



Conférence Européenne
des Directeurs des Routes
Conference of European
Directors of Roads

CEDR TRANSNATIONAL ROAD RESEARCH PROGRAMME

Call 2014

Asset Management and Maintenance

CEDR Transnational Road Research Programme

funded by

Belgium-Flanders, Finland, Germany, Ireland, Norway, the
Netherlands, Sweden, United Kingdom and Austria

Description of Research Needs (DoRN)

December 2014

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1 General introduction

This Call for Proposals is launched by the Conference of European Directors of Roads (CEDR). CEDR is an organisation which brings together the road directors of 25 European countries. The aim of CEDR is to contribute to the development of road engineering as part of an integrated transport system under the social, economical and environmental aspects of sustainability and to promote co-operation between the National Road Administrations. The website www.cedr.fr contains a full description of its structure and activities.

CEDR recognises the importance of research in the development of sustainable transport and has established a Technical Group (TG) to monitor European research activities and to advise the CEDR Board on issues relating to research. TG Research responsibilities include dissemination of research results as well as initiating research programmes that support CEDR members in current and future situations.

This Transnational Research Programme follows on from previous programmes organised under the ERA-NET ROAD brand. “ERA-NET ROAD – Coordination and implementation of Road Research in Europe” was a Coordination and Support Action funded by the 7th Framework Programme of the European Commission which concluded in December 2011. The goal of ERA-NET ROAD (ENR) was to develop a platform for international cooperation and collaboration in research areas of common interest. This included the production of an “ENR-toolkit” for carrying out transnational research and trials of the various procedures developed through a series of projects and programmes funded directly by European Road Administrations. Full details of the research projects commissioned through this process can also be viewed at the ENR website www.eranetroad.org.

The Governing Board of CEDR (CEDR GB) recognised in June 2010 that ERA-NET ROAD was delivering significant value for money as it structured the way CEDR members identify commonalities, reduce duplication of research and plan for transnational calls if needed. CEDR gave a mandate to its Technical Group Research (TG Research) to identify opportunities for further transnational road research programmes on the basis of the excellent start and of the experience gained during the ERA-NET ROAD project. CEDR also requested that:

- TGR only proposes suitable research topics and identifies good research proposals;
- TGR presents research proposals, when appropriate, to CEDR GB for decision; CEDR GB will decide what programmes are taken forward;
- all call procedures shall be open and transparent and all EU members shall be invited to participate, with no advantages given to preferred suppliers or groups of suppliers; and
- the costs of developing and managing the transnational calls shall be supported only by those CEDR members taking part in the programme.

2 Introduction to Call 2014

This Transnational Research Programme was developed initially within the framework of ENR and was then taken forward by TG Research to fulfil the common interests of the National Road Administration (NRA) members of CEDR.

The participating NRAs in this Call are Belgium-Flanders, Finland, Germany, Ireland, Norway, the Netherlands, Sweden, United Kingdom and Austria. As in previous collaborative research programmes, the participating members will establish a Programme Executive Board (PEB) made up of experts in the topics to be covered. The Common Obligation Programme Model from the “ENR-toolkit” has been adopted, with some modifications to take account of the role of TG Research in the process. The research budget will be jointly provided by the NRAs who provide participants to the PEB as listed above. PEB members will designate one of them to act as chair.

TG research has, on behalf of CEDR, appointed a Programme Manager (ProgM) to take over the administration of this Call for Proposals. For this programme, the ProgM will be the FFG, Austria. Responsibilities of the ProgM include preparation of the Call for Proposals, financial management of the programme and setting up and managing the contracts with the research providers. These responsibilities will be conducted by the ProgM in its country under its law and regulations under the direction of TG Research. The terms under which the ProgM and PEB will operate will be set out in a Collaboration Agreement, signed by senior representatives of each participating NRA.

Applications are invited from suitable qualified consortia in response to this Call for Proposals. Consortia must consist of at least two legal entities from different EU countries. Individuals and organisations involved in the formulation of the Call specification are prohibited from any involvement in proposals. Applications should focus on the sharing of national research, knowledge and experience at all levels as an important prerequisite for achieving the goals of CEDR and its members. This will accelerate the development of faster and durable methods and techniques for road maintenance and management. It is particularly important that the results can be easily implemented through various demonstration projects in order to contextualise **the benefits of the transnational collaboration**. The applications will be evaluated by the PEB in relation to:

- Extent to which the proposal meets the requirement of the DoRN
- Technical quality of proposal
- Track record of consortium members
- Management of project
- Value for money.

