



IMS INSTITUTE
BELGRADE



**FEASIBILITY STUDY
REPORT**

**ON TECHNICAL SOLUTIONS
FOR REDUCTION OF THE HARMFUL INFLUENCE
OF ROAD TRAFFIC NOISE
ON SELECTED SECTIONS OF STATE ROADS
INCLUDING THE SUGGESTION OF THE ACTION PLAN**

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Objective:	FEASIBILITY STUDY REPORT ON TECHNICAL SOLUTIONS FOR REDUCTION OF THE HARMFUL INFLUENCE OF ROAD TRAFFIC NOISE ON SELECTED SECTIONS OF STATE ROADS INCLUDING THE SUGGESTION OF THE ACTION PLAN
Ordering party:	PUBLIC ENTERPRISE "ROADS OF SERBIA" Bulevar kralja Aleksandra 282, Belgrade
Contract:	JPPS VIII No. 454-843 dated October 13, 2009 / IMS No. 41-12445 dated October 9, 2009
Expert team manager:	Ecological Consulting a.s. Mgr. Milan Bussinow, Ph.D.
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FEASIBILITY STUDY REPORT

The Public Enterprise “Roads of Serbia”, the Investor, has entrusted the work out of the Feasibility study of technical solutions for reduction of the harmful influence of road traffic noise on selected sections of state roads (hereinafter referred to as: the Study) to the IMS Institute a.d. by Contract JPPS VIII No. 454-843 dated October 13, 2009 (IMS No. 41-12445 dated October 9, 2009).

The IMS Institute a.d., Belgrade has worked out the Draft of the Feasibility study of technical solutions for reduction of the harmful influence of road traffic noise on selected sections of state roads (hereinafter referred to as: Study Draft) in cooperation with the Czech partner Ecological Consulting a.s., Olomouc.

Pursuant to the Law on Environmental Noise Protection (“Official Gazette of the Republic of Serbia”, No. 36/2009) and the Law on Public Roads (“Official Gazette of the Republic of Serbia”, No. 101/2005) the project manager is obliged to carry out the solutions of noise protection, meaning to construct buildings and prepare the equipment for noise protection in accordance with these Laws and other provisions at the occasion of the project work out, construction and reconstruction of buildings belonging to the traffic infrastructure.

General objectives of the Study are:

- Reduction of the negative influence of traffic on the environment in accordance with the principles of preservation of development,
- Reduction of the harmful influence of the road traffic on the environment,
- Realization of the road infrastructure adapted to the natural and cultural environment in a way that the natural resources are preserved and the traffic influences have an acceptable influence on the health and welfare of the people,
- Establishing an aimed noise control on most frequent roads,
- Road traffic noise protection and
- Reduction of the noise emission on the most endangered locations and preservation of the quality of the environmental noise there where it is good.

Specific objectives of the Study work out are:

- Establishing a spatial, ecological, social, financial, market and economical investment justification for performing technical solutions for reducing the harmful influence of road traffic noise on selected sections of the existing state roads and
- Creation of an expert basis for reaching a decision on investment and the instituting the procedure for issuing the approval for installing technical noise protection solutions on existing state roads.

The project location is the network of state roads of first and second category on the whole territory of the Republic of Serbia. The feasibility study on technical solutions for the reduction of the harmful influence of road traffic noise is worked out for selected sections of state roads with

an average yearly traffic flow higher than three million vehicles and state roads with other jeopardizing noise contents indicators on environment.

The Study draft containing 471 pages has been submitted to the investor on February 1, 2010 within the notice of time foreseen by the Contract.

The Study draft contains 3 parts including:

- A. The general documentation,
- B. The project task and
- C. The text part.

The text part contains 14 chapters including:

1. The introductory analytical and research activities of the project,
2. The establishment and the description of the potentially jeopardized contents along the selected sections of the state travel network and buildings,
3. The defining of the present and the future values of road traffic noise emission,
4. The establishment of possible, planned and designed technical and technological solutions,
5. The establishment of necessary inputs for application of the noise protection,
6. The establishment of special aspects of the designed protection,
7. The identification of ecological aspects – effects of technical noise protection solutions,
8. The establishment of the financial efficacy including the assessment of profitability of the solutions,
9. The establishment of the social and economic efficacy,
10. The analysis of sensitivity and the risk of investment,
11. The analysis of the financial sources, financial liabilities and dynamics,
12. The analysis of the organizational and human resources abilities for application of the technical noise protection solutions,
13. The conclusion about the feasibility and the justification of the investment and
14. The literature.

The Study matches with the project task in all aspects as well as with the regulations mentioned within. The domestic legal regulations present the basis for the Study work out.

This type of study has been assessed at the very beginning of its work out as a pioneer and new kind of study and its work out involved a great effort and support of the investor.

The Study has been worked out during the period right after the implementation of the Law on Environmental Noise Protection (“Official Gazette of the Republic of Serbia” No. 36/2009), at a time when neither all sub-legal deeds have been worked out nor the significant mistakes existing in the mentioned Law were amended.

Within the processed problems it was especially pointed out to the methodological access as well as the standard terminology, definitions and terms in the field of acoustics and especially the noise protection which proved to be deficient to a great extent in similar documents.

