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Liaison Office to Kosovo

**Technical Support to the
Ministry of Transport and Communications
to continue the development of a
Multi-Modal Transport Strategy
and Action Plan**

Project No 2008/162162 (06KOS01/09/003)

**Railway Transport in
Republic of Kosovo**

**ACTION PLAN AND
INVESTMENT PLAN**

March 2009



COWI

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GLOSSARY OF KEY ACRONYMS

AETR	International agreement on road vehicle driver and crew hours
ADR	Agreement Dangerous Routier – driver training dangerous goods
AI	Administrative instruction
CPC	Certificate of Professional Competence – National and International
DIR.RID	Roads Infrastructure Department
DOR	Directorate of Roads
DGSA	Dangerous Goods Safety Advisor
EAR	European Agency for Reconstruction
ECLO	European Commission Liaison Office
EDMU	Electric and Diesel Multiple Unit
EU	European Union
GIS	Geographic information system
GTK	Gross Tonne-Km
GVW	Gross Vehicle Weight
HEATCO	Harmonised European Approaches for Transport Costing
HDM	Highway Development Model
ICDs	Inland Clearance (or container) Depots
IFIs	International Financial Institutions
IRR	Internal Rate of Return
ITS	Intelligent Transport Systems
KDSP	Kosovo Development Strategy Plan
KFOR	Kosovo Force
LGV	Large Goods Vehicle
MTC	Ministry of Transport & Communications
MTEF	Mid-Term Expenditure Framework
NPV	Net Present Value
MFE	Ministry of Finance and Economy
MMTPS	Multimodal Transport Planning Strategy
PISG	Provisional Institution of Self Government
RID	Road Information Database
TAIEX	Technical Assistance Programme of the EU
ToR	Terms of Reference
TPU	Transport Planning Unit
TPMG	Transport Planning Management Group
UIC	Union Internationale des Chemins de Fer (International Union of Railways)
VfM	Value for Money

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EXECUTIVE SUMMARY

The Kosovo Railways operate more than 300 km of non-electrified single track lines. The maximum speed limit is 70 km/h even though the geometry of many parts of the network would permit to allow 160 km/h. The signaling and telecommunications equipment are under modernization; level crossings have been equipped with automatic barriers or even replaced by road bridges.

Regarding investments, two main scenarios are proposed for the railways in Kosovo:

- a development following a reference situation: i.e. without expecting any major modification of the modal split between private car and bus transport on one side and rail transport on other side;
- an important development of the railways in Kosovo following a so called “project situation” with, in fact also, a development of integrated public transport services combining urban public transport, inter-urban bus transport and passenger rail transport.

For the first scenario, only some projects already approved for implementation have been taken into account. The main provider for inter-urban public transport will remain the bus-operator’s network.

In the second scenario, the share of bus-lines as part of public transport have been reduced, compensated by additional rail services; in addition, some improvement of the infrastructure, as well as the use of new rolling stock (purchased or rented) have been proposed.

The Kosovo railway projects are:

- Public transport development with double tracking and electrification Fushë Kosovë – Prishtinë and a new multimodal station in the Capital;
- New link to the Prishtinë airport in complement of existing Fushë Kosovë – Bardh line section electrification;
- Rail/road freight villages;
- Greenness project (transport of vegetables from Prizren region);
- North-South line upgrading and electrification;
- East-West line and Prizren branch line upgrading;
- Link to Albania.

The railway infrastructure modernisation investments have been optimised taking into account the possibilities of the Kosovo Consolidated Budget; IFI loans and EU grants.

The total cost of all candidate infrastructure projects (new investments and improvements) have been estimated at 467 million Euros as follows:

	Cost (M€)	to be completed at end of
1 Fushë Kosovë - Prishtinë	29.0	2015
2 Fushë Kosovë - Ferizaj	38.1	2015
3 Prishtinë multimodal station	10.0	2015
4 Link to the Airport	14.6	2015
5 Rail/road freight villages	8.5	2011
6 Fushë Kosovë – Mitrovicë	42.1	2019
7 Bardh – Pejë	77.9	2021
8 Klinë – Prizren	58.1	2022
9 Ferizaj - Hani I Elezit	72.4	2025
10 Prishtina – Podujevë	39.7	2026
11 Prizren – Vermice (Albania)	13.4	2027
12 Mitrovicë - Leshak	63.1	2030
Total	466.9	
<i>EU Grant</i>	<i>233.4</i>	
<i>IFI Loan</i>	<i>116.7</i>	
<i>KCB</i>	<i>116.7</i>	

Table 1: Estimated Costs of Candidate Railway Infrastructure projects (€ million)

After completion of these works; in 2030; the rail network will be as hereafter presented in the map.

New rolling stock also has to be either purchased or rented according to the transport demand with the possibility that services would be provided by separate operator:

- EDMU¹
- IC coaches
- Electric locomotives
- Diesel locomotives
- Shunting locomotives
- Freight wagons

The main measures needed to ensure the implementation of such an ambitious investment programme, and even the more limited feasible parts are outlined in the tentative macro implementation schedule for railway investment projects on the following page.

All the identified projects would have to be analysed at “feasibility study level” and then would be implemented only if they are economically and financially justified.

¹ EDMU: Electric Diesel Multiple Unit: railway vehicles autonomous in energy: it could be used in electrified lines as well as non-electrified.

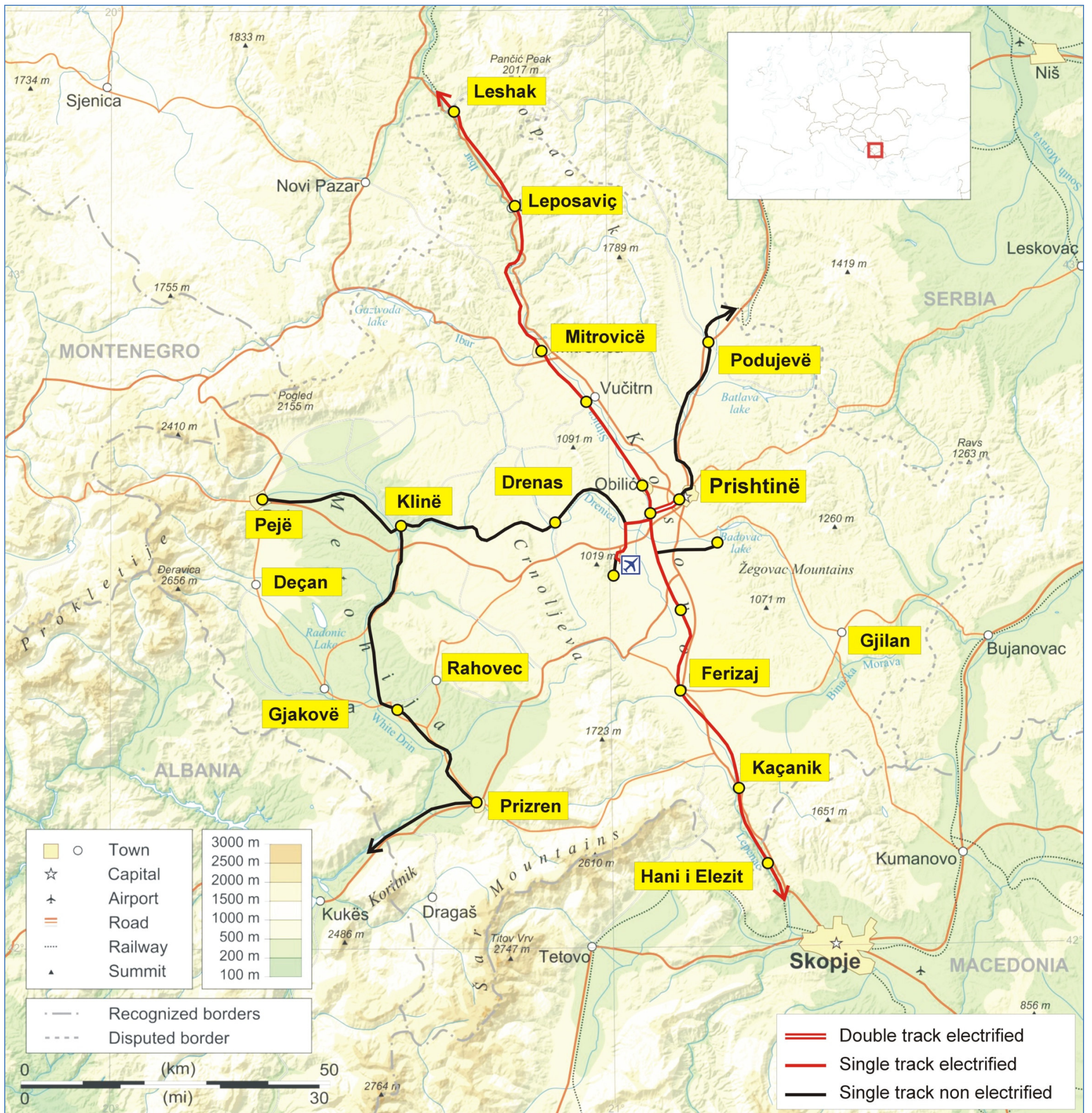


Figure 1: Kosovo Railway Network in 2030

Phase A	Total	2009	2010	2011	2012	2013	2014	2015
1 Fushë Kosovë - Prishtinë	29.0	2.90	4.35	4.35	4.35	4.35	4.35	4.35
2 Fushë Kosovë - Ferizaj	38.1	0.91	8.77	8.77	9.67	4.81	4.81	0.31
3 Prishtinë multimodal station	10.0				2.50	2.50	2.50	2.50
4 Link to the Airport	14.6					4.86	4.86	4.86
5 Rail/road freight villages	8.5	1.70	3.40	3.40				
Total	100.1	5.51	16.52	16.52	16.52	16.52	16.52	12.02
<i>EU Grant</i>	50.1	2.75	8.26	8.26	8.26	8.26	8.26	6.01
<i>IFI Loan</i>	25.0	1.38	4.13	4.13	4.13	4.13	4.13	3.00
<i>KCB</i>	25.0	1.38	4.13	4.13	4.13	4.13	4.13	3.00

Table 2: Rail Investment Plan – Phase A (€ million)

