

European Commission

**Regional Balkans
Infrastructure Study -
Transport**

Appendix 4 - Final Report

Investment Requirements

July 2003

European Commission

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Transport**

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Report no. 2
Issue no. Final
Date of issue 23 July 2003

Prepared JC/BS
Checked PCH
Approved ELH

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1 Introduction

The main objective of the Investment Requirements was to undertake an assessment of the investments needed to bring the network up to "EU-standard" by 2015.

The study included the collection of up-to-date information on construction costs and investment needs for the entire network.

The study was carried out during the period late February until early May 2003.

The result of the inventory includes ongoing projects, planned projects and new projects necessary to upgrade the network.

2 Methodology

2.1 General

The methodology adopted for the collection of technical data and estimated costs for modernisation of the road and rail network basically followed the methodology used for the TINA study, with minor modifications.

2.2 Standards

For roads, the European Agreement on Main International Traffic Arteries (AGR) has been used to define EU-standard for roads by 2015. The design speed is, in general, expected to be 80 km/h for all express and ordinary roads and 120 km/h for motorways. The design speed may be reduced in exceptional cases such as a limited length of road and in areas with difficult topographic conditions.

For railways, the "European Agreement on Main International Railway Lines" (AGC), and "European Agreement on Important International Combined Transport Lines and Related Installations" (AGTC) have been used as guidelines. An "Inventory of existing AGTC and AGC standards and parameters" was prepared by the United Nations Economic Commission for Europe (UN/ECE) in 1997. However, these agreements are rather ambitious and only Corridor X has been proposed for upgrading to 160 km/h while the other lines may have lower travel speeds.

3 Results

3.1 Investment costs on each corridor/route

In Table 3.1 an overview of the investments in each of the corridors and routes is given:

Table 3.1 Long-term investments on the Core Network.

Corridor/route	Road investment cost, million EUR	Rail investment cost, million EUR	Total investment, million EUR
Corridor V b	421	1,099	1,520
Corridor V c	461	1,593	2,054
Corridor VIII	409	1,167	1,576
Corridor X	689	2,731	3,420
Corridor X a	27		27
Corridor X b	132	369	501
Corridor X c	75	173	248
Corridor X d	75	304	379
Route No. 1	672	671	1,343
Route No. 2	463	244	707
Route No. 3	150		150
Route No.4	256	2,157	2,413
Route No.5	20		20
Route No. 6	144		144
Route No. 7	231		231
Route No. 9		213	213
Route No. 10		1,343	1,343
Route No. 11		288	288
Total	4,225	12,352	16,577

It is apparent that the overall majority of the identified investments are in the railway sector and these projects are, in general, modernisation of old lines. Railway has in general a lower feasibility than road projects. In particular it is our impression that the mentioned projects will turn out to have an unacceptable low economic feasibility.

In Annex 4.1, the location of the modernisation projects (road and railway) are shown.

3.2 Cost per country compared to Gross Domestic Product (GDP)

The GDP for the various Balkan countries in 2001 has been collected as described in Chapter 2.10 of the Main Report. Based upon these figures and estimates for the increase in GDP during the next 12 years, the following GDP has been calculated and the investment costs have been compared to the GDP:

Table 3.2 Comparison of GDP and investments.

	Sum of GDP from 2003 to 2015 (both incl.) in million EUR	Road investment, million EUR	Rail investment, million EUR	Total, million EUR	Total investment in percent of GDP
Albania	102,410	607	821	1,428	1.4
Bosnia and Herzegovina	99,420	889	1,584	2,473	2.5
Croatia	407,491	1,084	2,549	3,633	0.9
FYRO Macedonia	69,880	341	1,537	1,878	2.7
Serbia and Montenegro	233,322	1,304	5,861	7,165	3.1

In the TINA study a limit of 1.5% of the GDP was used as a guideline for the maximum investment in transport infrastructure (roads, railways, ports and airports). Assuming the same guideline in the REBIS countries, the investment level in Bosnia and Herzegovina, FYRO Macedonia and Serbia and Montenegro is slightly higher. However, compared to the TINA network the REBIS network is denser due to the fact that the countries are smaller and thus higher investment should be expected. In Serbia and Montenegro it may be difficult to ensure financing for all identified investments.

3.3 Collection of information and data

Data collection began with the preparation of questionnaires for cost estimates, and investment plans for the coming years. The questionnaires were sent to all Road and Rail Authorities in the five countries.

The information received has been studied and validated by the consultant. Interpretations, revisions and assumptions have been made by the consultant where insufficient data was received from the local authorities and/or where information was missing. The interpretations, revisions and assumptions have not been commented on by the local authorities as it was the case in the TINA project.

4 Roads

4.1 Visit to the road authorities

A substantial amount of information has been given to the consultant during meetings with road authorities and with the local REBIS offices.

Construction costs for the typical upgrading activities were also collected from the individual road authorities and ministries and they have been compared to construction costs for similar works in other countries in the region.

4.2 Road Capacity and Traffic in 2015

4.2.1 Road Capacity

In order to have a common basis for assessment of the capacity of the roads the tables shown below have been used. They are based upon "*Highway Capacity Manual 2000*" issued by Transportation Research Board in USA.

Table 4.1 Estimated Capacity Levels for 2x2-lane Highway.

AADT Veh/day	Free Flow Speed	
	80 km/h	100 km/h
Level terrain	(33 - 39,000)	38 - 46,000
Rolling terrain	(31 - 37,000)	36 - 44,000
Mountainous terrain	28 - 34,000	(33 - 40,000)

For 2x3-lane divided highway 50% may be added

Table 4.2 Estimated Capacity Levels for High Class 2-lane road.

AADT Veh/day	Free Flow Speed	
	80 km/h	90 - 110 km/h
Level terrain	(11 - 15,000)	13 - 15,000
Rolling terrain	(9 - 14,000)	12 - 15,000
Mountainous terrain	3 - 8,000	(5 - 8,000)

4.2.2 Traffic in 2015

The results from the REBIS Traffic Forecast Model (the Moderate Scenario) have been used to determine the traffic volumes (ADT) in 2015. A comparison of the traffic forecast for year 2015 and the expected capacity has been used to determine the need for capacity improvements, e.g. to upgrade from 2 lanes to 4 lanes.

4.2.3 Determination of investment needs

The investment projects have been identified either as projects which have already been planned, designed or tendered or future projects needed in order to ensure that:

- the width of the highways as a minimum fulfil the AGR-standard
- the capacity of the roads in 2015 is sufficient
- the pavement will be able to handle the expected traffic without unreasonably high vehicle operating costs

The projects have generally been suggested by the road authorities and validated by the consultant but not all suggestions have been accepted, e.g. some new motorways or four lane roads have not been included because the expected traffic in 2015 is not considered sufficient to make the investment feasible (eg. when ADT is less than 20,000).

However, it must be underlined that only feasibility studies can, at a later date, determine the exact feasibility of the individual projects.

4.3 Main Results

4.3.1 Typical upgrading projects on the core network

The typical upgrading projects, until 2015, will be rehabilitation of pavements, bridges and tunnels, widening of the pavement to 7 m and some realignments.

Widening of Narrow Roads. An important issue is widening of roads and increasing curve radii. About 870 km or 13 % of the roads need to be upgraded because they are too narrow. They have to be at least 7 m wide in order to fulfil the minimum AGR standard. The existing geometry of the road network is shown on the map Road Geometry in Appendix 1.

Pavement Condition. Another main issue is the upgrading of existing pavements on certain roads. The pavement condition was:

- | | |
|--|------|
| - Roads without problems | 28 % |
| - Roads which need new wearing course | 25 % |
| - Roads which need pavement rehabilitation | 24 % |

- Roads which need overlay +new wearing course 12 %
- Roads which need complete new pavement 11 %

The existing pavement condition of the road network is shown on the map Road Condition in Appendix 1.

By-passes. There are obstacles near some of the big cities for transit traffic due to heavy internal traffic. For that reason certain by-passes (around Belgrade, Tirana, Pristina, Mostar and Skopje) have been included by the Consultant.

Capacity. The majority of the roads have sufficient capacity to cover the projected traffic in 2015. Most of the roads which need upgrading due to capacity constraints up to 2015 are already under construction.

4.3.2 Costs

The unit costs used in the calculation of the investments have been based on the information received from the road authorities, but adjusted for comparison with the unit prices used in the TINA project and tender prices from international tenders. In general, a price level close to the one reported from Croatia has been used with minor modifications in all countries. The unit costs applied are shown in Annex 4.2 along with the total costs for each road section.

The price level is that for 2003.

The estimated total cost for upgrading the road core network in the Balkans, for the period 2003-2015, is EUR 4,097 million. The costs are distributed on the corridors as shown in Table 3.1. These costs do not include normal maintenance costs.

4.4 Individual Countries

This chapter describes the investment projects needed to be implemented before year 2015 including the related construction costs.

4.4.1 Albania

Projects

Upgrading from 2 to 4 lane road:

- Corridor VIII, 20 km, Rrogozhine - Lushnje

Upgrading from 2 to 4 lane road and complete new pavement on existing:

- Corridor VIII, 70 km, Lushnje - Fier - Vlore

Upgrading with complete new pavement:

- Corridor VIII, 25 km, Elbasan - Librazhd
- Corridor No. VIII, 64 km, Prenjas - Pogradec - Maliq - Korce
- Route No. 2b, 132 km, Bajze (border) - Shkoder - Mamuras - Vorre

- Route No. 2c, 105 km, Fier - Gjirokaster - border (Muzine)
- Route No. 7, 139 km, Lezhe - Kallmet - Blinisht - Puke - border (Kukes)

Costs

Estimated cost for upgrading the core network in Albania is EUR 607,000,000 distributed as follows:

- Corridor VIII	EUR 281.5 million
- Route No. 2b	EUR 52.0 million
- Route No. 2c	EUR 73.5 million
- Route No. 7	EUR 200.0 million

The total amount is equal to EUR 0.69 million/km core network in Albania and 0.33 % of the estimated GDP amount between year 2003 and 2015.

4.4.2 Bosnia and Herzegovina

There is a need for the rehabilitation and maintenance of certain roads and tunnels and on certain stretches to provide protection against landslides.

Plans in the Road Sector

According to information received from Federation BH Road Directorate, there are no plans for construction of any new roads for the time being. BH Road Directorate has a 3 years planning schedule and only some maintenance and rehabilitation projects are planned within this period.

Projects

Upgrading of following roads:

- Corridor Vc, 234 km, from Bos Samac (Border) to Sarajevo
- Corridor Vc, 105 km, from Sarajevo to Mostar
- Corridor Vc, 20 km, Mostar By-pass
- Corridor Vc, 60 km, from Mostar to Metkovic (border)
- Corridor Vc, 17 km, alternative link D. Bebrin (border) to Podnovlje
- Route No. 2b, 84 km, Sarajevo - Dobro - Foca - Scepan Polje (border)
- Route No. 2a, 213 km, Bosan Gradiska - Klasnice - Banja Luka Zenica
- Route No. 3, 135 km, Sarajevo - Rogatica - Medjedja - border (Visegrad)
- Route No. 1, 7 km, Neam (border) - Duzi (border)

Costs

Estimated cost for upgrading the core network in Bosnia and Herzegovina is EUR 888 million distributed as follows:

- Corridor Vc , Bos Samac (Border) to Sarajevo	EUR 456 million
- Corridor Vc , Sarajevo to Mostar	EUR 76 million
- Corridor Vc , Mostar By-pass	EUR 36 million
- Corridor Vc , Mostar to Metkovic	EUR 5 million
- Route No. 2b, Sarajevo - Dobro - Foca - Scepan Polje	EUR 96 million
- Route No. 2a, Bosan Gradiska - Zenica	EUR 196 million

- Route No. 3, Sarajevo - border (Visegrad) EUR 140 million
- Route No. 1, Neam (border) - Duzi (border) EUR 1 million

The total amount is equal to EUR 0.99 million/km core network in Bosnia and Herzegovina and 0.90 % of the estimated GDP amount between years 2003 and 2015.

