JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF CIVIL AFFAIRS AND COMMUNICATIONS
(BOSNIA AND HERZEGOVINA),
MINISTRY OF TRANSPORT AND COMMUNICATIONS
(FEDERATION OF BOSNIA AND HERZEGOVINA), AND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
(THE REPUBLIKA SRPSKA)

THE STUDY
ON
THE TRANSPORT MASTER PLAN
IN
BOSNIA AND HERZEGOVINA

FINAL REPORT

VOLUME III: ENTITY REPORT
– Federation of Bosnia and Herzegovina –

MARCH 2001

PACIFIC CONSULTANTS INTERNATIONAL

The following foreign exchange rates are applied in this study.

1 KM(Konvertibilna Marka)	=	1 DEM	=	0.51 EUR
			=	0.43 USD
			=	46.99 JPY
		1 USD	=	1.19 EUR
			=	2.32 DEM
			=	108.97 JPY

(As of October 31, 2000)

Study Area Map

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List of Abbreviations

AGR	European Agreement on Main International Traffic Arteries
ANS	Air Navigation System
ASG	Assignment Group
ATC	Air Traffic Control
ATS	Air Traffic Services
AWZ	Section Waterways and Sea Affairs
BiH	Bosnia and Herzegovina
BiHTMAP	Bosnia and Herzegovina Transport Master Plan
BiHDCA	Department of Civil Aviation
BOT	Build-Operate-Transfer
BR	Brcko Administrative District
BRIC	Joint Road Infrastructure Public Corporation
BHZJK	Joint Railway Public Corporation
B/C	Benefit Cost Ratio
CAA	Civil Aviation Authority
CB	Central Bank of Bosnia and Herzegovina
CEE	Communanté Economipac Européenne (Albania, BiH, Bulgaria, Croatia, FYR Macedonia, Romania and Yugoslavia)
CEEC	Central and Eastern European Countries
CEMT	Conference of European Ministers of Transport
CFR	Crash/ Fire/ Rescue
CIS	Commonwealth of Independent States
CTT	Combined Transport Terminals
CTP	Common Transport Policy
DEM	German Mark
DvS	Dienst voor de Scheepvaart
DOTS	IMF Direction of Trade Statistics
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EDI	Electric Data Interchange
EDS	Economic Development Strategy
EIB	European Investment Bank
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plans
ESCAP	Economic and Social Commission for Asia and the Pacific
ETRP	Emergency Transport Reconstruction Program
EU	European Union
EUR	Euro
FAA	Federal Aviation Authority
FBiH	Federation of Bosnia and Herzegovina
FDI	Facilitating Foreign Direct Investment
FED	Federal Institute of Statistics, Federation of Bosnia and Herzegovina
FDI	Foreign Direct Investment
FYR	Former Yugoslav Republic
FYROM	Former Yugoslav Republic of Macedonia
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
GPS	Global Positioning System
HDM-4	Highway Development and Maintenance - 4
HST	Hypersonic Transport
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICB	International Competitive Bidding
IEE	Initial Environment Examination

ILS	Instrument Landing System
IMF	International Monetary Fund
IMG	International Management Group
INTERBUS	International Passenger Transport by Road
ISO	International Organization for Standardization
ITT	Intermodal Transport Terminals
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
KM	Konvertibilna Marka
LOS	Level of Service
MAC	Mine Action Center
MOTC	Ministry of Transport and Communications
MTEF	Medium Term Expenditure Framework
NATO	North Atlantic Treaty Organization
NIS	National Institute for Statistics
NGO	Non Governmental Organization
NVZ	NV Zeekanaal en Watergebonden Grondbeheer Vlaanderen
OBB	Austrian Railways
OSCE	Organization for Security and Cooperation in Europe
OHR	Office of High Representatives
PCU	Passenger Car Unit
PD	Project Descriptions
PFI	Private Finance Initiatives
PPP	Public Private Partnership
ROI	Return on Investment
RS	Republika Srpska
RPC	Railway Public Corporation
RUC	Road User Charges
SAA	Stabilization and Association Agreement
SD	Site Descriptions
SEE	South East European
SECI	Southeast European Cooperative Initiative
SFOR	Security Force
SME	Small and Medium Enterprise
TEM	Trans European Motorways
TEN	Trans-European Transport Network
TEN-T	Trans-European Network for Transport
TINA	Transport Infrastructure Needs Assessment
TIR	Transport Internationale Rouliere
TOR	Terms of Reference
TSM	Transportation System Management
UIC	Union Internationalle der Chemines du Fer (International Union of Railways)
UIRR	International Union of Rail – Road Transport Companies
UK	United Kingdom
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNDP	United Nations Development Program
UNHCR	United Nations High Commission for Refugees
USAID	United States Agency for International Development
USD	United States Dollar
VAL	Value Added Logistics
VAT	Value Added Tax
V/C	Volume to Capacity Ratio
WB	World Bank (International Bank for Reconstruction and Development)
WTO	World Trade Organization
ZBH	The Bosnia and Herzegovina Railways
ZRS	The Republika Srpska Railways


BiHTMAP
The JICA Study
on Transport Master Plan
in Bosnia and Herzegovina
N
W
E
S
CROATIA
CROATIA
SERBIA
MONTENEGRO
ADRIATIC SEA
Banja Luka
Sarajevo
Mostar
Split
Ploce
Dubrovnik
LEGEND
Intermodal Points
Cities
Primary Centers
Primary Centers
Administrative Centers
Main Border Centers
Airports
Airport Development and Improv. of Safety & Security
Improvement of Safety & Security
Development of Smaller Airports
Other Airports
Railways
Focused Railway Facilities for Improvement
Tunnel Construction (Blazuj - Konic)
Tunnel Rehabilitation (Jedrinje, Ljeskove Vode)
Bridge Reconstruction (Samac)
Urgent Railway Rehabilitation (Doboj - Maglaj)
Maintenance Workshop Improvement (Blazuj, Rallovac)
Road Project Proposals
Committed Projects
Selected Improvements
Corridor Vc Development Projects
Bypass/Widening Projects
Other Primary Arterials I
Other Primary Arterials II
Secondary Road Improvements
Other Secondary Arterials
Urgent Rehabilitation Ports
Rivers
Sava River (Navigation Channel Project)
Other Rivers
Urban Transport Studies
Entities
Republika Srpska
Brcko Administrative District
Federation of BiH
20 0 20 40 60 80 100 Kilometers

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The Japan International Cooperation Agency (JICA), in cooperation with the Bosnia and Herzegovina Ministry of Civil Affairs and Communications; the Ministry of Transport and Communications, Republika Srpska as well as the Ministry of Transport and Communications, Federation of Bosnia and Herzegovina have conducted the Bosnia and Herzegovina (BiH) Transport Master Plan (BiHTMAP), based on the *Scope of Work* agreed upon between both side on November 27, 1998. Pacific Consultants International, headquartered in Tokyo, Japan, is the designated lead consultant for the study.

A basic premise of all investigations is that the BiHTMAP shall be comprehensive in nature, that is, address transport needs within each Entity, between Entities and between the country and her European neighbors[1]. Two key products form the foundation upon which planning efforts are based:

- Formulation of an integrated, multi-modal (road, rail, inland waterway, air) transport master plan extending over a twenty year planning horizon to year 2020; and,

- Identification, within the overall master plan framework, of high-priority projects whose implementation is to be achieved by year 2005, and whose merit is determined via pre-feasibility studies.

The transport strategy embedded in the Master Plan must concurrently contribute to an efficient economic structure of the country, strengthen trade relations with national neighbors and other areas of Europe, and provide a base for market-oriented transport

[1] Further detail regarding scope of work, Study Team composition and technical framework is contained in *Inception Report – The Study on the Transport Master Plan in Bosnia and Herzegovina*, prepared for the Japan International Cooperation Agency, Ministry of Civil Affairs and Communications (Bosnia and Herzegovina), Ministry of Transport and Communications (Federation of Bosnia and Herzegovina) and Ministry of Transport and Communications (The Republika Srpska), by Pacific Consultants International, November 1999.

activity. Post-war economic recovery within the Federation is well underway; continuing improvements in productivity and well-being are expected. As economic recovery continues, changes in transport activities and behavior will follow suit. Thus, the foci of transport planning must gradually shift from alleviation of war damage to realization of a transport system founded upon mutual cooperation and free-market principles. This strategy is particularly valid given the 20-year planning horizon adopted by the current study.

These challenges, especially when viewed through the prism of existing realities, required innovative, yet practical approaches to problem solving. Analytical efforts were therefore, in the case of high priority projects, focused on transport system inadequacies catalyzed by the war and maintenance shortfalls, thus reflecting present, observed transport patterns, preferences and deficiencies. In the longer term, however, transport activities and demand are anticipated to gradually evolve and diversify according to European norms and practices.

1.2 REPORTING APPROACH

The Study Team produced four reports during the course of the study.

- The *Inception Report*, which was submitted during November, 1999, contained detail regarding study methodologies, staffing plan and study outputs. This document was finalized in close cooperation with counterpart committees and other governmental representatives.

- The *Progress Report*, which was submitted during March, 2000, quantifies and clarifies study progress to near conclusion of what, in study terms, had been categorized as Phase I efforts. The content of the *Progress Report* amplified, as necessary, technical techniques and methodologies, presented findings as to existing conditions, documented major surveys and identified early opportunities and constraints.

- The *Interim Report* was submitted near end of November, 2000. It contains results of technical analyses, findings of designated surveys, evaluation of alternative approaches, demand forecasting/modeling, sectorial improvement strategies, and preliminary conclusions as to Master Plan content.

- The *Final Report* was submitted in two versions, a draft during January, 2001 and, following receipt of comments, the current document which was submitted during March, 2001[2]. The *Final Report* documents the Master Plan, details sector plans and describes results of pre-feasibility reviews for selected high-priority projects.

[2] In line with established procedures, Pacific Consultants International submitted the *Final Report* to the Japan International Cooperation Agency in Tokyo, Japan during latter March, 2001. JICA then forwarded all documents to the BiH side via diplomatic channels.

1.3 STRUCTURE OF THE FINAL REPORT

The structure of the *Final Report* is consistent with essential formats and tenets voiced in the *Inception Report*, as well as directives received from the studies Coordinating Committee[3]. The *Final Report* consists of five separate volumes:

- *Executive Summary*;

- *Volume I: Transport Master Plan* presents the Transport Master Plan in Bosnia and Herzegovina in such a manner as to address substantial discussions related to and necessary for seeking the transport sector policies and development directions from a long-term perspective, including not only hardware elements (infrastructure-specific items), but also software elements (technology and institution) and the human aspect (organizational issues, human resources training). Ultimate accession to the European Union is an essential element of the Master Plan.

- *Volume II: Sector Plans* presents individual sector plans for road, railway, waterway and air aviation, based on analytical and technical arguments obtained through surveys and investigations conducted by the Study Team over the past year. The sector plans contain a wide variety of technical issues so that the relevant agencies responsible for each transport sector may deepen their insights into future visions and tasks.

- *Volume III: Entity Report-Federation of Bosnia and Herzegovina;* and, *Volume IV: Entity Report-Republika Srpska,* each contain sector-specific and project-oriented documentation to assist each Entity in finalizing implementation strategies and administrative approvals thereof. In addition, results of pre-feasibility analyses of high-priority projects in each Entity are documented.

1.4 THE PARTICIPATORY APPROACH

The final structure of BiHTMAP, and the successful reception thereof, was achieved as a direct result of cooperative efforts and close liaison between the Study Team and local experts. Considerable efforts were expended in gathering information, reviewing previous studies and holding numerous discussions to enhance knowledge of, and sensitivity to, local transport conditions, norms and practices.

The FBiH Ministry of Transport and Communications, whose representatives chaired and coordinated the BiHTMAP FBiH Technical Committee, as well as members of the Committee and their advisors, deserve specific mention as valuable partners in defining both the BiHTMAP and the Entity report for the Federation.

[3] The Coordinating Committee, as documented in the *Minutes of Meeting on the Draft Final Report* dated 7 February, 2001, instructed the Study Team to prepare the *Final Report* in such a manner as to document the BiHTMAP as well as prepare, as separate volumes, reports for each Entity. The Entity reports are to be project and implementation oriented.

In addition to the FBiH Technical Committee, a partial listing of governmental contacts include various experts within the BiH Ministry of Civil Affairs and Communications (whose representatives participated in the Coordinating Committee for this study), the Republika Srpska Ministry of Transport and Communications (whose representatives chaired and coordinated the Republika Srpska Technical Committee for this study), Kantonal authorities in all 10 Kantons, various Ministries within both Entities, the BiH Railways Public Corporation and railway companies, members of the inland waterway community, airport and civil aviation authorities, statistical agencies at both the state and Entity levels, as well as various Institutes in both Entities. Representatives of municipal governments were, as reasonable and practical, consulted regarding sector-specific issues. In addition, on-going contact was maintained with the BiH Ministry of Foreign Affairs, as well as the Japan International Cooperation Agency.

Likewise, on-going and effective consultations were carried out with various international agencies, donors, and consultant groups in order to obtain an overview of previous, current, and likely future activities and/or involvement in BiH. A partial listing of contacts includes the Office of the High Representative, International Management Group, European Bank for Reconstruction and Development, World Bank, SFOR, European Commission, OSCE, Private Sector Development Task Force, USAID, ICAO, various institutions of the United Nations, the European Intermodal Association, Shipping and Transport College-Rotterdam, Communaute des Chemins de Fer Europeens, and the European Dredging Association. Contacts had also been arranged with representatives of the transport community and industry in neighboring countries.

Wide-spread information dissemination methodologies were, in addition to the issuance of reports, employed. These include, over the entire extent of the study, conduct of four workshops with a primarily technical orientation in each Entity, three seminars with a primarily coordinating focus, publication of a periodic BiHTMAP newsletter, submittal of monthly progress reports to the Chairmen of the coordinating and technical committees as well as the Ministry of Foreign Affairs, and frequent progress reports to JICA.

CHAPTER 2: ROADS AND ROAD TRANSPORT

2.1 ROAD INFRASTRUCTURE DEVELOPMENT PLAN

2.1.1 Road Maintenance

(1) Issues on Road Maintenance

Currently, road maintenance is organized and implemented differently in the two Entities. In the Federation of Bosnia and Herzegovina (FBiH) the administrative responsibility of main road resides in the Road Directorate of the Ministry of Transport and Communications at the Entity level, whereas that of regional roads resides in the Ministries of Transport of the ten Kantons. Each Kanton ministry has its own budgets, planning and implementation authority for regional roads in FBiH.

As the result of the ETRP projects the road and bridge conditions on main roads look fairly good. The smooth pavement surface and bridge connections have enabled decent level of road transport. The nice-looking surface conditions, however, does not necessarily mean the pavement is good enough to carry even near future heavy traffic. Since the purpose of ETRP was an urgent rehabilitation in nature, more focus was given to overlays, and the structural improvement was not well performed. It is therefore expected that many of the road sections, particularly those with more heavy vehicle routes, begin to expose structural defects in the near future. It is even more serious and dangerous for substandard bridges on the main roads since failure of bridges will cause serious accidents and traffic interruption.

This means it is indispensable to continue and strengthen rehabilitation and improvement of the road network particularly in terms of durability of the roads and bridges. In addition, deferred maintenance for road safety is causing increasing traffic accidents. The cost of these works is much more than normal maintenance works. These are particularly serious in slope protection and tunnel lighting. Proper road signs for both safety and proper guidance are also in urgent necessity.

(2) Maintenance Cost and Expenditure

The Road User Charges Study conducted by EBRD[1] (RUC Study) contains data about road maintenance cost and expenditure for both Entities of BiH. The RUC Study analyzed normative maintenance costs in BiH based on cross-country analysis as well as the present condition of BiH. In their definition in road maintenance "Cost" means a necessary amount of money for performing maintenance, whereas " Expenditure" means the actually spent money by road authorities. According to the RUC Study the expenditure on roads are estimated as in Table 2.1.1.

Table 2.1.1 Expenditure on Roads, average 1996 - 1998

Entity	Road Network	Expenditure (KM million)
Federation of BiH	Main Roads	15
	Kanton Roads	20

Source: The Road User Charges Study, op.cit.

On the cost side, maintenance works consist of routine maintenance (pavement repair, cleaning, grass cutting, signaling and winter maintenance) and periodic maintenance (resurfacing, etc.). The RUC Study made a distinction between fixed and variable maintenance (traffic dependent) costs, and identified that the following maintenance costs will be necessary for main and regional road network in BiH including routine and periodic maintenance.

Table 2.1.2 Fixed and Variable Maintenance Costs (KM/km/year)

Road Category	Routine Maintenance	Resurfacing		Overlays		Total Cost (Rounded)
		Periodicity	Per Year	Periodicity	Per Year	
Main (Core 3,500)	4,250	7.5	4,000	15	7,333	15,500
Regional	3,000		1,500		3,000	7,500

Source: The Road User Charges Study, op. cit.

It is understood that local authorities broadly agree on the level of this maintenance cost, given that the road condition is decent as a result of necessary rehabilitation. A substantial part of the road network in BiH still suffers from the war damage in spite of the ETRP Projects. Though the surface of the pavement has been rehabilitated in many of the main road network, the underlying structure may still be deficient. Substantial rehabilitation for structural improvement particularly for pavement and bridges will still be required in addition to these costs.

By quoting the costs indicated in Table 2.1.2, the estimated total maintenance cost for each entity is summarized as in Table 2.1.3. The estimated annual costs for maintenance for BiH is about KM100 million per year. This means over the 20 years, the study's

[1] Road User Charges in Bosnia Herzegovina, Emergency Transport Reconstruction Project, European Bank for Reconstruction and Development; May 2000

planning horizon, KM2,000 million will be required for maintenance in Year 2000 monetary terms.

A comparison between "cost" and "expenditure" shows that the required maintenance cost is in the range of 1.5 to 2.0 times actual expenditure of 1996-1998. In the Federation it is difficult to assess the budgetary framework and its yearly changes since the road administration is divided into the Entity level and the Kanton level, and it is difficult to obtain consolidated data on road maintenance.

Table 2.1.3 Estimated Maintenance Cost

Entity	Road Category	Length [1)]	Annual Maintenance Cost (KM million)
Federation of BiH	Main Roads	2,024 km	31.4
	Kanton Roads	2,724 km	20.4
	Total	4,748 km	51.8

Source: JICA Study Team based on Data by the Road User Charges Study

2.1.2 Functional Classification and Priority Corridors

(1) Assessment and Issues of the Existing Road Network in BiH

The public road system in BiH is formed under the three categories: (1) main roads; (2) regional roads; and (3) local roads. The main road network, which consists of 3,788 km in total, covers the entire BiH with basically a grid pattern. Even though it has severe topographic constraints, the network was formed to efficiently cover urban areas, local towns and villages. The regional road network is also efficiently formed to complement the main road network. Most of the main roads have paved surface, the conditions of which vary section by section due to war damages and backlog of maintenance. The regional roads still have many unpaved sections, simply because maintenance and improvement of the main roads have been allocated higher priority within the budget constraints.

The objective of the road sector master plan for future BiH road system, therefore, is not for primitive level of network construction, but for how the existing network should be utilized, improved, and strengthened to satisfy the future demand. It includes development of limited new road sections, but yet such new road sections should be considered as extended improvements of the existing links due to traffic congestions and topographic constraints.

(2) Functional Classification and Establishment of Priority Corridors

The road network classification of main, regional, and local roads is regarded as an administrative or jurisdictional classification, which focuses on responsibility of maintenance and development of the roads. In contrast, the road classification by function is the indicator of importance of roads for planning/design purposes.

The functional classification of roads typically consists of four major categories: Primary Arterial Road, Secondary Arterial Road, Collector/Distributor Road, and Local Road. As a countrywide transport master plan, BiHTMAP will put higher focus on primary arterial road network analysis.

The primary road system in BiH has two important functions. The first is to ensure the social and economic development in each of the Entities. The second is to ensure the freedom of movement of persons, goods services, and capital throughout BiH without any impedance, which is a requirement of the Constitution. These two functions must be included in both inter-entity connections and intra-entity connections. The policy to satisfy these functions must be kept in the analysis of primary road network identification.

Figure 2.1.1 shows the same Primary I (International Routes), Primary I and II network for the Entity with major inter-Entity connection points.

(3) Governmental Administrative Responsibility

Article III of the Constitution provides that the regulation of inter-Entity transportation is the responsibility of the state-level institutions of BiH. It also provides that all governmental functions and powers not expressly assigned in the Constitution to the state-level institutions of BiH shall be those of the Entities. In the respect of these provisions it is clear that economic development and its planning authority in the territory of each Entity remains in each Entity governments. Since road network is an important tool for the economic development, the authority in road development and maintenance is the right and responsibility of the Entities in this respect.

In this regard the Entities would have the responsibility for the establishment and implementation of the master plan. The Entity master plans, however:

- must not impede the freedom of movements between the Entities, in practical terms it means that these Entity master plans must be compatible;
- must take into account the common standards and regulations between the Entities; and
- should take into account the needs of the other Entity to sustain both economies to develop effectively.

When each Entity has its own master plan, some parts of the plan may only concern its own Entity and may have no interest to the other Entity. However, it is significant that:

- inter-Entity road transport has a strong and direct impact on the road system of both Entities;

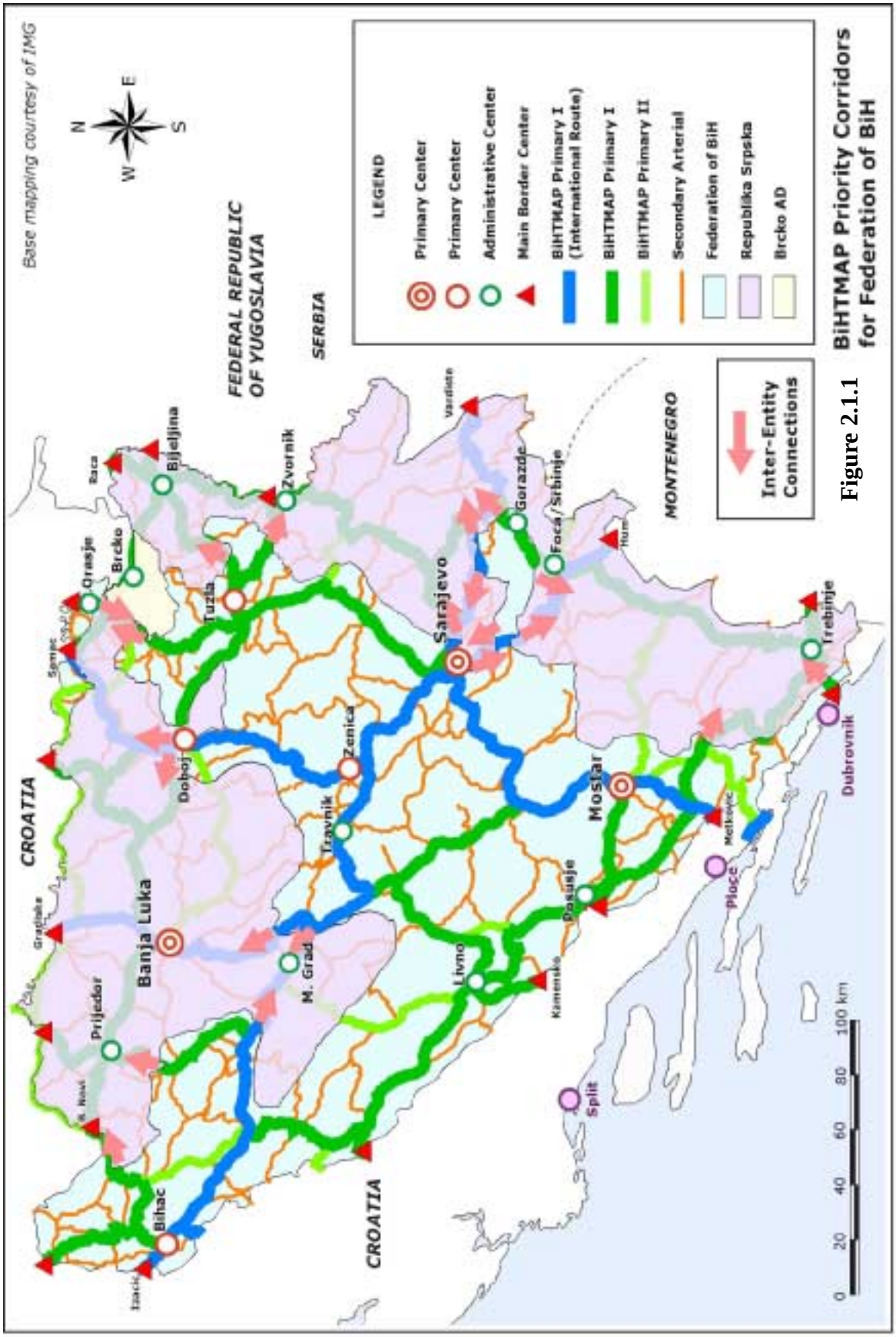

BiHTMAP Priority Corridors for Federation of BiH
Base mapping courtesy of IMG
N
S
E
W
LEGEND
Primary Center
Primary Center
Administrative Center
Main Border Center
BiHTMAP Primary I (International Route)
BiHTMAP Primary I
BiHTMAP Primary II
Secondary Arterial
Federation of BiH
Republika Srpska
Brcko AD
Inter-Entity Connections
FEDERAL REPUBLIC OF YUGOSLAVIA
SERBIA
MONTENEGRO
CROATIA
CROATIA
Sarajevo
Banja Luka
Mostar
Zenica
Tuzla
Bijeljina
Zvornik
Gorazde
Foca/Srbinje
Trebinje
Dubrovnik
Ploce
Split
Bihac
Prijedor
Brcko
Orasje
Doboj
Travnik
M. Grad
Livno
Posusje
Kamensko
Raca
0 20 40 60 80 100 km

Figure 2.1.1

- the Entities must comply with the rules and regulations established by the institutions of BiH as indicated above; and
- the co-ordination of policies on road network development would produce mutual economic benefit which would meet the needs of expanding economies.

These beneficial coordination can be achieved by exercising the responsibility of the state-level institutions of BiH, or in terms of physical infrastructure, those of the Bosnia and Herzegovina Public Corporations as agreed to in Annex 9 of the Dayton Agreement[2]. Figure 2.1.2 shows the proposed governmental administrative responsibilities for the functionally classified road system.

	Current Administrative Responsibility		Proposed Responsibility and Function				
	Main Road	Regional Road	Primary I (Int'l Routes)	Primary I	Primary II	Secondary	Border Facilities
State/ Public Corp.			◎	○	○		○
Entity (FBiH)	◎		◎	◎	◎		◎
Kanton (FBiH)		◎				◎	

Source: JICA Study Team

◎: Responsibility
○: Coordination for Inter-Entity Connections (Design Standard, Improvement Timing, etc.)

Figure 2.1.2 Proposed Administrative Responsibility

Table 2.1.4 shows the length of Primary I and Primary II for the Entity.

Table 2.1.4 Length of Primary Arterial Network by Entity

	FBiH
Primary I (Int'l Routes)	526 km
Primary I	981 km
Primary II	517 km
Total	2,024 km

Source: JICA Study Team

[2] Refer Chapter 5, volume I of the Final Report for further discussion of institutional issues.

2.1.3 Road Rehabilitation and Priority

(1) Issues on Road Rehabilitation

ETRP projects have been contributing to normalization of road conditions in BiH. The rehabilitated sections are summarized in Table 2.1.5.

Table 2.1.5 ETRP Projects: Summary

	Road Rehabilitation		Bridge Rehabilitation
	Main Road	Regional Road	Road Bridges
Completed	1,600 km	332 km	48
On-going	55 km	140 km	10
Not Yet Started	26 km	12 km	2
Total	2,165 km		60

Source: Emergency Transport Reconstruction Program: Roads, Bridges, Railways and Civil Aviation-September 2000, op. cit. Progress through August 2000.

Total length of ETRP projects for roads is 2,165 km, out of which 1,480 km is in FBiH.

The next issue is the durability of the rehabilitated road sections. The main purpose of the ETRP was to urgently rehabilitate the damaged roads, and the speed and length of rehabilitation was of higher importance. This resulted that the most of rehabilitation was no more than overlay and surface dressing. It means that the rehabilitated surface looks fine at this moment, but the quality of the rehabilitated road sections including bridge conditions in many sections cannot sustain future traffic volume for longer term, particularly where more number of heavy loading vehicles are expected.

(2) Proposed Rehabilitation Programs - BiHTMAP Priority Corridors

Road rehabilitation is an iterating process. Rehabilitated roads need another rehabilitation in due course of time even though they are well maintained during that period. Rehabilitation can be categorized as an extended part of road maintenance in that sense. In the present BiH context, however, stronger concerns should be put on the necessity of rehabilitation due to the damages of the roads caused by the war and backlog of maintenance.

It is highly required to continue the rehabilitation program for remaining major road sections. For prioritizing the rehabilitation projects, it is recommended that higher priority be given to the sections of **Primary I** and **Primary II** corridors which were not yet rehabilitated in the ETRP during the last five years. Figure 2.1.3 shows the completed and on-going rehabilitation sections under ETRP projects, and proposed BiHTMAP priority rehabilitation projects selected by these criteria for the Entity.

Table 2.1.6 summarizes the length of proposed rehabilitation sections for each Entity with estimated cost. The same level of unit cost as in ETRP was assumed for estimating the cost of the rehabilitation projects. In the ETRP projects the average cost for road and bridge rehabilitation was US$81,200/km (KM175,400/km). If it is considered that the total length of the rehabilitation sections for each period is 80 % of the ETRP projects, it is considered reasonable that these rehabilitation projects can be implemented during the next five-year period (2001 - 2005).

Table 2.1.6 BiHTMAP Priority Rehabilitation Projects

	FBiH
Priority Rehabilitation for Primary I	
Length	543 km
Cost (KM mil.)	95.2
Priority Rehabilitation for Primary II	
Length	223 km
Cost (KM mil.)	39.1

Source: JICA Study Team

The remaining question is whether this rehabilitation is enough or not. As rehabilitation is an iterating process, it is quite reasonable to assume the rehabilitated road sections will deteriorate in due course of time. The level of deterioration, which determines the necessity of the "next rehabilitation," will highly depend on the traffic volume on the road section. As it will be discussed in Section 2.1.4, the strategy of BiHTMAP is to properly guide the major portion of vehicle trips on Primary I corridor. If it is successfully achieved, the necessity of the iterating process can be concentrated on Primary I network, given that the remaining primary arterial and secondary arterials will be maintained properly.

The life cycle of rehabilitation highly depends on traffic volume; however, very roughly speaking it can be assumed that about 7 to 8 years is a life cycle for one rehabilitation to survive on the highest level of primary arterial corridors. This means in the next 15 years (2006 - 2020) after ETRP and the priority rehabilitation for Primary I have achieved, the additional two-time rehabilitation will be necessary on average for Primary I corridors.

This "next rehabilitation" is estimated and shown in Table 2.1.7. The length of roads for rehabilitation is the total length of Primary I minus the length of "Selected Improvements," which is a separate road quality improvement proposed in the following Section 2.1.4.

Table 2.1.7 The "Next Rehabilitation" (2006 - 2020)

	FBiH
Total Length (Primary I)	1,462 km
BiHTMAP Selected Improvements [1)]	84 km
Length for Rehabilitation	1,378 km
Cost (KM mil.) [2)]	483.4

Source: JICA Study Team
Note: 1) Refer to Table 2.1.11 for details.
2) Two-time rehabilitation cost for the designated road length during 2006 - 2020

(3) Proposed Rehabilitation Programs - Secondary Arterial Roads

In addition to these priority rehabilitation projects, rehabilitation for secondary arterial roads must be taken into account. In the BiHTMAP road classification, the length of secondary arterial roads is mostly the same as regional roads. So the rehabilitation cost for secondary roads are based on the regional road length in prospective. Since the number of bridges are much less than that of the main roads, and the level of rehabilitation can be less than that of the main roads due to the less traffic volume characteristics of the secondary arterial, the unit cost for rehabilitation was assumed to be the half of the cost for that of the primary arterial (i.e. KM88,000/km). Table 2.1.8 shows a summary of rehabilitation costs for secondary arterial roads.

Table 2.1.8 Rehabilitation Costs for Secondary Arterial Roads

	FBiH
Secondary Road Length	2,724 km
ETRP Length [1)]	330 km
Rehabilitation Length	2,394 km
Cost (KM mil.)	210.8

Source: JICA Study Team
Note: 1) Entity proportion was estimated by JICA Study Team based on ETRP Report

(4) Rehabilitation Program and Cost - Summary

The rehabilitation program and its cost are summarized in Table 2.1.10 with the implementation schedule in Table 2.1.9 as a summary of the discussion presented in the previous sections.

Table 2.1.9 Implementation Schedule for Rehabilitation Program

Period	2001 - 2005	2006 - 2010	2011 - 2015	2016 - 2020
BiHTMAP Priority Rehabilitation Projects (Primary I + Primary II)	▬			
The Next Rehabilitation		▬	▬	▬
Secondary Arterial Rehabilitation	▬	▬	▬	▬

Source: JICA Study Team

Table 2.1.10 (1) Rehabilitation Cost Summary for FBiH

Period	2001 - 2005	2006 - 2010	2011 - 2015	2016 - 2020
BiHTMAP Priority Rehabilitation Projects (Primary I + Primary II)	134.3	---	---	---
The Next Rehabilitation	---	483.4		
Secondary Arterial Rehabilitation	210.8			
Totals for Each 5-year Period	186.9	213.8	213.8	213.8
Total (2001 - 2020)	828.5			

Source: JICA Study Team

Table 2.1.10 (2) Rehabilitation Cost Summary by Entity

	FBiH
Rehabilitation Cost	828.5

Source: JICA Study Team

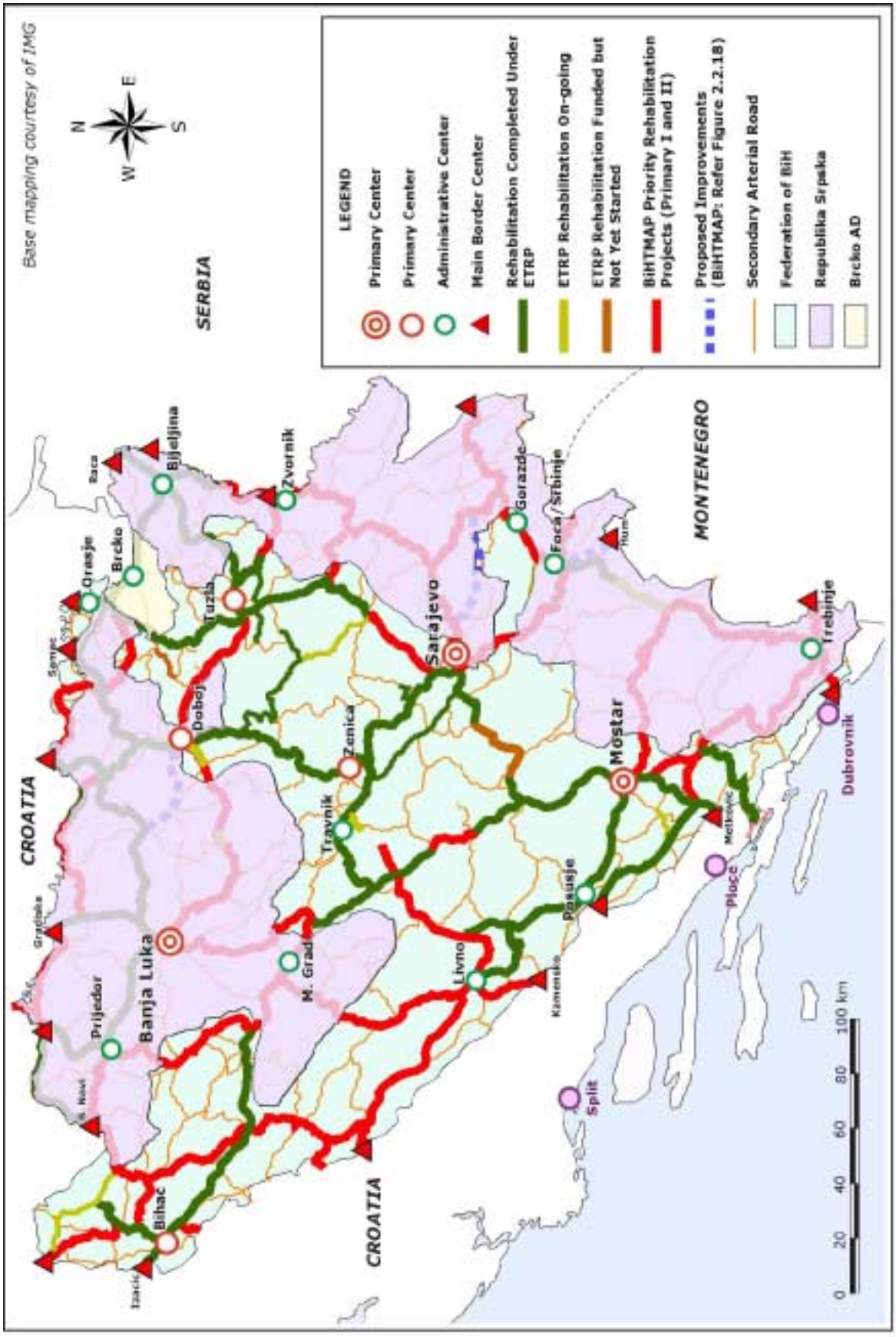


Figure 2.1.3(1) Proposed BiHTMAP Priority Rehabilitation Projects for Federation of BiH

2.1.4 Sufficiency Scenario with Project Proposals

(1) Sufficiency Scenario Formulating Process

A sufficiency scenario is a combination of project proposals to satisfy the traffic demand on the road network with minimum investment for capacity build-up. The analysis begins with identification of road sections with insufficient capacity under the Do-Nothing Scenario. The next step is to analyze what would be the likely solutions to ameliorate the insufficient capacity. There are basically two methods to achieve this. One is simply to build up the capacity of the road section itself. The other is to guide the overflowing traffic to other corridors. In this sense, an alternative solution may exert a larger influence on the network particularly when the alternative solution has a larger impact on capacity. For example, let us assume a road section with restricted capacity due to topographic constraints, and traffic volume at or near capacity. The problem could be solved by enhancing capacity in a competing corridor since a driver may well divert to the enhanced corridor in search of the minimum time path.

Because of its complicated causes and effects relationship, the process of searching for a sufficiency scenario is an iterative trial. After analyzing alternative solutions for insufficiency of future capacity, improvement projects on the road sections are proposed. The proposed projects are tested in the model, but the result should be analyzed carefully since it might catalyze multiple effects.

(2) BiHTMAP Project Proposals for Sufficiency Scenario

The road network assumptions for proposing new project proposals are as follows:

- Appropriate maintenance activities will be implemented by the local authorities (refer to Section 2.1.1 for discussion on maintenance);
- Reasonable pavement and bridge rehabilitation on Primary I and Primary II corridors will be implemented gradually in addition to specific projects proposed by BiHTMAP (refer to Section 2.1.2 for more discussion on rehabilitation); and
- Improvements due to committed projects are a given condition in the road network

BiHTMAP project proposals consist of several categories of projects. A brief description of each category and the projects are given below. These proposed projects are shown in Figure 2.1.4, and the list of projects with responsible Entity, length, indicative costs and proposed implementation periods are shown in Table 2.1.11. It should be noted that the costs indicated in Table 2.1.11 is indicative only, and further clarification for each project will be necessary when the projects are studied or designed more in detail.

1) Selected Improvement Projects

Selected improvement projects are proposed mainly in the view of two aspects. One aspect is the fact that there are substandard road links than others on Primary I network. These are and will be more serious bottlenecks when traffic volume grows. Such link improvement is indispensable to absorb the temporarily increasing volume of vehicle trips on the arterial network. The candidate projects in this category are:

- Velika Kladusa – Srbljani Road Improvement: This road has a function of the shortest link with Karlovac and further European network westward. A major pavement improvement will be necessary for satisfying the expected needs of the road.

- Bihac – Bosanska Novi Road Improvement: This road is a part of Bihac – Banja Luka road link, but particularly in bad condition compared with other part of the link due to the severe topography and deferred maintenance. A major pavement improvement will be important to upgrade the condition of the road.

- Sanski Most – Kljuc Road Improvement: This is a poor part of Prijedor – Kljuc road link. A major pavement improvement to function as a Primary I level function will be necessary.

- Ljubogosta - Mesici Road Development: It was planned as a bypass for E-761 through Pale and Praca. The project was already begun before the war, but was suspended by the war. A new tunnel near Gorovici was suspended in the middle of construction and left until now. This project consists of improvement of existing road between Ljubogosta and Renovica (L = 40 km), and new road development between Renovica and Mesici (L = 20 km)

- Tarcin - Mostar Road Improvement: This is a poorest road section among Corridor Vc existing road sections due to its hilly nature of the terrain. It requires a quality improvement for capacity and safety viewpoints. It will also sustain many important functions between Sarajevo and Mostar.

- Sarajevo – Tuzla Road Improvement: This road has a bypass function against Corridor Vc in the eastern part of BiH. However, it passes through a hilly terrain, and its road condition is poorer than it should be for its function. The local authority has already investigated the improvement possibility of this section in detail. The expected improvement plans are:

  - Srednje – Olovo (L=24km): Additional climbing lane (4 km)
  - Olovo – Kladanj (L=23km): Minor alignment improvement + Climbing lane
  - Kladanj – Djurdjevik (L=32km): Additional climbing lane (13 km)
  - Djurdjevik – Zivinice (L=4km): Pavement improvement

- Stolac – Neum Road Improvement: This is a strategic road link from Stolac to the Adriatic coast of Neum, the only coast line of BiH, and the expectation for the

function of this link is a country-wide interest. A major pavement improvement will be necessary.

The second aspect is the durability of the road. There are some road sections which can expect larger numbers of heavy truck traffic than other routes. These routes can be called "heavily loaded roads." The proposed improvement on these routes involves pavement and bridge durability. The candidate projects in this category are:

- Kamensko – Kupres Road Improvement: This road is a poor part of the link which has an important role of the major north-south axis in the western part of BiH, and a major connection from Banja Luka to Split through Livno and Kamensko (Border with Croatia).

