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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

EXECUTIVE SUMMARY

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)

PREFACE

In response to the request from the Government of Bosnia and Herzegovina, the Government of Japan decided to conduct the Study on the Transport Master Plan in Bosnia and Herzegovina, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Dr. Katsuhide Nagayama of Pacific Consultants International Co., Ltd. between November 1999 and February 2001. In addition, JICA set up an advisory committee headed by Mr. Nobuhiro Koyama, Development Specialist of JICA between March 2000 and January 2001, which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Governments of Bosnia and Herzegovina and conducted field surveys in the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the improvement of transport systems and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Governments of Bosnia and Herzegovina for their close cooperation extended to the team.

March 2001

Kunihiko Saito
President
Japan International Cooperation Agency

March 2001

Mr. Kunihiko Saito
President
Japan International Cooperation Agency

Subject: Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of “The Study on the Transport Master Plan in Bosnia and Herzegovina”.

The report contains results of the study which was carried out by Pacific Consultants International between November 1999 and February 2001. The report consists of Executive Summary, Main Text (Volume I and II) and Entity Reports (Volume III and IV).

The Executive Summary briefly illustrates the findings of the entire study. In the Main Text, Volume I is comprised of 7 chapters and presents the comprehensive master plan, and Volume II is comprised of 10 chapters and presents sector plans, pre-feasibility study results and environmental aspects of the study. Based on the agreement of the final coordination committee meeting, Volume III and Volume IV are derived from the Main Text, and are comprised of sector plan and project-oriented documents focused on each Entity. The Study Team sincerely hopes that the plans and recommendations presented in the study will be implemented for the realization of the Master Plan.

We wish to express grateful acknowledgement to the personnel of your Agency, Ministry of Foreign Affairs, Advisory Committee, Ministry of Land, Infrastructure and Transport, and Embassy of Japan in Bosnia and Herzegovina, and also to the officials of Ministry of Foreign Affairs of Bosnia and Herzegovina, Ministry of Civil Affairs and Communications of Bosnia and Herzegovina, Ministry of Transport and Communications of Federation of Bosnia and Herzegovina, and Ministry of Transport and Communications of Republika Srpska who greatly assisted the Study Team. The Study Team sincerely hopes that the result of this study will contribute to the transport development and peace in Bosnia and Herzegovina.

Yours faithfully,

Katsuhide Nagayama
Team Leader, JICA Study Team
The Study on Transport Master Plan
In Bosnia and Herzegovina



Study Area Map



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What is BiHTMAP?

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 conducted the **Bosnia and Herzegovina (BiH) Transport Master Plan (BiHTMAP)**. Pacific Consultants International, headquartered in Tokyo, Japan, was selected as the lead consultant to undertake this study.

1. INTRODUCTION

Refer to Chapter 1 of Volumes I and II for more details.

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 conducted the Bosnia and Herzegovina (BiH) Transport Master Plan (BiHTMAP), based upon the mutually accepted Scope of Work dated November 27, 1998. Pacific Consultants International, headquartered in Tokyo, Japan, was 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. Two key products form the foundation upon which planning efforts were based:

- Formulation of an integrated, multi-modal (road, rail, waterway, air) transport master plan extending over a twenty year planning horizon to year 2020; and,
- Identification, within the overall master plan framework, of urgent 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 concurrently contributes to an efficient economic structure of the country, strengthens trade relations with national neighbors and other areas of Europe, and provides a base for market-oriented transport activity. Post-war economic recovery within BiH 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 gradually shifts from alleviation of war damage to realization of an integrated transport system founded upon mutual cooperation and free-market principles. This strategy is particularly valid given the 20-year planning horizon adopted by the Study.

STUDY APPROACH

These challenges, especially when viewed through the prism of existing realities, required innovative, yet practical approaches to problem solving. Analytical efforts therefore focused, in the case of urgent projects, 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 forecast as gradually evolving and diversifying according to European norms and practices.

The components of the BiHTMAP further diversify beyond the traditional "hardware" concepts associated with infrastructure provision. Additional key elements consist of:

- "software" aspects, that is, available technology, international (EU) standards, and multi-modal integration needs (terminals, transfer points); and,
- "humanware" needs, or the cultivation of human resources via the designation of training and education programs as well as other requirements for developing expertise.

Thus, the formulation of enhanced operation and management strategies of transport systems and infrastructure are addressed within the BiHTMAP framework.

Another important element of the study was confirmation that the planning process must allow stakeholders to participate in shaping their own future. This is of substantial importance if the Transport Master Plan is to be adopted and used by all peoples of BiH. A participatory planning approach was, therefore, accepted as a vitally important study feature.

LIAISON ACTIVITIES

The study was conducted in cooperation with the BiH Ministry of Civil Affairs and Communications (whose representatives participate in the Coordinating Committee for the study), the Federation Ministry of Transport and Communications (whose representatives chair and coordinate the Federation of BiH Technical Committee), and the Republika Srpska Ministry of Transport and Communications (whose representatives chair and coordinate the Republika Srpska Technical Committee). On-going and effective consultations were also carried out with various international agencies, donors and consultant groups as well as a wide variety of local authorities, institutes and resource personnel.

2. SALIENT FEATURES OF THE STUDY AREA

ADMINISTRATIVE STRUCTURE

The General Framework Agreement for Peace in Bosnia and Herzegovina was initiated in Dayton on 21 November 1995 and signed in Paris on 14 December 1995. BiH consists of two Entities and the Brcko Administrative District (BR). The two Entities are the Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS).

Under the BiH Constitution, the state-level government is responsible for foreign policy; foreign trade policy; customs policy; monetary policy; finances of the institutions of BiH and for international obligations of BiH; immigration, refugee and asylum policy and regulation; international and inter-Entity criminal law enforcement; establishment and operation of common and international communications facilities; regulation of inter-Entity transportation; and air traffic control. Additional responsibilities can be assigned to the State if both Entities agree.

There are six state-level ministries: Foreign Affairs; Foreign Trade and Economic Relations; Civil Affairs and Communications; Treasury of the Institutions of Bosnia and Herzegovina; European Integration; and Human Rights and Refugees. The Ministry for Treasury of the Institutions of BiH only deals with financial matters pertaining to the above-mentioned functions assigned to the State under the constitution. All other financial matters are the responsibility of the Entities, each of which has its own Ministry of Finance. Also Brcko Administrative District handles its own financial affairs. Transport-related functions at the state-level are: establishment and operation of common and international communications facilities; regulation of inter-Entity transportation; and air traffic control. It is, at present, also realistic to emphasize that the existing Constitution assigns no tax collection power to the State.

The Entity governments are responsible for conducting all affairs not expressly assigned to the state. The FBiH government consists of 16 ministries, with 12 being based in Sarajevo and four in Mostar. The four Mostar-based ministries, each of which have representative offices in Sarajevo, are responsible for: Commerce; Transport and Communications; Energy and Industry; and Education, Science and Culture. The FBiH governmental

administration is sub-divided into 10 Kantons and also municipalities, which are empowered locally to implement various policies and regulations. The RS government consists of 16 ministries based in Banja Luka. The RS sub-unit of governmental administration is municipalities.

CURRENT POPULATION

Pre-war growth in the population of BiH was steady, if modest. A year 1961 population of 3.28 million grew to 3.75 million, 4.12 million and 4.38 million by 1971, 1981 and 1991, respectively. There has been no census in BiH since 1991. Depending on source, some 258,000 to 270,000 persons died or are declared as missing as a result of the war. Displaced persons aggregated to 1.28 million in 1995, 866,000 in year 1997 and 816,000 in year 1998. The war catalyzed an exodus of some 1.2 million refugees and, at present, it is estimated that approximately half have returned to BiH. Current estimates of resident population vary, but generally accepted statistics suggest a population of 3.89 million persons, 2.38 million thereof being in the Federation of Bosnia and Herzegovina, 1.43 million in Republika Srpska, and 80,000 in the Brcko Administrative District.

RECENT ECONOMIC ACTIVITIES

Prior to the onset of hostilities, BiH was classed as one of the lower income republics of ex-Yugoslavia; nevertheless, GDP per capita reached some \$2,400 (in current terms) in 1990. The economy was fairly diversified, with a large industrial base and a capable entrepreneurial class that produced complex goods such as aircraft and machine tools. Economic performance ground to a virtual halt as a result of the war. By year 1994, GDP had contracted from a pre-war 10.6 billion dollars to some 1.2 billion dollars (in current terms), and GDP per capita had fallen to near \$300. The speed of economic recovery from 1994/1995 onward has been impressive by any measure. GDP per capita increased to some \$1,000 by 1999, and breached \$1,100 during 2000, thus placing BiH solidly in the "lower middle" income grouping. Unfortunately, economic growth has not been uniform in both Entities. In 1994, the Federation and Republika Srpska contributed almost equally toward the BiH economy. However, by 1998, some three-fourths of a dollar-denominated economy originated in the Federation.

Refer to Chapter 2 of Volume I for more details.

3. ECONOMIC RECOVERY

AN OVERVIEW

The declaration of independence of Bosnia and Herzegovina at the end of 1991 was quickly followed by an exhausting war that lasted three and one-half years. The war completely shattered the economy and left extensive human and physical devastation. Large-scale transport infrastructure damage occurred as a result of the hostilities. Transport links leading to or near confrontation lines suffered the most extensive damage; over 2,000 kilometers of the main road network were partially or totally destroyed including more than seventy major bridges. Most railway lines were rendered inoperable, public transport facilities and vehicles were damaged or run down, and civilian aviation ceased to function. Transport institutions lost premises, records, staff, and funds and, in many instances, were forcibly fragmented.

The international community pledged nearly US\$ 5.1 billion, including funds for transport improvement programs which have understandably focused on the immediate alleviation of physical war damages and the re-activation of basic transport services and facilities. Toward this end, significant improvements to transport infrastructure have been achieved, mainly within the framework of the Emergency Transport Reconstruction Program with support provided by the EBRD, the World Bank, the European Union and other bilateral donor institutions. These works are still underway, but nearing completion, as of March 2001.

Due in part to the on-going reconstruction efforts, real GDP grew by some 36 percent per annum on the average during the period 1996 to 1998, and it is estimated that GDP in 2000 will reach about 65 percent of the prewar total. Along with such economic recovery, transport demands are increasing.

The per capita GDP of BiH was US\$ 2,231 in 1990. However, it reached US\$ 1,033 in 1999 and US\$ 1,130 in 2000.

INDUSTRIAL SECTOR RECOVERY IN BIH

Prewar Bosnia and Herzegovina contained about 1,000 industrial organizations employing nearly 450,000 people, accounting for about half of total employment outside agriculture. Heavy and light industries accounted for 43 percent of GDP in 1990, higher than in any other republic in the former Yugoslavia. The most important industries were iron ore production and processing, coal, ferrous and

nonferrous metal production, machinery, forestry, and wood processing.

Heavy industry was already in decline before 1992 with the gradual fading of the cold war. Light industries included food processing, construction, and the manufacture of textile products such as leather goods and shoes. Overall, industrial activities were concentrated in a small number of firms: a dozen large industrial conglomerates accounted for up to 35 percent of GDP prior to the war.

The war affected firms in a number of ways. Obviously many factories were damaged while some facilities have been repaired, but many are still in disrepair due to landmines around plants and equipment as well as loss of personnel. One of the most critical factors, however, has been changes in the market conditions, that is, the on-going postwar transition from centralized to free market mechanisms.

Skilled workers are in short supply. Nine of ten industrial workers were either in the armed forces or were physically displaced during the war. Many former workers, including some of the most skilled and best educated, are refugees abroad and are unlikely to return in the near future. Because of these problems, manufacturing output after the war was initially at only about 5 percent of prewar levels.

In a comparison between 1990 and 1998, the most recovered industrial sectors are:

- Trade and Business Services (the 1998 recovery rate is 125.2 against 1990=100);
- Government Services (118.8);
- Agriculture and Fishery" (80.1); and
- Trade (78.5).

The lagging industrial sectors are Water Management (20.7), followed by Industry and Mining (30.6) as well as Banking and Insurance (37.9).

Slow recovery of the Industry and Mining sector is seen as a bottleneck relative to countrywide economic recovery, since this sector was the dominating prewar industrial sector (43 percent of total 1990 GDP).

4. SEVEN PLANNING GOALS

Refer to Chapter 3 of Volume I for more details.

BiHTMAP embraces the following seven planning goals equally for both Entities as well as BiH:

- (1) *Economically Rational Transport Infrastructure*
- (2) *International Linkages with Neighboring and West European Countries*
- (3) *Competitive Intermodal Transport System*
- (4) *European Norms-based Transport Operation and Regulations*
- (5) *Capacity Building for Well-organized and Transparent Governance*
- (6) *Diversification of Financial Resources*
- (7) *Integration with the European Union*

(1) Economically Rational Transport Infrastructure

Neither over-investment nor under-investment for transport infrastructures should be made, since either catalyzes a significant economic loss vis-à-vis the composite BiH economy. As a simple rule, investment requirements must be determined based on economic feasibility and/or rationality under a market-driven economy.

(2) International Linkages with Neighboring and West European Countries

It is recognized that enhanced growth of the BiH economy requires international transport linkages with neighboring and West European countries. Strong attention, therefore, should be paid as to how the internationally integrated transport network system is functionally and effectively formed. This context is important in seeking a sustainable development scenario for roads, railway, waterway transport, and air transport, since these transport modes could otherwise not function properly.

(3) Competitive Intermodal Transport System

The economy, including agricultural, industrial and service components, always requires optimized and economical choices among alternative transport modes or

combinations of modes. Important is that each transport mode should first be developed to provide safe and reliable transport services, and that the most economically efficient combination of transport modes should be formulated under an enhanced concept of “intermodality”.

(4) European Norms-based Transport Operation and Regulations

Deregulation and liberalization of trade and transport activities among member states are two of the most significant contemporary issues in the European Union. The BiH State policy, as well as both Entities’ transport policies, regulations and rules, need to inevitably conform to the basic directions of EU policies.

(5) Capacity Building for Well-organized and Transparent Governance

Human capacity building is a critically needed element to ensure reliable and optimized implementation of transport policy. Government officials and transport operators should be familiar with, and aware of the importance of, international and European norms in terms of economic efficiency, competitiveness, fairness of pricing and legal aspects as well as technical and engineering standards for development, operation and management of transport facilities.

(6) Diversification of Financial Resources

Strengthening the financial acuity of government sectors is needed to cope with financial strategies and their role in development and maintenance of transport infrastructure. To tackle this issue, applicable tactics should be adopted to ensure *sustainable* transport improvement, taking into account, among others, 1) adoption of a “*user charge system*”; 2) application of *private sector financial initiatives*; and 3) seeking Public and Private Partnership (PPP).

(7) Integration with the European Union

It is anticipated that, within the 20-year horizon of BiHTMAP, the BiH transport system will, or should, be functionally integrated with transport systems of the European Union. Such mutual linkage will benefit both BiH and regional economic development.

5. DEVELOPMENT SCENARIO

Refer to Section 5.1 of Volume I for more details.

DEVELOPMENT PHASING

The Transport Master Plan views the two decades up to year 2020 as being divided into three phases:

- Phase 1 (short-term: 2001 ~ 2005);
- Phase 2 (medium-term: 2006 ~ 2010); and
- Phase 3 (long-term: 2011 ~ 2020).

ISSUES AND SCENARIOS

The following phased scenarios are given as a common basis for sector transport planning.

During **Phase 1**, all efforts need to be concentrated in completing the recovery from war damages and restoring the status quo. This can be achieved through expediting the implementation of committed rehabilitation projects and programs. Intensified efforts should be made to recover and stabilize the transport function of roads, railways, air, and waterway even before 2005. This must be the main theme of economic development; thus, institutional reforms need to be coherent and concomitant with such an enhanced scenario. Some of the actions and reforms embodied in the FBiH and RS transport sector expenditure strategies should be implemented during this period.

During **Phase 2**, the medium-term timeframe, economic development emphasis should be pointedly shifted towards restructuring of the economic and industrial bases (as opposed to heavy industry) to achieve more value-added performance. This can be realized through encouraging

FDI (foreign direct investment) and human resource development. Toward that end, the transport sector should be reliable and price-competitive while functionally linked with European and international markets. Full-functionalization and modernization of the entire transport system must be a focal strategy. At the same time, in order to procure considerable investments required to structure the infrastructure system, definitive legislative guidelines to mobilize alternative financial resources need to be clearly and transparently enacted.