4.4.3 Croatia

Projects

Motorways and semi motorways planned or under construction:

- Corridor Vb, 34 km from Gorican to Kneginec.
- Corridor Vb, 95 km (part of Rijeka-Zagreb Motorway)
- Corridor Xa, 8 km from Zapresic to Jankomir near Zagreb need upgrading from 2 to 4 lanes

Costs

Road upgrading within the core network in Croatia is well underway and most of the projects are already financed by loans.

The estimated cost is about EUR 1,083 million distributed as follows:

- Corridor X EUR 60 million
- Corridor X a EUR 27 million
- Corridor Vb EUR 421 million
- Corridor Vc EUR 5 million
- Route No. 1 EUR 571 million

The total amount is equal to EUR 0.79 million/km core network in Croatia and 0.19 % of the estimated GDP amount between year 2003 and 2015.

4.4.4 FYRO Macedonia

Projects

The following roads are proposed for upgrading as they are too narrow and have too small curve radii:

- Corridor X d, 44 km from Gradsko to Pletvar
- Corridor VIII, 27 km from Stracin to Kriva Palanka
- Corridor VIII, 13 km from Struga to the border
- Route No. 6, 20 km from Skopje to the border near Den Jankovic

Other projects

- Corridor VIII, Skopje-bypass 25 km around Skopje
- Upgrading of conditions on about 400 km other roads as specified in Detailed calculation (Appendix 4.2)

Costs

Estimated cost for upgrading the core network in FYRO Macedonia is EUR 287.9 million distributed as follows:

- Corridor X EUR 114 million
- Corridor X d EUR 75 million

- Corridor VIII EUR 128 million
- Route No. 6 EUR 24 million

The total amount is equal to EUR 0.57 million/km core network in FYRO Macedonia and 0.49 % of the estimated GDP amount between years 2003 and 2015.

4.4.5 Serbia

Preliminary design

The Road Directorate has/will prepare preliminary design for motorways as follows:

- Novi Sad - Subotica finished by March 2003
- Levosojе - Leskovac finished by end of 2003
- Nis Romania border finished by end of 2003

Core Network

The road Directorate wants to include Cacak - Kraljevo - Krusevac - Pojate road and Kraljevo - Kosovska Mitrovica road in the Core network.

Projects

New construction:

- Corridor X, 47 km, Remaining part of Belgrade By-pass
- Corridor Xb, Novi Sad - Batajnica (Belgrade)
- Route No. 4, Cacak By-pass

Upgrading of following roads:

- Corridor X, 114 km, Batrovic (Border) - Belgrade
- Corridor X, 228 km, Beograd - Nis
- Corridor X, 155 km, Nis - Strzovce (border)
- Corridor Xb, 122 km, Horgos (border) - Novi Sad
- Corridor Xc, 108 km, Nis - Bimitrovgrad (border)
- Corridor Xc, 81 km, Kocane - Raca
- Route No. 3, 33 km, Sljivovica - Kremna
- Route No. 4, 77 km, Pancevo - Vadin (border)
- Route No. 4, 326 km, Belgrade - Uzice - Nova Varos - Trojica (border)
- Route No. 5, 98 km, Paracin - Zajecar (border)
- Route No. 6, 18 km, Spiljani (border) - Ribarice (border)
- Route No. 7, 81 km, Kocane - Raca

Costs

Estimated cost for upgrading of the core network in Serbia is EUR 517 million distributed as follows:

- Corridor X EUR 514 million
- Corridor Xb EUR 132 million
- Corridor Xc EUR 8 million
- Route No. 3 EUR 10 million
- Route No. 4 EUR 102 million
- Route No. 5 EUR 20 million

- Route No. 6 EUR 1 million
- Route No. 7 EUR 12 million

4.4.6 Kosovo

Projects

- Route No. 6/7. By-pass around Pristina, 20 km 4 lane motorway
- Route No. 6, Improvement of the condition of 80 km road Pristina - Mitrovica - border
- Route No. 6, Improvement of the condition of 67 km road Pristina - Gabrica - Den Jankovic (border)

Costs

Estimated cost for upgrading the core network in Kosovo is EUR 76 million distributed as follow:

- Pristina-bypass EUR 31 million
- Route No. 6 EUR 26 million
- Route No. 7 EUR 19 million

The total amount is equal to EUR 0.26 million/km core network in Kosovo.

4.4.7 Montenegro

Planning of new projects

The Department for Road and Railway Infrastructure has identified landslides as a very serious problem and has started searching for "the black spots". There are about 160 locations with unstable slopes where it is important to protect against the landslides.

The capacity of the road network is sufficient and there are no plans for construction of roads with a higher capacity, but because the whole road network is very old it is in serious need of rehabilitation.

The tunnels also need rehabilitation. Only 4 tunnels have been improved with insulation and lighting, but the remaining (about 100) tunnels are in need of the similar improvements.

Climbing lanes for trucks in mountainous and hilly terrain is also given high priority.

Projects

- Upgrading of Route No. 4 and 6, Podgorica - Spiljani (border to Serbia)
- Upgrading of Route No. 1 and 4, Podgorica - Debeli Brijeg (border to Croatia)
- Upgrading of Route No. 2b, Podgorica - Scepan Polje (border to B&H)
- Upgrading of Route No. 2b, Podgorica - Tuzi (border to Albania)

Costs

Estimated cost for upgrading the core network in Montenegro is EUR 316 million distributed as follow:

- Route No. 1	EUR 100 million
- Route No. 2b	EUR 46 million
- Route No. 4	EUR 155 million
- Route No. 6	EUR 61 million

The total amount is equal to EUR 0.68 million/km core network in Montenegro.

5 Railways

5.1 Data collection

5.1.1 Questionnaire

The questionnaire included the following information/data sheets:

Unit Prices - Sheet 1 to 11.

In the schedule "EU Strategic Railway Sections" a preliminary proposal for splitting up the rail network in line sections was made. The railway companies were requested to check the proposed railway line sections and basic technical details, and make the necessary corrections and additions.

The line sections have been determined in order to form a reliable base for determining the costs for modernisation. The network was divided into sections where key characteristics (speed, geography etc) can be considered as uniform.. The line sections vary in length, but are in most cases less than 100 km.

Each railway company has been requested to provide information on the "Line Section Details" sheets. The requested information includes the main technical details, and plans for modernisation.

For the estimation of costs for modernisation, the railway companies have been requested to provide information on the typical unit prices for certain types of modernisation.

The following types of modernisation have been considered:

Line sections:

- Modernisation in accordance with AGC/AGTC agreements.
Double track line. Maximum speed 160 km/h.
- Modernisation. Single track line. Maximum speed 100 km/h.
- Construction of new track along existing line in accordance with AGC/AGTC agreements and modernisation of existing track.
Maximum speed 160 km/h.

Construction of new single track line.
Maximum speed 100-120 km/h.

Stations:

Modernisation of minor station/stop in category 4.
Modernisation of medium station category 3.
Modernisation of major station category 2.

The details about the stations in each category are in accordance with the details specified in the TINA study. The details were listed in the "Instruction" submitted to the railway companies.

5.1.2 Visit to the railway companies.

The railway companies in Zagreb, Belgrade, Sarajevo, Podgorica, Pristina, Skopje and Tirana were visited. The questionnaire and projects for modernisation of the rail network were discussed.

5.1.3 Present projects for modernisation

Each railway company was requested to list present plans for rehabilitation and modernisation of the rail network in the questionnaire.

5.2 Proposed modernisation

5.2.1 Basis for modernisation

The present technical standard and condition varies throughout the network. The main differences in technical standard are shown on the map "Present Technical Condition", and in the schedule "Present Technical Condition Details" presented in Appendix 1, Network Assessment.

The basis for determination of the level of modernisation has been the "European Agreement on Main International Railway Lines" (AGC), and "European Agreement on Important International Combined Transport Lines and Related Installations" (AGTC). An "Inventory of existing AGTC and AGC standards and parameters" has been prepared by United Nations Economic Commission for Europe (UN/ECE) in 1997. The following countries in the Balkan Region have become Contracting Parties to the Agreement: Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia (FYRO Macedonia) and Serbia.

The AGC and AGTC Agreements are rather ambitious. The requirements to infrastructure parameters in the agreements, which are considered in this study are:

There are no minimum requirements for the number of tracks to be provided on existing lines. However, it is noted, that it will normally only be possible to

provide high capacity and punctuality of operation on lines with at least two tracks.

The nominal minimum speed in the AGC agreement is 160 km/h for passenger trains on existing lines.

The minimum platform length in principal stations is 400 m.

The AGC aims at the elimination of existing level crossings.

5.2.2 Traffic data and proposal for modernisation

The traffic data shows, that there is no immediate need for an increase in the capacity of the railway lines. However, it may be expected, that the traffic will increase with the growth of the economy.

European traffic has been considered to have great importance, and it has been proposed to modernise Corridor X and Xb together with Corridor Vb to AGC standard. Double track line and maximum speed 160 km/h.

The line section Jelina - Grapska in Bosnia and Herzegovina is today, a double track line. It is proposed to modernise the line to AGC standard.

All other existing lines are single track lines. Some are electrified and some are not. It is proposed to modernise the lines by providing electricity, modern signalling and telecommunication systems, and maximum speed 100 or 120 km/h.

New single track line sections are proposed to be modern lines with speed 120 km/h.

5.3 Estimated costs for modernisation

Some railway companies have submitted information about unit prices for different types of modernisation of the rail network. However, the information is limited and varies considerably. The variations may reflect that the railway companies have different plans for modernisation. A general observation is also that the unit costs presented by the railway companies were much lower than the costs experienced in other countries.

To overcome the problem of limited information and uncertainty about the basis of the unit prices, a general set of unit prices for typical types of modernisation has been determined. The basis for the unit prices has been the information received from the railway companies, and comparison with unit prices in the TINA study for the countries Slovenia, Romania and Bulgaria. The unit prices are based on expected prices in international tenders.

The unit prices have been determined for the three typical terrain formations rural flat terrain, rural mountainous terrain and urban terrain. The types of modernisation, which have been considered, are:

Line sections:

Modernisation in accordance with AGC/AGTC agreements.
Double track line. Maximum speed 160 km/h.
Modernisation. Single track line. Maximum speed 100 km/h.
Construction of new track along existing line in accordance with AGC/AGTC agreements and modernisation of existing track.
Maximum speed 160 km/h.

Construction of new single track line.
Maximum speed 100-120 km/h.

Stations:

Modernisation of minor station/stop in category 4.
Modernisation of medium station category 3.
Modernisation of major station category 2.

Modernisation of a line to a greater speed than was originally intended, may include re-alignment in some areas in order to remove narrow curves. The land costs depend on the actual area. Urban areas and agricultural areas are more costly than remote areas. However, it has not been possible to include this variation in the cost estimates. The costs for land acquisition have been determined as EUR 5,000/- per km in rural areas and EUR 10,000/- per km in urban areas. Extent of land acquisition has been determined by the project team.

The costs for improvement of the substructure for the tracks vary considerably depending on the actual subsoil conditions. In the cost estimate it has been determined to use a medium to low value for tracks with speed 100 km/h and 120 km/h, and a higher value for tracks with speed 160 km/h. In mountainous areas the costs for track substructure will normally be higher than in flat areas. In the cost estimate it has been determined to use a unit price for mountainous areas approximately 50% higher than in flat areas. The unit prices in rural areas and urban areas are considered to be equal. In Albania and Montenegro the railway companies have estimated much lower prices. This may be because of good soil conditions or lower labour costs. In these areas the unit prices have been reduced by 50% to reflect this situation.

Modernisation of superstructure will normally include substitution of sleepers and rails. The costs depend mainly on train speed. The costs are considered to be more or less equal for all areas and regions, which is also in line with the figures from TINA. However, the figures received from the railway companies vary considerably. It has been decided to use figures in line with the figures from Serbia and from TINA.

Bridge structures are different in lengths. For the cost estimate the price has been determined in relation to a number of bridges of the following sizes. Short railway bridges, 30 m long. Long railway bridges, 60 m long. Two or four lane road bridges, 40 m long. Major bridges may be costly especially bridges cross-

ing the Danube. The costs for modernisation of major bridges have been determined by the project team.