- Zenica - Maglaj Road Improvement: This route is quickly deteriorating because of higher number of heavy vehicle traffic. It requires a major pavement improvement in near future, which should focus on heavily loaded aspects of the road.

- Donji Vakuf – Jajce Road Improvement: This is also a weak pavement section on one of the major truck route. The pavement improvement should focus on the accommodation of the heavy track traffic.

- Grude – Stolac Road Improvement: This is a part of Livno – Posusje – Capljina – Stolac – Trebinje link, and a heavy track traffic is particularly prominent in this section. Therefore the pavement improvement for this section should focus on the heavily loaded aspect of the road.

2) Corridor Vc Development Projects

These projects are proposed as capacity build-up within key segments of Corridor Vc, and in that sense the characteristics are the same as the New Bypass/Widening Projects. However, in view of importance of Corridor Vc vis-à-vis the Trans European Corridors, these projects are categorized separately.

- Sarajevo - Zenica Motorway Project: Capacity improvements are proposed between South Zenica and Josanica, and between Vlakovo and Tarcin. These sections will perform together with the Sarajevo Bypass Project (committed four-lane motorway-class facility between Josanica and Vlakovo). A widening to high-order four-lane expressway or motorway is recommended for Zenica - Josanica section, and a new motorway-class facility is recommended between Vlakovo and Tarcin as an extension of the Sarajevo Bypass Project.

- Mostar Bypass: Existing E-73 road section near Mostar is also expected to have a lack of capacity in future. A high-order two-lane bypass facility will most probably be required. The bypass should be planned in the close coordination with the Mostar-Gorica Road Improvement project, particularly for good connectivity. The actual location and alignment of the bypass need more detailed and careful study.

Same as in Doboj, the design details should be finalized when implementation is imminent[3].

3) New Bypass/Widening Projects

New bypass or widening projects are proposed in the view of lack of future capacity. These are major links in primary arterial corridors, and expected to carry higher traffic volumes in the future. The current roads are all two lanes on these routes and it is proposed to widen to four-lane capacity. However, if the road is urbanized, or is expected to be urbanized, or is difficult to avoid future urbanization, new bypass construction would often be a better alternative than widening. The candidate projects in this category are:

- Zivinice - Celik Road Improvement: This road section will be the busiest section between Tuzla (Zivinice) and Orasje. A four lane widening is recommended. Even if it is a future project, it is highly recommended that the right-of-way acquisition be initiated at the earliest opportunity.

- Lasva - Travnik Road Improvement: The traffic volume on this road section is expected to increase due to the generated traffic particularly in Travnik, Novi Travnik and on-going commercial development along the road. Some section of this road already shows a tendency toward urbanization, and a new bypass is considered preferable. The new bypass is recommended with right-of-way acquisition and roadside land use control to be initiated at the earliest opportunity.

- Mostar - Gorica (Croatian Border) Road Improvement: This link is increasingly important as a major route from the Croatian coast (Split) to Mostar and Sarajevo, due in part to the difficulty of expanding the customs facility at Metkovic on E-73 (Corridor Vc). A combination of widening to four lanes and new bypass on this corridor is proposed, including a new link between Grude and Privalj (L = 10 km). Since the major border customs facility between Croatia and BiH in this area is provided at Gorica, this new link will be necessary to connect existing Gorica - Grude and Privalj - Mostar road links[29].

4) Secondary Road Improvement Projects

In the secondary arterial network, which consists of other main roads and regional roads, there are effective links if they are properly improved. This does not mean they are proposed to be part of the primary arterial network, but if the road has a decent pavement condition, it will work as a quite good secondary bypass in the road network. Fifteen links are identified by BiHTMAP by careful network analysis and site survey. This does not mean these are the only secondary roads to be improved. Many other secondary

[3] Refer 5) Urban Transport Studies of this section for a more detailed discussion.

roads have their local needs. These projects are recommended from total BiH network viewpoints.

5) Urban Transport Studies

The focus of BiHTMAP is, as indicated previously, countrywide in nature. Thus, the ability of the study to focus on regional and/or urban issues is limited. Urban and regional transport issues should be studied separately with more focused and refined techniques as well as methodologies. For example, more detailed zone system, refined network content and approaches commensurate with local requirements. Nevertheless, some urban/regional traffic problems may be observed via the BiHTMAP transport model and, of course, in the field. Proposals to solve such problems, and address underlying issues, should be achieved via more careful studies rather than simple recommendations derived from an inter-city transport point of view. BiHTMAP recommends that separate follow-on transport studies be conducted possibly under the auspices of JICA. At time of writing, such needs can be observed particularly for Tuzla and Mostar. Independent transport studies for other urban areas should also be considered in due course of time.

Mostar Regional Transport Study

Technical reviews, coupled with extensive local liaison, have identified regional issues in the Mostar area which should be addressed via a more detail via a follow-on regional transport study. While this follow-on study is expected to formulate a scope of work that meets the needs of the local populace, the Study Team suggests that a series of issues be integrated into the work plan. These are illustrated schematically in Figure 2.1.3 (2).

BiHTMAP has noted the need for a Mostar ring road. This is composed of several segments:

- The northwest quadrant, linking roughly M-17 (north of Mostar) with M-6.1 (Mostar-Siroki Brijeg Road) west of Mostar. This segment is part of BiHTMAP project R-32, Mostar-Gorica Road Improvement which, in a broader sense, strengthens the Mostar-Split, Croatia, axis.
- The eastern half, linking M-17 (north of Mostar) with M-17 (south of Mostar) along the previously designated alignment of the Corridor Vc motorway.
- The southwest quadrant, linking roughly M-6.1 (Mostar-Siroki Brijeg Road) west of Mostar with M-17 (south of Mostar). It is understood that, at time of writing, discussions are proceeding with the EIB for financing of this project. It is further understood that site preparatory works have begun over a portion of the southwest quadrant alignment.

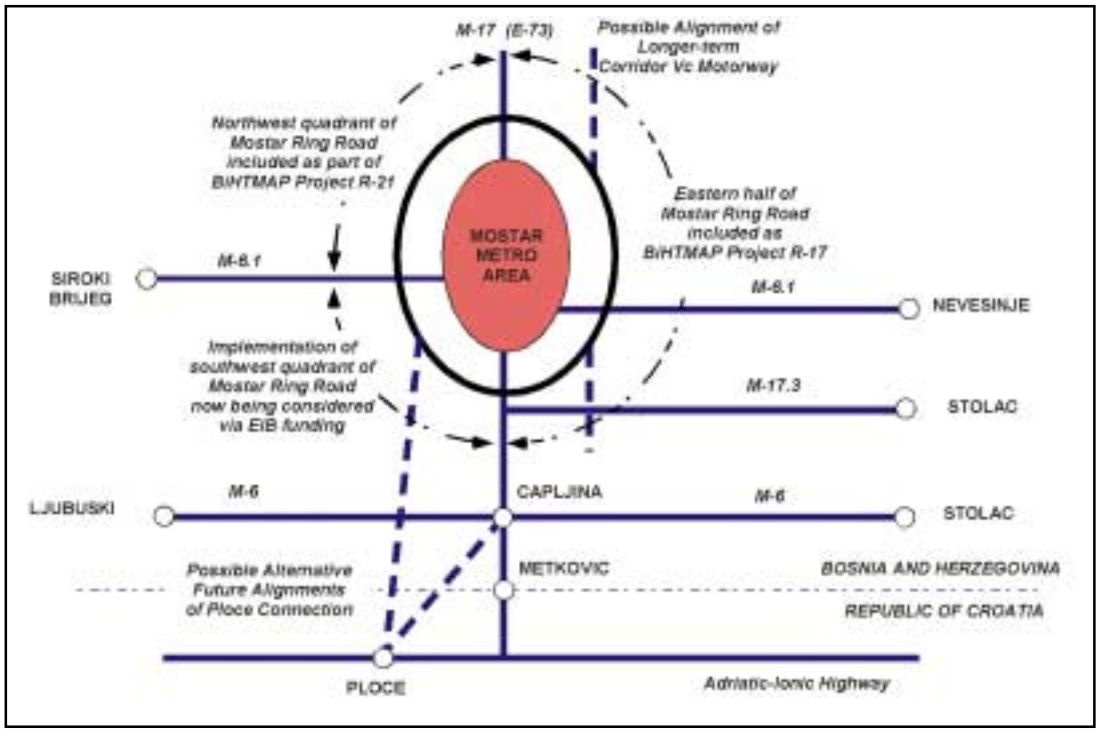


Figure 2.1.3(2) Potential Issues for Mostar Regional Transport Study

All segments of the Mostar Ring Road are seen as initially consisting of a two-lane cross-section, with adequate right-of-way reserve to permit future upgrading to high-order multi-lane status.

The capacity of existing border facilities along M-17 (Corridor Vc) near Metkovic is limited; thus, several alternative improvement options within a corridor extending roughly from Mostar to Port Ploce, Croatia, have been proposed. These include:

- Upgrading of the existing M-17, within or near to the current alignment;
- Constructing a new road (and border facilities) along a new alignment which extends roughly north from Port Ploce and intersects the southwest quadrant of the Mostar ring road; and,
- Constructing a new road (and border facilities) along a new alignment which extends roughly north/northeast from Port Ploce and intersects M-17 vicinity of Capljina.

Other options are understood to being currently considered, including upgrading of border facilities near Gorica.

In addition to these regional issues, urban issues should be noted. These include:

- Linkages between the ring road and Mostar itself, to include bridge crossings of the Neretva River;
- Road capacity within Mostar, particularly the central business district;

- Transverse corridors of demand, such as Nevesinje-Mostar-Siroki Brijeg and Mostar-Medjugorje; and,
- Mode interchange points (such as truck and inter-city bus terminals), logically located along the ring road, which foster cargo and passenger transfers, thus minimizing the need for heavy commercial vehicles to penetrate the more historical Mostar precincts.

The resolution of these challenges will entail detailed consultations at both regional and metropolitan levels, as well as focused site investigations.

Tuzla Transport Study

Tuzla is the industrial heart of BiH. A concentration of light and heavy industries, as well as a historic evolution astride strategic multi-modal transport corridors, ensures that a follow-on Transport Study must be tailored to the unique needs of the Tuzla area.

BiHTMAP has clearly confirmed that the traffic zone in which Tuzla is located represents one of the premier generators of trips, both within BiH and to/from international destinations. Trips by heavy commercial vehicles are pronounced. As a result, the north-south corridor has been strengthened to multi-lane status (BiHTMAP Project R-30), as has linkage to Sarajevo (BiHTMAP Project R-12). Other issues remain which should, following detailed consultations with local authorities, be integrated within the framework of the Tuzla Transport Study. A partial listing of issues includes:

- Existing spatial and transport planning, which largely dates from pre-war years, has proven totally inadequate in light of recent changes. On-going and future intensification of demographic, industrial and economic patterns are likely to continue worsening this situation, particularly as the economy continues its transition toward free-market status.
- The absence of a micro-scale transport and land use database, as well as up-to-date indicators of transport demand, render effective planning for transport facilities and services problematic.
- An action-oriented plan which addresses traffic management schemes, including TSM (Transportation System Management), parking schemes, operational optimization, and other relevant topics is urgently needed. In addition, effective strategies related to traffic safety, enforcement procedures, staff training, and public education/information dissemination are required. Due to the proliferation of industrial trip generators in the area, any TSM strategy must be particularly sensitive to the needs of heavy commercial vehicles.
- While the industrial status of Tuzla is undeniable, other uses have historically played a prominent role and will influence transport planning. Nearby Lake Modracko, for example, has a strong history in domestic (and possibly future international) tourism, yet transport linkages remain substandard.
- The east-west road axis which bisects Tuzla (Lukavac-Tuzla-Simin Han, with onward linkage to Doboj and Bijeljina) has been shown to carry heavy traffic. It is tempting to

recommend, as part of BiHTMAP, a multi-lane capacity along this corridor; however, solutions are more complex. For example, the interplay of through (inter-zonal) with local (intra-zonal trips), extensive roadside (strip) development, home-to-work commutation patterns, right-of-way availability, and expansion/intensification of urban land uses. A more locally focused approach is required, with a likely recommendation being, among others, consideration of an urban bypass/ring road along a new alignment.

- Both near and long-term strategies need to be devised for public transport services.

The resolution of these challenges will entail detailed consultations at both regional and metropolitan levels, as well as focused site investigations.

Table 2.1.11 Road Infrastructure Improvement Projects for FBiH

ID No.	Project Name	Description	Entity	Length	Cost * (KM mil.)	Implementation Period		
						2001-2005	2006-2010	2011-2020
Committed Projects								
R-01	Corridor Vc Sarajevo Bypass (Josanica-Vlakovo)	New Bypass	FBiH	13.6 km	** 135.0	O		
R-02	Sarajevo Bypass Access Highway (Phase II)	New Bypass	FBiH	2.3 km	** 26.7	O		
Selected Improvements					**			
R-04	Velika Kladusa-Srbljani Road Improvement	Improvement	FBiH	45 km	18.0		O	
R-05	Bihac-B. Novi Road Improvement (FBiH)	Improvement	FBiH	51 km	35.7		O	
R-07	Sanski Most - Kljuc Road Improvement	Improvement	FBiH	32 km	12.8		O	
R-08	Heavily Loaded Road Improvement (Kamensko-Kupres)	Improvement	FBiH	81 km	56.7			O
R-11	Heavily Loaded Road Improvements (Zenica-Maglaj)	Improvement	FBiH	53 km	37.1	O		
R-12	Sarajevo-Tuzla Road Improvement	Improvement	FBiH	98 km	102.3		O	
R-14	Ljubogosta-Mesici Road Development (FBiH)	Improvement	FBiH	6 km	4.2			O
R-16	Tarcin-Mostar Road Improvement	Improvement	FBiH	93 km	67.7	O		
R-23	Heavily Loaded Road Improvements (D. Vakuf-Jajce)	Improvement	FBiH	34 km	23.8			O
R-24	Heavily Loaded Road Improvements (Grude-Stolac)	Improvement	FBiH	69 km	48.3		O	
R-25	Stolac-Neum Road Improvement	Improvement	FBiH	51 km	20.4			O
Corridor Vc Development Projects								
R-27(1)	Corridor Vc (South Zenica-Josanica)	Motorway	FBiH	56 km	448.0		O	
R-27(2)	Corridor Vc (Vlakovo-Tarcin)	New Bypass	FBiH	16 km	243.5		O	
R-28	Corridor Vc (Mostar Bypass)	New Bypass	FBiH	20 km	142.0			O
Bypass / Widening Projects								
R-30	Zivinice-Celik Road Improvement	Widening	FBiH	51 km	168.3			O
R-31	Lasva-Travnik Road Improvement	New Bypass	FBiH	26 km	184.6			O
R-32	Mostar-Gorica Road Improvement	New Bypass/Widening	FBiH	51 km	264.7	O		
Secondary Road Improvements								
R-33	B. Krupa-S. Most Road Improvement	Pavement	FBiH	52 km	41.6			O
R-36	Jagare-Turbe Road Improvement (FBiH)	Pavement	FBiH	18 km	14.4			O
R-38	Novi Travnik-Bugojno Road Improvement	Pavement	FBiH	32 km	12.8		O	
R-39	Blazuj-Kaonik Road Improvement	Pavement	FBiH	50 km	40.0	O		
R-40	Mokronoge-Prozor Road Improvement	Pavement	FBiH	43 km	17.2			O
R-41	Posusje-Jablanica Road Improvement	Pavement	FBiH	65 km	26.0			O
R-42	Ostrozac-Fojnica Road Improvement	Pavement	FBiH	65 km	26.0			O
R-43	Mostar-Ljubuski Road Improvement	Pavement	FBiH	33 km	13.2			O
R-44	Siroki Brijeg-Capljina Road Improvement	Pavement	FBiH	47 km	18.8			O
R-45	Citluk-Zitomislici Road Improvement	Pavement	FBiH	10 km	4.0			O
R-46	Gradacac-Ormanica Road Improvement	Pavement	FBiH	14 km	11.2		O	
R-48	Gracanica-Srnice Road Improvement	Pavement	FBiH	24 km	19.2		O	
R-49	Zepce-Zivinice Road Improvement	Pavement	FBiH	80 km	32.0		O	
R-50	Olovo-Ribnica Road Improvement	Pavement	FBiH	40 km	32.0			O
Urban Transport Studies / Major Urban Projects								
R-55	Tuzla and Vicinity Urban Transport Study	Study	FBiH	---	1.0	O		
R-56	Mostar Urban Transport Study	Study	FBiH	---	1.0	O		
R-57	Sarajevo City Motorway	New Bypass	FBiH	10 km	** 99.5		O	
Total for BiHTMAP Project Proposals ***			Entity	Length	Cost	2001-2005	2006-2010	2011-2020
Total (Fedaration of BiH)			FBiH	---	**2,288.0**	807.0	687.8	793.2

Source: JICA Study Team **Year 2000 Constant Prices* ***Cost obtained by Local Authorities*

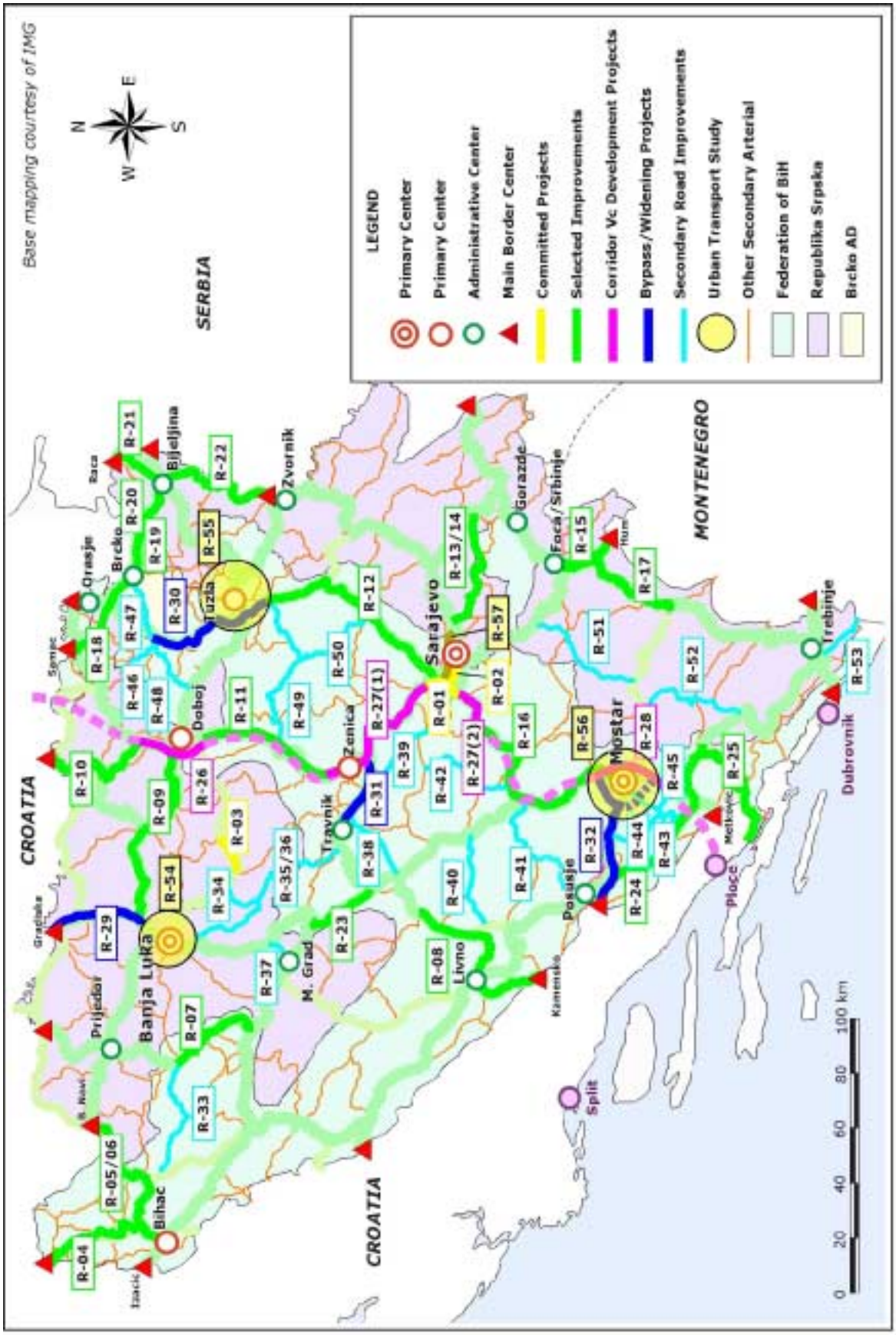


Figure 2.1.4 Project Location Map for BiHTMAP Project Proposals

2.1.5 Improvement Plan

(1) Road Infrastructure Investment: Summary

As a result of analysis on road maintenance, rehabilitation, and new project proposals, the overall investment required in the road infrastructure improvement is summarized in Table 2.1.12.

Table 2.1.12 Road Infrastructure Investment for Year 2001 - 2020: Summary

(Unit: KM million)

Item	FBiH
Maintenance	1,036.0
Rehabilitation	828.5
Committed Projects	161.7
BiHTMAP Projects	2,288.0
Total	4,314.2
% by Entity	59.7 %

Source: JICA Study Team

2.2 ROAD TRANSPORT OPERATORS

A review was conducted of road transport operators, that is, inter-city and long distance bus as well as truck activities. Complete detail is presented in Chapter 2 of *Volume II* of the *Final Report*. The interested reader is urged to consult following sections in this regard:

- Section 2.3.1, Trucking Activities. Main topics include organizational and operational overview, operator interviews, trade tendencies, traffic simulation results, as well as the European perspective. The latter examines historic experiences of European nations regarding cargo movements, as well as likely future developments of this mode.

- Section 2.3.2, Bus Services. Main topics include international lines, inter-Entity lines, Federation inter-Kantonal lines, Republika Srpska inter-Municipal lines, Federation Kantonal services, operator interviews, traffic simulation results, as well as the European perspective. The latter examines historic experiences of European nations regarding bus passenger movements, as well as likely future developments of this mode.

- Section 2.3.3, Sector Improvement Strategies. Discussions address regional transport initiatives, European integration, as well as sector modernization concepts whose underlying theme is privatization and operations founded upon market mechanisms.

2.2.1 Operational Synopsis [4]

Long Distance and Inter-city Truck Operations Cargo transport falls into two general categories: international and within (intra-Entity, inter-Entity) BiH. Further stratification such as specifically authorized inter- or intra- Entity truck transport does not exist since freedom of cargo movement within and among the Entities is guaranteed. Unfortunately, for intra-Federation and inter-Entity truck transport, little structured data exist regarding type of services, cargo carried, and operator performance[5]. In case of international operations, more robust information is sometimes available.

The Ministry of Civil Affairs and Communications is responsible for the issuance of permits authorizing foreign shipments of cargo by truck. Bilateral permits are the dominant means of authorization[6]; negotiated agreements are, on a reciprocal basis, reached with various countries regarding the number of permits issued in any given year. Trip permits are valid for a single round-trip. Bilateral agreements have been reached with 14 countries and encompassed a total of 19,375 permits for calendar year 2000 (Table 2.2.1). After negotiating the number of available permits with foreign governments, the Ministry subsequently distributes[7] these to the Entity Ministries of Transport according to a set formula, with one-third to Republika Srpska and two-thirds to the Federation[8]. The Federation Ministry of Transport and Communications, in turn, allocates permits to Kantons based on several criteria, among them industrial development, population, number of registered transport companies as well as number of vehicles.

[4] Considerable inputs to this discussion were obtained from interviews with persons knowledgeable of the truck and bus industries within the BiH Ministry of Civil Affairs and Communications and the Federation Ministry of Transport and Communications. Visits to all ten Kantons were also completed, to include discussions with Kantonal Ministries of Transport and Communications. All discussions were conducted during mid-2000. Interviews with select operators were also completed early 2000 on behalf of the Study Team by IPSA.

[5] The transport model was therefore used to estimate composite (international, intra-Entity, inter-Entity) truck and bus movements via the use of origin-destination matrixes derived from some 89,000 roadside interviews. Modeling detail is presented in Volume II, Section 2.1 of the *Final Report*, with a summary of findings contained in the subsequent Part 3 of this section , titled 'Activity Estimates'.

[6] CEMT permits are much more liberal in nature; permits issued within BiH are valid for an unlimited number of annual journeys within the CEMT signatory group, with limitations on vehicle types used for journeys to Italy and Austria. However, the number of CEMT permits is extremely small relative to bilateral permits having totaled only 251 during year 2000.

[7] Roughly 10 percent of permits are reported by the Ministry as being retained for emergency use, or to facilitate timely transport of high-priority shipments.

[8] The one-third/two-thirds split is applied equally to all country permits. At time of writing, no decisions had been reached regarding the role of the Brcko Administrative District in the permit allocation process.

Table 2.2.1
Bilateral Permits for International Transport of Cargo by Truck
Bosnia and Herzegovina – Year 2000

Country	Number of Permits (1)
Austria	5,875
Belgium	500
Czech Republic	1,000
Denmark	600
France	1,050
Netherlands	500
Italy	4,850
FYR Macedonia(2)	300
Germany	2,000
Poland	500
Romania	500
Slovak Republic	1,000
Spain	500
Slovenia(2)	200
Total	19,375

(1) For calendar year 2000, including transit permits.
(2) Permit system to be abolished following year 2000.
Source: Ministry of Civil Affairs and Communications

No permits are required for truck trade with Albania, Croatia, Hungary, Sweden, Switzerland, Turkey and, recently, Slovenia as well as FYR Macedonia. Formal agreements with Yugoslavia did not, at time of writing, exist. However, truck movements to/from Yugoslavia may readily be made.

A recent study examined the status of international licensed cargo movements in the Federation[9]. Findings reveal that, at 30 September, 1999, 643 trucking companies held licenses for export-import activities. These operators controlled 1,981 trucks, 1,582 thereof being standard units, with a further 243 and 156 holding Euro1 and Euro2 ratings, respectively. Of the 1,981 trucks, 154 indicated having a capacity of less than six tons, 650 a capacity of between 6 and 20 tons, with a further 1,177 being tractive (cab) units. The trailer fleet encompassed 1,515 units, 407 thereof being full trailers and 1,108 semi-trailers. In terms of truck age, some two percent were, at that time, more than 21 years old, 45 percent 11-20 years old, 36 percent 6-10 years old, and 17 percent less than six years old. The report gives insight to the Kantonal allocation within the Federation. Thus, during 1999, Zenicko-Dobojski was allocated 19.5 percent of annual CEMT licenses (which, for the Federation, totaled 164) and Tuzlanski Kanton received 19.2 percent of bilateral permits (Table 2.2.2).

[9] *Analiza Prijevoza Tereta U Medunarodnom Prometu I Iskoristenja Jednokratnih Inostranih Dozvola Za Prijevoz Tereta U Federaciji Bosne I Hercegovine*, by Federacija Bosne I Hercegovine, Federalno Ministarstvo Prometa I Komunikacija, Sektor Prometa, Mostar, Novembar 1999.

Table 2.2.2 Kantonal Allocation
Permits for International Transport of Cargo by Truck
Federation of Bosnia and Herzegovina – Year 1999

Kanton	Percentage Permit Allocation	
	CEMT	Bilateral
Unsko-Sanski	7.9	8.5
Posavski	1.2	1.9
Tuzlanski	14.0	19.2
Zenicko-Dobojski	19.5	16.9
Bosansko-Podrinjski	0.6	1.1
Srednjobosanski	8.5	10.2
Hercegovacko-Neretvanski	15.9	12.8
Zapadno-Hercegovacki	18.3	10.4
Sarajevski	11.6	15.6
Herceg-Bosanski	2.4	3.3
Total	100.0	100.0

Source: *Analiza Prijevoza Tereta U Medunarodnom Prometu I Iskoristenja Jednokratnih Inostranih Dozvola Za Prijevoz Tereta U Federaciji Bosne I Hercegovine*, op. cit.

International Bus Operations International bus services are not, as in the case of trucks, accomplished on a bilateral license basis. Instead, after an agreement between cooperating partners (operators) in both countries is reached, official arrangements are procured from relevant Ministries in both countries. In case of BiH, this is the Ministry of Civil Affairs and Communications.

Scheduled services are provided to nine foreign countries (Austria, Belgium, Denmark, Netherlands, Croatia, Germany, Slovenia, Switzerland and Sweden), and non-scheduled service agreements exist with five countries (Austria, Czech Republic, Croatia, Italy and Slovenia). During year 2000, 65 operators provided almost 74,000 officially scheduled annual departures from BiH (Table 2.2.3). No state-level formal arrangements existed, at time of writing, with Yugoslavia but bus operators, in particular from Republika Srpska, have extensively coordinated operations with Yugoslav operators to ensure that cross-border travel by bus is possible.

Table 2.2.3 International Scheduled Bus Services
Bosnia and Herzegovina – Year 1999

Country	Number of Lines			Annual Departures
	Federation BiH	Republika Srpska	Total	
Austria	24	9	33	5,752
Belgium	1	0	1	52
Denmark	1	1	2	156
Netherlands	1	0	1	104
Croatia	121	19	140	42,972
Germany	61	14	75	15,652
Slovenia	11	9	20	6,188
Switzerland	11	5	16	3,068
Sweden	1	0	1	52
Total	232	57	289	73,996

Source: Ministry of Civil Affairs and Communications

Inter-Entity Bus Operations To establish an inter-Entity line requires an agreement between counterpart operators. Following approvals by Entity Ministries of Transport, the Ministry of Civil Affairs and Communications issues an operating permit. In principle, some form of equal sharing of equipment and rolling stock is intended. All buses, regardless whether Federation or Republika Srpska based, travel from route origin to destination. At present, it is understood that 48 registered lines exist offering about 120 daily departures from each Entity. It is further understood that some 30 additional lines have been approved by the Entities, but not yet registered by the Ministry of Civil Affairs and Communications.

The registered lines link more than 30 cities; thus, include not only major long-distance destinations, but are also responsive to short-distance corridors of demand. Banja Luka and Sarajevo are the cities with most inter-Entity service corridor choices, while the most frequent inter-Entity services are provided between the Sarajevo metropolitan precinct (Grbavica, Ilidza, Vijecnica, Sarajevo) and nearby areas of Republika Srpska (Lukavica, Hresa, Renovica).

Inter-Kantonal Bus Operations The Federation Ministry of Transport indicates that some 140 companies operate within the Federation, roughly 40 providing non-scheduled services, the remainder scheduled services. Of the 100 operators providing scheduled services, the Ministry maintains a database for 62 operators; the remainder are not registered for Federation services and understood to provide other services, including at the Kanton and municipality levels. Of the 62 operators maintained in the database, 44 are indicated as providing inter-Kantonal service, and a further 18 Kantonal services. The registered operators own some 800 buses, with roughly 60 percent under public ownership, and 40 percent under private ownership.

The catchment area for Federation services is extensive, linking both longer-distance population centers as well as nearby centers of activity. Lowest headways are noted around major cities, particularly Sarajevo. But considerably differences apparently exist between scheduled operation and actual operation. For schedules valid through early year 2000, the route structure suggests that almost 90,000 route kilometers are expended each day [10]. However, it is understood that only some 50 to 60 percent of the indicated schedule was actually operated on a daily basis. The reasons for this are varied; some technical, some not.

New schedules were issued during early 2000 with the intention of rationalizing route/operator services, and eliminating problems identified with the earlier schedule[11]. It is understood that non-performance continues to also plague the new schedules, but that direct rectification is difficult due to a lack of enforcement mechanisms and a shortage of personnel. Nevertheless, the optimized schedules suggest that, for

[10] Scheduled route structure valid 1998 through 2000. Source: *Autobusni Red Voznje Federalnih Linija Bosne I Hercegovine* and Federation Ministry of Transport and Communications.
[11] *Commission for the Harmonization of Time Table for the Federal Bus Lines*, Federation of Bosnia and Herzegovina Ministry of Transport and Communications, Mostar, February 2000 (translated version).

Federation bus lines, 615 daily departures are scheduled over some 185 lines extending over 61,200 kilometers, thus yielding an average trip length per departure of slightly under 100 kilometers. In terms of trip length distribution, 63 departures are shown for route lengths of less than 30 kilometers, 360 departures for route lengths of 30-100 kilometers, 187 departures for route lengths of 100-250 kilometers, and 59 departures for route lengths of more than 250 kilometers. Average fares on Federation lines appear to somewhat vary by distance; for shorter distances, say, 30 kilometers, typical fares are on the order of 0.10 KM per kilometer, dropping to near 0.07 KM per kilometer for longest distances. However, differences in fare structure exist between the various lines. The average age of buses, as per early 2000, is 14.1 years, encompassing 16 types of buses, with average age by type ranging from 8.2 to 18.7 years.

Buses are inspected regularly, but the system can be complex and contradictory. Annual inspections are required under the Ministry of Internal Affairs, and three-month inspections under the Ministry of Transport and Communications. It is understood the latter inspection is more technical in nature and focuses on operational reliability of the vehicle. Thus, two sets of inspection certificates are required, and it is not uncommon to have a pass – fail situation. It is unclear at present as to which inspection result takes priority. The Federation Ministry of Transport and Communications is attempting to expand its network of inspection stations, and refine the process via a continuing introduction of computerized and automated testing processes. To date, nine inspection centers exist, with a further ten to eleven slated to come "on line." In response to Ministry-issued tenders, some 75 facilities have applied to be incorporated into the inspection network with 25 having been accepted based on Ministry criteria involving type of facility, type of equipment, and quality of staff. It remains a goal of the Ministry to ultimately provide a wide network of conveniently located vehicle inspection centers, each of which performs identical and automated state-of-the-art testing procedures, with results stored in a single, system-wide data base.

Privatization is, in line with governmental regulations, on-going. While some successes are noted (indeed about 40 percent of buses owned by operators providing Federation services are privately owned), difficulties persist. These relate to not only finding willing buyers (in some cases employees are becoming owners), but also legal questions, answers to which remain nebulous under existing statutes. While ownership of rolling stock is, for example, a direct issue, ownership of other assets (such as depots, ticket sales offices, stations) is not. Other complexities arise in sharing arrangements between the various BiH ethnic communities.

<u>Kantonal Bus Operations</u> Federation services and Kantonal services are schedule-coordinated in five Kantons; that is, arrival and departure schedules ensure reasonable opportunity for trip continuity at transfer points. Two Kantons do not explicitly coordinate schedules due to the small size of the Kantons and limited bus fleets (Unsko-Sanski and Bosansko Podrinjski Kantons). Typical Kantonal route structures focus on the Kantonal capital. A clear segregation among the various service hierarchies is virtually impossible as different operators tend to service different types of routes with their available fleets. The largest of the Kantonal services is GRAS, which provides the

bulk of public transport services in the Sarajevo area. During 1999, the operational GRAS fleet totaled 211 units, including 42 trams, 98 buses, 35 trolley buses, and 36 minibuses.

2.2.2 Issues and Opportunities

Principal conclusions of the review of long distance and inter city bus as well as truck operations are:

- The administrative system is complex and cumbersome as various jurisdictional hierarchies ranging from municipal to Kantonal, Entity and State are involved. This can be very intimidating, confusing, and contradictory for even knowledgeable operators, not to mention possible new external private sector participants.

- A clear segregation among the various truck and bus service hierarchies is virtually impossible to define as different operators tend to service different types of routes with their available fleets. Thus, operating statistics are intermingled. Likewise, performance measures considered standard in the international bus industry (route kilometers, seat kilometers, passenger kilometers, revenue kilometers) appear not to be routinely calculated nor available. Even the most basic of information, such as which inter-city domestic route is operational at what level of service, is not known with certainty.

- Licensing for international operations is accomplished largely on the State level. In case of trucks, there is little technical evidence to support the current practice of bilateral permit distribution with one-third going to Republika Srpska, and two-thirds going to the Federation. It is understood that historic precedence is the basis of this allocation; however, from a trade perspective, this ratio is totally insensitive to market mechanisms, trade patterns of local operators and fleet composition.

- Privatization is, in line with existing directives, on-going. While some successes are noted, difficulties persist. These relate to not only finding willing buyers (in some cases employees are becoming owners) or outdated equipment, but also legal questions, answers to which remain nebulous under existing statutes. While ownership of rolling stock can, for example, be a direct issue, ownership of other assets (such as depots, terminals, ticket offices, stations) is not. Other complexities arise in sharing arrangements between the various ethnic communities.

- The current fare and tariff structures are understood to be adequate to cover operating costs, but not fleet replacement. Thus, the typical bus and truck is 10-20 years old, and is likely to be, in essence, a used vehicle from western Europe. Exceptions exist in that element of the fleet employed in international operations; in case of trucks, for example, even though the overall fleet is dominated by “traditional” vehicles, trucks with Euro1 and Euro 2 engines are needed as part of bilateral permit procedures.

- Cargo transport is heavily influenced by "negative" economics; that is, varying taxation structures, high local costs, visa requirements and extensive border delays particularly to/from West Europe (BiH is not a member of the TIR group of nations).

- Buses and trucks are inspected regularly, but the system can be contradictory with annual mechanical inspections required under the Ministry of Internal Affairs and three month inspections under the Ministry of Transport and Communications. Thus, two sets of inspection certificates are required, and it is not uncommon to have a pass – fail situation. It is unclear at present as to which inspection result takes priority. No inspections of truck weight or loading practices are undertaken.

- European data would, in case of bus operations, suggest that viable inter-city, and international, bus services will continue to fill an important role in the movement of persons. While growth in bus passenger demand can, on a relative basis, be expected to be less than that of private (car) transport, the modest unit national income levels suggest that a sizable market, in absolute terms, will remain for some time.

- European precedence and statistical evidence has, in case of trucks, clearly confirmed that the role of road-based cargo vehicles will become increasingly important in future. It may readily be accepted that inevitable changes in the size and nature of economic demand will be increasingly shouldered by the road transport system. Over time, these changes will cause a significant shift in market share to road transport. Reliability, speed, and predictable service will become increasingly important to customers (and potential customers). Further, expanding privatization will offer extensive opportunities for small-scale ("mom and pop operators") to quickly enter the new economy by purchasing (or leasing) a commercial vehicle and providing cargo transport services.

South Eastern Europe is on the crossroad between Europe and Asia. Six out of ten multi-modal transport corridors included in the Helsinki and TINA Networks[12] go through South East European (SEE) countries. The collapse of the Soviet Union and the break-up of the Yugoslav Federation has led to radical changes in the direction of traffic flows, disruptions along the transport corridors, and the creation of new states. Performance of the border control agencies have been unsatisfactory: traffic has been subject to long waiting times, raising the cost of transport services and making them unpredictable; customs revenue collection has fallen short; and smuggling and corruption are understood to have become widespread. These deficiencies amount to bottlenecks to

[12] The TINA (*Transport Infrastructure Needs Assessment*) process was launched in September 1995. Its mandate was to identify the transport investment projects in the accession countries along the pan-European Transport corridors as defined by the 2nd Pan-European Transport Conference (Crete, 1994) and update at the third Pan-European Transport Conference (Helsinki, 1997). At the Helsinki Conference the concept of Pan-European Investment Partnership was endorsed to promote the connection of the Trans-European Transport Network (TEN) on the EU territory with the TINA Network of the accession countries, the Pan-European corridors on the territory of the NIS and the four Pan-European Transport Areas of the maritime sea basins and the Euro-Asian links, i.e., the TRACECA corridors.

trade, with macroeconomic effects similar to those of protectionist trade polices; they undermine incentives to improve competitiveness; and deter foreign direct investment.

Recent wars are not the only cause for the generally poor availability and quality of transport infrastructure and services in the SEE region. Though the countries in the region are significantly different, institutions and polices in the transport sector are generally weak. These weaknesses have led to decades of inadequate maintenance; continuing over-regulation of the sector; dependence of transport enterprises on subsidies; and insufficient progress towards commercialization and privatization of transport services (although, in the latter case, recent progress is encouraging). As a result, low quality of transport infrastructure and services, and relatively high transport tariffs limit international competitiveness of SEE countries.

BiH is not an island. Thus, a knowledge of, sensitivity to, and participation in regional transport initiatives will be an important stepping stone toward closer trade and passenger activity with national neighbors and other parts of Europe. In a broader sense, as indicated previously in this report, regional integration, in both strategic and tactical terms, is identified as an important element in the path to EU membership.

2.2.3 Activity Estimates

The trip matrixes developed as part of the road transport model, and described in Section 2.1 of Chapter 2, *Volume II* of the *Interim Report*, provide a surrogate measure for gaining insight into vehicle and, based on average occupancy/loading factors, passenger trip and cargo patterns. Several observations may be made for year 2000 inter-zonal vehicle trip demand. A total of 125,211 vehicle trips are recorded as occurring on a typical day during year 2000. Some 88 percent of that are by passenger cars (110,417 trips), two percent by buses (2,682 trips) and ten percent by trucks (12,112 trips). This relationship is compatible with official vehicle registration data which suggest that some 90 percent of registered vehicles are passenger cars, nine percent trucks, and one percent buses.

The combination of current patterns established via the roadside origin-destination filed surveys, and forecast demand projections, permits an estimation of daily passengers carried by cars and buses[13]. At present, an estimated 267,100 passengers are transported daily including 221,300 by cars (83 percent) and 45,900 by buses[14]. These totals are expected to grow to about 418,800 passengers per day by year 2010, and 618,000 passengers per day by year 2020 (Table 2.2.4). Over time, therefore, the relative share of passengers travelling by bus vis-à-vis by car are expected to decrease.

[13] Based on year 2000 occupancies of 2.0 persons per car and 17.1 persons per bus. As bus service efficiency increases, there is also a likelihood that the number of bus trips will be impacted.
[14] In modeling terms, base calculations reflect inter-zonal trips traveling on internal network links.

