TECHNICAL COMMITTEE 4.1 – PAVEMENTS

4.1.1. Use of Recycled Materials in Pavements

Strategies / Objectives
• General description of state of the art of the existing technologies and new technologies for recycling pavements. • Evaluate the use of these techniques in the world, separating by type of road, traffic flow, type of pavement, type of recycling, etc. taking into account the regulations and whether or not there are incentives. • Identify successful pavement recycling projects. • Encourage coordination with other TCs and TFs, such as *T.C. 3.3 - Asset management* and *T.F. 4.1 – Road Design Standards.*

The issue of recycling road pavements has been addressed in earlier cycles. In 2003 PIARC published a report from TC C7/8 on "Pavement Recycling". This report contains guidelines for in-place recycling with cement, emulsion or foamed bitumen and hot mix recycling in a plant. During the 2012-2015 cycle there was another objective on "Recycling and Reuse of Materials for Pavements". However, the report was never finalized and hence not published.

The first part of task *4.1.1* can built on these earlier reports to give a state of the art of existing technologies and to update with new technologies that have emerged during the last decade. In this Literature Review both in-place and in-plant techniques should be addressed, as well as the use of hydraulic (cement and other) or bituminous binders. The recycled materials can be bituminous bound materials, cement concrete, bound and unbound base layers, etc. The purpose is to as comprehensive as possible.

The second output is a Collection of Case Studies. This report should contain a collection of successful implementations from around the world from the techniques discussed in the Literature Review. These case studies can also be non-technical, e.g. how recycling is introduced in a certain country, how to deal with environmental aspects such as the recycling of dangerous substances (tar, asbestos, ...).

A Briefing Note could summarize the main findings.

Outputs	Expected Deadlines
• Literature review	• December 2020
• Collection of case studies	• June 2021
• Briefing note	• September 2021

4.1.2. Innovative pavement maintenance and repair strategies

Strategies / Objectives
• Identify innovative pavement maintenance and repair strategies of pavements in motorways, urban roads and rural roads. • Pay attention to innovative mechanization or even robotics. • Encourage coordination with other TCs and TFs, such as *T.C.2.2 – Accessibility and Mobility in Rural Areas* and *T.C.3.3 –Asset Management.*

The purpose of this task is to publish a Collection of Case Studies regarding innovative maintenance.

The different pavement "families" should be addressed - asphalt, concrete, ... - as well as different road types. *T.C. 2.2* has the task to provide "technical solutions for unpaved roads", which also covers maintenance, so unpaved roads are out of scope for *T.C 4.1*, although a collaboration between the two committees will be carried out however.

Innovation can be on the technical level, such as the use of special/new materials or the use of special techniques. But innovation can also be on the organizational level to answers questions on how to do maintenance on motorways with limited interruption of traffic or in urban areas to reduce hindrance to residents.

Several research programmes (e.g. by CEDR in Europe, Infravation projects, ...) deal with innovative materials to do maintenance/repair, which could be input for this task.

Therefore, a Collection of case studies that let know best practices would be a good approach to this issue. The main findings would be included in a Briefing note.

Outputs	Expected Deadlines
• Collection of case studies	• June 2022
• Briefing note	• September 2022

4.1.3. Road monitoring and management based on Big Data and Data Analytics

Strategies / Objectives
• Investigate the use of Big Data for monitoring the condition of roads. • Encourage coordination with other TCs and TFs, such as *TC 3.3 – Asset Management.*

In the last two cycles, two reports on Road Monitoring have been published. The first report (published in 2015) dealt mainly with traditional road monitoring techniques, the second report discusses also technologies in the development and experimental stages. Both reports have (short) chapters on the use of smartphone data and CAN-bus data.

The purpose of Issue *4.1.3* is to give a more comprehensive Literature Review on the use of Big Data in the field of road monitoring and should deal with how data is collected and analyzed, the data quality, what distresses can be measured, etc. The main findings would be included in a Briefing note.

The result of this task could be an input to update the PIARC Asset Management Manual, which is maintained by *T.C 3.3*.

Outputs	Expected Deadlines
• Literature review	• December 2021
• Briefing note	• March 2022

4.1.4. Measures for improving resilience of pavements

Strategies / Objectives
• Identify materials and construction and maintenance techniques for enhancing resilience of pavements. • Encourage coordination with other TCs and TFs, such as *T.C.1.4 – Climate Change and Resilience of Road Network T.C. 3.2. Winter Service, T.C.4.3 – Earthworks* and *T.F.4.1 Road Design Standards.*

This is the main task of the TC which covers the whole strategic theme "Resilient Infrastructure".

T.C E.1 – Adaptation Strategies / Resiliency (SP 2016 2019) of the former cycle has done already some preliminary work on the subject of resilience. They defined resilience as *"the ability to repel, prepare for, take into account, absorb, recover from and adapt ever more successfully to actual or potential adverse events, i.e. catastrophes or processes of change with catastrophic outcome which can have human, technical or natural causes"*. *T.C 1.4* continues this work with a holistic approach to resilience, its PIARC Climate Change Adaptation Framework is also input for this task.

The first part of the Full Report should analyse how this definition of resilience translates to pavements and can cover "adverse events" such as

- climate change and extreme weather conditions
- natural and man-made disasters
- increased traffic or higher axle loads
- ...

A second part should identify how to deal with these threats to enhance the resilience of a pavement. This can be done via

- the choice of materials
- road design, cfr. T.C 4.1
- construction and/or maintenance techniques
- ...

This second part could take the form of a collection of case studies.

Outputs	Expected Deadlines
• Collection of case studies	• June 2022
• Ful report	• December 2022

4.1.5. Carbon footprint

Strategies / Objectives
• Make the PIARC community aware of the existence of the report "Reducing the life Cycle Carbon Footprint of Pavements (2019R33).

Environmental consciousness is on the rise and many owners and operators of road infrastructure are looking for solutions to make their practices and policies greener or more sustainable. The purpose of this topic is to collect and analyze tools as well as practice ready solutions with regard to the CO2 indicators for road pavements over its entire service life.

Outputs	Expected Deadlines
• High impact summary	• March 2021

4.1.6. 9th Symposium on Pavements Surface Characteristics (SURF 2022)

Strategies / Objectives
• Organize in conjunction with a PIARC National Committee and the Secretariat General the 9th Symposium on Pavements Surface Characteristics SURF 2022. • Prepare the technical program for the Symposium.

Every four years the Symposium on Pavements Surface Characteristics, SURF for short, is organised. The former SURF symposiums were organised in:

- 1988: Pennsylvania, USA
- 1992: Berlin, Germany
- 1996: Christchurch, New-Zealand
- 2000: Nantes, France
- 2004: Toronto, Canada
- 2008: Portoroz, Slovenia
- 2012: Norfolk, USA
- 2018: Brisbane, Australia

Traditionally, a road research institute takes the lead in organizing the symposium. Some members of the TC will be part of the scientific committee. All members will be involved in the review process of abstracts and/or papers.

Outputs	Expected Deadlines
• Symposium	• Up to September 2022.