In **Phase 3**, the BiH economy will enter an expansion period, assuming Phase 2 has been successfully achieved. Phase 3 can be regarded as a challenging period for BiH to prepare for a significant role as part of the integrated European economy. In order to support requisite stable economic growth, the intermodal transport system should be functioning optimally in conformance with European norms and standards. Institutional enhancement and human resources development must continue throughout Phase 3.

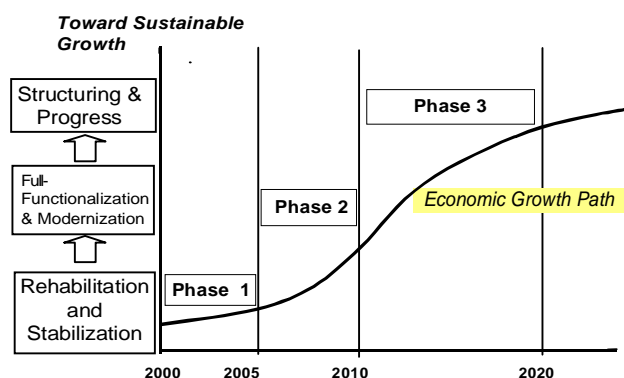


Figure 5.1: Economic Growth Path

Table 5.1: Phased Transport Socioeconomic and Institutional Development Scenarios

Phase	Main Theme of Socioeconomic Development	Enhanced Strategy for Transport Development	Focused Institutional Development
Phase 1 (2001 ~ 2005)	Economic recovery and transitional reforms	Rehabilitation and stabilization of existing infrastructure	Initialization of the planned institutional and policy reforms in the transport sector
Phase 2 (2006 ~ 2010)	Innovation and restructuring of the productive base	Optimization and modernization of the transport system	Institutionalization for sustainable resource mobilization
Phase 3 (2011 ~ 2020)	Further shifting towards an internationally competitive economy	Structuring for, and progress toward, an integrated European network	Conformance with European norms and standards

6. SOCIOECONOMIC FRAMEWORK

BASIC PREMISES

The socioeconomic framework is formulated as the foundation for transport analyses. The current socioeconomic parameters, that is, population, GDP, and Per Capita GDP (at 2000 constant price), are used to calibrate a series of transport models, while future parameters underlie future transport demand projections. The socioeconomic framework was examined firstly at the state level, and then split into two Entities and Brcko Administrative District.

The parameters were calculated at the analysis zone level of detail. BiH is divided into 41 analysis zones with other countries represented by a further 13 external zones. These 54 zones are considered sufficient for the purposes of a countrywide transport plan, which addresses major transport network systems and inter-city transport patterns.

POPULATION

The war resulted in a significant population decrease in BiH: from 4.38 million in 1991 to 3.89 million (estimate) at present. The future population increase is a vital issue in restructuring the country.

Average growth rates of the population, however, had historically decreased since the 1960s, reaching 0.60 percent per annum during the 1980s, the same as other East European countries. Thus, a remarkable growth in future population cannot be expected.

Refugee returns are a key to estimating the future population of BiH. According to the UNHCR, approximately 306,000 refugees are still in abroad without permanent solutions. The Study Team reached following hypotheses on the future refugee return:

- About a half of refugees (150,000) will return to BiH, with the remainder staying abroad by finding permanent solutions;
- The refugees will return to BiH during the coming ten years;
- In the first five years (2001 – 2005), 20,000 refugees will return to BiH every year; and
- The rest (50,000) will return during the remaining five years (2006–2010); that is, 10,000 refugees per year.

Needless to say, a key facet supporting socioeconomic development is the promotion encouraging refugees to return to BiH.

ECONOMIC DEVELOPMENT POTENTIALS

BiH should cope with the reconstruction from the war, and, at the same time, has to overcome difficulties in the transition from a centralized to a market economy. Each institution has its own administrative system; thus, concerted efforts are required to enhance on-going reforms in the government, financing and banking, manufacturing, and transport sectors.

It is clear that the current BiH economy, which had been historically structured with a heavy industry focus, should be reoriented towards a more internationally competitive economy, emphasizing value-added undertakings.

ALTERNATIVE ECONOMIC SCENARIOS

Three alternative future economic development scenarios for BiH were examined: high growth case, base case, and low growth case.

Under the **high growth case** (optimistic scenario), it is assumed that BiH will grow at the rate experienced by the Polish economy during its transitional period. Poland is one of the leaders in the economic recovery of Central and Eastern European transitional economies. The average annual growth rate of the economy was 5.4 percent between 1993 and 1999. Under the high growth case, per capita GDP of BiH will approximate US\$3,200 (KM 6,501) in the target year 2020, compared to US\$1,130 (KM 2,261) at present. Thus, the per capita GDP will triple in two decades.

The **base case** scenario, which is viewed as the most-likely scenario for the future economic development of BiH, is based upon a development potential analysis. The per capita GDP of BiH in 2020 would reach US\$2,660 (KM 5,404) in year 2000 constant prices.

The **low growth case** represents a pessimistic scenario based on the experience of Bulgaria, which achieved negative average annual growth rate of -1.3 percent, during its transition period. If the BiH reform and transition process results in failure, such a scenario could also be realistic for the BiH economy.

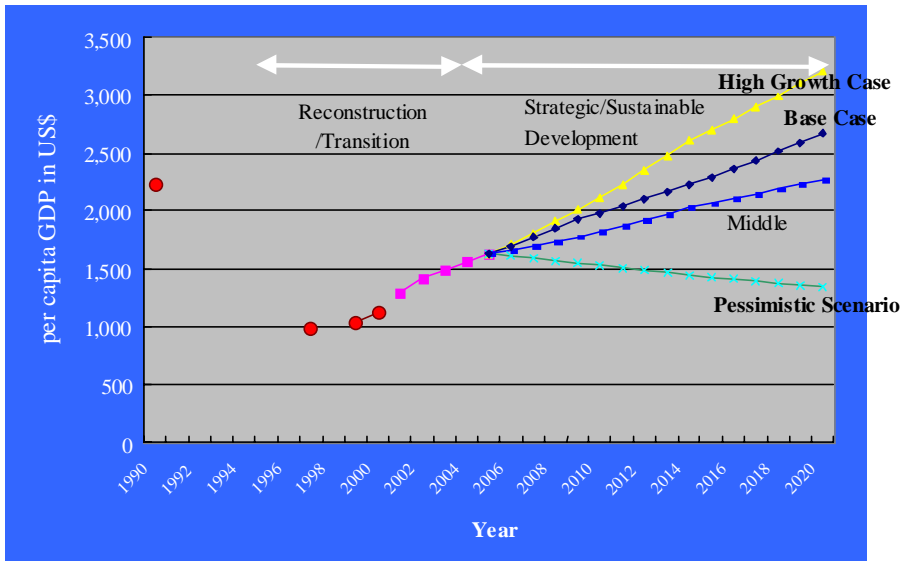


Figure 6.1: Alternative Economic Growth Scenarios - Bosnia and Herzegovina

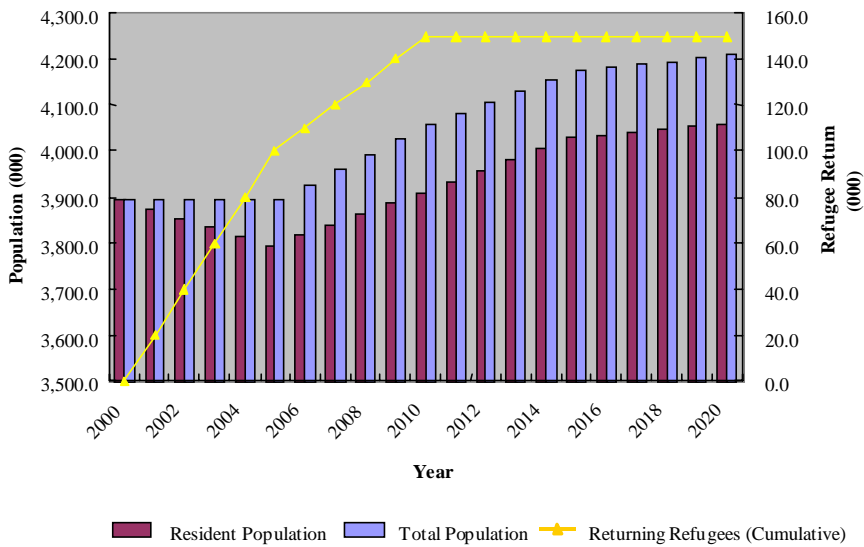


Figure 6.2: Future Population Forecast - Bosnia and Herzegovina

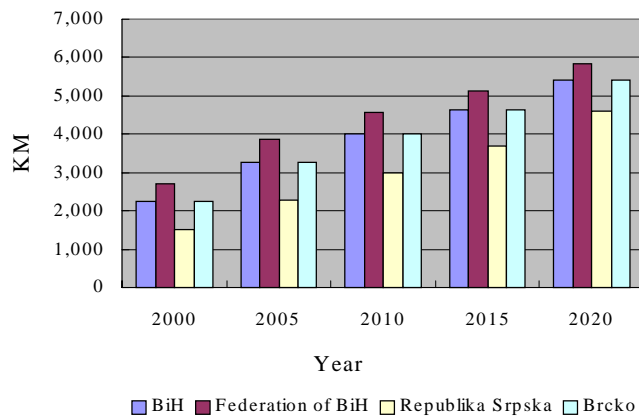


Figure 6.3: Per Capita GDP Growth Forecast

7. INTERMODALITY

Refer to Section 5.2 of Volume I for more details.

EUROPEAN CONTEXT

It is a key planning objective to formulate a functional intermodal transport system for all of BiH within which each Entity's economy can be activated while assuring the free and smooth movement of freight and passengers within Entities, between Entities, and along international linkages with European neighbors.

"Intermodal transport" is not a new transport technique but became a major European topic only during the past decade, mainly as a result of the aggravating road congestion and an increasing awareness to protect the environment. Also technological and operational innovations offer substantial potential for intermodal transport development.

THREE ELEMENTS OF INTERMODALITY

The European Commission has identified three main focal points for transport policy (Figure 7.1):

- The first focal point is the **elimination of remaining barriers**, via: 1) the facilitation of border crossings, reduction and *"standardization"* of document flows (including the use of paperless communication); and 2) the development of international networks of *"Trans European"* and *"Pan European Networks"*.
- The second important target is the **protection of the environment and the quality of life** for citizens. The main policy tools in this respect are: 1) the introduction of *"emission standards"*; and 2) the promotion of environmentally friendly transport modes.
- The third point of attention is the improvement of transport systems with a focus on **transit points and use of modern technology**.

Intermodal transport systems ensure that a passenger or a consignment arrives safely, switching, if necessary, from one transport mode to another in such a way that uses transport capabilities in the most efficient and best suited manner. This approach will also contribute to **fair pricing** in transport, with the user paying for what is actually used.

Intermodality will become a quality indicator of the level of economically efficient use of the different transport modes and infrastructures, as well as a social indicator to manage the best use of environmental and social resources in the competitive market mechanism.

Transport integration between modes needs to take place at the levels of infrastructures and other hardware, including loading units, vehicles, telecommunications, operations and services and functional transit facilities (Figure 7.2).

THE BIH INTERMODAL SYSTEM

The development of intermodal and combined transport in BiH is thus not limited to specific modes. It is a trading and mobility issues in which rail, water, air and road are called on to contribute to the optimization of the whole with new transport services and information technologies to improve/optimize the utilization of the existing infrastructure capacity.

The Transport Master Plan proposes a set of locations, where *"intermodal transport terminals (ITTs)"* and *"combined transport terminals (CTTs)"* should be developed. In a definition, the ITTs (blue circles) will link road, rail, and river transport, while the combined transport CTTs (red circles) function to link road and rail transport on the major land-based corridors (Figure 7.3).

The intermodal concept for BiH will focus on development of ITTs along the Sava River with three major intermodal transfer points, notably the ports of **Brcko**, **Samac** and, if economic development demands, the port of **Gradiska**.

The CTTs are on combined transport, efficiently linking the road and rail infrastructures on major connections, both north-south and east-west, namely, **Mostar**, **Sarajevo**, **Doboj**, **Banja Luka**, **Tuzla**, **Zenica**, **Zvornik**, and **Bos Novi**.

DEVELOPMENT OF TRANSIT TERMINALS

At the major transit points identified above, any form of transport terminal is recommended to be developed to meet requirements for transshipment activities being rendered in Europe.

Any change of mode within a journey involves a change of system rather than just a technical transshipment. This creates friction costs, which can make the intermodal transport less competitive in comparison with uni-modal haulage.

In order to make intermodal transport attractive for the user, friction costs must be identified, quantified, qualified, and reduced to a more competitive level. At the same time, logistics services within the intermodal transport

chain will need to provide value-added content to allow a certain level of friction costs. Terminals and transfer points in networks are particularly well suited for offering services such as warehousing, information management or product customization. The intermodal and terminal policy must eliminate any bottlenecks through:

- Simple and fast transshipment;
- High flexibility concerning capacity, storage capacity, terminal functions;
- Economically efficient transshipment performance;
- Integrated IT; and
- Optimal land usage.

According to the request at the terminals these can be differentiated into the following four (4) operating modes:

Type of Terminal	Transshipment	Candidate Locations
Hub Terminal	Road – Rail	Sarajevo, Banja Luka, Tuzla
Gateway Terminal	Road – Rail-Port	Samac, Brcko, Gradiska
Transshipment Terminal	Rail – Road	Mostar, Zvornik, Bihac, Doboј
Line Terminal	Road – Rail	Zenica,

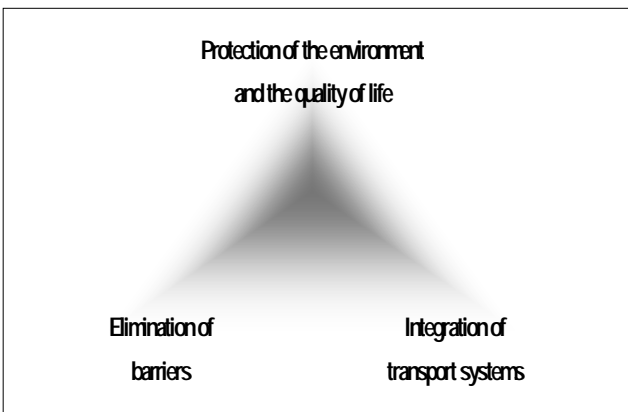


Figure 7.1: Three Focal Aspects on “Intermodality”



