provide not only basic information but also real value to road users, improving the efficiency of road network operations.



TOPIC 11: Resilient pavements

This topic will address:

- Resilience of pavements and roadside infrastructure, in urban and rural areas
- Experiences with adaption of resilient pavement designs and materials, e.g. to non-standard tires such as new generation wide based single tires
- Use of technology for post-disaster investigation and monitoring resilience
- Use of advanced pavement management approaches to mitigate/incorporate natural or man-made disasters may also be considered
- Materials with the potential for self-healing
- Pavement surfaces that retain their characteristics irrespective of climatic variations, etc.

The topic can be based on theoretical modelling, laboratory research, *in-situ* performance evaluation or case studies.



TOPIC 12: Bridge resilience considering natural hazards

With regards to road bridges, concerns associated with climate change are the extreme variation of air temperatures, extreme wind due to hurricanes and typhoons, sea level rise, frequency and intensity of rainfall and associated flooding, and so on. In addition, seismic events have caused severe damage to road bridges in seismic areas that have resulted in closing of road networks.

This topic could describe the following aspects:

- Bridge recovery after the occurrence of natural hazards
- Mitigation to accommodate effects due to natural hazards for road bridges
- Measures for increasing resilience to climate change
- Effects of climate change on bridge design and maintenance
- Mitigation to accommodate climate change effects
- Climate change resilient bridges
- Road Bridges damage-resilience in seismic areas
- Seismic retrofit techniques to enhance resilience of road bridges



TOPIC 13: Resilience of Earth Structures to natural hazards

It is essential to study the effect of natural hazards on existing earth structures and the measures used for their remediation. Specific measures are sought in design and construction of earth structures to prevent the effect of natural hazards on their performance over their design life.

Natural hazards include, but are not limited to:

- Heavy rainfall events and flooding
- Wind erosion
- The action of snow and frost penetration
- Rock falls
- Soil moisture deficit
- Earthquakes
- Any other effect of global climate change

Papers were invited from any geographical location and involving any techniques that have been used in the past to improve earth structure performance irrespective of the complexity of the method employed.

Papers from this topic may eventually be included in a PIARC report about the resilience of earth structures.



TOPIC 14: Resilience: measures to keep a road tunnel safely available for traffic under varying circumstances

Compared to the open road, tunnels are relatively vulnerable when it comes to availability for traffic, because of the many required safety measures to enable safe passage. Moreover, a traffic incident or fire in a tunnel often requires more time and effort to normalize the situation than on the open road. So, in the context of road tunnels, resilience could be described as the ability to keep the tunnel safely available for traffic, during various abnormal situations, like traffic incidents, technical malfunctions, extreme weather conditions, other natural and man-made hazards, or maintenance and refurbishments.

This topic should describe cases in which measures were planned and implemented to improve road tunnel resilience in general or for a specific road tunnel, focussed on events or circumstances that are particularly relevant for your situation or experience.

The analysis, design, implementation, monitoring and effectiveness of the measures in question would be interesting for the reader – do's and don'ts, recommendations, etc.



TOPIC 15: Resilience through asset management and security

PIARC's Strategic Plan recognizes resilience as one of the global issues that it should address. This topic relates to PIARC's works on:

- Asset management and resilience
- Security aspects of road resilience

This topic will gather best practices and approaches of Road Asset Management measures to improve the resilience of the road infrastructure. Resilience of road network is of high importance to ensure that road user costs and socio-economic costs are reduced in case of hazards. This topic will also address the general principles of a security-minded approach as well as the technical and operational practices to protect against a range of physical and cyber threats.

Photo: The Trans Canada Highway between Calgary and Banff Credit: Shutterstock

FORESIGHT SESSIONS

Foresight Sessions are co-organized with international and regional organizations which are partners of PIARC. They aim at consolidating the global outreach of the Congress as the major global forum of discussion and exchange for winter service and road resilience.

Session 1: Managed Retreat – Difficult but Necessary, organized with **Transportation Research Board (TRB), American Association of State Highway and Transportation Officials (AASHTO) and Federal Highway Administrations (FHWA)**

Transportation agencies across the world must address increasing impacts from climate change (e.g., sea level rise, land erosion, subsidence, pavement degradation) and extreme weather (e.g., flooding, landslides, wildfires, and drought), and balance the costs and benefits of making assets more resilient. For some locations, the costs of maintaining individual assets are so high that transportation agencies may choose to stop maintaining the asset. The purposeful moving or abandoning of assets due to current or future risks is known as managed retreat, and economics, politics, and system impacts all influence these decisions. Examples include retreat due to sea level rise, riverine flooding, and other climate impacts driving managed retreat decisions.

