European Commission

Regional Balkans Infrastructure Study - Transport

Appendix 7 - Final Report

Pre-feasibility Studies

July 2003

REBIS transport
Joint Venture

European Commission

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1 Introduction and summary

This appendix report comprises the pre-feasibility analyses conducted in connection with the REBIS project. This section provides a description of the process, the methodology applied and a summary of the results of the analyses. The remaining part of the appendix report provides the individual pre-feasibility analyses - conducted within a standardised framework. Each analysis can be read independently and documents the basic assumptions and calculations for the specific project.

1.1 Selection of projects for pre-feasibility analysis

The screening process of the REBIS project resulted in an assessment and ranking of projects on the core network. In a close dialogue with the European Commission, the Infrastructure Steering Group and the national authorities made a short list of projects which were then selected for pre-feasibility analysis during the spring of 2003. The criteria for selecting projects for analyses were:

- the project scored - in the screening process - above 70% of the maximum score possible (about half of all screened projects did that)
- up-to-date pre-feasibility analyses or feasibility analyses for the project were not available
- an analysis of the project was required to decide if the project was eligible for further detailed analysis or implementation without further analysis and
- the project had not been approved for implementation, and financing was not secured

In other words the REBIS project should be able to make a difference by adding value complementary to other on-going activities and to contribute to speeding up the implementation of projects.

1.2 Methodology and approach

The analyses have been carried out by REBIS consultants in the countries to ensure maximum utilisation of existing information and a close dialogue with

national authorities about project specifications and project aims. The analyses have been performed and presented within a harmonised framework to ensure consistency of results across countries.

The general principles on the methodology are described in Appendix 5: Methods for Project Screening and Pre-feasibility Analyses. However, to ensure the highest possible level of standardisation, some additional specific guidelines for project analyses have been prepared. These guidelines are summarised below.

Aim and scope of analyses

The aim of the pre-feasibility analyses has been to conduct a - preliminary - economic cost benefit analysis comparing the defined project with a realistic project reference and focussing on major changes induced by the project:

- in investment costs, operation and maintenance costs of the infrastructure
- in travel time for persons
- in operating costs of rolling stock and equipment
- in traffic safety

In addition, project information on financial issues, major environmental impacts and potential institutional barriers for project implementation have been considered qualitatively. However, an EIA is not performed as part of the pre-feasibility analyses

The pre-feasibility analyses follows the general principles for economic cost-benefit analysis - including those used in the TINA process. The major differences between the conducted pre-feasibility analyses - carried out over a short period with limited resource usage - and normal full comprehensive feasibility analyses are that:

- the traffic analyses are not based on major surveys and comprehensive network modelling or specific modal choice modelling, but accurate forecasts of future traffic is in any case very uncertain in the region

- estimates of infrastructure costs are, in many cases, not built on up-to-date specific design studies and are therefore more uncertain

- that likely traffic safety benefits are more uncertain due to the lack of specific historical accident data

- external costs related to environmental impacts are not directly included in the analysis

The results of the pre-feasibility analyses can be used by national authorities and IFIs to decide whether a more comprehensive and detailed analysis is required before a decision about the project is to be made. The project results

are also used by the REBIS consultants in the process of preparing the recommendations for the short term investment plan.

Specific guidelines

The basic principle is that the same general approach and assumptions are used in all countries, but data inputs are adopted to the local conditions if good local data are available and not in contradiction to the overall principles. Furthermore, to ensure that each pre-feasibility analysis can be read independently but still being prepared in a manner consistent with the other pre-feasibility analyses, a draft list of content has been defined.

Generally, the methodology for project appraisals is by far best developed for road projects, whereas general standardisation of railway project appraisals, in practise, is less and is least developed for other transport modes.

Traffic analysis

The REBIS forecasting model including traffic data and GDP projections is the basis for assessing actual traffic levels and future traffic levels in both the reference and the project situations. If specific trustworthy project data is available in the country and then said well documented such data has been used instead of the REBIS data. In some specific projects (small) traffic surveys have been conducted to obtain a reasonable understanding of the actual traffic situation.