Vertical Transshipment Technique

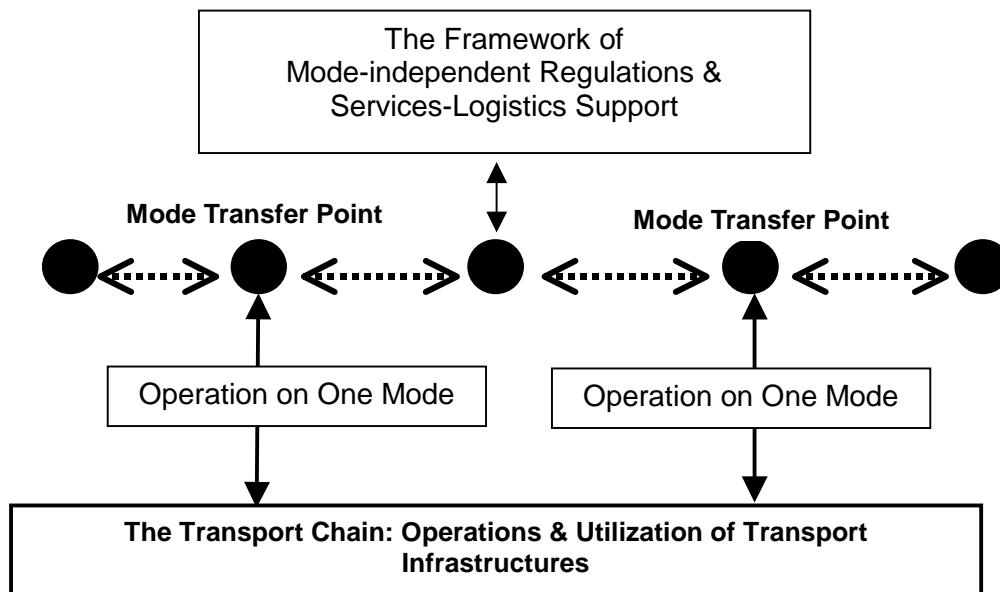


Figure 7.2: A Conceptual System for Intermodal Transport Integration

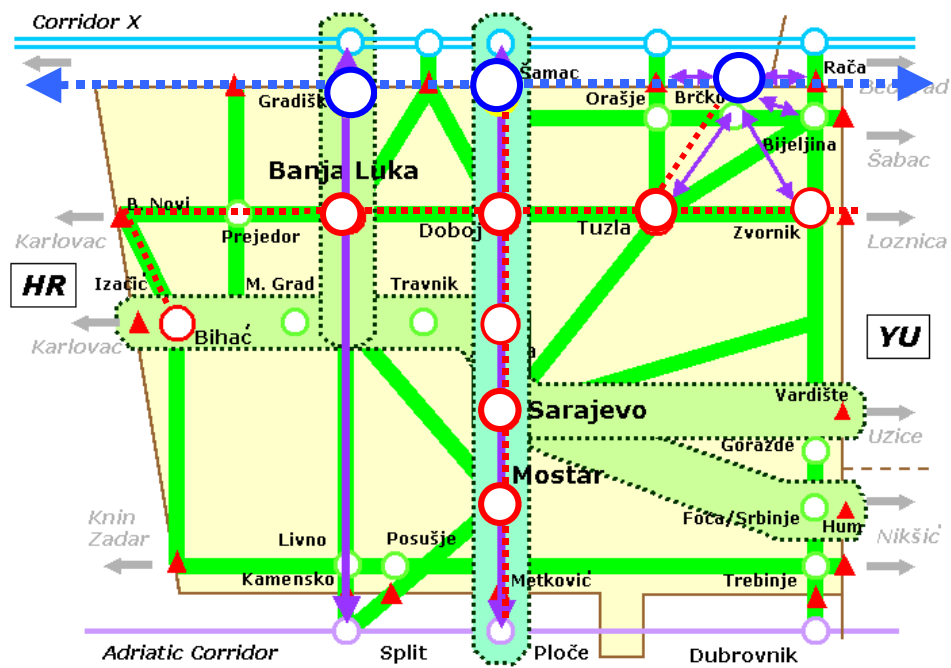


Figure 7.3: Intermodal Transport Network with Transfer Terminals

Table 7.1: Forecast of Modal Shares of Freight Transport in Bosnia and Herzegovina

(Unit: % of ton-km)

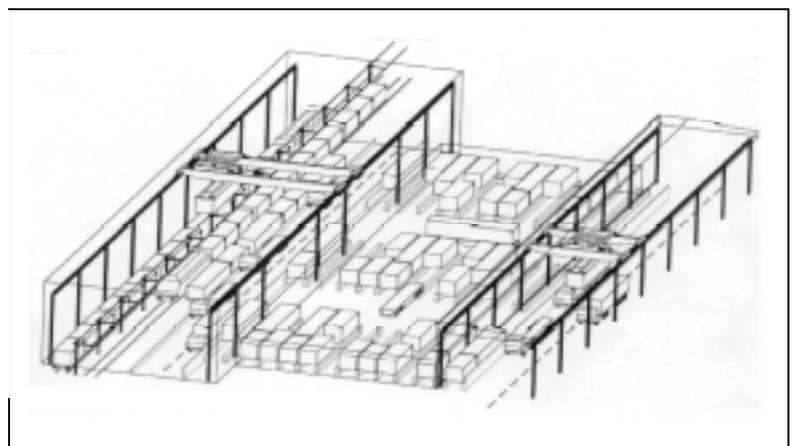
	Road	Railways	Waterway	Others	Total
1990*1	60.8	34.2	4.0	1.0	100.0
2000	95.2	3.7	0	1.0	100.0
2010	83.8	12.2	3.0	1.0	100.0
2020	67.2	28.8	5.0	1.0	100.0

Source: The JICA Study Team

Notes: *1: Estimated by the JICA Study Team, based on the report from Port Master's office, Bosanski Samac HQ



Typical Gate Application with IT

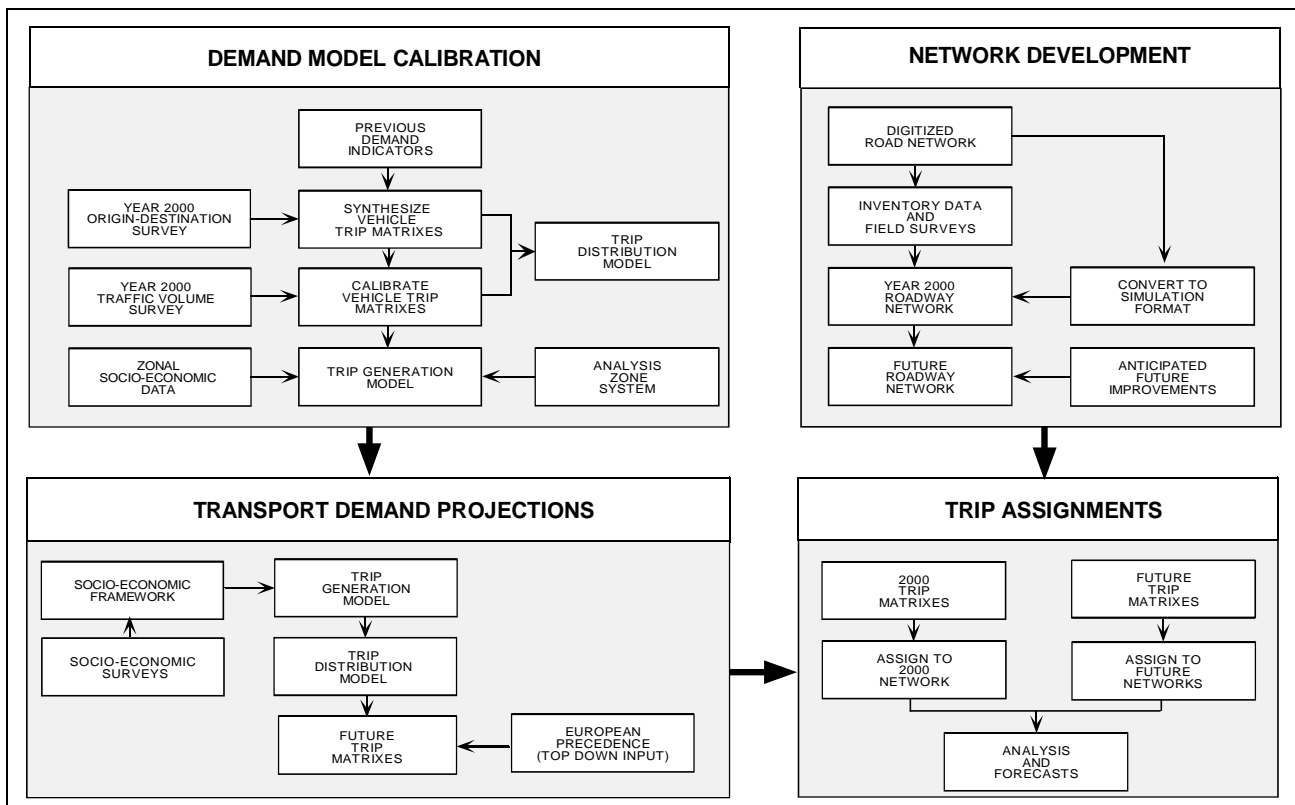


Transshipment System of the COMPACTTERMINAL

8. ROAD TRANSPORT DEMAND MODEL

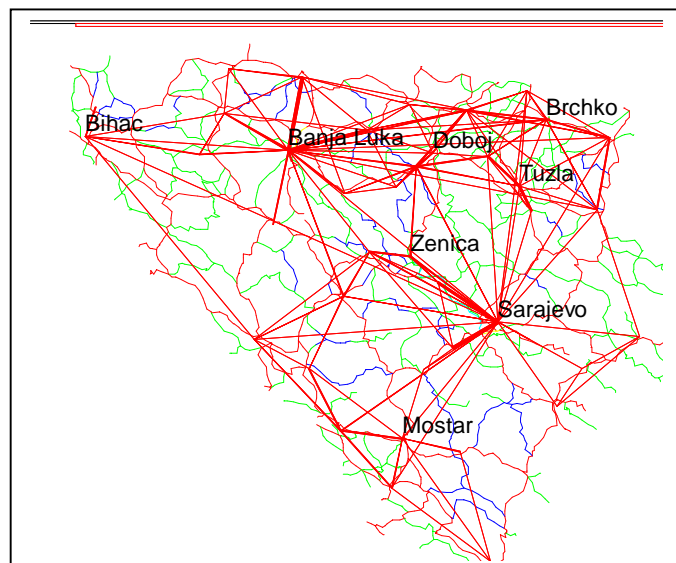
A countrywide traffic counting and roadside origin-destination (OD) interview survey was completed at 86 locations. All traffic counts were stratified by hour, direction, and ten vehicle types. The roadside OD program queried major items such as trip origin, trip destination, number of passengers, trip purpose and, in case of trucks, type and amount of commodities carried. On a composite basis, 100 percent of survey location

traffic was counted, and some 35 percent of passing traffic was surveyed resulting in a data pool of roughly 89,000 interviews. Findings of the survey program were used to develop a road transport simulation model, which actually consists of a series of nested and cascading components titled model calibration, development of existing and future networks, demand projections through year 2020; and trip assignments.



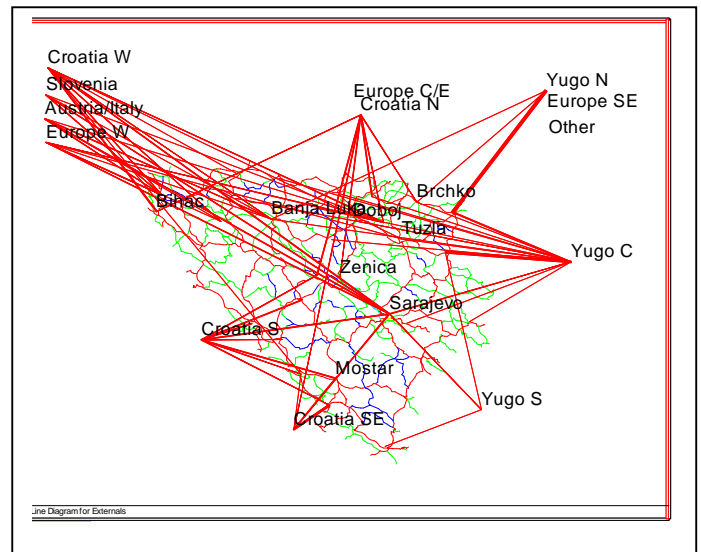
EXISTING DESIRE LINES

In analyzing the expanded data obtained from the roadside OD surveys, it was found that, in year 2000, some 125,100 daily long distance (inter zonal) vehicle trips take place. The majority are by passenger cars (85.8 percent) with an average occupancy of 2.0 people. Buses represent 2.6 percent of vehicle trips (average occupancy of 17.1 persons), rigid (up to 3 axle) trucks 7.2 percent of vehicle trips, and articulated (more than 3 axles) trucks 4.4 percent of daily vehicle trips. The general distribution of trips within BiH in the form of a desire line diagram confirms that major trip generation precincts include Sarajevo, Banja Luka, Mostar, Dobo, Zenica, and Tuzla. The average trip length of internal long distance passenger vehicles is around 90 kilometers whilst that of an articulated truck is 125 kilometers.



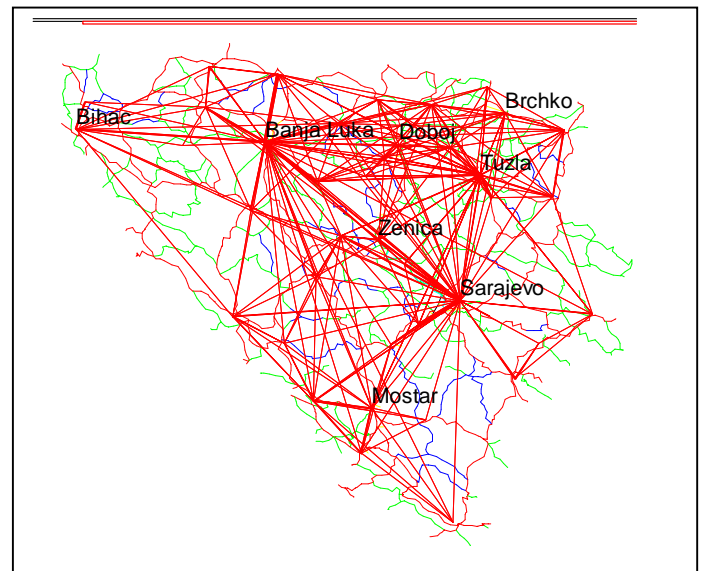
EXISTING EXTERNAL DESIRE LINES

There exists, in year 2000, a pronounced interaction with adjacent countries. Strong linkages between Croatia and southern BiH are noted, as are linkages between northeast BiH and Yugoslavia. On a composite basis, about 30 percent of daily vehicle trips have at least one trip end external to BiH. Of those external totals, Croatia and Yugoslavia account for 40-45 percent each, trips direction western Europe a further 12 percent, and other foreign locations two percent. Not surprisingly, the highest representation of international trips is found among large trucks, that is, having more than three axles. Conversely, the lowest incidence of international travel is found among the rigid truck population, that is, commercial vehicles of up to three axles.



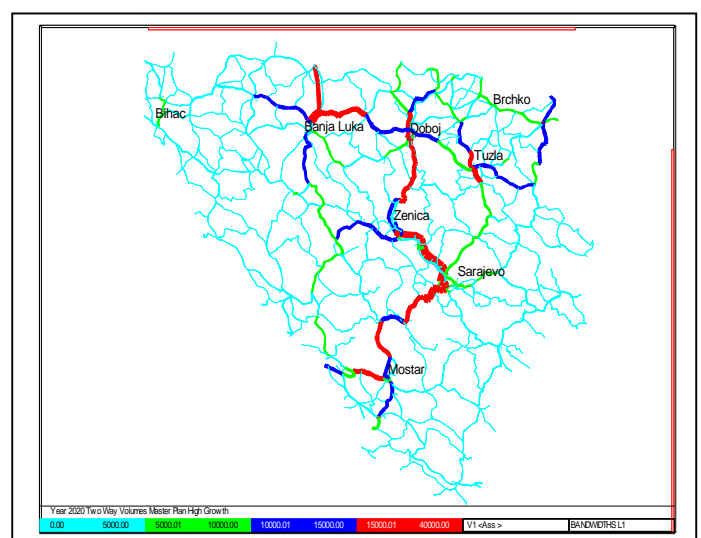
FORECAST DESIRE LINES

Trip demand was forecast to year 2020 based on alternative economic growth scenarios. Under the high economic growth scenario, the total number of daily vehicle trips is estimated to increase from some 125,100 in year 2000 to 305,100 in year 2020. The latter total includes approximately 96,000 external trips, that is, trips with at least one trip end outside of BiH. The year 2020 internal vehicle trip demand, again in the form of a desire line diagram confirms that demand among population and economic activity centers has increased and intensified from Year 2000 levels. Year 2020 trips were assigned onto a series of road networks as part of the iterative testing process which underlies formulation of the recommended road plan.



FORECAST ROAD TRAFFIC VOLUMES

The various networks include the base year committed network, that is, existing facilities plus committed road improvements such as on-going bridge reconstruction; a Corridor Vc motorway network, as well as a series of future year networks incorporating various potential improvement strategies. Year 2020 assignments on the final road plan are depicted in the form of a volume band diagram, with band width reflective of absolute volume. A series of color-coded ranges have also been annotated to assist in the presentation. As shown, highest volumes (up to 40,000 vehicles per day, total both directions of travel) are expected to be encountered in vicinity of major population/economic concentrations as well as within Corridor Vc.



