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Working Party on Road Transport
(Ninety-eighth session, 27-29 October 2004)

REPORT OF THE WORKING PARTY ON ROAD TRANSPORT ON ITS NINETY-EIGHTH SESSION

Proposed amendments to Annex II of the European Agreement on Main International Traffic Arteries (AGR)

Addendum

The present document contains a set of proposals to amend Annex II of the AGR (ECE/TRANS/16 and Amendments 1 to 9*) adopted by SC.1 at its ninety-eighth session (see report TRANS/SC.1/375, paragraphs 25-28). An explanatory memorandum concerning the proposals submitted can be found at the end of this document.

* * *

* A consolidated version which includes Amendments 1 to 8 exists under the symbol TRANS/SC.1/2002/3.

Proposals to amend Annex II (Conditions to which the main international traffic arteries should conform) of the European Agreement on Main International Traffic Arteries (AGR)

Amendments concerning the CONTENTS

Insert the following new section V (Existing sections V (Environment and landscaping) *and VI* (Maintenance) *become sections VI and VII, respectively):*

"V. MANAGEMENT, SAFETY EQUIPMENT AND GENERAL ARRANGEMENTS FOR TUNNELS

1. Traffic management systems
2. Control centre
3. Emergency exits and access for emergency services
4. Tunnel equipment
   - 4.1 Lighting appliances, power supply and electrical circuits
   - 4.2 Emergency appliances
   - 4.3 Ventilation systems
   - 4.4 Other appliances and systems for the improvement of safety"

Replace the summary of existing section V (ENVIRONMENT AND LANDSCAPING), *which becomes section VI, by the following:*

"VI. ENVIRONMENT AND LANDSCAPING

1. General remarks
2. Integration of roads into the environment
3. The main adverse effects of roads on the environment
   - 3.1 Water pollution
     - 3.1.1 Pollution during roadworks
     - 3.1.2 Seasonal pollution
     - 3.1.3 Accidental pollution
     - 3.1.4 Chronic pollution
   - 3.2 Noise
     - 3.2.1 Factors to be taken into account
     - 3.2.2 Measures to be taken
4. Taking account of the landscape and the cultural environment"

Replace the number of existing section VI (MAINTENANCE) *by the number VII.*

Amendments concerning the body of Annex II

I. GENERAL

…

Add the following to the end of the second paragraph:

"The provisions of this annex concerning tunnels shall apply to tunnels with lengths of over 500 m. Some of these provisions, however, concern long tunnels only."

…

II. CLASSIFICATION OF INTERNATIONAL ROADS

…

II.2 Express roads

Replace the existing text by the following:

"An express road is a road reserved for motor traffic accessible from interchanges or controlled junctions only and which:

(i) Prohibits stopping and parking on the running carriageway(s); and

(ii) Does not cross at level with any railway or tramway track, or footpath."

…

III. GEOMETRIC CHARACTERISTICS

III.1 General considerations

In the second sentence, "Changes of category … particular attention", in the third paragraph from the end, add in the brackets after "interchanges" ", toll areas and frontier posts.".

…

III.2 Horizontal and vertical alignment

III.2.1 Basic parameters

Amend as follows the table on recommended minimum values for parameters of horizontal and vertical alignment:

Design speed (km/h)		**60**	**80**	**100**	**120**	**140**
Minimum radii in plane (corresponding to maximum superelevation 7%)		120	240	450	650	1 000
Maximum gradient (percentage not to be exceeded)*		8	7	6	5	4
Maximum longitudinal gradient in new tunnels**		5	5	5	5	5
Minimum radii at the highest point of the vertical alignment (in m)	One-way	1 500	3 000	6 000	10 000	18 000
	Two-way	1 600	4 500	10 000	-	-
Minimum radii at the lowest point of the vertical alignment		1 500	2 000	3 000	4 200	6 000

* The maximum gradient should be decreased by 1% in the case of express roads and motorways. When the maximum gradient is applied, an additional lane for slow-moving vehicles should be envisaged.