Tunnels may require new concrete lining, and in some cases construction of new tunnels is required. In the cost estimate it has been considered, that rehabilitation works are required on existing tunnels. In the cost estimate it has been determined to use a figure in line with TINA.

For culverts and drainage the unit price depends on number of tracks and type of terrain. It has been determined to use unit prices a little lower, than estimated by the railway company in Serbia. In mountainous areas the costs are considered a little higher than in flat areas. For protection of the environment the same unit price has been used in all cases.

The existing electrical traction system generally requires upgrading and renewal. The unit prices in the cost estimate correspond to a general renewal. It has been determined to use the same unit prices in all areas, and unit prices in line with TINA.

The costs for modernisation of power supply have been included in the costs for the catenary system.

For signalling and telecommunication a complete renewal is expected. Modern signalling and telecommunication systems are relatively costly. It has been determined to use unit prices in line with TINA. The railway companies in Kosovo and Albania have estimated unit prices, which are much lower. The reason may be that the systems they have envisaged are less advanced and less costly.

The costs for stations have for all stations been calculated as for typical stations in the three categories 2, 3 and 4. The costs for the main stations in Zagreb and Belgrade have been included in accordance with cost estimates from present projects.

All costs are based on the price level in 2003.

6 Results

6.1 General

The information obtained from the railway companies has been listed in the schedules "Cost Estimate for Line Sections".

The unit prices used for calculation of the costs for modernisation have been listed in schedules "Unit Prices for Line Sections" and "Unit Prices for Stations" refer Annex 4.2.

The costs for modernisation have been calculated in the "Line Sections" sheets, and summarised in the schedule "Proposed Modernisation", refer Annex 4.2.

6.2 EU Strategic Rail Network

6.2.1 General

The EU Strategic Rail Network included in this study is shown in Appendix 1.

6.2.2 International corridors

The EU Strategic Rail Network in the Balkan Region includes the following international corridors:

Pan-European Transport Corridors (Helsinki).

Corridor X: Border to Slovenia - Zagreb - Belgrade - Skopje - Border to Greece.

Corridor Xb: Border to Hungary - Novi Sad - Stara Pazova.

Corridor Xc: Nis - Border to Bulgaria.

Corridor Xd: Veles-Border to Greece

Corridor Vb: Border to Hungary - Zagreb - Border to Slovenia.

Corridor Vc: Border to Hungary - Sarajevo - Ploce.

Corridor VIII: Border to Bulgaria - Skopje - Durres.

Additional Network AGC:

Zagreb - Split.

Belgrade - Bar.

Belgrade - Border to Rumania.
Kraljevo - Skopje.

The TEN network also includes some of the lines listed above.

6.2.3 Modernisation of rail network

The proposed modernisation is shown on map no T02 "EU Strategic Rail Network Balkan Region Proposed Modernisation Technical Condition 2015" ref. Annex 4.1.

The corridors are proposed to be modernised in compliance with the following:

Corridor X:	Double track line. Speed 160 km/h. Electrified. In accordance with AGC/AGTC.
Corridor Xb:	Double track line. Speed 160 km/h. Electrified. In accordance with AGC/AGTC.
Corridor Xc:	Single track line. Speed 100 km/h (120 km/h). Electrified.
Corridor Xd:	Single track line. Speed 100 km/h (120 km/h). Electrified.
Corridor Vb:	Double track line. Speed 160 km/h. Electrified. In accordance with AGC/AGTC.
Corridor Vc:	Single track line. Speed 100 km/h (120 km/h). Electrified.
Corridor VIII:	Single track line. Speed 100 km/h (120 km/h). Electrified.
Regional lines:	Single track line. Speed 100 km/h (120 km/h). Electrified.

6.2.4 Estimated costs

The estimated costs for modernisation are shown in the schedule "EU Strategic Rail Network Balkan Region Proposed Modernisation" refer Annex 4.2.

The costs have been based on information from the railway companies, and estimates based on general information from different studies.

The costs for modernisation of the international corridors and regional lines (excluding normal maintenance costs) are estimated to:

Corridors/Routes:	Costs (EUR)
Corridor X	2,731 million
Corridor Xb	369 million
Corridor Xc	173 million
Corridor Xd	304 million
Corridor Vb	1,099 million
Corridor Vc	1,593 million
Corridor VIII	1,167 million
Route No. 1	671 million
Route No. 2	244 million
Route No. 4	2,157 million
Route No. 9	213 million
Route No. 10	1,343 million
Route No. 11	288 million
TOTAL	12,328 million

6.3 Individual countries

6.3.1 Albania

Projects and studies for modernisation.

The Albanian Railways have submitted cost estimates for modernisation of all railway lines. The type of modernisation has been explained in the note "Explanatory Report".

Ongoing projects

The Albanian Railways have not submitted information regarding ongoing projects.

Proposed modernisation

It is proposed that all railway lines be modernised to a standard with a speed of 100 km/h.

For important line such as the Durres - Tirana route and for future construction of new lines the maximum speed is proposed to be 120 km/h.

It is proposed that all lines on the core network be electrified.

Estimated costs for modernisation

The costs are estimated to:

Line section Vore - Kufi (Border to Montenegro)	EUR 183 million
Line section Durres - Tirana	EUR 66 million
Line section Rrogozhine - Vlore	EUR 151 million

Line section Shkozet - Lime	EUR 389 million
Line section Lime - Kufi (Border to FYRO Macedonia)	EUR 9 million
Total:	EUR 797 million

6.3.2 Bosnia and Herzegovina

Projects and studies for modernisation

The Bosnia and Herzegovina Railways companies have submitted the following information about projects for modernisation:

BO-R-01: Track overhaul and reconstruction of line Bosanski Samac/Samac - Doboj to 120 km/h.

BO-R-02: Reconstruction of line Konjic - Mostar

BO-R-03: Rehabilitation and reconstruction of line Samac - Doboj - Sarajevo - Caplina

BO-R-04: Reconstruction of line Dibriljin - Banja Luka - Doboj.

In addition the following information has been provided:

Line section Sarajevo - Capljina:

There is a plan to improve the present state of the line to what it was before the war. That means a complete track overhaul and the rehabilitation of signalling and telecommunication systems. Some projects have already started with the preparation/implementation, such as the track overhaul on Bradina - Konjic sub-section (the most difficult one in terms of operation conditions) and the rehabilitation of signalling in station groups (Sarajevo, Mostar etc.). This project package is funded by the EBRD/EIB loan and it is foreseen that it will be under implementation until the end of 2004.

Line section Sarajevo - Jelina:

There is a plan to improve the present state of the line to what it was before the war. That means a complete track overhaul and the rehabilitation of signalling and telecommunication systems. Some projects have already started with the preparation/implementation, such as the PABX rehabilitation in Zenica and the rehabilitation of signalling systems for stations along the line section. This project package is funded by the EBRD/EIB loan and is foreseen that it will be under implementation until the end of 2004.

Line section Jelina - Grapska:

There is a project underway for rehabilitation of catenary system along the line section, which will be completed in the summer of 2003.

There is a plan to improve the present state of the line to what it was before the war. That means a complete track overhaul and the rehabilitation of signalling and telecommunication systems. Expected year of execution unknown.

Line section Grapska - Bosanski Samac:

There is a plan to improve the present state of the line, to what it was before the war. That means a complete track overhaul and the rehabilitation of signalling and telecommunication systems. Expected year of execution unknown.

Line section Banja Luka - Grapska:

There is a plan to improve the present state of the line to what it was before the war. That means a complete track overhaul, rehabilitation of signalling telecommunication systems. Some projects have already started with the preparation/implementation, such as the track overhaul on a 22 km long subsection Banja Luka - Josavka and modernisation of an interlocking system in the stations Stanari and Prisoje. This project package is funded by an EBRD/EIB loan and it is foreseen to be implemented by the end of 2004.

Ongoing projects

Track overhaul on Bradina - Konjic line section funded by EBRD/EIB.

PABX rehabilitation in Zenica and rehabilitation of signalling in stations funded by EBRD/EIB.

Track overhaul Banja Luka - Josavka and modernisation of interlocking system in stations Stanari and Prisoje.

Proposed modernisation

It is proposed to modernise the single track lines to that of a modern standard with a general speed of 100 km/h. In the mountainous regions, especially between Sarajevo and Mostar, it may not be realistic to obtain a speed of 100 km/h. The realistic maximum speed shall be determined on basis of the actual terrain conditions.

The existing double track line between Doboje and Jelina is proposed to be modernised in accordance with AGC/AGTC standards. The maximum speed shall be determined in relation to terrain conditions.

Estimated costs for modernisation

The costs are estimated to:

Line section Capljina - Bosanski Samac	EUR 1,371 million
Line section Grapska - Banja Luka	EUR 213 million
Total:	EUR 1,584 million

6.3.3 Croatia

Projects and studies for modernisation

The Croatia Railways has informed us that there are the following plans for modernisation of the railway lines:

Line section Savski Marof - Tovarnik:

Modernisation of Zagreb station. Estimated costs EUR 28 million.

Modernisation of signalling system Vinkovci - Tovarnik. Estimated costs EUR 17.5 million.

Line section Sapjane - Zagreb:

Modification of electrical system Sapjane - Brod Moravice. Estimated costs EUR 60 million.

Line section Slavonski Samac - Beli Manastir:

Modernisation of signalling system. Estimated costs EUR 10 million.

Rehabilitation of electrical system Slavonski Samac - Vrpolje. Estimated costs EUR 10 million.

Line section Ostarije - Split:

Line electrification. Estimated costs EUR 95 million.

Modernisation of signalling system. Estimated costs EUR 75 million.

Line section Ploce - Metkovic:

Modernisation of signalling system. Estimated costs EUR 5 million.

Modernisation of electrical system. Estimated costs EUR 5 million.

Ongoing projects

No ongoing projects have been reported.

Proposed modernisation

It is proposed to modernise the international corridors X and Vb in accordance with the AGC/AGTC agreements with a speed of 160 km/h.

Corridor Vc from Beli Manastir to Slavonski Samac is proposed to be modernised with a speed of 100 km/h like the other part of the corridor through Bosnia and Herzegovina.

The railway line Ostarije - Split runs mainly through a mountainous terrain. It is proposed to modernise the line to obtain a speed of 100 km/h where possible in relation to terrain conditions.

Estimated costs for modernisation

The costs are estimated to:

Line section Savski Marof - Tovarnik	EUR	528 million
Line section Sapjane - Zagreb	EUR	893 million
Line section Dugo Selo - Botovo	EUR	206 million
Line section Slavonski Samac - Beli Manastir	EUR	176 million
Line section Ostarije - Split	EUR	671 million
Line section Ploce - Metkovic	EUR	47 million
Station Zagreb	EUR	28 million

Total: **EUR 2,549 million**

6.3.4 Kosovo

Projects and studies for modernisation

UNMIK Railways has not provided information on modernisation projects.

Ongoing projects

There is no information about ongoing projects.

Proposed modernisation

It is proposed to modernise the railway line connecting Serbia and FYRO Macedonia to obtain a speed of 100 km/h.

Estimated costs for modernisation

The costs are estimated to:

Line section		
Border to Serbia - Border to FYRO Macedonia	EUR	1,083 million

Total: **EUR 1,083 million**

6.3.5 FYRO Macedonia

Projects and studies for modernisation

The Montenegro Railways have not provided any information.

Ongoing projects

The Montenegro Railways have not provided any information.

Proposed modernisation

Corridor X from Serbia to Greece is proposed to be modernised in accordance with the AGC/AGTC agreements with a speed 160 km/h.

The existing single track lines Skopje - Border to Kosovo and Skopje - Kicevo are proposed for modernisation to obtain a speed of 100 km/h. In the mountainous region a lower speed may be realistic depending on the terrain.

The new line constructions on corridor VIII are proposed to be designed as an electrified single track line with a speed of 120 km/h.