Generally, for existing road or rail alignment projects, induced or transferred traffic from other modes/routes is not taken into account unless very special circumstances exist. This will, in most cases, mean that traffic forecasts in the reference and project situations are identical. Projects for new alignments require specific traffic assessments.

Traffic benefits

For **road projects** standardised Vehicle Operating Costs (**VOC**) are established and applied. The VOC calculations are made with the World Bank developed RED model for cars and trucks considered relevant for the region.

One type of car is considered. Three types of trucks are considered and weighed together depending on the national situation:

- medium truck (single lorry minimum 6 wheels)
- heavy truck (semi-trailer)
- articulated truck (lorry with trailer)

If no national data on truck composition is available, the three types of truck are included with 1/3 for each. For trucks, the driver costs are included as part of the VOC.

The second type of traffic benefit is Value of Time (**VOT**) for drivers and passengers in cars. When no official data are available, VOT of a lost/gained hour of work is calculated as GDP/capita with addition of 50% (to account for the unofficial part of the economy) divided by 1650 hours (typical number of annual working hours), and that VOT for leisure travel purposes is 1/3 of business/work travel purpose. The composition of travel purpose (business, leisure) is based on specific project data, if available, but a starting point is 33% business and 67% leisure.

No value of time for goods is considered.

If reliable assessments of changes in **traffic safety,** as a consequence of the project, are available this benefit is included in the analysis. The value of saved/avoided accidents used for planning varies enormously between countries with the same level of economic development, so there are no generally accepted values internationally. Based on an analysis made by the World Road Association of the relationship between GDP/capita and used value of accidents in a large number of countries the values are estimated in the following way:

Value of a fatal injury = 1000 x (GDP/capita) / 68

Value of a non fatal injury = 0.28 x 1000 x (GDP/capita) / 68

If no reliable data or assessments are available, a qualitative statement of the likely impacts is included.

The benefits from **rail projects** depend greatly on the specific type of project. Principally, the same types of benefits as those for road projects are considered.

The benefits related to rolling stock are primarily related to reduced travel times in the form of reduced capital costs and costs of crew. Other forms of benefits could in principle be reduced maintenance of rolling stock and lower energy costs, but these types of benefits are not included in the pre-feasibility analysis unless good and trustworthy data on such benefits can be made available.

As very little data is normally available locally for Train Operating Costs (**TOC**), TOCs from the EBRD study on: Project Scooping for railway rehabilitation in Bosnia and Herzegovina, Investment Project Appraisal, Annex 6 for inspiration for railway project analyses (section 2.1.5) are used; the study data are updated to 2002 price levels by increasing the study values by 10%:

Freight train with two locomotives	1.07 EUR/minute
Freight train with one locomotives	0.61 EUR/ minute
Wagon costs (80 axles)	0.78 EUR/ minute
Passenger trains	0.72 EUR/ minute
Passenger coaches	0.00 EUR/ minute

The number of passenger coaches in use is not expected to be adjusted as a consequence of the study, due to general schedule planning and therefore no

savings are included. Operating cost of rolling stock related to km driven such as energy and maintenance costs are included when this is a major element in the project, but often these benefits are small compared to other benefits.

Value of time of passengers are calculated as for road projects, but especially the distribution of trip purposes is investigated, as the share of train passengers travelling with business purpose normally is lower than for cars.

Traffic safety benefits will normally not be included in the rail project assessments. Firstly, experience shows that this benefit is generally small, as the probability of rail accidents in Europe is small, and secondly, data on accident probabilities and changes due to a project are not available.

The indications from the EBRD study are that the largest benefits in many rail projects are related to reduced operating and maintenance costs of the infrastructure and not to savings of passengers and rolling stock.

For **port, inland waterway and airport projects** the same basic approach is used as for road and rail projects, but the quantification of specific effects (e.g. traffic changes, saved time and accidents) may be done on ad hoc basis depending on the project and the information available.

Infrastructure costs

For all projects it is the general principle to use locally made estimates of infrastructure costs and changes in annual operating and maintenance costs, but these estimates are checked against the consultants' data base with unit cost.