Table 2.2.4
Estimated Daily BiH Passenger Transport by Car and Bus
Years 2000, 2010 and 2020

Vehicle Type And Year	Passenger Kilometers (000)	Total Passengers Carried
Car		
2000	19,637.0	221,258
2010	29,158.4	362,154
2020	44,472.5	546,358
Bus		
2000	4,806.7	45,879
2010	5,755.2	56,687
2020	7,241.8	71,632
Combined		
2000	24,443.7	267,137
2010	34,913.6	418,841
2020	51,714.3	617,990

Source: JICA Study Team

As is the case with buses, the combination of current patterns established via the roadside origin-destination surveys, and forecast demand projections of the road transport model, permits an estimation of daily tonnage moved by trucks[15]. At present, an estimated 88,700 tons are transported daily including 33,800 tons by rigid trucks and 54,900 tons by articulated trucks[16]. This is expected to grow to about 159,000 tons per day by year 2010, and 288,000 tons by year 2020 (Table 2.2.5).

Table 2.2.5
Estimated Daily BiH Cargo Transport by Truck
Years 2000, 2010 and 2020

Truck Type And Year	Ton Kilometers (000)	Average Load (tons) Per Truck	Total Tons Carried
Rigid			
2000	3,683.1	4.2	33,803
2010	6,438.2	5.3	65,996
2020	11,142.6	6.5	115,213
Articulated			
2000	6,563.3	13.6	54,944
2010	10,121.5	14.8	92,992
2020	17,224.5	16.1	172,543
Combined			
2000	10,246.4	7.3	88,747
2010	16,559.6	8.5	158,988
2020	28,367.0	9.7	287,756

Source: JICA Study Team

[15] It is assumed that, over time, the current inefficient backload pattern will gradually moderate, reducing ultimately to 20 percent for rigid and 30 percent for articulated vehicles. As truck efficiency increases, there is also a likelihood that the number of truck trips will be impacted.
[16] In modeling terms, base calculations reflect inter-zonal trips traveling on internal network links.

2.2.4 A Regional and European Perspective

In a synoptic sense, in order to become a Member State of the European Union, acceding countries must align their national laws, rules and procedures to the entire body of Community legislation ('acquis communautaire') in such a way that the relevant EU law is fully incorporated in the legal system. This obligation continues after accession. The transport acquis[17] includes all the Directives, Regulations, and Decisions adopted on the basis of relevant provisions in treaties. It furthermore includes all the principles of law and interpretations of the European Court of Justice, all international transport agreements to which the European Community is a party, as well as the relevant declarations and Resolutions of the Council of Ministers.

While the transport acquis do indeed provide sector-specific information, it becomes immediately obvious that broader perspectives other than transport will likely play a leading role in the gradual transition of BiH and being selected for accession to the EU. In that sense, liberalization and harmonization policies, while by nature being country-specific, remain as the foundation for guiding policies of the EU. There are five areas that appear to be of a high priority:

- Private sector development, especially through liberalization of trade, improvement of the business regulatory environment, and strengthening of the financial sector, particularly banking regulation and supervision;

- Poverty reduction and social development, especially through policies to foster social cohesion and inclusion;

- Institutional development and governance, especially strengthening public administration, improving financial control mechanisms and improving legal and judicial systems;

- Infrastructure and transport policies, especially streamlining and commercialization, thus fostering a wider role for the private sector; and,

- Environmental policies, especially protection of valuable natural resources and remedying the consequences of recent conflicts.

The Federation has adopted liberalization and privatization as a basic policy for its economic transformation; these tenets must also flow to the transport sector. However, there currently exist a variety of constraints that hinder the immediate implementation of these policies and related measures; for example, existence of traditional systems and a shortage of funds. It is indispensable to develop a staged implementation program by taking priorities and constraints into account. Short-term priorities should be given to removing non-capital intensive bottlenecks, for example, elimination or improvement of legislative and jurisdictional barriers. Medium and longer-term priorities should be

[17] *Guide to the Transport Acquis*, Directorate General of Transport, The European Commission, October 1999.

given to improvement or development of strategic measures to encourage harmonization. During this period, a tactical focus should be rationalization strategies and industry modernization in terms of accelerated replacement of the aged transport fleet and supporting facilities so as to enhance the competitiveness of the Federation transport industry. Related measures include:

- Improvement of border crossing facilities in terms of procedures and facilities.
- Derivation of uniform, consistent and transparent fiscal, taxation and banking structures, considerations of vital importance to providers of both domestic and international cargo and passenger services.
- Transition of governments role from that of being a provider of services to one being a supervisor of services; that is, sort of a "watch dog" and facilitator.
- Development of an efficient and integrated multi-modal transport system, in line with recommendations promulgated by the current study.
- Accelerated upgrading of identified road segments and corridors.
- Replacement of aged fleets of trucks and buses, with an emphasis on energy efficiency and environmental protection as part of the EU standards for these vehicles.
- Introduction of user pay principles, to include "fair share" contribution for road maintenance, in accordance with the practices of EU countries.

Trade practices remain an economic cornerstone of international relationships and, as indicated previously, an important element in European integration. Trade practices between BiH and other European States are based on a variety of special arrangements and agreements. The enhancement of those relations, in terms of both practices and volumes, depends not only on bilateral relationships, but, in a larger sense, on the status of the Balkan region as a whole. Study Team representatives discussed in Brussels the perceived status of BiH transport with various organizations active in international transport. In addition to political and legislative constraints, an over-riding comment received was that BiH, in isolation, is likely to generate only modest cargo and passenger demands when compared to other east and central European states whose size is both larger, and geographically closer to, western Europe. This, in turn, is likely to dampen the desire of major European players in the transport industry of intensifying/extending services to/from the Federation and/or BiH. It was frequently suggested to the Study Team that "critical mass" in transport demand must be enhanced via regional consolidation, thus catalyzing larger, more concentrated, shipments to/from western Europe.

Similar issues are central to formation of the Stability Pact, and its impact of enhanced economic as well as trade activities among, and with, the SEE members – Albania, BiH,

Bulgaria, Croatia, FYR Macedonia, Romania and Yugoslavia. Action plans[18] focus on four key elements:

- Moving rapidly towards trade integration with the EU and within the region itself, and creating a stable, transparent and non-discriminatory environment for private sector development;

- Fostering social inclusion and social change within the region to reduce tensions and create the conditions for peace and stability;

- Improving institutional capacity and governance structures, and strengthening anti-corruption efforts in the region; and,

- Investing in regional infrastructure to integrate the region physically with rest of Europe and within itself, which must include initiatives that safeguard the environment.

The review goes on to state that the current state of trade relations – discriminatory, variable and sometimes highly protectionist – is a long way from the ultimate goal of regional countries, that is, integration with the EU. Yet there is no simple or single way of moving towards that objective. The review postulates a possible approach of meeting the objective of overall trade integration, an important prerequisite. This is presented in two phases with an intermediate review that would permit the analysis of progress achieved and would also permit the tailoring for further EU integration to individual countries.

- During the initial phase – say over two or three years, a gradual but general liberalization of all trade must be achieved, with support by the World Bank and IMF, and elimination of administrative barriers to trade must be achieved, as must the beginning of multilateralization of existing bilateral trade practices.

- Following the initial phase, the EU may wish to decide among various options with regional countries, but might include decisions as to which countries would simply continue building free trade relationships; which, if any, are invited to negotiate for EU accession; and which, if any, are invited to join a customs union on the way to fuller integration with the EU.

- During the second phase, the regional countries would need to establish a full-fledged Free Trade Area with the EU and among each other. In some cases, this may lead directly to full association with the EU; in others, a customs union may be an intermediate step. In both cases, countries will need to implement a convergence of their external tariff to that of the EU; in addition, they would have to make progress in aligning economic policies and institutions in other areas needed to make a customs

[18] *The Road to Stability and Prosperity in South Eastern Europe – A Regional Strategy Paper*, The World Bank, Europe and Central Asia Region, March 2000.

union and/or full integration effective. Concurrently, the EU will need to progressively eliminate remaining restrictions on imports from these countries according to timetables to be negotiated.

2.2.5 Sector Modernization Strategies

For a government to bring coherence into the actions of its many agents and to be able to communicate with the community it governs, it is necessary that there be a statement of the political, social and economic principles which guide its policies and actions. The road operations aspect of the Transport Master Plan is intended to fulfill this role for inter-city and long-distance truck and bus operations. It is, of necessity, a framework approach rather than an overly detailed statement of operations. The Study Team considers this approach necessary as first there must be established a new industry framework that is responsive not only to transport management and operating issues, but is compatible with other on-going efforts in areas of trade, taxation, privatization and financial restructuring. Only once the "ground rules" are established is there a coherent basis for more detailed reviews regarding the formulation of route structures, operating standards, etc.

The transition from pre-war to post-war conditions has been extraordinarily difficult; even today, many challenges remain due to both the war and the ongoing economic reforms within BiH. Thus, a continuing test in the transport sector may be to define a path which is adaptable to today's circumstances and tomorrow's market challenges.

- **In its most basic sense, the structure of the inter-city and long distance truck/bus operations strategy strives to put as much of the sector's assets and functions as possible in a deregulated, competitively structured private sector, in which determination of prices and investment is left to the marketplace. The government's role would then be limited to one of setting policies to ensure that the (transport) market place works effectively, that transport operations are undertaken safely, that environmental norms are observed, and that services are available to all users on an equal basis.**

The suggested strategy strives to be innovative, yet practical, while concurrently meeting the needs of various participants active in the transport industry. Following principles guide the process and form the basis upon which the framework is founded, and within which recommendations are derived:

- Regulation tends to protect firms from competition, whereas government monopolies are neither disciplined by the market nor by a regulator. Privatization and deregulation are alternative ways to restore competitive private markets to industries that government has traditionally controlled and/or operated. In deregulating or privatizing road transport services, one of the most essential services that government can perform is creation of an environment that fosters effective competition, and that prevents the formation of predatory monopolies or cartels.

- Any change in the transport sector, such as that contemplated for road transport, cannot be achieved in isolation. Instead, efforts must proceed parallel to, and be compatible with, on-going reforms in other sectors at both the State and Entity levels to include, among others, revisions of customs duties and procedures, restructuring of banking/financial markets, review of taxation policies, industrial privatization policies/practices and integration with the European Union. It should concurrently be understood that privatization of the inter-city and long distance road transport industry is not simply a matter of "selling the buses and trucks." If the privatization and deregulation of road transport operators is to succeed, and indeed it must, legal and administrative changes must concurrently occur.

- Privatization/deregulation comes in many forms; frequent references in literature are made to experiences in the United Kingdom, Russia, United States, Mexico, and Chile. The Study Team agrees that privatization and deregulation of the inter-city and long distance bus/truck operators is needed in BiH, but not necessarily in an unfettered free-market format driven entirely by market demand and performance. The local market is still imperfect, and likely to remain so for the near-term future; thus, initial actions regarding the road transport sector should embrace free market principles guided by a reasonable policy framework. But, in the medium to longer term, gradual transition to a more unfettered mechanism is desirable.

- The plan is based on the realities of the existing condition. It is apparent that throughout the Federation there are a number of individuals who are highly knowledgeable of, and experienced in, the operation of buses and trucks, but are often frustrated and constrained by the existing "system". Many essential elements for improvements are already in place, thus the current plan attempts to build upon existing opportunities, rather than suggesting that a whole new approach be implemented.

- Compliance with EU transport policies remains desirable, but it must concurrently be realistically accepted that full EU membership for BiH will take some time. Thus, in the bus and truck industry, one must "walk before running"; that is, initial efforts should focus on transforming the industry so as to provide efficient and effective services, then gradually conforming to EU standards and practices. This should not be mutually exclusive paths, but on-going (although not necessarily deterministic) exercises; indeed, considerable conformance has already been achieved by those operators providing services to western Europe.

- Any strategy that includes policy measures must be monitored and enforced. The safety characteristics of vehicles and the control of overloading are some of the most difficult technical regulations to be enforced.

- Existing regulations, controls, and procedures in the inter-city transport sector tend to be complex and intimidating. It must be accepted that, under a post-privatization scenario, bus and truck operators cannot continue to be smothered under a blanket of restraints. To do so will impede the growth and success of this vital sector, and if

private sector growth is impeded due to stifling governmental control, then all of the Federation will suffer, included the government itself. The path to a prosperous future will be blazed by private enterprise and market-driven economic mechanisms.

Within the spirit of the goals, and the framework of the Master Plan, further sector-specific modernization strategies are summarized in Table 2.2.6.

Table 2.2.6 Summary of Recommended Modernization Strategies
Long Distance and Inter-city Bus and Truck Operators

Focus	1. Issue	Proposed Action	Discussion
Entire Sector	Absence of reliable and consistent database is seen as a considerable deterrent to management, investment, and operations planning. Industry monitoring severely constrained.	Establish database which provides details regarding operator activities. Data flow must be dynamic, with, at minimum, semi-annual, or annual updates.	Focus on typical EU information norms including type of goods, fleet profile and utilization, trip length and goods origin-destination for trucks. For buses, route structure, trip length, fare levels, fleet profile and utilization (route kilometers, seat kilometers, passenger kilometers, revenue kilometers).
Ministry of Transport and Communications	Privatization and deregulation of government-owned assets	Devolution of assets either directly (say sale) or indirectly (such as setting up leasing companies); freight rates and passenger fares to be determined by market; regulatory structure to combat predatory monopolies; free access for new operators assuming compliance with general regulations.	Convert government-owned assets to private ownership. Operations to be deregulated, competitive and with prices and investments determined by marketplace. Government's role would revert to setting policies that ensure efficient sector performance, safe operations, that environmental norms are observed and that services are available to all users on an equal basis.
International Bus Operations	Permits managed by State. Agreements between operators leads process.	None	Private sector already has leading role; agreements between central authorities follows European practice.
International Truck Operations	Bilateral permits controlled by State. Distribution to Entities based on set formula (one third RS, two thirds Federation) applicable to all permit countries.	In recognition of the importance of international trade to BiH and the Entities, the allocation of bilateral cargo permits should be market driven so that the needs of the economy are met.	Further discussion regarding technical criteria needed, but could involve shipment contracts, trade statistics, modal shipment preferences, fleet composition, and use of previous-term permits. Such data could also support the bilateral negotiation process in an effort to increase the absolute number of permits made available to BiH.
Inter-Entity	Permits managed by State	Negotiations should proceed	Fixed route bus transport

Fixed Route Bus Transport	after service approvals by Entities.	to initiate permit-free fixed route inter-Entity passenger services based on demand and other market-driven considerations.	should follow the lead of permit-free inter-Entity charter bus transport and cargo (truck) transport.
Operator Associations	Following privatization, increasing need for operators (particularly small operators) to pool knowledge and resources via operator or route associations.	Chambers of Commerce, with an established private-sector focus and historically strong relationship with transport operators, should emerge as the umbrella organization for such associations.	Associations present collective voice of industry, and can achieve economies of scale in terms of market information, load optimization, procurement of vehicles and supplies, education, training and development of terminals and depots. Chambers, which now exist at regional, Entity and State level, offer broad arena for private sector integration, including foreign investors.
Bus Terminals	Inter-city bus terminals now under government control. Terminals serve as important passenger interchange points between longer distance and local bus services, as well as between bus services and other modes.	Privatize terminal operation; however, bus companies should not be permitted to also own terminals. Separate companies should be created, with revenue streams at terminals patterned after airport terminal operations.	In the fast-changing world of privatized bus operations information is critical. Existing and potential bus passengers must be able to easily compare different operators in terms of vehicles, schedules, and fares. This is best accomplished at a single (or limited number of) inter-city bus terminal(s).
Truck Terminals	Expected rapid increases in truck cargo transport imply gradual separation of trunk line and distribution services.	Begin with planning of truck terminals in periphery of urban centers with consideration to cargo transport needs and urban environment (traffic, accidents, noise, air quality).	Truck terminals could be operated by truck companies or associations. Major terminals should contain not only trans-shipment facilities, but also container depots, warehouses, sorting and packaging facilities.
Vehicle Inspections	Differing procedures for mechanical inspections in Entities. Limited, if any, control on truck weight or loading practices.	Begin discussions to unify mechanical inspection procedures to single standard. Start truck weighing program using permanent and portable scales.	Vehicles operating on the roads of BiH should, regardless of place of ownership, conform to identical measures of road safety, weight, and environmental standards.
Neighborly Relations	Bus and truck movements between BiH and Croatia are market driven and not subject to permits. Trade and passenger activities with Yugoslavia are, at time of writing, informal.	Ensure that similar procedures are adopted for both neighbors once the diplomatic situation so permits.	Yugoslavia and Croatia are important and traditional trading partners with BiH. This relationship should be market driven in future.

2.3 AFFORDABILITY OF ROAD SECTOR PROJECTS

Previous sections of the *Final Report* have addressed road sector investment needs to include maintenance, rehabilitation, proposed BiHTMAP projects and committed projects. These outlays aggregate, in summary, to some 4,314 million KM over the 20-year study horizon (Table 2.3.1).

Table 2.3.1 Synopsis of Proposed Federation of BiH Road Sector Investment Program

	Investment by Period (Million constant year 2000 KM)			
Improvement	2001-2005	2006-2010	2011-2020	Total
Maintenance	259.0	259.0	518.0	1,036.0
Rehabilitation	186.9	213.8	427.6	828.3
Committed Projects	161.7	0	0	161.7
New Projects	807.0	687.8	793.2	2,288.0
Subtotal	1,414.6	1,160.6	1,738.8	4,314.0

Source: JICA Study Team

This section presents issues regarding affordability, that is, a comparison of potential revenue sources vis-à-vis estimated investment costs. Discussions are presented in several areas:

- Section 2.3.1 discusses the current Entity budget, with a focus toward transport, and presents near-term budgetary forecasts.
- Section 2.3.2 synthesizes revenue and cost items.
- Section 2.3.3 presents conclusions regarding affordability.

2.3.1 Budgetary Analysis [19]

Consolidated figures for actual functional spending in 1998 for the Federation totaled some 3,037 million KM; year 1999 and 2000 budgets total 3,402.9 and 3,341.4 million KM, respectively (Table 2.3.2). This includes federal budget allocations, Kanton budget allocations, and projects funded by the international community. Also included are health expenditures financed from the Health Insurance Funds, but not pensions and unemployment benefit programs. During this period, General Government Services have declined from 30 percent of total expenditure in 1998 to 25 percent in the 2000 budget. While spending on defense and general public services have fallen, the share of spending on public order has increased with public order budgets in the Kantons now amounting to around two-thirds of spending on education.

[19] Data associated with this section have been drawn from *Budget Framework Paper 2001-03*, prepared with assistance from the World Bank by Federal Ministry of Finance, Federation of Bosnia and Herzegovina, July 2000. Document content was also discussed at several junctures with World Bank representatives.

Table 2.3.2 Budgetary Spending by Sector (Million KM)
Years 1998, 1999, and 2000 – Federation of BiH

Sector Group/Sector	Outlay (Million KM)											
	1998 Actual				1999 Budget				2000 Budget			
	Federation	Cantons + Health Ins. Fund	External Project Financing	Total	Federation	Cantons + Health Ins. Fund[1]	External Project Financing[2]	Total	Federation	Cantons + Health Ins. Fund	External Project Financing[3]	Total
General Government Services	437.1	342.3	134.6	914.0	476.8	331.2	66.8	874.8	431.9	324.1	69.8	825.7
General Public Services	113.0	89.5	94.2	296.7	57.5	59.3	37.0	153.8	71.0	56.7	65.7	193.4
Defense	285.5	37.5	40.4	363.3	368.0	0.0	29.7	397.7	305.5	0.0	4.0	309.6
Public Order	38.7	215.3		254.0	51.3	271.9		323.3	55.4	267.3	0.0	322.7
Community and Social Services	248.0	872.7	280.6	1,401.3	294.9	1,039.6	236.8	1,571.3	287.5	1,127.8	287.0	1,702.2
Education	5.7	343.6	48.1	397.4	3.1	407.8	27.0	437.8	3.1	419.1	17.0	439.2
Health	5.1	351.8	60.9	417.8	3.6	373.0	65.3	441.9	5.0	423.1	70.8	498.9
Social Security and Welfare	231.0	99.3	16.3	346.6	285.9	164.7	35.7	486.3	276.5	190.7	99.2	566.3
Housing and Communal Services	0.7	47.3	155.3	203.2	1.8	56.3	108.4	166.4	2.0	67.3	98.2	167.4
Recreational, Culture & Religious Services	5.5	30.7	0.0	36.2	0.5	37.9	0.5	38.9	1.0	27.5	1.8	30.3
Economic Services	65.8	130.3	422.4	618.5	41.9	152.7	499.8	694.4	45.8	94.4	361.3	501.4
Fuel and Energy		12.9	131.3	144.2	0.0	4.3	99.8	104.2	0.0	1.3	62.5	63.7
Agricultural, Forestry, Fishing & Hunting	19.6	5.4	15.2	40.2	8.7	16.0	32.3	56.9	8.9	21.1	25.5	55.5
Mining, Manufacturing and Construction	9.8	50.4		60.1	0.0	2.5		2.5	0.0	1.0	0.0	1.0
Transport and Communications	31.8	17.6	86.3	135.7	21.5	53.7	91.5	166.7	22.5	44.2	100.1	166.8
Other Economic Services	4.6	44.1	189.5	238.2	11.7	76.2	276.3	364.2	14.3	26.9	173.2	214.4
Other Services	28.7	74.5	0.0	103.2	106.4	156.0	0.0	262.5	174.9	135.6	1.5	312.0
Total	779.7	1,419.8	837.5	3,037.0	920.0	1,679.6	803.4	3,402.9	940.0	1,681.8	719.5	3,341.4

Notes: (1) Includes actual Health Insurance Fund Revenues; (2) RCC estimates of actual disbursements in 1999; (3) Sector distribution based on actual sector share of carry forward financing at beginning of 2000. Source: *Budget Framework Paper 2001-03*, op. cit.

Community and Social Services spending has increased from 46 percent of total expenditure in 1998 to 51 percent of budgeted expenditure in 2000. There has also been a rapid increase in Kanton budgets for social security and welfare. Externally financed spending on housing and community services has fallen, partially offset by increased spending from Kanton budgets.

Economic Services spending has fallen from 20 percent of total expenditure in 1998 to 15 percent in the 2000 budget. This reflects declining external assistance allocations, which account for around 70 percent of sector spending. Domestic budget allocations have fallen by almost 30 percent since 1998, with a marked decline in transport and communications.

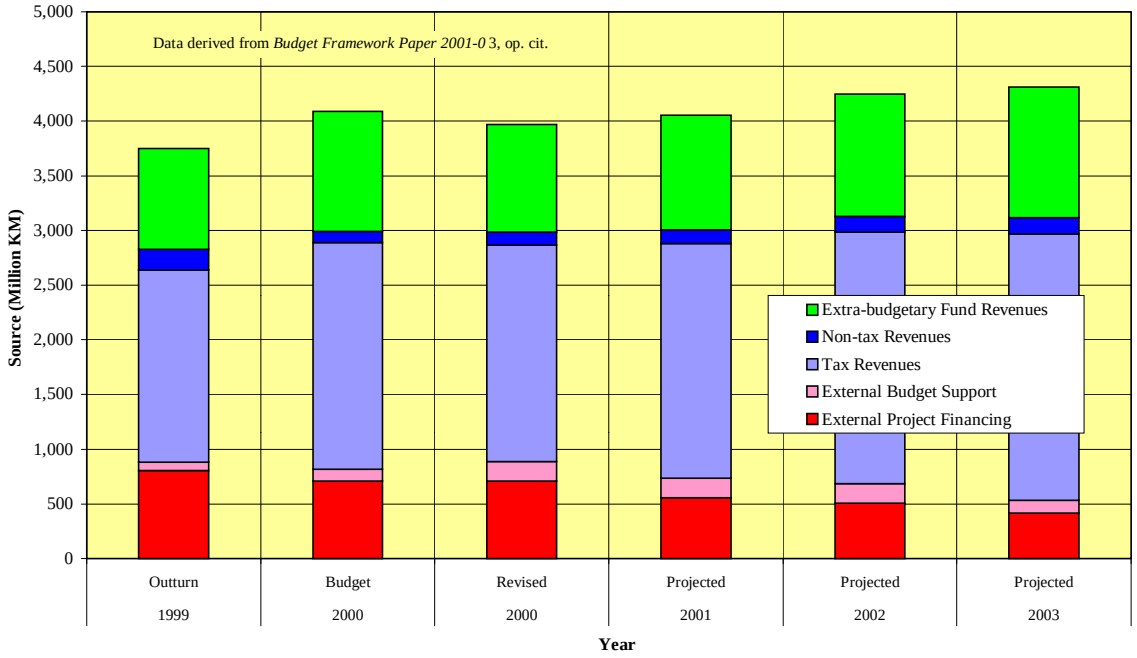
For the year 2000 budget, General Government Services account for 24.7 percent of the budget, Community and Social Services 50.9 percent, Economic Services 15.1 percent and Other Services 9.3 percent. On a source basis, 28.2 percent are federal budget, 50.3 percent Kantonal budgets, and 21.5 percent external project financing. Transport was allocated a total of 135.7 million KM in 1998, increasing to 166.7 million KM in 1999; almost no increase is foreseen in the year 2000 budget. External project financing is an important element of the transport budget accounting for 79.6 percent, 54.9 percent and 60.0 percent in the 1998, 1999 and 2000 budgets, respectively.

Responsibilities for financing transport infrastructure and services in the Federation are divided between the federal government (main road network, rail networks, civil aviation and water transport), Kanton governments (regional roads, public transport services), and municipalities (local roads). Federal and Kanton budget expenditures in the transport sector predominately relate to the maintenance of the road and subsidies to the rail networks which together account for over 85 percent of all expenditure on the sector excluding externally financed projects. Road outlay is not a dedicated line item and fiscal details are extremely difficult to ascertain; however, current levels of road maintenance allocations are, per World Bank estimates, seen as covering only 30 percent of requirements, and there are considerable arrears in payments to road maintenance organizations. The federal and Kanton governments have also had difficulties in meeting local cost contributions on externally financed road projects.

A reasonable estimate might therefore be that, at present, some 25-30 million KM per annum are being expended in the Federation from domestic resources on road maintenance and rehabilitation. Comparison to the estimated year 2000 Federation GDP of 6.43 billion KM yields a ratio of 0.4-0.5 percent. Inclusion of externally funded road projects raises this ratio to about 1.4 percent.

A forecast of the consolidated expenditure framework suggests that a year 2000 total of 4,090 million KM is expected to increase to 4,312 million KM by year 2003. Within that aggregate is an increase in domestic receipts (tax revenues, non-tax revenues, extra-budgetary fund revenues) from 3.3 billion KM in year 2000 to 3.8 billion KM in year 2003. However, over the same period, external revenues (external budget support, external project financing) are shown as decreasing from 817 million KM in year 2000 to 535 million KM in year 2003 (Figure 2.3.1).

Figure 2.3.1 Consolidated Expenditure Framework Years 1999 - 2003, Federation of BiH



2.3.2 Revenue Analysis

The issue of affordability is complex in that it involves the interplay of various considerations over the next two decades. These include:

- Near-term forecasts to year 2003 have confirmed that considerable reductions in external assistance can be expected, with year 2003 levels almost half of those noted during year 2000. Thus, increasing reliance on domestic revenues is unavoidable. The role of public-private partnerships (PPP) is therefore expected to assume a more positive role as scarce public resources continue to be placed under increasing stress.
- GDP is expected to grow in future; the socio-economic framework associated with the current study has developed twenty-year forecasts in terms of constant year 2000 KM. These include both a base case as well as high economic growth scenarios. Sectorial allocations should grow in rough proportion to GDP assuming inter-sectorial relationships remain balanced as at present.
- Quantum changes in governmental revenues could occur should major changes in the fiscal arena be implemented in areas such as taxation system. This would generate more revenue availability across all sectors, although competition for such funds among various Ministries would likely be fierce.
- Restructuring of the budget could occur; that is, higher shares allocated to, say, transport in response to reductions in other sectors or changes within the transport

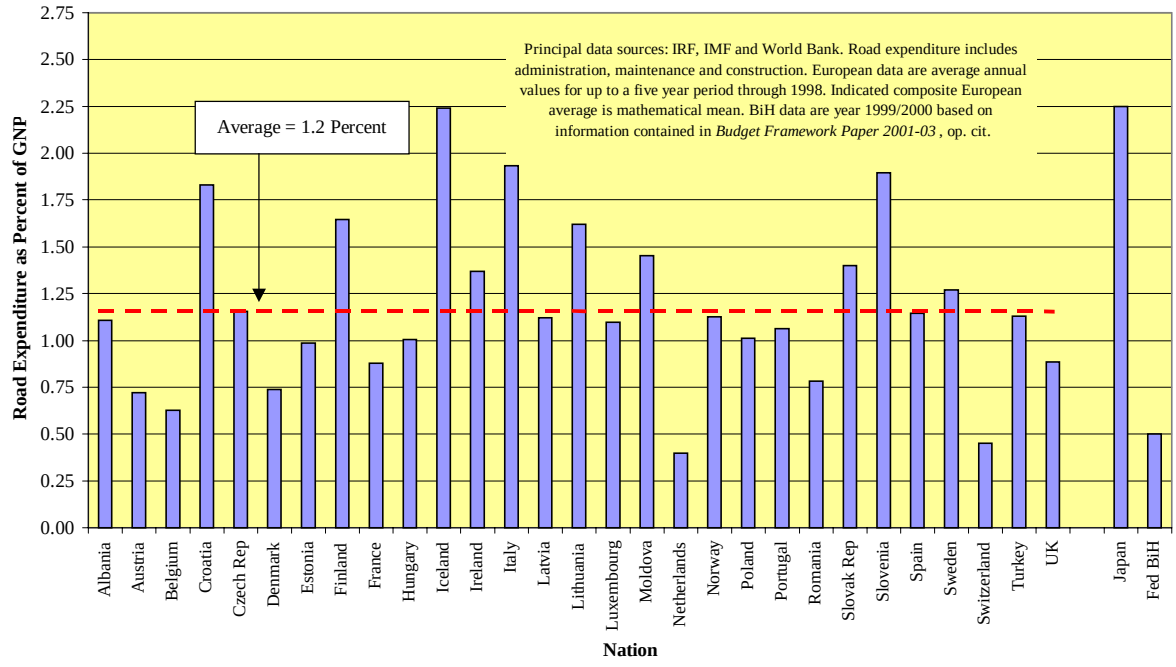
sector itself. For example, in the latter case, reduction or elimination of operations subsidies with yields funneled to, say, road construction.

- The sourcing of dedicated funds continues to be an issue in the Federation. The *Road User Charges Study* has made certain recommendations regarding the setting-up of a road fund from which core road maintenance and rehabilitation costs would be borne. No decision has, to the Study Team's knowledge, been made in this regard at time of writing.

The present analysis, therefore, focuses upon existing levels of domestic funding for the provision of road infrastructure, and how these compare to the proposed program of road improvements promulgated by the current study.

A review of road expenditure patterns was initially conducted to establish a general perspective of European norms. Data regarding average annual expenditure on roads ranges from some 0.4 percent to more than two percent vis-à-vis national GNP. The composite value hovers near 1.2 percent; as a comparison, the expenditure pattern for Japan is shown at 2.25 percent (Figure 2.3.2). Thus, one may conclude that the domestic spending pattern of the Federation, which is near 0.4-0.5 percent of GNP, mirrors the lowest range of European expectations.

Figure 2.3.2 ! Recent European GNP and Road Expenditure Relationship

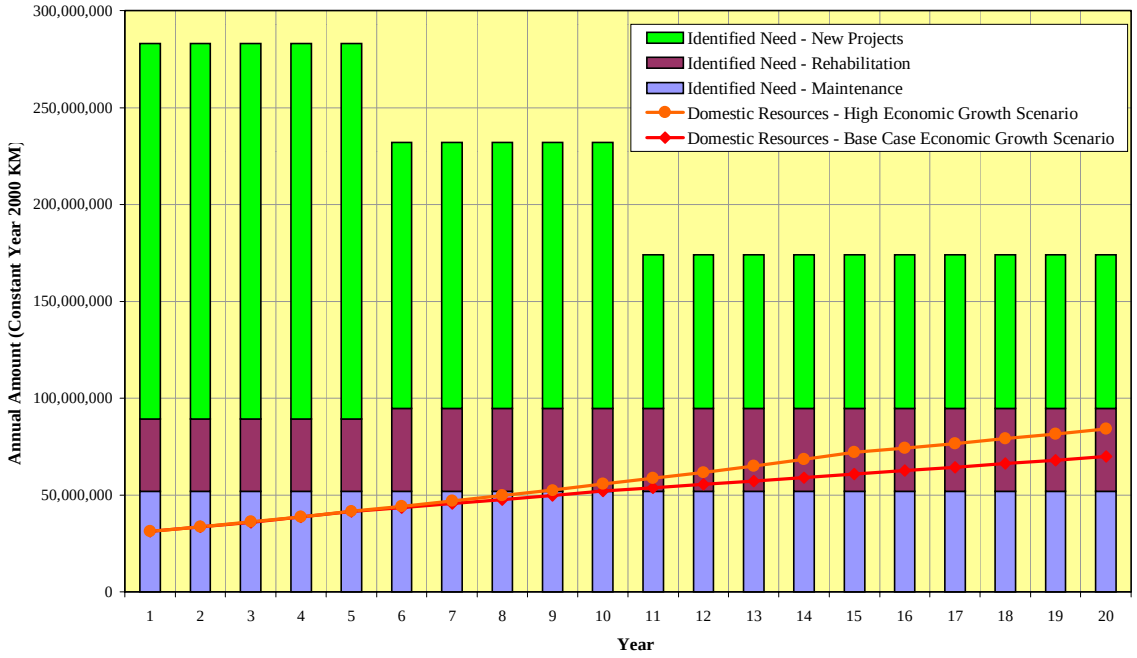


As the initial step, road improvement expenditure needs (refer Table 2.3.1) were equally allocated to each year within the identified three time periods within the 20-year planning horizon. Current domestic expenditure patterns, as a percent of GDP, were then extrapolated to future years based on the two economic growth scenarios contained

within the socio-economic framework; that is, real growth embedded in the base case and high economic growth scenarios.

The present Federation domestic expenditure pattern for roads appears insufficient to address even maintenance needs of the main and regional road networks. Within approximately 10 years real economic growth is expected to generate sufficient funds to accomplish proper maintenance; however, cash flow is not sufficient to fully address road rehabilitation needs even during the twenty-year planning horizon (Figure 2.3.3).

Figure 2.3.3 Comparison of Road Sector Needs and Domestic Resources Existing Funding Scenario, Federation of BiH



The implications are clear in that current domestic expenditure patterns are too low. On a cumulative basis, over the twenty-year period, some 25-30 percent of investment needs are met regardless of economic growth scenario (Figure 2.3.4). This implies that a massive infusion of external funding, or wide ranging PPP, is necessary to prevent continuing deterioration of the Federation road system.

A further review confirms the magnitude of this need. For this exercise, it has been assumed that all committed road projects (totaling 161.7 million KM) are removed from the improvement needs cost. Further, relative external assistance levels forecast for year 2003 (refer Figure 2.3.1) are assumed to occur every year over the twenty-year horizon in addition to current domestic investments in roads as shown under the high economic growth scenario (refer Figure 2.3.3). Even under such optimistic conditions, cumulative investments over the twenty-year period still aggregate to only 62 percent of identified need, thus suggesting requisite external funding that is unlikely to be met under what can be termed realistic conditions (Figure 2.3.5).

Figure 2.3.4 Comparison of Cumulative Road Sector Needs and Domestic Resources Existing Funding Scenario, Federation of BiH

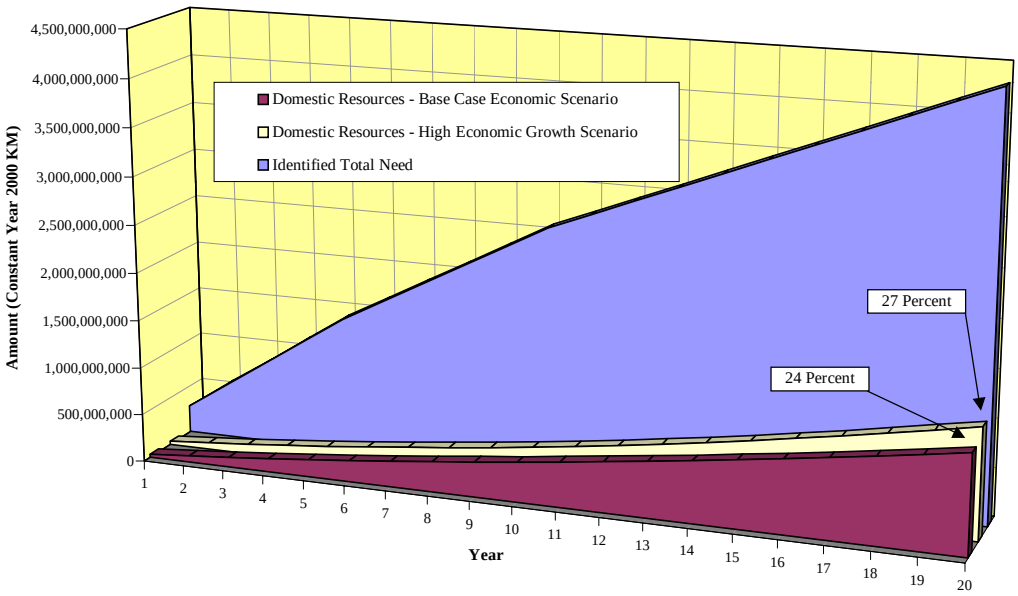
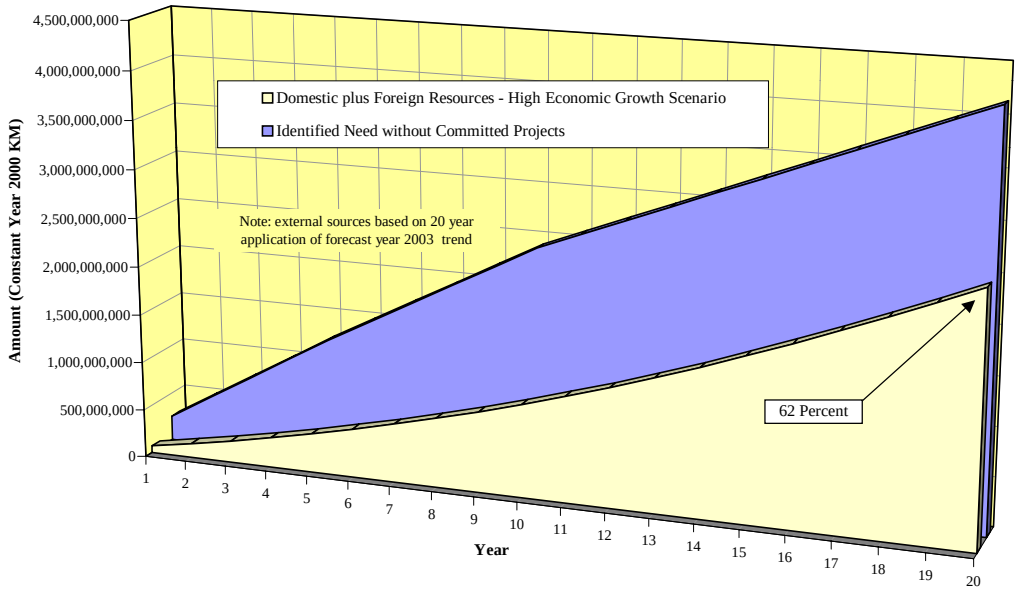


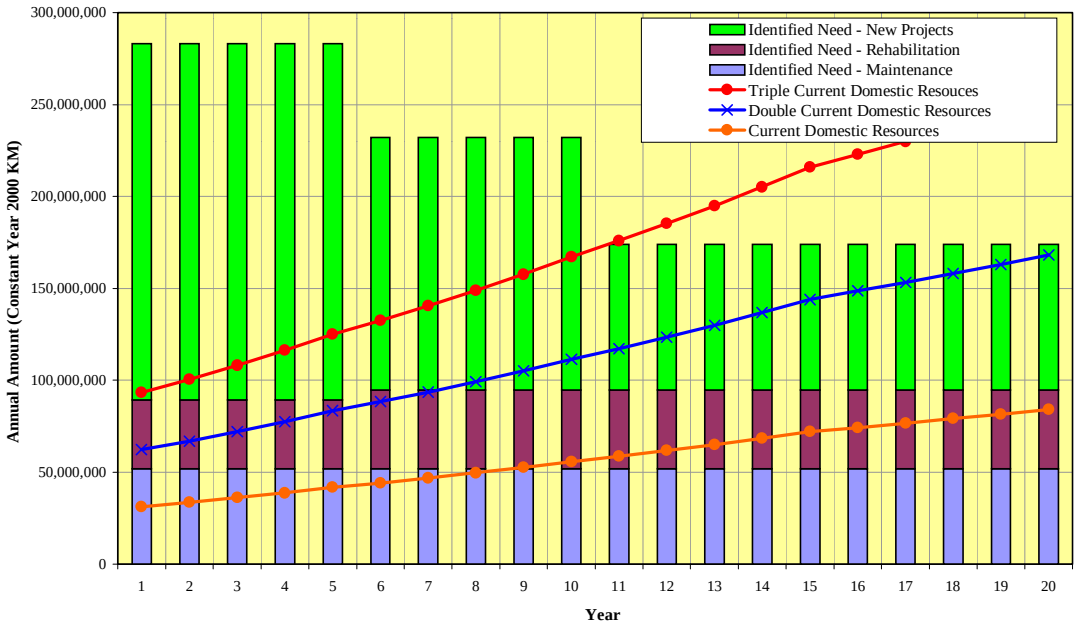
Figure 2.3.5 Comparison of Cumulative Road Sector Needs and Resources Optimistic Scenario: Existing Domestic plus External Resources, Federation of BiH



While the conclusion that the investment of domestic resources into road infrastructure improvements in the Federation is insufficient, the question is what level is sufficient? This, of course, depends on many variables and issues as outlined at the beginning of this section. Central to the theme is the realization that there exists a very strong linkage between economic development and the provision of infrastructure, particularly roads, and that deprivation of the latter implies negative impacts in terms of economic growth. Thus, investment in road infrastructure should be seen as an investment in the Federations economic future.