Estimated costs for modernisation

The costs are estimated to:

Line section Tabanovci - Skopje	EUR	147 million
Line section Skopje - Veles	EUR	160 million
Line section Veles - Gevgelija	EUR	341 million
Line section Gorce Petrov - Kicevo	EUR	209 million
Line section Kicevo - Border to Albania	EUR	158 million
Line section Skopje - Border to Kosovo	EUR	57 million
Line section Kumanova - Beljakovci	EUR	69 million
Line section Beljakovci - Border to Bulgaria	EUR	92 million
Line section Veles - Bitola	EUR	278 million
Line section Bitola - Krememoca	EUR	26 million

Total: EUR 1,537 million

6.3.6 Montenegro

Projects and studies for modernisation

The Montenegro Railways has informed us, that there are the following plans for modernisation of the railway lines:

Line section Vrbnica - Podgorica:

Overhaul of superstructure Vrbnica - Mojkovac. Estimated costs EUR 9 million.

Rehabilitation of tunnels. Estimated costs EUR 9 million.

Rehabilitation of substructure. Estimated costs EUR 3.7 million.

Rehabilitation of bridges. Estimated costs EUR 3.05 million.

Rehabilitation of catenary system. Estimated costs EUR 6 million.

Rehabilitation of superstructure Mojkovac - Podgorica. Estimated costs EUR 10 million.

Line section Podgorica - Bar:

Rehabilitation of slopes. Estimated costs EUR 2.7 million.

Passenger station in the city of Bar. Estimated costs EUR 2.2 million.

Modernisation of line for 120 km/h. Estimated costs EUR 13.5 million.

Rehabilitation of tunnel. Estimated costs EUR 2 million.

Ongoing projects

The Montenegro Railways has informed us that design of the planned modernisation has begun.

Proposed modernisation

It is proposed, that the railway line from the Serbian border to Podgorica /from the Serbian border to Podgorica, through mountainous terrain be modernised to allow a speed of 100 km/h.

The line from Podgorica to Bar, is proposed to be modernised to a speed of 120 km/h.

Estimated costs for modernisation

The costs are estimated to:

Line section Vrbnica - Podgorica	EUR 691 million
Line section Podgorica - Bar	EUR 163 million
Line section Podgorica - Bozaj	EUR 62 million

Total: EUR 916 million

6.3.7 Serbia

Collection of data

The questionnaire has been filled in. Unit prices have been given for different types of modernisation.

Projects and studies for modernisation

The present condition and plans for modernisation of the railway lines are described in the "Business Plan RTE Beograd 2002-2006" prepared by CIP Institute of Transportation and the study "Railway in Serbia Situation Necessities Programme Measures" April 2002 prepared by Transport Consult GMBH Austria, Institut Saobraćajnog Fakulteta Beograd and БEOГPАО.

Ongoing projects

The study "Railway in Serbia" lists the following ongoing projects for railway infrastructure:

HERMES network and Management Information System. Costs EUR 2 million. Donation by Canadian Government.

Rehabilitation of line Beograd - Nis, section Kusadak - Velika Plana. Costs EUR 16.4 million. Funded by EIB.

Rehabilitation of line Beograd - Subotica, section Cortanovci - Petrovardin. Costs EUR 13.5 million. Funded by EIB.

Rehabilitation of line Nis - Dimitrovgrad. Costs EUR 16 million. Funded by EIB.

Rehabilitation of line Beograd - Bar, section Resnik - Valjevo. Costs EUR 18.5 million. Funded by EIB.

Proposed modernisation

It is proposed to modernise the international corridor X from the Croatian border to the FYRO Macedonian border, and the corridor Xb from the Hungarian

border to Stara Pazova in accordance with the AGC/AGTC agreements with a speed of 160 km/h.

The international corridor Xc from Nis to the Bulgarian border is proposed for modernisation as single track line with a speed of 100km/h.

The other regional lines are proposed for modernisation as electrified single track lines with a speed of 100 km/h.

Estimated costs for modernisation

The costs are estimated to:

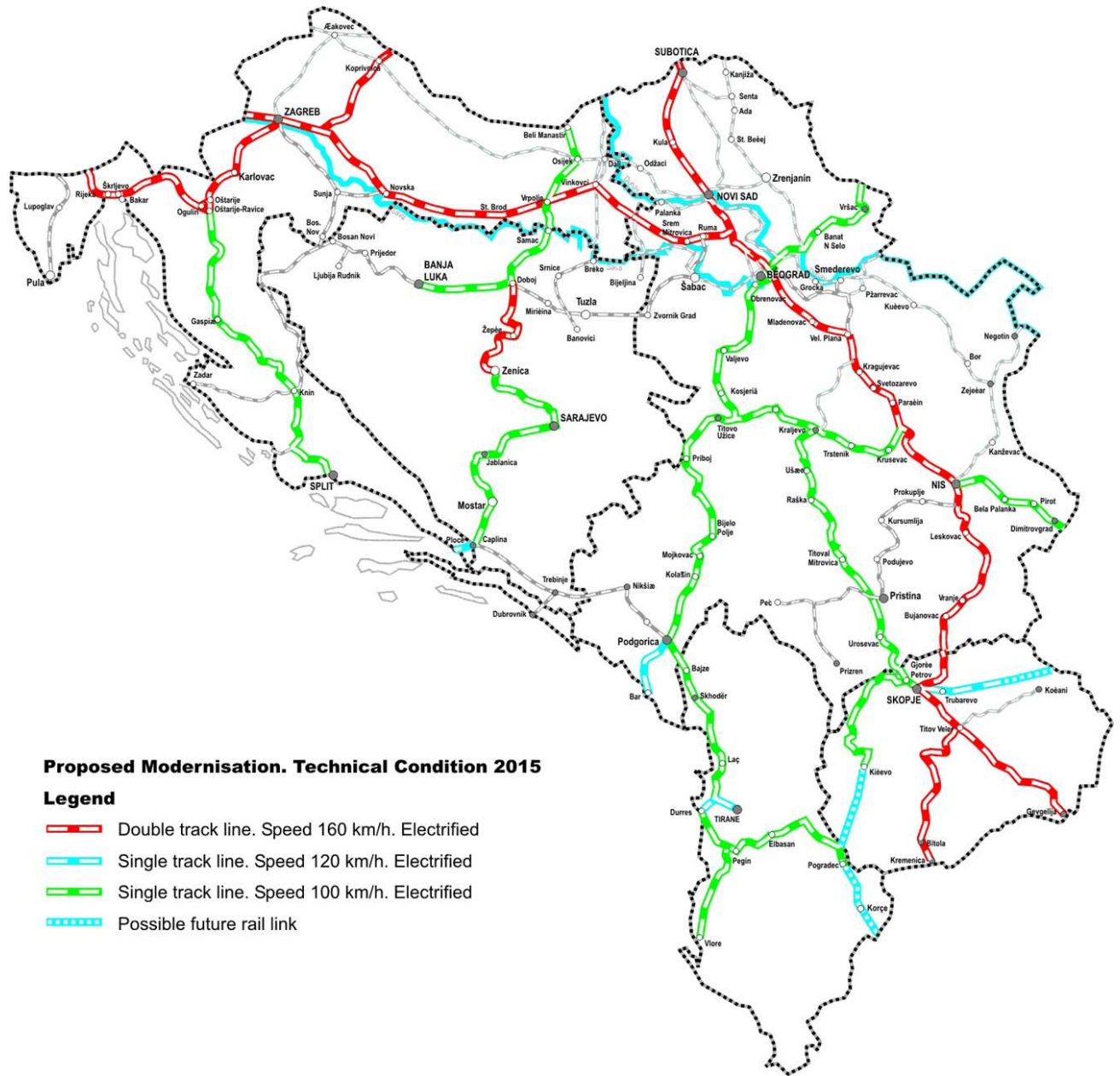
Line section Tovarnic - Precevo	EUR 1,394 million
Line section Kelebia - Stara Pasova	EUR 369 million
Line section Nis - Dimitrovgrad	EUR 173 million
Line section Pancevo - Stamura Moravita	EUR 117 million
Line section Beograd - Vrbnica	EUR 1,185 million
Line section Pozega - Stalac	EUR 288 million
Line section Kraljevo - Border to Kosovo	EUR 203 million
Station Beograd	EUR 133 million
Total:	EUR 3,862 million

Annex 4.1 Location of projects

Location of road investments.



Map no. T02 Proposed Technical Condition in 2015 after Modernisation



Annex 4.2 Detailed project information

Road Information

Unit costs for road investments

Proposed Modernisation of Railways.

Unit Prices for Line Sections.

Unit Prices for Stations.

Albania Line Sections.
Albania Summary Sheet.

Bosnia and Herzegovina Line Sections.
Bosnia and Herzegovina Summary Sheet.

Croatia Line Sections.
Croatia Summary Sheet.

Kosovo Line Sections.
Kosovo Summary Sheet.

FYRO Macedonia Line Sections.
FYRO Macedonia Summary Sheet.

Montenegro Line Sections.
Montenegro Summary Sheet.

Serbia Line Sections.
Serbia Summary Sheet.

Appendix 4 - Investment Requirements

Regional Balkans Infrastructure Study - Transport											
ROAD											
*Geometric Legend:	Less than 2 lane asphalt road (<7m)	1	***Condition Legend:	Road without problems	0	**Terrain Legend:	Flat terrain	1			
	2 lane asphalt road (7m)	2		Need of new wearing course	1		Hilly terrain	2			
	2 lanes + shoulders (11-12 m total)	3		Need of pavement rehabilitation (50%)	2		Mountainous terrain	3			
	3 lanes + shoulders	4		Need of overlay + new wearing course	3						
	4 lanes + shoulders (not motorway)	5		Need of complete new pavement	4						

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forcarst	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
Croatia	Vb	E 61		Rupa	Matulji	16	2		2	5,673	8,968			Motorway under construction	6		30.00
	Vb	E 65		Matulji	Rijeka	12			2	21,355	33,801						
	Vb	E 65		Rijeka	Kikovica	11	6	0	2	21,355	33,801						
	Vb	E 65	Cr-H-02aN	Kikovica	Ostrovita	9	3	0	3	7,346	11,587			Motorway is planned Motorway planned/under construction Under const. Exsp. Finish June 2003	from 3 to 6 from 3 to 6 6		33.4 69.4 85.7 141.00
	Vb	E 65	Cr-H-02bN	Ostrovica	Vrata	13											
	Vb	E 65	Cr-H-02cN	Vrata	Kupjak	17	3	0	3	7,346	11,587						
	Vb	E 65	Cr-H-02a	Kupjak	Bosiljevo 2	35			3								
	Vb	E 65	Cr-H-02a	Bosiljevo 2	Vukova Gorica	8	6		3								
	Vb	E 65		Vukova Gorica	Karlovac	18	6	0	2	7,194	11,366	4200	268	Under const. Exsp. Finish June 2003			
	Vb	E 65		Karlovac	Zagreb	38	6	0	1								
Croatia	Xa	E 59	Cr-H-03	Macelj	Krapina	13	3	0	2	8,501	13,460	757	549		from 3 to 6		16.41
		E 59		Krapina	Zapresic (Zagreb)	40	6	0	2	11,004	17,307						
		E 59		Zapresic (Zagreb)	Jankomir (Zagreb)	8	3	0	1	10,765	17,087						
Croatia		E 70		Samobor	Jankomir (Zagreb)	13	6	0	1		20,000						
	X	E 70	Cr-H-07a	Jankomir (Zagreb)	Okcani	132	6	2	1			"Sava"					
	X	E 70	Cr-H-07a	Okcani	Brodski Stupnik	46	6	2	1						2 2		22.50 7.36
	X	E 70		Brodski Stupnik	Beravsi	50	6	0	1	15,638	24,816						
	X	E 70	partly Cr-H-07	Beravsi	Spacva	53	6	0	1								
	X	E 70		Spacva	Lipovac (border)	13	3		1	1,556	2,491						30.20
Croatia	Vb	E 65/E 71		Border	Gorican	1	3	0	2	2,021	3,254			Motorway under construction	from 3 to 6		61.20
	Vb	E 65/E 71		Gorican	Kneginiec	34	6	0	2	11,602	18,290						
	Vb	E 65/E 71		Kneginiec	Sudovec	20	3	0	2	7,407	11,739						
	Vb	E 65/E 71		Sudovec	Zagreb	42	6	0	1								
Croatia	Vc	E 73		Udvar (border)	Osijek	70	3	0	1			294			1		4.80
	Vc			Osijek	Beravsi	60	3	1	1	5,694	8,909	100					
	Vc			Beravsi	Sikirevci (border)	9	3	0	1			556					
Croatia	1	E 71		Karlovac	Tusilovicki	15	3	1	1	11,124	17,585	496				1	1.20

