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ROAD SAFETY IN TUNNELS: THE ECOROADS PROJECT – APPROACH AND RESULTS

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Abstract

The EU-funded project entitled "Effective and Coordinated Road Infrastructure Safety Operations" (ECOROADS) aims to overcome the barrier emerging from the formal interpretation of the Road Safety and Tunnels Safety Directives that practically do not allow Road Safety Audits and Inspections (RSA/RSI) to be performed in uniform way along both open roads and in tunnels. The project experimented on an integrated approach for road and tunnel safety management, on the basis of the existing legislative framework, the experience of road and tunnel experts and international best practices. This common approach was tested at five road tunnels (test sites) in Central and Southeast Europe, where joint safety operations (field tests) were performed by international teams of tunnel and road experts.

Keywords*: Road Safety, Tunnel Safety, South East Europe, ECOROADS project.*

1 INTRODUCTION

1.1 Legal context

Road Safety operations (audits during project design, at pre-opening or at early operation phase and inspections during full operation), according to the prescriptions of the Road Infrastructure Safety Management Directive 2008/96/EC [1], could be beneficial for accidents risk prevention in tunnels. However, this Directive does not find application in tunnels;safety in tunnels is the subject of a specific Directive, 2004/54/EC [2],which though is mainly focused on safety and risk management in cases of hazardous incidents (e.g. fire, collisions).
Consequently, the literal application of the two Directives results in a non-uniform approach for infrastructure safety management, outside and inside tunnels.

1.2 ECOROADS concept and content

The ECOROADS concept has been based on the aforementioned gap that emerges from the formal interpretation of the two infrastructure safety directives, with the overall objective to experiment in combining the road and tunnels safety procedures in one integrated approach, based on best practices and experiences regarding road safety and infrastructure management and based on a commonly agreed methodology and procedure on joint road safety operations, as defined and tested by the project.
More specifically, the project comprised workshops with stakeholders (tunnel and road managers), exchanges of best practices and experiences between tunnel experts and road safety professionals, field tests at five European road sections that feature both open roads and tunnels, and formulation of recommendations for the extension of the application of the RSA/RSI concept in tunnels.
The 1st project Workshop with stakeholders was organized in September 2015 and a seminar for exchange of best practices between road and tunnel experts followed in November 2015. On the basis of the outcomes of these events, the analysis of the relevant Directives and the review of available literature and results of relevant national and international projects, the Common Procedures for the organization, performance, monitoring and evaluation of the field tests were elaborated in early 2016 [3].
Then, the first two field tests were performed, in March and April 2016, and based on the experts' feedback and the evaluation made during the 2nd project Workshop with stakeholders held in June 2016, the Common Procedures were fine-tuned [4] and re-tested through three more field tests organized during the period August – October 2016. The 3rd, and last Workshop with stakeholders foreseen by the project, took place in February 2017, providing a platform for discussion,among experts and Infrastructure Managers, of the drafted project recommendations for joint road and tunnel safety operations, which should be finalized and delivered by the end of the project, in May 2017.

1.3 Scope of the paper

The subject of the paper is the ECOROADS project approach and results. Specifically, it comprises the presentation of:
- the Common Procedures, tools and methods, which have been defined for the organization and performance of joint road safety operations;
- the outcomes and feedback received from all the field tests; and
- the experience gained towards the formulation of the project recommendations for joint road and tunnel safety operations.

2 COMMON PROCEDURES FOR THE JOINT ROAD SAFETY OPERATIONS

The ECOROADS Common Procedures concern the organization and performance of the field tests and the reporting and evaluation process, including the roles and responsibilities of visiting teams, the tools and methods to be used, the road/ tunnel safety elements to be assessed, etc. [5].

2.1 Definition of the scope of the joint operations – The test sites

The specialization of the concept of the project, with explicit definition of the five test sites and the principles for the segmentation of the infrastructure subjected to the joint road safety operations, was discussed in detail between the partnership at early stage of the project and with the stakeholders that participated at the first project Workshop.
It was decided that the joint operations should be performed at a) the adjacent (to the tunnel) open roads, b) the tunnel transition areas (on both sides and bi-directionally) and c) the tunnel interior, as presented in **Figure 1**.