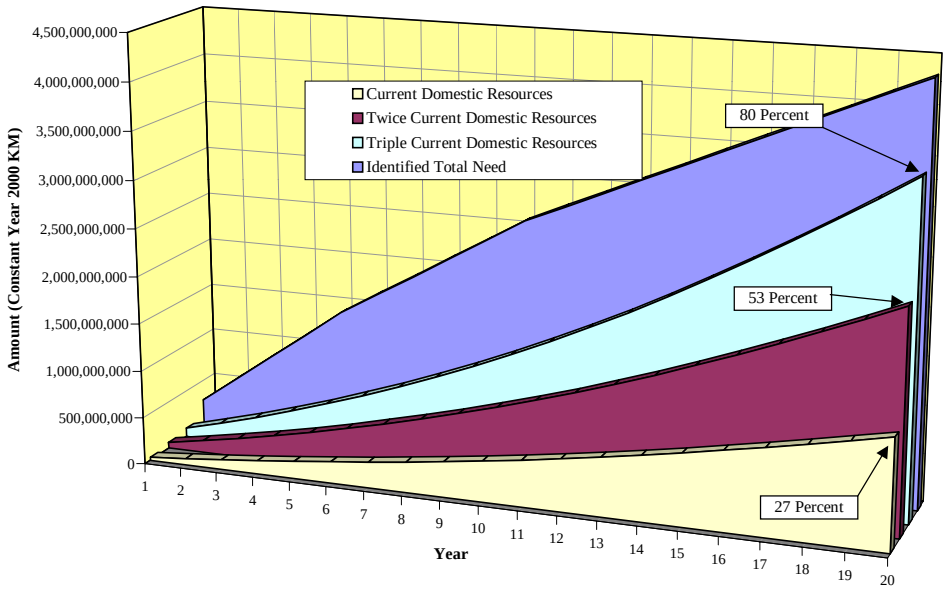
A reasonable supposition might be that domestic investments in road infrastructure should be adequate to cover, in the first instance, maintenance and, in the reasonable future, rehabilitation. Thus, external funds and PPP may be focused upon improvements of the road network. A doubling of the current Federation investment, to about one percent of GDP, appears a reasonable target in this instance (Figure 2.3.6).

Figure 2.3.6 Comparison of Road Sector Needs and Domestic Resources
Alternative Domestic Funding Scenarios, Federation of BiH



A doubling of domestic investments would, over the twenty-year horizon, address almost 60 percent of road investment needs. A tripling of current investments, to near 1.5 percent of GDP, would address almost 80 percent of identified needs, however, it is unlikely that such an increase is possible given other pressing needs within the Federation budget (Figure 2.3.7).

Figure 2.3.7 Comparison of Cumulative Road Sector Needs and Domestic Resources Alternative Domestic Funding Scenarios, Federation of BiH



2.3.3 Conclusions

Previous sections presented a comparison between road improvement needs identified by the JICA Study Team, as well as the status of domestic funding in the Federation of BiH. Several conclusions flow from that review, augmented by wider considerations which evolved as part of the current study.

- Near-term budgetary forecasts to year 2003 have confirmed that considerable reductions in external assistance can be expected, with year 2003 levels almost half of those noted during year 2000. Thus, increasing reliance on domestic revenues is unavoidable. The role of public-private partnerships (PPP) may therefore assume a more prominent role as scarce public resources continue to be placed under increasing stress.

- On-going and effective road maintenance is, in the first instance, seen as being a top priority to ensure that continuing deterioration of road systems is prevented. In the second instance, road rehabilitation is seen as being of critical importance to carry on efforts begun under the Emergency Transport Reconstruction Program (ETRP) while concurrently expanding such works to those parts of the network not addressed by the ETRP.

- The allocation of scarce domestic resources should be dictated by the needs of maintenance and rehabilitation, with a goal being self-sufficiency, that is, on-going and effective maintenance and rehabilitation using own resources without need for external support.

- The Study Team has, in addition to maintenance and rehabilitation works, proposed a series of priority projects thus expanding, in one form or the other, the existing network. It is concurrently noted that for such projects to be effective, other elements of the road net must have the benefit of proper maintenance and rehabilitation.

- A clear and impartial understanding of Federation road sector investments can only be obtained once budgetary allocations for maintenance, rehabilitation and new construction are uniquely specified in both federal and Kantonal accounting systems. Nevertheless, the Team's analyses suggest that road funding in the Federation is inadequate to meet even current maintenance needs of main and regional roads. It is suggested that domestic allocations for roads be so increased as to achieve a rate of approximately one percent of Federation GDP. This implies an immediate annual budget of some 60-65 million KM for the Road Directorate. Real growth in the economy would likely yield sufficient revenue streams within less than a decade to also address rehabilitation needs, thus further reducing requirements for external funding support. Any external assistance can therefore, once maintenance and rehabilitation are increasingly addressed via domestic sources, be focused on those elements of the road network where new/improved facilities are seen as being of importance to the enhanced movement of people and goods.

- It is noted that, at the present time, two events are on-going in the Federation which are of importance to this matter. The first relates to the Federation *Law on Roads*, which has been drafted in various forms (latest version dated July 2000) and is understood to have been in debate for several years. This law contains provision for the allocation of resources for road infrastructure. Speedy action on part of the Parliament is urged. The second is the recently completed EBRD-sponsored *Road User Cost Study*[20], which contains recommendations on the equitable allocation of costs to road users, as well as strategies for the funding of road infrastructure maintenance, rehabilitation, and improvement. This study is also, at time of writing, still being considered. Timely action is urged.

Within the spirit of those recommendations, it logically follows that the Road Directorate should continue to develop its road management and planning capabilities to successfully carry out a staged and technically sound approach to road system management, ideally with the support of a Road Maintenance Management System and associated database. A number of initiatives are underway, under sponsorship of the World Bank and others, to provide assistance for the support of such a venture. In this regard, the on-going privatization of road maintenance companies, as well as competitive bidding for maintenance contracts, should continue to be followed.

[20] *Road User Charges in Bosnia Herzegovina*, Emergency Transport Reconstruction Project, European Bank for Reconstruction and Development; May 2000

CHAPTER 3: RAILWAYS

3.1 INTRODUCTION

The railway system in BiH has not been functionally recovered yet from the critical war damages in terms of its infrastructures, facilities/equipment, and operational systems. Since the Dayton agreement in December 1995, the peace has been maintained and the reconstruction and rehabilitation works in the transport sector started over the entire country, however, the railway system has been left unable to meet the demands for passenger and freight transportation. As an essential transport mode incorporated into the entire intermodal transport system, the railway transport should be first rehabilitated and re-functionalized, then innovated in such a manner that the railway can be sustainably operated at a commercial basis, as a part of the European railway network. Tremendous efforts need to be made to this end.

The railway development plan should be prepared to assure more efficient and effective transport services for each Entity, between Entities and among the countries and her European neighbors. The transport strategies embedded in the master plan must concurrently contribute to recover of economy of BiH, strengthen trade relations with neighbors and other areas of Europe, and provide a base for market-oriented transport activity. Based on the above recognition, the key objectives are addressed as follows:

- To identify an urgent recovery plan of the railways in BiH; and
- To formulate a railway development plan in a phased manner towards the target year 2020 in Bosnia and Herzegovina;

3.2 DEVELOPMENT STRATEGY

3.2.1 Railway Transport Demand Forecast

(1) Railway Transport

Table 3.1 and Figure 3.1 show railway transport volume changes since 1990. Data during the war is missing.

As shown in the figure, the war gave a deathblow to the railway traffic volume. However, it should be noted that the volume dropped drastically in 1991, when Slovenia, Croatia, and Macedonia declared independence from the former Yugoslavia.

In 1990, railway freight transport volume in terms of ton-km was 4,009 million. It means that the average daily railway freight transport density per kilometer was more than 10,000 ton. This transport density was extraordinary high, because more than ten freight trains with 1,000-ton capacity were operated every day in the network on average to cope with the density. With regard to passenger transport, the average daily number of passengers per km was 3,700. This figure was considered relatively small.

Average transport length was 152 km for freight and 104 km for passenger. It can be said that the railway was used for long distance transport means both for passenger and freight transport.

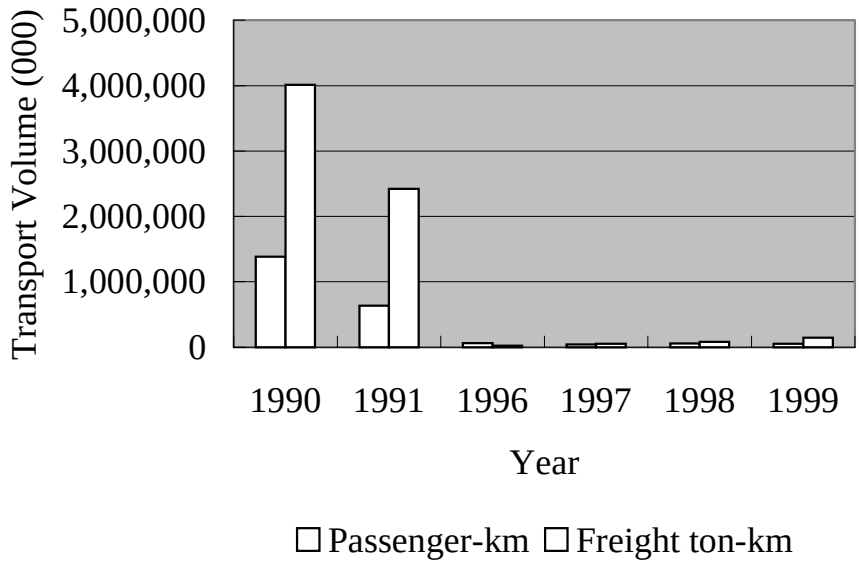


Figure 3.1 Railway Transport Volume Changes

In 1991, transport volume dropped to a half against the previous year both in passenger and freight. Average transport lengths were dropped as well to 140 km and 84 km in freight and passenger transport, respectively.

Table 3.1 Railway Transport Volumes

	1990	1991	1996	1997	1998	1999
Passenger Transport						
Number, 1000	13,171	7,527	2,878	1,476	1,751	1,481
Pax-km, 1000	1,382,000	637,000	61,189	41,873	56,616	51,104
Freight Transport						
Tons, 1000	26,253	17,307	2,521	1,905	2,870	3,247
Ton-km, 1000	4,009,000	2,424,000	24,827	48,539	85,291	146,054

Source: Federal Institute of Statistics, Institute of Statistic of Republika Srpska

After the war, the railway freight transport volume in terms of ton-km dropped to 24.8 million, which was less than 1 % of the pre-war (1990) level. Freight tons transported in 1996 was dropped to less than 10 % compared to the volume in 1990. Average transport length was also decreased to 9.8 km, which was unbelievably short for railway freight transport.

As to the passenger transport, number of passengers was decreased to 2.9 million in 1996, which was less than one fifth compared to the 1990 level. The passenger-km was decreased to less than 5 %. The average travel length of the passengers was also decreased to 21 km.

According to the latest railway transport statistics in 1999, railway passenger transport was reduced to 1.5 million in number and 51.1 million in passenger-km, which are almost a half and 15 % decrease compared to even the 1996 level, respectively.

The freight transport has been increasing since 1996 in both tons and ton-km. In 1999, freight tons and ton-km transported by the railway was 3.2 million and 146 million, which were about 30 % and about 6 times bigger compared to the 1996 level. However, the freight transport volumes were 13 % and 3 % compared to the 1990 level in terms of tons and ton-km, respectively. The average transport length was 45 km in 1999, which is considered very short as railway transport.

As a conclusion, the followings can be pointed out.

- The railway passenger transport was dropped extraordinary by the war and it has been decreasing even after the war. The average travel length of railway passenger was also very short.

- The railway freight transport was decreased drastically by the war, however, the transport volume has been increasing after the war. The average transport length has been increasing after the war, although the length is still very short as railway.

(2) Railway Freight Transport Demand Forecast

1) Basic Methodology

The railway transport facilities and rolling stocks were heavily damaged by the war. Only limited railway operation has been realized after the war. The transport volume by the railway is very small at present, because no normal railway transport service has been supplied.

Therefore, it was considered inappropriate to forecast future railway transport demand directly under this condition. Only a potential demand can be forecasted by assuming possible railway service recovery in future.

Accordingly, future freight transport demand for the railway was conducted in the following manner.

- Analysis on a relation between the past railway freight transport volume and the GDP of the industry and mining sector.
- By assuming an elasticity of railway freight transport demand against the sector GDP is 1.0 in terms of ton-km, future potential demand was forecasted.
- The railway service will be recovered to transport 40 % of potential transport demand in 2005, 70 % in 2010 and 100 % in 2020.
- The estimated future demand was verified referring to the past European experience in terms of railway modal share in the transport market.

2) Railway Transport Demand Forecast

Table 3.2 and Figure 3.2 show the future railway freight transport demand forecast results.

In 2010, the railway freight transport demand will be 2,049 million ton-km, which is as about a half of the transport volume as in 1990. The demand will be 4,437 million ton-km in 2020, which is about 10 % bigger than the 1990 level.

Table 3.2 Railway Freight Transport Demand Forecast

	1990	2000	2005	2010	2020
GDP of Industry and Mining Sector (Million KM, 2000 price)					
	5,100	1,922	2,795	3,723	5,644
Railway Freight Transport Demand (Million ton-km)					
Potential Demand	4,009	1,511	2,197	2,927	4,437
Realization Ratio	-	-	40%	70%	100%
Possible Transport Demand	-	-	879	2,049	4,437

Note: GDP growth of the industry and mining sector was assumed as as same as the countries GDP until 2005. After 2005, growth rates of 5.9%, 4.4% and 4.1% was assumed to 2010, 2015 and 2020 respectively.

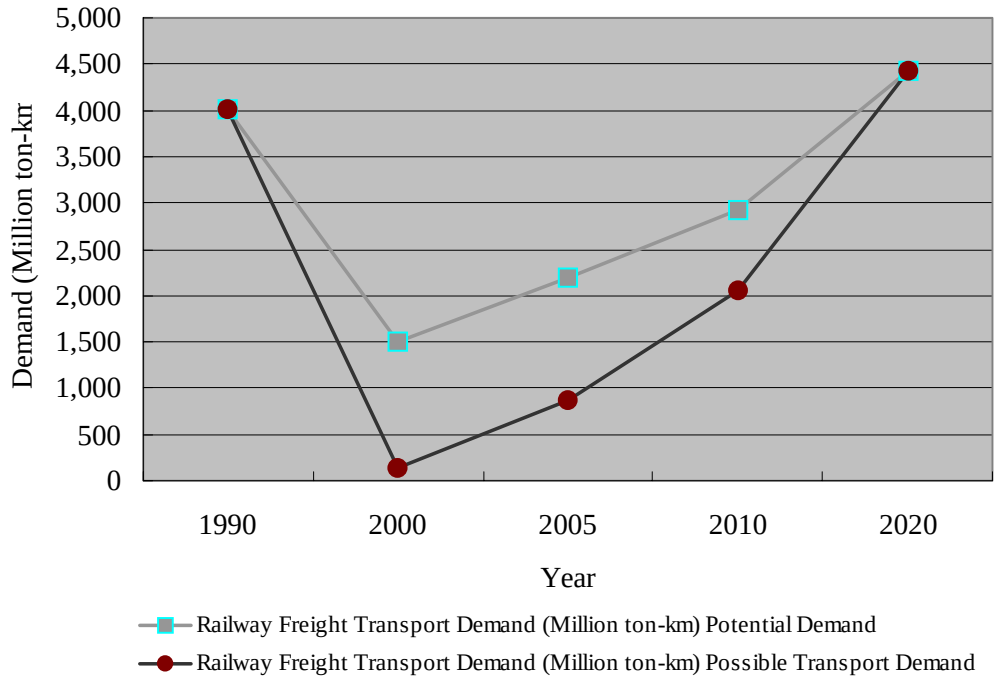


Figure 3.2 Future Railway Freight Transport Demand

(3) Railway Passenger Transport Demand Forecast

1) Basic Methodology

With regard to passenger transport, transport volume of the railway was not big in BiH compared to the freight transport as described before. The basic methodology for the railway passenger transport demand forecast is not similar to the freight transport, because the passenger transport demand is not depend on GDP growth only.

Therefore, the study team made assumption for the railway passenger transport demand forecast as follows.

- Railway passenger demand would recover to the 1990 level in 2020, if appropriate improvement of the railway service were made.
- In 2005 and 2010, recovery ratio would be 40 % and 70 % respectively.

2) Future Railway Transport Demand Forecast

Table 3.3 and Figure 3.3 show the forecast results of future railway passenger transport.

Table 3.3 Future Railway Passenger Transport Demand

	1990	2000	2005	2010	2020
Railway Passenger Transport Demand (Million pax-km)					
Potential Demand	1,382	51	1,382	1,382	1,382
Realization Ratio	-	-	40%	70%	100%
Possible Transport Demand	1,382	51	553	967	1,382

Note: Railway passenger-km in 2000 represents the number in 1999.

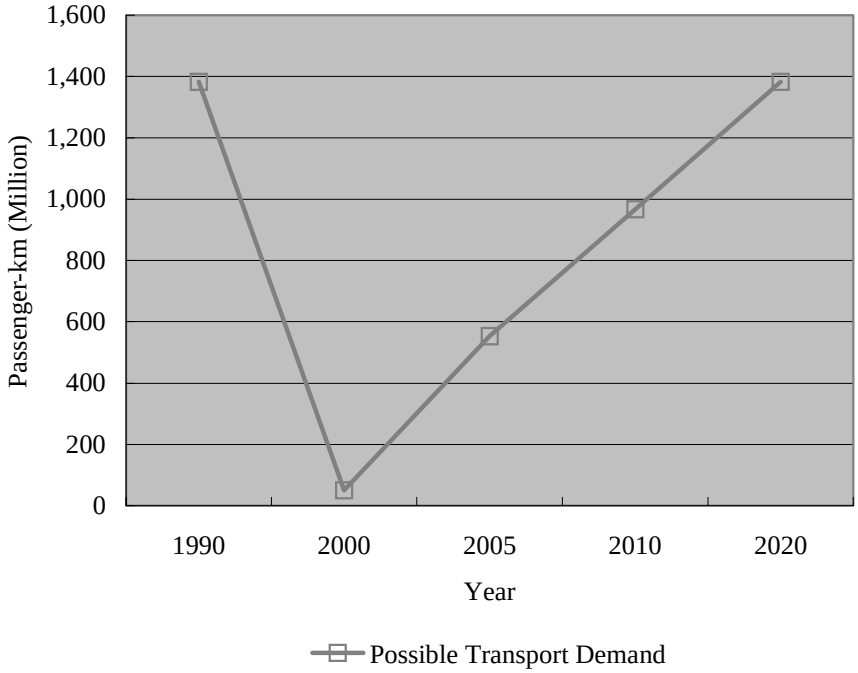


Figure 3.3 Future Railway Passenger Transport Demand

3.2.2 Development Strategy

The railway transport plan was formulated with the following basic planning views:

- The railway plan should contribute to recover an efficient economic structure of BiH, thereby strengthening economic relations with customers in and around BiH.
- Development and strengthening of transport network linkages with EU countries will be fundamental, because BiH will be, in the long run, integrated with the international as well as the European economy
- The railway operation system shall be restructured in the medium-term to be competitive in the market-oriented economy.
- Viewing the longer-term beyond the target year 2020, the railway activities and its traffic demands are influenced more greatly by the European economy. At the

same time, the operational system of the railways shall be further technically modernized so as to meet the European standards and norms.

Meanwhile, the international donor organizations are now contributing to reconstruction efforts in BiH. Currently, a number of projects are being implemented under the Emergency Transport Reconstruction Program. Continuity, consistency, and coherence with these committed and/or on-going projects should be kept in the railway plan.

Moreover, the existing plans proposed by both Entities and by Railway Public Corporation (BHZJK) shall be taken into account by the Study Team to establish the railway plan for BiH through facilitating constructive discussions with the concerned organizations.

3.3 DEVELOPMENT PLAN

3.3.1 Overall Railway Development Plan

At present, several projects such as the reconstruction of signal and telecommunication, the reconstruction of Samac Bridge and the reconstruction of catenary system are on-going by international organizations as a part of the ETRP.

Railway plan recommended by JICA Study Team has the concept that railway system in BiH will be rehabilitated / reconstructed and sustainably operated at a commercial basis, aiming at a part of European railway network.

Railway plan is established based on the phased implementation schedule with the step-wise target for recovery of railway operation to the condition before the war, then strengthening to UIC standard, and innovation of railway system.

Railway recovery schedule comprises three phases:

- Phase 1 (up to 2005) is recognized as the “normalization period” aiming at facility recovery to the condition before the war,
- Phase 2 (2006 to 2010) is regarded as the “transportation recovery period” aiming at transportation recovery to the condition before the war, and
- Phase 3 (2011 to 2020) is conceptualized as the “functionally strengthening period” including railway system innovation aiming at the commercial operation as a part of European railway network.

Figure 3.4 and Table 3.4 show the overall railway development projects, respectively.

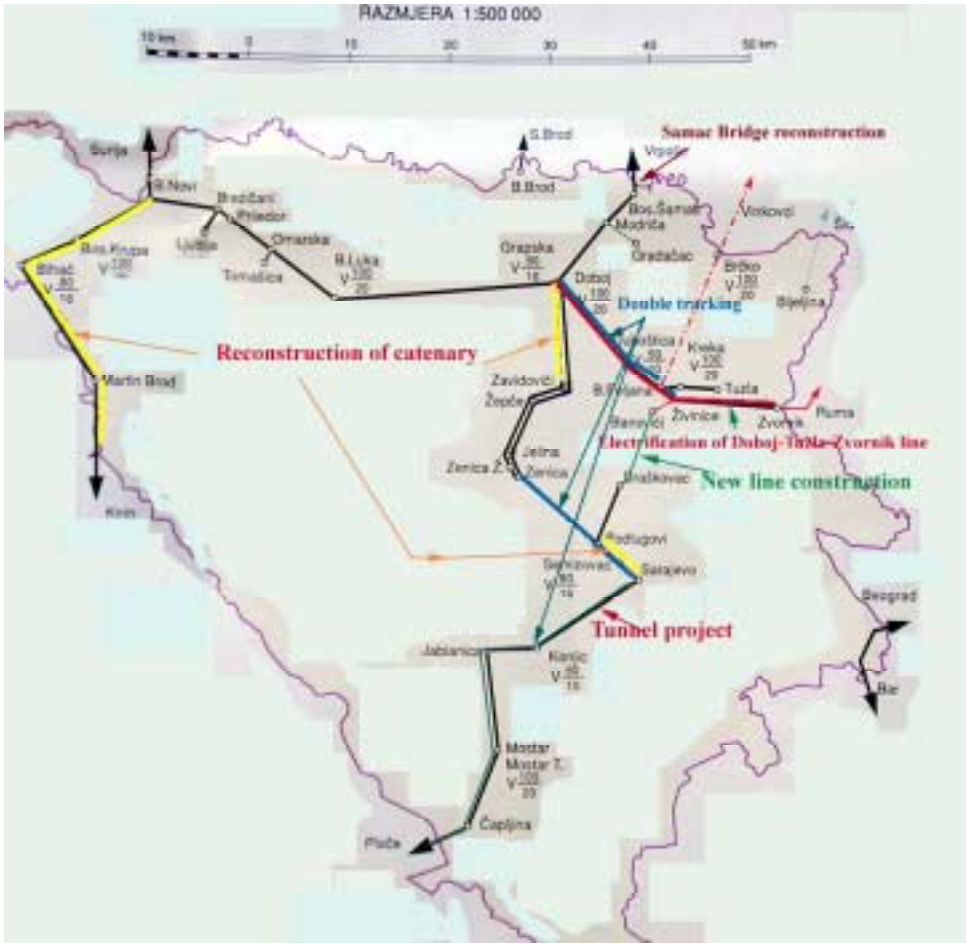


Figure 3.4 Map of Projects of Railways in BiH

Table 3.4 Railway Projects in BiH

	Items	Construction Cost in US 000 000 $	Feasibility	Period
1	Electrification			
1)	Electrification of Doboj-Tuzla-Zvornik line	12	A	2003-2005
2)	Electrification of Tuzla-Brcko line	9	B	2010-2020
3)	Reconstruction of electrification system of Bos. Novi/Novi Grad-Bihac-Knin line	2.5	A	2003-2005
2	IT system	100	A	2003-2010
3	Introduction of pendulum train			
1)	130 km/h		A	2005-2010
2)	160 km/h		B	2010-2015
4	Curvature improvement		A	2010-2015-
5	Recovering 6 destroyed stations	2	A	-2003
6	Double tracking project			
1)	Zenica-Sarajevo	200	A	2010-2020
2)	Sarajevo-Capljina including tunnel 35km long	875	B	2020-
3)	Doboj-Tuzla	300	C	2020-
7	Tunnel project			
1)	Blazuj-Konjic 35 km double track	500	A	2015-2020-
2)	Banovic-Vares	250	C	2020-
8	International corridor			
1)	Master Plan formation	1	B	2003-2005
2)	Completion of 6 border stations	6	A	2003-2007
3)	Adriatic coast line			2020-
4)	Completing "West - East line" parallel to Corridor 10			2001 - 2010

Note: 6. 1) Construction period of Blazuj - Konjic tunnel project will be replaced by 2005-20
, if Olympic Games 2010 are organized.

Note: Rank A project is admitted essential as for international corridor.
Rank B project is considered important but its profitability should be checked.
Rank C project is doubtful for realization.

3.3.2 Major Railway Projects along Corridor Vc and Parallel to X

Major projects along the Corridor Vc and the line parallel to Corridor X are shown in Table 3.5.

(1) Major Projects along Railway Line Parallel to Corridor X

- Electrification between Doboj and Zvornik
- Innovation of signal and communication system
- Safety system recovery at level crossings

Enforcement of track maintenance machine

- Enforcement of rolling stock maintenance equipment

- Introduction of 160km/h train operation
- Double track project between Doboj and Tuzla (B. Poljana)
- Border stations

(2) Major Projects along Vc Corridor Line Electrification between Doboj and Zvornik

- Innovation of signal and communication system
- Introduction track maintenance machines
- Modernization of catenary maintenance system
- Recover the facilities of Rajlovac central workshop
- Safety system at level crossings
- Double track project between Zenica and Sarajevo
- Double track project between Sarajevo and Capljina
- Tunnel project between Blazuj and Konjc
- Introduction of 160km/h train operation and improvement of curvatures
- To recover the destroyed stations
- Border stations

Table 3.5 Major Projects along Corridor Vc and Parallel to X

No .	Pro j ect	Line Croatia Border-Doboj -Sarajevo-Mostar-Croatia		
		ZBH (10^3 EUR)	Border RS (10^3 EUR)	Total (10^3 EUR)
1	Border railwa station Samac			1,650
2	Border railway station Capljina	1,000		1,000
3	Reconstruction of tunnel of Jedrinje	1,500		1,500
4	Station signalling system on the line Samac-Capljina	10,700	5,000	15,700
5	Power traction remote control on the line Samac-Capljina	1,800	200	2,000
6	Traffic remote control on the line Samac-Capljina	1,250	250	1,500
7	Communication system on the line Samac-Capljina	7,190	1,410	8,600
8	Information system on the line Samac-Capljina	1,437	363	1,800
9	Equipment for infrastructure maintenance on the line Samac-Capljina	5,500		5,500
	Total :	**30,377**	**8,873**	**39,250**

No .	Project	Line Croatia Border-Banja Luka-Doboj-Tuzla-Serbia		
		ZBH (10^3 EUR)	Border RS (10^3 EUR)	Total (10^3 EUR)
1	Border railway station Dobrljin		1,000	1,000
2	Border railway station Zvornik		1,000	1,000
3	Power traction remote control on the line Doboj-Novi Grad		600	600
4	Communication system on the line Dobrljin-Zvornik	1,580	6,520	8,100
5	Information system on the line Dobrljin-Zvornik	351	1,449	1,800
6	Equipment for infrastructure maintenance on the line Dobrljin-Zvornik		4,830	4,830
	Total:	**1,931**	**15,399**	**17,330**
	Grand Total:	**32,308**	**24,272**	**56,580**

CHAPTER 4: AIR TRANSPORT

4.1 INTRODUCTION

This air transport sector plan was made for the Federation of Bosnia and Herzegovina, Bosnia and Herzegovina, based on the Transport Master Plan. This sector plan contains infrastructure plan, operational plan (navigation services), and priority projects.

4.2 DEVELOPMENT STRATEGY

4.2.1 Future Air Transport Demand

The study team referred to some existing air transport forecasts for Central Europe and examined past trends in BiH. The study team analyzed airfare elasticity and relation between air transport demand and per capita GDP.

Our estimation is then that the total volume of air passenger traffic, in the year 2020, will be approximately 1.4m. This is four times higher than existing flows. This total volume must then be broken down for individual airports.

Air transport demand in 2020 is summarized in Table 4.1.

Table 4.1 Annual Air Transport Demand in 2020

	Passenger		Cargo	
Airport	Low estimate	High estimate	Low estimate(tons)	High estimate(tons)
Sarajevo	660,000	1,000,000	5,000	28,750
Mostar	100,000	150,000	1,800	3,250
Tuzla	100,000	150,000	7,500	43,000

4.2.2 Development Strategy

Earlier investigations indicate that most of the airports have sufficient capacity, after some moderate improvements, to cater for these volumes, although some additional

investment may well be required, towards the latter part of the master plan time horizon, particularly at Sarajevo airport.

The major observation from site investigations is that the main infrastructural elements are now in place. However, moderate investments would increase the operational capacity of airports and improve safety, which is of utmost importance. These limited improvements concern, primarily, navigational aids and, for example, the provision of an aircraft apron at Tuzla to increase its operational capacity.

The overall infrastructure development in the air transport sector needs to be liked with substantial improvements in other transport sectors. This will improve airport accessibility. At the same time, it ensures that there will be less demand for domestic air services.

Infrastructure plans have been drawn up for the three main airports in FBiH separately (Sarajevo, Mostar and Tuzla) as each airport is primarily operating independently. An indicative implementation timeframe has been given for each component to ensure timely compliance with: 1) safety and security issues to international standards; 2) conformity with international service standards; and 3) traffic demand growth. The subject of smaller airports and training requirements are also addressed. Investment components are summarized at the end.

4.3 DEVELOPMENT PLAN

4.3.1 Infrastructure Plan

(1) Sarajevo Airport

The master plan, produced by Italian Consultant S.E.A. Aeroporti di Milano, related to the ultimate runway capacity up to year 2020, has been found extremely relevant. As the runway capacity is the most limiting factor in the development of Sarajevo Airport (due to meteorological and geographic conditions at this particular site), the study indicates clearly and convincingly that with adequate operational measures and minor technical improvements to the taxiway configuration, the runway capacity can accommodate the projected passenger and cargo flows.

It is expected that there will be imminent completion of a number of on-going projects at the airport. Those include rehabilitation of new terminal building plus airside car park, rehabilitation of cargo building, completion of control tower and equipment supply, completion of airfield lighting installation, completion of supporting technical facilities such as a boiler house. These on-going components, as of 2000, are not included in this infrastructure plan.

The infrastructure plan has taken account of the Master plan Report of S.A.E. Aeroporti di Milano of January 1999 with full details on facility sizings.

(2) Mostar Airport

Mostar Airport should presently be able to cope with approximately 150,000 passengers. The basic infrastructure has been in place; so in principle the short-term traffic flows should be accommodated without major constraints.

As soon as new traffic trends become visible (preferably through hard facts i.e. number of passengers, aircraft movements, eventually cargo etc. counted during at least three consecutive years), actual traffic forecasts should be made. Charter flights movements for a tourism purpose will be further accommodated.

Although the airside infrastructure (runway, taxiway, navigational and lighting aids) has adequate capacity to deal with even the long-term traffic flows, the terminal building would need to be further developed while cope with increased traffic flows

The extent and nature of above named facilities (i.e. terminal building, cargo building, commercial and parking areas) are prime targets for private investment and should therefore be implemented through public-private partnership. This will ensure timely accommodation of the increased traffic flows.

Some genuine requirements would still need to be satisfied during the development process described above: airport safety and security.

(3) Tuzla Airport

The existing basic airport infrastructures, including civil and building infrastructure, with the exception of a proper apron and minimum cargo building at Tuzla Airport, is generally adequate for passenger flows up to 150,000 per annum, referring to the size of the new terminal building of 900m^2, and the peak hour design capacity of 120 passengers/hr; also, up to 50,000 aircraft movements.

Implementation of missing elements in the basic infrastructure set up, such as an apron area, a minimum cargo building, an access road, and improvement of safety and security standards to international standards, is considered as a pre-requisite to stimulate further air traffic growth (passenger and cargo).

Facility capacities have been taken from the preliminary Master plan studies carried out by IPSA in April 1999 and from the Sarajevo Master plan for the cargo building sizing.

4.3.2 Training/Licensing/Certification

(1) Training

With respect to the procurement of any airport equipment, adequate on-the-job and factory training needs to be included in any procurement contract. Said training will primarily focus on operational and maintenance aspects.

(2) Training and Certification

With respect to CFR services additional "formal" training is required to ensure CFR staff is certified to international standards. This type of formal training to be carried out through established international training centers outside BiH (such as ICAO Civil Aviation Training Schools, FAA training centers, Singapore Aviation School, etc).

(3) Training and Licensing

With respect to ANS services, reference is made to the next Section 4.3.3.

All these training/certification/licensing projects need to be addressed in the short term to meet international safety and security standards as soon as practicable.

4.3.3 Operational Aspects

With respect to the air navigation services for Bosnia Herzegovina, reference is made to the summary of discussions of the Second ICAO Meeting on Air Navigation Services for Bosnia and Herzegovina of 13 and 14 September 2000. The meeting was attended by all parties concerned i.e. the BiHDCA, the Croatian Civil Aviation, the Federal Republic of Yugoslavia Civil Aviation, EUROCONTROL, IATA, ICAO, OHR, SFOR.

A government-own airline company currently provides air transport service in FBiH, namely Air Bosnia. It is the fact that the air transport business has been internationally competitive under the open air policy in Europe. This will be the case in BiH, being involved in such a competitive market, hence, a more economically efficient operation model should be explored to restructure the exiting airline companies, facilitating a privatization scheme in the short-term.

Domestic air services between major cities such as Sarajevo, Tuzla and Mostar as well as short-haul international flight services to connect major cities in neighboring countries will be further demanded along with the economic recovery. The air operators need to be sensitive to such business and market environment.

4.3.4 Financing

The infrastructure development plans, as outlined in the previous sections, are hinged on the following three components:

- Improving of safety and security to meet international standards (ICAO/FAA/IATA etc);

- Setting up of the basic airport infrastructure to create an environment which will stimulate further demand and growth;

- Increasing of operational capacity; this is fully based on demand and commercially driven; development to take place in a modular approach to cope with increased traffic flows as and when these take place

For the first component, which is of urgently importance, external funding through donation, soft loan, etc. is definitely required, as no funds are available within BiHDCA and the State Ministry for the time being. In the medium- to long-term, it is expected that the maintaining safety and security standards should be covered by the increasing aeronautical revenues.

For the second component, external funding is also required to cover the massive financial needs. Since these investments are basically a cost-recovery type of projects, some concessional soft loans from external aid organizations should be provided, based on feasibility studies.

For the third component, an increase of operational capacity, after the minimum basic set-up is in place, should become the responsibility of each airport, assuming that public and private partnerships are created to manage and operate commercially driven and independent airport businesses. Private funding will then be required, in association with the public funding. International technical and financial assistance programs are also required to facilitate such an innovative initiative.

Needless to say, aid coordination among relevant international donors is significantly important for the sake of bearing integrated and efficient benefits.

4.4 PRIORITY PROJECTS

The project components which need to be addressed in the short-term (2000-2005) to meet the ICAO standards with respect to **safety and security** as soon as practicable and to ensure future international demand and growth of traffic have been labeled as priority projects.

With respect to the general aviation, all project components have been labeled as priority projects to meet **adequate general aviation operations** and to stimulate further general aviation growth. However, the precise number of smaller airports to be developed has not yet been verified. A feasibility study for such purpose has been included in the list of priority projects.

With respect to **ANS services and training requirements**, all project components have been noted as priority projects as they affect directly the safety and security standards at the airports. A specific list of these projects with cost estimates is presented herewith by airport. Indications for the ANS Services and training projects are given thereafter.

For the preparation of the **intermediate airspace traffic control system**, it has been committed that after the delegation to the third party (by the year 2005), one ATS unit is

to be established in BiH. In order to make the devolution technically smooth, the project of the station with one single ATS unit is also taken into account as the priority project.

The summary of priority projects with indicative cost estimates is tabulated as shown in Tables 4.2 through 4.6.

Individual priority project sheets have been prepared and can be found in Appendices in Volume I. These sheets summarize each priority project: identification of project, description, objective, cost, implementation time, dependency from other activities, etc

4.4.1 Priority Investment Projects at Main Airports

Table 4.2 Establishment of One ATS Unit for Intermediate Space Control

Project Components	Indicative Cost (Mill. KM, at 2000 prices)
Purchase of Secondary Radar, range app. 200 NM (SSR) with necessary equipment	43.0
Construction of physical facilities with necessary equipment	5.1
Provision of Technical Training of the Staff	4.2
Total	**52.3**

Source: BiHTMAP

Table 4.3 Priority Investment Projects, Sarajevo Airport

Project Components	Indicative Cost (Mill. KM, at 2000 prices)
Acquisition of land in accordance with master plan development	not costed
Construction of runway strip	0.6
Construction of new perimeter fence with emergency exits and intruder detection system	3.5
Construction of new perimeter and operational access roads	1.7
Widening/reconstruction of connecting taxiways "C" and "B" including fillets to suit class 4D aircraft	1.2
Construction of by pass exit at runway end 30	1.7
Relocation of fuel farm (preparation of new area)	1.7
Relocation and reconstruction of fire fighting building, re-equipment of CFR (minimal fire tender building: 2.9 m. KM; one fire tender: 1.4 m. KM)	4.3
Preparation for solid waste disposal and water treatment plants	1.2
Installation of radar for terminal (SSR)	5.8
Total	**22.0**

Source: BiHTMAP

Note: Cost estimates, for Sarajevo Airport, have been derived from the Master Plan Report based on US$1=KM2.32 (full details to be found in the Final Master Plan Report of S.E.A. Aeroporti di Milano)

Table 4.4 Priority Investment Projects, Mostar Airport

Project Components	Indicative Cost (Mill. KM, at 2000 prices)
Improvement of Safety and Security to meet the ICAO Standard	
Installation of MLS system or GPS System in lieu of ILS. Estimate based on equivalent ILS systems at other airports.	6.0
Construction of CFR building and re-equipment (only if SFOR equipment is not transferred)	3.5
Maintenance facilities and equipment (only if SFOR equipment is not transferred)	2.5
Total	**12.0**

Source: BiHTMAP

Table 4.5 Priority Investment Projects, Tuzla Airport

Project Components	Indicative Cost (Mill. KM, at 2000 prices)
Improvement of Safety and Security to meet the ICAO Standard	**15.5**
Installation of ILS system (only if SFOR equipment is not transferred)	5.0
Construction of CFR building and re-equipment (only if SFOR equipment is not transferred)	3.5
Maintenance facilities and equipment (only if SFOR equipment is not transferred)	2.5
Construction of new ATC tower and installation of equipment (only if SFOR equipment is not transferred)	4.5
Airport Facility Development	**3.5**
Construction of concrete apron area of 11,000 m^2	3.0
Construction of cargo building of 250m^2	0.5
Total	**19.0**

Source: BiHTMAP

Note: Facility capacities and cost estimates have for the proposed concrete apron area and the cargo building at Tuzla airport have been taken from the preliminary Master plan studies carried out by IPSA in April 1999 and unit costs available from Sarajevo Airport Master plan.

Table 4.6 Priority Investment Projects, Small Aerodromes

Project Components	Indicative Cost (Mill. KM, at 2000 prices)
Urgent minimum needs for improvement of "Safety and Security" for Selected Strategic Aerodromes	5.0
Feasibility Study *	0.5
Total	**5.5**

Source: BiHTMAP

Notes: A number of selected aerodromes need to be studied in terms of functions to be enhanced and improvement needs in the entire aviation network system for BiH, taking into account Bihac (Zeljave) and Visoko in FBiH.

4.4.2 Other Projects

Implementation of ANS recommendations should be facilitated. Costs being prepared by ICAO at present time have no details available yet. However, a sum of 7.5m KM is allocated to cover training for air navigation services staff, meteorological staff and for management.

CFR training needs to be conducted. An indicative cost of 1.5 million KM (assuming 40 trainees over 5 year, 3 months training per trainee) is estimated for the urgent project.

CHAPTER 5: WATERWAY TRANSPORT

5.1 INTRODUCTION

Before 1990, the rivers in Bosnia Herzegovina had an important commercial, social, and recreational function. In particular the river Sava, via the Danube River, constituted an efficient link to the international industrial and economic network. For the last decade, the rivers have no longer been used for commercial traffic. Maintenance and quality improvements were absent and the entire waterway network declined and lost its commercial functionality. The objective of this chapter is to revitalize the declined transport systems, including the waterway network taking into account its commercial and social functionality.

5.2 DEVELOPMENT STRATEGY

5.2.1 Demand Forecast for Waterway Transport for Sava River

Several basic assumptions have been made for the forecast. The assumptions are:

- The status of the river Sava is clarified,
- Sava river becomes an international river,
- The ports of Brcko and Samac are operational (minimum start-up investments are realized),
- The minimum navigation channel for Sava river is dredged, and
- There will be economic recovery of the industries that used waterway transport before 1990 and that these industries use this transport mode as soon as the basic infrastructure becomes available.
- Transport activities will resume in 2002,

- Modal split equals 1.3% of total road traffic (average modal split for river transport share),

Based on above assumptions and various waterway transport studies in Europe, the total volume of waterway transport forecast on Sava River is shown in Figure 5.1.