Phase B	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
6 Fushë Kosovë – Mitrovicë	42.1	14.03	14.03	7.01	7.01											
7 Bardh – Pejë	77.9	19.48	19.48	9.74	9.74	9.74	9.74									
8 Klinë – Prizren	58.1			11.62	11.62	11.62	11.62	11.62								
9 Ferizaj - Hani I Elezit	72.4					12.07	12.07	12.07	12.07	12.07	12.07					
10 Prishtina – Podujevë	39.7								9.93	9.93	9.93	9.93				
11 Prizren – Vermice (Albania)	13.4										4.47	4.47	4.47			
12 Mitrovicë - Leshak	63.1											12.62	12.62	12.62	12.62	12.62
Total	366.7	33.50	33.50	28.37	28.37	33.43	33.43	23.69	22.00	22.00	26.47	27.02	17.09	12.62	12.62	12.62
<i>EU Grant</i>	183.4	16.75	16.75	14.19	14.19	16.72	16.72	11.85	11.00	11.00	13.23	13.51	8.55	6.31	6.31	6.31
<i>IFI Loan</i>	91.7	8.38	8.38	7.09	7.09	8.36	8.36	5.92	5.50	5.50	6.62	6.75	4.27	3.16	3.16	3.16
<i>KCB</i>	91.7	8.38	8.38	7.09	7.09	8.36	8.36	5.92	5.50	5.50	6.62	6.75	4.27	3.16	3.16	3.16

Table 3: Rail Investment Plan – Phase B (€ million)

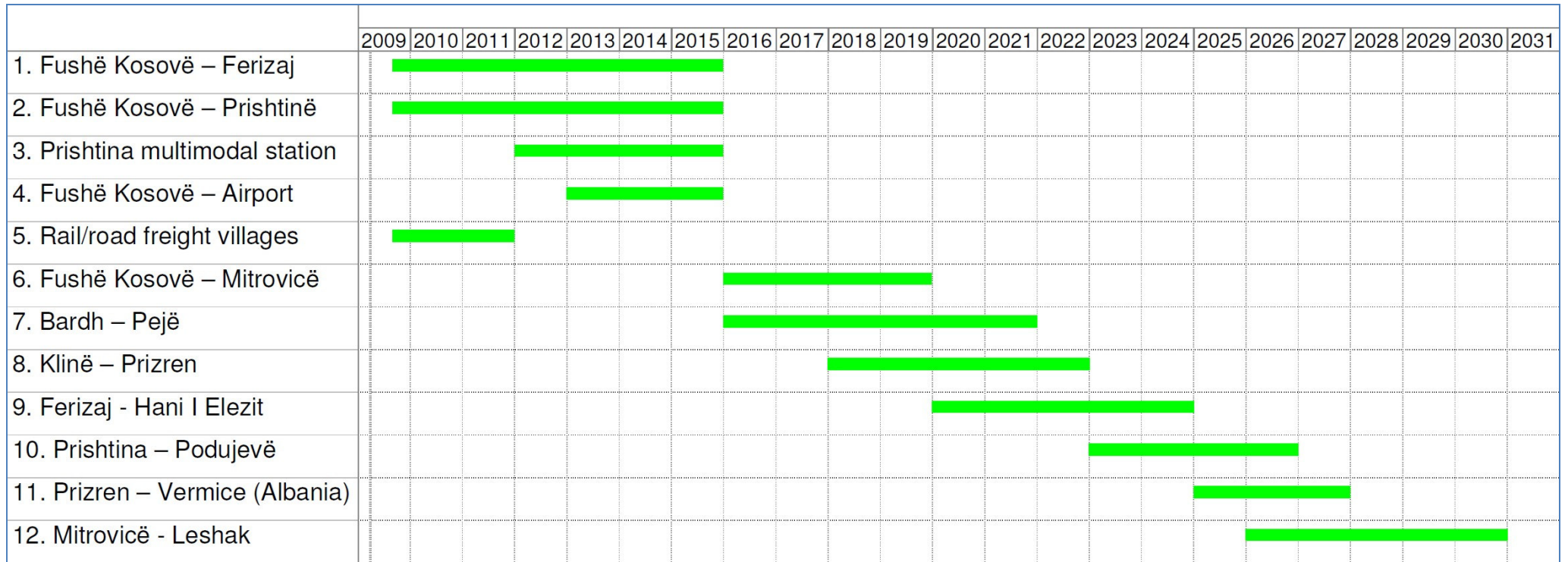


Figure 2: Macro-Schedule of Railway Investment Projects

1 INTRODUCTION

The objective of this report is to develop priority railway investment projects up to 2025.

This will be achieved on the basis of:

- Our diagnosis of the past and present situation of the railway sector,
- Traffic appraisals,
- Projects already identified by Kosovo railways.

2 PASSENGERS

The railway projects identified here are limited to infrastructure works which **have a direct measurable impact on travel times and thus on the demand and can be tested with the traffic model.**

Subsequently, with the model we have tested the proposed projects and rail service levels by 2025 with regard to ridership levels, accounting for a reorganisation of the bus network so it is not in competition to the rail but complementary.

2.1 Reference Case

A first step to identify projects is to study the reference case and to determine what will happen if no future infrastructure investments are made in the railway sector.

Based on traffic model forecasts, we can expect 3 times more train passengers in the reference case in 2025 due to general population, employment and GDP increases in Kosovo. A further assumption in order to make this demand possible is that Kosovo railways provide the required additional trains and that there is sufficient capacity on the existing network.

A reasonable assumption is that the number of trains operated by Kosovo railways is doubled until 2025 in order to cope with the demand. These trains could be provided with donor assistance as in the past.

Based on the present supply we then obtain the following services in 2025:

- 4 daily trains between Hani I Elezit and Leshak (continuing to Belgrade with no change);
4 daily trains between Prishtinë and Leshak (continuing to Belgrade with no change); we propose a redirection of this service from the present Fushë Kosovë – Leshak as Prishtinë should become the main passenger station;
- 8 daily Intercity trains between Hani I Elezit and Prishtinë (coming from Skopje and passing by Fushë Kosovë);
- 4 daily trains between Hani I Elezit and Fushë Kosovë;
- 8 daily trains between Prishtinë and Pejë.

Based on our diagnosis of the past and present situation of the railway sector, we propose to cancel the following stations due to lack of passengers: Gurëz, Kodrion v.c., Bablak, Hashanaj v.c., Miradi² and Frashër on the North-South line.

New services in the reference case, which do not require significant infrastructure investments, could most likely be:

- 4 daily trains between Prishtinë and Prizren.
- 8 daily trains between the Airport and Prishtinë.
- 4 daily trains between Prishtinë and Podujevë.
- a new train stop for all services to Prishtinë station could be provided close to the main bus terminal.

² Miradi freight terminal is not concerned by this measure

In order for the above project services to be possible, we assume that the existing infrastructure is upgraded by Kosovo Railways at its own expense and that the additional trains are donated to Kosovo Railways.

2.2 Capacity and Safety

A schematic view of the total number of trains on the central sections is shown in the following figure. As it is possible to operate approximately 64 daily trains (2 trains per hour per direction) both ways on a single track, we can see that there is sufficient capacity on the existing network to carry the above services. There are however significant disadvantages, which we will discuss in the next chapter.

We have included an estimate of freight trains in order to determine the available capacity on the network. It is difficult to predict the future number of freight trains as it is dependent on the orders which Kosovo Railways obtains from clients. In next figure we have estimated that the freight transport orders will triple between now and 2025 on existing main freight corridors.

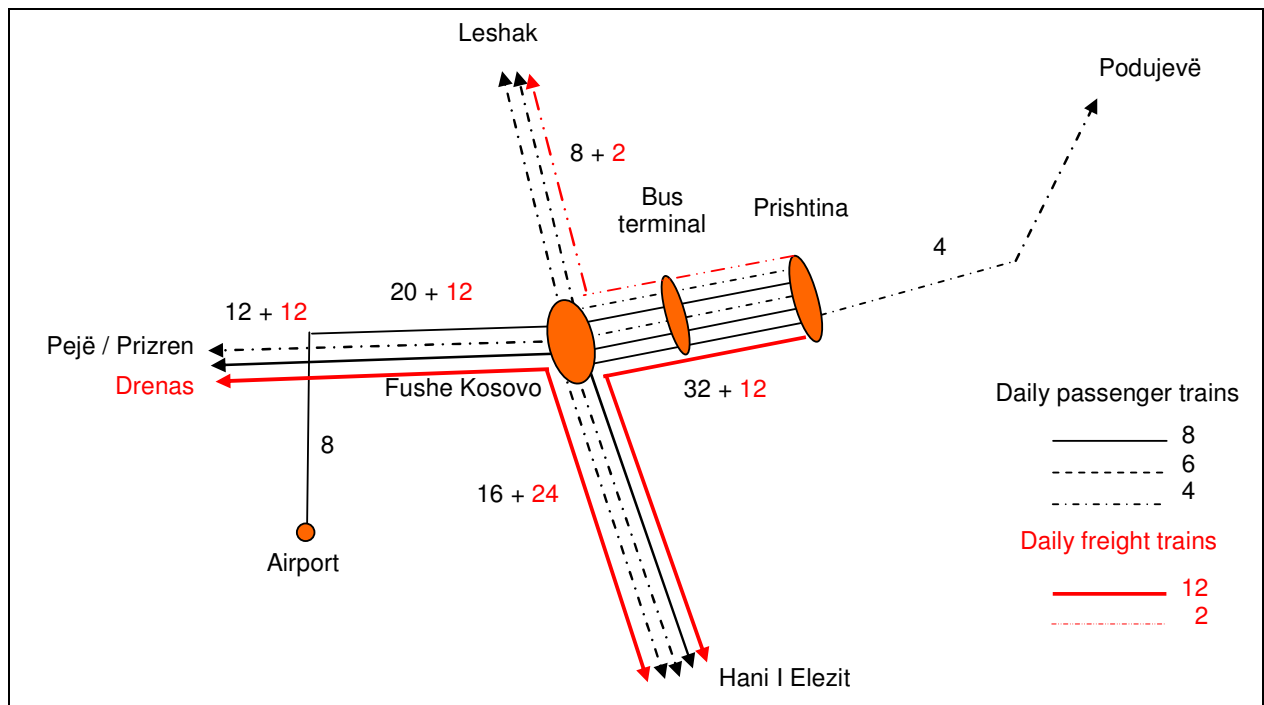


Figure 3: Daily trains both ways in the reference case in 2025

2.3 Single Track Operations

We do not recommend continued operations on single tracks for an increasing number of passenger trains on the central sections, which is the present trend in Kosovo. Without block signalling, which requires a significant investment discussed in the project case, single-track operations for the forecasted train volumes on the central section cannot be considered safe enough for passenger trains.