** Unless no other solution is geographically possible. In tunnels with gradients higher than 3%, additional and/or reinforced measures should be taken to enhance safety on the basis of a risk analysis.

Amend the last paragraph of the section to read:

"Horizontal alignment curves shall, when appropriate, be introduced by transition curves."

…

III.3 Cross-section between junctions

After the existing text, add the following paragraphs:

"In this respect, tunnels and bridges, structures which are an integral part of the road system, should, to the extent possible, with the exception of the emergency lane, have the same number of traffic lanes as there are before and after these structures. Any change in the number of lanes should occur at a sufficient distance from the entrance to these infrastructures.

For tunnels, the principal criteria to be taken into account in deciding on the number of tubes to build (a single tube or two tubes) are traffic forecasts and safety (taking into account such aspects as the percentage of heavy goods vehicles, gradient and length).

Emergency stopping places (lay-bys) should be provided at least every 1000 m in narrow bidirectional tunnels with heavy traffic.

New tunnels without an emergency lane should as far as possible be provided with emergency walkways, elevated or not, for tunnel users in the event of an incident. In existing tunnels where there is neither an emergency lane nor an emergency walkway, additional and/or reinforced measures should be taken to ensure safety."

III.3.1 Number and width of traffic lanes

Delete the second (The volume of traffic flow…) *and third* (Various methods…) *paragraphs.*

…

III.5 Intersections

Before paragraph III.5.1, insert the following definition:

"An intersection is a point at which two or more traffic flows meet."

III.5.1 Choice of type of junction

In the last paragraph, "The use of junctions … to users", *replace* "with traffic signals (three colour lights)" *by* "… with traffic light signals (three colour system) …".

…

III.5.3.2 Geometric characteristics

Amend the first sentence of the third paragraph to read:

"Horizontal curves shall be joined by transition curves of a suitable length. …"

Add (c) at the end of this subsection to read:

"(c) Should the total number of converging traffic lanes be reduced, this reduction should be made at a sufficient distance from the point of convergence."

…

IV. EQUIPMENT

…

IV.3.1 Safety fences and barriers

Modify the fourth paragraph as follows:

"Such safety devices shall normally be provided on structures and in their approach zones."

…

IV.4.2 Variable traffic signs

In the English text replace "lines" *by* "lanes".

…

IV.5 Road lighting

Replace the first sentence by the following:

"Lighting is desirable at some special areas such as frontier posts, tunnels, adjoining areas, interchanges with other "E" roads, toll areas, etc.".

…

IV.6.3 Protection from animals

Amend the title to read:

"Protection from and of animals".

…

Insert the following new section V (the existing sections V (Environment and landscaping) and VI (Maintenance) become sections VI and VII respectively):

"V. MANAGEMENT, SAFETY EQUIPMENT AND GENERAL ARRANGEMENTS FOR TUNNELS

V.1 Traffic management systems

Tunnels with high traffic volume should be equipped with traffic management systems in order to avoid traffic congestion, particularly in the case of an incident.

In the case of long or short-term closure of tunnels, the best possible alternative itineraries should be planned and indicated to users at diversion locations situated in advance of the tunnel.

In the event of a serious accident, all the affected tubes of the tunnel should immediately be closed to traffic. The traffic should be managed in such a way that unaffected vehicles can quickly leave the tunnel.

V.2 Control centre

A control centre should be provided for long tunnels with a heavy volume of traffic. Surveillance of several tunnels may be centralized at a single control centre.

For tunnels starting and ending in different countries or falling under the control of different national regions, one single control centre should be designated as being in control at any given time.

V.3 Emergency exits and access for emergency services

The need to provide emergency exits and the distance between them should be decided on the basis of a risk analysis of the tunnel in question. However, in new tunnels, emergency

exits should be provided where the traffic volume is higher than an annual daily average of 2000 vehicles per lane.

The maximum distance between two emergency exits should not exceed 500 m.

Shelters without an exit leading to escape routes to the open air should be avoided in future tunnel construction.

In twin-tube tunnels, in the event of an incident in one tube, the other tube may be used as an escape and rescue route. To this effect, the tubes should be connected at regular intervals by cross-connections for pedestrians and by cross-connections allowing the passage of emergency services. In the absence of these, direct connections with the outside or with an emergency gallery should be provided in each tube.