Applied price and cost levels

All costs and benefits in the analyses are made in economic prices, which are market prices minus taxes, dues etc. The price level in all calculations is 2002 price level.

Generally, it is assumed that economic unit costs/prices depending on salary levels will increase in pace with real development in GDP (as specified in the assumptions for the REBIS traffic model).

This means that VOT and costs of accidents should increase with the same growth rate as real GDP development. Furthermore, the part of the VOCs and TOCs related to staff costs should also be increased with the same growth rates as GDP (in fixed price level), whereas the other part of VOCs should remain constant in fixed price level. All other prices/costs are kept constant in 2002 price level.

Financial issues

It is considered if the project is likely to be partly financed from user payments (e.g. toll roads, increased ticket revenues in railways). Information on

committed financial sources from public bodies and IFIs is reviewed and reported.

Environment implications

Environmental problems (and benefits) identified in relation to the project are stated in qualitative terms only. Normally improvement and modernisation of existing links/alignments will not cause major environmental problems, but the situation may be different for new links and alignments. The assessment is based purely on existing information available and no field studies are made.

Institutional barriers

For each project it is considered if there are institutional barriers for the implementation of the project. If this is the case these barriers are identified.

1.3 List of content for pre-feasibility analyses

The principal list of content for the analyses is:

1 Introduction and background

2 Project description

3 Traffic

4 Benefit assessment

5 Cost assessment

6 Economic analysis

7 Financial analysis

8 Environmental applications

9 Institutional barriers

10 Summary of conclusions

In practise, the individual analysis may vary slightly from the above list of content depending on the specific characteristics of the project[1], but all elements are treated in the analyses.

[1] E.g. the analysis of YU-H-11, Second carriageway between Novi Sad and Hungarian border vary from the other road project analyses due to the amount of information and existing analyses available.

1.4 Summary of results

A short summary of the results and recommendations for the analysed projects is presented in the following. For each project the real internal rate of return p.a. (IRR) and the estimated investment cost (exclusive VAT and taxes, land costs and design and supervision) are shown in 2003 prices.

The location of projects is shown in Figure 1.1 and Figure 1.2.

AL-H-06: Rehabilitation Road Link Hani Hotit - Shkoder (29 MEUR)

Location: Route 7 on the Core Network

Recommendations and conclusions:
The project concerns the improvement of the link of the Core Network between Albania and Montenegro and the reduction of the costs for regional and local traffic. Two alternatives have been analysed, with and without bypasses of main urbanised areas. For both alternatives, the economic cost-benefit analysis indicates that the projects are feasible. The IRR for the solution with bypasses is 13.4% (Alternative I), while it is 17.8% for the alternative without bypasses (Alternative II).

It is recommended:

- to undertake the necessary environmental assessment for Alternative II
- to start engineering design for the project
- to update the pre-feasibility study to a full feasibility study once the final cost estimates from the engineering design are ready and the environmental assessment has been carried out

BO-H-03: Reconstruction of the road link Šešlije – Šamac (18 MEUR)

Location: Corridor Vc on the Core Network

Recommendations and conclusions:
The economic pre-feasibility analysis indicates that the rehabilitation of the road from its southern end at Šešlije up to the northern end at Šamac at the border crossing with Croatia is economically feasible. The project IRR in the base case scenario is very high, 49%, and is robust even under pessimistic assumptions regarding traffic growth and investment costs.

It is recommended to launch the following activities immediately:

- updated economic feasibility study using HDM-IV
- detailed engineering design and preparation of documents for tender
- Environmental Impact Assessment

BO-H-10: Reconstruction of road link South Zenica – Visoko (156 MEUR)

Location: Corridor Vc on the Core Network

Recommendations and conclusions:
The economic calculations show an economic IRR of 15.2%. This indicates that the project is feasible, primarily because the project covers the second step of the construction of the motorway. The previously made investments, included in the construction of the first phase, are expected to reduce the costs of this project considerably.

It should be noted that there is considerable uncertainty related to the traffic data. The figures used are from the REBIS model concerning the traffic between Sarajevo and Zenica. Other sources provide figures that are different and significantly lower, which would have a marked effect on the IRR of the project.