There can also be problems with long freight trains if there are not enough long passing stretches, reducing the capacity of the track even more.

If Kosovo Railways is to continue operating with single-tracks, operations can be improved by constructing crossing loops at a low cost at frequent intervals. The crossing loops should be arranged to be in line of sight of one another, so that drivers in one direction can see if vehicles in the opposing direction are already in the single line section. The single line sections thus need to be straight.

When trains are running in opposite directions on a single-track railway line, meeting points are scheduled, at which each train must wait for the other at a passing pass. Neither train is permitted to move before the other has arrived. In the U.S. the display of two green flags (green lights at night) is an indication that another train is following the first and the waiting train must wait for the next train to pass. In addition, the train carrying the flags gives eight blasts on the whistle as it approaches. The waiting train must return eight blasts before the flag carrying train may proceed.

The simplest form of operation, at least in terms of equipment, is to run the system according to a timetable. A fixed schedule is drawn up with which every train crew must be familiar. Trains may only run on each section of track at their scheduled time, during which they have possession and no other train is permitted to use the same section.

The timetable system has several disadvantages. First, there is no positive confirmation that the track ahead is clear, only that it is scheduled to be clear. The system does not allow for engine failures and other such problems, but the timetable is set up so that there should be sufficient time between trains for the crew of a failed or delayed train to walk far enough to set up warning flags, flares, and detonators or torpedoes to alert any other train crew.

A second problem is the system's inflexibility. Trains cannot be added, delayed, or rescheduled without advance notice.

A third problem is a corollary of the second: the system is inefficient. To provide flexibility, the timetable must give trains a broad allocation of time to allow for delays, so the line is in the possession of each train for longer than is otherwise necessary.

2.4 Project Costs

For each project proposed in the following chapter we have calculated the related investment costs.

In our costing, we distinguish between single track upgrading, double track upgrading and new lines with or without electrification.

Upgrading works account for permanent way and track renewal including realignments to create a straight railway line allowing for higher speeds with conventional rolling stock, this reducing the cost of rolling stock and operations, and improving passenger safety and comfort.

With straight railway lines Kosovo Railways can continue using donor trains for speeds up to 160 km/h.

Electrification³ and signalling are two other major components of the upgrading.

Signalling costs include the following components: cables, automatic block system, Automatic Train Protection (ATP), Automatic Train Control (ATC), and radio link.

³ Please note that electrification of the railways will require adapted power plants in Kosovo, which presently are highly insufficient to provide sufficient and uninterrupted power supply for the railways

Renovation and construction of new stations are also included in the upgrading costs.

For the station renovations we distinguish between:

- Small stations: with passing track on a single track line, without signalling and without any other equipment.
- Intermediate stations: with one passing track on a single track line with interlocking and signalling without any other equipment.
- Main stations: double track service station with signalling, turnouts, CTC, etc.

Enlargement costs of existing railway bridges and tunnels for the doubled lines and new line are evaluated as well.

To avoid collisions, control devices are required at the level crossings, which in Europe typically are automatic with half-barriers, flashing lights and a bell.

A level crossing is an intersection where a rail line and a road cross one another at the same level. Level crossings should however be avoided. The strongest argument in favour of avoiding or abolishing railway level crossings and replacing them with road over- and underpasses is, of course, the possibility of removing the great danger to life which their presence causes. In spite of all the safety devices and precautions, every now and then a serious accident takes place, causing a loss of life, which the separation of grades might have prevented.

Road over- and underpasses, also called at grade separations, are created when a bridge or tunnel is built to allow the roadway to pass over or under the rail line, completely separating automobiles and other traffic from trains. These at grade separations unfortunately have prohibitive costs compared to level crossings, as they are app. 15 and 30 times higher for road overpasses and road underpasses respectively. In the following costing of the projects we estimate that 10% of existing level crossings are critical from a safety perspective and need to be replaced by either a road over pass or a road underpass.

The elimination of level crossings is also desirable for reasons of transport economy in dense traffic. Calculations based on time lost by passing trains holding back street traffic can show results of enormous amounts.

Where no grade crossings are encountered, there may also be a great saving in expense to Kosovo Railways, for the reason that they are able to dispense with safety gates, guards and the slowing down of trains. We therefore recommend at grade separation.

All Costs Account for Local Labour and Existing Infrastructure and Buildings.

We have also estimated the cost of new electric and diesel rolling stock. Even after completion of the railway infrastructure projects, part of the network will remain “non-electrified”.

In order to optimise the rolling stock; we propose “dual energy” vehicles able to be operated with electric as well as diesel power supply type “B82000” currently operated by the French railways for long distances and regional services. Their main characteristics are:

- Length: 72.8 m
- Capacity: 220 seats
- Maximum speed: 160 km/h

- Power supply:
 - Electric: 1500V, 25kV/50Hz (4 motors)
 - Diesel: 2 motors MAN “D2842 LE 60”
- Power:
 - Electric: 1900 kW
 - Diesel: 1324 kW
- Cost: 5 M€



Figure 4: Dual Energy Railway Car

The estimation of the number of rolling stock required for the new services is provided in the chapter on the new services.

2.5 Project Case

As a general measure, due to safety issues discussed previously, we recommend an immediate upgrading of the lines to 160 km/h and implementation of automatic block signalling gradually on all sections of the Kosovo railway network. Other project proposals are specific for each section.

The projects proposed hereafter account for all projects identified by Kosovo Railways.

2.5.1 Fushë Kosovë – Hani I Elezit Section Upgrading

In terms of infrastructure investments in the short term, we first recommend to upgrade the Fushë Kosovë – Hani I Elezit section to 160 km/h commercial speed on double track with electrification. This section has the most passenger and freight traffic and is a part of the Route 10 priority project of SEETO.

In the reference case, we proposed to cancel the following stations due to lack of passengers: Gurëz, Kodrion v.c., Bablak, Hashanaj v.c. and Miradi. The average distance between the stations is thus 11.9 km which is sufficient to achieve the targeted average commercial speeds of 120 km/h, thus providing an express inter-city service. The remaining stations will be upgraded.

The characteristics of the Fushë Kosovë – Hani I Elezit section are as follows:

- Single track non electrified with a length of 65 km
- 7 tunnels / 33 bridges / 46 level crossings
- In total, there are 8 stations among which 7 are small stations, and Fushë Kosovë a main station.

The construction costs for upgrading the Fushë Kosovë – Hani I Elezit section are evaluated as shown in the table below.

Fushë Kosovë – Hani I Elezit	Unit	Unit price	Unit / km	cost/km	65 km line
Rails UIC 60	m	41	4,000	164,000	10,660,000
Concrete sleepers	unit	40	3,400	136,000	8,840,000
Elastic fastenings	unit	15	13,400	201,000	13,065,000
Ballast	m3	18	4,200	75,600	4,914,000
Land acquisition	m2	2	10,000	15,000	975,000
Earthwork	m3	2	20,000	40,000	2,600,000
Track upgrading total cost				631,600	41,054,000
Signalling and telecom	km			235,000	15,275,000
Catenary and substations	km			450,000	29,250,000
Subtotal	km			1,316,600	85,579,000
Level crossings ⁴	unit	150,000	41		6,210,000
Bridge	unit		1.3	11,250,000	14,850,000
Tunnel	unit		0.3	15,000,000	4,200,000
Road overpass	unit	2,250,000	3		6,750,000
Road underpass	unit	4,500,000	2		9,000,000
Small station	unit	500,000	7		3,500,000
Intermediate station	unit	1,500,000	0		0
Main station	unit	15,000,000	1		15,000,000
Total					145,089,000

Table 4: Costs for upgrading the existing Fushë Kosovë – Hani I Elezit section to 160 km/h on double track and electrification (€)

⁴ 5 are replaced by 3 road overpasses and 2 road underpasses

2.5.2 Fushë Kosovë – Prishtinë Section Upgrading

The Fushë Kosovë – Prishtinë section should also be upgraded to 160 km/h on double track with electrification.

The characteristics of the Fushë Kosovë – Prishtinë section are as follows:

- Single track non electrified with a length of 8 km
- 1 bridge / 6 level crossings
- Prishtinë is the only station and should be upgraded to a “main station” category.

Following the important infrastructure improvement we will increase the number of trains from 4 daily trains to a 2-hourly service, i.e. 16 daily trains in both directions. This service can be ensured by 1 additional train.

Fushë Kosovë – Prishtinë	Unit	Unit price	Unit / km	cost/km	8 km line
Rails UIC 60	m	41	4,000	164,000	1,312,000
Concrete sleepers	unit	40	3,400	136,000	1,088,000
Elastic fastenings	unit	15	13,400	201,000	1,608,000
Ballast	m ³	18	4,200	75,600	604,800
Land acquisition	m ²	2	10,000	15,000	120,000
Earthwork	m ³	2	20,000	40,000	320,000
Track upgrading total cost				631,600	5,052,800
Signalling and telecom	km			235,000	1,880,000
Catenary and substations	km			450,000	3,600,000
Subtotal	km			1,316,600	10,532,800
Level crossings	unit	150,000	5		810,000
Bridge	unit		0.04	11,250,000	450,000
Tunnel	unit		0.0	15,000,000	0
Road overpass	unit	2,250,000	1		2,250,000
Road underpass	unit	4,500,000	0		0
Small station	unit	500,000	0		0
Intermediate station	unit	1,500,000	0		0
Main station	unit	15,000,000	1		15,000,000
Total					29,042,800

Table 5: Costs for upgrading the existing Fushë Kosovë – Prishtinë section to 160 km/h on double track and electrification (€)

The services from Skopje, Pejë and Prizren could also stop at the bus terminal on this line. Once we have reorganised the bus network, we can determine the rail-bus ridership with the traffic model and from this the required rail and bus service levels.

2.5.3 Fushë Kosovë – Leshak Section Upgrading

In a next phase, we recommend the same type of project for the Fushë Kosovë – Leshak section in order to complete the Kosovo part of route 10 priority project. Single track operations will be sufficient to carry the demand on this section.

In the reference case, we proposed to cancel Frasher station due to lack of passengers. In the project case we propose further cancellations of low affluence stations in order to achieve the targeted average commercial speed of 120 km/h, thus providing an express intercity service. The stations to cancel are as follows: Dardhishtë, Analum, Vërrin, Mirash, Vushtrri, Vallaç, Sllatina and Dren. The remaining stations will be upgraded. The average distance between the stations will then become 7.2 km.