For twin-tube tunnels, wherever geographically possible, crossing of the central reserve (median strip) should be made possible outside each entry and exit to allow emergency services to gain immediate access to either tube.

V.4 Tunnel equipment

All safety installations or facilities for tunnel users, in particular, emergency telephones, fire extinguishers, emergency exits, lay-bys, or the indication of radio frequencies or use of radio should be signalled by means of fully visible signs and panels. The signs and panels to be used are described in the Vienna Convention on Road Signs and Signals of 1968.

The safety equipment required in tunnels should be defined on the basis of a risk analysis of the tunnel under consideration. A list of such equipment is provided below. Some of this equipment is intended mainly for long tunnels and/or tunnels with heavy traffic.

V.4.1 Lighting devices, power supply and electrical circuits

- Normal lighting to ensure appropriate visibility day and night for drivers;
- Safety lighting to allow a minimum visibility in the event of a breakdown of the power supply;
- Evacuation lighting, such as evacuation marker lights, at a height of no more than 1.5 m to guide tunnel users to evacuate the tunnel on foot, in the event of an emergency;
- Emergency power supply capable of ensuring the operation of safety equipment indispensable for the evacuation of users;
- Design of electrical, measurement and control circuits such that a local failure (such as one due to a fire) does not affect unimpaired circuits.

V.4.2 Emergency provisions

- Emergency stations, equipped with at least an emergency telephone and two fire extinguishers, should be installed at the entry and exit of tunnels and inside at regular

intervals. These intervals should not exceed 150 m for new tunnels and 250 m for existing tunnels.

– In addition, a water supply should be provided for the fire brigade near the tunnel entry and exit and inside at intervals which should not exceed 250 m.

V.4.3 Ventilation systems

Appropriate ventilation systems should be provided to ensure the control of pollutants emitted by road vehicles under normal conditions and in the event of an incident, and the control of the air and of smoke in the event of a fire. When mechanical ventilation is necessary, the following recommendations should be observed:

– In tunnels with congested bidirectional or unidirectional traffic, longitudinal ventilation should be used only if a risk analysis of the tunnel in question shows it is acceptable and/or if appropriate measures are taken.

– Transverse or semi-transverse ventilation systems should be used in other cases.

– In bidirectional tunnels with transverse or semi-transverse ventilation, equipped with a control centre, when justified by the length and the traffic, air and smoke extraction dampers should be installed which can be operated separately or in groups. In addition, the longitudinal air and smoke velocity should be monitored constantly and the steering process of the ventilation system adjusted accordingly.

– In twin-tube tunnels, appropriate means should be implemented to stop the propagation of smoke and gases from one tube to the other in the case of fire.

V.4.4 Other safety improvement devices and systems

– Radio broadcast installations that can be used by the emergency services;

– Systems for video surveillance and automatic detection of incidents and/or fires;

– User information systems (radio, loudspeakers, variable message signs);

– Traffic lights, barriers and other equipment to stop vehicles when necessary before the tunnel entrance and, if required, road signs and other appropriate means within the tunnel;

– Overheating control systems for heavy goods vehicles (to be installed outside tunnels);

– Road signs and/or markings to help drivers to maintain an adequate distance from the vehicle in front;

– Automatic systems for detecting violations of traffic regulations particularly regarding speed limits and distance between vehicles.

V.5 Fire resistance of the structure

The main structure of tunnels where a local collapse may have catastrophic consequences (for example, an underwater tunnel or a tunnel liable to cause the collapse of large adjoining structures) should ensure a sufficient level of fire resistance."

Replace the provisions of the existing section V, which becomes section VI, by the following:

"VI. ENVIRONMENT AND LANDSCAPING

VI.1 General remarks

Roads are a tool for road-users, designed within the framework of town and country planning. They make possible the movement and transport of people and goods and offer access to work, rest and leisure areas. However, in some circumstances they can give rise to various nuisances (noise, pollution, vibrations) both in and outside urban areas; these have taken on a new dimension as a consequence of a considerable increase in road traffic. Taking account of the impact of a road on the environment must therefore be considered carefully with the general aim of maximizing the positive effects on the environment and correcting the negative ones.