The project should be further developed as the pre-feasibility study indicates a strong economic performance. The following steps are recommended:

- to develop a full-scale feasibility study including EIA, traffic counts and OD surveys
- to develop - as part of or parallel to the feasibility study - a conceptual design for better estimation of costs and environmental issues, and for better understanding of the technical requirements in the difficult terrain

BO-R-02: Reconstruction of the rail line Konjic to Mostar (26 MEUR)

Location: Corridor Vc on the Core Network

Recommendations and conclusions:
The pre-feasibility analysis of the rehabilitation of the 62 kilometres long single-track line section between Konjic and Mostar shows that the project may not be economically feasible in the short term.

The railway project is a continuation of the ongoing rehabilitation of the railway line between Sarajevo and Konjic, which is carried out under an EBRD/EIB loan to be completed by 2004.

The economic analysis shows an IRR of around 1% in the base case. Taking into account the uncertainties related to the demand assessment, an updated economic feasibility analysis could be launched at a later stage. This should be based on a more detailed assessment of the market development to/from the port of Ploce and take into account impacts on road traffic, if rail traffic were to stop completely on the line.

CR-H-02abc: Upgrade from semi-motorway to full motorway on three sections from Kikovica-Kupjak (Section a: 141 MEUR, sections b+c: 155 MEUR)

Location: Corridor Vb on the Core Network

Recommendations and conclusions:
The main effect of the three sub-projects is increased capacity of the southern end of the ARZ motorway. However, due to initial low levels of traffic and high capital costs, benefits are forecast to be relatively small compared to the cost of the individual projects. NPV and IRR are clearly negative, so that the cost-benefit results are unable to justify any upgrade to full motorway profile for the moment.

From a financial viewpoint, any upgrade not yet initiated should be deferred until there is significantly more traffic and the motoring public becomes more willing to pay the higher tolls that would be required by the proposed projects.

CR-R-02b: Modification of electrical traction system Moravice-Rijeka-Sapjane sections (56 MEUR)

Location: Corridor Vb on the Core Network

Recommendations and conclusions:
The pre-feasibility study has analysed the proposed upgrading of the remaining part of the Croatian railway network that operates on 3kV to 25kV traction. The main effects of the proposed project are the avoided investment and operating costs associated with keeping the existing system. The economic analysis shows attractive returns. For the central case, IRR is nearly 34%.

It is recommended to proceed with a feasibility study including a more in-depth financial assessment of the project. The financial assessment should e.g. look into the freight revenues to determine, if the present traffic is profitable, and investigate further alternatives such as diesel locomotives options.

CR-R-06an: Remote control traffic system Savski Marof - Zagreb - Tovarnik (23 MEUR)

Location: Corridor X on the Core Network

Recommendations and conclusions:
The project analysed includes the installation of a remote control system for train traffic regulation. The main quantifiable benefit from the project is expected to be a reduction in manpower at many of the stations on the Corridor X railway line.

The cost-benefit results indicate that the project is likely to be economically feasible. For the central case, the economic IRR is about 16%. The project

could turn out to be a politically sensitive project, involving a significant number of redundancies, if the benefits from the project are to be realised.

It is recommended to carry out a feasibility study, and it may be sensible to include a similar project (CR-R-02c) on railway Corridor Vb and the section Zagreb-Sisak-Novska (which can be considered as part of Corridor X) as integrated components of the study.

MA-H-11: Upgrading of Gradsko-Prilep (13 MEUR)

Location: Corridor Xd on the Core Network

Recommendations and conclusions:
The proposed project is economically feasible with an IRR in real terms of more than 21% - if a new competing road connection is not constructed.

However, the road is most likely a temporary alternative to the direct route from Veles to Prilep, for which the Government is actively seeking financing and, which has a higher priority than the rehabilitation of the project road (and an even higher IRR according to another study).

It is suggested to carry out a feasibility study building on the present pre-feasibility study and a pre-feasibility study carried out on the alternative new route Veles-Prilep. The study should also include environmental impact assessments of the two possible projects. Based on such a feasibility study, a decision should be taken on how to develop this part of the Core Network and where to focus the investment. As, at least, one of the projects will most likely be recommended for implementation, planning should proceed immediately.