The characteristics of the Fushë Kosovë - Leshak section are as follows:

- Single track non electrified with a length of 83 km
- 7 tunnels / 41 bridges / 58 level crossings
- In total, there are 9 stations of among which 8 are small stations, and Mitrovicë an intermediate station.

The construction costs for upgrading the Fushë Kosovë – Leshak section are evaluated as shown in the table below.

Fushë Kosovë – Leshak	Unit	Unit price	Unit / km	cost/km	83 km line
Rails UIC 60	m	41	2,000	82,000	6,806,000
Concrete sleepers	unit	40	1,700	68,000	5,644,000
Elastic fastenings	unit	15	6,700	100,500	8,341,500
Ballast	m ³	18	2,100	37,800	3,137,400
Land acquisition	m ²	2	10,000	15,000	1,245,000
Earthwork	m ³	2	20,000	40,000	3,320,000
Track upgrading total cost				343,300	28,493,900
Signalling and telecom	km			180,000	14,940,000
Catenary and substations	km			340,000	28,220,000
Subtotal	km			863,300	71,653,900
Level crossings	unit	150,000	52		7,830,000
Bridge	unit		0	0	0
Tunnel	unit		0	0	0
Road overpass	unit	2,250,000	3		6,750,000
Road underpass	unit	4,500,000	3		13,500,000
Small station	unit	500,000	8		4,000,000
Intermediate station	unit	1,500,000	1		1,500,000
Main station	unit	15,000,000	0		0
Total					105,233,900

Table 6: Costs for upgrading the existing Fushë Kosovë – Leshak section to 160 km/h on single track and electrification (€)

2.5.4 Airport Express Link

Another priority project is the Airport Express link to provide an express passenger service from Prishtinë Airport to Prishtinë Station. In the reference case, as discussed previously, this train could use existing tracks on the section Prishtinë – Fushë Kosovë – Bardh – Airport. In the project case, we recommend an upgrading including electrification on single track

The characteristics of the Airport Express link are as follows:

- Single track non electrified with a length of 12 km
- 3 bridges / 10 level crossings
- The airport is the only station and should be upgraded to an “Intermediate station” category. As it is an entirely new station the cost will be higher.

Fushë Kosovë – Airport	Unit	Unit price	Unit / km	cost/km	12 km line
Rails UIC 60	m	41	2,000	82,000	984,000
Concrete sleepers	unit	40	1,700	68,000	816,000
Elastic fastenings	unit	15	6,700	100,500	1,206,000
Ballast	m3	18	2,100	37,800	453,600
Land acquisition	m2	2	10,000	15,000	180,000
Earthwork	m3	2	20,000	40,000	480,000
Track upgrading total cost				343,300	4,119,600
Signalling and telecom	km			180,000	2,160,000
Catenary and substations	km			340,000	4,080,000
Subtotal	km			863,300	10,359,600
Level crossings	unit	150,000	9		1,350,000
Bridge	unit		0	0	0
Tunnel	unit		0	0	0
Road overpass	unit	2,250,000	1		2,250,000
Road underpass	unit	4,500,000	0		0
Small station	unit	500,000	0		0
Intermediate station	unit	2,250,000	1		2,250,000
Main station	unit	15,000,000	0		0
Total					16,209,600

Table 7: Costs for upgrading the existing airport link to 160 km/h on single track and electrification (€)

2.5.5 Other Lines to Upgrade

As for the remaining railway lines in Kosovo there is not enough demand to justify large investments for double track and electrification. Due to safety, and in order to provide attractive speeds up to 160 km/h, we recommend a phased construction of block signalling and at grade separations. The costs are as follows.

According to the forecast demand, we recommend the following phasing:

- Bardh – Pejë
- Klinë – Prizren
- Prishtinë – Podujevë

The construction costs for upgrading the other lines are evaluated as shown in the tables hereafter.

The Bardh – Pejë section should also be upgraded to 160 km/h on single track with block signalling without electrification.

Presently, there are 17 stations on this section. We propose to cancel low affluence stations in order to achieve the targeted average commercial speed of 120 km/h, thus providing an express inter-city service.

The stations to cancel are as follows : Siperant, Gurkat, Aqarevë, Damanek and Mjekaj. The remaining stations will be upgraded. The average distance between the stations will then become 7.3 km.

The characteristics of the Bardh – Pejë section are as follows :

- Single track non electrified with a length of 80 km
- 6 tunnels / 20 bridges / 65 level crossings
- In total, there are 12 stations of among which 11 are small stations, and Pejë an intermediate station.

The construction costs for upgrading the Bardh – Pejë section are evaluated as shown in the table below.

Bardh – Pejë	Unit	Unit price	Unit / km	cost/km	80 km line
Rails UIC 60	m	41	2,000	82,000	6,560,000
Concrete sleepers	unit	40	1,700	68,000	5,440,000
Elastic fastenings	unit	15	6,700	100,500	8,040,000
Ballast	m ³	18	2,100	37,800	3,024,000
Land acquisition	m ²	2	10,000	15,000	1,200,000
Earthwork	m ³	2	20,000	40,000	3,200,000
Track upgrading total cost				343,300	27,464,000
Signalling and telecom	km			180,000	14,400,000
Catenary and substations	km			0	0
Subtotal	km			523,300	41,864,000
Level crossings	unit	150,000	59		8,775,000
Bridge	unit		0	0	0
Tunnel	unit		0	0	0
Road overpass	unit	2,250,000	3		6,750,000
Road underpass	unit	4,500,000	3		13,500,000
Small station	unit	500,000	11		5,500,000
Intermediate station	unit	1,500,000	1		1,500,000
Main station	unit	15,000,000	0		0
Total					77,889,000

Table 8: Costs for upgrading the existing Pejë – Bardh section to 160 km/h on single track (€)

The Klinë – Prizren section should also be upgraded to 160 km/h on single track with block signalling without electrification.

The characteristics of the Klinë – Prizren section are as follows :

- Single track non electrified with a length of 58 km;
- tunnels / 12 bridges / 52 level crossings
- In total, there are 8 stations of among which 7 are small stations, and Prizren an intermediate station.

The construction costs for upgrading the Klinë – Prizren section are evaluated as shown in the table below.

Klinë – Prizren	Unit	Unit price	Unit / km	cost/km	58 km line
Rails UIC 60	m	41	2,000	82,000	4,756,000
Concrete sleepers	unit	40	1,700	68,000	3,944,000
Elastic fastenings	unit	15	6,700	100,500	5,829,000
Ballast	m3	18	2,100	37,800	2,192,400
Land acquisition	m2	2	10,000	15,000	870,000
Earthwork	m3	2	20,000	40,000	2,320,000
Track upgrading total cost				343,300	19,911,400
Signalling and telecom	km			180,000	10,440,000
Catenary and substations	km			0	0
Subtotal	km			523,300	30,351,400
Level crossings	unit	150,000	47		7,020,000
Bridge	unit		0	0	0
Tunnel	unit		0	0	0
Road overpass	unit	2,250,000	3		6,750,000
Road underpass	unit	4,500,000	2		9,000,000
Small station	unit	500,000	7		3,500,000
Intermediate station	unit	1,500,000	1		1,500,000
Main station	unit	15,000,000	0		0
Total					58,121,400

Table 9: Costs for upgrading the existing Klinë -Prizren section to 160 km/h on single track (€)

The Prishtinë – Podujevë section should also be upgraded to 160 km/h on single track with block signalling without electrification.

The characteristics of the Prishtinë – Podujevë section are as follows:

- Single track non electrified with a length of 44 km
- 2 tunnels / 7 bridges / 31 level crossings
- In total, there are 7 stations which all are small.

The construction costs for upgrading the Prishtinë – Podujevë section are evaluated as shown in the table below.

Prishtinë – Podujevë	Unit	Unit price	Unit / km	cost/km	44 km line
Rails UIC 60	m	41	2,000	82,000	3,608,000
Concrete sleepers	unit	40	1,700	68,000	2,992,000
Elastic fastenings	unit	15	6,700	100,500	4,422,000
Ballast	m3	18	2,100	37,800	1,663,200
Land acquisition	m2	2	10,000	15,000	660,000
Earthwork	m3	2	20,000	40,000	1,760,000
Track upgrading total cost				343,300	15,105,200
Signalling and telecom	km			180,000	7,920,000
Catenary and substations	km			0	0
Subtotal	km			523,300	23,025,200
Level crossings	unit	150,000	28		4,185,000
Bridge	unit		0	0	0
Tunnel	unit		0	0	0
Road overpass	unit	2,250,000	2		4,500,000
Road underpass	unit	4,500,000	1		4,500,000
Small station	unit	500,000	7		3,500,000
Intermediate station	unit	1,500,000	0		0
Main station	unit	15,000,000	0		0
Total					39,710,200

Table 10: Costs for upgrading the existing Prishtinë – Podujevë section to 160 km/h on single track (€)

2.5.6 New Link to Albania

Another project considered having crucial importance for Kosovo and the region involves construction of a new railway line to Albania on the following link: **Prizren – Vermice – Durrës**. As app. 17 km of the line is in Kosovo, and 83 km is in Albania. It is mainly up to the Albanian Government to ensure the investment for the project.

We propose to construct a 160 km/h single track with block signalling, without electrification.

The characteristics of the Prizren – Vermice section are as follows :

- Single track non electrified with a length of 17 km
- 0.1 km bridge
- In total, there are 2 stations which all are small.

The construction costs for the new link to Albania are evaluated as shown in the table below.

Prizren – Vrbnica	Unit	Unit price	Unit / km	cost/km	17 km line
Rails UIC 60	m	41	2,000	82,000	1,394,000
Concrete sleepers	unit	40	1,700	68,000	1,156,000
Elastic fastenings	unit	15	6,700	100,500	1,708,500
Ballast	m3	18	2,100	37,800	642,600
Land acquisition	m2	2	10,000	15,000	255,000
Earthwork	m3	2	75,000	150,000	2,550,000
Track total cost				453,300	7,706,100
Signalling and telecom	km			180,000	3,060,000
Catenary and substations	km			0	0
Subtotal	km			633,300	10,766,100
Level crossings	unit	150,000			0
Bridge : 0.1 km	km		0.1	11,250,000	1,125,000
Tunnel	km		0	15,000,000	0
Road overpass	unit	2,250,000			
Road underpass	unit	4,500,000			
Small station	unit	750,000	2		1,500,000
Intermediate station	unit	2,250,000	0		0
Main station	unit	22,500,000	0		0
Total					13,391,100

Table 11: Costs for constructing a new 160 km/h single line from Prizren to Vrbnica (€)

2.5.7 A Multi-Modal Station in Prishtinë

The biggest bus station in Kosovo is located in Prishtinë in the South-West of the city; directly connected with the highway “M2”, just near the junction with the “M9”. Taking into account the proximity of the railway line linking Fushë Kosovë (300 metres), the existing bus terminal could constitute the basis of the future “multimodal station of Prishtinë”. The Municipality of Prishtinë has already proposed such new railway station on the Urban Plan prepared about five years ago.