The session will share an overview of managed retreat, examples of managed retreat from around the world, and host a discussion with panellists from around the world. The session will be interactive and use an online polling tool to engage with participants.

Session 2: Resilience Frameworks and Metrics for Road Stakeholders, organized with **European Conference of Transport Research Institutes (ECTRI) and Transportation Research Board (TRB)**

This session stems from the need to present indicative perspectives of state-of-the-art resilience frameworks and metrics that are of interest and applicable to road stakeholders.

These perspectives cover a wide range including resilience considerations in freight movements from disruptive events, methods and concepts for assessing the resilience of transport infrastructures, guidelines proposed for measuring resilience and prioritizing intervention, a framework for investment considerations, and use of big data in improving resilience.

A roundtable discussion on the presentations and on key selected questions with the participation of experts representing ECTRI, TRB, PIARC and the presenters will shed further insight into the presented issues and how these could be best exploited by various stakeholders, including Low and Middle-Income Countries (LMICs).

Session 3: Adapting Infrastructure for Resilience: Research and Experience, organized with **Transportation Association of Canada (TAC)**

Around the world, the transportation sector faces serious challenges to ensure infrastructure is resilient to the impacts of climate change, including unpredictable weather and storm events. In Canada, recognizing that resilient infrastructure is critical to our current and future way of life, a variety of organizations are working on adaptation initiatives. This session will share research and experience as we all strive to ensure

transportation networks continue to provide the level of service that global economies and communities require every day.

Canada's National Research Council's ground-breaking work to integrate climate resilience into building and infrastructure design, guides, and codes will be presented. This initiative is driving innovation and providing science-based knowledge and tools to make sound decisions about how to design, operate, and maintain infrastructure assets.

The Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol will be showcased. The Protocol establishes the adaptive capacity of infrastructure to support informed engineering judgments on components that require adaptation, and how to adapt them.

Speakers will also bring local perspectives to the topic and describe work being done in Quebec, the Yukon and the City of Calgary to adapt infrastructure to the impacts of climate change.

Session 4: Road resilience of today and tomorrow – what should we know, organized with the **United Nations Economic Commission for Europe (UNECE)**

Roads are instrumental to the safe, efficient and reliable movement of people and goods. Disruptions on the road network may lead to adverse economic and social effects. At the same time, extreme weather events, some of which are increasing in intensity and frequency due to climate change, can result in damages to roads, road operational disruptions and pressure on supply chain capacity and efficiency serviced by road transport, amongst others.

This session will present the work that the UNECE Group of Experts on Assessment of Climate Change Impacts and Adaptation for Inland Transport has been conducting on future impacts of climate change on main transport assets (including on roads). The Group of Experts brings together experts from various countries and organizations, among others from Canada, various European countries, the UN Conference on Trade and Development, the World Meteorological Organization, the United Nations Framework Convention on Climate Change, the International Union of Railways, etc.

The analysis looks into various climate variables that are used as proxies for understanding changes in the potential impacts of climate change. Regional maps have been produced showing the spatial distribution of the climate change projections, which are overlain by main transport networks.

Session 5: 40 years of Road Weather Research – how can we stay resilient for the next 40, organized with **Standing International Road Weather Commission (SIRWEC)**

This session will celebrate the long history of cooperation between SIRWEC and PIARC. Indeed, in 2024, the Standing International Road Weather Commission will be 40 years old. The name of the commission can sometimes be misleading as the focus for nearly all of those 40 years has been winter service and indeed, the origins of many of the major innovations in improving winter resilience can be found in the proceedings from the bi-annual SIRWEC conference.

The session provides an opportunity to look back at key innovations and experiences from the last 40 years, the current state-of-the-art, and more intriguingly, where the winter service sector is headed. The session is designed to document this journey, to illustrate the increasingly rapid pace of technological change in the sector while reflecting on the uncertainties of a changing climate.

Session 6: Electrified and Smart Transportation, organized with **China Highway Transportation Society (CHTS)**

Transportation has been undergoing a rapid and one of the most remarkable transformations in the modern era, in which electrification and smart technologies represent two of the major driving forces. On the one hand, given the mounting pressure to combat climate change, electrification of vehicles has direct and significant impacts on reducing fossil fuel use and greenhouse gas (GHG) emissions from the transportation sector, which accounts for 14 percent of global GHG emissions. On the other hand, smart transportation technologies, especially by leveraging big data and artificial intelligence, help reduce not only GHG emissions, but also system inefficiency and social cost.