MA-H-18: New motorway Kumanovo - Tabanovce (6 MEUR)

Location: Corridor X on the Core Network

Recommendations and conclusions:
Due to the low traffic, the economic performance of the project is relatively weak with an IRR of 7 %.

Furthermore, there is a need to better analyse the environmental aspects and to assess mitigation costs associated with e.g. noise barriers more precisely.

The project may soon become the only short stretch for a relatively long part of Corridor X, which is not motorway standard, and, thus, it can be considered to upgrade the road in the medium term to complete the network. Furthermore, the project can be re-considered at short notice as the design exists in case traffic develops faster than expected.

MA-R-10n: Up-grading of the railway line Skopje - Tabanovce (16 MEUR)

Location: Corridor X on the Core Network

Recommendations and conclusions:
The project concerns the modernization of the railway line between Skopje and Tabanovce at the border with Serbia and Montenegro over a total distance of 48.8 km.

The economic analysis of the upgrade shows a low IRR at around 4%. Traffic levels are insufficient to make the investment economically attractive, even assuming that significant traffic may be attracted to the railway as service is improved. It is recommended to conduct a feasibility study at a later stage to assess, in more detail, the potential of increasing future traffic as well as the alternative and less costly investment solutions that could sufficiently improve the quality of the services to attract more international traffic.

YU-H-11: Construction of a second carriageway on the E-75 Highway between Novi Sad and the Hungarian border (Horgoš) (92 MEUR)

Location: Corridor X on the Core Network.

Recommendations and conclusions:
The economic pre-feasibility analysis indicates that the upgrading of the existing road to a full motorway between Novi Sad and Feketić (70 km) may be feasible in the short term, as the IRR is around 10%. A feasibility study to confirm the conclusion and to determine the optimal phasing of the construction works is recommended. The section between Feketić and Horgoš is, with an IRR of 6%, less likely to be feasible in the short term and may be considered in a longer term perspective for the development of Corridor X.

YU-H-19: Podgorica Eastern Bypass (15 MEUR)

Location: Route 4 on the Core Network.

Recommendations and conclusions:
The project involves the construction of a bypass road including a 330 m bridge across a river east of the existing road, which is presently used for both local and transit traffic. The bypass is aligned along an existing road which is, thus, made part of the bypass.

The pre-feasibility analysis shows an internal rate of return of above 20%. The estimates on speed/traffic relations are rather elaborate, hence the time saving calculations are thorough. However, the results contain some degree of inaccuracy/uncertainty due to the rough traffic model used.

A more detailed feasibility is recommended as a next step. It is proposed to look at the entire traffic of Podgorica and possibly establish a traffic model for major roads into and through Podgorica. The bypass project may also include a review of traffic regulation (signals etc.) through the city centre with the aim of increasing capacity.

YU-R-01ab: Rehabilitation of Belgrade – Stara Pazova – Sid – Tovarnik (71 MEUR)

Location: Corridor X on the Core Network

Recommendations and conclusions:
The rehabilitation of the railway section from Stara Pazova to Sid on the line Belgrade - Tovarnik (at the border to Croatia) will establish a fully functional rail line between Belgrade and Croatia, which meets Trans European Railways requirements.

However, the current traffic level is not sufficient to justify the high investment cost. The economic cost-benefit analysis shows a relatively poor result with an IRR reaching –0.7% for the main scenario.

If effects of mode shift from road to rail and induced traffic were to lead to a 100% growth in traffic under a high traffic growth scenario, IRR would reach 6.8%.

The rehabilitation of the railway section from Stara Pazova to Sid on the line Belgrade - Tovarnik (at the border to Croatia) is urgent from an operational point of view, but from an economic perspective, the justification needs to be strengthened by further detailed studies.

It is recommended to launch a feasibility study, which should also look at more cost-effective options such as restoration of the railway section to original design speed.