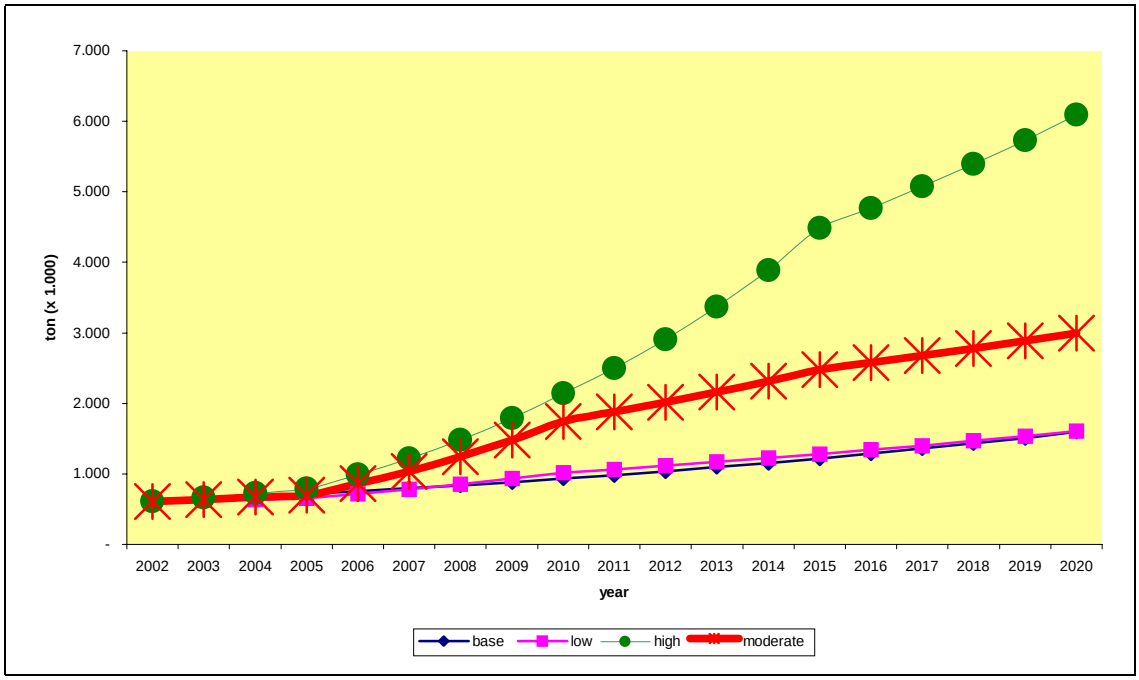


Figure 5.1 Traffic Forecast: Total Traffic on Sava River: All Scenarios

According to the results visualized in the figure below, the high growth scenario would generate over 6 million tons of traffic on river Sava. Although this number is feasible, it requires full industrial growth, in particular in the sectors that will use river transport for an important share of their transport needs. The Base scenario shows around 1.1 million tons of traffic in 2020.

5.2.2 Development Strategy

The first priority is the completion of the emergency reconstruction program for the river Sava and the port of Brcko. Future developments will be determined by industrial development and commercial transport needs. Privatization of port activities is the logical future path and is similar to the European evolution. However, creating sustainability in the river transport sector cannot fully be transferred to the private sector. The public sector will continue to play an important role. Public authorities will guarantee sustainability in the sector via:

- Further dredging of Sava river to EU standards,

- Maintenance of the river banks and signaling systems, and

- Controlling and rationalizing transport infrastructure investments.

While the two first tasks are straight forwards, controlling and rationalizing transport infrastructure investments are a more complicated public responsibility.

Although the development of river transport in BiH concentrates on the commercial use of the Sava River, other waterway infrastructure is also available in Bosnia and Herzegovina. This infrastructure has no direct short-term potential for developing large-scale commercial transport by river, but its future economic value should not be underestimated. In particular the lakes and the stretch along the Adriatic coast (the region of Neum) could be valuable for the development of local transport of passengers and goods and for stimulating tourism and recreation.

Integrating lakes and smaller river in the waterway transport system

Studies on the hydrological and morphological characteristics of the waterways in BiH have demonstrated that it is technically possible to expand the waterway network along the following rivers:

- NERETVA from Gabela to Mostar 43 rkm;
- DRINA from the mouth up to Zvornik 90 rkm;
- BOSNA from the mouth up to Doboj 72 rkm;
- VRBAS from the mouth up to Banja Luka 60 rkm;
- UNA from the mouth up to Bosanski Novi 73 rkm;

Substantial (financial) efforts are however necessary to expand commercial river transport to these waterways in Bosnia and Herzegovina. If economic and industrial conditions require upgrading these rivers, it will be the responsibility of the public authorities to provide the initial investments (dredging, etc.), but the private sector will have to develop transport on these rivers.

Given the present status of the economy in BiH, the timeframe for the development of the other rivers for important commercial transport is unclear.

This does not mean that the rivers and lakes cannot be used. On the contrary, the lakes and several stretches of the rivers can be used for transporting goods and passengers in a local context. The potential of it should be assessed on a project-by-project basis.

Water recreation and tourism

BiH has several lakes of which the most important ones are: Modrac, Jablanica, Salakovac, Grabovica, Hutovo Blato, Husko and Pliva. Before 1990, these lakes had an important recreational function. Furthermore, BiH has a 24 km coastal line along the

Adriatic Sea near the city of Neum that offers interesting opportunities for tourism and recreation development.

At present, most of this potential is not validated in spite the fact that the necessary public investments to stimulate private sector initiatives are relatively low, in particular in Neum and surroundings.

Several high quality hotels are located in the city of Neum. The condition of the road system in the region is very good and there is a quay that would enable river transport of tourists coming, e.g., from Dubrovnik on a day-trip. This quay is also interesting for the commercialism sight seeing trips along the islands and coastline near Neum. In that context, public authorities in BiH (in particular in Neum) could cooperate with Croatian responsible authorities (in particular the Dubrovnik city council) to formulate a joint strategy for tourism development in the region. This joint initiative should efficiently promote the region and facilitate private investments in tourism-related activities.

The lakes in BiH, finally offer possibilities for recreation and tourism development. Again, the initiative should be taken by the private sector, while public authorities need to act as "facilitator" for these initiatives. Contrary to the Adriatic Coast, access roads to several of these lakes are in a poor condition or go through industrial zones and there is insufficient signalization towards the lakesides and tourist centers. The relevant public authorities should therefore take action to improve access conditions and to upgrade lakeside facilities, therewith making the lakes more attractive for tourists and stimulating private investors to invest in tourism and recreation development.

5.3 DEVELOPMENT PLAN

5.3.1 Infrastructure Plan

The waterway transport development plan consists of three phases considering transport integration and intermodality.

Phase 1 the completion of the emergency reconstruction program, while Phase 2 and phase 3 are focusing on the intermodal integration of the river transport system.

Phase 1:

Urgent reconstruction of the port of Brcko and the rehabilitation of the river are urgent reconstruction projects to enable the future development of river transport in BiH. The emergency projects should be fully completed in 2005.

At that time, a minimum navigation channel of class III should be available from the border over Brcko to Samac and both ports should be fully operational. The rest of the river should be accessible for class II vessels and, depending upon private initiatives.

The further development of river transport is related to the economic and industrial development that will determine the future need for river transport as a part of the total transport offer.

Phase 2 includes:

- **Stabilization of Sava river accessibility**
  - Further dredging of the Sava river (class IV from border to Samac)
  - Hydraulic engineering to avoid further silting of the river
  - River bank improvements

- **Further development of the ports**
  - Improvement of road and rail access to the port of Brcko
- **Development of the region of Neum**
  - Promote tourism development in the region
  - Establishment of ferry services, tourism on the sea, commercial fishing and other initiatives

Phase 3 includes:

- **Stabilization of Sava river accessibility**
  - Maintenance dredging of the Sava river
  - Hydraulic maintenance
  - River bank maintenance

- **Integration of river transport**
  - Intermodal platform Brcko

The objective of the latter two phases is to gradually integrate river transport in the entire transport system of BiH; the concept is demonstrated in next figure. The integration is necessary to achieve sustainability of river transport. At the same time, transport integration will benefit the other transport modes and improve the entire transport system of Bosnia and Herzegovina. Figure 5.2 shows a conceptual approach of the river transport integration.

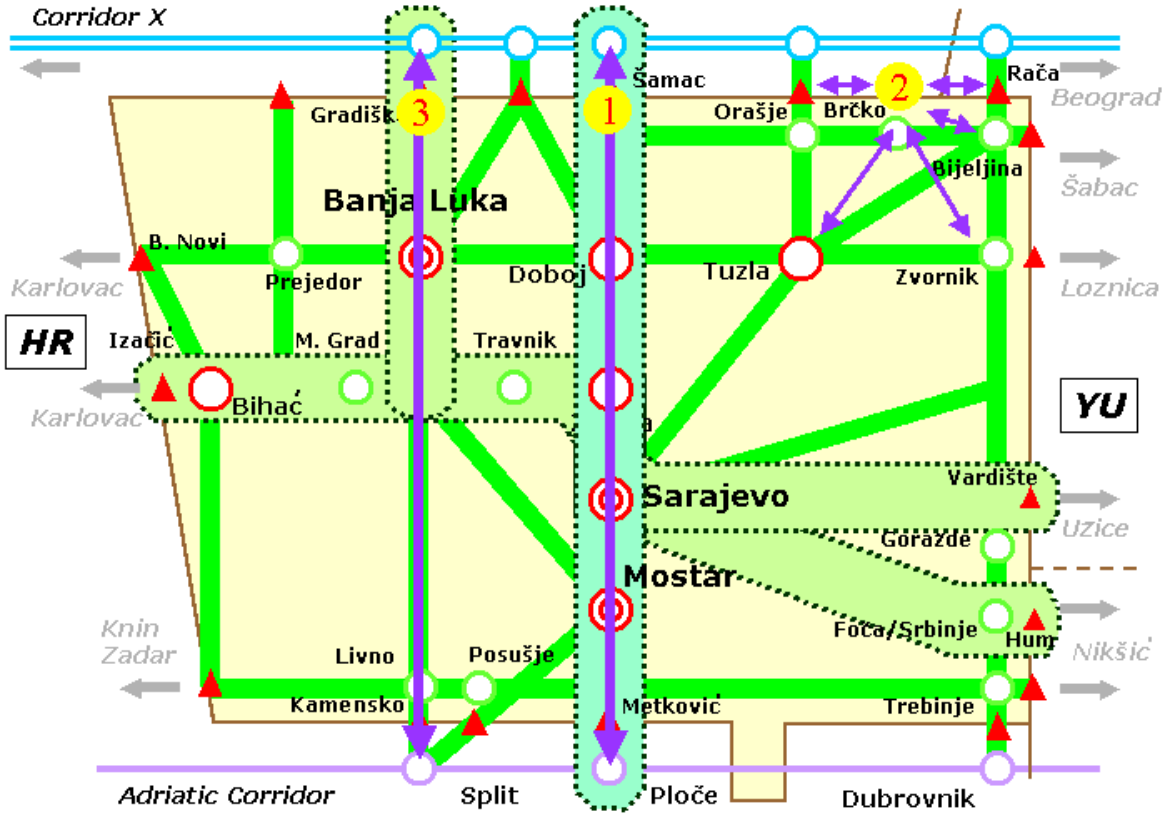


Figure 5.2 River Transport Integration: Conceptual Approach

5.3.2 Operational Aspects

Prior to operational aspects, regulatory framework was examined, because it is a critical point for the operation.

(1) Regulatory Framework

a. High Priority Initiatives

- Ratification of the Protocol on Sava River and inclusion of Yugoslavia in the process,
- Establishment of the Waterways and Ports Public Corporation to co-ordinate initiatives from both entities, and
- Preparation of the international status of Sava River.

b. Priority Initiatives

- Realization of international status of Sava River,

- Organization of a Sava River Management Board to co-ordinate future development initiatives, and
- Collaboration of Sava River Management Board with the Danube Commission.

c. Sustainability Initiatives

- Standardization of regulations on Sava river transport and management,
- EU integration by meeting international standards on river transport, and
- Integration of Sava River Management Board within the Danube Commission structure and accession to Danube / waterway promotion.

It is clear that coherent regulations for navigation on the Sava River are a priority condition for the near future. This will need co-operation at different levels (inter- and intra-entity level, tri-country level and international level).

(2) Operational Framework

Transport infrastructure is needed for the benefit of the industry and of the population. However, the interests of both groups are not always converging. Therefore, the only possible way for public authorities to respond to the problem is by approaching the transport problem from an *integrated network approach,* in which the river transport must not be regarded as a competing alternative to road transport, but as a separate component in its own right of an integrated (intermodal) transport network.

The ultimate goal of public authorities should be to satisfy as much as possible private and industrial needs and create a sustainable balance between economic and societal objectives.

This balance can be achieved via:

- The integration of private investors in transport infrastructure development (public private partnerships);
- The rationalization of transport infrastructure investments on the basis of the return of investment (RoI), either socio-economic, economic or financial; and
- The need for expertise to guarantee the sustainability of the operational framework.

5.3.3 Financing

The participation by the government is important in all phases of the project lifecycle. The conditions imposed by government and the engagements required from the private partner are clearly defined and constitute a full part of the project. This agreement also

includes punitive damages in case the private partner does not meet the agreed upon condition.

The approach of the government is straightforward. If a project is interesting, the AWZ (Administration Waterways and See transport of the Department of Infrastructure and the Environment) develops the infrastructure and invites the private partner to exploit this infrastructure under strict conditions during a fixed period of time.

The general conditions for the private partners are:

- Participate 20 % in the development of the infrastructure without becoming owner of the infrastructure;
- Develop the site in purchasing equipment and construct the superstructure;
- Maintain the site during the concession period;
- To pay an annual concession fee; and
- To guarantee a minimum level of performance / volume or to pay punitive damages if these volumes are not met.

5.4 PRIORITY PROJECTS

5.4.1 Navigation Channel on the River Sava

The rehabilitation of the navigation channel on the Sava River is one of the most important urgent reconstruction projects. Without a navigable channel, all investments in the port of Brcko and other locations are futile because they will remain inaccessible for river traffic.

Reconstruction of a minimum navigation channel includes three elements:

- De-mining of navigation channel, port and terminal access and river banks where necessary,
- Debris removal in navigation channel, port and terminal access and river banks where necessary,
- Dredging of minimum navigation channel.

The de-mining of river Sava needs coordination and cooperation with MAC, SFOR and the entity and regional public authorities. A detailed survey is necessary to estimate the total number of mines on the riverbanks and around the signaling systems.

Table 5.1 Estimated Cost for De-mining

Location	# mines	Costs (KM)	Estimate made by
Samac	20,000	100,000	IMG
Brcko	8,000	40,000	IMG
Brod Refinery	10,000	50,000	Various / Industry
River + banks	50,000	250,000	Estimate BiHTMAP
Total	88,000	550,000	(Including survey costs)

Table 5.2 Estimated Dredging Costs

Source of cost estimate	*Cost per m^3*	*Total cost for dredging*
European Dredging Association	4 KM	3,960,000 KM
IMG	6 KM	5,940,000 KM
Captaincy / Industry	10 KM	9,900,000 KM

Urgent rehabilitation port of Brcko

5.4.2 Rehabilitation of Brcko Port

Table 5.3 Urgent Rehabilitation Costs Port of Brcko

Item	Quantity	Total cost (KM)
Mine clearance (port area)	10,000	50,000
Cranes (new, min 5 ton)	1	3,000,000
Crane rail track and supply (repairs)	1	25,000
Transformer station rehabilitation	1	200,000
Rehabilitation (sloped quay)	1	150,000
Rehabilitation (vertical quay)	1	1,000,000
Port railway track repair	1	150,000
Port road repairs (+ new stretch)	1	65,000
Engineering study costs	1	450,000
TOTAL COSTS		**5,090,000**

CHAPTER 6: PRE-FEASIBILITY STUDY ON ROAD IMPROVEMENT PROJECT (SARAJEVO - MOSTAR)

6.1 PROJECT DESCRIPTION

6.1.1 Development Alternatives

The existing road link between Sarajevo and Mostar is the hilliest section on E-73, which is the existing route for Corridor Vc. As the development of a full motorway-class facility for Corridor Vc all through BiH was suggested too early in terms of traffic demand in BiHTMAP, an improvement of this section should be analyzed to satisfy one of the most important links between the major cities in the south of BiH.

On Corridor Vc development, two projects are currently under planning. One is the Sarajevo Bypass project from Josanica to Vlakovo, coded as R-01 (Committed Projects) in BiHTMAP. This is now under preparation for implementation with a finance from the European Development Bank and other sources. The other is Sarajevo - Zenica Motorway Project, coded as R-27 (Corridor Vc Development Projects) in BiHTMAP. This project is to widen the existing high-order two-lane highway between Sarajevo and Zenica to a motorway-class facility utilizing the high level of applied design for the existing highway. An extension of the Sarajevo Bypass from Vlakovo to Tarcin was one of the proposals in BiHTMAP since this section is expected to have relatively high traffic demand affected by the Sarajevo Bypass and Sarajevo-Zenica Motorway when these are realized.

The purpose of this pre-feasibility study is to conduct a cost-benefit analysis for:

a) the preliminary plan of new Corridor Vc bypass between Vlakovo and Tarcin as an extension of the Sarajevo Bypass (L = 16.2 km), and

b) the existing road improvement for Tarcin - Mostar section of E-73 (L = 93.0 km).

Figure 6.1.1 shows the improvement plan for Sarajevo - Mostar. It consists of the above two parts. The proposed improvement plan is as follows:

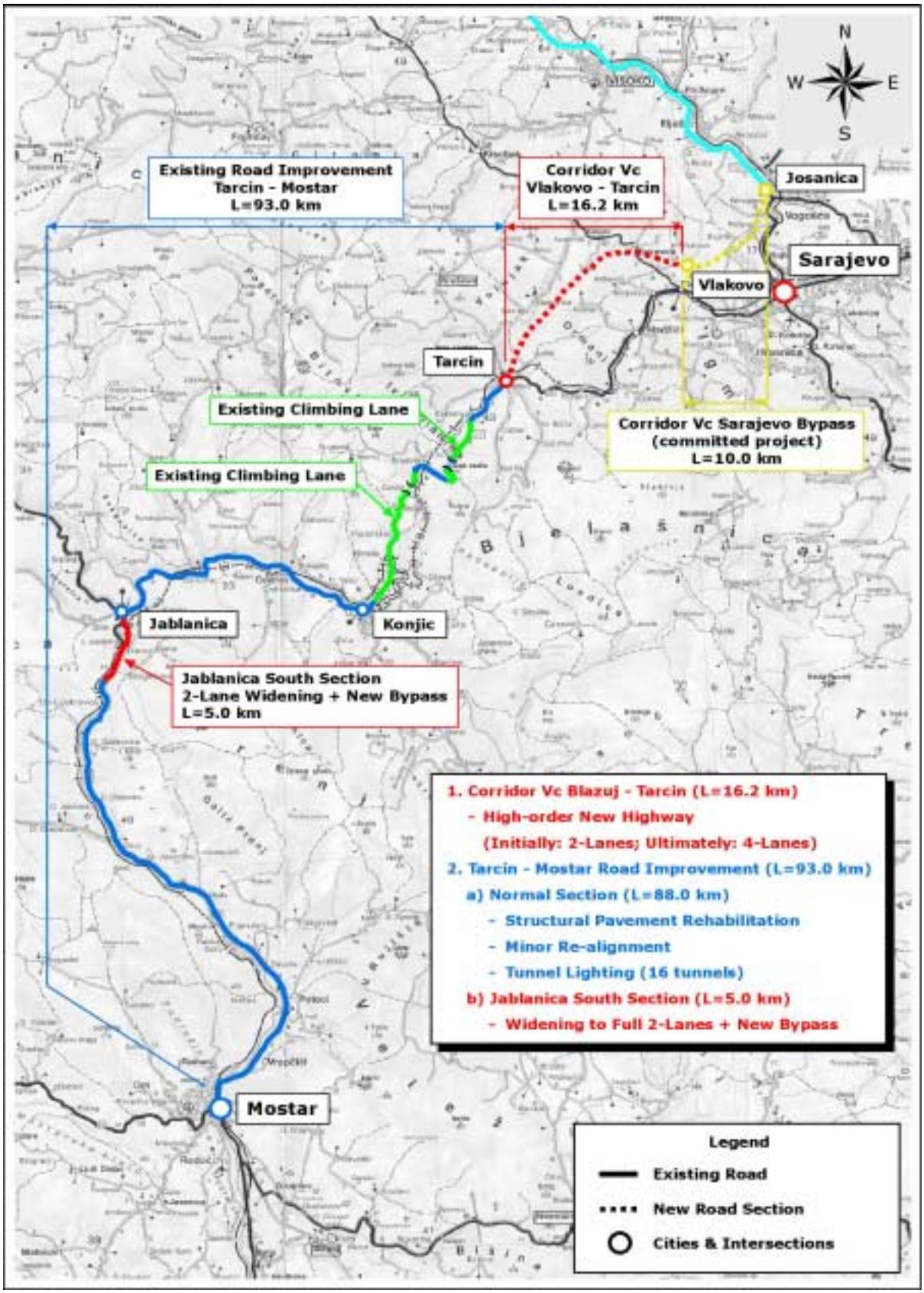


Figure 6.1.1 Sarajevo - Mostar Road Improvement Plan

1) Corridor Vc Vlakovo - Tarcin Section (L = 16.2 km)

   - High-order New Highway: Initially 2-Lanes; Ultimately 4-Lanes

2) Tarcin - Mostar Road Improvement (L = 93.0 km)

   a) Normal Section (L = 88.0 km)

      - Structural Pavement Rehabilitation
      - Minor Re-alignment
      - Tunnel Lighting (16 tunnels)

   b) Jablanica South Section (L = 5.0 km)

      - Widening to Full 2-Lanes + New Bypass

To evaluate the alternatives for these projects, two cases of development scenarios are designated as shown in Table 6.1.1.

Table 6.1.1 Project Case Designation

Project No.	R-27 (1)	R-01	R-27 (2)	---	R-16
Sections	Zenica - Josanica	Josanica - Vlakovo	Vlakovo - Tarcin	Vlakovo - Tarcin	Tarcin - Mostar
Description	Sarajevo-Zenica Motorway	Corridor Vc Sarajevo Bypass	Corridor Vc New Bypass	Existing Road Improvement	Existing Road Improvement
Length	69.0 km	10.0 km	16.2 km	17.8 km	93.0 km
Base (WITHOUT)	YES	YES	NO	NO	NO
Case 1 (WITH)	YES	YES	NO	YES*	YES
Case 2 (WITH)	YES	YES	YES	NO	YES

Source: JICA Study Team
* Improvement within 2-lane designation.

This means that the Sarajevo - Zenica Motorway and the Sarajevo Bypass are considered as a given condition, and try to evaluate WITH and WITHOUT the new bypass of Vlakovo - Tarcin, together with the existing road improvement of Tarcin - Mostar section.

Corridor Vc: Vlakovo - Tarcin is a new bypass, and a proposed preliminary design is shown in Figure 6.1.2, and a proposed typical cross section is shown in Figure 6.1.3. This preliminary design was given by the local authorities.

The alignment begins at the connection point of the Sarajevo Bypass, runs through the mountainous area through Bukovica, and intersects with E-73 at Tarcin. The design parameters will be higher than the minimum requirement to satisfy 100 km/hr design speed.

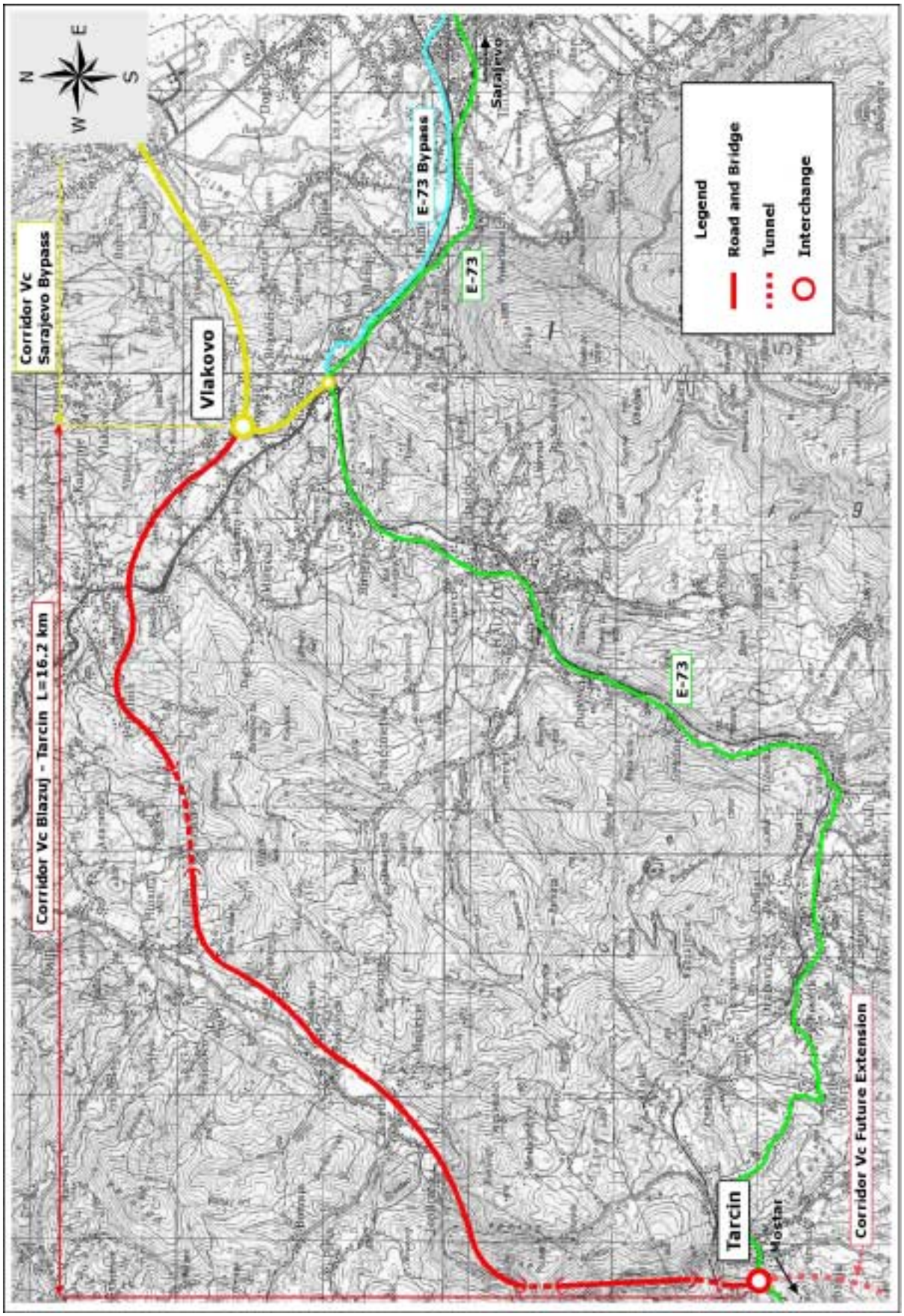


Figure 6.1.2 Proposed Preliminary Alignment for Corridor Vc Vlakovo - Tarcin Project

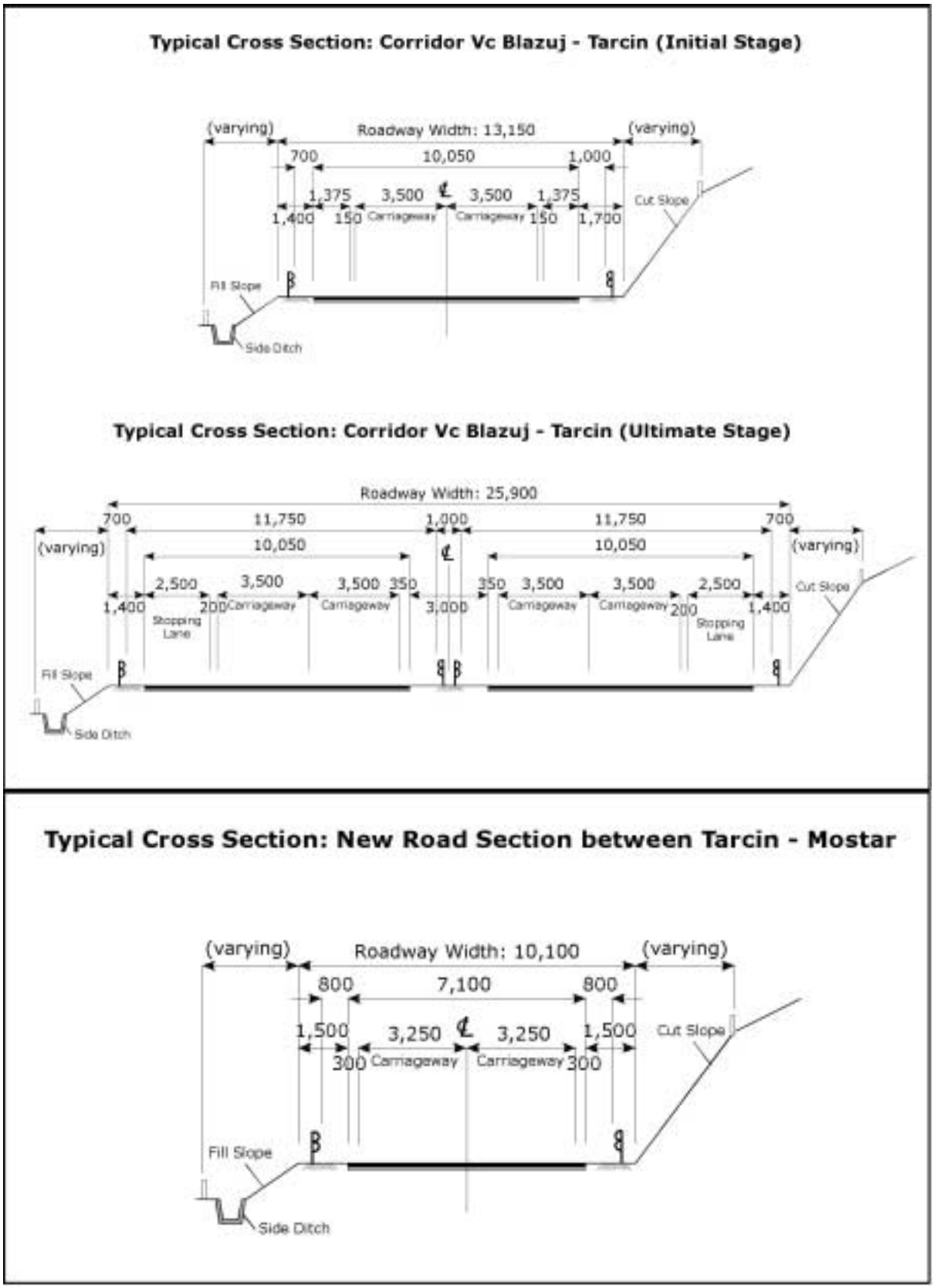


Figure 6.1.3 Proposed Typical Cross Sections for Sarajevo-Mostar Improvement

6.1.2 Definitions and Assumptions of the Project

Due to the limitation of the available inputs for this pre-feasibility study and to clarify the setting of the analysis, the following definitions and assumptions are made.

(1) The pavement for the "normal section" for Tarcin - Mostar (L = 88.0 km), which means the remaining section other than the "South Jablanica Section" (L = 5.0 km), is assumed to be fully improved for about 50 % in length. This is a very rough assessment for the necessity of the pavement improvement by observations of the site.

(2) The bridge reconstruction is not included in the improvement proposal for the "normal section." This is because the most of the bridges on this route are already rehabilitated and reconstructed in the ETRP programs, and their conditions are considered to be able to support the future traffic without major structural problems.

(3) The South Jablanica Section (L = 5.0 km) will be fully improved as explained in Section 6.1.1.

(4) The flee flow speed after improvement will be 100 km/hr for Corridor Vc Vlakovo - Tarcin, 64 km/hr for Tarcin - Mostar road (WITH condition) against the assumed existing flee flow speed of 52 km/hr (WITHOUT condition).

(5) The implementation schedule of the project is assumed to be from Year 2002 to 2004, and the start of the service will be at the beginning of Year 2005.

(6) The project life is assumed to be 30 years.

(7) The economic project cost is assumed to be 87 % of the financial cost. A more detail discussion will be made in Section 6.4.4: Economic Project Cost.

6.2 TRAFFIC DEMAND FORECAST

This analysis is to estimate future traffic demand for the project and savings for Sarajevo - Mostar Road Improvement Project. As an input to that economic evaluation, travel time savings and vehicle cost savings are estimated.

The road transport savings are estimated from the road transport model. The model is first run WITHOUT the project and then again WITH the project. The difference in the two model runs is the net savings or net loss as a result of the inclusion of the new project in the road network. The transport model is run for three time horizons namely:

- Year 2005 (Assumed Year of Opening);
- Year 2010; and
- Year 2020(Planning Data is not available beyond this year).[1]

[1] In the year 2020, the analysis is made for the High Economic Growth Scenario. This growth scenario was used in the formulation of the Road Sector Master Plan.

The savings or benefits associated with each project are estimated over an area of influence rather than the complete road network of BiH. In this analysis the area of influence is chosen as an agglomeration of traffic zones. In general it is likely that the introduction of a higher standard road into a regional road network will attract additional trips from alternative routes. This can result in trips traveling over shorter routes in time but longer in distance. It is therefore feasible that on a regional network; a new route will increase the total amount of vehicle kilometers of travel(VKT) whilst resulting in a decrease in vehicle hours of travel(VHT). This theoretically could produce a negative benefit. To ensure consistency within the area of influence, the VKT is normalized to the base case.

The increase in VKT does not necessarily mean an increase in vehicle travel costs. Some portions of these trips will likely occur at a higher speed and thus more likely at a cheaper unit vehicle operating cost. For this reason in the detailed estimate for vehicle distance related travel cost, the VKT has been prepared over 19 speed ranges. These ranges are defined in Table 6.2.1. The results (VKT) from the transport model are estimated for each speed range and for the four vehicle types namely car, bus ,truck, and articulated truck.

Table 6.2.1 Speed Group Classifications

Speed Group	Speed Range (KPH)		
1	0.0	–	12.5
2	12.6	–	17.5
3	17.6	–	22.5
4	22.6	–	27.5
5	27.6	–	32.5
6	32.6	–	37.5
7	37.6	–	42.5
8	42.6	–	47.5
9	47.6	–	52.5
10	52.6	–	57.5
11	57.6	–	62.5
12	62.6	–	67.5
13	67.6	–	72.5
14	72.6	–	77.5
15	77.6	–	82.5
16	82.6	–	87.5
17	87.6	–	92.5
18	92.6	–	97.5
19	> 97.6		

Source: JICA Study Team

6.2.1 The Priority Project

The priority project in FBiH is the upgrade of the existing road link between Sarajevo and Mostar. The analysis is undertaken for two cases namely:

- Case 1- Upgrade of Vlakovo to Mostar; and
- Case 2 – Upgrade of Tarcin to Mostar plus Vlakovo to Tarcin Bypass.

The engineering upgrade (Vlakovo - Mostar) is to improve the quality of the road with the inclusion of passing lanes and with some horizontal realignment for the South Jablanica Section. These road improvements are reflected in modeling terms with an increase in daily capacity of 20 % and an increase in free flow speed of 10 % in the mountainous and rolling sections of the road.

The motorway between Sarajevo and Zenica including the Sarajevo Bypass is treated as a given condition in both cases.

For the estimation of benefits the area of influence of this project was defined to include traffic zones11, 12, 18 and zones 20 through to 25.

6.2.2 Traffic Demand Forecast

The result of the future traffic demand forecast is shown by cases in Table 6.2.2.

Table 6.2.2 Traffic Demand Forecast Results

Case	Project No.	Section	FF Speed	Daily Traffic Volume		
			(km/hr)	2005	2010	2020
Base (WITHOUT)	R-27 (1)	Sarajevo-Zenica Motorway	100	16,200	20,100	29,100
	R-1	Sarajevo Bypass	100	16,200	20,100	29,100
	R-27 (2)	Vlakovo-Tarcin New Bypass	---	---	---	---
	---	Vlakovo-Tarcin (E-73)	52	15,200	17,700	23,500
	R-16	Tarcin-Mostar	52	5,600	6,200	9,800
Case 1 (WITH)	R-27 (1)	Sarajevo-Zenica Motorway	100	16,700	20,300	29,000
	R-1	Sarajevo Bypass	100	16,700	20,300	29,000
	R-27 (2)	Vlakovo-Tarcin New Bypass	---	---	---	---
	---	Vlakovo-Tarcin (E-73)	64	15,200	17,900	23,800
	R-16	Tarcin-Mostar	64	6,900	8,300	13,200
Case 2 (WITH)	R-27 (1)	Sarajevo-Zenica Motorway	100	16,600	20,300	29,800
	R-1	Sarajevo Bypass	100	16,600	20,300	29,800
	R-27 (2)	Vlakovo-Tarcin New Bypass	100	6,600	9,900	18,000
	---	Vlakovo-Tarcin (E-73)	52	10,700	10,700	10,900
	R-16	Tarcin-Mostar	64	6,800	8,300	13,300

Source: JICA Study Team

The volume for existing Vlakovo - Tarcin section (E-73) shows a very high volume for a 2-lane road in Base Case and Case 1. This indicates an overflowing condition.

6.2.3 The Estimation of Savings

The estimation of savings for the three time horizons is presented in Tables 6.2.3 through to Table 6.2.5. The time savings associated with Case 2 vary between 6 % and 10 % whereas for Case 1 the savings are of the order of 1%. The inclusion of the Bypass project in Case 2 has a significant impact on the project. The Sarajevo-Mostar project without the bypass is not a significant project and does not generate high benefits.

Table 6.2.3 (a) Overall Performance Characteristics in 2005

Case	Daily VKT	Daily VKT
Base (WITHOUT)	3,901,383	71,613
Case 1	3,916,816	71,172
Case 2	4,045,339	64,901

Source: JICA Study Team

Table 6.2.3 (b) Summary of VKT by Grouped Speed Category - Percentage Distribution in 2005

Speed Range	Base (WITHOUT)	Case 1	Case 2
<20	2.3	2.3	0.5
20 - 50	21.9	21.8	21.3
50- 65	32.0	31.9	30.7
>65	43.7	43.9	47.6
Total	100.0	100.0	100.0

Source: JICA Study Team

Table 6.2.4 (a) Overall Performance Characteristics in 2010

Case	Daily VKT	Daily VKT
Base (WITHOUT)	4,769,026	88,941
Case 1	4,783,181	88,216
Case 2	4,971,244	80,892

Source: JICA Study Team

Table 6.2.4 (b) Summary of VKT by Grouped Speed Category - Percentage Distribution in 2010

Speed Range	Base (WITHOUT)	Case 1	Case 2
<20	2.3	2.3	0.5
20 - 50	27.9	29.0	28.4
50- 65	26.0	24.8	23.2
>65	43.8	43.9	47.9
Total	100.0	100.0	100.0

Source: JICA Study Team

Table 6.2.5 (a) Overall Performance Characteristics in 2020

Case	Daily VKT	Daily VHT
Base (WITHOUT)	7,458,336	155,474
Case 1	7,503,361	155,090
Case 2	7,812,073	146,768

Source: JICA Study Team

Table 6.2.5 (b) Summary of VKT by Grouped Speed Category - Percentage Distribution in 2020

Speed Range	Base (WITHOUT)	Case 1	Case 2
<20	3.5	3.6	2.9
20 - 50	44.3	37.7	33.6
50- 65	11.9	20.5	20.7
>65	40.3	38.3	42.9
Total	100.0	100.0	100.0

Source: JICA Study Team

In tables 6.2.3 (b), 6.2.4 (b) and 6.2.5 (b) the normalized change in distribution of VKT by summary speed category are shown for years 2005, 2010 and 2020 respectively. These table present only minor changes for Case 1 but significant changes for Case 2. The fact that the Bypass is an extension of the Motorway is also significant.

In fact by 2020 the time savings show a decrease for Case1 indicating that Case 2 is needed to generate significant benefits rather than just Case 1.

6.3 COST ESTIMATION

The financial project cost was estimated based on the unit cost information collected through discussions with the local authorities, engineers and specialists. The basic premises in estimating the project cost are as follows:

1) All the construction works will be executed by contractors to be employed.

2) The unit price of each cost component was determined based on the economic conditions prevailing in November 2000.

3) The construction cost was estimated for the items of earthwork, pavement, bridge and tunnel structures as the representing items, and other cost items are estimated by assumed percentage of these basic costs.

4) Indirect cost including contingency, contractor's profit, administration and others are estimated as 30 % in total of the direct construction cost.

5) Land acquisition cost was estimated for new road sections and additional right of way for widening.

6) Engineering cost, consisting of final engineering design and construction supervision, is assumed to be 10 % of the sum of direct and indirect construction cost.

The estimated cost for each route is summarized in Table 6.3.1.

Table 6.3.1 Project Cost Estimate for Sarajevo - Mostar Road Improvement

No.	Item	Unit	Unit Cost (KM)	Case 1 (a) Vlakovo - Tarcin L= 17.8 km		Case 1 (b) Tarcin - Mostar L= 93.0 km		Case 2 (c) Vlakovo - Tarcin 2-Lane L= 16.2 km	
				Q'ty	Cost (x000)	Q'ty	Cost (x000)	Q'ty	Cost (x000)
1	Earthwork								
	Cut and Fill	m^3	4.0			126,000	504	294,000	1,176
	Embankment/Subgrade	m^3	7.0			172,000	1,204	183,750	1,286
2	Pavement								
	Structural Overlay (t=15cm)	m^2	72.0	124,600	8,971	298,900	21,521		
	Surface+Binder Course (t=15cm)	m^2	72.0			51,100	3,679	105,000	7,560
	Base Cource (t=30cm)	m^2	24.0			51,100	1,226	105,000	2,520
	Subbase (t=30cm)	m^2	15.0			51,100	767	105,000	1,575
3	Bridges & Viaducts								
	L=30 - 100m; H<20m (W=9.0m)	m	17,000			300	5,100		
	L<100m; H<20m (W=9.0m)	m	15,000					4,200	63,000
	L=30 - 100m; H<20m (W=18.0m)	m	25,000						
	L<100m; H<20m (W=18.0m)	m	22,000						
4	Tunnels								
	500<L<2,000m; Fav. Geology (2L)	m	20,000					1,700	34,000
	500<L<2,000m; Fav. Geology (4L)	m	36,000						
5	Interchanges	LS						1	4,550
	Sub-Total (1)				8,971		34,001		115,667
6	Ditches & Culverts	LS	5.0%		449		1,700		5,783
7	Miscellaneous Items	LS	30.0%		2,826		10,710		36,435
	Sub-total (2)				12,246		46,411		157,886
8	Indirect Cost		30.0%		3,674		13,923		47,366
	Total Construction Cost				15,919		60,335		205,252
9	Engineering Cost	LS	10.0%		1,592		6,033		20,525
10	Land Acquisition & Compensation	m^2	30.0			42,000	1,260	588,000	17,640
	Total Section Cost				**17,511**		**67,628**		**243,417**
Total Project Cost						**Case 1 Total:**	**85,139**		
								Case 2 Total:	**311,045**

Source: JICA Study Team

6.4 PROJECT EVALUATION

In this section, economic analysis is made as a process of project evaluation regarding road improvement project for Sarajevo - Mostar.