Details of these evaluation criteria and how they will be interpreted and applied by the PEB are presented in the Guide for Applicants (GfA) which accompanies this Call for Proposals.

3 Aim of the Call

The aim of this research programme is to do research on Asset Management and Maintenance. The expected research builds on the outcome of earlier calls, in particular “Effective Asset Management meeting Future Challenges” (ENR call 2010).

The call has two sub-themes, with three respectively two research projects:

I: Road Asset Management

- A) Road equipment asset management
- B) Why and how to implement ISO 55000
- C) Social benefits and costs

II: Road Maintenance

- D) Use of standard travelling tests to predict pavement durability
- E) Recommendations for maintenance procurement by investigating current practices

4 Reasons for the Transnational Research Programme

The main reason for this Transnational Research Programme is to gain better knowledge and guidance of how to manage and maintain all assets of a road network (main waterways are not considered).

This Call for Proposals has the following objectives and expected outputs:

A: Road equipment asset management

An asset management system usually consists of three types of assets: pavements, structures (bridges and tunnels) and road equipment. While the knowledge on how to deal with pavements and structures is reasonably well established, there's still a lack of knowledge on how to manage these other road assets.

For each road asset, the most efficient maintenance strategy should be determined. This can be preventive, depreciation based, condition driven or based on a risk analysis linked to a level of performance.

In general, the elements needed to manage a road asset are:

- inventory and attributes of the asset: which minimal set of properties of the asset is needed to manage the asset ? this can include geometrical properties, age of the asset, period of availability of spare parts, type of the asset, etc.
- data collection methods to determine the condition of the asset: the methods should be carried out in an efficient way and should be feasible on a network level
- evaluation of the condition of the asset: recommendations on how to translate the condition into dimensionless indicators (e.g. according to the method of the COST 354 action), possible thresholds, etc.
- management of the asset: description of possible maintenance strategies

It's possible that not all of these elements are needed to manage certain road equipment assets.

The road equipment assets to be considered are (in no particular order):

- road markings
- road signs
- vehicle restraining systems (safety barriers)
- noise barriers
- electro-technical and electro-mechanical equipment (roadside technology incl. tunnel equipment)

The **outcome** of the research should consist of:

- a comprehensive guide on how to manage road equipment assets, meaning that all the elements mentioned above should be addressed
- the guide can deal with one or more of the five mentioned assets
- the guide shall describe a methodology on how to use the knowledge about selected equipment in road management
- the guide can describe current practice but should be focussed on new knowledge

B: Why and how to implement ISO 55000

The ISO 55000 series on Asset Management is a general international standard for optimized management of (physical) assets, which has been adopted in different sectors. The goal of this research objective is to collect existing case studies from different network managers (e.g. railway, gas distribution companies, ...) and early adopters from certain road authorities, and give recommendations on what can be learnt from these studies. The research should provide clear recommendations as to why asset management should be adopted by roads authorities and also advice on as why and an how to apply them to road asset management.

The **outcome** of the research should consist of:

- a collection of case studies of sectors who have successfully implemented the ISO 55000 series
- lessons to be learnt from these case studies, applied to road asset management and key factors for success
- a guide for implementation for road management
- benefits and costs of implementing an AMS

C: Social benefits and costs

One key element of asset management is the life cycle cost analysis of different maintenance strategies. While it's common to calculate the cost and technical benefit of the construction and maintenance actions, social costs and benefits are not often determined. Different models exist (e.g. road user models), but can give a wide spread of results.

The goal of this research objective is to describe good practices of existing models to be used in network level assessment or, when these are not available, to develop new models. Focus should be on the effect that the model has on the user, taking into account risk analysis methods. The research should focus on:

- (new) road user models
 - environmental benefits and costs (noise, pollution, ...)
 - traffic (travel time, availability, ...)
- effects of backlog for management (road administrations) and society
- viewed from the maintenance point of view

A key issue to be addressed is that the data needed to run the model should be easily available or it should be possible to collect the data at a reasonable cost.

