

TECHNICAL COMMITTEE 3.2 – WINTER SERVICE

3.2.1. Integration of the new technologies in winter services

Strategies / Objectives

- 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 equipments for winter service in the future.
- Encourage coordination with other TCs and TFs, such as *T.C.3.3 – Asset Management*.

Fighting snow and ice on roads with de-icing chemicals is a major task in winter maintenance. On the main road network usually sodium chloride is used. Various studies and practical experience have proven the high efficiency of sodium chloride treatments on traffic safety and national economy. The application methods have been enhanced worldwide in the past few years. Pre-wetted salting and application of only brine are more and more established on roads and also bicycle lanes.

However, researches point out that even with pre-wetted salt at 30 percent brine quotient, the potential of salt savings with pre-wetted technology is not fully tapped. Thus, new spreaders have been developed, allowing higher brine share and/or application of only brine via spray nozzles.

In the last PIARC cycle Technical Committee B.2 - Winter Service conducted a survey of winter maintenance in the countries represented in PIARC. Scopes were winter maintenance standards, type of de-icing chemical and application method. Besides current development and research projects have been compiled.

Matters of particular interest were the development of spreading techniques in different countries, especially the application method of pre-wetted salt and brine. The current status and different ways of development were analyzed comparative. Best practices and special developments of selected countries will be presented. The report also discusses open questions such as the limit of brine at low temperatures and gives an outlook on future developments.

Around the world, scientific projects and practical approaches concerning de-icing agents and application are conducted. Among the different projects, two main findings have been made independently. Brine, either in form of pre-wetted salting or brine application has been a success. Especially for preventive treatments, brine convinced practical users. The survey of application methods showed that brine is used more and more in the last years all over the world, especially for preventive actions.

The tendency to more brine usage will be going on the next years and should be followed in a PIARC report. Literature in form of research reports and experience of new technologies in operational winter maintenance could build the basis for such a report. The infrastructure needed with the increased use of brine should also be covered in the report.

Apart from spreading techniques there has been development in mobile sensors for winter maintenance application. Such sensors have been developed to measure information's critical for winter maintenance such as temperatures, road state and water/ice film thicknesses.

With accurate measurements from a sensor network it would also be possible to give this information to road users. This can happen either using web interfaces where potential routes to the road user's destination could be checked out before departure. Other ways to communicate this information will be social media or apps for smartphones. If the users are already on the roads, they could be informed using digital road signs or comparable.

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.

Outputs	Expected Deadlines
• Literature review	• November 2021
• Full report	• March 2023

### 3.2.2. Winter maintenance in urban areas

#### Strategies / Objectives

- Make a precise description of the organization of winter service in urban areas.
- Response to extreme climate events, information provision, traffic restrictions, etc
- Propose a Best Practices Guide with different methods used for several winter maintenance operations.
- Encourage coordination with other TCs and TFs, such as *T.C. 2.1 – Mobility in Urban Areas*.

In 2014, 54% of the world's population lives in cities. If we take the example of European territory the inhabitants live 80% in a city of more than 100 000 inhabitants, 30% of the population living in a city of more than one million inhabitants. In Japan, 92% of the population lives in urban areas. The vast majority of travels start and end in cities, if they even leave an urban area. This means that road authorities in cities have to provide a good winter maintenance in order to keep the city working. Much of the winter maintenance research tends to lend itself to roads that are of higher volume traffic, and/or non-urban in nature. The intent of this topic is to focus on delivery of urban road winter service, and documentation of successful examples of that.

Compared to rural roads or highways winter maintenance in cities is different in many ways. The different modes of transportation, the lack of space for snow, often very narrow roads and one-way streets make planning winter maintenance very complex.

Many different responsible organizations (Cities, residents, public transport companies...) lead to different service intervals and times on roads next to each other or on different parts of the road (sidewalk, bikeway, bus lane, street).

A specialty of cities are pedestrian areas with a huge amount of walking and shopping persons where winter maintenance is a challenge during times of high pedestrian volume. Thus, it is necessary to finish the winter maintenance during the night to have clean and ice-free pedestrian areas during the day.

Another challenge is the lack of space for snow to be stored temporarily in urban areas. To get the snow out of public traffic areas it has to be dispatched. Some cities have restrictions for storing/dumping contaminated snow that must be removed and transported out of the city centers. Even if there are larger areas where one could store snow, these often are occupied by urban furniture and equipment. It is also of interest what smaller cities do, they have often different problems.

Due to the large percentage of sealed surfaces, compacted soil as well as other environment factors trees and other plants face more troubles compared to the natural soil next to rural roads. Therefore, it is even more important so use as little spreading material as possible in urban winter maintenance.

The plurality of the mode of transport and multimodality is big (Cars, bicycles, buses, scooter, skateboard, tramway, metro, cable transport by air, ferries...) and will be even bigger in the future due to the Political will to reduce the use of cars. A coordination with *T.C. 2.1 – Mobility in Urban Areas* should be established.

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.

Documentation of successful urban agencies and how they deal with these challenges would be beneficial to all cities and urban areas confronted with winter weather. Due to the fact that basic conditions vary a lot between cities there might not be a "best practice". A report collecting different approaches however will be a very good guide to find different methods.