The concern to preserve the quality (visual and ecological) of the environment also means that roads must be designed to harmonize with landscapes.

It is therefore important that all administrators should acquaint themselves with the environmental features involved and should subsequently take appropriate measures to inform users of the presence of these features and the regulations protecting them, or should take steps to protect them physically.

VI.2 Integration of roads into the environment

When a new project is proposed or existing roads are upgraded, consideration should be given to the direct and indirect effects of the roads and traffic on:

- People, fauna and flora;
- Soils, sub-soils, water, air, microclimate;
- Landscape, physical property and cultural heritage.

In this regard the following factors should ideally be taken into account:

Good coordination of the alignment and the longitudinal profile, in relation to the elements of the landscape, should ensure not only harmonious integration of the alignment with local topography and land use but also prevent unfavourable impact on the safety of road users.

Acoustic nuisances, vibration and air, water and soil pollution deriving from traffic and from the maintenance and exploitation of roads, should be limited as far as possible by appropriate means, in accordance with the regulations of the countries concerned.

Whenever a new road and the works involved have a great influence on the landscape, it would be better to take care of their quality by creating a new landscape rather than trying to mask it.

VI.3 The main adverse effects of roads on the environment

The most acute problems generally arise from water and noise pollution. Water pollution may affect man and his environment, while noise directly disturbs the rhythm of his life and particularly his sleep.

VI.3.1 Water pollution

There are four types of pollution caused by roads. As conventional drainage systems can remove only a small fraction of the pollution deposited on the roadway, specific solutions need to be devised for each type of pollution.

VI.3.1.1 Pollution during roadworks

On the one hand, there is the erosion by rainwater of the bare soil and embankments, which carries off fine materials. To avoid this, it is important to clear and strip only the surfaces necessary for the work. The temporary installation of desilting or infiltration basins makes it possible to reduce and hold back the waste materials in the most susceptible places. On the other hand, the works vehicles leave behind traces of oil and suspended solids.

VI.3.1.2 Seasonal pollution

Seasonal pollution is caused by dissolvable and abrasive de-icing products used in winter maintenance, most of which are based on sodium chloride. This type of pollution can be reduced by salting the roads less and reducing the amount of salt used. Moreover, it is strongly advised to cover stocks in order to avoid the constant discharge of brine.

VI.3.1.3 Accidental pollution

Accidental pollution results from spills following road accidents involving the transport of dangerous goods. Statistics show that such accidents usually take place outside built-up areas. Hydrocarbons are the main cause of this type of pollution. Solutions to this problem involve both measures to adapt the infrastructure and operational measures. Susceptible environments can be protected by installing crash barriers or embankments or by building a watertight drainage system.

VI.3.1.4 Chronic pollution

Chronic pollution describes all the forms of pollution associated with road traffic: wear of the roadway, metal corrosion, tyre wear and exhaust emissions. It should be noted that only a small proportion of the amounts emitted is carried off by rainwater to discharge points. However, a rainstorm or mini-flood can drain a sizeable area and thus cause more widespread pollution. The cleansing capacities of ditches and soil should therefore be maximized.

VI.3.2 Noise

Road noise is typically a combination of unpleasant and undesirable sounds caused by the passage of light and/or heavy vehicles. The noise level, measured in decibels (dBA), can cause disturbances in people's daily lives and sleeping habits.

The relationship between the noise level experienced and disturbances allows us to define the thresholds above which noise-reduction measures should be taken. These thresholds, which should be set nationally or, failing that, by administrators, vary from country to country.

VI.3.2.1 Factors to be taken into account

The following factors concerning noise should be taken into account in environmental impact assessments:

- Information on the estimated daytime and night-time traffic and on the traffic observed at particular times (percentage of heavy goods vehicles);
- Inhabited or sensitive areas, where necessary;
- Information on relief;
- Nature of the project: new, existing or modified;
- Information on the road surface;
- Nature of buildings to be protected; measures differ for hospitals, housing and factories;
- Category of road concerned and speed limit(s) authorized, etc.