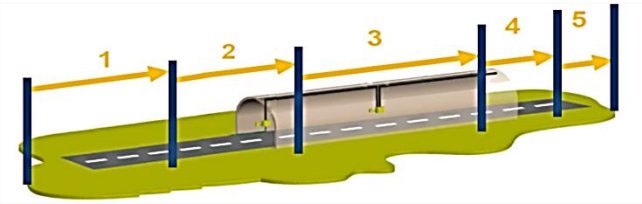

Fig. 1 *Segmentation of infrastructure of the ECOROADS field tests [3]*

Open road sections: its length at each site had to be defined, taking into account the influence of the tunnel before and after its transition areas and based on the local conditions and particularities, after receiving information from the Infrastructure Managers and local experts, and taking into account the distance of warning of road users about the existence/ approach to the tunnel (vertical signage and road marking) and the presence of adjacent interchanges, entry/ exit ramps, weaving maneuvers, etc.
Transition Areas: The lengthof the transition area, consisted of parts of both an open road and a tunnel, was defined at least as the sum of:
- the calculated distance covered in 10 seconds by a vehicle travelling at the speed limit before the tunnel portal; and
- the stopping distance after the tunnel portal, for a vehicle travelling at speed limit, if not identical with design speed.

This minimum rule would obviously applyand on the opposite direction and also - maybe slightly modified due to reduced speed within the tunnel - at the exit of the tunnel on the same direction.
Tunnel Interior: The remaining part of the tunnel infrastructure between its transition areas.
All five ECOROADS test sites, whichwere selected among several candidaturesthrough a multi-criteria ranking procedure, are located along sections of the Trans-European Transport Network and its extension in the Western Balkans region.Their basic features are presented below:
- Kennedytunnel, Antwerp – Belgium: 690m long tunnel under Schelde River, which consists of two unidirectional tubes with three lanes each for car traffic (plus 1 tube for train traffic and 1 for pedestrians and cyclists).
- Krrabe tunnel, Tirana - Elbasan highway – Albania: Twin tube tunnel (2.23 and 2.5km long) with two lanes each, but with only the one tube open for traffic. The open road section on the one side of the tunnel is a motorway, while motorway construction works are unfinished on the other side.
- Rennsteig Tunnel – Germany: 19.6km motorway (two traffic lanes per direction) with four consecutive tunnels with total length of 12.6km included. The selected test site concerned 10.3km, including the longest tunnel (7.9km).
- Belgrade bypass Strazevica tunnel – Serbia: 745m long tunnel, with one lane per direction, along the Belgrade bypass, which in the future will be constructed with full motorway characteristics (two unidirectional tunnel tubes).
- Demir Kapija tunnel, Corridor X – Former Yugoslav Republic of Macedonia: 554m long tunnel, with one lane per direction. Open road section on the one side of the tunnel is partly a 4-lane motorway (apart from 650m before the tunnel entrance) and one lane per direction on the other side (motorway construction works are on-going on a different alignment).

2.2 Organization, planning and methodological tools

The organization and planning, as well as the methods and tools to be used during the joint operations, were defined according to the particularities and needs of the project and based on international and national best practices and recommendations.
First of all, as simulation of RSI procedures, the joint road safety operations ought to be carried out independently (from the Infrastructure Managers) by an international Core Team consisted of road and tunnel safety experts. Specifically, this team had to be formed by at least three, and preferably four (2 road + 2 tunnel), experts, with one of the road safety experts as Team Coordinator.
The Core Team waspart of a wider visiting Group, additionally composed by:
- a “Facilitator”: a local/ national expert and member of the ECOROADS consortium,responsible to establish and maintain a direct link and cooperation with the Infrastructure Managers for organizational and operational purposes, before and after the site visits.
- representatives of the Infrastructure (Road/ Tunnel) Managers or State/ Regional Road Authority, responsible to co-organize and facilitate the field tests, provide the necessary information and data and respond to the RSA/RSI Report.
- “External” Observers: stakeholders with different competences, representing different authorities that could provide information to the Core Team (particularities of a test site, seasonal conditions, peak months, raining or hard winter days, etc.).
- other “External Experts” and Stakeholders: experts/ stakeholders from local and national interested parties (incl. road user groups and associations), which could provide complementary information.
- the ECOROADS “Internal” Observer: a member of the consortium, who had to monitor the simulation at a field test andto report back to the consortium, in order to ensurethe proper and homogeneous application of the Common Procedures at all field tests.