This session invites four internationally renowned leading scholars to share their experience and perspectives on important issues, challenges, and opportunities in the design, planning, development, and operations of electrified

and smart transportation systems, on both passenger and freight transportation, and from multicontinental perspectives.

Session 7: Severe weather and natural events: Solutions to guarantee road freight transport, organized with **PIARC Technical Committee 2.3 Freight**

This session will focus on providing knowledge on efficient and safe road freight transport under challenging weather and road conditions and natural events. The goal is to identify and share initiatives that are transferrable and/or can be adapted to meet the needs and conditions in any country in any type of severe events.

With climate change, we are increasingly facing more extreme weather conditions, and adverse weather is one of the major causes of delay on the roadway system. The entire transportation community, including freight transport, must find ways to cope with this challenge and mitigate its effects.

Weather-related delays and natural disasters can add significantly to shipping costs, resulting in negative impacts on the overall economy. Specifically, different cases need to be considered: end products may arrive late to customers, or parts may arrive at the factory later, potentially interfering with the production process. Building a robust roadway system is key to minimizing the negative impact on the economy.

An important focus of this foresight session is to better understand what strategies and solutions are being developed and deployed around the world to mitigate adverse weather-related and natural disaster delays to commercial motor vehicles.

Topics to be highlighted are impacts on supply chains by interruptions of road freight flows, redundancy in the road network for freight, and approaches to handling extreme weather and road conditions using truck management information systems and Intelligent Transportation Systems (ITS).

Session 8: Planning for more resilient urban mobility, organized with **POLIS Network**

This session will focus on the topic of resilient mobility planning. First, the authors of the “Planning for More Resilient and Robust Urban Mobility” SUMP Topic Guide will set the tone of the session – by introducing the concept of urban mobility resilience and present the seven principles of resilience while Laura Babío (POLIS) will present a toolbox of measures to help cities increase their resilience.

Peter Jones (UCL), scientific coordinator of the MORE project will focus on how reallocating road space considering the needs of current and future road users can make cities more resilient. The presentation will draw on both the theoretical work developed during the project, and the application of the MORE tools and concepts in five European cities: London, Lisbon, Constanta, Malmö, and Budapest.

Given the ongoing transformations in urban transport and the uncertainties associated with the post-pandemic mobility, the use of new technologies and data sources are crucial for ensuring resilient planning and management of urban mobility. Javier Burrieza (Nommon) from the MOMENTUM project will look at how we can combine these new sources to monitor and predict bike-sharing demand in the city of Madrid, looking at the impact of COVID-19 in the role of this shared mobility service in the city.

Session 9: HDM-4 and Resilience, organized with **HDM Global**

HDM-4 is an economic appraisal tool that is used worldwide for assessing different road investment strategies. Typical uses of HDM-4 include project evaluation where the economic and technical efficiencies of the proposed scheme are analyzed, as well as preparing annual road work programmes under

budgetary restrictions. In light of climate change and other impacts that may affect pavement performance, it is now more common to determine how resilient the proposed plan of work is to such effects, or to design resilience into HDM-4 prior to the analysis.

This foresight session looks at approaches to address resilient road investment strategies using HDM-4. The session will present case studies where resilience has been addressed by HDM-4 from a number of different countries, as well as take a forward look at how HDM-4 can address this important issue in the future.

Session 10: The challenges of training and retaining a winter maintenance workforce, organized with **Association québécoise des transports (AQTr)**

For many countries such as Canada-Québec, the winter maintenance workforce is a recurring problem for road maintenance professionals today.

The training of this specific workforce, the workforce shortage, the means of retaining the workforce and the possible workforce attractiveness strategies will be addressed during the discussions through a panel of regional and international experts.

The objective will be to better understand the issues of the respective stakeholders, and to share promising initiatives put forward in the organizations to identify best practices. The session will also be a deep reflection on the transformation of work, and the impact of technological changes in all dimensions of the development of skills and expertise of individuals; in particular, their capacity to remain up to date and to pursue their continuous learning.

Session 11: Road resilience mainstreaming and improvement with the support of multilateral development banks, organized with **the World Bank Group**

Representatives from relevant ministries and road network managers in different parts of the world will present selected case studies and good practices from their networks, to illustrate promising approaches and summarize early lessons learned.