6.4.1 Methodology for Economic Analysis

(1) General

The main purpose of the economic analysis is to show the effects of the implementation of the project of the road improvement for Sarajevo - Mostar" (hereinafter called as

"Project"), from the point of view of the country's economic well-being and to estimate a return on the resources invested. The economic analysis is an assessment of the economic viability of the Project. For the purposes of evaluation, the economic internal rate of return (EIRR), net present value (NPV) and benefit-cost ratio (BC ratio) are demonstrated.

Economic analysis follows a conventional cost benefit analysis of discounted cash flow methodology. The cost benefit analysis is made by comparison between project benefits and project costs.

- The formula of EIRR is shown below:

$$\sum_{t=1}^{n} \frac{Benefits_t}{(1+R)^t} = \sum_{t=1}^{n} \frac{Inv.\ cost_t + O/M\ cost_t}{(1+R)^t}$$

where:

$Benefits_t$	:	Benefits in year t
$Inv.\ cost_t$	:	Investment cost in year t
$O/M\ cost_t$	:	Operation and Maintenance costs in year t
n	:	Calculation period
t	:	Year t (from 1 to n)
R	:	Value of EIRR

EIRR is the value which will satisfy the above formula.

- The formula of NPV is shown below:

$$\sum_{t=1}^{n} \frac{Benefits_t}{(1+D)^t} - \sum_{t=1}^{n} \frac{Inv.\ cost_t + O/M\ cost_t}{(1+D)^t}$$

- The formula of BC Ratio is shown below:

$$\sum_{t=1}^{n} \frac{Benefits_t}{(1+D)^t} \Big/ \sum_{t=1}^{n} \frac{Inv.\ cost_t + O/M\ cost_t}{(1+D)^t}$$

where:

$Benefits_t$	:	Benefits in year t
$Inv.\ cost_t$	:	Investment cost in year t
$O/M\ cost_t$	:	Operation and Maintenance costs in year t
n	:	Calculation period
t	:	Year t (from 1 to n)
D	:	Discounted rate

(2) Basic Assumptions

The following basic assumptions are made:

1) The benefits are calculated for the planning year of 2005, 2010 and 2020, and by the four categories of vehicle; passenger car, bus, truck and large truck in accordance with the traffic demand forecast.

2) The construction work of the project road is scheduled to be from 2002 to 2004, and the start of service is from 2005.

3) The base year is 2000. The project life is assumed to be 30 years after the start of service. The calculation period of cost benefit analysis is 35 years of from 2000 to 2034.

6.4.2 Project Benefits

(1) Expected Benefits

Benefits which can be expected by implementation of the Project are as follows:

As a direct benefit,

- Saving in vehicle operating cost
- Saving in vehicle time cost, and
- Reduction of vehicle accident cost, and

As an indirect benefits,

- Contribution to regional industrial and tourism development

(2) Quantitative Benefits

In this economic analysis in the pre feasibility study stage, out of the above, two benefits of the saving in vehicle operating cost and the saving in vehicle time cost are treated as quantitative benefits.

(3) Estimation of Benefits

Saving in Vehicle Time Cost

The saving in vehicle time cost is calculated as a difference between the vehicle time cost in the case of "WITH" project condition and that in "WITHOUT" project condition. While "WITH" project condition means the case in which an investment for road improvement is implemented, "WITHOUT" project condition means the case in which no such an investment is made except a daily basis maintenance. Higher speed is, in general, expected in the case of "WITH" project than "WITHOUT" project.

The vehicle operating time costs are calculated by multiplying the vehicle-hours by the unit vehicle time cost. The vehicle-hours are obtained as a result of traffic assignment process in the traffic demand forecast. The unit time cost is set up by vehicle type.

Saving in Vehicle Operating Cost

The saving in vehicle operating cost is calculated as a difference between the vehicle operating cost in the case of "WITH" project condition and that in "WITHOUT" project condition.

The vehicle operating time costs are calculated by multiplying the vehicle-kilometer by the unit vehicle operating cost. The vehicle-kilometers are obtained as a result of traffic assignment process in the traffic demand forecast. The unit vehicle operating cost is set up by vehicle type and speed range.

(4) Unit Cost of Vehicle Time Cost and Vehicle Operating Cost

While the estimation of time costs of passenger car and bus are made on the basis of per capita GDP, those of truck and large truck are based on the study results in the report of " Development of Branches on Corridor V, Bosnia and Herzegovina Road, Phare, June 2000". For both estimations, the results of traffic survey which has been conducted by the Study Team are utilized.

The estimation results are shown in the following tables: The details of estimation process are referred to Appendix.

Table 6.4.1 shows the estimated vehicle time value of bus and passenger car per hour.

Table 6.4.1 Estimated Vehicle Time Value of Bus and Passenger Car per Hour (KM in constant year 2000 price)

	2000	2005	2010	2020
Bus	15.53	22.58	27.49	37.12
Passenger Car	2.25	3.28	3.99	5.38

Source: JICA Study Team

Table 6.4.2 shows the estimated vehicle time value of truck and large truck.

Table 6.4.2 Unit Vehicle Time value of Truck and Large Truck

Type	Unit Time Value per Ton-hour (KM)	Year	Freight Load	Unit Time Value per Vehicle-hour (KM)
Truck	0.6	2005	4.8	2.85
		2010	5.3	3.19
		2020	6.5	3.89
Large Truck	0.6	2005	14.2	8.50
		2010	14.8	8.87
		2020	16.1	9.60

Source: JICA Study Team

Table 6.4.3 show the estimated unit vehicle operating cost.

Table 6.4.3 Unit Vehicle Operating Cost

(KM per vehicle-kilometer)

Speed	Pass. Car	Bus	Truck	Large Truck
(Km/hr)				
10.000	1.204	4.345	1.973	3.747
15.000	0.885	3.276	1.508	2.863
20.000	0.726	2.747	1.278	2.427
25.000	0.631	2.437	1.144	2.172
30.000	0.568	2.237	1.058	2.009
35.000	0.524	2.099	1.000	1.900
40.000	0.491	2.003	0.960	1.824
45.000	0.465	1.935	0.933	1.771
50.000	0.445	1.886	0.913	1.734
55.000	0.430	1.852	0.899	1.707
60.000	0.418	1.827	0.890	1.690
65.000	0.409	1.811	0.884	1.678
70.000	0.401	1.800	0.879	1.670
75.000	0.395	1.793	0.877	1.665
80.000	0.390	1.789	0.876	1.663
85.000	0.386	1.786	0.875	1.661
90.000	0.383	1.786	0.875	1.661
95.000	0.379	1.786	0.875	1.661
100.000	0.378	1.786	0.876	1.663

Source: JICA Study Team

6.4.3 Estimation of Benefits

As the results of traffic assignment in traffic demand forecast process, daily vehicle kilometers and daily vehicle hours are obtained for the cases of "WITHOUT" project and "WITH" project, in which four cases of "Case 1" and "Case 2".

Multiplying the above obtained vehicle kilometers by the unit vehicle operating cost, vehicle operating costs are calculated. Similarly, multiplying the above obtained vehicle hours by the unit vehicle time cost, vehicle time costs are calculated. Then, as a difference of values between "WITHOUT" and "WITH," benefits are calculated.

The above daily basis benefits are converted to the annual basis benefits by using a conversion factor of 300. The summary of annual benefits is shown in Table 6.4.4. The details of calculation results of daily benefits in 2005, 2010 and 2020 are shown in Tables A.6.4.15 to A.6.4.17 in Appendix, respectively.

Table 6.4.4 Summary of Estimated Annual Benefits (Sarajevo - Mostar Road Section)

(KM 1,000/year)

	Case 1			Case 2		
	VOC Saving	Time Saving	Total	VOC Saving	Time Saving	Total
2005	5,569	2,146	7,714	25,041	9,208	34,249
2010	6,533	2,557	9,090	30,093	11,976	42,069
2020	20,605	4,787	25,392	56,353	15,901	72,254

Source: JICA Study Team

6.4.4 Economic Project Costs

(1) Estimation of Economic Costs

The project costs in terms of financial costs are referred to Section 6.3 in this Chapter. Economic analysis treats an economic cost, which is estimated by eliminating the portion of transfer item such as taxes from financial costs.

In this economic analysis, the related taxes to the estimated costs are assumed as the custom duty and the tax on trade on goods and services.

Regarding the tax system (tax ratio), while that of the custom duty are common to Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS), that of the tax on trade on goods and services are different by FBiH and RS.

The tax ratios regarding tax on trade of goods and services in FBiH are 24% in tariff No. 1, 12% in tariff No.2 for goods, and 12% for services. Tariff No. 1 is applied in general. Tariff No. 2 includes commodities related to, for example, energy, basic agricultural / fishery products, products serving for food of people, construction material such as timber, etc. Tariff No. 1 stands for the other commodities than stipulated in tariff No. 2.

Regarding the tax on trade on goods and services in RS, there are two categories of tax rate of 18% and 8%. The tax rate of 18% is applied in general, and that of 8% is, for example, for food products, agricultural / fishery products, electricity, coal, materials for construction such as timber, etc.

Regarding fuel, there are several special taxes both for FBiH and RS.

According to the law on the custom duty, the custom tariff which is considered to be related to project ranges, roughly speaking, 0%, 5%, 10% and 15%, for example; construction equipment such as crane (0% / 5%), forklift (5%), bulldozer (5% / 10%), machinery for work of road construction (5%), truck (10%), bus (15%), passenger car (15%), rail locomotive (0%), passenger coach (5%), freight wagon (5%), equipment for

signal (5%), etc. It should be noted that the above tax ratios are still only shown as a general sample. The actual tax ratio is determined based on the detailed specification of equipment.

For the elimination about tax portion, the following are to be taken into consideration:

In the cost estimates of projects in this pre-feasibility study stage, specification and procurement source of equipment are not fixed. And the breakdown of cost component for local / foreign currency portion and also that for labor / material / depreciation for equipment portion in the total cost is not certain (just rough estimates) in the pre-feasibility study stage. Therefore, it is difficult to estimate a tax portion.

Regarding the estimation of economic cost, the following are assumed:

According to the engineering study, the percentage of equipment cost in foreign currency portion is roughly estimated to be about 5% to the total cost. Regarding the custom duty, 5% of custom tariff is assumed to this portion. And regarding the portion of the other tax than custom duty, i.e. the tax portion including the tax on trade of goods and services, ratio of 15% is assumed to be as a tax portion, considering the share of material cost in total cost.

As a result, a conversion factor of 0.87 is obtained, and using this factor economic cost is obtained.

(2) Economic Project Costs

As a result, the economic project costs are estimated as shown in Table 6.4.5. The annual distribution is based on the assumption of portion of 30%, 40%, and 30% for 2002, 2003 and 2004.

Table 6.4.5 Economic Project Cost (Sarajevo - Mostar Road Section)

(KM 1,000)

Case	Total	2002	2003	2004
Case 1	74,071	22,221	29,628	22,221
Case 2	270,609	81,183	108,244	81,183

Source: JICA Study Team

The annual operation and maintenance costs are estimated based on the unit cost per kilometer of KM 15.5 thousand. The economic price of annual operation and maintenance costs is obtained by using an above-mentioned conversion factor of 0.87, which is about KM 13.5 thousand per kilometer. The total lengths of road in WITHOUT case and Case 1 are both 110.8 km, whereas that in Case 2 is 109.2 km. Thus, the operation and maintenance costs in terms of economic price are obtained to be KM 1,494 thousand per annum for WITHOUT case and Case 1, and KM 1, 473 thousand for Case 2 per annum.

The operation and maintenance costs in WITHOUT case are considered in the cash flow of cost benefit analysis. The rehabilitation cost for WITHOUT case is also considered.

6.4.5 Cost Benefit Analysis

Based on the above estimated benefits and the related costs, cost benefit analysis was made. In this economic analysis, benefits after 2021 are assumed to be fixed as the 2020 values. The calculation results are summarized in Table 6.4.6. These results show that either case is economically feasible.

Table 6.4.6 Summary of Cost Benefit Analysis for Sarajevo - Mostar Road Section

	Case 1	Case 2
EIRR	15.5%	15.0%
NPV (KM 1,000)	22,388	62,377
B/C	1.48	1.33

Source: JICA Study Team
Note: NPV and B/C are computed at a discount rate of 12 %

The details of cash flow of cost benefit analysis are shown in Tables A.6.4.19 and A.6.4.20 in Appendix for Case 1 and Case 2 of Sarajevo - Mostar Road Section, respectively.

6.5 IMPLEMENTATION PLAN AND RECOMMENDATIONS

6.5.1 Evaluation of the Cases

The results of the project analysis shows that the two cases, Case 1 and Case 2 are at the same level of feasibility. These numbers should be considered almost the same if the level of detail of this study is taken into account. The EIRR of 15.0 % - 15.5 % is considered that the project is at a feasible level.

As mentioned in Section 6.1.2: Definitions and Assumptions, these results are under many simplified assumptions. However, it is a result to figure out an “investment limit”, which means how much investment is allowed to make this project feasible. In the designated cases, the message is that the level of improvement proposed in the description is considered feasible.

However, this does not mean the satisfaction to the accommodation of future traffic demand is the same between the two cases. Table 6.2.2: Traffic Demand Forecast Results suggests that a serious overflowing condition is observed in E-73 Vlakovo - Tarcin section in Case 1, as well as in the same section in WITHOUT case. This means the implementation of Case 1 will still leave a lot of traffic problem in this section.

It is theoretically possible to designate a case of four-lane improvement for the existing E-73 Vlakovo - Tarcin against Corridor Vc development. However, it was not considered because of the following reasons:

- E-73 Vlakovo - Tarcin has urbanized areas, and the further urbanization will prevent this section from achieving a rural 4-lane capacity by the widening.

- The busy four-lane arterial would create more serious traffic accidents and other negative social influence to the local communities along the road.

- A development of separate Corridor Vc highway will take long-distance traffic away from the existing E-73, whether E-73 stays in two lanes or is widened to four lanes. Case 2 forecast demand in Table 2.2.2 suggests that existing two lanes will be sufficient for the next twenty years if Corridor Vc bypass is provided. This means the investment for four laning of E-73 would not be an effective investment unless the realization of Corridor Vc is far future.

It is therefore recommended that Case 2: Corridor Vc new bypass for Vlakovo - Tarcin be developed at the soonest possibility. However, it is recommended to be 2 lanes at the initial stage with 4-lane right of way, which can be further widened to 4 lane full motorway when time comes.

In reality, however, Corridor Vc Vlakovo - Tarcin Project is feasible only if Sarajevo - Zenica Motorway and Sarajevo Bypass projects are realized. The Vlakovo - Tarcin section should be considered as the next step following these two prior projects.

6.5.2 Implementation Schedule

A recommended overall implementation schedule is shown in Figure 6.5.1. This is considered at the earliest possible schedule if the full feasibility study and detailed design are implemented without delay. Particularly it is recommended that Tarcin - Mostar road improvement be implemented at the earliest possibility in accordance with this schedule. The case of Corridor Vc Vlakovo - Tarcin development, however, should be carefully planned in accordance with the progress of the related Corridor Vc development projects, namely Sarajevo - Zenica Motorway and Sarajevo Bypass because the feasibility of Corridor Vc Vlakovo - Tarcin will strongly depend on the realization of these two prior projects.

Figure 6.5.1 Recommended Implementation Schedule

Item	2002	2003	2004
Feasibility Study and Detailed Design	▬▬		
Construction		▬▬	▬▬

For the further analysis in the later stage of the project, a more detailed analysis is recommended to assess the existing pavement conditions of Tarcin - Mostar section to examine more detailed pavement improvement design, and to assure the durability of individual bridges.

6.5.3 Project Finance and Implementation

The finance of the project is recommended to be by a low-interest foreign loan from international project finance organizations. The availability of domestic funds is limited, and for those domestic funds a higher priority should be given to achievement of better road maintenance system and more urgent rehabilitation needs. It is considered that the result of economic analysis supports the realization of the project by an international finance mechanism.

It is strongly recommended that Corridor Vc Vlakovo - Tarcin be implemented by a toll road system. This is because of the following reasons:

1) This highway is an expensive investment for much higher level of service than ordinary arterial highway, and it is reasonable to charge the project cost to the beneficiary users.

2) This highway is a completely new road separated from the existing arterial highway, and it is easy to implement a toll collection system.

Private finance initiative is recommended to promote the realization of this project because of the adaptability and reasonableness of applying a toll road system. If a larger view of future Corridor Vc development is taken into account, it is highly recommended that the future string of Corridor Vc highway be consolidated in a single tollway mechanism. If each segment of the new highway is developed with independent toll charge system, it is highly likely that toll gates have to be furnished at each boundary of the project segment, which forces the users to stop at each boundary of the designated project section. It would be a silly system because the advantage of an access-controlled high-order tollway is to minimize the travel time of the users.

Unfortunately, such a silly example is what is actually happening in many other countries particularly when separate segments of a highway are constructed by independent private investors. It is important that the responsible government organizations will carefully analyze the future tollway system at the planning stage.

CHAPTER 7: PRE-FEASIBILITY STUDY ON RAILWAY IMPROVEMENT PROJECT

7.1 PROJECT DESCRIPTION

Since the Dayton agreement in December 1995, several railway reconstruction programs have been focused on the immediate alleviation of physical war damages and the re-activation of basic transport service and facilities. For this end, significant improvement of transport infrastructure have been achieved, mainly within the framework of Emergency Transport Reconstruction Project with support provided by the EBRD, the World Bank, the European Union, and other bilateral donor institutions.

At present, several projects such as the reconstruction of signal and telecommunication, the reconstruction of Samac Bridge, and the reconstruction of catenary system are on-going. These projects have been treated as a "committed project."

Railway plan recommended by JICA Study Team has the concept that railway system in BiH will be rehabilitated / reconstructed and sustainably operated at a commercial basis, aiming at a part of European railway network.

Railway plan is established based on the phased implementation schedule with the step-wise target of recovery of railway operation to the condition before the war, then strengthening to UIC standard, and innovation of railway system.

Railway recovery schedule comprises three phases:

- Phase 1 (up to 2005) is recognized as the "normalization period" aiming at facility recovery to the condition before the war,
- Phase 2 (2006 to 2010) is regarded as the "transportation recovery period" aiming at transportation recovery to the condition before the war, and

- Phase 3 (2011 to 2020) is conceptualized as the "functionally strengthening period" including railway system innovation aiming at the commercial operation as a part of European railway network.

Out of the above phasing, Phase 1 is treated as an objective of the pre-feasibility study.

7.2 FUTURE DEMAND FORECAST

Future railway transport demand was forecasted in Part 1: Sector Plans in Vol.2 for passengers and cargoes. However, the forecast was made based on the railway improvement plan consisting of three phases. For the pre-feasibility study of the railway, two forecasts are necessary, namely for with project and without project cases to supply basic information on effects by the railway improvement.

Regarding the forecast for the with case, future railway transport demand was forecasted based on relation to economic activity level of the country, as mentioned in Part 1. The realization ratios against the potential demand were assumed to forecast the demand according to the improvement progresses. Therefore, possible demand for the Phase 1 improvement is the forecast in 2005, when all the project components of the phase were completed. Future railway demand is assumed to be stable, because no more improvements would be realized in the phase.

In the without case, only committed railway improvement projects were considered. The study team assumed for the without case forecast that the demand would be double compared to transport volume in 1999 both for passenger and freight transport. The railway transport demand for the without case would not increase, if the Phase 1 improvement projects were not implemented. Therefore, future railway transport demand will be stable.

The future railway transport demand forecast is shown in Table 7.1. Railway passenger demand will be 102 million passenger-km and 553 million passenger-km after 2005 for the without and with cases respectively. Freight transport of the railway will be 292 million ton-km and 879 million ton-km for the without and with cases respectively.

Table 7.1 Future Railway Transport Demand for Passengers and Freight

	1999	2005	2010	2020
Passenger-km (million)				
without case	51.1	102.2	102.2	102.2
with case	-	553.0	553.0	553.0
Freight ton-km (million)				
without case	146.1	292.1	292.1	292.1
with case	-	879.0	879.0	879.0

7.3 DEVELOPMENT PLAN

7.3.1 Railway Improvement Policy

Since the railway system of BiH was destroyed severely, only limited transport service is supplied currently, although efforts have been made by international society and the railway companies, as mentioned in Part 1.

The target of the railway improvement plan is the "normalization" of railway transport service to the level of pre-war condition.

Figure 7.1 shows the idea of the improvement plan.

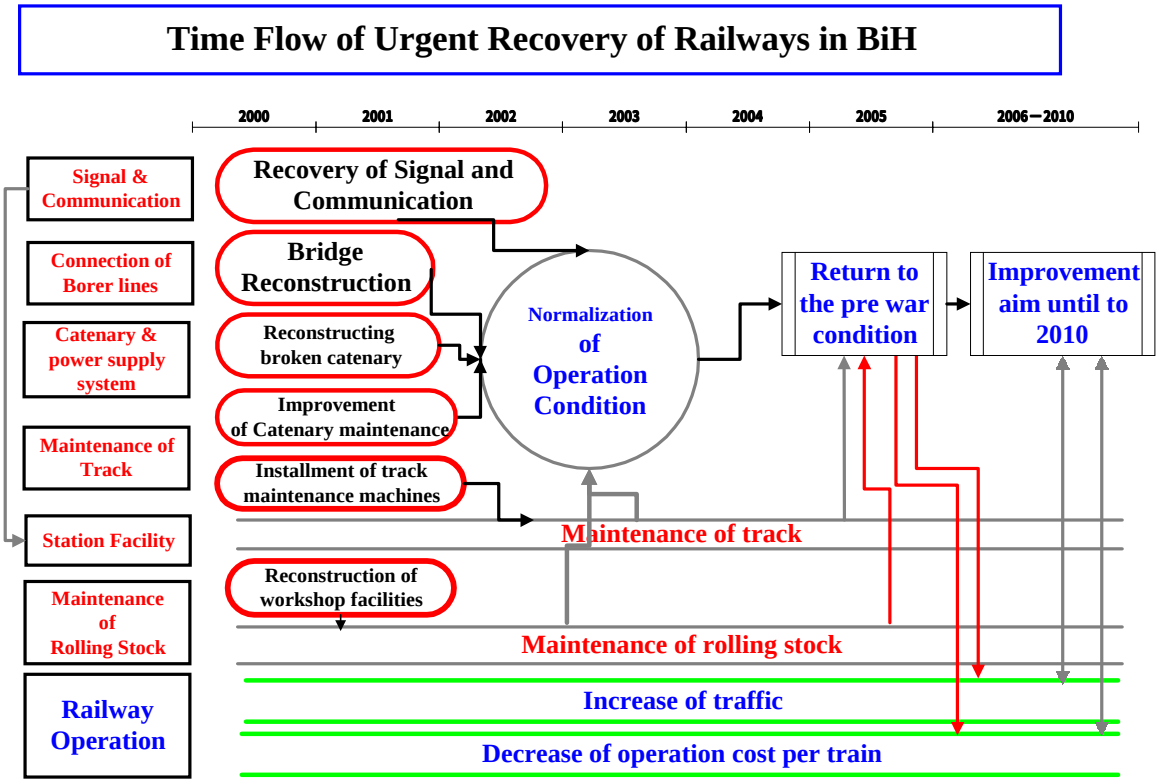


Figure 7.1 Railway Improvement Plan

For the "normalization" purpose, the Phase 1 includes following improvement projects:

- Urgent Recovery;
- Signal & Telecommunication system reconstruction;
- Catenary Reconstruction;
- Procurement of Rolling Stocks

- Reconstruction of track maintenance facilities;
- Maintenance of track;
- Reconstruction of power maintenance facilities;
- Reconstruction of workshop machines;
- Maintenance parts supply; and,
- Reconstruction of border stations.

7.3.2 Major Improvement Projects in Phase 1

(1) Urgent Recovery

Until 2005, facilities will be restored as pre-war situation, but condition of track and rolling stock is too serious in whole area.

For realizing the Phase 1 target, the urgent program should be executed as soon as possible. Without urgent project, Phase 1 improvements cannot be achieved especially on the recovery of track and rolling stock which will determine the train operation speed.

By considering the actual situation of railways in BiH, the urgent program is the base and the most important step controlling all endeavors of 3 phases.

Railway transportation is at the stage of starting of recovery. For that sake, the contents of railway recovery should be explained in detail upon the fundamental matters.

Urgent recovery plans are to be completed until 2002-2003. They are mainly consisted of connection, safety recovery and running condition between rail and wheel.

(2) Catenary Reconstruction

By war activities, about 190 km of overhead contact line has been completely destroyed or severely damaged, as well as external signaling and telecommunication devices, centers for traffic remote control and electric traction facilities, the electric sectioning posts, and the traction substations.

The catenary system of some sections near Samac Bridge and of Una line is also destroyed. In near future, this section shall be repaired before the reconstruction of Samac Bridge.

(3) Signal & Telecommunication System Reconstruction

The signal and communication innovation, completely damaged by war, will lead to the inovation of IT revolution in adverse. The construction work by using railway track facility will bring the merit of low cost investment of most modernized system..

(4) Maintenance Machines

By accumulated deteriorated track facility, the inoperable and poor capacity cannot support the required track maintenance work.

Some maintenance cars for catenary and for track maintenance work are donated to BiH, but fundamental tie tamper machine and measuring equipment are not yet.

Railways in BiH are confronting with serious financial deficit and they cannot start improving work by themselves.

The following maintenance machines are necessary:

- One tamping machine for switches;
- One ballast clearing machine; and,
- Eight motor trolleys for track and OCL maintenance.

Other equipment (tools, instruments, light track machines), service road vehicles for infrastructure maintenance are necessary.

(5) Reconstruction of Workshop Machines

Extraordinary condition of rail and wheel figures is preventing normal speed operation for fear of derailment. Low train speed requires much more rolling stock and operation personnel.

Plenty of wheels out of gauge control are waiting at outside of all car workshops.

(6) Procurement of Rolling Stocks

To cope with the increased transport demand by the Phase 1 improvement, procurement of rolling stocks is necessary for passengers and freight. Table 7.2 shows the necessary number of rolling stocks.

Table 7.2 Necessary Number of Rolling Stocks

Necessary car number

Necessary number of cars				1990	2000	2,005	2010	2015	2020
Locomotives		Total	1	174	73	97	122	131	174
	Diesel locomotives	Main line use	2						
		Shunting use	3						
		Sub total	4	87	24	44	61	60	60
	Electric locomotive		5	87	49	53	61	71	114
Freight cars			6	9,406	764	2,613	4,703	7,055	9,406
Passenger coaches			7						
	2 axle coach		8	155	23	86	109	136	155
	4 axle coach		9	219	33	122	153	192	219
		Subtotal		374	56	208	262	328	374
	EC		10	24	4	13	17	19	24

Possesed car number

Necessary number of cars				1990	2000	2,005	2010	2015	2020
Locomotives		Total	1	174	73	123	104	70	34
	Diesel locomotives	Main line use	2						
		Shunting use	3						
		Sub total	4	87	24	49	52	35	17
	Electric locomotive		5	87	49	74	52	35	17
Freight cars			6	9,406	764	1,764	2,764	3,762	1,881
Passenger coaches			7						
	2 axle coach		8	155	53	78	93	62	31
	4 axle coach		9	219	144	169	131	88	44
		Subtotal		374	197	247	224	150	75
	EC		10	24	4	13	14	10	5

Necessary new car number

Necessary number of cars				1990	2000	2,005	2010	2015	2020
Locomotives		Total	1	174		0	18	61	140
	Diesel locomotives	Main line use	2						
		Shunting use	3						
		Sub total	4	87	0	0	9	25	43
	Electric locomotive		5	87		0	9	36	97
Freight cars			6	9,406	0	849	1,939	3,293	7,525
Passenger coaches			7						
	2 axle coach		8	155		8	16	74	124
	4 axle coach		9	219		0	22	104	175
		Subtotal		374		0	38	178	299
	EC		10	24		0	3	9	19

Accumulated cost of acquiring new car

US mill. $

Total value of cars			unit price	1990	2000	2,005	2010	2015	2020
Locomotives		Total							
	Diesel locomotives	Main line use	2.5						
		Shunting use	1.5						
		Sub total	2		0	0	18	50	86
	Electric locomotive		5			0	45	180	485
Freight cars			0.08		0	68	155	263	602
Passenger coaches									
	2 axle coach		0.1			1	2	7	12
	4 axle coach		0.2			0	4	21	35
	EC		2			0	6	18	38
		Grand total			0	69	230	540	1,258

7.3.3 Train speed increase by Phase 1

In parallel with the improvement of terminal operation, the travel time and train operation speed will control the railway competitiveness and efficiency of using rolling stock and operation personnel.

Actual train maximum speed is limited to 40/50 km/h although the standard of track and rolling stock is designed to 100/120 km/h.

Although the train average speed should be calculated by train km and train hours, the attractiveness and efficiency of train operation service can be estimated by using typical train operation data.

The following data table, that will be used for the evaluation of improvement on railway management, shows the possible train operation speed increase in each stage by selecting typical trains from the former train diagrams and actual train diagrams.

Table 7.3 Typical Train Speed by Phase

Transition of typical passenger express train speed km/h

Line number	Where	Km	Actual max speed	1990	Actual	By committed	Phase 1	Phase 2	Phase 3	after 2020
No 11	Sarajevo-Ploce	193.5		70.0	39.4	39.4	63.0	77.0	86.7	93.6
No 12-1	Samac-Doboj	60.6	50	71.0	37.1	40.0	63.9	78.1	80.0	85.0
No 12-2	Doboj-Sarajevo	172.4	50,70	70.4	45.0	48.1	63.3	77.4	80.0	85.0
No 12	Samac-Sarajevo	233.0	50,70	73.8	41.1	45.1	74.0	75.0	80.0	85.0
No 13-1	Doboj-Tuzla	57.6	50		34.6	34.6	57.6	70.4	78.0	80.0
No 13-2	P. Novo-Tuzla	30.5	50		40.7	40.7	57.6	70.4	78.0	80.0
No 14	Brcko-Sicki Brod	63.4			39.6	39.6				
No 15	Petrovo Novo-Zvornik	81.0	50		30.0	30.0	83.7	102.3	100.0	112.0
No 16	Doboj-Novi Grad/Bos Novi	180.0	70	73.9	55.1	55.1	73.9	83.6	90.0	100.0
No 17	Novi Grad/Bos Novi-Bihac	65.8	50		37.6	37.6	59.3	65.9	82.8	86.5
Total					39.7	40.7	67.5	77.3	84.5	90.5

Note: Total travel speed is summed up by considering weight of each line.

Transition of typical freight train speed km/h

Line number	Where	Km	Actual max speed	1990	Actual	By committed	Phase 1	Phase 2	Phase 3	after 2020
No 11	Sarajevo-Ploce	193.5		48.9	23.5	23.5	44.0	48.9	48.9	48.9
No 12-1	Samac-Doboj	60.6	50							
No 12-2	Doboj-Sarajevo	172.4	50,70							
No 12	Samac-Sarajevo	233.0	50,70	45.7	35.0	38.7	41.1	45.7	45.7	45.7
No 13-1	Doboj-Tuzla	57.6	50							
No 13-2	P. Novo-Tuzla	30.5	50							
No 14	Brcko-Sicki Brod	63.4								
No 15	Petrovo Novo-Zvornik	81.0	50							
No 16	Doboj-Novi Grad/Bos Novi	180.0	70	58.0	43.5	43.5	52.2	58.0	58.0	58.0
No 17	Novi Grad/Bos Novi-Bihac	65.8	50							
Total										

The difference of train speed between freight and passengers is relatively few in actual stage because of the maximum speed is limited to low areas of 40/50 km/h for fear of derailment.

The rail condition and running gear of rolling stock are improved by the progress of maintenance condition and the train maximum speed will be raised up to former conditions.

Before the war, the track was still not sufficient for running to physical allowable speed by lack of enough maintenance work. By considering the importance of leveling up the train operation speed, such serious situation, that restrict competitiveness of railway, will be solved in the progress of improvement by improving the curvatures, rolling stock running gears, electrification, double tracking projects, tunnel projects, etc.

Firstly the effect will be released on the intercity passenger express trains and the difference of speed between freight and passenger trains will be enlarged. The average freight train speed will not appear clearly, although improvement of curvatures, track conditions, electrification, double tracking will reveal the effect on speed up and efficiency on the usage of rolling stock, etc.

The effects of freight trains are belonging to the future heavy investment as shown in the above, and the speed data given in the above table do not consider their effect because the speed difference will cause also the negative effect on the freight train average speed by waiting the higher speed trains at intermediate stations.

The study team expects that train operation speed will recover the pre-war level by 2005.

7.4 COST ESTIMATION

Necessary investment cost is shown in Table 7.4. The cost is the value in year 2000 constant KM.

Table 7.4 Phase 1 Investment Cost Estimates

(KM million)

		2002	**2003**	**2004**	Total
Rolling	Rolling Stock	47.68	63.57	47.68	158.92
Stock	Workshop	9.05	12.06	9.05	30.2
	Maintenance	6.96	9.28	6.96	23.2
	Subtotal	**63.7**	**84.9**	**63.7**	**212.3**
Infrastructı	Signal & Telecom.	29.23	38.98	29.23	97.4
	Track Maint. Faclty.	13.22	17.63	13.22	44.1
	Curcature Imprv.				0.0
	Track	34.80	46.40	34.80	116.0
	Power Maint. Faclty.	4.87	6.50	4.87	16.2
	Caternary	4.87	6.50	4.87	16.2
	Border Station	3.48	4.64	3.48	11.6
	Subtotal	**90.5**	**120.6**	**90.5**	**301.6**
Total		154.2	205.6	154.2	513.9

7.5 PROJECT EVALUATION

7.5.1 Economic Analysis

(1) General

1) Methodology

The main purpose of the economic analysis is to show the effects of the implementation of the project of "Pre feasibility study of railway improvement project in Phase 1 stage" (hereinafter called as "Project"), from the point of view of the nation's economic well-being and to estimate a return on the resources invested. The economic analysis is an assessment of the economic viability of the Project. For the purposes of evaluation, the economic internal rate of return (EIRR), net present value (NPV) and benefit –cost ratio (BC ratio) are demonstrated.

Economic analysis follows a conventional cost benefit analysis of discounted cash flow methodology. The cost benefit analysis is made by comparison between project benefits and project costs.

The formula of EIRR is shown below:

$$\sum_{t=1}^{n} \frac{\text{Benefits}_t}{(1+R)^t} = \sum_{t=1}^{n} \frac{\text{Inv. cost}_t + \text{O/M cost}_t}{(1+R)^t}$$

where:

Benefits_t	:	Benefits in year t
Inv. cost_t	:	Investment cost in year t
O/M cost_t	:	Operation and Maintenance costs in year t
n	:	Calculation period
t	:	Year t (from 1 to n)
R	:	Value of EIRR

EIRR means the value, which will satisfy the above formula.

The formula of NPV is shown below:

$$\sum_{t=1}^{n} \frac{\text{Benefits}_t}{(1+D)^t} - \sum_{t=1}^{n} \frac{\text{Inv. cost}_t + \text{O/M cost}_t}{(1+D)^t}$$

The formula of BC Ratio is shown below:

$$\sum_{t=1}^{n} \frac{\text{Benefits}_t}{(1+D)^t} \Big/ \sum_{t=1}^{n} \frac{\text{Inv. cost}_t + \text{O/M cost}_t}{(1+D)^t}$$

where:

Benefits_t	:	Benefits in year t
Inv. cost_t	:	Investment cost in year t
O/M cost_t	:	Operation and Maintenance costs in year t
n	:	Calculation period
t	:	Year t (from 1 to n)
D	:	Discounted rate

2) Basic Assumption

The following basic assumptions are made:

i) Cost benefit analysis

Cost benefit analysis is made in comparison between the incremental costs and the incremental benefits, in which "incremental" means the difference between "With project" condition and "Without project" condition.

ii) Precondition on benefit estimation

The benefits are calculated for the planning year of 2005, 2010 and 2020.

For other years than the planning years, estimation by interpolation is made.

iii) Implementation schedule

The construction work of the project is scheduled to be from 2002 to 2004, and the start of service is from 2005.

iv) Calculation period of cost benefit analysis

The base year is 2000. The project life is assumed to be 30 years after the start of service. The calculation period of cost benefit analysis is 35 years from 2000 to 2034.

v) With project and without project

In this economic analysis, while "With project" means the condition in which investment related to "Phase 1" project is implemented, "Without project" stands for the condition in which investment only related to "Committed project" is implemented.

vi) Railway transport demand

The transport demand in "With project" and "Without project" follows the previous section in this chapter (refer to Table 7.5)

Table 7.5 Railway Transport Demand

		2005	2010	2020
With Project	Passenger-km (1,000)	553,000	553,000	553,000
	Ton-km (1,000)	879,000	879,000	879,000
Without Project	Passenger-km (1,000)	102,208	102,208	102,208
	Ton-km (1,000)	292,108	292,108	292,108
Incremental	Passenger-km (1,000)	450,792	450,792	450,792
	Ton-km (1,000)	586,892	586,892	586,892

Source: JICA Study Team

(2) Project Benefits

1) Expected Benefits

Benefits which can be expected by implementation of the Project are as follows:

As a direct benefit,

Saving in time cost regarding railway passengers and freight in transport demand of "Without" condition

Saving in time cost regarding railway passengers and freight in incremental transport demand, and

Saving in operating cost regarding railway passengers and freight in incremental transport demand, and

As an indirect benefits,

Contribution to regional industrial and tourism development

2) Quantitative Benefits

In this economic analysis in the pre feasibility study stage, out of the above, three benefits of i) saving in time cost regarding railway passengers and freight in demand of "Without" condition, ii) saving in time cost regarding railway passengers and freight in incremental demand, and ii) saving in operating cost regarding railway passengers and freight in incremental demand are treated as quantitative benefits.

3) Estimation of Benefits

i) Saving in time cost regarding railway passengers and freight in transport demand of "Without" condition

The saving in time cost regarding railway passengers and freight in transport demand of "Without" condition is calculated based on the difference of passenger-hour and ton-hour between in the case of "With" project and that in "Without" project

condition. The difference of passenger-hour and ton-hour are derived from the difference of travel speed between in "With" project and "Without" project condition. By the train operation service with higher running speed, passengers, and freight in "Without project" condition can enjoy a saving in time cost.

ii) Saving in time cost regarding railway passengers and freight in incremental transport demand

The saving in time cost regarding railway passengers and freight in incremental transport demand is calculated based on the difference of passenger-hour and ton-hour between in the case of "With" project condition (use of railway mode) and that in "Without" project condition (use of road mode). The difference of passenger-hour and ton-hour are derived from the difference of travel speed between in railway mode of "With" project and that in road mode of "Without" project. By the railway operation service with higher running speed than road mode, incremental passengers and freight can enjoy a saving in time cost.

iii) Saving in operating cost regarding railway passengers and freight in incremental transport demand

The saving in operating cost regarding railway passengers and freight in incremental transport demand is calculated based on the difference of operating cost between in the case of "With" project condition (operating cost of railway mode) and that in "Without" project condition (operating cost of road mode).

4) Unit Time Cost

i) General

While the estimation of time cost of passenger is made on the basis of per capita GDP, that of freight is based on the study results in the report of " Development of Branches on Corridor V, Bosnia and Herzegovina Road, Phare, June 2000" (hereinafter called as "Phare Report").

ii) Estimation of unit time cost of passenger

The socioeconomic framework of per capita GDP in BiH (base case) is shown in Table 7.6.

Table 7.6 Per Capita GDP in BiH

(KM in constant year 2000 price)

	2000	2005	2010	2020
BiH	2,261	3,288	4,002	5,404

Source: JICA Study Team

The total annual working hour is assumed as follows:

- Total number of weeks is approximately 52.
- Total working hour per week is assumed to 40 hours. (8.0 hours x 5)
- Gross annual working hour is 2,080 (40 x 52).
- Assumed total number of non working days and hours except Saturday and Sunday is 25 days and 200 hours (25 x 8.0), respectively.
- Total average annual working hours is 1,880 (2,080 – 200)
- Assumed total average annual working hours is 1,800 (approximately).

As a result, per capita GDP per working hour is obtained as shown in Table 7.7.

Table 7.7 Estimated Per Capita GDP per Working Hour

(KM in constant year 2000 price)

	2000	2005	2010	2020
BiH	1.26	1.83	2.22	3.00

Source: JICA Study Team

Using the distribution of trip purpose based on the traffic survey conducted by the Study Team on June 2000, and the assuming the facto (refer to Table 7.8), time value after consideration of trip purpose are obtained. Here, while for the trip purpose of "work / business", 1.0 is given as a factor, for "personal" and "others," 0.5 is given. The results are shown in Table 7.9.