It is evident from the composition of the visiting Group that mobilization of many experts from different European countries was required. In order to minimize the joint operations duration, and ensure time and costs savings, the field tests had to be planned and organized to last for two days. This enhanced the need to dedicate more time in preparatory work and to exploit any data and material that would be made available by the Infrastructure Managers/

Road Authorities to the assigned experts' team before the field tests.The required data and documents included:

- Designs "as built" (longitudinal and cross sections);
- Description of deviations from official standards and from detailed design + Documentation;
- Data on traffic volumes and traffic composition for the last 5 years;
- Data on accidents and analysis (type, severity, cause, involved type of vehicle, etc.) for the last 5 years;
- Maintenance plans;
- Designs/ descriptions of most recent intervention(s);
- Traffic signal systems and operational manuals of traffic guidance systems (Variable Message Signs - VMS);
- Traffic signs and markings plans;
- Schemes, calculations/data on lighting conditions; and
- Safety documentation for tunnels, where applicable.

Additionally, it was envisaged that pictures and video recordingswould be used for preparation and reporting purposes. The exploitation of such material was also encouraged for ensuring the least need of exposure of the visiting Group to traffic during inspections.

Therefore, field tests had to be scheduled timely, in order to ensure that the necessary documents and data would be made availableto the experts. Moreover, the days and hours of the field tests had to be defined according to the project needs, the particularities of the site, the traffic conditions and the possibilities for infrastructure closure (e.g. tunnel inspection on foot to coincide with its closure for maintenance).

The 2-days program always started with a Briefing Meeting, a) to present to the participants the scope and procedures of ECOROADS field tests andb) for the experts to receive details of the project under RSA/RSI and clarifications on issues that emerged from the available data and information and to collect information and opinions from external experts and other stakeholders.Then a series of visits had to follow: site visits under traffic conditions, technical visits at tunnel control centers and night visits during closure of the tunnels. For ensuringsafety, for both the road users and the visiting Group, appropriate measures had to be taken, in cooperation with the Infrastructure Managers and Traffic Police, given the more radical measures (closures of traffic lanes, appropriate warning signage for road works and directional signs) required for carrying out inspections on high speed roads and inside tunnels.

The use of official cars for the transfer to the site and during the inspection was considered most suitable, having appropriate warning signage (flashing lights, traffic beacons). Members of the visiting Group were obligated to respect the road/ tunnel rules and when outside from the inspection car – where this was permitted – to wear helmets and phosphorescent vests and to take care not to burden the traffic or surprise the road users with any unpredicted behavior or risky activities.

On the second day a working meeting of the experts of the Core Team had to be organized for the preparation of their preliminary report. The use of checklistswas recommended, as a mean that ensures a homogeneous approach and assessment of road safety and at the same time the avoidance of failures of noticing all safety problems, minimizing the possibility of overlooking some important safety elements due to a more loose approach by the experts, due to their expertise on specific aspects. For the scope of the ECOROADS exercise, the RSA/RSI checklists proposed by PIARC were adopted as a basis of work specifically for open roads, as also used in the SEETO checklists [6].

Especially concerning tunnels and transition areas, two checklists were composed [7], provided that the aspects that had to be checked in ECOROADS tunnels and transition areas should not be all those of the Tunnel Directive, but the main criterion of their inclusion in checklists should be oriented to road user' safety. In this aspect,the checklists developed comprise aspects that influence road safety in transition areas and in tunnels (e.g. sharp curves of the alignment near the tunnel, unprotected edges at portals, use of ordinary road markings instead of rumble strips) and have taken into account the relevant EU Directives' criteria, elements for tunnel safety assessment included in RSA/RSI checklists in various countries, relevant national guidelines that include such provisions for RSA/RSI in tunnels and the PIARC workon human factors and road tunnel safety regarding users [8].