The report will be based on a questioner that will cover the questions and problems like the following:

- Strategy to deal with the dense road network with large variations in traffic volume
- Optimization and minimization of the routes for maintenance vehicles.
- Treatment methods and vehicles for winter on bicycle lanes

- How to create a continuous bicycle lane network with different types of infrastructure?
- Sidewalk and pedestrian areas, accessibility (for those with reduced mobility), tactile paving.
- Equipment and layout of urban areas, what to do with the snow, remove or thaw?
- Best practices for tramways, buses and other public transportation, including the tracks and access to stations.
- Solutions to ploughing different surfaces without disadvantaging any transport mode

A particularly attractive session at the XV International Winter Road Congress in Gdansk with twelve papers were presented around 10 % of the communications was on the topic winter maintenance in urban areas. The interest is very high and a report with different strategies would be of good use for people looking for solutions in urban winter maintenance and will strengthen the urban session at the winter road congress.

In this Cycle, a full report and best practices Guide based on the collection of case studies is expected to be completed.

Outputs	Expected Deadlines
<ul style="list-style-type: none"> <li>• Collection of case studies</li> </ul>	<ul style="list-style-type: none"> <li>• June 2022</li> </ul>
<ul style="list-style-type: none"> <li>• Full report and best practices Guide</li> </ul>	<ul style="list-style-type: none"> <li>• March 2023</li> </ul>

### 3.2.3. Implications of connected and automated vehicles on winter services

#### Strategies / Objectives

- Identify, investigate and document implications of connected and automated vehicles on winter service.
- Encourage coordination with other TCs and TFs, such as *T.F. 2.1 – New mobility and its impact on Road Infrastructure and Transport* and *T.F. B.2 – Automated vehicles – challenges and opportunities for road operators and authorities*.

“What are we talking about when we talk about autonomous vehicles and winter service equipment and where are the problems?”. The idea is to know the development of technologies in the field of winter service as well as automated vehicles.

On one hand we need to know how the use of automated vehicles impact on winter service, since they could rely heavily on road markings or other types of sensors.

On the other hand the item could be how to manage traffic in wintery conditions using sensors. Mobile sensors for winter maintenance application have been developed to measure information’s critical for winter maintenance such as temperatures, road state and water/ice film thicknesses. How can we use this information for automated spreading and how can you get it to the road users?

By last, another item would be the communication in order to manage data for better winter service. At the XV International Winter Road Congress in Gdansk 2018 there have been some presentations about the developments in Vehicle to Vehicle and Vehicle to Infrastructure communication to help winter maintenance with better forecasts and real-time information. The data may include typical weather observations such as air and road temperature or relative humidity, but may also include vehicle-specific relevant data like wiper blade speed and Anti-lock Braking System (ABS) status.

A briefing note that encompasses knowledge from sharing experiences between experts from the field of winter maintenance and automated vehicles would be a good contribution.

This issue could be also an item for the XVI World Winter Service and Road Resilience Congress in Calgary.

Outputs	Expected Deadlines
<ul style="list-style-type: none"> <li>• Briefing note</li> </ul>	<ul style="list-style-type: none"> <li>• August 2022.</li> </ul>

### 3.2.4. Update of the Snow and Ice Data Book

#### Strategies / Objectives

- To update the Snow and Ice Data Book with the case studies and main findings.
- To establish the Snow and Ice Data Book as a current resource for knowledge transfer globally.
- Set up the methodology to update the SIDB.
- Study the possibility of developing an online manual or similar.

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.

Due to the long update cycles it takes some time for new information to be found in the SIDB, thus the possibility of an online manual which could be updated more easily should be checked out. This also means the inclusion of an interactive format to facilitate use by members of PIARC.

The Snow and Ice Data Book will be updated during this cycle. In addition, a Workshop on the possibility of producing an online manual or similar will be carried out.

Outputs	Expected Deadlines
<ul style="list-style-type: none"> <li>• Update of the Snow and Ice Data Book</li> </ul>	<ul style="list-style-type: none"> <li>• December 2021</li> <li>• June 2023</li> </ul>
<ul style="list-style-type: none"> <li>• Workshop on the possibility of producing an online manual or similar</li> </ul>	<ul style="list-style-type: none"> <li>• October 2021</li> </ul>

### 3.2.5. Preparation of the 2022 World Winter Service and Road Resilience Congress (8th to 12th February 2022)

#### Strategies / Objectives

- Prepare the technical program for the Congress including:
  - Summary of the specific road safety issues related to winter service
  - Identification of the following steps for future works
  - Definition of additional topics to be proposed in order to be presented as individual speeches
  - Evaluation of abstracts and full individual speeches
  - Taking into consideration possible contributions from other Technical Committees
- Possible collaboration in Foresight Sessions.
- Possible collaboration in workshops.
- Contribution to the Proceedings

The 2022 World Winter Service and Road Resilience 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. This T.C. is expected to prepare a call for the Technical Sessions. In addition, it would be appreciated to collaborate in Foresight Session and/or Workshops, as well as contribute to the Proceedings.

Outputs	Expected Deadlines
<ul style="list-style-type: none"> <li>• Technical Session</li> </ul>	<ul style="list-style-type: none"> <li>• IWRC 2022</li> </ul>
<ul style="list-style-type: none"> <li>• Possible collaboration in Foresight Session and/or Workshops</li> </ul>	<ul style="list-style-type: none"> <li>• IWRC 2022</li> </ul>
<ul style="list-style-type: none"> <li>• Contribution to the Proceedings</li> </ul>	<ul style="list-style-type: none"> <li>• May 2022</li> </ul>