**ROAD TRANSPORT CHARACTERISTICS:
FINDINGS FROM THE TRAFFIC DEMAND ANALYSIS**

Simulated Internal and External Vehicle Trip Totals, Year 2000

Vehicle Type	Trip Type			% of Trips	Average Trip Length (km)
	Internal	External	Total		
Car	77,597	32,820	110,417	88.2	92.1
Bus	1,907	775	2,682	2.1	97.1
Rigid Truck	7,104	984	8,088	6.5	108.5
Articulated Truck	2,093	1,931	4,024	3.2	125.1
Total	88,701	36,510	125,211	100.0	94.3
Percent of Trips	70.8	29.2	100.0	*	*

Source: The JICA Study Team

Simulated Existing and Forecast Daily Vehicle Trips

Trip Type	Vehicle Type	Daily Vehicle Trips by Year				
		2000	2005	2010	2020	2020 High*
Internal	Car	77,598	106,619	126,753	156,148	187,130
	Bus	1,910	1,918	2,003	2,087	2,096
	Rigid Truck	7,105	9,018	10,673	13,489	15,135
	Artic Truck	2,094	2,846	3,377	4,145	4,693
External	All	36,513	49,288	58,330	71,616	96,014
Total		125,211	169,687	201,136	247,485	305,068

Source: The JICA Study Team

Notes: *: stands for the high economic growth scenario

Distribution of Surveyed Vehicles by Class and Occupancy: Year 2000

Vehicle Class	Description	Percentage	Average Occupancy
1	Passenger Car	85.8	2.0
2	Bus	2.6	17.1
3	Rigid Truck	7.2	1.4
4	Articulated Truck	4.4	1.3
Total		100.0	2.3

9. ROADS AND ROAD TRANSPORT

PLANNING ISSUES

The main road and regional road network in BiH extends over 8,630 kilometers. Since the end of the war significant improvements have been achieved, mainly by the Emergency Transport Reconstruction Program (ETRP). This, however, does not necessarily mean that pavement and bridges are good enough to carry expected future heavy traffic.

To strengthen maintenance capability and continue rehabilitation as well as improvement is an absolute minimum necessity. The next issue is what is necessary in addition to maintenance and rehabilitation to cope with future traffic. BiHTMAP proposes strategic improvements based on functional classification and projects analyzed via the demand forecast model.

FUNCTIONAL CLASSIFICATION AND PRIORITY CORRIDORS

As a countrywide transport study, BiHTMAP gives its focus to the primary arterial network. The primary arterial network is sub-divided into two categories, Primary I and Primary II for highlighting relative roles and identifying an efficient primary arterial system for BiH. Among Primary I network, Primary I (Int'l Routes) are defined as coinciding with the existing E-Roads and Corridor Vc designations, which are shown as thick green lines in Figure 9.1. The remaining green lines represent other Primary I corridors.

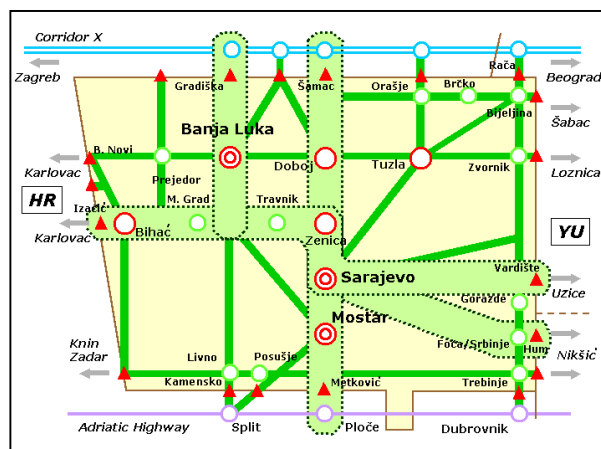


Figure 9.1: Priority Transport Corridors

Primary I (Int'l Routes), Primary I, Primary II and Secondary Arterials are shown on an actual map in Figure 9.2.

Table 9.1 shows the length of Primary I and Primary II arterials for each responsible precinct.

	FBiH	RS	BR	Total
Primary I (Int'l Routes)	526 km	469 km	---	995 km
Primary I	981 km	943 km	29 km	1,953 km
Primary II	517 km	578 km	---	1,095 km
Total	2,024 km	1,990 km	29 km	4,043 km



Figure 9.2: BiHTMAP Priority Corridors

Table 9.2 shows the proposed governmental responsibility for the functionally classified road system.

Table 9.2: Current and Proposed Administrative Classifications

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

●: Responsibility
○: Coordination for International Connections

ROAD REHABILITATION AND PRIORITY

The ETRP projects have been contributing to normalization of road conditions in BiH. The total length of the ETRP projects is 2,165 kilometers, of which 1,480 kilometers are located in FBiH, and a further 685 kilometers in RS.

It is highly required to continue the rehabilitation program for remaining major road sections. It is recommended that higher priority be given to the sections of Primary I and Primary II corridors which have not yet been rehabilitated by the ETRP, as shown by red lines in Figure 9.3. The green, yellow, and orange lines are completed and on-going ETRP project sections.

The priority rehabilitation projects are also summarized in Table 9.3.

Table 9.3: BiHTMAP Priority Rehabilitation Projects

	FBiH	RS	BR	Total
Priority Rehabilitation for Primary I				
Length	543 km	702 km	---	1,768 km
Cost (KM mil)	95.2	123.1	0.0	218.3
Priority Rehabilitation for Primary II				
Length	223 km	300 km	---	523 km
Cost (KM mil)	39.1	52.6	0.0	91.7

Figure 9.3: BiHTMAP Priority Rehabilitation Projects



Since rehabilitation is an iterating process, it is quite reasonable to assume that rehabilitated road sections will deteriorate in due course of time. The level of further deterioration will highly depend on the traffic volume. These analyses are considered in the process of estimating rehabilitation cost over the next twenty years, and summarized with secondary road rehabilitation cost as shown in Table 9.4.

PROJECT PROPOSALS FOR SUFFICIENCY SCENARIO

Sufficiency analyses are a combination of project proposals which satisfy the forecast traffic demand on the road network coupled with realistic investment for capacity build-up and quality improvements.

The sufficiency analysis begins with identification of road sections with insufficient capacity under “Do-Noting Scenario,” and proceed to analyze what would be the likely solutions to ameliorate capacity shortfalls. This is based on the assumptions that 1) appropriate road maintenance will be implemented, 2) reasonable pavement and bridge rehabilitation on Primary I and II corridors will be implemented, and 3) improvements due to committed projects are a given condition on the road

network. Figure 9.4 shows BiHTMAP project proposals.

Investment requirements for road maintenance, rehabilitation, and new project proposals are summarized in Table 9.4. The expected road infrastructure investment for the next twenty years is about KM 6,500 million. This means on average total BiH would require KM 325 million investment per year in the road sector over the next two decades.

Table 9.4: Road Infrastructure Investment Summary: 2001-2020

Item	FBiH	RS	BR	Total	%
Maintenance	1,036.0	940.0	15.4	1,991.4	30.7%
Rehabilitation	828.5	750.3	1.7	1,580.5	24.6%
Committed Projects	161.7	9.1	---	170.8	2.5%
BiHTMAP Projects	2,288.0	1,160.1	39.5	3,487.6	42.2%
Total	4,314.2	2,859.5	56.6	7,230.3	100.0%
% by Precinct	59.7%	39.5%	0.8%	100.0%	---

Figure 9.4: BiHTMAP Project Proposals



ROAD OPERATORS

A review was conducted of road transport operators, that is, inter-city and long distance bus as well as truck activities. This is seen as being particularly relevant given that European precedence and statistical evidence have, for example 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 demand as reforms take hold in BiH's economy will be increasingly shouldered by the road transport system. Over time, these changes will reinforce a continuing shift in market share to road transport. Reliability, speed and predictable service will become more important to customers in a market economy than movement of large volumes at low cost in response to pre-determined plans – as was largely the case in the Yugoslav pre-war economy. 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 vehicle and providing commercial transport services.

The existing administrative and operational framework for road transport operators is complex, controlled, and cumbersome. Various jurisdictional hierarchies ranging from municipal to Kantonal, Chambers of Commerce, 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.

Table 9.5: Estimated Daily 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

Rigorous data for the industry is by and large lacking, however, estimates derived via the road transport model suggest that passenger kilometers accumulated by cars and buses will expand from 24.4 million per day to 51.7 million per day between years 2000 and 2020, respectively (267,100 to 618,000 daily passengers, 80 to 90 percent thereof being via the car mode). In case of trucks, 10.3 million daily year 2000 ton-kilometers (88,700 tons) are forecast to grow to 28.4 million daily year 2020 ton-kilometers (287,800 tons).

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.

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 BiH transport industry.

10. RAILWAYS

Refer to Chapter 3 of Volume II for more details.

PLANNING ISSUES

The railway system in BiH has not yet functionally recovered from war damages to infrastructure, facilities, equipment, and operational systems. Following the Dayton Agreement, reconstruction and rehabilitation of the transport sector started throughout BiH, however, the railway system has been largely unable to respond to needs of passenger and freight transportation (Figure 10.1).

As an essential element of the BiH intermodal transport system, railway transport should be first rehabilitated and re-functionalized, then modernized in such a manner as to achieve sustainable operation on a commercial basis, and as part of the European railway network.

The railway can, in this manner, support more economically feasible transport services for each Entity, between Entities and with European neighbors, while concurrently providing a base for market-oriented transport services.

STRATEGIC RAILWAY CORRIDORS IN BIH

The railways in BiH have historically functioned as the predominant transport mode supporting heavy industries as well as mining and quarrying industries, undertakings mostly located in vicinity of railway corridors. These industrial activities eventually encouraged urbanization processes in major urban centers along the railway corridors. It is estimated that more than 70 percent of human settlements are located in vicinity of railway corridors. Thus, the railway network structures the backbone of the BiH economy (Figure 10.2).

The BiH railway network, extending over 1,031 kilometers, connects the strategically important seaport of Ploce and the Sava River ports of Samac and Brcko, thereby providing a north-south trunk railway corridor linking Adriatic Europe and Southeast Europe. This corridor is recognized as **Corridor Vc**. Another east-west railway trunk corridor parallel to **Corridor X** provides transport linkages with the Croatian and Yugoslavian economies. Thus, the most important lines are:

- Corridor Vc: Samac – Doboj – Sarajevo – Mostar – Capljina - Ploce (Adriatic Port Ploce in the Republic of Croatia);
- The line parallel to Corridor X; Zvornik - Tuzla- Doboj - Banja Luka - Novi Grad Bos. Novi - the Republic of

Croatia;

- Banovici-Tuzla-Brcko; and
- Dobrljin – Novi Grad, Bos. Novi – Bihac - Martin Brod - Knin, Republic of Croatia.

Line alignments are predominantly hilly, with 174 tunnels (total length 50.5 km), 399 bridges (total length 15.3 km), as well as many sharp curves and steep gradients.

FUTURE RAILWAY TRANSPORT DEMANDS

The result of the railway freight transport demand forecast indicates that railway freight transport demand could reach 2,049 million ton-km in 2010, which is as about half of year 1990 transport volume. The demand could be 4,437 million ton-kilometers in 2020, which is about 10 percent greater than the 1990 level. There is a gap between the projected potential demands and the most-likely realized demands. This gap will not disappear until year 2020 when the railway system is modernized to function efficiently following completion of all practical rehabilitation.

RAILWAY IMPROVEMENT SCENARIO

(1) Phased Development Strategies

Enhanced efforts should be realized in a phased manner:

- Phase I (up to 2005) is recognized as “*the normalization period*”, when all efforts should be made to recover from the current deficient situation and normalize the entire system.
- Phase II (2006 ~ 2010) is regarded as “*the transportation recovery period*”, when the credibility of railway transport is regained and abilities to absorb increasing demands realized.
- Phase III (2011 ~ 2020) is conceptualized as “*the strengthening period*”, when the BiH railway system should be further strengthened and modernized in its technical, operational and managerial facets. The railways in BiH can play a significant role as part of the Pan European Network, sharing European norms, regulations, and standards for commercial operations.