A new railway line section and a railway station would have to be created with a length of 3.09 km:

- from the west; it will overpass the Fushë Kosovë – Prishtinë highway with a bridge;
- then access to the existing bus terminal area by the south-west;
- the station will be about 370m length that is enough even for long trains; it will have six tracks;
- then the new railway section will be implemented in a 580m’ tunnel under the main highways arriving in the new roundabout already under construction;
- then the section will join the existing railway layout near the existing Prishtinë rail station (see the map hereafter).

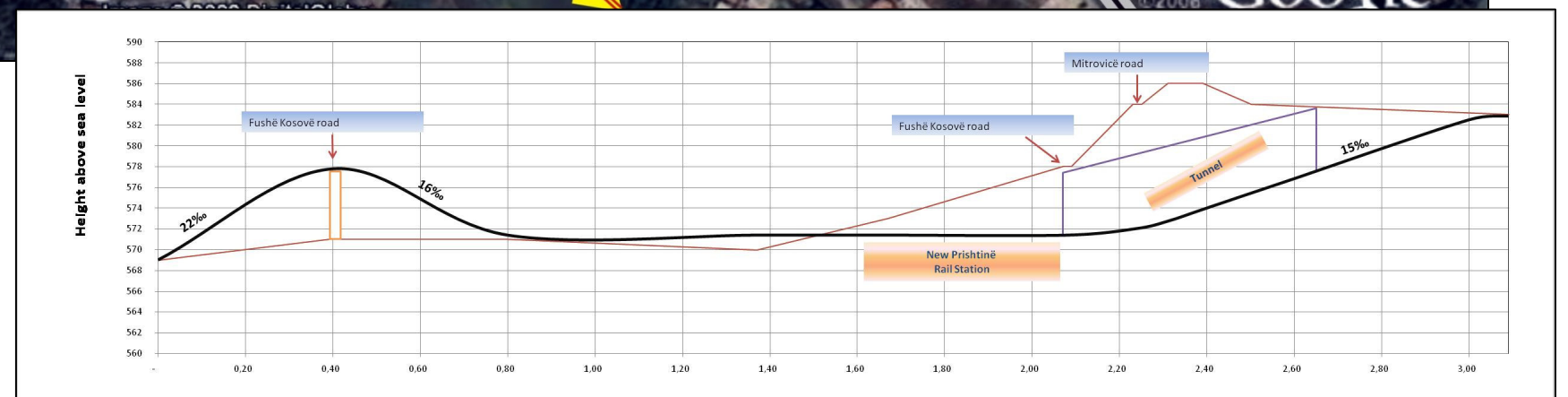
With the development of the city LRT; the inter-modal station will provide connections between all earth public transport services.

According to the available space there would be always space for the parking of private cars as well as the establishment of commercial areas.

The “bus part” of investment cost for Prishtinë inter-modal station is estimated at €2.5m as the “railway parts” will cost €10.0m.



Figure 5: Location of Prishtinë interurban bus station and new rail station



2.6 Railway Infrastructure Project Overview

The following table gives a summary of the infrastructure investment costs required to fully upgrade the Kosovo Railways into a modern infrastructure integrated into the regional rail network.

Project	Type	EUROS
Fushë Kosovë – Hani I Elezit	Double track electrification 160 km/h	145,089,000
Fushë Kosovë – Prishtinë	Double track electrification 160 km/h	29,042,800
Fushë Kosovë – Leshak	Single track electrification 160 km/h	105,233,900
Fushë Kosovë – Airport	Single track electrification 160 km/h	16,209,600
Bardh – Pejë	Single track 160 km/h	77,889,000
Klinë – Prizren	Single track 160 km/h	58,121,400
Prishtinë – Podujevë	Single track 160 km/h	39,710,200
Prizren – Vrbnica	New line single track 160 km/h	13,391,100
Prishtinë railway station	New intermodal station: part of rail	10,000,000
Total cost		494,687,000

Table 12: Overview of projects and costs

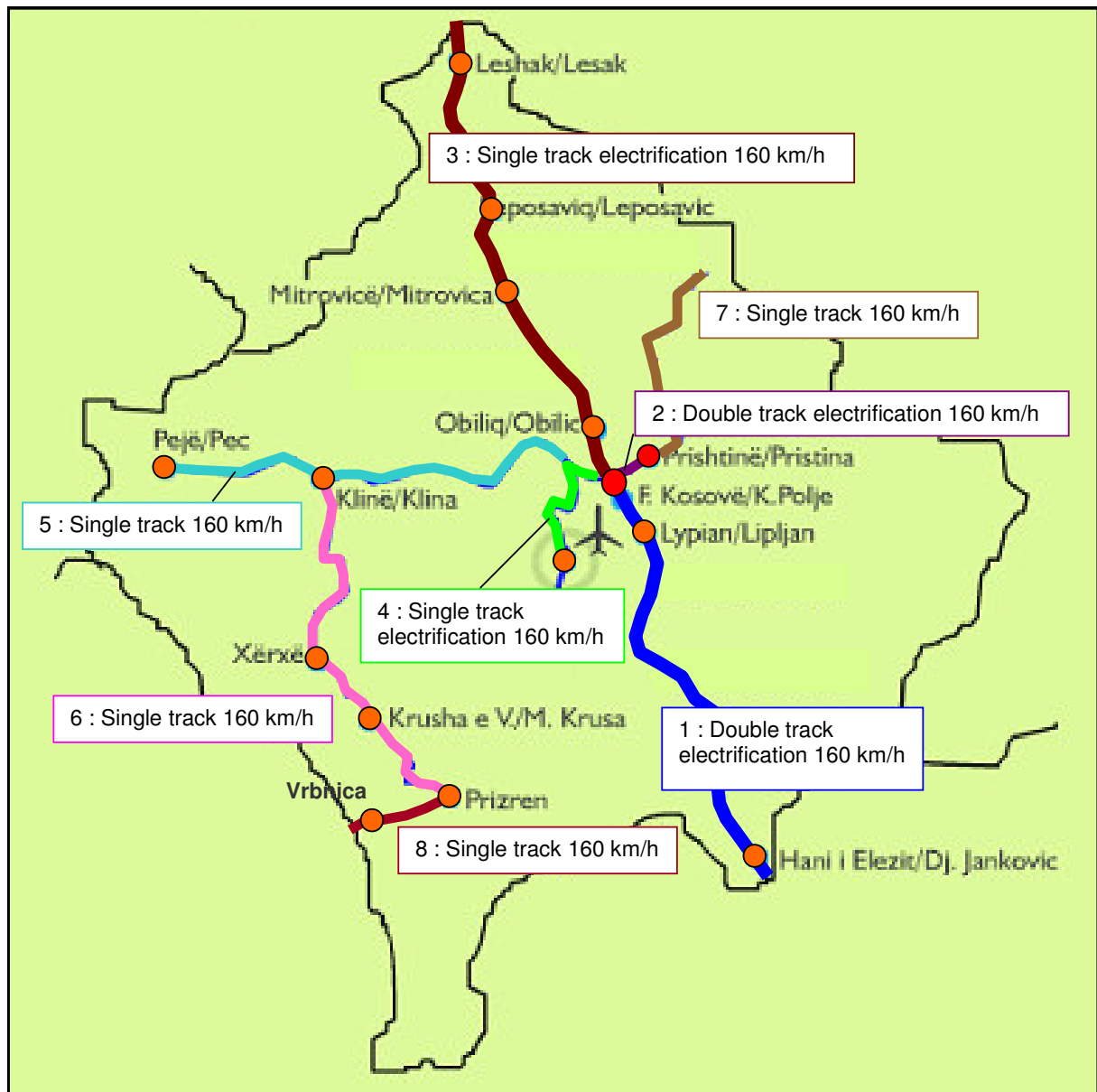


Figure 6: Overview of the Projects

With the model we have tested the above rail service levels by 2025 accounting for a reorganisation of the bus network so it is not in competition to the rail, but rather complementary.

It appears, however, from the model outcome that many rail services are not attractive when compared to the initial bus service proposed. This may be due to the importance of local transport compared to inter-urban and inter-regional exchanges, and certainly, the size of the country plays an important role.

The deletion of stations on the existing network may reduce more than expected the transport demand by rail, but maintaining the stations is also incompatible with the design operational speed.

A strategic decision has to be made here by MTC and Kosovo Railways.