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forcarst	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
	1	E 71		Tusilovicki	Slunj	35	3	0	2			260					
	1	E 71		Slunj	Rakovica	20	3	0	3								
	1	E 71		Rakovica	Plitvice	12	3	0+20km 2	2			168				20 km *2	2.20
	1	E 71		Plitvice	Gracac	82	3	0+20km 1	2			79				20 km *1	1.60
	1	E 71		Gracac	Split	157	3	0	2			4072	1450				
	1	E 65	Cr-H-10N	Split	Ploce-Metkovic	109	3	2	2	10,496	16,468		226		6		560.00
	1	E 65		Ploce-Metkovic	Piznovac	24	3	0+50%1	2	4,682	7,358					50 % 1	0.96
	1	E 65		Piznovac	Dubrovnik	96	3	0+50%1	2							50 % 1	3.84
	1	E 65/E 80		Dubrovnik	Hercegnovi	35	3	0+50%1	2							50 % 1	1.40
	Vc			E 65	Metkovic	9			2	5,032	7,962						
Croatia						1375										Total	1,083.27
																Cost/km	0.79

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forecast	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
Serbia	X	E 70		Batrovic (border)	Beograd	114	6	1	1	6,604	12,582			1 bridge longer than 50 m		1	18.24
	X	E 75	Yu-H-09	Beograd	Mihajlovac	67	6	1	2	15,799	30,175			2 bridges longer than 50 m		1	8.2
	X	E 75	Yu-H-09	Mihajlovac	Plana	23	6	2	1	11,959	22,885			2 bridges longer than 50 m		2	2.8
	X	E 75	Yu-H-09	Plana	Nis	138	6	1	1	9,749	18,699			6 bridges longer than 50 m		1	16.9
	X	E 75		Nis	Kocane	21	6	1	1	4,673	8,963			1 bridge longer than 50 m		1	3.36
	X	E 75		Kocane	Pecenjevce	11	6	0	1	4,673	8,963			1 bridge longer than 50 m			
	X	E 75		Pecenjevce	Leskovac	13	2	3	2	4,673	8,963					3	2.08
	X	E 75	Yu-H-06/1&2	Leskovac	Grdelica	17	2	3	2	4,673	8,963					3	55.2
	X	E 75	Yu-H-06/1&2	Grdelica	Bujanovac	68											220.6
	X	E 75	Yu-H-05	Bujanovac	Preservo	20											14.30
	X	E 75		Preservo	Strzovce (border)	5	2	1	2	5,532	10,633			6 bridges and 3 tunnels			
Serbia	X		Yu-H-13	Beograd Motorway	By-pass	48	(6)		1					"Sava"	Total cost is about 323 mill. €	6	172.50
Serbia	Xb	E 75	Yu-H-11	Horgos (border)	Palic	22	3	0	1	4,905	9,365						17.00
	Xb	E 75	Yu-H-11	Palic	Novi Sad	100	3	1	1	5,420	10,349	2 nos		Motorway is planned		1	75.00
	Xb	E 75	Yu-H-07	Novi Sad	Liberty Bridge												20.00
	Xb	E 75	Yu-H-11a	Novi Sad	Batajnica (Beogr.)	70	3	2	1	12,589	24,029	2 nos		Motorway under construction	from 3 to 6	1	20.00
Serbia	4	E 70		Beograd	Pancevo	19	5	0	1	9,258	17,753						
	4	E 70		Pancevo	Uljma	51	1	3	1								13.26
	4	E 70	Yu-H-14	Uljma	Vadin (border)	26	1	1	1	4,243	8,083						3.80
Serbia	5			Paracin	Don. Mutnica	10	1	2	2	2,373	4,547				from 1 to 2	2	2.60
	5			Don. Mutnica	Lukovo	36	3	2	3	2,373	4,547					2	6.12
	5			Lukovo	Boljevac	7	1	2	2	2,373	4,547				from 1 to 2	2	1.75
	5			Boljevac	Seliste	13	3	2	2	2,373	4,547					2	1.11
	5			Seliste	Zajecar (border)	32	1	2	2	2,373	4,547				from 1 to 2	2	8.00
Serbia	Xc	E 80		Nis	Niska Banja	22	1	0	2	3,336	6,384	1 no			from 1 to 2		2.64
	Xc	E 80	Yu-H-12	Niska Banja	Bela Planka	27	1	2	2	3,336	6,384		13 nos	Tunnels need upgrading	from 1 to 2	2	25.00
	Xc	E 80	Yu-H-12	Bela Planka	Pirot	27	1	2	2	3,336	6,384				from 1 to 2	2	25.00
	Xc	E 80	Yu-H-12	Pirot	Bimitrovgrad	24	1	2	2	3,336	6,384				from 1 to 2	2	22.00
	Xc	E 80		Bimitrovgrad	border	8	3	0	2	3,336	6,384						
Serbia	7	E 80		Kocane	Zitorada	11	1	1	1						from 1 to 2	1	2.2
	7	E 80		Zitorada	Prokuplje	11	1	0	1	2,873	5,481				from 1 to 2		1.32
	7	E 80		Prokuplje	Beloljin	17	1	1	2	2,873	5,481				from 1 to 2	1	3.4
	7	E 80		Beloljin	Kursumlija	18	1	2	2	2,873	5,481				from 1 to 2	2	3.06
	7	E 80		Kursumlija	Raca	24	2	1	2	2,873	5,481	1 no				1	1.92

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forcarst	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
Serbia	4	E 763		Beograd	Steppievac	42	3	0	2								
	4	E 763		Steppievac	Ljig	46	2	1	1			1 no					3.68
	4	E 763		Ljig	Gor Milanovac	39	1	2	2			2 nos	1 no		from 1 to 2	2	9.75
	4	E 763		Gor Milanovac	Cacak	19	2	1	2			1 no				1	1.52
	4	E 763	Yu-H-28N	Cacak	By-pass	10	new		2	7,959	15,166			Traffic near Cacak	3		25.00
	4	E 763	Yu-H-27N	Cacak	Ovcar Banja	9	1	1	2	4,479	8,548	6 nos	2 nos		from 1 to 3	1	3.50
	4	E 763	Yu-H-15	Ovcar Banja	Bottlenecks	-											6.00
	4	E 763	Yu-H-27N	Ovcar Banja	Pozega	27											10.50
	4	E 763		Pozega	Uzice	24											
	4	E 763		Uzice	Partizanske Vode	25	4	1	3	4,479	8,548	3 nos	3 nos			1	2.13
	4	E 763	Yu-H-10	Partizanske Vode	Nova Varos	46	1	3	3			1 no	1 no		Reconstruction	3	10.00
	4	E 763		Nova Varos	Bistrica	19	2	1	3				2 nos			1	1.52
	4	E 763		Bistrica	Lucice	25	1	3	3			1 no			from 1 to 2	3	6.63
	4	E 763		Lucice	Trojica (border)	24	2	3	3	2,876	5,492		4 nos			3	4.32
Serbia	3			Sljivovica	Kremna	33	1	3	2	2,021	3,861						8.75
	3			Kremna	border	18	1	0	3	2,021	3,861	1 no	1 no		from 1 to 2 from 1 to 2	3	1.53
Serbia	6	E 65/E 80		Spiljani (border)	Ribarice (border)	18	2	1	3	2,306	4,416	9 nos	7 nos			1	1.44
Serbia	Total					1544										Total	865.63
	Cost/km															Cost/km	0.56

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forcarst	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
Kosovo	7	E 80		Podujevo (border)	Luzane	22	2	0	1	2,873	5,481	50					
	7			Luzane	Pristina	18	2	0	2	8,564	16,489			Trafic is near Pristina			
Kosovo	6/7		Yu-Ko-H-05	Bypass around	Pristina	20	6								6		31.00
Kosovo	6	E 65/E 80	Yu-Ko-H-02	Pristina	Mitrovica	45	2	3	1	17,635	33,854	50		Trafic is near Pristina		3	4.00
	6	E 65/E 80	Yu-Ko-H-03	Mitrovica	border	35	2	3	1	6,642	12,625					3	6.00
Kosovo	6	E 65	Yu-Ko-H-01a+c	Pristina	Gabrica	43	2	1	1	5,074	9,749	168		Ongoing projects		1	11.90
	6	E 65	Yu-Ko-H-01a+c	Gabrica	Kacanik	8								Ongoing projects			2.60
	6	E 65	Yu-Ko-H-01b+c	Kacanik	Den Jankovic (bord.)	16	2	2	2	4,550	8,268	572		Ongoing projects		2	1.80
Kosovo	7		Yu-Ko-H-04	Lipljan	Crnojjevo	25	2	0	1	7,731	14,884						5.7
	7		Yu-Ko-H-04	Crnojjevo	Suva Reka	23	2	0	3								5.3
	7		Yu-Ko-H-04	Suva Reka	Prizren	19	2	0	1			53					4.3
	7		Yu-Ko-H-04	Prizren	Vrbnica (border)	14	2	0	2	3,576	6,884						3.2
Kosovo						288										Total	75.8
																Cost/km	0.26

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forecast	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €	
Montenegro	4	E 65/E80	Yu-H-20	Podgorica	Medjurijecje	44	2	3	2	3,347	6,376	2062	833		25% from 2 to 4	tunnels/slopes+3	26.90	
	4	E 65/E80	Yu-H-20	Medjurijecje	Mojkovac	50	2	2	2			300	850		25% from 2 to 4	tunnels/slopes+2	30.50	
	4	E 65/E80	Yu-H-20	Mojkovac	Vrapce Polje	14	2	2	2			70	24		25% from 2 to 4	tunnels/slopes+2	8.60	
	4			Vrapce Polje	Bijelo Polje	6												
	4			Bijelo Polje By-pass	Bijelo Polje	10												39.00
	6	E 65/E80	Yu-H-35N	Vrapce Polje	Berane	29	2	2	2			145	49		25% from 2 to 4	tunnels/slopes+2	16.53	
	6	E 65/E80		Berane	Rozaje	30	2	2	3			671	1454		25% from 2 to 4	tunnels/slopes+2	24.30	
	6	E 65/E80		Rozaje	Spiljani (border)	23	2	3	3	3,558	6,776	840	1587		25% from 2 to 4	tunnels/slopes+3	20.47	
Montenegro	4	E 65/E80	Yu-H-19	Podgorica	By-pass	40	2	2	1			675			25% from 2 to 4	2	15.00	
	4	E 65/E80	Yu-H-16	Podgorica	Vipazar	-											13.60	
	1	E 65/E80	Yu-H-37N	Vipazar/Bar	Tunnel	19	2	2	3			87			25% from 2 to 4	2	14.50	
	1	E 65/E80	Yu-H-37N	Vipazar	Petorvac	18	2	2	2			207			25% from 2 to 4	2	6.46	
	1	E 65/E80	Yu-H-18	Budva	Tivat	27									25% from 2 to 4	tunnels/slopes+2	10.50	
				Short-cut	Verige Bridge (Kotor	-											57.00	
				Tivat	Kamenan	43	2	2	1					85		25% from 2 to 4	tunnels/slopes+2	16.80
1	E 65/E80		Kamenan	Debeli Brijeg (bord.)	18	2	2	2	3,558	6,776				25% from 2 to 4	2	5.94		
Montenegro	2b	E 762	Yu-H-36N	Scepan Polje (bord.	Pluzine	26	1	3	3	2,642	5,047	632	5505		from 1 to 2	3	6.10	
	2b	E 762	Yu-H-36N	Pluzine	Sipacno	46	1	2	3						from 1 to 2	2	10.7	
	2b	E 762	Yu-H-36N	Sipacno	Niksic	15	1	2	2						from 1 to 2	2	3.5	
	2b	E 762	Yu-H-30N	Niksic By-pass													11.00	
	2b		Yu-H-36N	Niksic	Danilovgrad	30	2	2	2			69	1510		25% from 2 to 4	2	7.00	
	2b	E 762	Yu-H-36N	Danilovgrad	Podgorica	20	2	2	1			292			25% from 2 to 4	2	4.70	
	2b	E 762		Podgorica	Tuzi	10	1	4	1						from 1 to 2	4	1.10	
	2b	E 762		Tuzi	Border	14	1	4	2	2,618	4,971				from 1 to 2	4	1.54	
Montenegro					532										Total Cost/km	361.74		
																	0.68	