Table 7.8 Distribution of Trip Purpose

(KM in constant year 2000 price)

Trip Purpose	Percentage	Assumed Factor	After factor
Work/business	44.6%	1.0	0.446
Personal	53.0%	0.5	0.265
Others	2.4%	0.5	0.012
Total	100.0%		0.723

Source: JICA Study Team

Table 7.9 Estimated Unit Time Cost of Passenger

(KM in constant year 2000 price)

	2000	2005	2010	2020
BiH	0.91	1.32	1.61	2.17

Source: JICA Study Team

iii) Estimation of unit time cost of freight

Regarding the unit time cost of freight, the data in the above Phare Report are utilized, due to the limitation of data availability. According to the Phare Report, the 1999 time of value for railway freight is EUR 0.28 per ton-hour. Assuming that this value is equivalent to the 2000 value, and using the exchange rate of KM 1.96 per

EUR as of October 31 2000, the year 2000 time value of road freight is obtained as approximately KM 0.55 per ton-hour.

5) Unit Cost of Vehicle Operating Cost (VOC)

Regarding the unit vehicle operating cost, the data in the above Phare Report are utilized, due to the limitation of data availability. According to the Phare Report, the 1999 vehicle operating costs (for existing trunk road) in EUR per km are shown in Table 7.10. Assuming that these values are equivalent to the 2000 value, and using the exchange rate of KM 1.96 per EUR as of October 31 2000, the year 2000 unit vehicle operating costs are obtained as shown in Table 7.10.

Table 7.10 Unit Vehicle Operating Cost (VOC)

Vehicle Type	Unit VOC in EUR per kilometer	Estimated Unit VOC in KM per kilometer
Passenger Car	0.199	0.390
Bus	0.919	1.801
Truck	0.453	0.888
Large Truck	0.863	1.691

Source: Phare Report, and JICA Study Team

These values are not in accordance with the speed range. Regarding the VOC with speed range pattern, the study result of HDM-VOC (version 4) has been incorporated. According to this study result, index by speed range of unit VOC are shown in Table 7.11.

Table 7.11 Unit VOC Index by Speed Range

SPEED (km/hr)	Car Category	Bus Category	Truck Category
10.000	3.086	2.414	2.217
15.000	2.270	1.820	1.694
20.000	1.862	1.526	1.436
25.000	1.619	1.354	1.285
30.000	1.457	1.243	1.189
35.000	1.343	1.166	1.124
40.000	1.258	1.113	1.079
45.000	1.193	1.075	1.048
50.000	1.142	1.048	1.026
55.000	1.102	1.029	1.010
60.000	1.071	1.015	1.000
65.000	1.048	1.006	0.993
70.000	1.029	1.000	0.988
75.000	1.013	0.996	0.985
80.000	1.000	0.994	0.984
85.000	0.990	0.992	0.983
90.000	0.981	0.992	0.983
95.000	0.973	0.992	0.983
100.000	0.968	0.992	0.984

Source: HDM-VOC (version 4)

As a result, unit vehicle operating costs are shown in Table 7.12.

Table 7.12 Unit Vehicle Operating Cost

(KM per vehicle-kilometer)

SPEED (km/hr)	Passenger Car	Bus	Truck	Large Truck
10.000	1.204	4.345	1.973	3.747
15.000	0.885	3.276	1.508	2.863
20.000	0.726	2.747	1.278	2.427
25.000	0.631	2.437	1.144	2.172
30.000	0.568	2.237	1.058	2.009
35.000	0.524	2.099	1.000	1.900
40.000	0.491	2.003	0.960	1.824
45.000	0.465	1.935	0.933	1.771
50.000	0.445	1.886	0.913	1.734
55.000	0.430	1.852	0.899	1.707
60.000	0.418	1.827	0.890	1.690
65.000	0.409	1.811	0.884	1.678
70.000	0.401	1.800	0.879	1.670
75.000	0.395	1.793	0.877	1.665
80.000	0.390	1.789	0.876	1.663
85.000	0.386	1.786	0.875	1.661
90.000	0.383	1.786	0.875	1.661
95.000	0.379	1.786	0.875	1.661
100.000	0.378	1.786	0.876	1.663

Source: JICA Study Team

(3) Estimation of Benefits

1) Saving in Time Cost Regarding Railway Passengers and Freight in Transport Demand of "Without" Condition

According to the engineering study result, the train speed condition is as shown in Table 7.13.

Table 7.13 Train Speed Condition

	Without	With	Difference
Passenger Train	35 km/hour	63 km/hour	28 km/hour
Freight Train	25 km/hour	44 km/hour	19 km/hour

Source: JICA Study Team

The saving in time cost is represented as a difference of passenger-hour / ton-hour between "Without" condition and "With" condition. Passenger-hour is estimated by dividing passenger-kilometer by speed of passenger train, and similarly ton-hour is estimated by dividing ton-kilometer by speed of freight train. The estimation results of difference of passenger-hour and ton-hour between "Without" condition and "With" condition are shown in Tables 7.14 and 7.15, respectively.

Table 7.14 Estimation of Passenger-hour (for Without Transport Demand)

		2005		2010		2020	
	Train Speed (km/ hour)	Pax.-km (1,000) for Without	Pax.-hour (1,000)	Pax.-km (1,000) for Without	Pax.-hour (1,000)	Pax.-km (1,000) for Without	Pax.-hour (1,000)
Without	35	102,208	2,920	102,208	2,920	102,208	2,920
With	63	102,208	1,622	102,208	1,622	102,208	1,622
Difference			1,298		1,298		1,298

Source: JICA Study Team

Table 7.15 Estimation of Ton-hour (for Without Transport Demand)

		2005		2010		2020	
	Train Speed (km/ hour)	Ton-km (1,000) for Without	Ton-hour (1,000)	Ton-km (1,000) for Without	Ton-hour (1,000)	Ton-km (1,000) for Without	Ton-hour (1,000)
Without	25	292,108	11,684	292,108	11,684	292,108	11,684
With	44	292,108	6,639	292,108	6,639	292,108	6,639
Difference			5,045		5,045		5,045

Source: JICA Study Team

The benefits of saving in time cost are calculated as shown in Table 7.16. The unit time values are referred to the previous section of "4) Unit time cost."

Table 7.16 Estimation of Time Saving Benefits for Railway Passengers and Freight in Transport Demand of Without Condition

	Passengers			Freight			Total
	Pax.-hour Saved (1,000)	Unit Time Value (KM/ hour)	Time Saving Benefits (KM 1,000)	Ton-hour Saved (1,000)	Unit Time Value (KM/ hour)	Time Saving Benefits (KM 1,000)	Time Saving Benefits (KM 1,000)
2005	1,298	1.32	1,714	5.045	0.55	2.769	4,483
2010	1,298	1.61	2,086	5.045	0.55	2.769	4,855
2020	1,298	2.17	2.817	5.045	0.55	2.769	5,586

Source: JICA Study Team

2) Saving in Time Cost Regarding Railway Passengers and Freight in Incremental Transport Demand

Railway passengers and freight in incremental transport demand means the diverted demand from road mode, and they can enjoy a saving in time cost due to the difference of travel speed between rail mode and road mode.

The train speed condition in "With condition" is already shown in Table 7.13. The speed condition of road is obtained based on the traffic assignment result in the process of road transport demand forecast.

Here, as a corresponding vehicle type for passenger and freight transport, bus and large truck are assumed, considering the process of road transport demand forecast. The obtained speeds of passenger car are 53 km/hour, 52 km/hour and 45 km/hour for 2005, 2010 and 2020, respectively. The running speed of bus and large truck are assumed to be 80% of that of passenger car, which is equivalent to 42 km/hour, 42 km/hour and 36 km/hour for 2005, 2010 and 2020, respectively. The running speed in road mode shows a decreased trend in accordance with the traffic congestion in road. The comparison of the above speeds between railway mode and road mode is shown in Table 7.17.

Table 7.17 Comparison of Speed Condition between Railway and Road Mode

(km/hour)

		2005	2010	2020
Rail Mode	Passengers	63	63	63
	Freight	44	44	44
Road Mode	Passengers (Bus)	42	42	36
	Freight (Large Truck)	42	42	36
Difference	Passengers	21	21	27
	Freight	2	2	8

Source: JICA Study Team

The saving in time cost is represented as a difference of passenger-hour / ton-hour between rail mode and road mode. Passenger-hour in rail mode is estimated by dividing passenger-kilometer by speed of passenger train, and passenger-hour in road mode is estimated by dividing passenger-kilometer by speed of bus. Similarly, ton-hour in rail mode is estimated by dividing ton-kilometer by speed of freight train, and ton-hour in road mode is estimated by dividing ton-kilometer by speed of large truck. The estimation results of difference of passenger-hour and ton-hour between rail mode and road mode are shown in Tables 7.18 and 7.19, respectively.

Table 7.18 Estimation of Passenger-hour (for Incremental Transport Demand)

	2005			2010			2020		
	Pax.-km (1,000) Incre-mental	Speed	Pax.-hour (1,000)	Pax.-km (1,000) Incre-mental	Speed	Pax.-hour (1,000)	Pax.-km (1,000) Incre-mental	Speed	Pax.-hour (1,000)
Road	450,792	42	10,733	450,792	42	10,733	450,792	36	12,522
Rail	450,792	63	7,155	450,792	63	7,155	450,792	63	7,155
Difference			3,578			3,578			5,367

Source: JICA Study Team

Table 7.19 Estimation of Ton-hour (for Incremental Transport Demand)

	2005			2010			2020		
	Ton-km (1,000) Incre-mental	Speed	Ton-hour (1,000)	Ton-km (1,000) Incre-mental	Speed	Ton-hour (1,000)	Ton-km (1,000) Incre-mental	Speed	Ton-hour (1,000)
Road	586,892	42	13,974	586,892	42	13,974	586,892	36	16,303
Rail	586,892	44	13,338	586,892	44	13,338	586,892	44	13,338
Difference			636			636			2,965

Source: JICA Study Team

The benefits of saving in time cost are calculated as shown in Table 7.20. The unit time values are referred to the previous section of "4) Unit time cost."

Table 7.20 Estimation of Time Saving Benefits for Railway Passengers and Freight in Incremental Transport Demand

	Passengers			Freight			Total
	Pax.-hour Saved (1,000)	Unit Time Value (KM/ hour)	Time Saving Benefits (KM 1,000)	Ton-hour Saved (1,000)	Unit Time Value (KM/ hour)	Time Saving Benefits (KM 1,000)	Time Saving Benefits (KM 1,000)
2005	3,578	1.32	4,725	636	0.55	349	5,074
2010	3,578	1.61	5,752	636	0.55	349	6,101
2020	5,367	2.17	11,650	2,965	0.55	1,627	13,277

Source: JICA Study Team

3) Saving in Operating Cost Regarding Railway Passengers and Freight in Incremental Transport Demand

Railway passengers and freight in incremental transport demand means the diverted demand from road mode, and they can enjoy a saving in operating cost due to the difference of operating cost between rail mode and road mode. Here, incremental operating cost is treated in accordance with the incremental transport demand.

i) Operating cost of rail mode

In this economic analysis, the operating cost of rail mode is assumed to comprise the personnel cost including overhead and the energy cost.

a. Personnel cost

Based on the information obtained interview from Railway Public Corporation, the average personnel cost is obtained to be US$ 2,000 per person / annum. Using the exchange rate of KM 2.32 per US$, this value is equivalent to KM 4,640 per annum (financial price). The portion of tax is obtained to be 35% based on the information obtained interview at Railway Public Corporation. Assuming this ratio, the average unit personnel cost in terms of economic price is obtained as KM 3,440 per annum.

According to the statistical information, the actual number of staff related to railway is 23,856 and 7,314 in 1990 and 2000, respectively. The number of staff in 2005 in "With condition" is estimated as follows:

(1990 actual number) x (transport volume ratio of 2005 to 1990) x (assumed efficiency factor)

The transport volume ratio of 2005 to 1990 is obtained as shown in Table 7.21.

Table 7.21 Estimation of Transport Volume Ratio of 2005 to 1990

	Pax.-km	Ton-km	Total		Ratio
Transport Volume (1990)	1,520,200	4,409,900	5,930,100	(a)	(b)/(a)=
Transport Volume (estimated 2005)	553,000	879,000	1,432,000	(b)	0.25

Source: Transport volume (1990): Community of the Yugoslavia Railways, Statistics, for 1990.
Transport volume (estimated 2005): JICA Study Team

The efficiency factor is assumed to be 1.25 considering the current management condition. As a result, the number of staff in 2005 is estimated to be 7,455 persons (23,856 x 0.25 x 1.25).

The number of staff in 2005 in "Without condition" is assumed to be the same as the actual number in 2000, which is equivalent to 7,314 persons. Thus, the incremental number of staff between "With condition" and "Without condition" is estimated to be 141 persons (7,455 minus 7,314).

Consequently, the incremental personnel cost is estimated to be KM 654 thousand in terms of financial price (KM 4,640 x 141 persons). The incremental personnel cost is estimated to be KM 485 thousand in terms of economic price (KM 3,440 x 141 persons).

Assuming the portion of overhead to personnel cost to be 100%, the incremental personnel cost including overhead portion is estimated to be KM 1,308 thousand and KM 970 thousand, in terms of financial and economic price, respectively.

b. Energy cost

According to the statistical information regarding transport volume and energy cost (Community of the Yugoslavia Railways, Statistics, for 1989 and 1990), the unit energy cost is estimated to be KM 0.01939 per TU-kilometer in terms of financial price. (TU-kilometer means the total value of passenger-kilometer and ton-kilometer.) Assuming the conversion factor to economic price to be 0.87, the unit energy cost is estimated to be KM 0.01687 per TU-kilometer in terms of economic price. (Regarding the conversion factor to economic price is mentioned later in the Section (4).)

The energy cost for the incremental transport demand is estimated as shown in Table 7.22.

Table 7.22 Estimation of Incremental Energy Cost

		2005	2010	2020
Incremental Transport Volume	Pax.-km (1,000)	450,792	450,792	450,792
	Ton-km (1,000)	586,892	586,892	586,892
	TU-km (1,000)	1,037,684	1,037,684	1,037,684
Unit Cost (KM per TU-km)	Financial Price	0.01939	0.01939	0.01939
	Economic Price	0.01687	0.01687	0.01687
Estimated Energy Cost (KM 1,000)	Financial Price	20,120	20,120	20,120
	Economic Price	17,505	17,505	17,505

Source: JICA Study Team

ii) Operating cost of road mode

The operating costs of road mode are estimated as follows:

The incremental transport demand in terms of passenger-kilometer and ton-kilometer are converted into vehicle-kilometer basis using the load factor in road vehicle. Then applying the unit vehicle operating cost to the above calculated vehicle-kilometer, the incremental vehicle operating costs are obtained. The estimation process is shown in Table 7.23.

Here, the load factors of bus and large truck are set-up based on the results of traffic survey conducted by the Study Team. Regarding large truck, the future load factor is assumed to be increased according to the improvement of occupancy rate. The running speeds of bus and large truck are referred to Table 7.17. The unit vehicle operating costs in accordance with running speed are assumed based on those in the similar speed range as shown in Table 7.12.

Table 7.23 Estimation of Incremental Vehicle Operating Costs

			Passengers	Freight	Total
Incremental Demand in Rail Mode			Pax-km (1,000)	Ton-km (1,000)	
	2005		450,792	586,892	
	2010		450,792	586,892	
	2020		450,792	586,892	
Load Factor in Road Vehicle			Bus (persons)	Large Truck (tons)	
	2005		17.1	14.2	
	2010		17.1	14.8	
	2020		17.1	16.1	
Conversion to Vehicle-kilometer (1,000)			Bus	Large Truck	
	2005		26,362	41,330	
	2010		26,362	39,655	
	2020		26,362	36,453	
Unit Vehicle Operating Cost (KM per Vehicle-km)			Bus	Large Truck	
	2005	Speed	42 km/hour	42 km/hour	
		Unit VOC	KM 2.003	KM 1.824	
	2010	Speed	42 km/hour	42 km/hour	
		Unit VOC	KM 2.003	KM 1.824	
	2020	Speed	36 km/hour	36 km/hour	
		Unit VOC	KM 2.099	KM 1.900	
Estimated Incremental			Bus	Large Truck	Total
	2005		52,803	75,387	128,190
	2010		52,803	75,387	125,134
	2020		52,803	69,261	124,595

Source: JICA Study Team

iii) Estimated benefits of saving in operating cost

The incremental operating costs on rail mode and road mode are estimated as shown in the above sections. Table 7.24 shows the summary of the incremental operating costs on rail mode and road mode, and the difference is represents benefits of saving in operating cost.

Table 7.24 Estimation of Benefits of Saving in Operating Cost

(KM 1,000)

	2005	2010	2020
Incremental Operating Cost in Road Mode	128,190	125,134	124,595
Incremental Operating Cost in Rail Mode			
Personnel Cost	970	970	970
Energy Cost	17,505	17,505	17,505
(Rail Total)	18,475	18,475	18,475
Difference	109,715	106,659	106,120

Source: JICA Study Team

4) Summary of Estimated Benefits

The estimation results of benefits are summarized in Table 7.25.

Table 7.25 Summary of Estimated Annual Benefits

(KM 1,000/year)

	Time Saving for Without Demand	Time Saving for Incremental Demand	Operating Cost Saving for Incremental Demand	Total
2005	4,483	5,074	109,715	119,273
2010	4,855	6,101	106,659	117,615
2010	5,586	13,277	106,120	124,983

Source: JICA Study Team

(4) Project Costs

1) Project Costs

The project costs in terms of financial costs are shown in Table 7.26. (Referred to Section 7.4 in this Chapter.) Economic analysis treats an economic cost, which is estimated by eliminating the portion of transfer item such as taxes from financial costs.

Table 7.26 Project Costs (in terms of Financial Price)

(KM million)

		Total
Rolling Stock	*Rolling Stock*	158.92
	Workshop	30.2
	Maintenance Parts	23.2
	(Subtotal)	212.3
Infrastructure	Signal & Telecommunication	97.4
	Track Maintenance Facility	44.1
	Track	116.0
	Power Maintenance Facility	16.2
	Catenary	16.2
	Border Station	11.6
	(Subtotal)	301.6
	Total	513.9

Source: JICA Study Team

2) Estimation of Economic Costs

In this economic analysis, the related taxes to the estimated costs are assumed as the custom duty and the tax on trade on goods and services.

Regarding the tax system (tax ratio), while that of the custom duty are common to Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS), that of the tax on trade on goods and services are different by FBiH and RS.

The tax ratios regarding tax on trade of goods and services in FBiH are 24% in tariff No. 1, 12% in tariff No.2 for goods, and 12% for services. Tariff No. 1 is applied in general. Tariff No. 2 includes commodities related to, for example, energy, basic agricultural / fishery products, products serving for food of people, construction material such as timber, etc. Tariff No. 1 stands for the other commodities than stipulated in tariff No. 2.

Regarding the tax on trade on goods and services in RS, there are two categories of tax rate of 18% and 8%. The tax rate of 18% is applied in general, and that of 8% is, for example, for food products, agricultural / fishery products, electricity, coal, materials for construction such as timber, etc.

Regarding fuel, there are several special taxes both for FBiH and RS.

According to the law on the custom duty, the custom tariff which is considered to be related to project, ranges, roughly speaking, 0%, 5%, 10% and 15%; for example, construction equipment such as crane (0% / 5%), forklift (5%), bulldozer (5% / 10%), machinery for work of road construction (5%), truck (10%), bus (15%), passenger car (15%), rail locomotive (0%), passenger coach (5%), freight wagon (5%), equipment for signal (5%), etc. It should be noted that the above tax ratios are still only shown as a general sample. The actual tax ratio is determined based on the detailed specification of equipment.

For the elimination about tax portion, the following are to be taken into consideration:

In the cost estimates of projects in this pre-feasibility study stage, specification and procurement source of equipment are not fixed. And the breakdown of cost component for local / foreign currency portion and also that for labor / material / depreciation for equipment portion in the total cost is not certain in the pre-feasibility study stage. Therefore, it is difficult to estimate a tax portion.

Regarding the estimation of economic cost, the following are assumed:

In the case of railway project, regarding the custom duty, the following assumption are made:

Although the specification and procurement source of equipment are not fixed, out of the cost items, rolling stock (actually, passenger coach and freight wagon), maintenance parts for rolling stock, signal telecommunication facilities, track maintenance facilities

and power maintenance facilities are assumed to be imported in this economic analysis. And the custom duty ratio of 5% is assumed for the above cost item. And regarding the portion of the other tax than custom duty, i.e. the tax portion including the tax on trade of goods and services, ratio of 15% is assumed to be as a tax portion, considering the share of material cost in total cost.

For the cost item which is conceived to be not related to import, a conversion factor of 0.87 (100 / 115 = 0.87) is assumed.

3) Economic Project Costs

As a result, the economic project costs are estimated as shown in Table 7.27. The annual distribution is based on the assumption of portion of 30%, 40%, and 30% for 2002, 2003 and 2004.

Table 7.27 Project Costs (in terms of Economic Price)

(KM million)

		Total	2002	2003	2004
Rolling Stock	Rolling Stock	131.60	39.48	52.64	39.48
	Workshop	26.20	7.87	10.49	7.87
	Maintenance Parts	19.20	5.76	7.69	5.76
	(Subtotal)	177.04	53.11	70.82	53.11
Infrastructure	Signal & Telecommunication	80.7	24.21	32.28	24.21
	Track Maintenance Facility	36.50	10.95	14.60	10.95
	Track	100.90	30.26	40.35	30.26
	Power Maintenance Facility	13.40	4.03	5.38	4.03
	Caternary	14.10	4.24	5.65	4.24
	Border Station	10.10	3.03	4.03	3.03
	(Subtotal)	255.73	76.72	102.29	76.72
	Total	432.77	129.83	173.11	129.83

Source: JICA Study Team

4) Reinvestment

In this economic analysis, the following life expectancy is assumed as shown in Table 7.28. Assets except signal & telecommunication and catenary, the life expectancy of 30 years is assumed in accordance with the period of project life.

Table 7.28 Assumption on Life Expectancy

(Year)

		Life Expectancy
Rolling Stock	*Rolling Stock*	30
	Workshop	30
	Maintenance Parts	-
Infrastructure	Signal & Telecommunication	15
	Track Maintenance Facility	30
	Track	30
	Power Maintenance Facility	30
	Catenary	10
	Border Station	30

Source: JICA Study Team

Consequently, reinvestments regarding signal & telecommunication and catenary are set-up in accordance with the above life expectancy.

5) Annual maintenance repair cost

The annual maintenance repair cost is estimated base on the assumption of ratio of 2% to the initial investment cost. The economic price of annual maintenance repair cost is obtained by using an above-mentioned conversion factor of 0.87.

(5) Cost Benefit Analysis

Based on the above estimated benefits and the related costs, cost benefit analysis was made. The calculation results are summarized in Table 7.29. This result shows that the Railway Phase 1 Project is economically feasible.

Table 7.29 Summary of Cost Benefit Analysis for Railway Phase 1 Project

EIRR	17.6%
NPV (KM 1,000 at discounted rate of 12%)	154,550
B/C (at discounted rate of 12%)	1.34

Source: JICA Study Team

The detail of cash flow of cost benefit analysis is shown in Table 7.30.

Table 7.30 Cash Flow of Cost Benefit Analysis (Railway Phase 1 Project)

EIRR :	17.6%	
NPV :	154,550 (KM 1,000 at Discounted Rate:	12.0%)
B/C :	1.34 (at Discounted Rate :	12.0%)

(KM 1,000)

		Benefits				Costs					Net
		Time Saving for Without Demand	Time Saving for Increm. Demand	Operating Cost Saving for Increm. Demand	Total	Invest.	Maint. Repair	Personnel Cost (including Overhead)	Energy Cost	Total	Cash Flow
1	2000				0					0	0
2	2001				0					0	0
3	2002				0	129,830				129,830	-129,830
4	2003				0	173,110				173,110	-173,110
5	2004				0	129,830				129,830	-129,830
6	2005	4,483	5,074	109,715	119,273	0	8,655	970	17,505	27,130	92,142
7	2006	4,557	5,280	109,104	118,941	0	8,655	970	17,505	27,130	91,811
8	2007	4,632	5,485	108,493	118,609	0	8,655	970	17,505	27,130	91,479
9	2008	4,706	5,690	107,881	118,278	0	8,655	970	17,505	27,130	91,148
10	2009	4,781	5,895	107,270	117,946	0	8,655	970	17,505	27,130	90,816
11	2010	4,855	6,101	106,659	117,615	0	8,655	970	17,505	27,130	90,484
12	2011	4,928	6,818	106,605	118,352	0	8,655	970	17,505	27,130	91,221
13	2012	5,001	7,536	106,551	119,088	0	8,655	970	17,505	27,130	91,958
14	2013	5,074	8,253	106,497	119,825	0	8,655	970	17,505	27,130	92,695
15	2014	5,148	8,971	106,443	120,562	14,130	8,655	970	17,505	41,260	79,302
16	2015	5,221	9,689	106,389	121,299	0	8,655	970	17,505	27,130	94,169
17	2016	5,294	10,406	106,335	122,036	0	8,655	970	17,505	27,130	94,905
18	2017	5,367	11,124	106,282	122,772	0	8,655	970	17,505	27,130	95,642
19	2018	5,440	11,842	106,228	123,509	0	8,655	970	17,505	27,130	96,379
20	2019	5,513	12,559	106,174	124,246	80,700	8,655	970	17,505	107,830	16,416
21	2020	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
22	2021	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
23	2022	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
24	2023	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
25	2024	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
26	2025	5,586	13,277	106,120	124,983	14,130	8,655	970	17,505	41,260	83,723
27	2026	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
28	2027	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
29	2028	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
30	2029	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
31	2030	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
32	2031	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
33	2032	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
34	2033	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853
35	2034	5,586	13,277	106,120	124,983	0	8,655	970	17,505	27,130	97,853

Source: JICA Study Team

7.5.2 Financial Analysis

(1) General

1) Methodology

The main purpose of the financial analysis is to show the financial viability of the project of "Pre feasibility study of railway improvement project in Phase 1 stage" (hereinafter called as "Project"), from the point of view of the project implementation body. For the purposes of evaluation, the financial internal rate of return (FIRR) is demonstrated.

Financial analysis follows a conventional cost benefit analysis of discounted cash flow methodology. The cost benefit analysis is made by comparison between project benefits (revenues) and project costs. In the case of financial analysis, benefits represent financial revenues.

The formula of FIRR is shown below:

$$\sum_{t=1}^{n} \frac{\text{Revenues}_t}{(1+R)^t} = \sum_{t=1}^{n} \frac{\text{Inv. cost}_t + \text{O/M cost}_t}{(1+R)^t}$$

where:

Revenues_t	:	Revenues in year t
Inv. cost_t	:	Investment cost in year t
O/M cost_t	:	Operation and Maintenance costs in year t
n	:	Calculation period
t	:	Year t (from 1 to n)
R	:	Value of FIRR

FIRR means the value, which will satisfy the above formula.

2) Basic Assumption

The following basic assumptions are made:

i) Incremental revenues and incremental costs

Cost benefit analysis is made in comparison between the incremental costs and the incremental revenues, in which "incremental" means the difference between "With project" condition and "Without project" condition.

ii) Precondition on revenues estimation

The revenues are calculated for the planning year of 2005, 2010, and 2020. For other years than the planning years, estimation by interpolation is made.

iii) Implementation schedule

The construction work of the project is scheduled to be from 2002 to 2004, and the start of service is from 2005.

iv) Calculation period of cost benefit analysis

The base year is 2000. The project life is assumed to be 30 years after the start of service. The calculation period of cost benefit analysis is 35 years from 2000 to 2034.

v) With project and without project

In this economic analysis, while "With project" means the condition in which investment related to "Phase 1" project is implemented, "Without project" stands for the condition in which investment only related to "Committed project" is implemented.

vi) Railway transport demand

The transport demand in "With project" and "Without project" follows the previous section in this chapter (refer to Table 7.5 in Section 7.5.1.)

(2) Project Revenues

1) Fare Level

i) Information of Railway Public Corporation

Based on the information obtained from Railway Public Corporation, the fares of passenger and freight are estimated to be KM 0.0413 per passenger-kilometer and KM 0.14 per ton-kilometer, respectively. The estimation process is as follows:

- According to the recent transport data in Railway Public Corporation, the average passenger trip length is 105 kilometer, and the corresponding fare is KM 6.2. As a result, the fare is estimated to be KM 0.059048 per passenger-kilometer. Assuming the average discount rate to be 30%, the passenger fare after discount is estimated to be KM 0.0413 per passenger-kilometer.

- According to the recent transport data in Railway Public Corporation, the average freight trip length is 150 kilometer, and the corresponding fare is KM 6.2 per ton-kilometer. As a result, the fare is estimated to be KM 0.2 per ton-kilometer. Assuming the average discount rate to be 30%, the freight fare after discount is estimated to be KM 0.14 per ton-kilometer.

ii) Assumption on fare level

According to the information of USAID regarding other countries' railway fare, the world railroad industry considers US$ 3 cents per ton-kilometer as a standard cost target rate. This is equivalent to KM 0.0696 per ton-kilometer, using the exchange rate of KM 2.32 per US$. Thus, although the data is only mention about freight, the fare level of Railway Public Corporation can be said to be, roughly speaking, approximately twice that of world railroad industries.

In the revenue estimation in financial analysis, consequently, regarding the fare level, several alternative cases are assumed, setting-up the fare level of Railway Public Corporation to be a base case, as shown in Table 7.31.

Table 7.31 Assumption on Fare Level

	Passenger	Freight
Base Case of Fare	KM 0.0413 per pax.-kilometer	KM 0.14 per ton-kilometer
Case 1	75% of Base Case	75% of Base Case
Case 2	50% of Base Case	50% of Base Case

Source: JICA Study Team

2) Incremental Transport Demand

The incremental transport demand is shown below (Refer to Table 7.5):

		2005	2010	2020
Incremental	Passenger-km (1,000)	450,792	450,792	450,792
Transport Demand	Ton-km (1,000)	586,892	586,892	586,892

3) Estimation of Revenues (railway operation revenue)

By using the above assumed fare and the incremental transport demand, railway operation revenues are estimated as shown in Table 7.32.

Table 7.32 Estimation of Revenues

(KM 1,000)

		2005	2010	2020
Base Case of Fare	Passengers	18,618	18,618	18,618
	Freight	82,165	82,165	82,165
	Total	100,783	100,783	100,783
Case 1	Passengers	13,963	13,963	13,963
	Freight	61,624	61,624	61,624
	Total	75,587	75,587	75,587
Case 2	Passengers	9,309	9,309	9,309
	Freight	41,082	41,082	41,082
	Total	50,391	50,391	50,391

Source: JICA Study Team

4) Estimation of Other Revenues (compensation)

The compensation for the amount of discount of fare is assumed. Although as mentioned previously the discount rate for fare is 30%, the portion of compensation is assumed to be 5% of revenues in this financial analysis.

5) Estimation of Other Revenues (revenue from rental of optical fiber cable)

The investment plan of Phase 1 includes a facility of optical fiber cable along railway line. Railway Public Corporation has a plan to rent an optical fiber cable for the portion of capacity over its own usage to a private telecommunication company. The expected rental revenue is assumed to be KM 10,000.

Regarding this revenue item, the alternative of two cases; "with rental revenue" or "without rental revenue" is assumed in the revenue estimation.

(3) Project Costs

1) Project Costs

The project costs in terms of financial costs are shown in Table 7.26 in Section 7.5.1.

2) Reinvestment

As similar to "Economic Analysis" (refer to the Section (4), 7.5.1), reinvestments are set-up.

3) Annual Maintenance Repair Cost

As similar "Economic Analysis" (refer to the Section (4), 7.5.1), annual maintenance repair cost is set-up.

(4) Estimation of FIRR

Based on the above estimation of revenues and the costs, FIRR for the Phase 1 railway project is calculated as shown in Table 7.33. The detail of cash flow for FIRR calculation for the case of "base case" regarding fare level and "without rental revenue" is shown in Table 7.34. In the case of "without rental revenue", FIRR values in "base case", "75% of base case" and "50% of base case" regarding fare level show 11.9%, 6.9% and –0.1%, respectively. In the case of "with rental revenue", FIRR values in "base case", "75% of base case" and "50% of base case" regarding fare level show 13.6%, 8.9% and 3.0%, respectively. These results suggest that fare level equivalent to a world railroad industry is difficult to support a sound financial condition.

Generally speaking, FIRR in the "base case" of fare level show rather high value as a FIRR value for a railway project. This can be explained by an existence of "sunk cost." The phase 1 railway project is not a "new" project but a rather "improvement" project. Consequently, investment amount is rather small compared to "new" project. The existing facilities (in the condition after implementation of "Committed project") can be utilized as a base, which can be considered as a "sunk cost."

Table 7.33 FIRR for Phase 1 Railway Project

Fare Level	Rental	
	Without Rental Revenue	With Rental Revenue
Base Case	11.9%	13.6%
75% of Base Case	6.9%	8.9%
50% of Base Case	-0.1%	3.0%

Source: JICA Study Team

Table 7.34 Cash Flow of FIRR (Railway Phase 1 Project)

FIRR : 11.9%

(KM 1,000)

		Revenues							Costs					
		Railway Operation Revenues			Other Revenues			Grand Total	Invest.	Maint. Repair	Personnel Cost (including Overhead)	Energy Cost	Total	Net Cash Flow
		Passe-ngers	Freight	Total	Compen-sation	Rental Revenue	Total							
1	2000												0	0
2	2001												0	0
3	2002								154,164				154,164	-154,164
4	2003								205,552				205,552	-205,552
5	2004								154,164				154,164	-154,164
6	2005	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
7	2006	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
8	2007	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
9	2008	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
10	2009	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
11	2010	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
12	2011	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
13	2012	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
14	2013	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
15	2014	18,618	82,165	100,783	5,039	0	5,039	105,822	16,240	10,278	1,308	20,120	47,946	57,875
16	2015	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
17	2016	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
18	2017	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
19	2018	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
20	2019	18,618	82,165	100,783	5,039	0	5,039	105,822	97,440	10,278	1,308	20,120	129,146	-23,325
21	2020	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
22	2021	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
23	2022	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
24	2023	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
25	2024	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
26	2025	18,618	82,165	100,783	5,039	0	5,039	105,822	16,240	10,278	1,308	20,120	47,946	57,875
27	2026	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
28	2027	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
29	2028	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
30	2029	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
31	2030	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
32	2031	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
33	2032	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
34	2033	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115
35	2034	18,618	82,165	100,783	5,039	0	5,039	105,822	0	10,278	1,308	20,120	31,706	74,115

Source: JICA Study Team

7.6 IMPLEMENTATION SCHEDULE

Table 7.35 shows an implementation schedule of the railway Phase 1 improvement project.

Table 7.35 Implementation Schedule

Item \ Year	2001	2002	2003	2004
Feasibility Study and Detailed Design	■			
Construction		■	■	■

For further details of the implementation schedule, a full scale of feasibility study will be necessary to clarify technical issues as well as funding methodologies.

7.7 RECOMMENDATION

The Phase 1 railway improvement plan was justified by the economic and financial analyses. The EIRR was 17.6 %, which is exceptionally high value for a railway project. The FIRR was also high enough. These results are considered as a result of "sunk cost" effect, because the railway has enormous railway assets, even though the damages were so severe. Additional investment to the railway reconstruction will contribute to BiH industries and economy a lot.

However, the study team strongly recommends that a full scale of feasibility study should be conducted for the realization of the project to confirm the feasibility more precisely. The study team believes that the railway reconstruction is one of key factors to revitalize the overall economy of Bosnia and Herzegovina, since the railway lines locate at most densely populated area of the country and the railway should do roles in the transport sector which would contribute the total transport system of the country more effective and efficient.

CHAPTER 8: TRANSPORT TRAINING INSTITUTE DEVELOPMENT PLAN

8.1 NEED FOR EXPERTISE BUILDING

Transport in all its different dimensions has become very complex and different levels of expertise have emerged with the introduction of innovative techniques and technologies. The complexity of transport knowledge is no longer limited to the physical transport of goods and passengers, but has expanded towards a set of complex issues:

- Complexity of the regulatory environment;
- Complexity of the operational transport systems;
- Complexity of efficient transport management and the applied management systems;
- Complexity of applied technology and techniques (including automated systems);
- Complexity of international markets.

Consequently, humanware development in BiH cannot be limited to professional training and education of transport operators but has to be extended towards all public and private stakeholders, including corporate managers and public decision-makers. Given the complexity of transport, expertise building is a critical success-factor that has to be *urgently* attended to guarantee that the future transport system is used, maintained, and improved according to EU and international standards and practices. *The lack of modern and dedicated training and education constitutes at present a serious cross-modal problem.*

Three country-specific evolutions caused the present situation, namely:

- The emigration of high quality professionals immediately after the war;

- The lack of training and education for the remaining experts, which causes a substantial difference between their present knowledge base and the modern techniques and technologies applied in modern logistics;

- The present need to train local experts in European institutes enables BiH experts to find employment in Europe and do not return home.

All professional experts and public representatives recognize the lack of professional staff and consider this a critical problem that requires immediate attention. They argue that training and education in modern techniques and technologies and in integrated logistics is a basic requirement to develop transport in BiH in the future. Representatives from the profession emphasize the need for basic practical training to ensure a minimum quality level at all levels of the transport system.

A general overview of required expertise for both private and public stakeholders is provided in the figure hereafter.

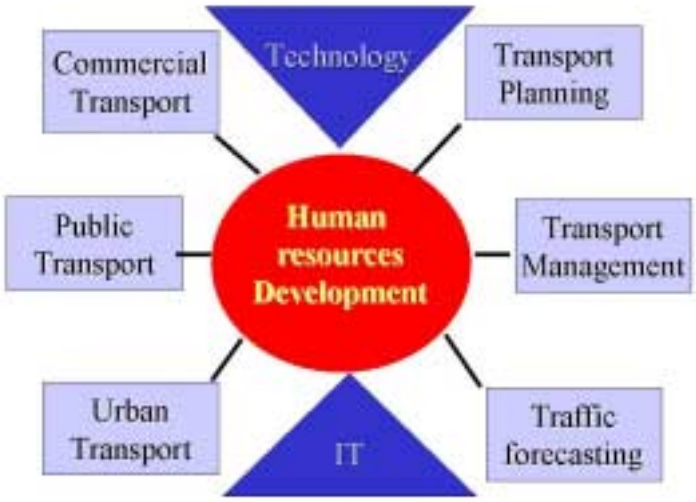


Figure 8.1 General Fields of Transport Expertise

To ensure that sustainable expertise is build in BiH, the creation of a **Transport Training Institute** should be a short-term objective. In support of the activities of the Transport Training Institute, a strategic planning instrument should be developed and later implemented. The staff of the Institute will also have to be familiarized with the instrument and stimulated to use this instrument to tackle the ongoing and coming required changes within and outside the Transport Training Institute in an efficient and effective way.

The long-term objective of the proposed development plan is to ensure the continuity of the Institute as an efficient and effective institution for the transport industry, which can be achieved by creating "stability" during the development processes and by ensuring that quality of training is at a high international level. This high international level means

also recognition of the **certificates** to be issued by the Institute as being equal to those of the traditional Western nations.

Specific targets have therefore to be set for the Transport Training Institute in terms of organization, structure, and expertise level so that this institute can contribute to the sustainable development of human expertise in the transport sector.

8.2 IMPLEMENTATION CONTEXT

The organization of training and education in BiH should be organized in such a way that cooperation with the different stakeholders is direct and efficient. Concentration and rationalization of the training and education system is, therefore, a key issue in the development program. Because the final goal of the Transport Training Institute is to issue certificates, accepted by both entities and the international community, the organizational issue, including the relation with public authorities is a priority concern in the realization of the Transport Training Institute for Bosnia and Herzegovina. The training and education program needs to be developed to European quality standards and international practices and the related certificates homologated at the international level. It is essential that foreign expertise be incorporated into the development plan of the BiH training and education program.

(1) Structure

Controlling and monitoring the training and education programs is essential for international acceptance. A structure is therefore necessary to guarantee international quality standards in the training and education programs. Equal standards and certification methods in both Entities are essential to obtain international acceptance and support.

(2) Expertise

Expertise in the transport sector and at the level of public authorities responsible for transport issues is a critical issue. The available expertise in the public and private sectors is at present below the required standards. Both basic and advanced training for public and private transport professionals is essential to ensure the sustainability of future development of the transport sector in BiH. The proposed development plan for the Transport Training Institute incorporates all the above-described targets and considers not only the training and education aspects, but also the organizational, structural, and financial aspects to strengthen the training functions for the entire BiH transport system.

8.3 AVAILABLE TRAINING AND EDUCATION FACILITIES IN BIH

Three important initiatives / facilities are presently ongoing / available in BiH that have direct or indirect relevance to the conditions for establishing the Transport Training Institute in BiH.

(1) The Universities in Bosnia and Herzegovina

At present, transport related courses are provided in the University of Sarajevo and Banja Luka.

In Sarajevo, transport courses are scheduled under the Faculty of Civil Engineering. This Faculty has 4 sections, each including an Institute for "commercialization" of the available expertise. The Department for Traffic degree (traffic engineer) can be obtained after a 5-year program, consisting of 9 semesters and 1 semester for the Thesis. The focus is still on basic physical traffic engineering problems but plans exist to extend the courses and adapt these to European level. This would include courses such as traffic management, logistics, etc. The university of Sarajevo also offers post-graduate courses in transport in collaboration with foreign Universities via the Department of Transport. The impact of the war on the performance of the university has been devastating. Experts have left the country, infrastructure has been damaged and equipment has been destroyed or stolen.

The University in Banja Luka only offers a basic course on transport within the Faculty of Civil Engineering.

(2) PHARE Program on Institutional Reforms

At present, the European Commission under the PHARE program funds a large-scale project for institutional reforms. This project includes a segment related to the training of civil servants. Within that context, civil servants in BiH responsible for and working on transport related issues could be trained in basic aspects of transport. These training courses could be developed within the context of the Transport Training Institute in collaboration with the PHARE project. It is likely that several courses such as computer knowledge and basic management training for civil servants could be provided on a joint basis.

(3) PHARE Program on Transport Training

Since 1999, a multi-year transport training program is ongoing in Bosnia and Herzegovina. The project includes international experts to establish training courses in international road freight transport and ADR transport according to EU standards (see proposal COM(97) 25 final and COM(97) 501 final and Council Directive 98/76/EC amending Directive 96/26/EC on the admission to the occupation.