The **outcome** of the research could consist of:

- evaluation of good practices of existing models (e.g. HEROAD, ASCAM, EVITA, ...) and recommendations for future developments
- development of new effect models to assess social benefits and costs based on the quality/condition of the infrastructure
- effects that backlog cause in the society and how to deal with them

D: Use of standard ravelling tests to predict pavement durability

Working group 1 of CEN TC 227 has published four test methods to test the ravelling resistance of asphalt mixtures in the laboratory as described in CEN/TS 12697-50 (Resistance to scuffing):

- the ARTe (the Aachener Ravelling Tester);
- the DSD (the Darmstadt Scuffing Device);
- the RSAT (the Rotating Surface Abrasion Test);
- the Triboroute

Research is needed to determine which test method corresponds best with in situ behaviour and to arrive, ideally, to one harmonised test standard. Sample preparation (e.g. aging) could be included in the research. A liaison with relevant representatives of TC 227 / WG 1 should be established during the whole research project.

The **outcome** of the research should consist of:

- trueness analysis of the four test methods, i.e. how good do the test methods discriminate between good and poor ravelling resistant asphalt layers
- compare the results of laboratory mixtures and samples (cores) taken on sites in different countries
- calibration of the laboratory tests versus in situ performance
- a proposal to CEN TC 227 / WG 1 based on the results of the research

E: Recommendations for maintenance procurement by investigating current practices

There is a large turnover of personnel in the road maintenance sector, both on the NRA side and with the providers. During the last years a lot of experienced people have retired, and it has also been difficult to keep younger people for a longer period. This has caused a loss of important competence.

The change in regime from mainly in-house execution of works to procurement of services from consultants and contractors has changed the framework of road maintenance and therefore also a need for new knowledge and a competence profile.

The goal for this research objective will be to look into how different NRA's have solved these challenges. Different countries are in different stages of this development, and it may also be of interest to study countries outside of EU such as Australia.

The **outcome** of the research could consist of:

- identify how different countries modernised
- procurement and how this effects efficiency
- set out recommendations on how to share or not share risks
- benchmarking of success factors (including an advise on good strategies in order to prevent efficiency loss)

5 Overview of current and previous activities

A general overview of current and existing relevant research projects undertaken across Europe and other sources of information are outlined in Appendix A. These resources and subsequent reports will provide the starting point for proposals submitted in response to this Call and proposals will be evaluated on this basis. **Applicants must not duplicate existing results or ongoing projects.** Proposals should be based on the outcomes and state-of-the-art identified in these projects listed below. Failure to take account of available research conclusions will disqualify proposals from this call.

6 Additional information

The aim of this Transnational Research Programme is to provide applied research services for the benefit of National Road Administrations in Europe. The Call is open to legal entities established in Europe. Applications using the templates provided must be submitted by a coordinator of a consortium of at least two independent organisations from different countries. A maximum 75% of the workload can be assigned to one partner.

The duration of this programme is 36 months from November to October 2017. The target dates within this programme are:

Call opens:	17. December 2014
Call closes:	18. March 2015 at 12:00 (CET) sharp
Evaluation:	March/April 2015
Selection:	End of April 2015
Project commencement:	June 2015

The duration for individual projects can be up to 24 months within the programme timescale.

The programme language is English: only proposals submitted exclusively in English are acceptable.

The target budget provided by the participating National Road Administrations for this programme is EUR 1,9 million.

Submissions received after the deadline will not be considered.

Please refer to the Guide for Applicants (GfA) for full details of how to submit proposals in response to this Call.

Appendix A: Existing projects and resources

Europe wide

Projects of earlier ENR and CEDR calls, in particular

- Effective Asset Management meeting Future Challenges (call 2010)
- Rapid and Durable Maintenance Methods and Techniques (call 2011)
- Sustainability and Energy Efficient Management of Roads (call 2011)
- Integrating strategic noise management into the operation and maintenance of national road networks (call 2012)
- Ageing Infrastructure Management (call 2013)

Test methods for condition of road markings, noise barriers, ...

CEN/TS 12697-50: Resistance to scuffing

Studies regarding “Resistance to scuffing”

- J. Groenendijk, Dutch Highways Agency experience with the Rotating Surface Abrasion Test for characterising ravelling susceptibility of asphalt mixes, Rijkswaterstaat Centre for Traffic and Navigation. Delft, The Netherlands, Date November 21, 2012
- BRRC evaluation of Arte

ISO standard on Asset management:

- ISO 55000: Overview, principles and terminology
- ISO 55001: Management systems - Requirements
- ISO 55002: Management systems - Guidelines for the application of ISO 55001

PIARC TC 4.1 "Management of Road Assets"

HDM-4 models

COST 354: Performance indicators for road pavements

National programmes

Rijkswaterstaat backlog model