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forcarst	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €	
B&H	Vc	E 73	Bo-H-03	Bos Samac (border)	Podnovlje	44	2	4	1	6,086	11,339	742				4	16.10	
	Vc	E 73		Podnovlje	Kotorsko	13	2	2	1	4,491	8,364		1500			2	1.04	
	Vc	E 73	Bo-H-04	Kotorsko	Doboj	17	2	2	1	4,491	8,364		1500	Ongoing project			1.00	
	Vc	E 73	Bo-H-05	Doboj	Maglaj	28	2	2	3			218				2	13.30	
	Vc		Bo-H-22N	Doboj By-pass		15		n/a	3								55.00	
	Vc	E 73	Bo-H-05	Maglaj	Zenica	72	2	1	3			1709	3337			1	34.20	
	Vc	E 73	Bo-H-10	Zenica	Visoko	38	2	0	2	28,534	53,142	2854			from 2 to 6		155.00	
	Vc	E 73		Visoko	Semizovac	13	2	0	2	28,534	53,142	2854			from 2 to 6		24.57	
	Vc	E 73		Sarajevo(Lidzaj)	Tarcin	18	2	2	3			347				2	36.30	
	Vc	E 73	Bo-H-09	Tarcin	Konjic	25	2	2	3			158	849			2	20.50	
	Vc	E 73		Konjic	Jablanica	25	2	2	3			539	1293			2	2.75	
	Vc		Bo-H-06	Jablanica detour		5		n/a	3								9.00	
	Vc	E 73		Jablanica	Zeljusa (Mostar)	37	1	2	3			375	1258			2	11.47	
	Vc	E 73	Bo-H-11	Mostar By-pass		20	n/a	n/a	1							3	71.00	
	Vc	E 73		Zeljusa (Mostar)	Buna	21	2	1	1	11,474	21,368	1311	116			1	1.68	
	Vc	E 73		Buna	Tasovcice	25	2	1	3							1	2.25	
	Vc	E 73		Tasovcice	Metkovic (border)	14	2	1	1				474			1	1.12	
B&H	1	E 65/E80		Neam (border)	Duzi (border)	7	2	1	3	4,682	7,358					1	0.63	
B&H	2b	E 762		Sarajevo	Dobro Polje	32	2	2	2	2,012	3,747					1	2.56	
	2b			Dobro Polje	Foca	31	1	3	3	2,012	3,747	116	86			1	5.27	
	2b		Bo-H-08	Foca	Scepan Polje (bord.)	21	1	4	3	2,012	3,747	373	1449	Geological very bad area		10%tunnel+4	88.00	
B&H	2a	E 661	Bo-H-01	Bosan Gradiska	Klasnice	31	2	0	1			258		Ongoing project		from 2 to 5	82.00	
	2a	E 661	Bo-H-01	Klasnice	Banja Luka	16	5	0	1	7,909	14,729	177		Ongoing project		from 2 to 5	43.00	
	2a	E 661		Banja Luka	Donji Vakuf	122	1	3	3	2,389	4,448	441	1174			from 1 to 2	55.29	
	2a	E 661		Donji Vakuf	Zenica	60	1	2	2	2,846	5,299	247				from 1 to 2	15.60	
B&H	3	E 761		Sarajevo	Podromanija	40	2	1	2	2,012	3,747	579	2335	Tunnels need improvement		10%tunnel+1	45.60	
	3	E 761		Podromanija	Rogatica	31	1	1	3			62	1579	Tunnels need improvement		from 1 to 2	37.41	
	3	E 761		Rogatica	Medjedja	32	1	1	3			1009	1243	Tunnels need improvement		from 1 to 2	31.65	
	3	E 761		Medjedja	border (Visegrad)	32	2	1	3	1,400	2,608	246	1223	Tunnels need improvement		10%tunnel+1	25.03	
B&H					894											Total	888.32	
																	Cost/km	0.99

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forecast	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
Macedonia	X	E 75	Ma-H18	Border	Kumanovo	8	2	3	1	1,978	3,584					from 2 to 6	5.70
	X	E 75	Ma-H10	Kumanovo	Skopje approach	20	5	3	1	4,339	7,864			No emergency lane in North direction		Reconstruction	7.40
	X	E 75	Ma-H10	Skopje approach	Veles	34	5	3	2	3,682	6,673	1000		No emergency lane in South direction		Reconstruction	12.6
	X	E 75		Veles	Gradsko	29	5	1	2	2,333	4,228	400				1	4.64
	X	E 75		Gradsko	Negotino	16	6	0	2	2,835	5,135						
	X	E 75	Ma-H-24N	Negotino	Demir Kapija	16	2	3	2	3,338	6,045	150				from 2 to 6	16.00
	X	E 75	Ma-H-05-B/2	Demir Kapija	Rabrovo	20	2	3	3	2,514	4,554	600				from 2 to 6	34.00
	X	E 75	Ma-H-05-B/2	Rabrovo	Smokvica	14										from 2 to 6	24.00
	X	E 75	Ma-H-05-B/1	Smokvica	Gevgelija (border)	12	2	0	2	3,568	6,465	600				from 2 to 6	10.00
Macedonia	Xd	E 65		Titov Veles	Prilep	65	1	3	2	4,973	9,020				New no. 3		65.00
	Xd	E 65		Prilep	Bitola	42	2	2	1	3,541	6,423						4.62
	Xd	E 65		Bitola	Niki (border)	18	1	4	1	1,659	3,020	75			from 1 to 2	4	5.76
Macedonia	VIII	E 871		Kumanovo	Vojmk	14	4	1	2	3,481	6,316					1	1.68
	VIII	E 871		Vojmk	Rugince	10	2	2	2			225				2	1.30
	VIII	E 871		Rugince	Stracin	8	4	2	2							2	1.04
	VIII	E 871	Ma-H-07	Stracin	Kriva Palanka	27	1	2	2	2,634	4,779	100			from 1 to 2	2	30.70
	VIII	E 871		Kriva Palanka	border	16	2	4	2	1,087	1,974	200				4	4.32
Macedonia	VIII			Skopje approach	Skopje	14	6										
	VIII		Ma-H-25-N	Skopje bypass		25	6							Planned			70.00
	VIII	E 65		Petrov (Skopje)	Tetovo	34	6	0	1	3,071	5,573						
	VIII	E 65		Tetovo	Gostivar	25	5	1	1	5,902	10,710			No emergency lanes		1	4.00
	VIII	E 65		Gostivar	Mavrovsko	17	2	1	3	3,377	6,134					1	1.53
	VIII	E 65		Mavrovsko	Kicevo	19	2	1	2							1	1.62
	VIII	E 65		Kicevo	Izvor	16	2	1	2	1,776	3,227					1	1.36
	VIII	E 65		Izvor	Pesocani	21	4	1	3							1	2.52
	VIII			Pesocani	Struga	30	2	1	2	7,273	13,190					1	2.55
	VIII	E 852		Struga	border	13	1	4	3	1,121	2,035				from 1 to 2	4	4.94
Macedonia	6	E 65	Ma-H-01	Skopje	Den Jankovic (bor.)	20	1	3	2	4,550	8,268				2+ impr. Alignment	3	24.00
Macedonia						603										Total Cost/km	341.28
																	0.57

Appendix 4 - Investment Requirements

Country	Route or Corridor No.	Road number	TERN	From	To	Length km	Geometric *	Road surface condition	Topography	Traffic	Traffic forcarst	Bridges longer than 50m length m	Tunnels Length m	Remarks	Expected Geometric Improvement	Expected Conditional Improvement	Cost in Million €
Albania	VIII VIII VIII VIII VIII		AL-H-01	Tirane	Durres	46	5	0	1	12,004	37,179	160					
				Durres by-pass													5.00
				Durres	Rrogozhine	38	3	0	1	12,004	37,179						47.50
				Rrogozhine	Elbasan	45	3		1								
			AL-H-23	Elbasan	Librazhd	25	2	4	2	3,081	9,367	380				4	20.00
				Librazhd	border(Prenjas)	37	3	0	3	2,416	7,319	300					
Albania	VIII		AL-H-04	Prenjas	Pogradec	34	2	4	2	2,416	7,319						46.00
	VIII		AL-H-05	Pogradec	Maliq - Korce	30	2	4	1	3,507	10,971	160				4	30.00
	VIII			Korce	Bilisht (border)	30	3	0	1	3,194	9,321	260					
Albania	2b 2b 2b 2b 2b		AL-H-06	border (Bajze)	Shkoder	35	2	4	1			250		Partly finished/partly under construction		4	29.00
			AL-H-07	Shkoder	Lezhë	43	3	0	1	3,957	11,703	860			3		15.00
				Lezhë	Mamuras	27	3	0	1	3,957	11,703	430			3		
				Mamuras	Fush-Krujë	14	3	0	1	3,957	11,703	430			3		
			AL-H-15	Fush-Krujë	Vorre	13	2	4	1	5,186	15,365	230				4	8.00
	VIII		AL-H-02	Rrogozhine by-pass													3.00
Albania	VIII			Rrogozhine	Lushnje	20	3	0	1	11,083	34,161						25.00
	VIII		AL-H-08	Lushnje	Fier	31	2	4	1	9,566	29,377	150				4	46.50
	VIII		AL-H-09	Fier	Vlore	39	2	4	1			320				4	58.50
Albania	2c		AL-H-10	Fier	Tepelene	75	2	4	2	2,133	6,567	410		Alignment no. 3		4	53.00
Albania	2c		AL-H-11	Tepelene	Gjirokaster	30	2	4	2	2,133	6,567	410				4	20.50
	2c			Gjirokaster	border (Muzine)	31	3	0	1	2,592	7,814	80					
Albania	7		AL-H-12	Lezhe - Kallmet	Blinisht - Puke	61	2	4	3			240				4	88.00
	7		AL-H-12	Puke	border (Kukes)	78	2	4	3			620				4	112.00
Albania						782										Total	607.00
Balkan						6018										Total Cost/km	0.78
																Total Cost/km	4,223.04
																	0.70

Albania		Unit	Unit Costs, Million EUR									
			Total Unit Cost					Land Cost				
Type of Work			Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain	Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain
			Rual areas	Rual areas	Rual areas	Urban areas	Urban areas	Rual areas	Rual areas	Rual areas	Urban areas	Urban areas
A New Motorways												
-4-lane + shoulder, 26-28 m total width		km	2.0	2.5	NA			0.30	0.21	0.15	1.20	0.60
B New Highways												
-2-lane + shoulder, 11-12 m total width		km				NA	NA	0.15	0.10	0.08	0.60	0.30
C Major New Engineering Structures												
-Major Bridges (longer than 50 m)		m ²	0.0006	0.0007	0.0007	NA	NA					
-Tunnels (one 2-lane tube)		m	NA	0.012	NA	NA	NA					
D Rehabilitation/Upgrading of Existing 2-lane Roads												
-New wearing course (no strengthening)		km	0.030	0.032	0.035	0.035	0.035					
-Pavement rehabilitation, 50% of pavement to be rehabilitated		km	0.080	0.080	0.080	0.090	0.090					
-Overlay + new wearing course		km	0.100	0.120	0.130	0.100	0.100					
-Complete new pavement		km	0.800	0.900	0.900	NA	NA					
- Extension from 2 to 4 lanes		km	0.800	0.900	1.000	NA	NA	0.12	0.09	0.07	0.50	0.25
- Extension with hard shoulders (2x2.5m)		km	0.50	0.60	0.70	NA	NA	0.10	0.08	0.06	0.40	0.20
E Motorway, Side Service Facilities												
-Large Rest Areas		pc	NA	NA	NA	NA	NA					
F Other works, Please Specify												