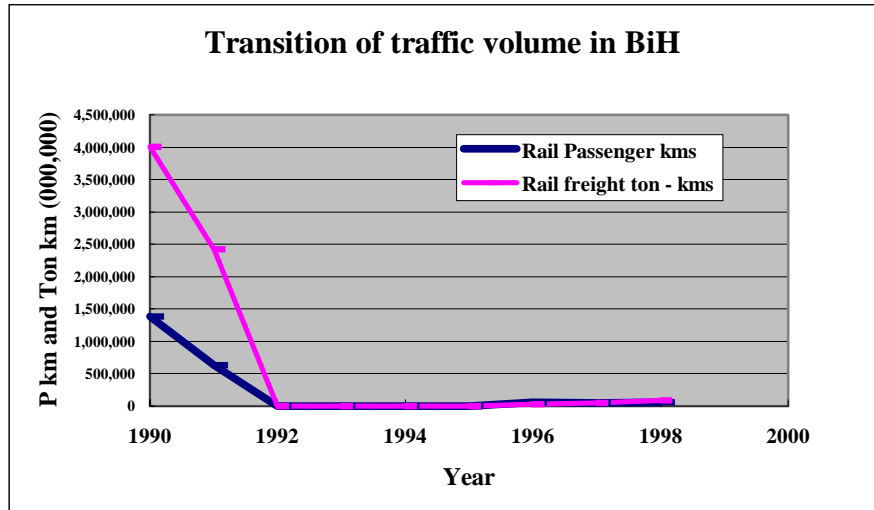


Figure 10.1: Historic Changes in BiH Railway Transport



Worn Wheel Waiting for Cutting at Rajilovac Workshop

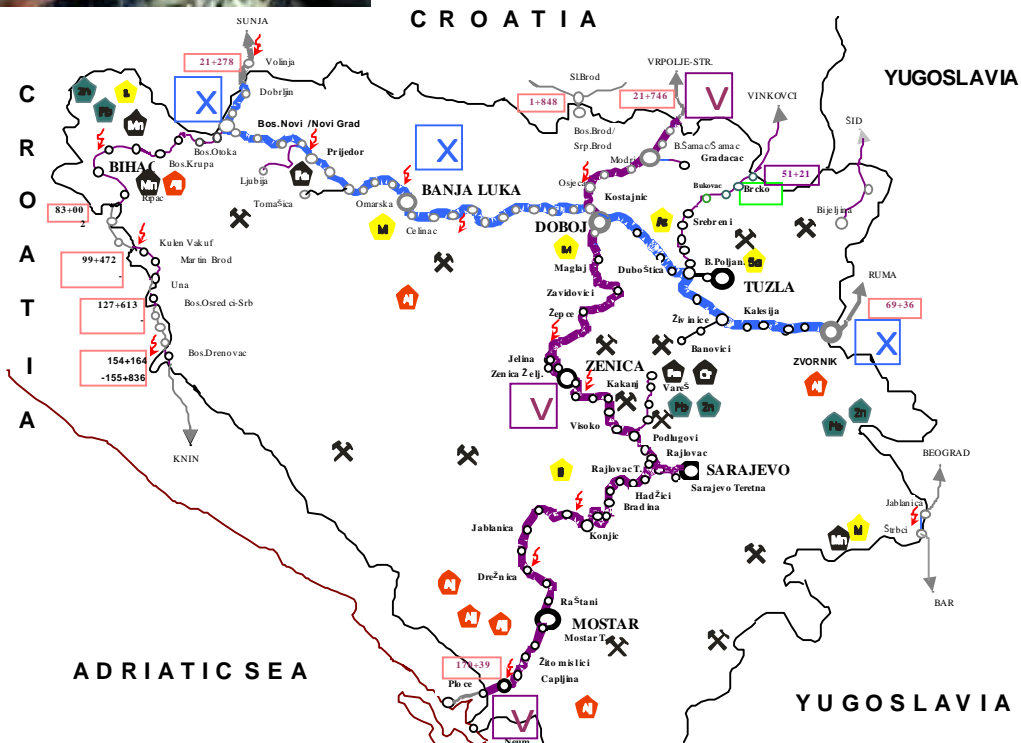
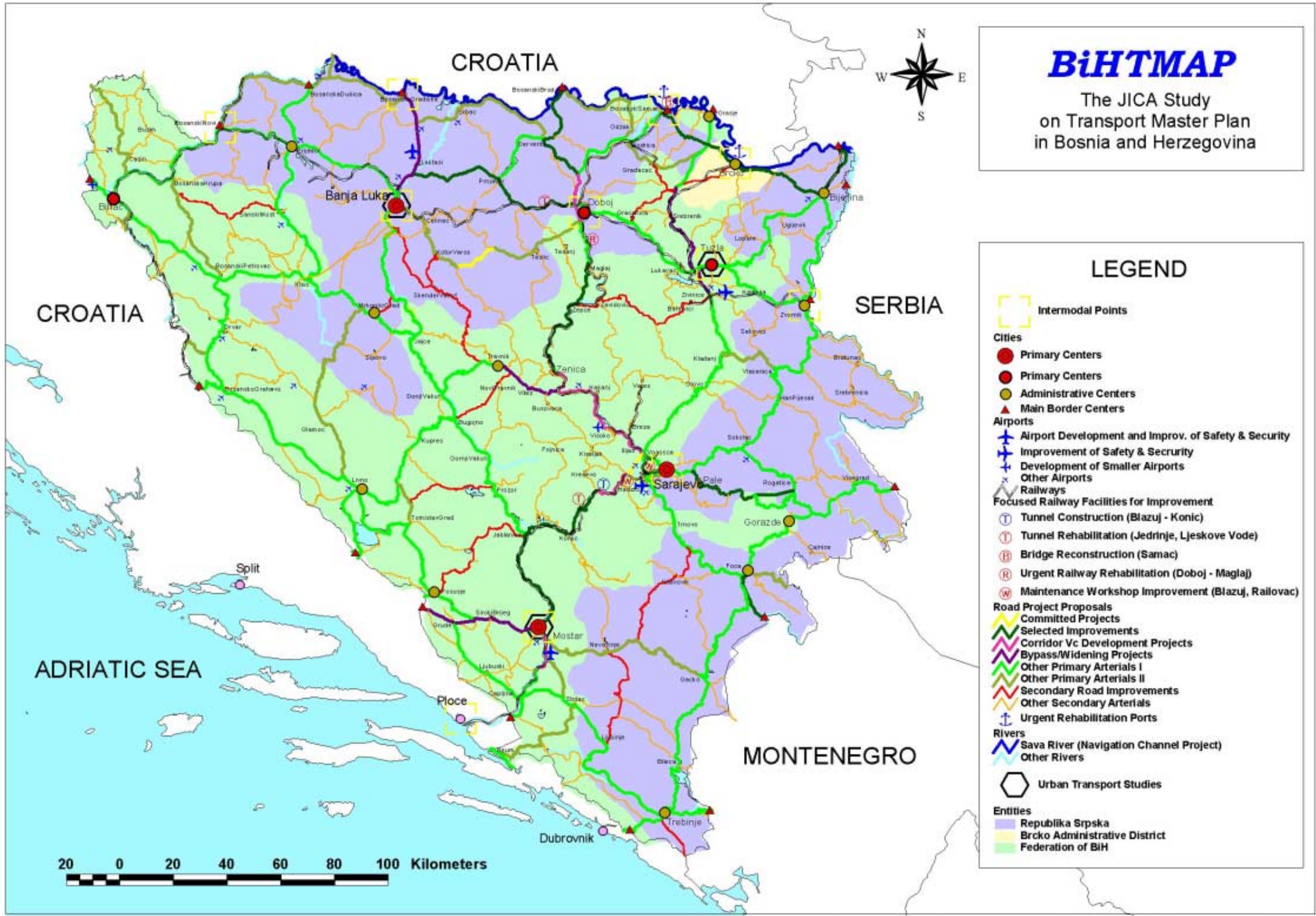


Figure 10.2: The Railways in Bosnia and Herzegovina and Locations of Industrial Activities

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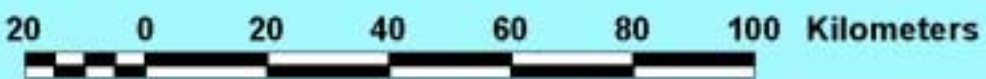


BiHTMAP

The JICA Study
on Transport Master Plan
in Bosnia and Herzegovina

LEGEND

- Intermodal Points
- Cities**
- 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**
- T Tunnel Construction (Blazuj - Konic)
- T Tunnel Rehabilitation (Jedrinje, Ljeskove Vode)
- B Bridge Reconstruction (Samac)
- R Urgent Railway Rehabilitation (Doboj - Maglaj)
- W Maintenance Workshop Improvement (Blazuj, Railovac)
- 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



(2) Necessity of Integrated Approach

The railway transportation is an integrated system with three essential elements: 1) **network connection**; 2) **safety system**; and 3) **proper operation**. Without all three elements, the railway system cannot function safely or adequately. Similarly, each element of the rehabilitation tasks cannot be separated or implemented independently. Therefore, those improvements should be implemented jointly via an integrated approach (Figure 10.3).

URGENT PROGRAM

The urgent program, which is the most important step affecting the progress for all three phases, is proposed as a comprehensive program (Figure 10.4). Within the urgent program, immediate rehabilitation needs to make the railways operable are given highest priority, namely: 1) reconstruction of signal and communication systems; 2) Samac Bridge reconstruction (currently under construction and scheduled for completion in 2002); and recovery of disconnected catenary system.

INDICATIVE COSTS FOR THE RAILWAY REHABILITATION PROJECT

Projects undertaken by the international community have focused on the high priority components of the two strategic railway corridors in BiH. Those are: Corridor Vc: Croatia border – Doboj – Sarajevo – Mostar - Croatia border (single line, 311 km electrified, double track 95 km electrified); and line parallel to Corridor X: Croatia border - Banja Luka – Tuzla - Yugoslavia border (single line electrified 285 km).

The cost of the urgent program totals nearly KM110 million, out of which the investment cost for ZBH accounts for about 57 percent of the total, while that for ZRS, 43 percent of the total. These works are scheduled for completion in 2003.

An insight is provisionally obtained that the full recovery of the railways will cost a total of about KM 1,000 million, including the above committed urgent program, out of which approximately KM500 million needs to be invested for the normalization in Phase I (up to 2005).

INSTITUTIONAL ISSUES

(1) Strengthening Absorptive Capacity

Massive investments will be required to rehabilitate and further improve the entire railway system, including not only infrastructure but also maintenance facilities and

equipment. In order to receive requisite concessional loans and/or grant funds from international donors, questions as to whether or not the railway organizations will be able to implement the projects/programs smoothly and properly must be addressed. Therefore, it is important to strengthen the railway organizations' absorptive capacity to make efficient and transparent use of such funds.

(2) Structuring Commercial Operations

The railways need to be operated on a commercial basis, as a reliable and economically advantageous transport mode. The entire transport system should be geared towards economic reforms within a market-driven economy. The railways must be competitive in terms of transport pricing and quality.

(3) Integrated Borderless and Seamless Operation

In order to strengthen the competitiveness of the railways, longer haulage must be cost-advantageous. From the commercial operation perspective and taking into account the importance of international transport relations with neighboring countries, the railways of ZFBH and ZRS should be collectively operated in an integrated manner under responsibility of the Bosnia and Herzegovina Railways Public Corporation (BHZJK).

(4) Innovative Railway Technology

Technological advances for modernization should be further pursued at the same level and schedule for both ZFBH and ZRS. Both railways need to gradually apply European technical standards for infrastructure, facilities, and equipment.

(5) Pursuance of Privatization Policy

As a measure for more efficiently commercialized operation based on market mechanisms, some models of privatization schemes such as a BOT should be further explored, particularly in areas of cargo handling, station management, and other related businesses.

(6) Education and Training

An enhanced education and training function should be restored and/or re-strengthened for railway staff. It is recommended that those most important tasks be related to BHZJK as one function of the proposed Transport Training Institute.

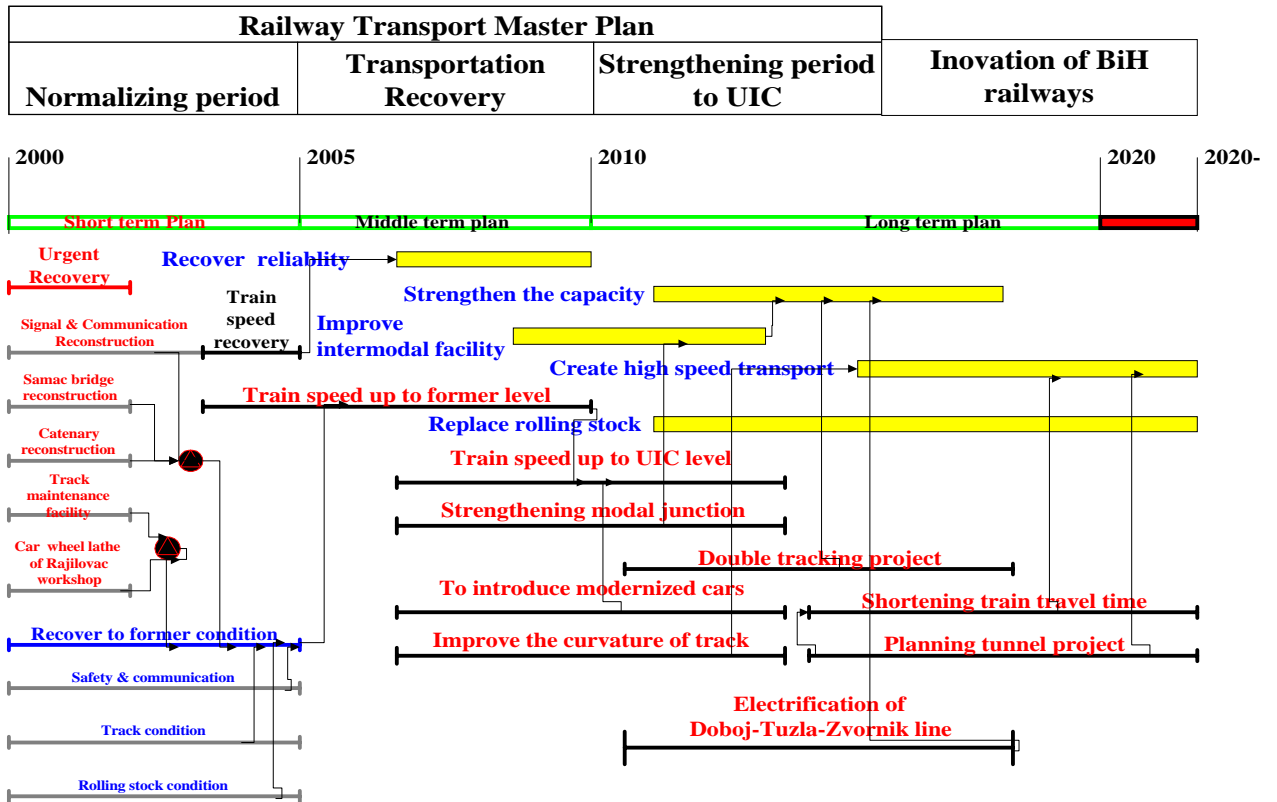


Figure 10.3: Overall Task Items of Railway Reconstruction and Improvement

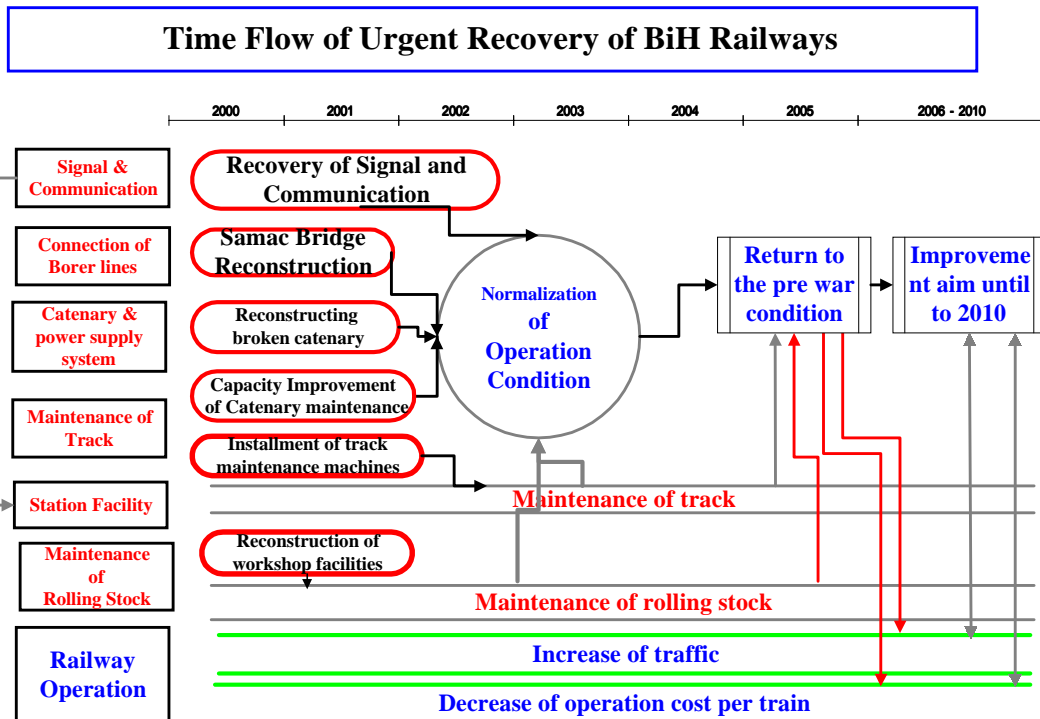


Figure 10.4: Project Components and Time Schedule of Urgent Railway Program

Refer to Chapter 4 of Volume II for more details.

11. AIR TRANSPORT

PLANNING ISSUES

The last decade has seen an increasing trend of privatization and deregulation taking place within the European aviation sector. This has led to increasing competition between airports as they seek to attract airlines to use their facilities. Furthermore, competition has increased over shorter distances as transport links have been improved for other modes. At the same time there has been an increasing demand for passenger air travel as countries get more affluent and the price of airfares has reduced, in real terms.

BiH has four main airports, all of which serve international air traffic. In addition, there is competition from neighboring countries i.e. the airports of Zagreb, Belgrade, Split, and Dubrovnik. Accessibility to airports is also important. Figure 11.1 shows a series of concentric rings, between 100 and 300 km in radius, around the four airports of BiH. This illustrates the competition for air traffic within the country. The proximity of the main airports to each other, and the relatively small size of the country, will mean that there are unlikely to be significant levels of domestic air traffic.



Figure 11.1: Main Airports in Bosnia and Herzegovina

HISTORIC TRAFFIC RATES

In 1999 Sarajevo catered for 304,000 passengers, and its average over the last four years was 280,000. Sarajevo Airport was the only airport in BiH where all civil aviation has been performed with infrastructure and technical facilities.

The situation in the remaining airports is a little more complex. Historically, these airports have served a lesser role. Banja Luka and Tuzla are former military airfields and, thus, are new entrants into the international air market. Evidence from Mostar shows something different with volumes of almost 100,000 passengers recorded, mainly religious pilgrims in the early 1990's. It must be said, however, that all flows at the three airports have been partly constrained due to air navigation equipment and other limitations.

Total passenger volumes for BiH as a whole, in 1999, were approximately 340,000.

FUTURE PASSENGER AND CARGO FLOWS

Forecasting future air traffic growth is difficult because of the transition process that has taken place and because some of the airports are only now beginning to commence civilian operations. Possible growth trends for BiH will depend, in particular, on its greater integration within Europe as a whole.

Based on air traffic flows for other Eastern Europe countries, the total passenger and cargo volume for BiH as a whole, in 2020, was forecast, as shown in Table 11.1. GDP per capita forecasts for BiH, made by the JICA Study Team, were utilized and price elasticities were also taken into account. It was estimated that the total volume of air passenger traffic, in the year 2020, will be approximately 1.6 million.

Based on known traffic at Sarajevo airport, and after deducting traffic relating to current military and

Table 11.1: Forecasted Passenger and Cargo Flows by Airport, 2020

	2020 passengers	2020 passengers (Highest Growth)	2020 cargo (tons)	2020 cargo (tons) (Highest Growth)
Sarajevo	1,000,000	1,550,000	5,000	28,750
Banja Luka	250,000	580,000	1,800	3,250
Mostar	150,000	150,000	1,800	3,250
Tuzla	150,000	150,000	7,500	43,000
Total	1,550,000	2,430,000	16,100	78,250

humanitarian agency personnel, reasonable traffic growth rates and income elasticities were applied to produce a passenger forecast for the year 2020, for Sarajevo airport. The remaining traffic for the country as a whole was split by other airport on the basis of approximate population catchment areas, taken into account accessibility to Sarajevo airport.