Finally, the program foresaw a Completion Meeting, for the presentation of the experts' findings and for the coordination of further activities (reporting, feedbacks and deadlines).At the same time, specific deadlines had to be commonly agreed, for the delivery of the Final Report of the Core Team experts and the feedback of the participants. This reporting, feedback and monitoring process comprised:

- a report with the identified road safety deficiencies, delivered to the Infrastructure Managers and the other members of the visiting Group, with description of the proposed measures and experts' recommendations/ advice for solutions to alleviate problems and to reduce risks and accidents' numbers or severity in the short-, medium and long-term (the Report of the Core Team);
- feedbacks from all members of the visiting Group, on specific templates designed per participant's role;
- a Report of the "Internal" Observer on the conformity of the procedures followed with the Common Procedures;
- the feedback from the Infrastructure Manager on the findings of the experts' Report; and
- the Final Report, taking into account the response of the Infrastructure Manager.

All these reports had to remain confidential within the consortium, as they concerned simulation of road safety operations (not official RSI). A relevant affirmation was provided to the Infrastructure Managers that gave consent to be part of the joint operations and therefore, these reports do not constitute publicly-available deliverables of the project.

3 EXPERIENCE AND OUTCOMES FROM THE FIELD TESTS

3.1 Review of the activities performed in comparison with the Common Procedures– Received feedback

The Common Procedures presented in the previous chapter, constituted the organizational and technical framework of the joint road safety operations. They have been applied successfully, with slight deviations that mainly concerned organizational problems due to unforeseen circumstances. Details are provided in the following paragraphs.

3.1.1 Organizational aspects

The organization of the five field testsincluded:

- two days operations;
- involvement of 3-4 road safety and tunnel experts at each joint operation;
- a Briefing Meeting, which lasted 2-3 hours on average (depending on the test site particularities, i.e. data available and volume of issues for discussion/ clarification);
- a visit at the tunnel control centre for at least 1 hour;
- a visit-inspection during daylight with 2 crossings in each direction, depending on the test site particularities (length, single/ unidirectional or twin tube tunnel, traffic conditions);
- a visit-inspection on foot, which in most of the cases lasted for 2 hours, depending on test site particularities (length, closure potentials);only in one case it was decided by the experts not to performed, after detailed accidents analysis;
- a working meeting of the experts for drafting their preliminary findings/ RSI report that lasted 2.5-3 hours on average; and
- a Completion meeting, which lasted 1 hour on average.

It was proved that the information provision prior to the field tests and a well-planned communication and management were very important. The organization was efficient due to the proactiveness and the skills of the Facilitators and the willingness and cooperation of the host organizations, i.e. Road Authorities, Agencies and Infrastructure Managers. It is indicative of the very careful and in detail organization that overall, the duration for the entire procedure to be completed for each field test (i.e. from the preparatory activities to the delivery of all reports) varied between 4 and 6 months. This was the reason that in all cases no major comments were received as feedback for the improvement of the procedures:

In some cases it was said that, compared to regular road safety inspections, the time provided had been too short; however, the focus of the joint operations was the transition areas and tunnel interiors, whilst more time was required for the inspection of the open roads sections, mainly due to their length.

Provided the time limitations, the duration of the joint operations was considered primarily sufficient, but again there were some feedbacks that the time provided for tunnel inspection was marginally sufficient in some cases; however, this was due to the inability to prolong the closure of the tunnels concerned (absence of alternative road that required stoppage of traffic during inspections). Especially for long and complex tunnels, it was suggested that the duration of the inspections should be prolonged, and in cases of major differences (alignment, portals orientation) between the tunnel tubes of twin tunnels, the inspection of both tubes would be needed.