YU-R-02: Modernisation of the railway section from Ralja to Kovacevac (14 MEUR)

Location: Corridor X on the Core Network

Recommendations and conclusions:
The rehabilitation of the railway section from Valja to Kovacevec on the line Belgrade – Nis – Presevo – Tabanovce will contribute to the establishment of a fully functional rail line from Belgrade in Serbia and Montenegro to Bulgaria and FYRO Macedonia.

The economic cost-benefit analyses show good results with an IRR of 13% for the main scenario without including the external effect of mode shift from road to rail and possible induced traffic.

It is recommended to proceed with a full feasibility study and an EIA.

YU-R-07: Repair of Danube and Sava Bridges at Belgrade (12 MEUR)

Location: Corridor X on the Core Network

Recommendations and conclusions:
The project includes the repair of the destroyed Ostruznica Bridge on Sava River and the strengthening of the old Pancevo Bridge on Danube River in order to re-establish a fully functional corridor X rail line for freight transit traffic bypassing Belgrade centre and to ensure a fully functional rail line for rail passenger traffic (both commuter and long distance).

The economic cost-benefit analyses show the following results:

- for the Ostruznica bridge, the analysis results in an IRR of 27% for the main scenario
- for the Pancevo bridge, the result is an IRR reaching 13% for the main scenario

It is recommended to prepare a full feasibility study for the 2 bridges including an EIA study.

YU-R-08: Reconstruction of the Zezlj Bridge at Novi Sad (30 MEUR)

Location: Corridor Xb on the Core Network

Recommendations and conclusions:
This reconstructed bridge will have two road lanes for road traffic and three railway tracks for rail traffic. The reconstruction of the Zezlj bridge at Novi Sad will establish a fully functional rail line by removing the present rail bottleneck in the form of a temporary bridge on the corridor X while, at the same time, facilitating river transport on the Danube, which is presently hampered by the temporary bridge.

The economic cost-benefit analysis shows an IRR of 6.9% for the main scenario. It is recommended to carry out a full feasibility study and an EIA for the project.

YU-KO-H-04: Improvement/up-grading of M25 Pristina-Prizren-Vrbnica (19 MEUR)

Location: Route 7 on the Core Network

Recommendations and conclusions:
The project concerns the upgrading of the road between the Albanian border and Lipljan, where the road M25 South merges with the road M2 South about 7.5 km of Pristina, covering a total distance of 77.5 km. The project considers various up-grading possibilities including:

- improvement of the existing road
- construction of a new four-lane motorway
- construction of by-passes around the three major cities, which the road crosses or, alternatively, rehabilitation of city streets

The pre-feasibility analysis shows that the rehabilitation and up-grading of the road from Lipljan to the Albanian border, including the construction of about 10 km of climbing lanes, has an IRR of more than 20% and, thus, is economically justified. The analysis also shows that the construction of a new motorway from Lipljan to the border is not likely to be justified.

A comprehensive feasibility study is recommended to verify the results of the pre-feasibility analysis.

YU-KO-H-05: Western road by-pass of Pristina on the Core Network (31 MEUR)

Location: Routes 6 and 7

Recommendations and conclusions:
The key routes linking the North with the South of Kosovo (M2 and M25) and linking the East with the West (M9) go to the center of Pristina. As a result the through traffic must merge with the local traffic to cross Pristina, creating heavy traffic jam in the city center.

The prefeasibility study analyses a number of different investment options in the form of improvement or upgrading of roads. The economic analyses show that several of the proposed investments result in IRRs of more than 20%

It is recommended to carry out a full feasibility study comprising all major options considered in the pre-feasibility analysis including an EIA.

AL-P-Durres: Draft Terms of Reference for Master plan for the development of the Port of Durres (n.a.)

Location: Corridor VIII on the Core Network

Recommendations and conclusions:
The purpose of the study is to review, update and complete the current Land Use Plan of the Port of Durres from 2000 taking into account all the studies carried out since 1989, and embodying the new policy for the development of the Port as laid down in the proposed Port Law, recently, submitted to Parliament.

YU-H-35N: Bypass Bijelo Polje (39 MEUR)

Location: Routes 4 and 6 on the Core Network

Recommendations and conclusions:
The project concerns the construction of the by-pass to avoid transit traffic through the centre of Bjelo Polje and to improve the condition at Bjelo Polje. In addition, the improvement of the existing road alignment and the rehabilitation of the most deteriorated sections are also included.