The evaluation of the number of inhabitants per jeopardized zone is a fact which needs to be paid attention to at a great extent. This fact is emphasized in the Study and the further processing and work out of criteria should be the objective of some future project.

The Study contains the definition of the present and the future values of road traffic noise emission as well as the noise maps as a significant indicator to the problems.

It is of special importance to emphasize the general survey of possible noise protection solutions in this Study. Ten possibilities have been specified as a full set and these solutions are:

- 1) sound insulation of the façade and the façade elements,
- 2) noise barrier,
- 3) tunnel,
- 4) selection of the special road surface,
- 5) deep plant of trees,
- 6) maintenance of the roadway,
- 7) dislocation of the road,
- 8) changes to the traffic regime,
- 9) raising the quality of the fund of the means of transportation and
- 10) active protection.

Solutions given in such a way may be classified into groups regarding to their efficacy according to different principles. From the aspect of investment and expenses of investment and exploitation they may be classified according to the requests and the type of solution as global, technical, ecological, social and urban or political. The classification may be done also according to the type of solutions such as acoustic and non-acoustic.

From the acoustic point of view the Study sees the technical solution of the noise protection through the application of 3 items mentioned under 1), 2) and 4): the sound insulation of the façade and the façade elements, the noise barrier and the selection of the special road surface.

The Study also points out the fixed layman opinion that the rows of trees and plants may be designed as contribution to the reduction of traffic noise, which is completely wrong.

It is significant to point out that interventions on the façade beside the greatest contribution to the noise reduction may also contribute to a better of energy efficacy, so the benefit doubles.

The noise barriers as one of possible acoustic solutions on the other hand significantly disturb other traffic, technical and ecological aspects, primarily the security, the orientation but also the landscape and the sight. For that reason the Study contains an illustrative survey of some technical solutions by using noise barriers.

The Study points also to the possible non-acoustic solutions which are trespassing the volume of the Study itself: the maintenance of the roadway, the changes of the traffic regime and the raise of quality of the fund of means of transportation.

Finally the dislocation of the road is always a suitable solution for a zone but with numerous negative consequences. The migration of inhabitants following the new road location and the occupancy of new areas should be mentioned as a banal consequences.

THE SUGGESTION OF THE ACTION PLAN

The action plan should be carried out through two independent and separate procedures. The first procedure presents the preparatory actions and the second procedure a range of concrete steps in the realization of the noise protection for the concrete location.

1. Preparatory phase

The part of the lacking documentation should be prepared within the preparatory phase. The sequence of steps is as following:

- 1.1. To make a unique methodology of monitoring of traffic flows including measuring the speed and the noise.
- 1.2. To make a unique methodology determining of the sound insulation of windows and the selection of the same.
- 1.3. To make a unique methodology determining of the sound insulation and sound absorption of the barrier and the selection of the same.

Remark: Points 1.2 and 1.3 imply the work out of the project task, the definition of the estimate and technical conditions.

- 1.4. To make model reports for the purpose of noise monitoring:
 - systematization according to the kind of measurement,
 - octave analysis (statistical analysis),
 - adapted methodology of measuring for the needs of the Public Enterprise “Roads of Serbia”,
 - the work out of standard reports with parallel indicators ,
 - conditions for the expert house,
 - conditions for the tender.

Remark: Appropriate technical instructions are to be worked out in the preparatory phase.

2. Realization phase

- 2.1. The initiative for noise protection on a location arises on the grounds of:
 - data of traffic counting and the jeopardizing estimate (noise maps),
 - particular or systemized noise measurements,
 - the objections and complaints of citizens,
 - by planning (decision of the investor based on the master plan).
- 2.2. Work out of the master plan of the ecological jeopardy from the road traffic noise concerning agglomerations in the state roads zone.
- 2.3. Formation of the list of priorities.

- 2.4. Deciding on the institution of the procedure.
- 2.5. Organization of the noise monitoring.
- 2.6. The initiative justification check. The decision of the necessity for protection for the concrete location is reached on the grounds of the monitoring.
- 2.7. Control of realized parameters.
- 2.8. To make the noise reduction project for priority locations:
 - Definition of the criteria and the project task,
 - Choice of the project organization,
 - To make the project.
- 2.9. Approval to the project.
- 2.10. Providing of financial resources for financing of selected projects:
 - Establishing of the volume and the dynamics of the necessary resources based on the worked out project documentation,
 - Identification of potential financial resources,
 - Applying for resources with identified financial resources.
- 2.11. Implementation of selected projects including the financial structure in the work program of the Public Enterprise “Roads of Serbia” for the coming year.
- 2.12. The selection of the most favorable bidder.
- 2.13. Work performance on the priority locations.
- 2.14. Monitoring and evaluation of accomplished results with the suggestion for solutions for advancement of the procedure in the next plan cycle.

The activities of the mentioned action plan may be accomplished by the Public Enterprise “Roads of Serbia” with the support of a certain number of external organizations. Also, the investor may chose the realization of the project according to the system “turn key” and entrust the whole work to an appropriate organization in the field of project management which would organize the realization of all activities of the action plan.

This action plan needs to be included in the program for next year.

Remark: It would be fit that the solutions for noise protection be checked on test sections for each of the three suggested protection solutions by following the acoustic parameters.

Remark: The approval of the Regulations for the work out of noise maps is awaited.

Belgrade, 28 June 2010

Project manager

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