Generally, the followed time schedule was effective and the operations well-structured and organized, despite the fact that there had been some unforeseen circumstances that were solved on site. These had nothing to do with safety, where all necessary measures were taken by the organizers, but with traffic congestion conditions in some cases that caused less number of crossings through the tunnel or with less time available for inspection on foot. This is the reason that the organization of daylight inspections (under traffic conditions) should be organized during off-peak hours. Also, the use of several cars (instead of buses) was considered preferable for better observations by the experts, as front passengers in each vehicle.

The Briefing and Completion meetings were very efficient. Especially the briefing meeting provided the opportunity to discuss and clarify issues that emerged from the pre-review of the documents made available to the experts prior to the field test. As aforementioned, the extension of the duration of the Briefing Meeting duration was one of the suggestions made, also for more thorough analysis/ discussions regarding the project under consideration.

The delivered reports were according to the prescriptions of the Common Procedures, with minor omissions (summary of findings, list of missing documents), which had no major influence on the quality of the reports.

Finally, the responses of IMs were provided during Completion Meeting and after RSA/RSI report submission, with delays in some cases, whilst the feedback from participants (evaluation forms), with constructive comments received timely in all cases.

3.1.2 Technical aspects

Regarding the tools and methods, the segmentation of the infrastructure in three segments (open roads, transition areas, tunnel interior) was considered reasonable, but it was suggested that still there is need to focus on transition areas and better define their length, depending on each test site particularities and according to the principles set by the project (vehicle speed, stopping distance).

The required documents and data were provided timely. They had beenconverted in appropriate format that ensured readability by all the experts (not requiring CAD software) and uploaded in the private file-zone of the project website. They concerned mostly designs and accidents statistics, as well as details for lighting conditions and traffic signals. In some cases, where the field tests included old tunnels, the design documents were not in electronic version, but where made available in scanned version (or in hard copy at the Briefing Meeting).Also, there were cases that some designs were missing or outdated, or in national language, which resulted in difficulties for the foreign experts to understand.Therefore, translation assistance is needed for designs/ documents made available in national language, when there is involvement of international experts in similar cases of joint road safety operations that take place abroad.

Data on accidents and analysis were not sufficient in many cases (missing data series, insufficient details and analysis), whilst safety documentation for the tunnel and designs/ descriptions of recent interventions was provided only for one test site.Provision of accidents data and more detailed analyses (location, type, time, severity, and collision diagrammes) are extremely important for the assessment of road safety.

Real-time videos presented during the visits at the tunnel control centres, videos of the infrastructure under peak and off-peak traffic conditions and of accidents proved to be very usefulfor the scope of the field tests. The same applies for the exploitation of modern technology (mapping and

routing software, satellite images, digital layouts)for preparatory evaluation, for the minimization of the inspection time on site and for the preparation of the relevant reports.
The usage of the checklists formulated for tunnels and transition areas was proved to be very important.Their use during the first two field tests was just recommended, but afterthe fine-tuning of Common Procedures it was considered as mandatory for the rest of the test sites [4].Given the particularity of the project, requiring reporting by several experts from different countries, it was suggested that it would be better to go through the checklists during the working meeting of the experts (to extend the meeting duration accordingly) and to address as many issues as possible,inthe presence of the tunnel manager.

3.2 Outcomes of the field tests and feedback from the experts and the Infrastructure Managers

As previously mentioned, the outcomes from the five joint road safety operations consist of the reports of the experts and the feedback from all the participants from each field test, including the Infrastructure Managers.
While some issues from the feedbacks, regarding organizational, procedural and technical issues, have been commented in the previous paragraphs, in this sub-chapter the focus is placed on the results of the joint operations and the feedback regarding the added value and the experience from the participation in these operations, as well as the feedback of the Infrastructure Managers.
Firstly, concerning the reports that were prepared as the final technical outcome for each field test, they comprised all identified deficiencies with focus on road safety, with "fixed obstacles"being one of the major concerns of the experts, increasing the risk of severe injuries and fatalities. Moreover, the crash of a bus at a concrete wall inside the Sierre Tunnel in Switzerland with 28 fatalities and several severe injuries had been one of the main reasons of inception of the ECOROADS project.
Fixed obstacles wereidentified in many cases, especially inside the tunnels and in transition areas, comprising:
- unprotected obstacles at tunnel portals (see **Figure 2**);
- lay-bys, retaining or recession walls (niches) and cross passages in tunnels that have been constructed perpendicularly to the trafficdirection (see **Figures 3** and **4**);
- presence of concrete barriers, which areused as channelizing island or central reserve (see **Figure 5**);
- presence of unprotected lighting poles, signs or VMS poles and bridge pillars (see **Figures 6** and **7**); and
- inappropriate finishing of guardrails/ crash barriers endings and missing or interrupted/ damaged guardrails/ crash barriers (see **Figure 8**).