A pre-feasibility analysis of the project has not yet been completed but will be included in the Final Report.

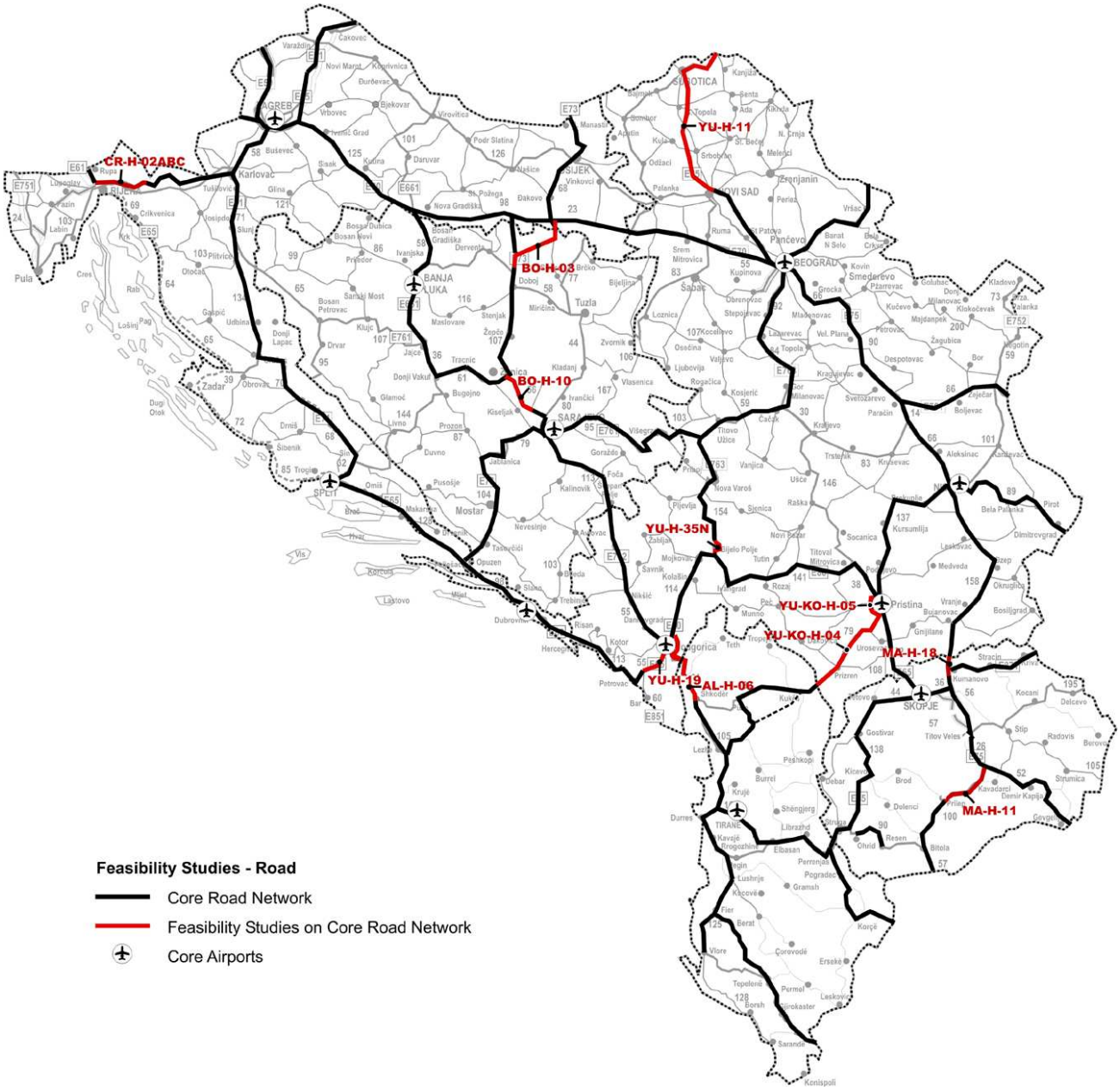

Figure 1.1 Location of pre-feasibility studies - road.