Meanwhile, additional passenger estimates for Sarajevo and Banja Luka have been made. The Master Plan of Sarajevo Airport (January 1999), made by the SEA Aeropoti di Milano, forecasts the 2020 passenger demand at 1.55 million for Sarajevo. The Development Plan for Banja Luka Aerodrome indicates that passenger totals will reach 580,000 in year 2020. Taking into account a relation between expected economic performance and air traffic demands based on the other Eastern Europe countries' experiences, these estimates are thought to be of the highest scenario.

The resulting forecast passenger and cargo flows are shown in Table 11.1.

AIR NAVIGATION SERVICES

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 (ANS) for Bosnia 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, and SFOR.

On the basis of the above meeting it is considered that all air navigation services issues have been solved in principle for the long term. Implementation constraints (of the agreed airspace / ATC services) with respect to civil/building, equipment, training, licensing, etc. need to be left in the capable hands of specialized international organizations such as ICAO because subject matters are highly specialized. Funding of projects to implement the recommendations is considered as a priority project in the air sector plan.

AIR TRANSPORT DEVELOPMENT PLAN

The major observation from site investigations is that the main infrastructural elements at airports 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.

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, especially at Sarajevo and Banja Luka Airports.

At the master plan level, the issue of developing smaller airports is of lesser relevance. However, it is recommended that a feasibility study should be carried out to identify the airports needing investment, in order to ensure safe general aviation operations, and to stimulate regional commitment and development.

Training is considered to be a priority issue within the aviation sector, with respect to air navigation services, crash/fire/rescue (CFR), meteorological staff, and management of such.

The project components which need to be addressed in the short-term (2000-2005) to meet the international 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. The indicative cost for priority projects for the BiH airports are estimated to be KM 167.7 million at the 2000 prices, including the training costs of KM 9.0 million.

Table 11.2: List of Priority Projects

Priority Investment Projects	Cost (mil. KM)
Intermediate airspace traffic control system:	
- Establishment of one ATS unit for intermediate space control	52.3
Sarajevo airport:	
- Improvement of safety and security to meet ICAO standards	22.0
Banja Luka airport:	
- Improvement of safety and security to meet ICAO standards	37.7
- Airport development (including cargo terminal)	10.2
Mostar airport:	
- Improvement of safety and security to meet ICAO standards	12.0
Tuzla airport:	
- Improvement of safety and security to meet ICAO standards	15.5
- Airport development (concrete apron area and cargo terminal)	3.5
Small aerodromes:	
- Urgent minimum improvement for safety and security	5.0
- Feasibility study	0.5
Training:	
- Staff training (implementation of ANS recommendations)	7.5
- CFR training	1.5
Total	167.7

12. WATERWAY TRANSPORT

Refer to Chapter 5 of Volume II for more details.

PLANNING ISSUES

The Sava River is seen as the catalyst for development of waterway transport in BiH. The functional role of Brcko is in the first instance to serve its natural hinterland which includes the Tuzla region. Samac will have its natural hinterland oriented towards the Republika Srpska and in addition benefit from its location on Corridor Vc.

From year 2005 onwards, the **Corridor Vc** location of Samac, in concert with road and rail improvements connecting major industrial centers within Corridor Vc, will influence the traffic distribution between both ports. While Samac could enjoy a constant increase in traffic, the market share of Brcko may gradually reduce, partly because other terminals and loading/unloading facilities will gradually become operational along the Sava River.

In the longer term, regional waterway transport can also be developed on other rivers such as the Neretva and the mouths of Rivers Una, Bosna, and Drina. Lakes such as Modrac offer interesting opportunities to develop in terms of water-based activities (water sports, fishing, tourism and recreation). Finally, the region of Neum and the 24-kilometer long Adriatic coast area can be developed for tourism, passenger traffic, commercial fishing, and small commercial transport.

DEMAND FORECAST BY SCENARIOS

The evolution of BiH traffic on the Sava River is summarized according to the different development scenarios depicted in Figure 12.1. Traffic to and from Brod is included in these numbers.

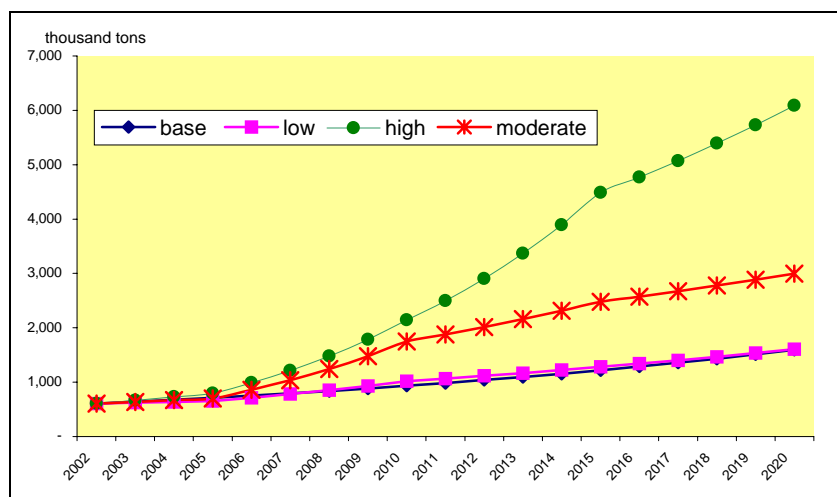


Figure 12.1: Sava River Traffic Forecast by Scenario

The **high growth scenario** would generate 6 million tons of traffic on the Sava River. 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 **low growth scenario** and the base scenario follow the opposite approach where industrial development will be moderate (as compared to services and manufacturing) and the share of river transport would correspondingly remain low.

This is a very pessimistic view and contrary to the European development in river transport where the share of this mode increases with higher than minimum growth rates. The **moderate scenario** is the probable scenario according to which river transport will develop in the near future. Under this scenario, total river traffic will again reach prewar levels around year 2020, to further grow over the following 10 years at moderate rates.

The share of river transport will grow because of its inherent logistics benefits to industry. It will also grow because there is expected increase in industrial development and expansion of cross border transport. It will be up to the river transport operators and port managers to maximize the potential benefits generated by these evolutions. Modal integration and development of new markets will be a core success factor to reach optimistic levels of transport growth.

URGENT RECONSTRUCTION PROJECTS

The *urgent reconstruction projects* are projects that need to be implemented in the short-term future in order to have as soon as possible an operational river transport sector in BiH. The following actions need to be undertaken urgently to revitalize the waterway transport system which will be properly operated as part of the European water system.

(1) Navigation Channel on the Sava River

Several sources indicated that approximately 95 percent of the river is at that standard and that 5 percent of the river length (16,500 m) needs to be dredged. According to this information, a total volume of 990,000

m³ needs to be dredged.

(2) Urgent Rehabilitation of Port of Brcko

Loading and unloading facilities are a necessity for utilizing the benefits of river transport. Port of Brcko is one of two important facilities along Sava River that offers the industry access to the benefits of river transport. Urgent repairs are necessary to ensure minimum operations.

(3) Urgent Rehabilitation of Port of Samac

Port of Samac is the second important facility along Sava River in addition to Brcko port. Urgent repairs are necessary to ensure minimum operations in the port area. The proposed investments are mainly for new buildings. To start operations, crane and quay investment is mandatory. Other investments can follow once the port has started up its activities.

- Intermodal platforms at Port Samac and Port Brcko
- Intermodal platform at Port Gradiska

The objective of the two phases is to gradually integrate river transport with the entire transport system of BiH, as conceptually demonstrated in Figure 12.2.

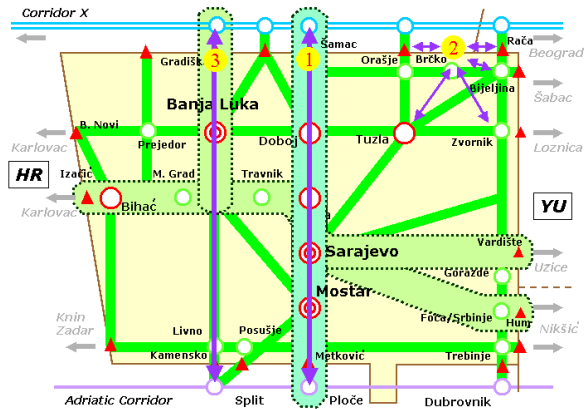


Figure 12.2: Conceptual Approach to River Transport Integration

Table 12.1: List of Urgent Reconstruction Projects

Urgent Reconstruction Projects	Cost (thousand KM)
Navigation channel on Sava river	7,540
Rehabilitation of Port of Brcko	5,090
Rehabilitation of Port of Samac	7,850
Total	20,480

PHASED DEVELOPMENT PROJECTS

The *phased development projects* are infrastructure investments that are necessary in the medium- and long-term to guarantee sustainable river transport on the Sava River and to upgrade the system to EU levels.

For the medium-term (Phase 2), the plan includes:

- Stabilization of Sava River accessibility
 - Further dredging of the Sava river (Class IV from Yugoslavian 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 ports of Brcko and Samac
 - Preparation of development plan for Gradiska port
- Start development of Neum coast line for tourism and local initiatives on other rivers

For the long-term (Phase 3), the plan includes:

- Stabilization of Sava River accessibility
 - Maintenance dredging of the Sava River
 - Hydraulic and river bank maintenance
- Integration of river transport

REGULATORY FRAMEWORK

Clear and coherent regulations for navigation on the Sava River are a priority condition to generate traffic in the future. This will need cooperation at different levels such as inter- and intra-Entity level, tri-country level (BiH, Croatia, and Yugoslavia) and international level. The basic regulatory concept and related responsibilities is demonstrated in Figure 12.3. There exists the need for the **Waterways and Ports Public Corporation**, as part of Transport Public Corporation, to coordinate between the Entities on relevant issues of river transport. During a further stage, organization of the Sava River Management Board (which includes BiH, Croatia, and Yugoslavia) is vital, because the Sava River runs through all the three countries.

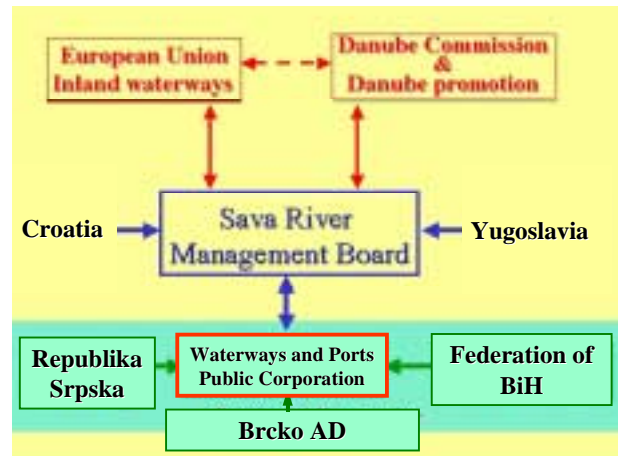


Figure 12.3: Proposed Regulatory Framework for Rivers and Ports

13. HUMAN RESOURCE DEVELOPMENT

NECESSITY OF STRENGTHENING TRANSPORT TRAINING FUNCTIONS

An important part of “*humanware*” development is the professional training and education of public and private stakeholders. Expertise building is a critical success-factor to guarantee that the future transport system is used, maintained, and improved according to EU standards. The lack of modern training and education constitutes at present a serious cross-modal problem. All professional experts and public representatives consider the lack of professional staff as a critical problem that requires immediate attention. Thus, training and education in modern techniques and technologies and in integrated logistics is a basic prerequisite for developing future BiH transport.

A PROPOSAL OF THE TRANSPORT TRAINING INSTITUTE

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

The objective is to ensure continuity of the Institute as a sustainable institution which provides up-to-date international knowledge for the transport industry. A high international standard means also recognition of “*certificates*” to be issued by the Institute as being equal to those of the traditional Western nations.

The organization of training and education in BiH should be structured in such a way that international cooperation with the different stakeholders is direct and efficient.

The training and education program needs to be developed with international (European) quality standards and the related certificates homologated at the international level. Therefore, it is essential that international expertise and assistance be incorporated into development of the BiH training and education program.

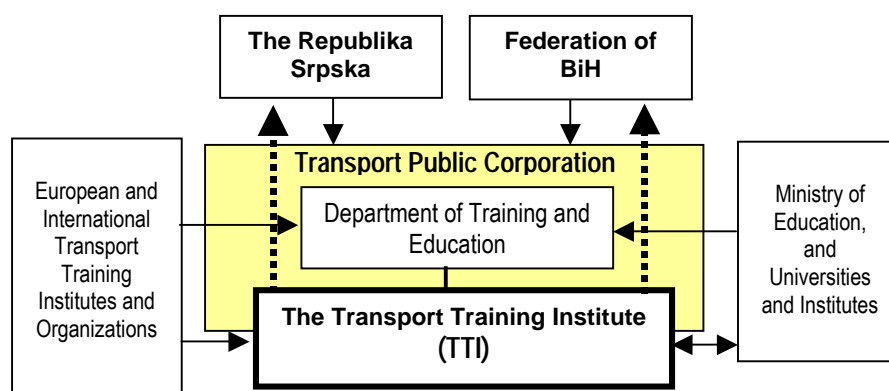
DEVELOPMENT STRATEGIES

The specific phases of the proposed development program include following steps:

- (1) Investigate the present situation in BiH to identify needs, and facilitate state-of-the-art expertise building for public decision makers
- (2) Establish the Transport Training Institute (TTI):
 - Organize a “*Train-the-Trainers program*” that will set the basis for self sustainability of transport training and education;
 - Develop training programs and write the “*course syllabi*” in accordance with those available in similar European and/or international training institutes.
- (3) Assist the TTI to become a self-sustaining organization, while ensuring a long-term cooperation structure with European high-quality partners.

INSTITUTIONAL SETTING

The TTI could be organized as an integrated part of the Transport Public Corporation. Within the Transport Public Corporation, a special department for Training and Education is recommended to be organized, having the responsibilities for managerial and operational matters, including collaborations with BiH universities and relevant institutes as well as integration of different technical assistance programs from donors.



14. ENVIRONMENTAL ADMINISTRATION

ORGANIZATIONS FOR ENVIRONMENTAL PROTECTION IN BIH

Both Entities in the State of Bosnia and Herzegovina have their own Ministry of Physical Planning and Environment. There is no Ministry of Environment at the state level. However, there is an Environmental Steering Committee (with 8 members) for coordination among both Entities of environmentally related matters. Each Entity has four members assembled in the Steering Committee, which meets generally once per month.

Under both Ministries of Physical Planning and Environment, there are four Departments, among which the Department dealing with environmental issues:

- Department of Physical Planning;
- Department of Environmental Protection;
- Department of Construction and Reconstruction; and
- Department of Law Cases and General Affairs.

Departments of Environmental Protection in both Entities are operational at present, but are understaffed. Policy emphasis needs to be placed on strengthening the environmental administration capability.

ENVIRONMENTAL REGULATIONS IN BIH

Although at present there are no specific environmental laws and regulations in either Entity, the existing Law on Physical Planning has about 40 provisions related to environmental issues. Each Entity will have its own environmental laws in the near future, but they will be practically identical.

With EU assistance, six new laws are being formulated. An Environmental Framework Law is being prepared now and will probably be finalized at the end of the year. Other environment-related laws under preparation are: 1) Law on Water Protection; 2) Law on Waste; 3) Law on Nature Protection; and 4) Law on Air Protection.

ENVIRONMENTAL GUIDELINES FOR TRANSPORT DEVELOPMENT

Environmental guidelines to be followed for the BiHTMAP are in principle the regulations and guidelines of both Entities. However, because both Entities have not yet formulated their own environmental laws and regulations, the JICA and EU guidelines are being followed for the Initial Environmental Examination (IEE).

In general, it can be stated that EU and JICA environmental regulations, as well as international guidelines, prescribe that transport development projects should be designed and constructed along environmentally sound principles to ensure sustainability. Environmental considerations for the transport project are taken according the following process.

INITIAL ENVIRONMENTAL EXAMINATION

Transport development projects are implemented to improve the mobility of goods and persons, which should result in improved economic development. However, almost every project has also negative environmental impacts, being slight or severe.