Other deficiencies concerned elements at open roads (**OR**), transition areas (**TA**) and tunnel interior (**TI**), such as:
- existence of damaged road signs;
- damaged pavement (ruts, potholes);
- absence of rumble strips or poor contrast provided by the existing road marking;
- missing road signs, e.g. diverting dangerous goods vehicles (OR);
- existence of multiple (overlapping) and ambiguous (contradictory) road signs (OR);
- roadside or median vegetation and plantings reducing sight distance in horizontal curves and visibility of signs (OR);
- existence of high gradient steep before the tunnel that could cause engine or brakes overheating of heavy vehicles (OR);
-

Fig. 2*Unprotected obstacles at a tunnel portal*

Fig. 3*Recession walls (niche)*

Fig. 4*Retaining wall (left) – Lay-by wall (right)*

Fig. 5*Concrete barriers*

Fig. 6*Unprotected lighting androad sign poles and bridge pillar*

Fig. 7*Unprotected lighting and road sign poles*

Fig. 8*Inappropriate guardrails finishing/ Interrupted guardrails*

- inappropriate speed limits (OR/ TA);
- inappropriate transition between different types of safety barriers (OR/ TA);
- landslides, with damaged road equipment (TA);
- absence of adequate regulatory signage for prevention of users from inappropriate use of emergency central median openings in front of the tunnel (TA);
- existence of distracting signs and advertising labels near the portal area (TA);
- illumination conditions, e.g. lights not functioning, type of light, uniformity of lighting (TA/ TI);
- existence of access-service roads in the transition areas without appropriate regulatory signage and barriers (TA);
- not functioning or malfunctioningVMS (TA/ TI);
- absence ordirtiness of retroreflective road equipment (TA/ TI);
- late or missing directional signage for weavings using exit-entry ramps before and after a tunnel (TA/ TI);
- illuminated signs inside tunnel not functioning or not visible due to dirt (TI);
- existence of high dismissive sidewalks, endangering loss of control of vehicle and impeding cars to drive at the side to clear the way for emergency crews (TI);
- existence of other obstacles not favoring pedestrians movement in case of emergency situations to access emergency doors and equipment (TI);
- absence or inadequacy of signage of emergency equipment, e.g.phones, fire extinguishers (TI);
- inappropriate interval between successive VMS for lane closures in case of incident (TI);
- narrow access to vehicles cross-passage between tunnel tubes, to be used in case of evacuation need (TI); and
- existence of locked doors of fire hydrant niches (TI).

It is evident from the above that the deficiencies observed covered several aspects from the road safety and not tunnel-only point of view, due to the exchange of observations and experiences between the engaged experts, resulting from their different scientific background (tunnel and road), experiences (different legal framework, design and safety standards and practices in origin countries) and approaches.Overall, the cooperation among the experts of the Core Team was smooth and efficient, on-site and in-house and they perceived their participation in the joint operations as very useful. This cooperation and exchange of information and views among experts from different countries and with different backgrounds was an added value of the project, but also the cooperation and exchange of views, experiences and practices between all participants, i.e. experts of the Core Team, other experts participating in the field tests as observers and experts of the national road authorities and Infrastructure Managers.

The success of the joint road safety operations is evident, not only from the positive feedback from all the participating experts, but also from the Infrastructure Managers. The project contributed to the increase of awareness of relevant road authorities in the Balkan region regarding the importance of road safety and to the familiarization with the EU directives and the infrastructure management expertise and practices on a higher level, providing the opportunity for those to be applied and implemented in future projects.