NA= not available

Bosnia and Herzegovina		Unit	Unit Costs, Million EUR								
			Total Unit Cost					Land Cost			
Type of Work		Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain	Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain
		Rual areas	Rual areas	Rual areas	Urban areas	Urban areas	Rual areas	Rual areas	Rual areas	Urban areas	Urban areas
A New Motorways											
-4-lane + shoulder, 26-28 m total width	km	2.5	3.9	4.2			0.45	0.32	0.30		
B New Highways											
-2-lane + shoulder, 11-12 m total width	km	1.80	2.80	3.30			0.35	0.28	0.16		
C Major New Engineering Structures											
-Major Bridges (longer than 50 m)	m ²	0.0005	0.00006	0.0009							
-Tunnels (one 2-lane tube)	m	0.018	0.020	0.022							
D Rehabilitation/Upgrading of Existing 2-lane Roads											
-New wearing course (no strengthening)	km	0.11	0.12	0.14							
-Pavement rehabilitation, 50% of pavement to be rehabilitated	km	0.08	0.09	0.11							
-Overlay + new wearing course	km	0.16	0.17	0.19							
-Complete new pavement	km	0.20	0.24	0.31							
- Extension from 2 to 4 lanes	km	1.26	1.80	2.31							
- Extension with hard shoulders (2x2.5m)	km	0.15	0.18	0.20							
E Motorway, Side Service Facilities											
-Large Rest Areas	pc										
F Other works, Please Specify											

Croatia		Unit	Unit Costs, Million EUR								
			Total Unit Cost					Land Cost			
Type of Work		Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain	Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain
		Rual areas	Rual areas	Rual areas	Urban areas	Urban areas	Rual areas	Rual areas	Rual areas	Urban areas	Urban areas
A New Motorways											
-4-lane + shoulder, 26-28 m total width	km	2.5	3.9	4.2			0.45	0.32	0.30		
B New Highways											
-2-lane + shoulder, 11-12 m total width	km	1.80	2.80	3.30			0.35	0.28	0.16		
C Major New Engineering Structures											
-Major Bridges (longer than 50 m)	m ²	0.0005	0.00006	0.0009							
-Tunnels (one 2-lane tube)	m		0,012-0,018	0,012-0,018							
D Rehabilitation/Upgrading of Existing 2-lane Roads											
-New wearing course (no strengthening)	km	0.11	0.12	0.14							
-Pavement rehabilitation, 50% of pavement to be rehabilitated	km	0.08	0.09	0.11							
-Overlay + new wearing course	km	0.16	0.17	0.19							
-Complete new pavement	km	0.20	0.24	0.31							
- Extension from 2 to 4 lanes	km	1.26	1.80	2.31							
- Extension with hard shoulders (2x2.5m)	km	0.15	0.18	0.20							
E Motorway, Side Service Facilities											
-Large Rest Areas	pc										
F Other works, Please Specify											

FYRO Macedonia		Unit	Unit Costs, Million EUR									
			Total Unit Cost					Land Cost				
Type of Work			Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain	Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain
			Rual areas	Rual areas	Rual areas	Urban areas	Urban areas	Rual areas	Rual areas	Rual areas	Urban areas	Urban areas
A	New Motorways											
	-4-lane + shoulder, 26-28 m total width	km	2.5	3.5	7.0	5.0	10.0	1.0	0.8	0.6	1.5-2.0	1.5-2.0
B	New Highways											
	-2-lane + shoulder, 11-12 m total width	km	0.7	1.0	1.3							
C	Major New Engineering Structures											
	-Major Bridges (longer than 50 m)	m ²	0.0007									
	-Tunnels (one 2-lane tube)	m	0.015									
D	Rehabilitation/Upgrading of Existing 2-lane Roads											
	-New wearing course (no strengthening)	km	0.05									
	-Pavement rehabilitation, 50% of pavement to be rehabilitated	km	0.10									
	-Overlay + new wearing course	km	0.125									
	-Complete new pavement	km	0.25									
	- Extension from 2 to 4 lanes	km										
	- Extension with hard shoulders (2x2.5m)	km										
E	Motorway, Side Service Facilities											
	-Large Rest Areas	pc										
F	Other works, Please Specify											

Serbia and Montenegro		Unit	Unit Costs, Million EUR									
			Total Unit Cost					Land Cost				
Type of Work			Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain	Flat terrain	Hilly terrain	Mountainous	Flat terrain	Hilly terrain
			Rual areas	Rual areas	Rual areas	Urban areas	Urban areas	Rual areas	Rual areas	Rual areas	Urban areas	Urban areas
A	New Motorways											
	-4-lane + shoulder, 26-28 m total width	km	2.5	3.9	4.2							
B	New Highways											
	-2-lane + shoulder, 11-12 m total width	km	1.8	2.8	3.3							
C	Major New Engineering Structures											
	-Major Bridges (longer than 50 m)	m ²	0.0008	0.0009	0.0011	0.0009	0.0010					
	-Tunnels (one 2-lane tube)	m										
D	Rehabilitation/Upgrading of Existing 2-lane Roads											
	-New wearing course (no strengthening)	km	0.080	0.080	0.085	0.090	0.095					
	-Pavement rehabilitation, 50% of pavement to be rehabilitated	km	0.11	0.13	0.15	0.14	0.16					
	-Overlay + new wearing course	km	0.14	0.16	0.18	0.17	0.19					
	-Complete new pavement	km	0.24	0.27	0.30	0.27	0.30					
	- Extension from 2 to 4 lanes	km	0.42	0.48	0.55	0.50	0.60					
	- Extension with hard shoulders (2x2.5m)	km	0.07	0.09	0.12	0.09	0.12					
E	Motorway, Side Service Facilities											
	-Large Rest Areas	pc										
F	Other works, Please Specify											

Railway Inventory

EU Strategic Rail Network - Balkan Region

Proposed Modernisation

Country	International code	Reference number to map	Section of line		Modernisation				Estimated costs
					Total length of section	Number of tracks	Electrification	Maximum speed	
			From:	To:	km			km/h	EUR
Croatia	Corridor X		Savski Marof	Zagreb	26.12	2	Electrification	160	74,923,995
Croatia	Corridor X		Zagreb			2	Electrification	160	28,000,000
Croatia	Corridor X		Zagreb	Dugo Selo	18.701	2	Electrification	160	54,950,325
Croatia	Corridor X		Dugo Selo	Novska	84.551	2	Electrification	160	243,908,128
Croatia	Corridor X		Novska	Vrpolje	118.897	2	Electrification	160	0
Croatia	Corridor X		Vrpolje	Tovarnik	66.497	2	Electrification	160	153,872,330
Serbia	Corridor X		Tovarnik	Stara Pazova	87.8	2	Electrification	160	193,037,000
Serbia	Corridor X		Stara Pazova	Novi Beograd	30	2	Electrification	160	102,607,250
Serbia	Corridor X		Beograd			2	Electrification	160	133,000,000
Serbia	Corridor X		Beograd	Velina Plana	90.4	2	Electrification	160	293,496,750
Serbia	Corridor X		Velina Plana	Stalac	85.9	2	Electrification	160	212,561,500
Serbia	Corridor X		Stalac	Nis	67.2	2	Electrification	160	166,228,250
Serbia	Corridor X		Nis	Precevo	156.1	2	Electrification	160	425,809,000

Country	International code	Reference number to map	Section of line		Modernisation				Estimated costs
					Total length of section	Number of tracks	Electrification	Maximum speed	
					km			km/h	
Macedonia	Corridor X		Tabanovce	Skopje	49.8	2	Electrification	160	147,035,500
Macedonia	Corridor X		Skopje	Veles	50.9	2	Electrification	160	160,407,000
Macedonia	Corridor X		Veles	Gevgelija	115	2	Electrification	160	341,151,250
Total Costs for Corridor X									2,730,988,278
Serbia	Corridor Xb		Kelebia	Stara Pazova	149.6	2	Electrification	160	369,287,250
Total Costs for Corridor Xb									369,287,250
Serbia	Corridor Xc		Nis	Dimitrovgrad	103.9	1	Electrification	100	172,850,100
Total Costs for Corridor Xc									172,850,100
Macedonia	Corridor Xd		Veles	Bitola	129.3	1	Electrification	100	278,289,700
Macedonia	Corridor Xd		Bitola	Kremenica	16	1	Electrification	100	26,098,750
Total Costs for Corridor Xd									304,388,450
Croatia	Corridor Vb		Botovo	Dugo Selo	78.629	2	Electrification	160	205,871,783
Croatia	Corridor Vb		Zagreb	Osarije	104.259	2	Electrification	160	322,512,313
Croatia	Corridor Vb		Osarije	Sapjane	156.259	2	Electrification	160	570,193,945
Total Costs for Corridor Vb									1,098,578,041
Croatia	Corridor Vc		Beli Manastir	Slavonski Samac	102.885	1	Electrification	100	176,139,345
BiH	Corridor Vc		Bosanski Samac	Grapska	57	1	Electrification	100	115,999,250
BiH	Corridor Vc		Grapska	Jelina	92	2	Electrification	160	265,259,250

Country	International code	Reference number to map	Section of line		Modernisation				Estimated costs
					Total length of section	Number of tracks	Electrification	Maximum speed	
					km			km/h	
BiH	Corridor Vc		Jelina	Sarajevo	86	1	Electrification	100	220,720,500
BiH	Corridor Vc		Sarajevo	Capljina	170	1	Electrification	100	768,730,500
Croatia	Corridor Vc		Metkovic	Ploce	22.755	1	Electrification	120	46,572,008
Total Costs for Corridor Vc									1,593,420,853
Macedonia	Corridor VIII		Border to Bulgaria	Kumanova	70,6*	1	Electrification	120	161,250,150
Macedonia	Corridor VIII		Gorce Petrov	Border to Albania	169,3*	1	Electrification	100	367,712,700
Albania	Corridor VIII		Kufi	Lime	3.8	1	Electrification	100	8,568,550
Albania	Corridor VIII		Lime	Mirake	49.03	1	Electrification	100	188,657,955
Albania	Corridor VIII		Mirake	Rrogozhine	54.36	1	Electrification	100	137,023,938
Albania	Corridor VIII		Rrogozhine	Shkoze	32.93	1	Electrification	100	62,996,025
Albania	Corridor VIII		Shkozet	Durres	2.1	1	Electrification	120	7,897,800
Albania	Corridor VIII		Shkozet	Tirane	36.57	1	Electrification	120	58,440,000
Albania	Corridor VIII		Rrogozhine	Vlore	83.25	1	Electrification	100	150,885,900
Albania	Corridor VIII		Lime	Pogradec	14.39	1	Electrification	100	25,245,525
Albania	Corridor VIII		Pogradec	Border to Greece	80*	1	Electrification	120	127,581,750
Total Costs for Corridor VIII									1,296,260,293

Country	International code	Reference number to map	Section of line		Modernisation				Estimated costs
					Total length of section	Number of tracks	Electrification	Maximum speed	
					km			km/h	
Croatia	1		Ostarije	Split	321.731	1	Electrification	100	671,362,300
Total Costs for Ostarije - Split									
Montenegro	2		Podgorica	Bozaj	24.74	1	Electrification	100	61,527,045
Albania	2		Kufi	Shkoder	35.28	1	Electrification	100	54,294,398
Albania	2		Shkoder	Vore	83.38	1	Electrification	100	128,595,405
Total Costs for Podgorica - Vore									
Serbia	4		Pancevo	Stamora Moravita	85.4	1	Electrification	100	117,148,650
Total Costs for Pancevo - Stamora Moravita									
Serbia	4		Beograd	Vrbnica	301.5	1	Electrification	100	1,185,136,500
Montenegro	4		Vrbnica	Mojkovac	33.49	1	Electrification	100	556,394,625
Montenegro	4		Mojkovac	Podgorica	83.1	1	Electrification	100	135,070,823
Montenegro	4		Podgorica	Bar	51.2	1	Electrification	120	163,300,275
Total Costs for Beograd - Bar									
BiH	9		Doboj	Banja Luka	87	1	Electrification	100	212,864,750
Total Costs for Doboj - Banja Luka									
Serbia	10		Kraljevo	Border to Kosovo	79.7	1	Electrification	100	203,182,800