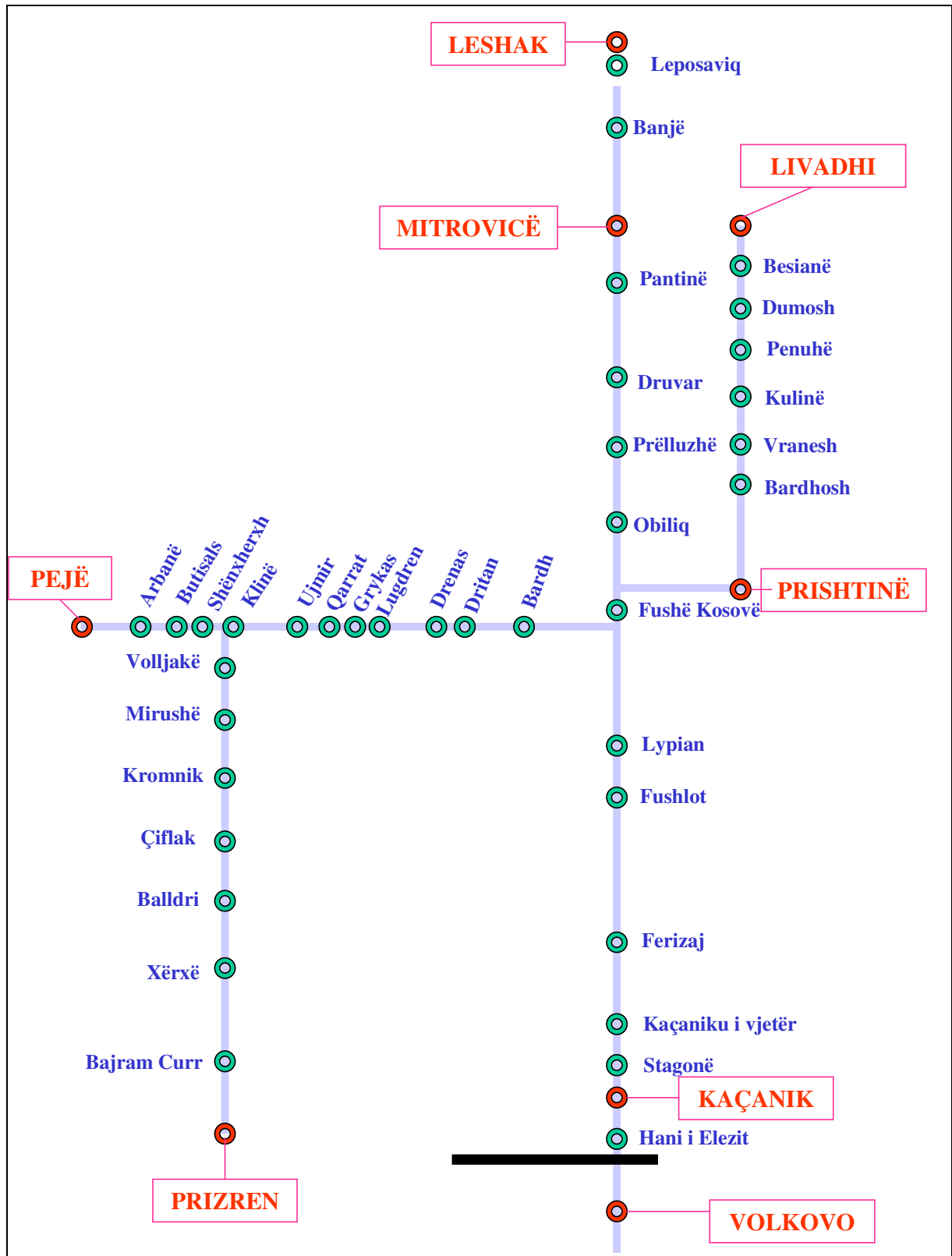


Figure 7: Stations in the project case on the existing network

After completion of these works; in 2025; the rail network will be as hereafter presented in the map.

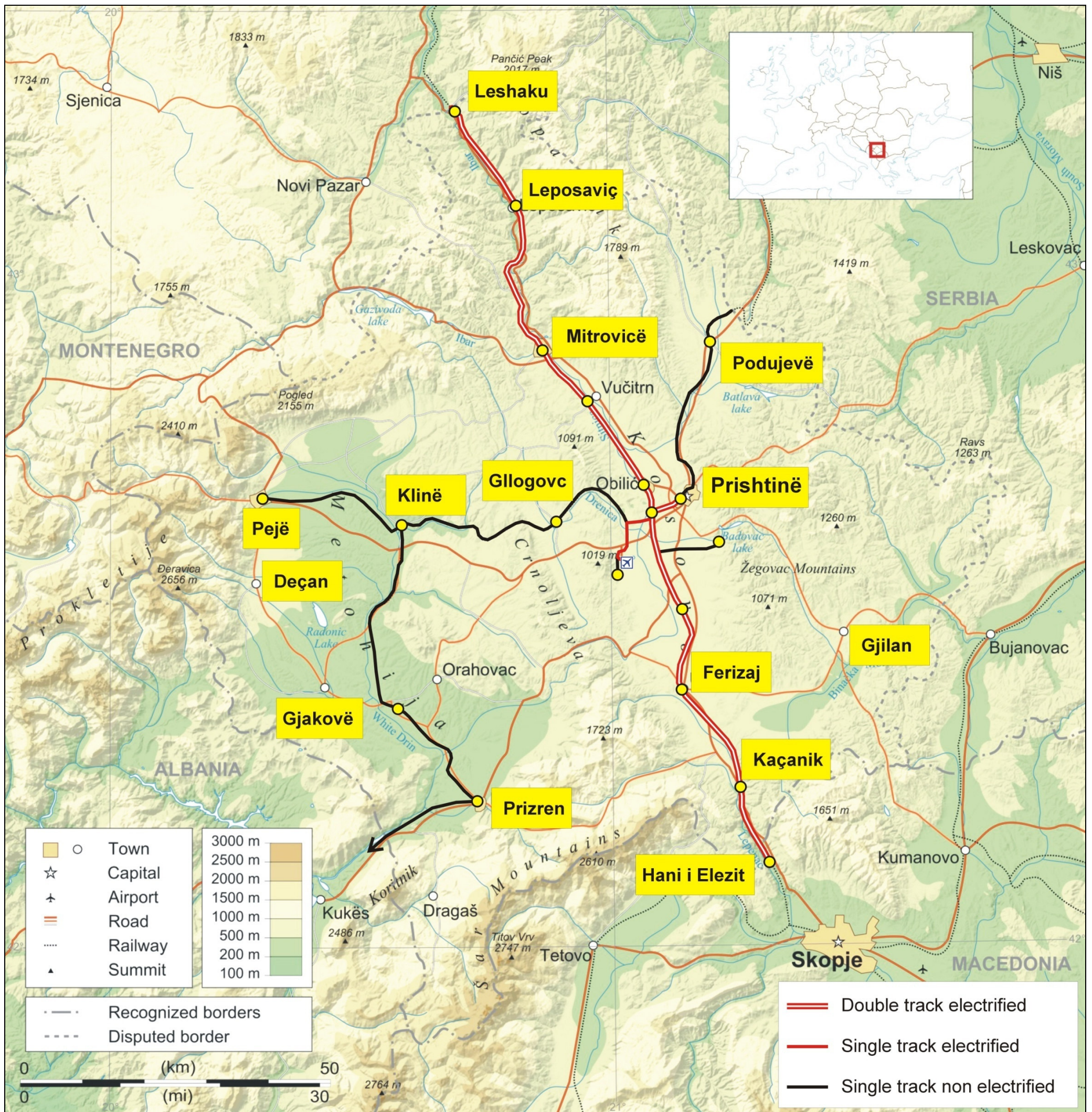


Figure 8: Kosovo Railway Network in 2025

2.7 New Services

In this chapter we describe the service improvements following the infrastructure projects and estimate the total number of required trains in 2025. For each project we propose regular services when the expected demand allows for it.

- **Hani I Elezit – Fushë Kosovë**
Following the important infrastructure improvement we will increase the number of trains from 4 daily trains in the reference case to a **2-hourly service**, i.e. 16 daily trains in both directions.
- **Hani I Elezit – Leshak**
Again, we will increase the number of trains from 4 daily trains in the reference case to a **2-hourly service**, i.e. 16 daily trains in both directions.
- **Prishtinë – Leshak**
Again, we will increase the number of trains from 4 daily trains in the reference case to a **2-hourly service**, i.e. 16 daily trains in both directions.
- **Hani I Elezit – Prishtinë**
We will increase the number of trains from 8 daily trains in the reference case to a **1.3-hourly service**, i.e. 24 daily trains in both directions.
- **Prishtinë – Pejë**
Again, we will increase the number of trains from 8 daily trains in the reference case to a **1.3-hourly service**, i.e. 24 daily trains in both directions.
- **Prishtinë – Prizren**
We will increase the number of trains from 4 daily trains in the reference case to **12 daily trains** in both directions.
- **Airport – Prishtinë**
We will increase the number of trains from 8 daily trains in the reference case to a **1.5-hourly service**, i.e. 24 daily trains in both directions.
- **Prishtinë – Podujevë**
We will increase the number of trains from 4 daily trains in the reference case to **12 daily trains** in both directions.

- Prishtinë – Vermice

For this new service we propose **12 daily trains** in both directions.

We have estimated the number of trains required to ensure the new services. This estimation is based on a regular service, and an estimation of total times to complete a circuit (with stops at terminals of 25 minutes) and intervals. The average commercial speed is 110 km/h. Please note that we do not account for operations continuing into Serbia, Albania and Macedonia for this estimation.

The number of trains required is estimated in the following table.

Relation	Return (train)	Time (min)	Interval (min)	Circuit (min)	Trains
Fushë Kosovë – Hani I Elezit	8	35	120	121	1.0
Hani I Elezit – Leshak	8	81	120	211	1.8
Prishtinë – Leshak	8	50	120	149	1.2
Hani I Elezit – Prishtinë	12	40	80	130	1.6
Prishtinë – Pejë	12	49	80	148	1.9
Prishtinë – Prizren	6	65	160	181	1.1
Airport – Prishtinë	12	11	80	72	0.9
Prishtinë – Podujevë	6	24	160	98	0.6
Prishtinë – Vrbnica	6	75	160	199	1.2

Table 13: Service levels and required trains

It has been proposed to provide rail passenger transport services with EDMU⁵ and trains composed with coaches hauled by electric or diesel locomotives. Rolling stock requirements for passenger are presented hereafter.

	Quantity	Unit cost (M€)	Cost (M€)
EDMU	16	5.0	80.00
IC coaches	24	1.2	28.80
Electric locomotives	3	4.0	12.00
Diesel locomotives	4	4.0	16.00
Workshops (10% of rolling stock investment)			13.68
		Total	150.48

Table 14: Required rolling stock for rail passenger transport services

⁵ EDMU: “Electric and Diesel Multiple Unit”, dual energy railcars as French railways type B82000.

3 FREIGHT

3.1 Freight Transport Opportunities for Kosovo Railways

In the reference case we estimated a future number of freight trains in order to determine the available capacity on the network.

Freight projects cannot be evaluated based on socioeconomic forecast with the traffic model as each service is directly dependent on the orders which Kosovo Railways obtains from clients.

We can however predict that the total freight demand will increase in pace with growing imports and exports to Kosovo, also considering that it is Kosovo Railway' strategy to develop the freight business as much as possible.

In the same time, the projects proposed in the previous chapter allow for considerable improvements in Kosovo Railway' offer to the freight transporters as average commercial speeds are tripled on the network. They can thus be considered as freight projects as well, although they are indirect. An exception is the proposed upgrading of the **Fushë Kosovë – Hani I Elezit** section, which is a direct consequence of the present and forecasted freight demand on this section in addition to the passenger demand.