The program has established an Institute for Education within the framework of the Chamber of Industry of Bosnia and Herzegovina (Sarajevo). The Institute for Education has recently applied for membership of EUROTRA (European Transport Training Association).

The main objective of the Institute is to establish and operate a training facility for road transport in accordance with existing UN/ECE and EU standards. According to the terms of reference, the Institute should in future issue valid certificates for professional competence for road haulage and road passenger operators. The long-term objective for the Institute is to become self-sustainable.

8.4 WHY THE TRANSPORT TRAINING INSTITUTE?

- Passenger and freight transport, using different modes and intermodal constructions will become increasingly important when the BiH economy further develops. International and inter-entity transport will increase and cooperation with foreign industries and transport service providers will prevail.

- This evolution will force private transport operators and public authorities to improve the present transport offer to a level that meets international standards. To achieve this goal, operators in the transport sector and civil servants organizing, controlling and assisting the transport sector in its development need to have the necessary up-to-date expertise and knowledge about the legislation, regulations and organization of international passenger and freight transport, and this for all transport modes (air, road, rail, water, combined and intermodal).

- During and after the war, academic and professional experts have left the country and have therewith disrupted the knowledge base of Bosnia and Herzegovina. As a direct consequence, the training and education offer for transport related subjects is limited, endangering the further draining of expertise because the younger generations will lack sufficient training in stat-of-the-art transport and logistics.

- Although several initiatives are ongoing in the field of transport training and education, the offer remains too limited to meet future demands. Furthermore, the focus of these programs is on specific segments of transport (e.g., engineering or road transport) and do not integrate these aspects in the total transport problem. Undoubtedly, there is an urgent need to establish a Transport Training Institute at the level of the country (possibly the Balkan regions) that approach transport from an integrated multi-modal perspective, offering a wide variety of relevant courses at a high level of education that meets European standards, rules and regulations.

- The final objective of the Transport Training Institute is to train public and private experts in all fields of transport and logistics. Certificates that are recognized at the European level should validate their expertise. The integration

of all courses into a single "official" Transport Training Institute will facilitate the processes related to the courses, exams, the evaluations, certification and recognition of it etc....

- The diversification of training initiatives is interesting in a well-developed market economy where several recognized institutes compete. Generally, this has a positive effect on the prices of the courses. However, in transition countries such as Bosnia and Herzegovina, the social, economic and political conditions are not suitable to introduce private and competitive activities in expertise building. This section of the development of the country needs careful monitoring and supervision to assure that the transition can continue under optimal conditions and according to international standards.

- The development of the Transport Training Institute should also be considered from an international dimension. What could be the role of that institute in the greater Balkan region and how should that institute be connected to / cooperating with European institutes and universities. These questions and others need to be answered in order to determine the future structure of the Transport Training Institute for Bosnia and Herzegovina.

Finally, there is also an economic dimension related to the project. An integrated approach to transport training and education, accepted and validated at the national, European and international level, could create value added to the Institute. They could attract foreign students and professionals to follow specialized training and education at the Institute. Their presence in Bosnia and Herzegovina would generate revenues to the country and the institute, improving therewith the possibility of becoming self-sustainable in the medium-term.

Provision of modern transport training thus requires a practical approach to training and education in all relevant segments of transport, including freight forwarding, intermodal transport chain management, document flows, technological and technical applications, dangerous goods etc. Furthermore, the establishment of the Institute should take into consideration all related operational, regulatory/institutional and structural/financial problems via the creation of a ***roll-out plan for the Transport Training Institute*** during the first phase of the project.

8.5 ROLL-OUT PLAN

(1) Activities

The development of a roll-out plan for the Transport Training Institute is the first and most critical phase in the concrete development of the Institute. The design of the plan includes following steps among others:

- Investigate the present situation in BiH:

- Investigate the existing training and education facilities and available expertise
- Benchmark existing facilities and expertise with European examples
- Identification of needs;

- Design the detailed need for foreign assistance in the concrete establishment of the Transport Training Institute in terms of equipment and human expertise and design a detailed timetable and allocation of human and financial resources for the implementation of the project.

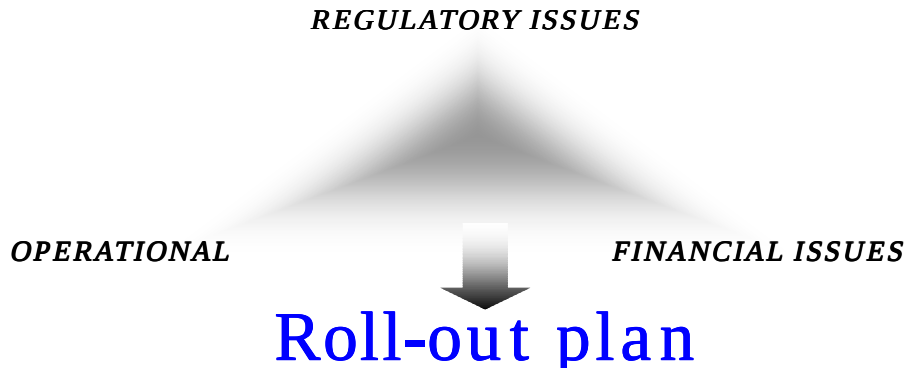
- Evaluate the practical conditions of integrating existing training and education initiatives and design the structure of the integrated Transport Training Institute for BiH;

- Evaluate the situation in the larger Balkan region and determine the international potential of the Institute;

- Assess the availability of infrastructure and identify one of more suitable locations for the establishment of the different training and education departments of the Institute;

- Assess the political and regulatory framework in which the Transport Training Institute should operate and identify the needs for national and international validation of the certificates issued by the Transport Training Institute

The first phase of the project (design of roll-out plan) thus concentrates on 3 critical issues that will determine the shape and structure of the Transport Training Institute. These 3 issues are visualized in next figure.



The regulatory / institutional issues consider a very important first element of attention in the roll-out plan. In this section, possibilities and structures have to be proposed on the ownership of the Institute, the involvement of public and private stakeholders, the relationships between the partners, etc.

The complexity of the institutional environment is visualized in Figure 8.2.

Figure 8.2 Regulatory Framework

On the one hand, decisions have to be taken regarding the relation between the Transport Training Institute and the different levels of government (Entities, Country, International authorities). Simultaneously, the future development of the Transport Public Corporation has to be taken into consideration and the relation between both organized. Secondly, structures have to be proposed regarding the relation between the TTI and the universities and training institutes both in BiH and in Europe (in particular with a well-established European Institute for the future agreement of a strategic alliance).

As regards the operational conditions, the framework has to be set for modern, flexible, and practical training courses. The available courses at BiH universities and institutes as well as other initiatives (e.g. PHARE) have to be evaluated and compared with European and international training and education standards. Specific provisions have to be incorporated in the operational roll-out plan to adapt training and education facilities to the specific conditions in BiH.

Finally, an important element in the roll-out plan is the financial analysis. In that context, it is essential that the future self-sustainability of the institute is taken into consideration and plans are proposed on how to secure future revenues (Figure 8.3).

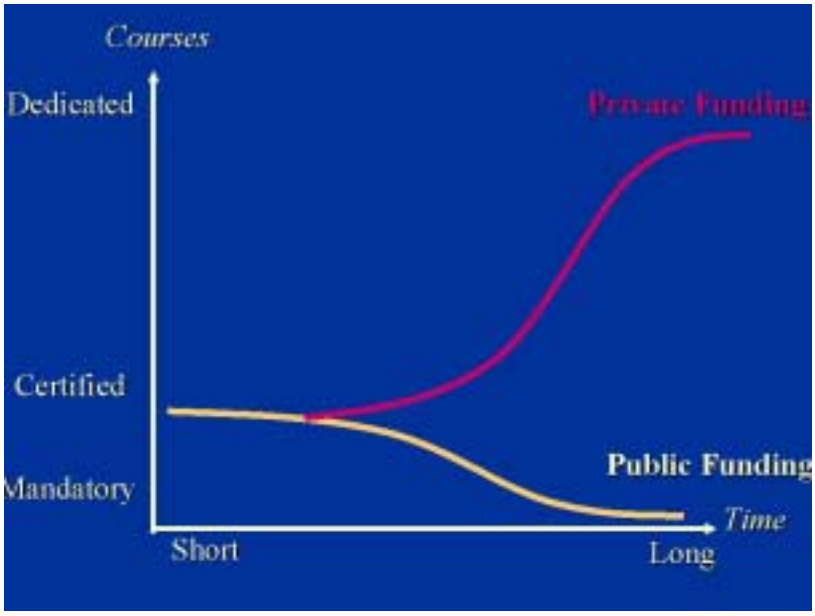


Figure 8.3 Financial Framework

As demonstrated in Figure 8.3, the financial framework has a long-term objective of self-sustainability through private funding. The level of private funding will have to be related to the different types of courses that will be offered at the institute. The mandatory and certified courses will in time remain partly public funded, while the dedicated courses (and in time the certified courses and parts of mandatory courses) will have to be privately funded through tuition fees.

The draft roll-out plan will be evaluated via:

- Discussions with local teachers/trainers. These discussions will aim to determine the need for upgrading expertise. Also the need for upgrading the know-how of supporting staff (administration, technical staff, etc.) should be determined in this procedure.

- Follow–up interviews with public authorities and technical experts, responsible for the development of transport and of education in BiH.

- Discussions with relevant experts (e.g., World Bank, EBRD, EIB, EU, OHR, etc) regarding the planned and ongoing training needs and programs for BiH.

The optimal concept of the future Transport Training Institute will thus be decided in close cooperation with university experts, the Institute for Education of the Chamber of Industry, the PHARE program for assistance to institutional reform and the relevant public authorities in BiH.

(2) Budget Information Related to Phase 1 of the Project

Item	Goal	Time (months)	Budget (KM)
Expertise	Identification of local and international experts to conduct the different analyses	1	30,000
Tenders	Issuing tenders for the selection of experts according to the regulations of the donor	2	60,000
Selection	Selection of experts	1	30,000
Analyses	Analysis of the political, operational and location conditions related to the establishment of the Transport Training Institute (*for details see above*)	10	320,000
Conclusions	Development and approval by client of roll-out plan (including budget for phase 2 of the project)	4	60,000
TOTAL		**18**	**500,000**

After approval of the roll-out plan and the therewith related need of human and financial resources, the second phase can be initiated on the basis of the agreed upon plan.

8.6 PHASE 2: ESTABLISHMENT OF TRANSPORT TRAINING INSTITUTE

(1) Activities: General Overview

In the second phase, all steps identified in the agreed upon roll-out plan will be implemented. Solutions have to be found for all operational, legal and location problems and this within the timeframe and budget as calculated in the roll-out plan. For that reason, the tender procedure in phase 1 is very important. The selection of the right experts will proof its value during the second phase in terms of time – and cost – efficiency during the execution of the project.

The establishment of the Transport Training Institute consists of several phases, which are:

- Ensure that the necessary expertise will be available once the institute becomes operational
- Organize the location(s) for the different departments of the Transport Training Institute
- Ensure that all vocational materials are state-of-the-art and meet European and international standards
- Negotiate agreements with local universities and the Chamber of Industry's Institute for Education on the terms of the cooperation
- Negotiate cooperation conditions with International institutes and universities
- Formalize the establishment with the relevant public authorities in Bosnia and Herzegovina, the two Entities and the International institutions
- Formalize the certification and examination procedures in terms of recognition and official validation

(2) Expertise Building

The development of an international recognized Transport Training Institute requires public and private decision makers, responsible for the control and management of the Institute, to have sufficient knowledge about the transport sector and the way training and education for transport is given. Also key persons that will be directly involved in the transport training activities (training and teaching staff) should be introduced with the state-of-the-art in transport training and education.

Expertise building will therefore include a combination of **practical training courses and study tours** to selected training institutes, education facilities, and public authorities. The study tours are beneficial because they will provide in-depth insight in the *organization and operations of high quality transport training institutes, education centers such as universities*.

For the future trainers and teachers, the expertise-building program foresees a **Train-the-Trainers Program** where the future training and education staff will be trained according to their individual expertise and needs. The training will include

1) Modern Logistics

In this module the background of modern logistics is explained. It deals with questions like how goods flows come about and what the term "logistics" stands for. A systems approach is presented to help defining traffic flows, borders, starting- and endpoints and

transfer points. The field of logistics will also study logistics influence on other departments in a company and will include an introduction to transport economics, where logistic costs are analyzed. Finally, the roles of the different means of transport, distribution centers, terminals, and storage facilities are discussed.

2) Forwarding

Forwarders can be regarded as the "architects of the transport." They set up transport flows and keep them going. On the physical distribution side attention is paid to public warehousing, Distribution Requirements and Resources Planning, Material Requirements Planning and Manufacturing Resources Planning as well as Roles of the forwarder, integration with truckers, distribution centers and storage facilities.

3) Document Flows

The Bill of Lading and the Connossement and their different use, aspects and problems are discussed in detail in this module. For road transport the CMR, for rail transport the CIM, the Air Waybill for air transport and the DGC for sea/air transport are discussed separately and in combination. Furthermore, insurance certificates, packing, and type of goods are analyzed in detail. Seller's risks, Buyer's risks and claims are subjects of this module. The relations between transport documents, customs documents and payment documents are given in-depth attention. The use of INCO-terms and the different aspects of each of the terms are explained. A detailed description on the aspects of terms and critical points (costs, risks, documents) gives not only theoretical but also practical expertise.

The **Train-the-Trainers Program** also includes vocational and managerial training. The trainers will be introduced in the use of new technologies such as distant learning, Internet applications, interactive courses on computer and via Internet, etc. Training the trainers program will also include social / practical training modules such as:

- Flexible learning & multi-form learning;
- Distant learning;
- Study techniques;
- Modular training;
- Designing/adapting study and teaching material;
- Open/flexible curriculum design;
- Self-instructional study material;
- Teacher's role; student's role;
- Contemporary adult pedagogy.

(3) Establishment of the Transport Training Institute

The development of the Institute plan includes following concrete steps:

- Guidance and technical assistance during the process of establishing the training institute
  - Selection of location(s) for the institute
  - Conclude cooperation agreements with local institutes and universities
  - Conclude cooperation agreements with international institutes and universities
  - Formalization of the Transport Training Institute in relation to regulatory and political issues;
- Assistance in procurement of training staff;
- Assistance in obtaining training skills (a *train-the-trainers program*);
- Assistance in curriculum design; and
- Assistance to the institute in becoming self-supporting.

Foreign experts will provide the necessary technical assistance in the concrete establishment of the Transport Training Institute. This assistance includes among others

- Identification of necessary teaching equipment (computers, printers, projectors, etc);
- Installment and testing of the equipment; and
- Familiarization of staff with new teaching equipment.

Similar assistance will be provided in the selection of teaching staff for the Transport Training Institute. In collaboration with the responsible authorities, the best selection procedure will be determined to guarantee the necessary quality levels of the staff, responsible for future training activities.

(4) Transport Training Curricula

The development of transport training curricula is the next segment in this phase of the program. Some important principles are applied in the development of the training programs and courses:

- The program and courses are **modular-based**, meaning that the traditional curricula are split up in small(er) units, modules, which are elaborated in direct contact with the market / stakeholders and with consideration taken of future needs. This has several advantages in comparison with the more traditional approach. *First*, it allows a more flexible course management, which answers to specific needs. *Second*, it is more efficient, since it allows an individual approach. *Third*, it allows easily adjustments of the training to a changing transport environment.

- The curricula will consider **the existing situation.** Consideration must be given to existing training curricula and training material and they should be used / integrated as much as possible.

- The courses will offer **both theoretical and practical components**. The theoretical parts are substantiated through practical examples and hands–on exercises to introduce the students with concrete market practices.

- Training courses will be **interactive**, including group work, presentations and discussions and computer based applications.

Although the training courses for the Transport Training Institute have to be decided during the development program, a first overview of what might be necessary is discussed hereafter. The professional training courses include three different approaches:

- Courses with syllabi;
- Simulation courses (with CD-ROM and group sessions); and
- Interactive courses.

1) Courses with Syllabi

The courses with syllabi contain four main fields:

- General Transport Training: general requirements and conditions of (intermodal) transport and freight handling;

- Function – Specific Training: detailed training, directly related to specific duties and responsibilities in the transport environment;

- Training in Economics and Management: training courses in various fields of economics and management; and

- Training in Intermodal Logistics: specialized training in intermodal logistics and freight forwarding, including affiliated fields of interest such as automation.

Following types of courses can further be integrated in the total curriculum of the institute:

i) <u>General Courses on Transport</u>

- Transport economics

- Studies in traffic culture and traffic rules and regulations

- Transport mode standardization (European standards)

- Road and railroad transport and introduction to intermodal transport concepts
- Operations handling of goods in ports and terminals
- Acceptance of loads, loading/unloading
- Vehicle and container construction/inspection/reparation
- Environmental issues

ii) Function Specific Training (to be determined by the beneficiary)

- European Transport Policy
- Integrated chain logistics
- Hazardous and toxic waste transport
- Training with different equipment and vehicles (off-the-job training) such as straddle carriers, fork lift trucks, container stacking equipment and empty container handling
- Responsibilities of consignors, consignees, drivers, haulers, ship-owners, air carrier owners, etc.

iii) Transport Specialization Courses

- Air Transportation
- Maritime Technology
- Shipping (Management; Operations)
- Safety training & Environmental protection
- Terminal Management
- Techniques of International Trade and Transport
- Port Informatics
- Maritime Law
- Transport Law
- Hinterland Transportation
- Maritime and Transport Insurance

iv) Automation and Telematics Courses

- Windows and Windows NT
- WORD, WordPerfect, EXCEL (spreadsheets), CorelDraw and PowerPoint
- Internet use (management of the «homepage », Website creation)
- Intranet computer network management (NOVEL NETWORK 4.1)
- Specialized computer programs on freight handling, transport document handling dangerous goods, warehousing, stuffing and stripping, queuing systems, etc
- EDI / EDIFACT, GPS, GNSS technology etc;

v) Courses in Economics and Management

- Strategic Management
- Strategic Management Tools
- Operational Management
- Structural changes in the World Economics
- Maritime Economics
- Port Economics
- Transport Economics
- Environmental Economics

vi) Intermodal Transport Training Module

Attention must also be devoted to intermodal transport. An in-depth training program on all elements of intermodal transport should therefore be available. An example syllabus of this type of course is provided hereafter.

Module 1: Costs and benefits of intermodal transportation:

- cost calculations of the different modalities for a certain transport route
- cost build-up of intermodal transport

Module 2: Non-financial costs and benefits of intermodal transportation:

- qualitative advantages and disadvantages
- rules and regulations in the different European countries

Module 3: Essentials of intermodal transportation:

- possibilities for combinations
- mechanisms and systems for combinations

Module 4: The importance of co-operation, from both a national and an international point of view:

- reasons for strategic alliances are discussed in order to facilitate the decision process

Module 5: Company strategy development:

- internal and external analytical methods

Module 6: Advantages and disadvantages of production organization compared with traditional organization

- process and management systems
- modern socio-technology

Module 7: Information technology:

- types and applications
- advantages and disadvantages

Module 8: Implementation of strategic changes:

- concepts of intermodal transportation
- phases of the implementation process

Module 9: Case Studies:

- integration of the knowledge and skills obtained in the course
- development of a business plan for intermodal transport
- presentation of the business plan
- discussion on the practical application of the plan

2) Transport Simulation Tools

Given that the Transport Training Institute requires a long-term sustainable development plan, the training program should also include a *Transport Network Simulator*. The simulation of transport and logistics in door-to-door transport includes all typical transport needs, operational, administrative, and managerial. Transport is nearly always implemented by a variety of organizations working together to complete the transport, but each chasing their own objectives by contributing in this specific transport. The program will therefore offer a helicopter view that surpasses the objectives of single organizations in the intermodal transport chain. The logistical full mission simulator will answer to the questions and problems of all network participants. The objective of the Transport Network Simulator is to provide students insight in the realities of transport. To teach students the concept of logistics they have to be familiar with the tools of the trade. So any education starts with the basics of transport, described in the following paragraphs at operational, tactical, and strategic level.

Full mission simulators provide environments in which:

- a complete job can be exercised;
- the level of complexity can be managed by the succession of exercises;
- it is possible to go "to far"; students are allowed to make mistakes that would cause a disaster when done in reality;
- exercise can be varied in as many ways as required; and
- an exercise can be repeated indefinitely.

So a carefully composed set of exercises give students the opportunity to find out what logistics is all about, at each stage adapted to their knowledge and experience.

3) Interactive Training Courses

Computer aided courses on logistics can be used in the (computer) classroom and mad available for the students at home. These programs provide a very flexible type of study material, with which the student can set his or her own pace.

Most available courseware is divided into modules. Each module deals with a certain subject of transport and forwarding and consists of the following elements:

- a written text, explaining the subject
- Software: one or more diskettes or CD's, containing:
- an interactive software program, including questions
- a test, consisting of multiple choice questions. The software registers the results of this test
- exercises to be submitted to a lecturer.

The following interactive training modules exist and can be easily adapted to the needs of the training institute in BiH:

- Logistics in general
- Logistics in transport
- Ports as nodal points of logistic flows
- Transport of dangerous goods

- Logistic costs
- Electronic Data Interchange (EDI)
- Planning in Transport
- Transport and storage of pesticides
- Loading carriers with dangerous goods
- Documents in Transport
- INCO-terms

4) Distant Learning Courses

Special training courses will be applied in the Transport Training Institute that applies **i**nteractive distant learning in core topics. To bring persons from different background up to date with new developments or changing approaches to familiar problems requires a highly adaptable and flexible didactical method. Interactive training is the most flexible method to reach that goal. Even when these people are professionals and/or managers, interactive learning methods can give them new opportunities, even when they have no time to attend regular courses. The courseware can be studied in the classroom, at home or on the job. The equipment only includes a (Pentium II) PC with CD-ROM and an Internet connection (modem).

In general, each module in an interactive training course deals with a specific subject and includes following elements:

An Internet site, containing:

- **Pre-test** for students that are familiar with the subject to check how much they already know and to determine if it is useful to use that part of the course. If their answers are satisfactory they can proceed to the next item. The results of the Pre-test are recorded and can be checked by the tutor.

- **Theoretical introduction** into the subject, basically an interactive syllabus.

- **Exercises** to be made by the student to test his/her ability to understand the theory and to get some practice in the required actions.

- **Post-test** to test the knowledge and understanding of this subject. The results of the Post-test are recorded and can be checked by the tutor. After satisfactory completion of a module the student can continue with another module (subject).

A CD-ROM application, containing the video-clips required for the theoretical or exercise part. This is done to avoid long waiting times in case of slow connections to the Internet.

An Email address for the student and for the teacher to exchange assignments, guidance, advice, questions, answers, etc.

(5) Budget Information Related to Phase 2 of the Project

Item	Goal	Time (months)	Budget (KM)
Train trainers	Training of civil servants and selected specialists who will provide training in the institute	6	250,000
Organization	Organization of the Transport Training Institute in terms of regulatory, political, locational and other issues as well as cooperation with local and international institutes and universities	8	145,000
Institute	Physical establishment of Transport Training Institute (construction works)	15	1,150,000
Equipment	(*for details see calculations below*)	4	1,088,200
Courses	Development of courses and syllabi in local language	18	1,150,000
TOTAL		**18**	**3,783,200**

The following table provides an indicative budget for the establishment of a modern Transport Training Center.

Description	#	Unit price (EUR)	Total (EUR)
NT Server, incl UPS/ Tape	2	14.000	28.000
Workstations	30	5.000	150.000
Docent workplace	2	5.000	10.000
Network printer Laser Z/W	2	4.000	8.000
Network printer Laser color	2	6.500	13.000
Patch system	2	2.000	4.000
HUB	3	1.200	3.600

Software			
NT Server version 5.0	2	2.080	4.160
NT workstation 5.0	30	960	28.800
MS Office 97	30	1.922	57.660
Cables / CAT 5			1.500
Projection screen	2	590	1.180
Overhead projector / Beamer	2	13.000	26.000
Video Conferencing camera's	30	900	27.000
Electronic equipment & Cable protection system			6.000
UPS workstations	30	1.500	45.000
Office furniture			57.000
Floor 80 M2			7.200
Transport / Hardware + furniture			13.000
Installation - man hours	400	240	96.000
Travel	10	2.500	25.000
Hotel / expenses	80	400	32.000
TOTAL			**644.100**

The above provided information is intended as demonstration for the complexity of modern training facilities. The final framework will have to be determined and fixed during the roll-out phase via the benchmark of the available facilities in BiH and the requirements according to international and European standards.

8.7 PHASE 3: HELP THE TRANSPORT TRAINING INSTITUTE BECOME SELF-SUPPORTING

(1) Expert Assistance for Transition Period

The expert assistance in the final phase will include:

- A financial plan (expected costs and revenues) that satisfies the need to become self-sufficient. This financial plan should evaluate the possibility of alternative financing structures;

- Methods to find support by private companies;
- Potential partners for strategic alliances and co-operations agreements;
- Organizational and operational structures; and
- Development of a management information system on student progress, finance, equipment, personnel, curricula (yearly development /revision), buildings, energy, consumption, facilities (classrooms, workshops, copying and printing facilities, audio-visual equipment, hard- and software)

(2) Financial Business Plan

The financial plan will be based upon the evaluation of following elements:

- Identify number and location of facilities
- Commercial conditions, based on market prices
- Size of groups of students
- Possible combinations of study lines
- Co-operation between different departments
- Cooperation with the transport industry to assess job profiles

(3) Indicative Investment Requirements

The required budget for the third transition phase is estimated at **250.000 KM**. The majority of the works will consist of short-term assistance in specific fields of training and in the management of the Transport Training Institute including financial auditing and budgetary optimization.

8.8 OVERVIEW TOTAL BUDGET

Implementation phase	Estimated Costs (KM)
Research and facility assessment	500,000
Establishment of the Institute	3,783,200
Assistance during transition period	250,000
Total	**4,533,200**

Source: The JICA Study Team

8.9 IMPLEMENTATION TIME FRAME

A tentative implementation timeframe is provided in the table hereafter. A detailed time span for the implementation of the project will be established during phase 1 of the project and will be included in the roll-out plan for the Transport Training Institute.

In general terms, it is expected that the implementation time to establish the Transport Training Institute is 2.5 years and an additional 1.5 years for assistance during the transition period.

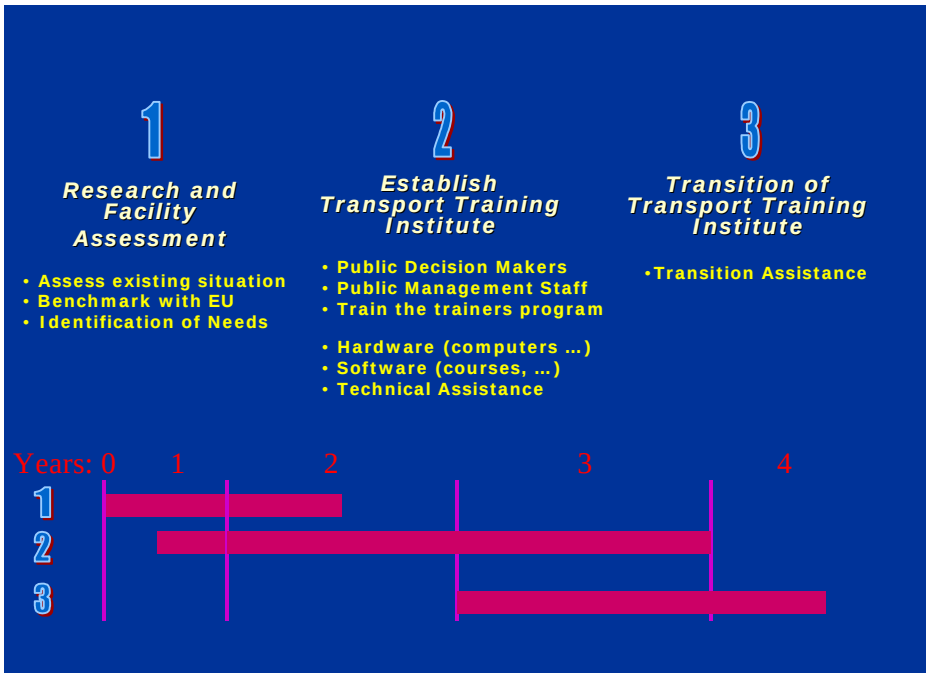


Figure 8.4 General Time Frame for the Establishment of the TTI

8.9.1 Institutional and Organizational Arrangements

The Transport Training Institute needs a flexible organization that is embedded in a consistent political structure. It should be noted that the final organization and structure of the Transport Training Institute is subject to the results of the organizational and structural assessment.

The Transport Training Institute could be organized as an integrated part of the Transport Public Corporation (see Chapter 7 for details on this issue). A structure and organizational context of the concept is provisionally proposed as shown in Figure 10.5.

Within the Transport Public Corporation, a special department for Training and Education will be responsible for:

- the content of the courses of the Transport Training Institute;

- the (quality) control of the institute;
- the certification of the institute and other (private) transport training centers; and
- the ratification of certificates and diplomas.

Given that a section of their activities is related to educational aspects, a direct relation with the Ministry of Education is advisable. Consultation between both parties will ensure that the courses in transport education at the graduate and post-graduate levels are consistent with market requirements and that specialized training programs in the Transport Training Institute can be integrated in the course packages at BiH universities.

During and after the transition phase, a preferred relation with a well-reputed European Transport Training Institute should be established. This strategic alliance will ensure that the Transport Training Institute in BiH will continue to operate according to European standards of transport training.

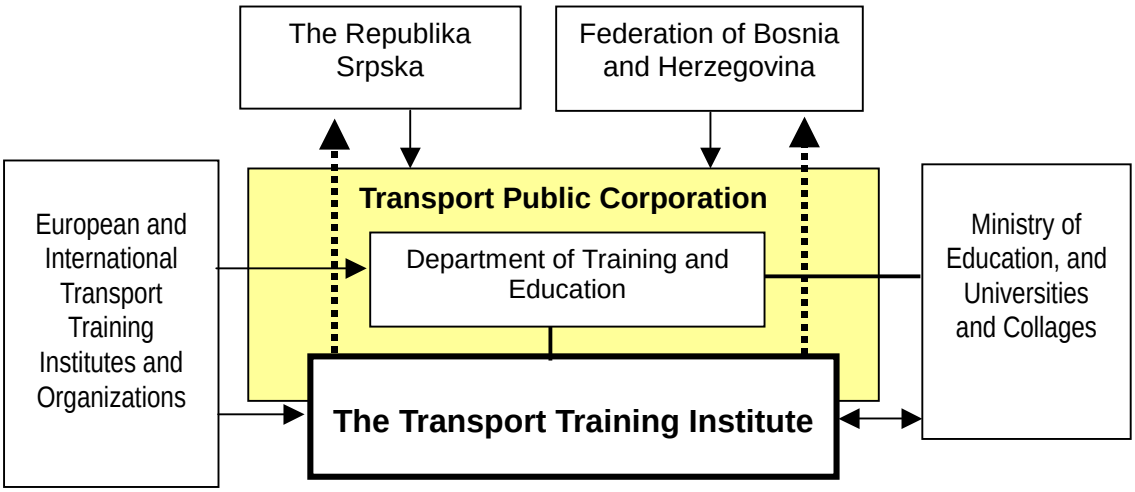


Figure 8.5 A Proposed Structure and Organizational Context

Final conclusions and proposal in relation to the integration of the Transport Training Institute in the political framework of Bosnia and Herzegovina can only be formally decided during the preparation phase of the project (phase 1).

8.10 EXPECTED BENEFITS

Every major public investment requires a feasibility study to estimate future benefits and to determine in time the viability of the planned allocation of public resources. However, estimating the benefits of the Transport Training Institute is difficult if not impossible to quantify.

The most important reason is that the Institute is a public service with the objective of improving the know-how of both public and private transport experts and professionals so that the activities of the transport sector will become more efficient and the negative consequences for / impact on the public and the environment reduced to acceptable levels.

In that perspective, the benefits of establishing the Transport Training Institute will be achieved on the qualitative level of the transport sector. The level of expected benefits of the development of the Transport Training Institute in BiH will be discussed hereafter. It should be noted that during the first phase of the proposed project, detailed quantitative and financial analyses will be conducted in addition to the total quality analysis to determine the viability of the project and to draw up the financial plan of the Institute in the short and medium term (e.g., for the first five years).

The establishment of the Transport Training Institute in BiH will generate qualitative benefits in three major fields, as demonstrated in next Figure 8.6.

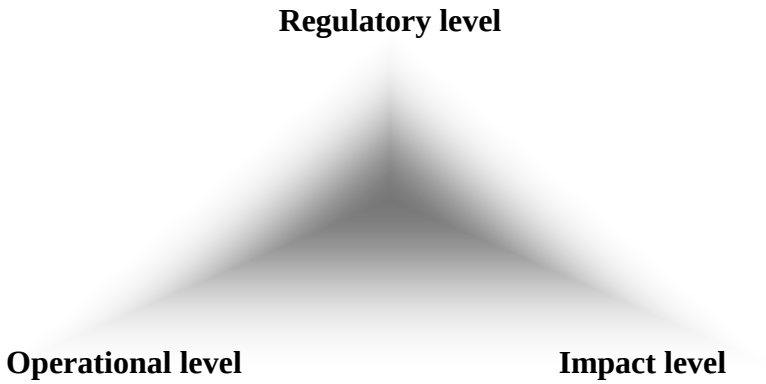


Figure 8.6 Qualitative Benefits of the TTI

The *first* level of qualitative benefits can be found at the regulatory level. This level is undoubtedly of major importance for the future integration of BiH in the international transport environment. If this integration will be successful, it is imperative that the public authorities, responsible for the transport sector, have the necessary expertise to install rules and regulations according to which the sector will operate in the near future.

The TTI will therefore offer transport training courses for public decision-makers and persons in the public administration. These persons will be trained in all forms of modern logistics and transport, including in-depth training in international transport law and standards.

Training of public decision makers and administrators, responsible for the transport sector, will be fundamental for BiH to obtain international acceptance and to ensure that

transport in BiH will develop according to international standards and regulations governing in all transport modes.

In that context, the direct and indirect regulatory benefits of the Transport Training Institute are:

- Up-to-date expertise at the level of public decision makers and administrative staff, responsible for the management of transport in BiH;
- Introduction of new and / or improved legislation that is in accordance with international rules and regulations;
- Introduction of standards that are conform international standards governing national and international transport;
- Introduction of minimum quality requirements for companies and persons active in the transport sector that are equal to the requirements set forward in the European Union;
- Efficient control on national and international transport activities on the territory of Bosnia and Herzegovina.

The above described qualitative effects will indirectly generate quantitative effects, mainly in terms of:

- Cost savings at the level of public administration due to improved procedures in decision making and reduction of staff;
- Cost savings at the level of the public budget via improved and more efficient budget allocation in transport infrastructure development and maintenance;
- Cost savings at the level of the transport sector via improved government control and regulation of professional activities, and through the reduction of public participation and further efficient privatization of transport activities presently under public responsibility;
- Increased direct and indirect benefits (taxes, VAT, foreign investments, etc...) because increased professionalism of the transport sector and an efficient public administration is the minimum requirement to attract foreign investors;
- Benefits at the level of the country and the environment (see further).

The *second* level of qualitative effects can be found in the sector itself. The Transport Training Institute will be the most important means to increase professionalism in the transport sector. Professionals will be trained in all fields of transport and logistics, enabling transport companies in Bosnia and Herzegovina to expand their business and participate in international transport activities.

The qualitative effects of efficient and modern training can also be demonstrated at both the internal and external corporate level. Internally, increased expertise will assist companies to improve the efficiency of operations and reduce operational costs. Increased knowledge and use of computer technology will, for example, reduce operational costs at the level of staff allocation, inventory management, transport costs (fuel and transport time), etc... At the external level, individual companies will integrate in international and intermodal transport operations, therewith increasing activities while at the same time further reducing operational costs.

The qualitative benefits at the operational level can be summarized as follows

- Improved expertise of the transport sector in Bosnia and Herzegovina;
- Improved efficiency of transport activities;
- Increased commercial activities;
- Reductions in operational costs;
- Integration of local companies in international transport activities.

The possible benefits will not remain limited to the transport sector itself. Indirectly, the whole industrial community of Bosnia and Herzegovina will benefit from an increase in transport efficiency. Given that transport is and will always be a *service to the economy*, improvements in the transport sector will directly reflect on economic activities that need transport services. More concretely, industries will be able to reduce their overall transport costs and therewith increase benefits. Furthermore, the industry in Bosnia and Herzegovina will be able to increase productivity because companies will be able to

- Efficiently import high quality basic materials hence produce better products;
- Expand in new markets via more cost efficient export, therewith reducing their prices and increase their international competitive position;
- Develop new economic and industrial activities such as the production of semi-finished products or final assembly, activities that require high quality transport services.

The *third and last* important level of qualitative benefits is related to the impact of transport activities on the community and the environment. The present transport services in Bosnia and Herzegovina are characterized by

- Inefficiency of transport operations, generating in particular unnecessary travel and therewith creating congestion and pollution;
- Use of old and badly maintained equipment that is far below international safety and environmental standards;

- Uncoordinated implantation of transport activities having a negative impact on living conditions and urban / land planning.

Increased expertise by public decision makers and transport professionals will have a direct positive influence on safety and security on the one hand and on the environment on the other hand.

Improved expertise via dedicated and modern training will contribute to:

- Reduce accidents when handling transport equipment;
- Reduce road accidents through reductions in physical transport, better management of road traffic and the use of intermodal and combined transport alternatives;
- Reduce the negative impact on the community via a better and expertise driven selection of the locations for warehouses, terminals and other transport and logistics activities;
- Improve mobility on the roads via a better and technology driven selection of transport routes and modes, using optimal routing programs and other state-of-the-art technology to avoid urban areas and highly congested traffic spots;
- Reduce the impact of final distribution in urban areas via the introduction of modern applications that have already demonstrated their effectiveness in Western countries.

Increased public and private expertise will also improve the environmental conditions of Bosnia and Herzegovina, a problem that is critical in Europe and will increase in importance when Bosnia and Herzegovina will further integrate in the international community. Positive effects on the environment can be expected on:

- Pollution by CO_2 via the use of better transport equipment and reduced road transport;
- Land use via better planning in the location of transport facilities and in the development of new transport infrastructure;
- Noise pollution via better route planning and use of environment friendly transport modes;

8.11 CONCLUSIONS

The establishment of a Transport Training Institute for Bosnia and Herzegovina is undoubtedly an interesting and priority investment of which the benefits have been clearly demonstrated in this chapter and the costs for its establishment remain limited.

The estimated cost of 4.5 million KM for the establishment of the Institute are only a small fraction of the annual costs that transport in Bosnia and Herzegovina will generate.

Furthermore, it is anticipated that the Transport Training Institute will become self-sufficient after the transition period via the provision of dedicated training courses, entrance fees, and other commercially viable initiatives. As demonstrated in next figure, it is expected that the Institute will not only offer certified and mandatory courses but also dedicated and high quality courses that will be attended by professionals from Bosnia and Herzegovina as well as from the surrounding countries.

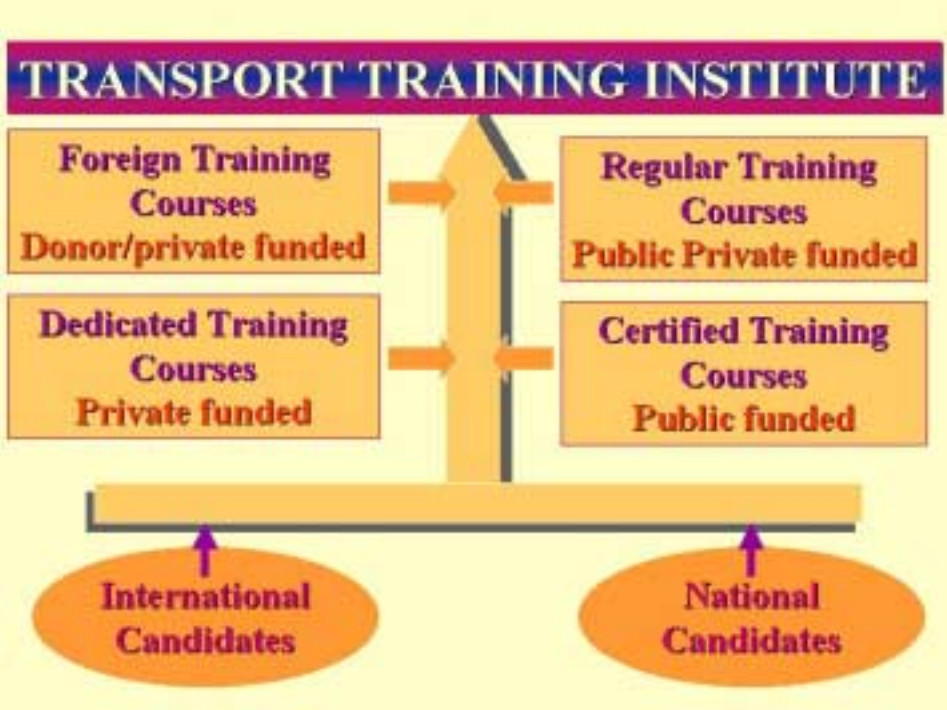


Figure 8.7 Dedicated Training Courses of the TTI

The establishment of the Transport Training Institute will have one general and highly important overall benefit. It will assist both public authorities and transport professionals in Bosnia and Herzegovina to set forward the necessary conditions for the integration of Bosnia and Herzegovina in the international community and in particular in the European Union.

Ensuring a level of expertise that meets international standards will have direct benefits at three major levels, the regulatory level, the professional level, and the level of the community and the environment.

Although the majority of benefits are at the qualitative level, the financial and economic benefits of modern expertise building cannot be underestimated. These benefits will be generated at the public level through a more efficient allocation of public financial resources and at the professional level via reductions of operational and managerial costs and increased commercial activities. Finally, increased safety and security and reduced external environmental effects will generate indirect financial benefits to the country because les financial resources will have to be invested in dealing with the consequences of traffic accidents, pollution, congestion and other consequences of inefficient transport.