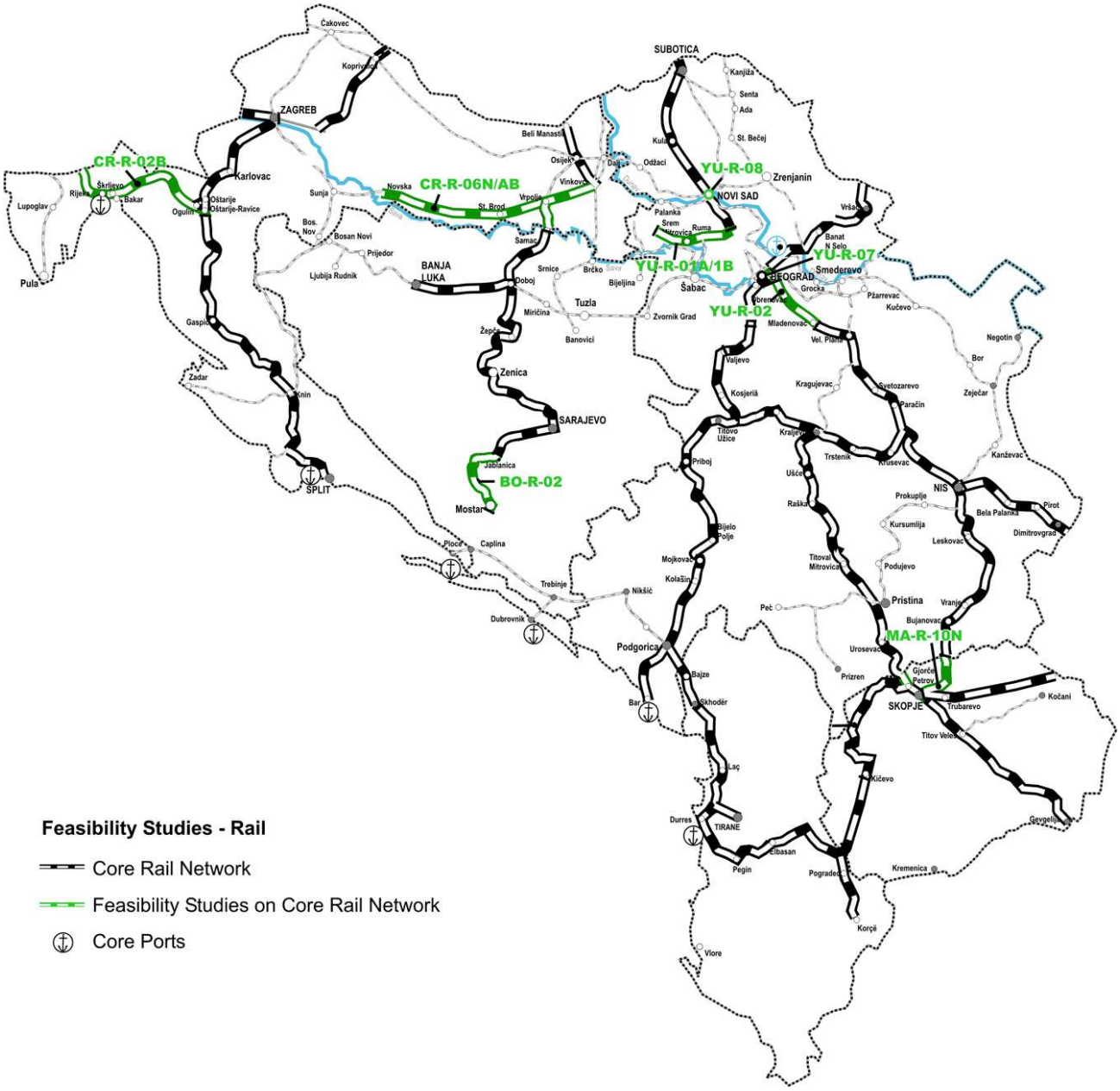

Figure 1.2 Location of pre-feasibility studies - rail.