Country	International code	Reference number to map	Section of line		Modernisation				Estimated costs
					Total length of section	Number of tracks	Electrification	Maximum speed	
					km			km/h	
Kosovo	10		Border to Serbia	Border to Macedonia	332,641*	1	Electrification	100	1,082,855,400
Macedonia	10		Border to Kosovo	Skopje	30*	1	Electrification	100	56,859,000
Total Costs for Kraljevo - Skopje									1,342,897,200
Serbia	11		Pozega	Stalac	138.1	1	Electrification	100	287,559,900
Total Costs for Pozega - Stalac									287,559,900
TOTAL COSTS FOR MODERNISATION									12,481,925,136

*) Estimated

Unit prices for line sections

Modernisation in accordance with AGC/AGTC Double track line. Speed 160 km/h

Unit prices for modernisation of existing line

Tracks between stations		A1 Rural area Flat terrain	A2 Rural area Mountainous terrain	A3 Urban area
Item	Unit	Unit price EUR	Unit price EUR	Unit price EUR
Land acquisition	km ²	5,000/km	5000/km	10000/km
Track substructure	km	500,000	700,000	500,000
Track superstructure	km	700,000	800,000	700,000
Railway bridge - short. Length 30 m.	nos.	400,000	500,000	450,000
Railway bridge - long. Length 60 m.	nos.	1,200,000	1,500,000	1,200,000
Road bridge - two lane. Length 40 m.	nos.	250,000	250,000	250,000
Road bridge - four lane	nos.	500,000	500,000	500,000
Rock tunnel	m		15,000	
Culverts and drainage	km	40,000	50,000	40,000
Protection of environment	km	10,000	10,000	10,000
Catenary system	km	200,000	200,000	200,000
Power supply	km			
Signalling	km	400,000	400,000	400,000
Telecommunication	km	100,000	100,000	100,000
Planning, design and supervision	pct	5	5	5

Unit prices for line sections

Modernisation Single track line. Speed 100 km/h.

Unit prices for modernisation

Tracks between stations		A1 Rural area Flat terrain	A2 Rural area Mountainous terrain	A3 Urban area
Item	Unit	Unit price EUR	Unit price EUR	Unit price EUR
Land acquisition	km ²	5.000/km	5.000/km	10.000/km
Track substructure	km	250,000	350,000	250,000
Track superstructure	km	350,000	400,000	350,000
Railway bridge - short. Length 30 m.	nos.	250,000	300,000	250,000
Railway bridge - long. Length 60 m.	nos.	700,000	800,000	700,000
Road bridge - two lane. Length 40 m.	nos.	200,000	200,000	200,000
Road bridge - four lane	nos.	400,000	400,000	400,000
Rock tunnel	m		10,000	
Culverts and drainage	km	30,000	40,000	30,000
Protection of environment	km	10,000	10,000	10,000
Catenary system	km	150,000	150,000	150,000
Power supply	km			
Signalling	km	300,000	300,000	300,000
Telecommunication	km	80,000	80,000	80,000
Planning, design and supervision	pct	5	5	5

Unit prices for line sections

Construction of new single track line. Speed 100 km/h - 120 km/h

Unit prices for construction of new line

Tracks between stations		A1 Rural area Flat terrain	A2 Rural area Mountainous terrain	A3 Urban area
Item	Unit	Unit price EUR	Unit price EUR	Unit price EUR
Land acquisition	km ²	5,000/km	5,000/km	10,000/km
Track substructure	km	250,000	350,000	250,000
Track superstructure	km	350,000	400,000	350,000
Railway bridge - short. Length 30 m.	nos.	350,000	400,000	350,000
Railway bridge - long. Length 60 m.	nos.	800,000	900,000	800,000
Road bridge - two lane. Length 40 m.	nos.	300,000	300,000	300,000
Road bridge - four lane	nos.	600,000	600,000	600,000
Rock tunnel	m		20,000	
Culverts and drainage	km	30,000	40,000	30,000
Protection of environment	km	10,000	10,000	10,000
Catenary system	km	150,000	150,000	150,000
Power supply	km			
Signalling	km	300,000	300,000	300,000
Telecommunication	km	80,000	80,000	80,000
Planning, design and supervision	pct	5	5	5

Unit prices for line sections

Construction of new track along existing line in accordance with AGC/AGTC, and modernisation of existing track. Speed 160 km/h.

Unit prices for construction of new track.

Tracks between stations		A1 Rural area Flat terrain	A2 Rural area Mountainous terrain	A3 Urban area
Item	Unit	Unit price EUR	Unit price EUR	Unit price EUR
Land acquisition	km ²	5.000/km	5.000/km	10.000/km
Track substructure	km	600,000	800,000	600,000
Track superstructure	km	700,000	800,000	700,000
Railway bridge - short. Length 30 m.	nos.	500,000	600,000	500,000
Railway bridge - long. Length 60 m.	nos.	1,300,000	1,600,000	1,300,000
Road bridge - two lane. Length 40 m.	nos.	250,000	250,000	250,000
Road bridge - four lane	nos.	500,000	500,000	500,000
Rock tunnel	m		25,000	
Culverts and drainage	km	40,000	50,000	40,000
Protection of environment	km	10,000	10,000	10,000
Catenary system	km	200,000	200,000	200,000
Power supply	km			
Signalling	km	400,000	400,000	400,000
Telecommunication	km	100,000	100,000	100,000
Planning, design and supervision	pct	5	5	5

Unit prices for stations

Modernisation of station in accordance with AGC/AGTC. Speed 160 km/h.

Modernisation of station. Speed 100 km/h.

Unit prices for modernisation.

Stations		B1 Minor station/stop 4 th category	B1 Minor station/stop 4 th category
Item	Unit	Unit price EUR	Price EUR
Track substructure	2.8 km	250,000	700,000
Track superstructure	2.8 km	350,000	980,000
Switches	12 nos.	50,000	600,000
Passenger subway/pedestrian bridge	1 nos.	500,000	500,000
Drainage	lump sum		100,000
Platforms	150 m	800	120,000
Buildings for passengers/personnel	100 m ²	150	15,000
Passenger facilities	lump sum		30,000
Landscaping	lump sum		30,000
Protection of environment	lump sum		30,000
Catenary system	2.8 km	200,000	560,000
Power supply	lump sum		
Signalling	2.8 km	300,000	840,000
Telecommunication	2.8 km	100,000	280,000
Planning, design and supervision	pct	15	615,000
Total for station			5,400,000

Unit prices for stations

Modernisation of station in accordance with AGC/AGTC. Speed 160 km/h.

Modernisation of station. Speed 100 km/h.

Unit prices for modernisation.

Stations		B2 Medium station 3 rd category	B2 Medium station 3 rd category
Item	Unit	Unit price EUR	Price EUR
Track substructure	4,15 km	250,000	1,037,500
Track superstructure	4,15 km	350,000	1,452,500
Switches	16 nos.	50,000	800,000
Passenger subway/pedestrian bridge	1 nos.	500,000	500,000
Drainage	lump sum		100,000
Platforms	500 m	800	400,000
Buildings for passengers/personnel	200 m ²	150	30,000
Passenger facilities	lump sum		40,000
Landscaping	lump sum		40,000
Protection of environment	lump sum		40,000
Catenary system	4,15 km	200,000	830,000
Power supply	lump sum		
Signalling	4,15 km	300,000	1,245,000
Telecommunication	4,15 km	100,000	415,000
Planning, design and supervision	pct	15	1,070,000
Total for station			8,000,000

Unit prices for stations

Modernisation of station in accordance with AGC/AGTC. Speed 160 km/h.

Modernisation of station. Speed 100 km/h.

Unit prices for modernisation.

Stations		B3 Major station 2 nd category	B3 Major station 2 nd category
Item	Unit	Unit price EUR	Price EUR
Track substructure	6,4 km	250,000	1,600,000
Track superstructure	6,4 km	350,000	2,240,000
Switches	20 nos.	50,000	1,000,000
Passenger subway/pedestrian bridge	1 nos.	500,000	500,000
Drainage	lump sum		100,000
Platforms	750 m	800	600,000
Buildings for passengers/personnel	400 m ²	150	45,000
Passenger facilities	lump sum		50,000
Landscaping	lump sum		50,000
Protection of environment	lump sum		50,000
Catenary system	6,4 km	200,000	1,280,000
Power supply	lump sum		
Signalling	6,4 km	300,000	1,920,000
Telecommunication	6,4 km	100,000	640,000
Planning, design and supervision	pct	15	1,425,000
Total for station			11,500,000

Rehabilitation / Modernisation of Railway Lines

Country: Albania

Summary for all lines

Estimated costs:

Lines	Price EUR
Line section Vore - Kufi (Border to Montenegro)	182,889,803
Line section Durres - Tirane	66,337,800
Line section Rrogozhine - Vlore	150,885,900
Line section Shkozet - Lime	388,677,918
Line section Lime - Kufi (Border to Macedonia)	8,568,550
Line section Lime - Border to Greece	152,827,275
Total for all Lines	950,187,246

Rehabilitation / Modernisation of Railway Lines

Country: **Bosnia and Herzegovina**

Summary for all lines

Estimated costs:

Lines	Price EUR
Line section Capljina - Bosanski Samac	1,370,709,500
Line section Grapska - Banja Luka	212,864,750
Total for all Lines	1,583,574,250

Rehabilitation / Modernisation of Railway Lines

Country: Croatia

Summary for all lines

Estimated costs:

Lines	Price EUR
Line section Sapjane - Tovarnik	1,345,437,040
Line section Zagreb - Savski Marof	74,923,995
Line section Dugo Selo - Botovo	205,871,783
Line section Slavonski Samac - Beli Manastir	176,139,345
Line section Ostarije - Split	671,362,300
Line section Ploce - Metkovic	46,572,008
Station Zagreb (no calculation sheet)	28,000,000
Total for all Lines	2,548,306,471

Rehabilitation / Modernisation of Railway Lines

Country: **Kosovo**

Summary for all lines

Estimated costs:

Line sections	Price EUR
Line section Border to Serbia - Border to FYRO Macedonia	1,082,855,400
Total for Line	1,082,855,400

Rehabilitation / Modernisation of Railway Lines

Country: FYRO Macedonia

Summary for all lines

Estimated costs:

Line sections	Price EUR
Line section Tabanovci - Skopje	147,035,500
Line section Skopje - Veles	160,407,000
Line section Veles - Gevgelija	341,151,250
Line section Gorce Petrov - Kicevo	209,213,550
Line section Kicevo - Border to Albania	158,499,150
Line section Skopje - Border to Kosovo	56,859,000
Line section Kumanova - Beljakovci	69,491,400
Line section Beljakovci - Border to Bulgaria	91,758,750
Line section Veles - Bitola	278,289,700
Line section Bitola - Kremenica	26,098,750
Total for Line	1,538,804,050

Rehabilitation / Modernisation of Railway Lines

Country: Montenegro

Summary for all lines

Estimated costs:

Lines	Price EUR
Line section Vrbnica - Podgorica	691,465,448
Line section Podgorica - Bar	163,300,275
Line section Podgorica - Bozaj	61,527,045
Total for all Lines	916,292,768

Rehabilitation / Modernisation of Railway Lines

Country: Serbia

Summary for all lines

Estimated costs:

Lines	Price EUR
Line section Tovarnic - Precevo	1,393,739,750
Line section Kelebia - Stara Pasova	369,287,250
Line section Nis - Dimitrovgrad	172,850,100
Line section Pancevo - Stamura Moravita	117,148,650
Line section Beograd - Vrbnica	1,185,136,500
Line section Pozega - Stalac	287,559,900
Line section Kraljevo - Border to Kosovo	203,182,800
Station Beograd (no calculation sheet)	133,000,000
Total for all Lines	3,861,904,950