To obtain insight into this field and to ensure sustainability, an Initial Environmental Examination of the priority projects should first be carried out as part of the Transport Master Plan studies. The IEE will indicate negative and positive environmental impacts, to be expected from the proposed projects, in order to determine whether or not more detailed follow-up environmental studies are required such as a full Environmental Impact Assessment (EIA) and/or Environmental Management and Monitoring Plans (EMMP), depending upon the significance of adverse environmental impacts. Also an indication of mitigation measures, required to alleviate adverse impacts, will be provided.

ENVIRONMENTAL ASSESSMENT CRITERIA

Environmental criteria for the transport development projects relate to processes and activities, which may affect the social and cultural environment and the physical and biological environment (landforms, the preservation of nature reserves, flora, fauna, quality of water resources).

Criteria to judge the significance of environmental impacts relate to characteristics of the projects, to the location/environmental sensitivity of project areas, and to characteristics of potential impacts. Additionally, the number of environmental components affected and the cumulative nature of impacts should be taken into account.

The administrative capability should be strengthen to appropriately evaluate the environmental studies and monitor all processes.

15. PRIORITY PROJECTS AND PROGRAMS

CONCEPT OF PRIORITIZATION

Priority projects/programs are identified as those whose implementation shall be achieved by year 2005. Based on the basic phasing concept, as described in Section 5, priority is given to projects and programs whose implementation will contribute to the recovery from war damages and restoring prewar conditions. Consideration is also taken that priority projects shall serve as stepping stones toward the ultimate goal of: integration into the European Union.

RECOMMENDED URGENT PROJECTS

Urgent projects identified within the sector plans for each mode are summarized in this section, including indicative cost estimates. Costs are estimated in terms of constant year 2000 prices.

(1) Road Sector

The adopted road sector approach is to identify needs over a 20-year horizon, stratified by three implementation periods: 2001 – 2005 (priority projects), 2006 – 2010, and 2011 – 2020. BiHTMAP project proposals are based on sufficiency analysis and are intended to expand, in one form or another, the road network (Figure 15.1 and Table 15.1). However, it is concurrently noted that more than half of total investment is dedicated to maintenance and rehabilitation of roads (Table 15.2).

(2) Railway Sector

With a target being functional modernization of BiH railways, a package improvement is proposed, whose focus is Corridor Vc and the line parallel to Corridor X. The highest priority should be given to immediate actions for: 1) rehabilitation of rolling stock, including rehabilitation of workshops and maintenance functions; 2) improvements of infrastructure, including signal and communications, as well as recovery of disconnected catenary system. The project package includes several work items, among them:

- Procurement of maintenance machines for:
 - Installation of track;
 - Repair of catenary system;

- Rolling stock maintenance, especially wheel tread forming;
- Safety system improvement;
- Improvement of train operations; and
- Engineering improvement of tunnel structures.

It is provisionally estimated that the full recovery of this package will cost a total of about KM 500 million, excluding the committed urgent program (Table 15.3).

(3) Air Transport Sector

Those project components which need to be addressed in the short-term to meet ICAO standards with respect to safety and security, and to meet future international demand have been identified as priority projects. Each airport requires investment for these purposes, with absolute totals dependent on airport function and demand. A total of approximately KM 168 million would be required for these urgent projects (Table 15.4).

(4) Waterway Transport Sector

The urgent reconstruction projects should be focused on making the Sava River transport system operational as soon as practicable. To this end, the status of Sava River needs to be clarified in terms of its responsibilities, international status, and organizational setting for port operations. The urgent reconstruction projects also need to include the following vital activities.

- Facilitation of Safety and Navigability of Sava River:
 - 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.
- Rehabilitation of major Ports of Brcko and Samac.

The total cost is provisionally estimated at about KM 20.5 million (Table 15.5).

(5) Transport Training Institute (TTI)

The Transport Training Institute is proposed as an important urgent program, as discussed in Section 13. The program cost would be around KM 4.5 million.

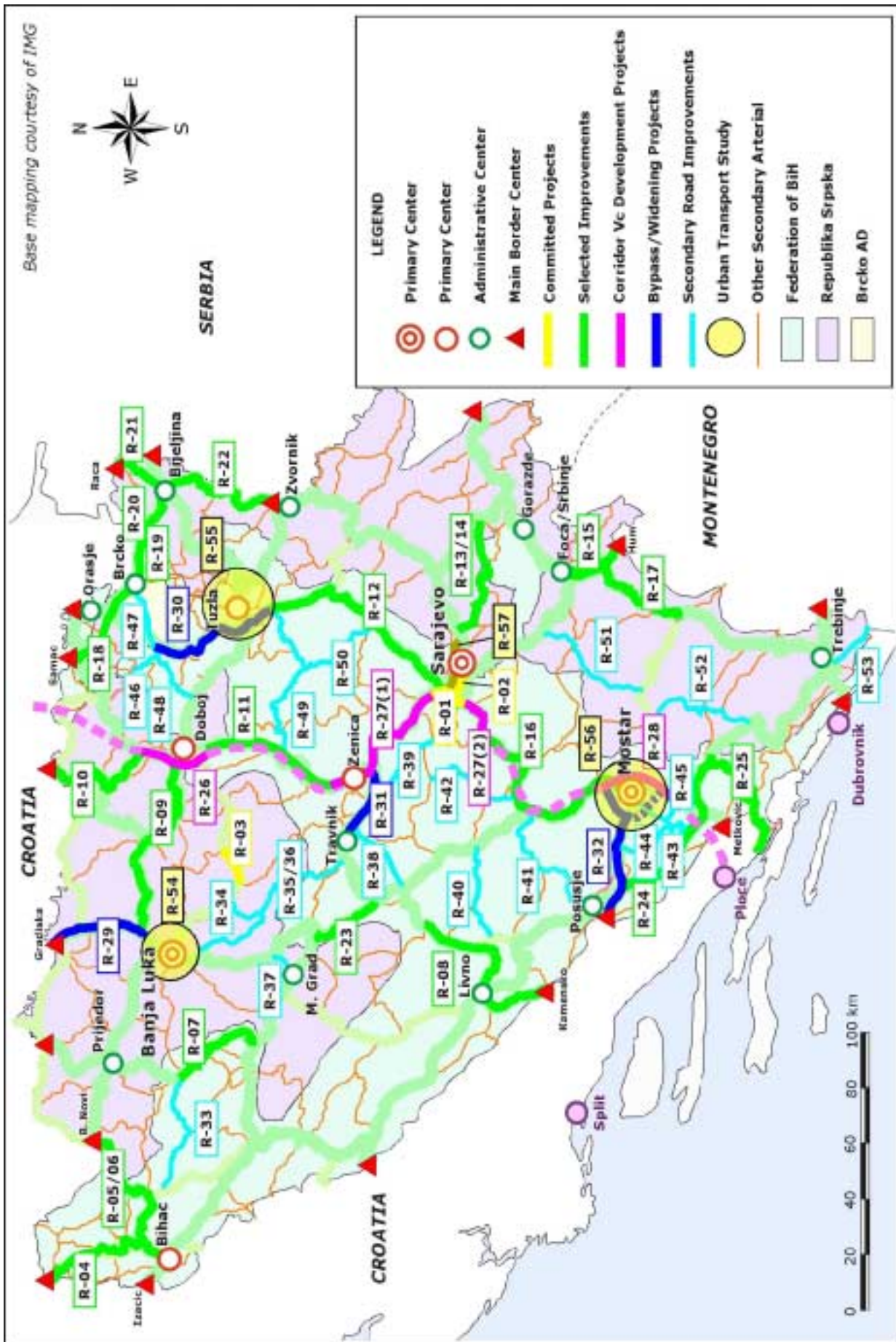


Figure 15.1: Road Project Location Map for BiHTMAP Project Proposals

Table 15.1: Proposed BiHTMAP Road Infrastructure Improvement Projects

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	○		
R-02	Sarajevo Bypass Access Highway (Phase II)	New Bypass	FBIH	2.3 km	** 26.7	○		
R-03	Maslovare-Pribilic Road Improvement	Improvement	RS	6 km	** 9.1	○		
Selected Improvements								
R-04	Velika Kladusa-Srbijani Road Improvement	Improvement	FBIH	45 km	18.0		○	
R-05	Bihac-B. Novi Road Improvement (FBIH)	Improvement	FBIH	51 km	35.7		○	
R-06	Bihac-B. Novi Road Improvement (RS)	Improvement	RS	17 km	11.9		○	
R-07	Sanski Most - Kljuc Road Improvement	Improvement	FBIH	32 km	12.8		○	
R-08	Heavily Loaded Road Improvement (Kamensko-Kupres)	Improvement	FBIH	81 km	56.7			○
R-09	Banja Luka-Doboj Road Development	Improvement	RS	86 km	168.7	○		
R-10	Heavily Loaded Road Improvements (B. Brod-Seslija)	Improvement	RS	50 km	35.0	○		
R-11	Heavily Loaded Road Improvements (Zenica-Maglaj)	Improvement	FBIH	53 km	37.1	○		
R-12	Sarajevo-Tuzla Road Improvement	Improvement	FBIH	98 km	102.3		○	
R-13	Ljubogosta-Mesici Road Development (RS)	Improvement	RS	54 km	187.8			○
R-14	Ljubogosta-Mesici Road Development (FBIH)	Improvement	FBIH	6 km	4.2			○
R-15	Foca/Srbinje-Hum Road Improvement	Improvement	RS	21 km	172.2		○	
R-16	Tarcin-Mostar Road Improvement	Improvement	FBIH	93 km	67.7	○		
R-17	Foca/Srbinje-Gacko Road Improvement	Improvement	RS	64 km	25.6			○
R-18	Heavily Loaded Road Improvements (Samac-Loncari)	Improvement	RS	27 km	18.9			○
R-19	Heavily Loaded Road Improvements (Loncari-Vrsani)	Improvement	BR	29 km	20.3			○
R-20	Heavily Loaded Road Improvements (Vrsani-Bijeljina)	Improvement	RS	25 km	52.7			○
R-21	Heavily Loaded Road Improvements (Bijeljina-Raca)	Improvement	RS	23 km	9.2			○
R-22	Heavily Loaded Road Improvements (Bijeljina-Zvornik)	Improvement	RS	54 km	37.8			○
R-23	Heavily Loaded Road Improvements (D. Vakuf-Jajce)	Improvement	FBIH	34 km	23.8			○
R-24	Heavily Loaded Road Improvements (Grude-Stolac)	Improvement	FBIH	69 km	48.3		○	
R-25	Stolac-Neum Road Improvement	Improvement	FBIH	51 km	20.4			○
Corridor Vc Development Projects								
R-26	Corridor Vc (Doboj Bypass)	New Bypass	RS	15 km	106.5			○
R-27(1)	Corridor Vc (South Zenica-Josanica)	Motorway	FBIH	56 km	448.0		○	
R-27(2)	Corridor Vc (Vlakovo-Tarcin)	New Bypass	FBIH	16 km	243.5		○	
R-28	Corridor Vc (Mostar Bypass)	New Bypass	FBIH	20 km	142.0			○
Bypass/Widening Projects								
R-29	Klasnica-Gradiska Road Improvement	New Bypass	RS	32 km	163.2		○	
R-30	Zivinice-Celik Road Improvement	Widening	FBIH	51 km	168.3			○
R-31	Lasva-Travnik Road Improvement	New Bypass	FBIH	26 km	184.6			○
R-32	Mostar-Gorica Road Improvement	New Bypass/Widening	FBIH	51 km	264.7	○		
Secondary Road Improvements								
R-33	B. Krupa-S. Most Road Improvement	Pavement	FBIH	52 km	41.6			○
R-34	K. Varos-S. Vakuf Road Improvement	Pavement	RS	16 km	12.8			○
R-35	Jagare-Turbe Road Improvement (RS)	Pavement	RS	80 km	64.0			○
R-36	Jagare-Turbe Road Improvement (FBIH)	Pavement	FBIH	18 km	14.4			○
R-37	Crna Rijeka-M. Grad Road Improvement	Pavement	RS	14 km	11.2		○	
R-38	Novi Travnik-Bugojno Road Improvement	Pavement	FBIH	32 km	12.8		○	
R-39	Blazuj-Kaonik Road Improvement	Pavement	FBIH	50 km	40.0	○		
R-40	Mokronoge-Prozor Road Improvement	Pavement	FBIH	43 km	17.2			○
R-41	Posusje-Jablanica Road Improvement	Pavement	FBIH	65 km	26.0			○
R-42	Ostrozac-Fojnica Road Improvement	Pavement	FBIH	65 km	26.0			○
R-43	Mostar-Ljubuski Road Improvement	Pavement	FBIH	33 km	13.2			○
R-44	Siroki Brijeg-Capljina Road Improvement	Pavement	FBIH	47 km	18.8			○
R-45	Sitluk-Zitomislic Road Improvement	Pavement	FBIH	10 km	4.0			○
R-46	Gradacac-Ormanica Road Improvement	Pavement	FBIH	14 km	11.2		○	
R-47	Cerik-Brcko Road Improvement	Pavement	BR	24 km	19.2			○
R-48	Gracanica-Srnice Road Improvement	Pavement	FBIH	24 km	19.2		○	
R-49	Zepce-Zivinice Road Improvement	Pavement	FBIH	80 km	32.0		○	
R-50	Olovo-Ribnica Road Improvement	Pavement	FBIH	40 km	32.0			○
R-51	D. Polje-Pluzine Road Improvement	Pavement	RS	67 km	53.6			○
R-52	Nevesinje-Ljubinje Road Improvement	Pavement	RS	55 km	22.0			○
R-53	Trebinje-Grab Road Improvement	Pavement	RS	15 km	6.0		○	
Urban Transport Studies/Major Urban Projects								
R-54	Banja Luka Urban Transport Study	Study	RS	---	1.0	○		
R-55	Tuzla and Vicinity Urban Transport Study	Study	FBIH	---	1.0	○		
R-56	Mostar Regional Transport Study	Study	FBIH	---	1.0	○		
R-57	Sarajevo City Motorway	New Bypass	FBIH	10 km	** 99.5		○	
Total for BIHTMAP Project Proposals ***			Entity	Length	Cost	2001-2005	2006-2010	2011-2020
Total (Federation of BiH)			FBIH	---	2,288.0	807.0	687.8	793.2
Total (Republika Srpska)			RS	---	1,160.1	204.7	364.5	590.9
Total (Brcko District)			BR	---	39.5			39.5
Total (Bosnia and Herzegovina)			---	---	3,487.6	1,011.7	1,052.3	1,423.6

Source: JICA Study Team

* Year 2000 Constant Prices

** Cost obtained by Local Authorities

*** Not including Committed Projects

Table 15.2: Road Infrastructure Investment Program: 2001-2020

[thousand KM]					
Item	FBiH	RS	BR	Total	%
Maintenance	1,036.0	940.0	15.4	1,991.4	30.7%
Rehabilitation	828.5	750.3	1.7	1,580.5	24.6%
Committed Projects	161.7	9.1	---	170.8	2.5%
BiHTMAP Projects	2,288.0	1,160.1	39.5	3,487.6	42.2%
Total	4,314.2	2,859.5	56.6	7,230.3	100.0%
% by Entity	59.7%	41.2%	0.7%	100.0%	---

Table 15.3: Priority Railway Investment Program

Category	Cost Component	Total (mil. KM)
Rolling Stock	Rolling Stock	158.9
	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	

Table 15.5: Priority Waterway transport Investment Program

Project Components	Total Cost (‘000 KM)
Safety and Navigability of Sava River	
De-mining (88,000 mines)	550
Clearing (330rkm)	990
Dredging (16.5 km)	4,500
Surveys and Project Management	1,500
Sub-total	7,540
Urgent Rehabilitation of Port of Brcko	5,090
Urgent Rehabilitation of Port of Samac	7,850
Total	20,480

Notes: The port rehabilitation project includes: 1) mine clearance in the port area; 2) improvement of cranes; 3) transformer station rehabilitation; 4) quays rehabilitation; 5) port rail track and road repair; 6) buildings; and 7) engineering cost.