Already, in the time period after the conclusion of the final reports of the field tests and the organization of the 3rd project Workshop with stakeholders, Infrastructure Managers took action to confront some of the deficiencies identified, on the basis of the experts' recommendations.

The implemented measures concerned low-cost and short-term interventions, such as restoration of safety barriers (guardrails) continuity and uniformity, prevention of usage of emergency opening before tunnel entrance by increasing the density of portable barriers, relocation of vertical signage, addition of concrete layer finishingat drop-off at the pavement edge, installation of safety barriers (see **Figure 9**) and other custom-made crash cushions at perpendicular walls [10], removal of temporary signs that had remained after works completion (see **Figures 10** and **11**), removal of excessive and ambiguous road signage, restoration of road marking (consecutiveness of stripes), addition of missing signage, cleaning of walls and reflective equipment, and VMS repair and improvements [11]. Implementation of other measures recommended will be considered in the framework of forthcoming maintenance programs and during the construction worksforeseen, whilst the experience gained from ECOROADS has been transferred by implementing safety measures at transition areas of tunnels at another on-going project (E-763 road) in Serbia [11].

Fig. 9*Installation of guardrail in front of perpendicular wall of lay-by in Krrabe tunnel in Albania (before and after situation)[10]*

Fig. 10*Ambiguous road signs along the open road section of the field test in Serbia (situation before) [11]*

Fig. 11*Removedambiguous road signs along the open road section of the field test in Serbia (situation after) [11]*

4 CONCLUSIONS

As it was recognized during the last project Workshop that followed the conclusion of the performance of all field tests foreseen, the practical experimentation of joint road safety operations provided a valuable experience for all participants and a solid basis for discussion among the partnership and with the stakeholders for an integrated approach for addressing road safety issues in tunnels both during the design and construction phase, as well as during operation,to prevent road accidents.

This was also recognized by the hosting organizations and Infrastructure Managers of the countries where the field tests were performed. They agreed with many of the observations and recommendations of the road and tunnel experts and where it was feasible, technically and financially, they took their suggestions into consideration to implement the proposed corrective/ preventing road safety measures. As aforementioned, already in some cases the Road Authorities/ Infrastructure Managersproceeded to the implementation of some interventions, according to the recommendations of the experts, even though these were not made as part of an official RSI procedure.

In the framework of the ECOROADS project, SEETO:

- was the responsible partner for the definition of the Common Procedures for the performance of the joint road safety operations;
- was the "Facilitator" of all three field tests in the region (Albania, Serbia and the Former Yugoslav Republic of Macedonia);
- undertook the important role of the "Internal Observer" at four field tests, to ensure the appropriate monitoring of homogeneous implementation of the procedures;
- provided the opportunity to national road safety experts from the region to participate in the joint road safety operations (each time two experts from two different SEETO Regional Participants participated at one field test, additionally to the representatives/ experts of the host organization – Ministry/ Infrastructure Manager/ Road Authority);
- is involved in the task of formulation of the policy recommendations of the project, which is the overall target of the project towards improving road safety on open roads and in tunnels.

Roadsafety is an area now recognized as one of the most tangible transport policy (soft) measures on the extended Core Trans-European Transport Network in the Western Balkans for the establishment of competitive, reliable and safe transport system, according to Connectivity Agenda of the High-Level Western Balkan Summits (Vienna2015 and Paris 2016).

SEETO, under its institutional role and as a key-player for Transport Policy in the region of South East Europe, will continue to monitor the progress of implementation of the Connectivity Agenda, to promote cooperation and joint research among the Regional Participants and other EU countries, and to lead and facilitate the work with the national administrations on their capacity building in the field of Road Safety, in line with the EU relevant framework and best practices and in line with the provisions of the Valetta Ministers Declaration on Road Safety [12], which includes – among others –commitment to the improvement of safety for road users by infrastructure development, as well as by ensuring allocation of adequate funding for future Road Safety policies, programmes, research and projects promoting Road Safety.

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