VI.3.2.2 Measures to be taken

The measures to be taken are:

- Avoid inhabited or sensitive areas (schools, hospitals);
- Install protective devices (noise barriers);
- Use less noisy surfaces where possible;
- Soundproof facades;
- Take account of the existing noise pollution in planning documents.

VI.4 Taking account of the landscape and the cultural environment

Such elements of the landscape that are visible from the road will contribute to traffic safety and to the comfort of road users. They should supplement and reinforce visual guidance and add to the interest of the journey.

The sight of towns, rivers, hills, etc., gives users an opportunity to take their bearings and should be conserved as far as possible.

Plantations (in alignment or other forms) may contribute to improving visual guidance and to breaking the monotony of the road alignment, provided that the conditions of their implementation do not create additional risks.

Landscaping may also contribute to protection against dazzle and against adverse weather conditions (wind, snow, etc.).

When the installation of noise barriers is considered, care should be taken in their construction to ensure that they are integrated to the maximum into the landscape and compensate users for any information hidden.

It is desirable for the cultural heritage of the regions travelled through to be brought to the attention of users by appropriate means: signs, information centres in service and rest areas, etc.

For primarily safety reasons, commercial advertising near roads should be avoided."

Amend the numbering and content of the existing section VI (MAINTENANCE), renumbered as section VII, as follows:

"VII. MAINTENANCE

VII.1 General considerations

Add the following to the second paragraph (It is advisable that … traffic flow):

"… and safety."

Insert a new paragraph after the second paragraph to read:

"Complete or partial closure of lanes due to construction or maintenance works planned in advance should always begin outside tunnels."

*In the English text, in the third paragraph of existing subsection VII.1 (*Maintenance concerns … building, etc.), *replace* "building" *by* "buildings".

…

VII.2 Maintenance management

In the English text, at the beginning of the second sentence of the first paragraph, replace "facilities" *by* "measures".

…

VII.3 Specific aspects of maintenance

…."

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EXPLANATORY MEMORANDUM (Justification of the proposed amendments)

The proposed amendments presented here are intended to supplement Annex II of the AGR - which deals with the conditions to be met by major international traffic arteries - with regard to two issues which have grown in importance in recent years: safety in tunnels and the environment.

With regard to tunnels, and following the serious accidents that have occurred in Alpine tunnels, it has seemed necessary to introduce measures to reinforce the safety of these infrastructures on “E” roads, on the basis of the relevant recommendations drawn up by the Ad hoc Multidisciplinary Group of Experts on Safety in Tunnels, established under the aegis of UNECE, in its report TRANS/AC.7/9 and Add.1. This then is the purpose of the amendments to paragraphs III.2.1, III.3, section V (in its entirety) and paragraph VII.1.

As for the environment, it has nowadays become a responsibility if its resources and the future of the generations to come are to be preserved. This is a vast topic with repercussions on a very large number of areas, including road infrastructures, because of the impact a road can have in terms of adverse effects (pollution, noise) and its consequences for human beings, the air, the fauna, the flora, the soil, the landscape and the cultural heritage. It is for this reason that a careful study must be made of how to take these factors into account in order to maximize the positive effects and correct those that are negative.

The AGR as it stands already contains some provisions in this regard, but they are nowadays insufficient. The aim of the proposals presented here is therefore to develop those points to which particular attention should be given in building a new road or upgrading an existing road. The provisions relating to this subject are developed in section VI (in its entirety).

The Working Party on Road Transport (SC.1) of the United Nations Economic Commission for Europe has taken advantage of these major amendments to supplement, adjust, modernize or update other provisions. These can be found in paragraphs II.2, III.1, III.2.1 (table and last paragraph of the section), III.3.1, III.5, III.5.1, III.5.3.2, IV.3.1, IV.5 and IV.6.3. Corrections have also been made to the English version, concerning paragraphs IV.4.2, VII.1 and VII.2.

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