Other present freight customers and activities, which may benefit from the previously identified projects, are:

- Llamkos,
- transport of minerals from the North,
- transport of clinker from Sharr Cemi,
- transport of corn for the silos in Xërxë.

Potential freight for the railways will be development of the mining industry in Kosovo. Ferronikeli's three open pit mines are:

- Dushkaja mine with estimated reserves of 6.2 million tons,
- Suka mine with 0.8 million tons,
- Gllavica with 6.8 million tons.

Another potential source for freight transport is the **Trepca mining complex** in northern Kosovo, near the town of Mitrovicë.

As mentioned previously, between Gllavica and Drenas, there are **11 level road crossings** which need to be equipped ASAP at least with automatic barriers and signalling in order to ensure safety and undisrupted passages of the freight trains to the Ferronikeli plant. In particular, the crossing M9 on the road to the airport represents a critical safety problem.

These level crossings have been included in the projects in the previous chapter.

3.2 Identified Projects

3.2.1 Freight Villages

According to Kosovo Railways increased freight demand will most likely also require the construction of “Railway/road freight villages” in the following sites:

- Prishtinë Airport
- Hani I Elezit station
- Prishtinë station
- Pejë station
- Klinë station
- Mitrovicë station
- Miradi station

The extent of the above projects and construction works will depend on the type of contracts Kosovo Railways expects to obtain and their business strategy. It is therefore not useful to try to quantify the cost at this stage.

The investment cost of these freight villages has been estimated at €5.00m.

3.2.2 Vegetables Train Project

Another project identified by Kosovo Railways is the “Vegetables Train” Project. This project in Southwest Kosovo (river “Drini i Bardhë”) is known as one of the best farming regions in the Balkans for vegetable products (peppers, tomatoes, potatoes, watermelon, melon, grapes and others).

The characteristics of the project are:

- Two railway stations (Xërxe and Krusha e Vogël) will serve as collection points for daily vegetable transport to Pristina Airport (distribution on EU market);
- Two storage facilities with large refrigerators;
- Investment in reparation of railway track, signalling and telecommunication equipments;
- Estimated budget: €3.20m.

3.3 Rolling Stock to Face Rail Freight Transport Development

New wagons, diesel and electric locomotives have to be acquired to face rail freight transport development. The needs have been estimated and are presented hereafter.

	Quantity	Unit cost (M€)	Cost (M€)
Electric locomotives	3	4.0	12.00
Diesel locomotives	4	4.0	16.00
Shunting locomotives	10	1.0	10.00
Wagons	125	0.3	37.50
Workshops (10% of rolling stock investment)			7.55
Total			83.05

Table 15: Required rolling stock for rail freight transport services

4 PROJECT SCHEDULING

Hereafter are presented the tables with the programme of railway projects.

Project	Scheme name	Total scheme cost	Year of completion	I	K	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	Fushë Kosovë – Hani I Elezit	145.10	2016	X	X	7.26	14.51	14.51	29.02	29.02	29.02	14.51	7.26									
2	Freight terminals	8.50	2010	X		1.70	6.80															
3	Fushë Kosovë – Prishtina	29.00	2013	X			8.70	8.70	11.60													
4	Prishtina multimodal station	10.00	2013	X				5.00	5.00													
5	Fushë Kosovë – Leshak	105.20	2017		X					21.04	21.04	21.04	21.04	21.04								
6	Fushë Kosovë – Airport	16.20	2017		X							4.86	4.86	6.48								
7	Bardh – Pejë	77.90	2021		X									7.79	15.58	23.37	23.37	7.79				
8	Klinë – Prizren	58.10	2022		X											5.81	11.62	17.43	17.43	5.81		
9	Prishtina – Podujevë	39.70	2024		X													3.97	7.94	11.91	11.91	3.97
10	Prizren – Vermice	13.40	2025		X																5.36	8.04
11	Rolling stock	234.00		X	X		15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60
	total KCB	383.05				3.63	7.26	7.26	14.51	35.55	35.55	33.16	29.53	35.31	15.58	29.18	34.99	29.19	25.37	17.72	17.27	12.01
	total IFI	354.05				5.33	38.36	36.56	46.71	30.11	30.11	22.86	19.23	15.60	15.60	15.60	15.60	15.60	15.60	15.60	15.60	-
	TOTAL	737.10				8.96	45.61	43.81	61.22	65.66	65.66	56.01	48.76	50.91	31.18	44.78	50.59	44.79	40.97	33.32	32.87	12.01

Table 16: Rail Investment Plan (€ million)

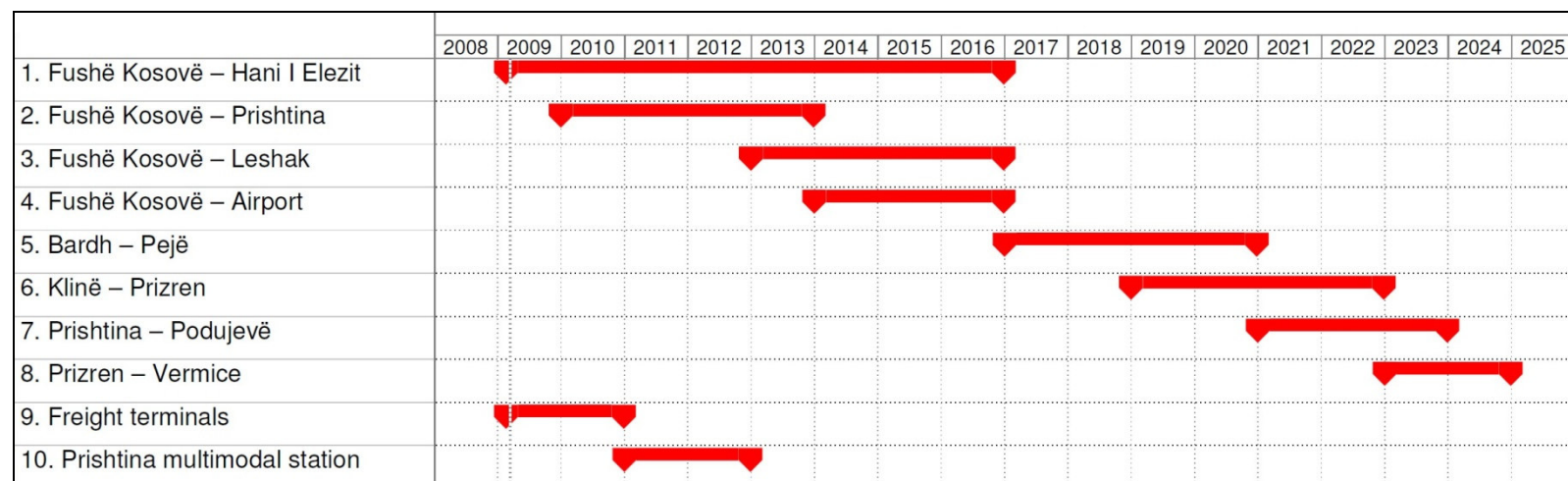


Figure 9: Macro-Schedule of Railway Investment Projects

5 SUMMARISED ACTION PLAN FOR THE RAIL SECTOR

	FIELD OF INTERVENTION	PROBLEM IDENTIFIED	PROPOSED ACTIONS			Possible Technical Assistance
			Short Term	Medium Term	Long Term	
1.1	Institutional	Lack of capacity to monitor / manage large projects	Prepare AI to staff MTC according to needs identified, describing the task delegation			MTC TA recommended for the project implementation
2.1	Rail infrastructures	Lack of capacity and performances	Fushë Kosovë – Prishtinë line upgrading: double tracking and electrification	North – South line upgrading: double tracking and electrification	East – West and Prizren branch line upgrading	TA recommended for feasibility study and required for project financing
2.2		Insufficient development of rail network		Airport link	Link to Albania	TA recommended for feasibility study and required for project financing
3.1	Passenger transport	Lack of service	Development of existing services to and from Prishtinë	Commuter services around Prishtinë	International services to Albania	TA recommended for project financing
4.1	Freight transport	Lack of transport capacity	Acquisition of new locomotives and wagons			KR, IFI support
4.2		Low rail modal split	Marketing development			TA required
4.3			“Road / Rail Freight villages” implementations	North – south rail transit development	Development of freight transport to and from Durres port	KR TA recommended

6 OPTIMISATION OF THE RAILWAY INFRASTRUCTURE INVESTMENTS

6.1 Preamble

As presented above the Kosovo railway development plan would meet the transport demand. However; taking into account the possibilities of the budget of the Republic of Kosovo (KCB); IFI loans and even EU grants; it has to be optimised. Consequently; the projects would be completed within 21 years instead of 16.

Two phases of development have been considered:

- Phase A: modernization of Prishtinë – Fushë Kosovë – Ferizaj and link to the airport;
- Phase B: all other projects considered above.

6.2 Phase A Appraisal

6.2.1 Infrastructure Investments

The Phase A would still need to be analyzed at “feasibility study” level. A first appraisal suggests that the project would be economically feasible. Within Phase A; it’s assumed:

- Prishtinë – Fushë Kosovë double tracking and electrification;
- Fushë Kosovë – Ferizaj electrification (double tracking would be necessary in long term, after 2030 horizon);
- Fushë Kosovë – Bardh electrification;
- Creation of the electrified link to the airport (building of a 700m’ direct junction between Fushë Kosovë – Bardh and Bardh – Magurë line sections; modernization of Bardh – Magurë and building of airport access);
- Creation of rail/road freight villages.

Railway infrastructure investments would cost 100 million Euros for this Phase A. According to the schedule below and taking into account a 50% EU grant and 25% IFI loans; KCB would never spend more than 4.13 million Euros per year up to 2015 inclusive.