The discussion will cover country-specific vulnerability to climate-related risks and other disaster threats, as well as achievements and plans regarding key stakeholders’ capacity in road-network climate resilience planning, response, recovery and adaptation – including consideration of COVID-19 recovery needs.

TECHNICAL VISITS

We are pleased to offer you the following virtual technical tours during the Congress, which will be by video and available in English, French and Spanish:

River Flooding in Calgary: Journey from 2013 to Resilience

June 2013 brought flooding to Southern Alberta resulting in the costliest natural disaster in Canadian history at the time. Impacts in the City of Calgary included neighborhood-wide evacuations, major transportation, economic and utility disruption, life safety risks and environmental impacts assessed at over \$2 billion Canadian. Intending to not only recover but to build back with enhanced resilience, the City of Calgary assembled an Expert Management Panel on River Flooding, drawing on expertise from across the region and around the globe to guide a comprehensive flood resilience strategy.

The strategy has resulted in a range of programs as well as investments in local and regional flood protection infrastructure, structural and non-structural measures, all configured to work synergistically and adaptably. Join us for a tour of some key local flood resilience measures and share insights with staff on regional hydrology, geology, economy, infrastructure design practices, climate change, bioengineering and ecosystem services, land use regulation, and citizen engagement.

Innovation at The City of Calgary's Traffic Management Centre

Using everything from drones, virtual reality goggles, real-time data from citizens using traffic navigation apps, and even humour, The City of Calgary's Traffic Management Centre is always exploring inventive solutions to keep Calgarians on the move in our winter city.

Join us for a guided tour of our newly renovated Centre that uses state-of-the-art technologies to gather real-time traffic information that impacts our winter service, traffic signal operation, and management.

Walk through the Calgary Traffic Management Centre and learn how we incorporate many innovative technologies and hear how our new Traffic Tuesday program aims to make motorists smile through humorous traffic safety messages. Explore our multi-layered approach to communicating with motorists in real-time about traffic conditions, congestion, lane closures, and construction delays to keep traffic moving and ensure everyone's safety.



Photo: Sunrise over Bow River, Calgary, Alberta
Credit: Shutterstock

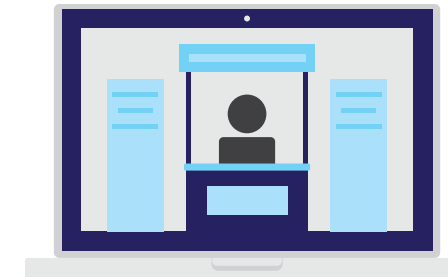
In managing national parks, **Parks Canada** maintains and restores ecological integrity, while providing Canadians with opportunities to safely discover and enjoy these special places. Through this virtual excursion on the Trans-Canada Highway you will be introduced to two innovative aspects of highway management in Banff National Park.

Aquatic Connectivity and Highway Wildlife Crossings / Exclusion System

The Trans-Canada Highway in Banff and Yoho national parks boasts the world's most extensive network of highway wildlife overpasses, underpasses and exclusionary fencing. In addition to discussing wildlife crossings, an Aquatics specialist will present advancements and commitments Parks Canada has made to improve the ecological integrity of aquatic ecosystems by reconnecting aquatic habitat.

Avalanche Control for Highway Safety

Parks Canada is a leader in avalanche safety and monitors slide paths that affect highways daily throughout the winter in the mountain national parks. When avalanche risks are elevated, Parks Canada staff deliberately trigger avalanches on slide paths that may affect park highways. In a few locations, Parks Canada has installed remote avalanche control systems (RACS) which can be safely deployed at any time of day or night and in all weather conditions.



EXHIBITION/PARTNERSHIP PROGRAM BOOK NOW!

We welcome you to participate as a partner and/or exhibitor at Calgary 2022. Our unique Congress platform has a virtual exhibition hall which mimics a live hall – kiosks and pavilions are customizable in size and shape! As well, there are many places for partner visibility. Book your partnership package or exhibition stand as soon as possible in order to get maximum exposure! Please visit www.piarc-calgary2022.org for more information.



PIARC PRIZES

In the lead up to the Congress, PIARC is running an International Prize Competition for the best papers, including those identified by PIARC Committees and those nominated by National Committees hosting their own national competitions.