	Total	2009	2010	2011	2012	2013	2014	2015
1 Fushë Kosovë - Prishtinë	29.0	2.90	4.35	4.35	4.35	4.35	4.35	4.35
2 Fushë Kosovë - Ferizaj	38.1	0.91	8.77	8.77	9.67	4.81	4.81	0.31
3 Prishtinë multimodal station	10.0				2.50	2.50	2.50	2.50
4 Link to the Airport	14.6					4.86	4.86	4.86
5 Rail/road freight villages	8.5	1.70	3.40	3.40				
Total	100.1	5.51	16.52	16.52	16.52	16.52	16.52	12.02
<i>EU Grant</i>	50.1	2.75	8.26	8.26	8.26	8.26	8.26	6.01
<i>IFI Loan</i>	25.0	1.38	4.13	4.13	4.13	4.13	4.13	3.00
<i>KCB</i>	25.0	1.38	4.13	4.13	4.13	4.13	4.13	3.00

Table 17: Railway Infrastructure Investment Plan – Phase A (€ million)

6.2.2 Assumptions

Implementing this project; it's expected that railway traffic increases for passenger; mainly by transferring from bus; and for freight especially for containers in the beginning and for fruit and vegetable transport from South-West of Kosovo to Prishtinë Airport for exportation by air.

Several assumptions have been taken into account:

- New passenger services will begin from 2011 with 220-seats' EDMU even if the electrification works would be completed in 2015;
- A new freight train will be operated 100 days a year from 2011 between Macedonia and Miradi freight terminal;
- Passenger services will be developed in 2016 and 2021;
- The Macedonia – Miradi freight train will be operated 200 days a year from 2016;
- A new freight train (fresh fruits and vegetables) will be operated from Xërxë to Prishtinë Airport 90 days a year from 2016;
- Electric locomotives will replace diesel in electrified sections from 2016;
- One EDMU will “produce” 200,000 km a year;
- Freight trains are with 20 wagons loaded in one way at 50 tonnes on average;
- One wagon will “produce” 0.60 million tonne-km a year.

6.2.3 Operating Costs

- Energy Costs

Two types of energy are considered to operate the passenger trains with EDMU of 85 tonnes:

- diesel at 5 liters per 1000 GTK⁶ at €0.80 per liter;
- electric at 25 Wh per GTK at €0.10 per kWh.

For freight trains; consumptions are 4 liters of diesel and 15 kWh per 1000 GTK.

- Rolling Stock Renting Costs

Although Kosovo Railways have expressed a preference for purchase of new rolling stock, according to the situation of the international market; it has been assumed that the rolling stock will be rented. The cost is calculated at 10% of the acquisition value (including the maintenance).

⁶ GTK : Gross Tonne-km

- Staff on Board Costs

Staff on board will consist on one driver and one controller of the tickets taking into account staff costs of €400 per month (all charges included) and an average of 4 staff per post (with 8-hours a day; 5-days a week and holidays).

6.2.4 Traffic Revenue Increases

The traffic revenue increases have been calculated taking into account 2007' average revenues per passenger-km and tonne-km as registered in Kosovo Railways adding by 5% to obtain 2009' values:

- Passengers: €0.042 per km
- Freight: €0.0834 per tonne-km

6.2.5 Eluded Investments

Without project; i.e. in "Reference Situation"; Kosovo Railways has to invest in order to be able to maintain the current services according to the table below.

<i>In 2014</i>						
DMU	4	units	5.00	M€/unit	20.00	M€
Diesel locomotives	3	units	0.30	M€/unit	0.90	M€
Shunting locomotives	2	units	1.00	M€/unit	2.00	M€
Wagons	44	units	0.30	M€/unit	13.20	M€
Workshops					3.61	M€
					39.71	M€
<i>from 2017 to 2019</i>						
Track renewals					17.12	M€
Signalling renewals					6.05	M€
					23.17	M€
<i>In 2022</i>						
Diesel locomotives	2	units	1.00	M€/unit	2.00	M€
Shunting locomotives	1	units	1.00	M€/unit	1.00	M€
Wagons	44	units	0.30	M€/unit	13.20	M€
Workshops					1.62	M€
					17.82	M€

Table 18: Eluded Investments– Phase A (€ million)

6.2.6 Results

The Phase A of the railway project presents an IRR at 10.0% and a 6%-rate NPV of 23.4 million Euros. Hereafter is presented the detailed table with these results.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Traffic (million pass-km)																						
Reference	11.0	11.3	11.5	11.8	12.0	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.5	14.8	15.1	15.5	15.8	16.2	16.6	16.9	17.3	17.7
Project	11.0	11.3	162.1	221.1	226.2	231.4	236.7	303.7	414.2	423.7	433.5	443.4	446.0	570.3	583.4	596.8	610.5	624.6	639.0	653.6	668.7	684.1
Difference			150.6	209.3	214.1	219.0	224.1	290.8	401.0	410.2	419.7	429.3	431.5	555.5	568.3	581.3	594.7	608.4	622.4	636.7	651.3	666.3
Revenues (M€)																						
Passenger revenue increase			6.3	8.8	9.0	9.2	9.4	12.2	16.8	17.2	17.6	18.0	18.1	23.3	23.9	24.4	25.0	25.6	26.1	26.7	27.4	28.0
Freight revenue increase			0.6	0.6	0.6	0.6	0.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Investments (M€)																						
Rolling stock						- 39.7								- 17.8								
Rail infrastructure	5.5	16.5	16.5	16.5	16.5	16.5	12.0		- 7.7	- 7.7	- 7.7											
Investment balance	5.5	16.5	16.5	16.5	16.5	- 23.2	12.0	-	- 7.7	- 7.7	- 7.7	-	-	- 17.8	-	-	-	-	-	-	-	-
Operating costs (M€)																						
Reference for passengers	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Project for passengers	0.4	0.4	0.6	0.6	0.6	0.6	0.6	1.0	1.0	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Rolling stock renting																						
EDMU			3.2	3.2	3.2	3.2	3.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Diesel locomotives			1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Electric locomotives								0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Freight wagons			1.7	1.7	1.7	1.7	1.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Shunting locomotives			0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Supplement for freight			0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Saving for electric freight trains								- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1
Infrastructure maintenance supplement								1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Difference			6.4	6.4	6.4	6.4	6.4	14.8	14.8	14.8	14.8	14.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Balance	- 5.5	- 16.5	- 16.0	- 13.5	- 13.3	26.6	- 8.4	- 0.8	11.6	12.0	12.4	5.0	3.1	26.1	8.8	9.4	9.9	10.5	11.1	11.7	12.3	12.9

Table 19: Railway Project Balance – Phase A (€ million)

6.3 Conclusion

It's clearly proposed to implement the Phase A of the railway development plan; then other project will be carried out until 2030 as hereafter presented.

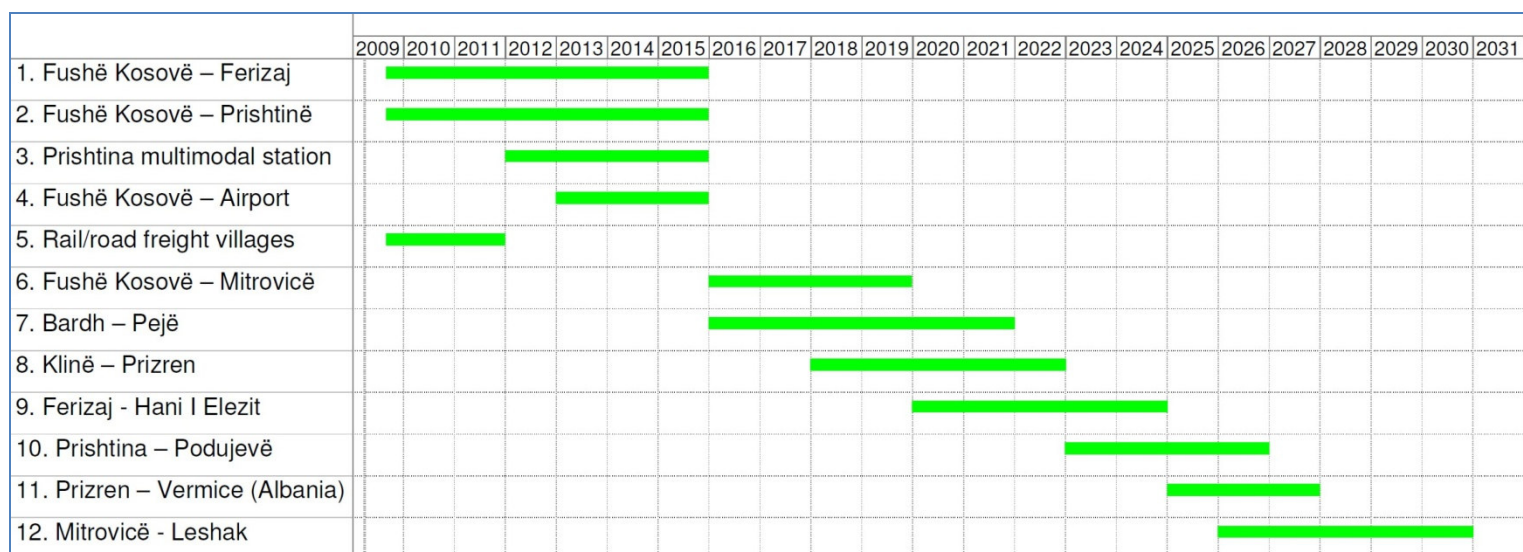


Figure 10: Macro-Schedule of Railway Investment Projects with Optimisation

Phase B infrastructure investments will cost 367 million Euros.

	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
6 Fushë Kosovë – Mitrovicë	42.1	14.0	14.0	7.0	7.0											
7 Bardh – Pejë	77.9	19.5	19.5	9.7	9.7	9.7	9.7									
8 Klinë – Prizren	58.1			11.6	11.6	11.6	11.6	11.6								
9 Ferizaj - Hani I Elezit	72.4					12.1	12.1	12.1	12.1	12.1	12.1					
10 Prishtina – Podujevë	39.7								9.9	9.9	9.9	9.9				
11 Prizren – Vermice (Albania)	13.4										4.5	4.5	4.5			
12 Mitrovicë - Leshak	63.1											12.6	12.6	12.6	12.6	12.6
Total	366.7	33.5	33.5	28.4	28.4	33.4	33.4	23.7	22.0	22.0	26.5	27.0	17.1	12.6	12.6	12.6
EU Grant	183.4	16.8	16.8	14.2	14.2	16.7	16.7	11.8	11.0	11.0	13.2	13.5	8.5	6.3	6.3	6.3
IFI Loan	91.7	8.4	8.4	7.1	7.1	8.4	8.4	5.9	5.5	5.5	6.6	6.8	4.3	3.2	3.2	3.2
KCB	91.7	8.4	8.4	7.1	7.1	8.4	8.4	5.9	5.5	5.5	6.6	6.8	4.3	3.2	3.2	3.2

Table 20: Railway Infrastructure investments – Phase B (€ million)