These prizes are intended to promote professional excellence, research, innovation and applications that demonstrate great interest and success in all areas of roads and road transport. The five categories, each supported by a PIARC Prize partner country, reflect PIARC's past experiences, strategic priorities and the themes of the Congress:

- Adapting to a Changing World (United States)
- Winter Service (Italy)
- Resilience (Russia)
- Young Professional (35 years of age or younger) (Hungary)
- Authors from Low- and Middle-Income Countries (Japan)

An international jury will evaluate the papers to select winners. The jury, composed of representatives from the PIARC Prize partner countries and members of the General Secretariat, will be led by the Chair of the Communications Commission.

PIARC Prize winners will be featured during the Congress. Good luck everyone!

PRACTICAL INFORMATION

LANGUAGES/INTERPRETATION

The Canadian Organizing Committee is proud to announce that the Congress will have three official languages: **English, French and Spanish**. Simultaneous interpretation for plenary, technical and foresight sessions will be available. Our Congress platform will make it easy to participate in the Congress official language of your choice!

WELCOME

BIENVENUE

BIENVENIDOS

VIRTUAL PLATFORM

We are excited to offer a customized platform for Calgary 2022 that integrates the three official languages of the Congress; networking and social experiences such as chats, meetings, video calls, texts; an information booth that is 'open' with live support during the Congress; and an exhibition area which mimics a live hall – booths and pavilions are customizable in size and shape! You will be 'in' Calgary without the hassle of travelling internationally during a pandemic!

HOW TO PAY

There are two ways to pay for the Congress: by credit card (VISA, MasterCard or American Express), or by bank transfer. If paying by bank transfer, your registration must be paid in full **no later than five business days before the start of the Congress (Friday, January 28, 2022)** in order to process the transaction and gain access to the full program and pre-proceedings for the start of the Congress. **Credit card payments are processed and applied immediately.**

Please see the Congress website for instructions on how to register and make your payment. If you wish to pay by bank transfer, please consult the Congress registration site for more details **before** you start the registration process.

TIME ZONES

Hosting and attending an online international Congress can be a challenge, so PIARC and the Canadian Organizing Committee are planning a schedule that is as flexible as possible. For Calgary 2022, all live online sessions, including a Question and Answer (Q&A) period, will be offered in Mountain Standard Time, which is Calgary's time zone. Some sessions will be held in the early morning of Calgary

to make them accessible to Africa and Europe, and some sessions will be held in the afternoon of Calgary to make them accessible to Oceania and East Asia. All sessions will be available on the Congress platform on demand, 24 hours a day. You can manage your personal Congress schedule in your own time zone!



CALGARY

9:00
12:00
18:00



MEXICO CITY

10:00
13:00
19:00



OTTAWA

11:00
14:00
20:00



PARIS

17:00
20:00
02:00



BEIJING

24:00
03:00
09:00



TOKYO

01:00
04:00
10:00



SYDNEY

03:00
06:00
12:00

REGISTRATION AND PAYMENT

Registration for the Congress is now open! Full registration information can be found on our Congress platform where the Congress is being hosted.

The following registration fees apply for the Congress:

	CAD*	EURO**	USD**
PIARC Members			
EARLY BIRD: October	\$600 + GST	€ 408	\$498
REGULAR: November–December	\$700 + GST	€ 476	\$581
LATE: January–February	\$800 + GST	€ 544	\$664
Non-PIARC Members			
EARLY BIRD: October	\$700 + GST	€ 476	\$581
REGULAR: November–December	\$800 + GST	€ 544	\$664
LATE: January–February	\$900 + GST	€ 612	\$747

* Canada will be accepting payment for the Congress in Canadian dollars exclusively, subject to 5% Goods and Services Tax (GST). The fee comparison is based on the exchange rate in June, 2021. The actual cost at time of registration could vary according to fluctuations in international currency rates.

** Prices in Euro and USD are for comparison only.

KEY DATES



Registration opens	Now Open!
Exhibition/Partnership Program opens	October 2021
Early bird registration deadline	October 31, 2021
Authors notified of accepted papers	November 1, 2021
PIARC Prize winners notified	December 31, 2021
Regular registration deadline	December 31, 2021
Deadline to pay registration by bank transfer	January 28, 2022
Late registration deadline	February 4, 2022
XVI World Winter Service and Road Resilience Congress — virtual	February 7–11, 2022

CONTACT US

Congress Website: www.piarc-calgary2022.org

Email: info@piarc-calgary2022.org



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Photo: Snow plow truck on snowy road
Credit: Shutterstock