Table 15.4: Priority Air Infrastructure Investment Program

Priority Investment Projects	Cost (mil. KM)
Intermediate airspace traffic control system:	
- Establishment of one ATS unit for intermediate space control	52.3
Sarajevo airport:	
- Improvement of safety and security to meet ICAO standards	22.0
Banja Luka airport:	
- Improvement of safety and security to meet ICAO standards	37.7
- Airport development (including cargo terminal)	10.2
Mostar airport:	
- Improvement of safety and security to meet ICAO standards	12.0
Tuzla airport:	
- Improvement of safety and security to meet ICAO standards	15.5
- Airport development (concrete apron area and cargo terminal)	3.5
Small aerodromes:	
- Urgent minimum improvement for safety and security	5.0
- Feasibility study	0.5
Training:	
- Staff training (implementation of ANS recommendations)	7.5
- CFR training	1.5
Total	167.7

Refer to Section 6.3 of Volume I for more details.

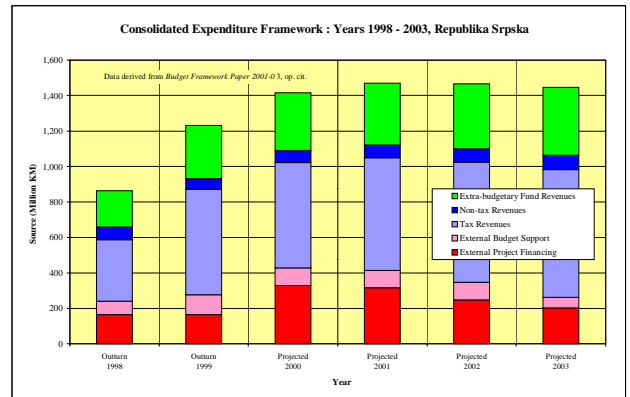
16. BUDGETARY AFFORDABILITY

A review of affordability was conducted for the road sector, that is, the relationship between identified road improvement needs (maintenance, rehabilitation, new projects), current expenditure patterns, near-term budgetary forecasts authored by Entity Ministries of Finance (in cooperation with the World Bank) as well as longer-term economic growth scenarios embedded in the BiHTMAP socio-economic framework.

FUNDING SYNOPSIS

Fiscal support for roads in Republika Srpska is guaranteed via dedicated funding sources. During 1999, the Roads Directorate expended some 41.2 million KM on the maintenance, reconstruction, or construction of roads, a total expected to reach about 45.5 million KM during year 2000. Within the Federation of BiH expenditures on transport are allocated from the composite budget; thus, Federal and Kantonal Ministries of Transport must compete with other ministries for scarce domestic resources. Road-related outlays do not appear as unique budgetary items, however, based on available data, some 25-30 million KM seems a reasonable estimate of current annual outlay on road maintenance and rehabilitation. This translates, in relative terms, to about two percent of GDP and 0.4 percent of GDP for Republika Srpska and the Federation, respectively.

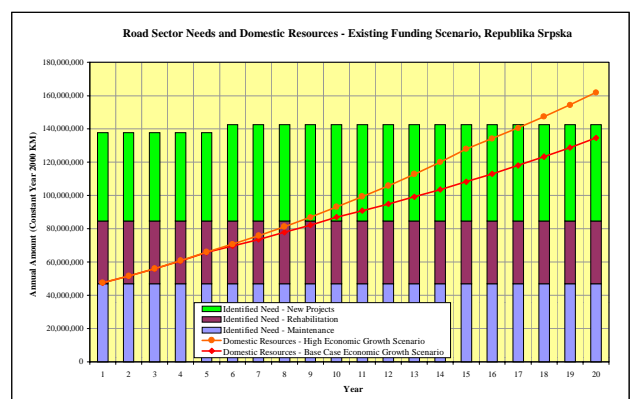
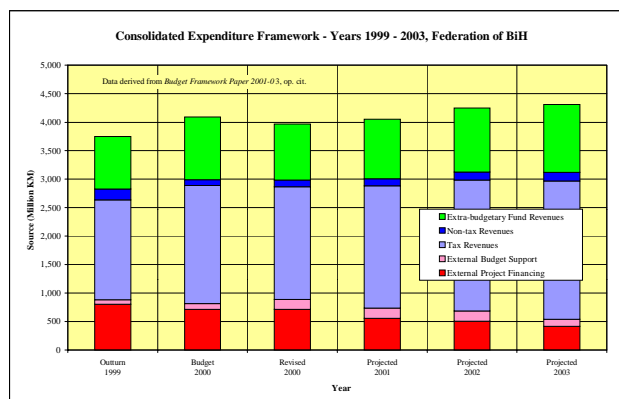
A near-term forecast of the consolidated budgetary framework of both Entities is similar; that is, total Entity revenue through year 2003 is expected to be stable with perhaps minimal increases. While revenues generated from domestic sources are likely to grow in line with economic expectations, external project financing is expected to considerably decline with year 2003 totals being some 60 to 65 percent of current receipts.



COMPARISON OF IDENTIFIED NEED AND DOMESTIC RESOURCES

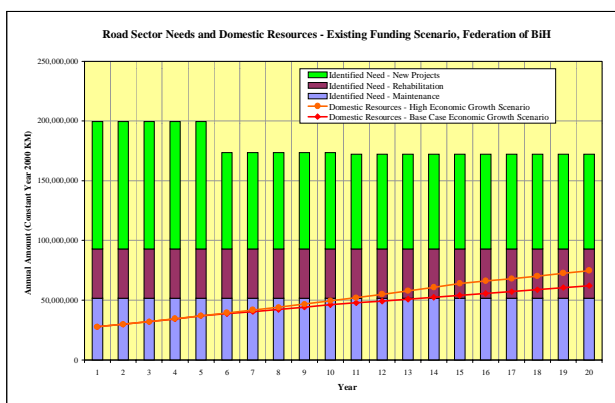
The cost of BiHTMAP road improvement needs were, for analysis purposes, equally allocated to each year within the identified three time periods over the 20 year planning horizon. Current domestic expenditure patterns, as a percent of GDP, were then extrapolated to future years based on the two economic growth scenarios contained within the socio-economic framework; that is, real growth embedded in the base case and high economic growth scenarios.

In case of Republika Srpska, the present expenditure pattern confirms that outlay may be considered sufficient to address maintenance needs of the main and regional road networks. Within approximately 10 years real economic growth is expected to be address both maintenance and rehabilitation needs. And, near end of the twenty year planning horizon, domestic resources would approach self-sufficiency in terms of road needs. On a cumulative basis over the twenty-year period domestic resources can be expected to provide between 63 and 71 percent of road needs, thus suggesting that



alternative sources (external funding, PPP) are needed to cover the remaining gap.

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. The implications are clear in that current domestic expenditure patterns emerge as being too modest. On a cumulative basis, over the twenty-year period, less than 30 percent of



investment needs are met regardless of economic growth scenario. This implies that a massive infusion of external funding, or wide ranging PPP, is necessary to prevent continuing deterioration of the Federation road system.

CONCLUSIONS

The comparison between road improvement needs identified by the JICA Study Team, as well as the status of domestic funding in the Federation of BiH and Republika Srpska, leads to several conclusions:

- Near-term budgetary forecasts to year 2003 have confirmed that considerable reductions in external assistance can be expected thus increasing reliance on domestic revenues.
- 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 for roads should be dictated by the needs of maintenance and rehabilitation, with a medium-term goal being self-sufficiency without a requirement 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.
- In general, the Team's analyses suggest that domestic allocations in Republika Srpska are adequate to address road maintenance needs at present and, within the next decade should, given anticipated levels of real economic expansion, likely also be sufficient to address rehabilitation needs. Thus, external financial assistance can 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 suggested that Federation domestic allocations to road systems, from both federal and Kantonal budgets, be so increased as to achieve a rate of approximately one percent of Federation GDP. This implies an annual budget of some 50,000,000 million KM which would be adequate for road maintenance purposes. Real growth in the economy would yield sufficient revenue streams within less than a decade to also address rehabilitation needs, thus further reducing requirements for external funding support.

- Legislative action is urged regarding passage of the Federation *Law on Roads*; further, Ministerial decisions on the recently completed EBRD-sponsored *Road User Cost Study* should be accelerated. Both contain guidelines and/or recommendations regarding road upkeep.

Within the spirit of those recommendations, it logically follows that the Entity Road Directorates develop adequate 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.

17. ORGANIZATIONAL ASPECTS

AN OVERVIEW OF INSTITUTIONAL DEVELOPMENT

Institutional development across all sectors including transport is guided and influenced by the Dayton Agreement, the Stability Pact for South Eastern Europe, access to the World Trade Organization, steps necessary to reach a Stabilization Association Agreement (SAA), and further actions towards reaching EU conditions and norms (The Acquis).

In the context of institutional development in the transport sector, the Dayton Agreement is seen as long term (Annex 4: The Constitution; and Annex 9: Public Corporations). The concept of Public Corporations fits with past and present trends in Europe, both in existing EU countries and those in the queue to join (i.e., public corporations or agencies created to operate transparently at arms length from government).

(1) Short-term Outlook (until 2005)

When the Transportation Corporation is set up in BiH (perhaps in 2001), it will be a joint structure between the two Entities – just like the Railway Public Corporation (BHZJK) and the Road Public Corporation (BRIC). With help from OHR, there are on-going developments to create two more public corporations as part of the Transportation Corporation: a Ports and Waterways Corporation which will focus on business promotion; and an Airports Corporation which concentrates on the development of the landside part of the air traffic business (not air traffic control). Therefore, the short-term outlook is that there would be four modal corporations (road, rail, water and air transport) **under the roof** of the Transportation Corporation.

In legal terms, the Transportation Corporation and the four modal corporations are **at Entity level, not above Entity level**. The joint corporations have to be legally registered in both Entities and are not financed under the State budget through the newly created state-level Ministry for Treasury. In other words, the joint corporations are not state-level institutions. Nevertheless, the overarching purpose of the joint corporations is to establish institutionalized cooperation between the two Entities. This situation reflects two inter-related realities: political and financial. The financial reality is that each Entity has its own money, with the State having no significant revenue sources of its own.

To improve the enabling environment for private sector participation in the economy, OHR is assisting State and Entity authorities to prepare a BiH-wide cross-sectoral model for Concession Legislation. A working group between State and Entity authorities has been established to address this task. The eventual legislation will be enacted at both State and Entity level, but with both levels being consistent with each other. This initiative will be of particular importance for the transport sector.

(2) A Long-term Perspective

Long-term visioning is inherently difficult. It is accepted as a basic premise that the transport-related parts of the Dayton Agreement (Annex 9 and the assignment of transport and financial functions between the State and the Entities under the Constitution) would remain unchanged until at least 2020. This assumption does not conflict with the aim of BiH for realizing closer ties with Europe through a Stabilization and Association Agreement.

Once the Transportation Corporation and all four transport sub-sector corporations are fully running and staffed, a long-term institutional solution would largely be in place, should the key transport institutions in each Entity be given adequate human and other resources to implement the path of reform laid down in the Entity-level Transport Sector Expenditure Strategies (key institutions include the Roads Directorates and the Rail Companies). At that point, however, there would still be parts of the puzzle missing which should be solved in the medium-term:

- Firstly, state-level transport legislation would be a logical step. Such legislation would need to be based on the split of transport functions between the State and the Entities under the existing Constitution.
- Similarly, it would be logical to create a new state-level Ministry by separating Civil Affairs from Communications. The functions of the new Ministry for mobilities would follow the existing Constitution.
- Also it would be desirable to create a BiH multi-modal Transport Training Institute under the roof of the Transportation Corporation.
- Independent regulatory bodies would also need to be established at both State and Entity levels to reflect the split of transport functions assigned to each level under the Constitution.

It is envisaged that almost all transport implementation (infrastructure and operation) would remain with the Entity institutions and companies. The sector corporations

would particularly focus on harmonization of standards (design, construction, safety etc) while the Transportation Corporation would consolidate the work of the modal corporations to realize a multi-modal dimension and database. The State could have a seat on the joint Transportation Corporation's Board of Directors.

In BiH however, the technical/safety standards must be harmonized countrywide as well as strategic plans formulated for international and inter-Entity routes. As long as the Entities retain financial power, it is envisaged that any BOT and/or PPP type of transport projects would have to be organized and legally concluded by Entity institutions.

PRIORITIES ON INSTITUTIONAL DEVELOPMENT

Technical assistance priorities in the short- to medium-term are seen as follows:

- Strengthen the Roads Directorates and gradually transform them into Road Agencies so as to provide more management autonomy;
- Restructure the railway business including the separation of infrastructure from operations;
- Assist/consolidate start-up activities and gradually strengthen management in BRIC and BHZJK which are sectoral arms of the Transportation Corporation;
- Establish a BiH Transport Training Institute (see Section13, Human Resource Development);
- Establish independent regulatory bodies; and
- Assist the start-up of a new state-level "Ministry of Mobilities," by separating the Ministry of Civil Affairs and Communications.

FOLLOW-UP FOR THE IMPLEMENTATION OF THE MASTER PLAN

The Transport Master Plan should be properly implemented and continually monitored, with periodic revisions, if necessary, to cope with unforeseen changes in the socioeconomic environment. This important task is assumed chiefly by each Entity. Therefore, Entity Ministry of Transport and Communications (MOTC) should have a Policy and Planning Unit mandated to:

- Coordinate project implementation among relevant authorities/organizations, and chair the Transport Technical Committee (the ad-hoc Technical Committee for the JICA Master Plan Study should be continuously maintained);

- Study transport policy issues and measures, and advise Ministerial decision-making;
- Study the legislative framework for Public Private Partnership (PPP) and administratively support the implementation of PPP projects;
- Conduct a series of regulated traffic surveys and maintain a comprehensive transport data-base to analyze current transport problems;
- Monitor BiHTMAP periodically with empirical and theoretical bases;
- Manage the capacity building program; and
- Govern other planning-related administrations.

PUBLIC-PRIVATE PARTNERSHIP (PPP) FOR TRANSPORT PROJECT IMPLEMENTATION

In view of the stringent budgetary constraints in EU member states and considering the urgent need to realize many of the targeted projects in the Trans-European transport network, the possibility to combine public and private financing has received renewed interests. The PPP concept, however, is so sophisticated to maneuver, and requires high managerial capability in the public sector.

(1) Risks and Private Participation Level

The overall risks cannot be fully excluded for all companies and institutions participating in a transport infrastructure investment. The selection of the optimal PPP structure will remain a project-based decision, because no general assessment rules exist. The level of concrete participation of project partners in a PPP will determine the total risks. But on the other hand, increasing the number of partners in the PPP reduces the flexibility of the partnership to scan the market for the best opportunities in terms of investors, contractors, and operators.

(2) Private Sector Involvement in Project Preparation

Using a study syndicate to prepare the project is an interesting option. In addition to evaluating the financial viability of the investment, the study syndicate could also assess the existing schemes and, if necessary, new systems can be developed according to the structural needs of the project in terms of partners, engagements and commitments. *The key factor is that the project risks must be allocated to the public and private sector respectively, according to each party's ability to manage such risks without destroying the economic balance of the project.*

Refer to Chapter 7 of Volume II for more details.

18. PRE-FEASIBILITY STUDY (ROADS)

Banja Luka - Doboј Road Improvement Project

PROJECT DESCRIPTION

The existing road link between Banja Luka and Doboј is one of the weak links among the major cities in BiH in terms of distance and travel time. The existing routes are through Prnjavor - Derвента (Route 1: blue) and Kotor Varos - Teslic (Route 3: green) (Figure 18.1).

Two more possible routes are assessed to enhance this link through Prnjavor - Stanari (Route 2: red) and Prnjavor - Johovac (Route 4: yellow).

The purpose of this pre-feasibility study is to conduct an alternative route study to evaluate the best future alternative for the main road link between Banja Luka and Doboј, and perform a preliminary cost-benefit analysis for the project. The characteristics of each route are as follows:

Route 1 is, at present, typically used. For future demand, it needs pavement improvement, bypasses for Prnjavor and Derвента, minor re-alignments and an interchange at Klasnica to accommodate the busy traffic at this junction point.

Route 2 is a proposed link with the shortest distance between the two cities. For future demand, it needs a major improvement between Prnjavor and Rudanka, minor re-alignments and an interchange at Klasnica.

Route 3 is an existing route which generally has a good alignment except a hilly section between Maslovare and Pribinic. For future demand, it needs a climbing lane for

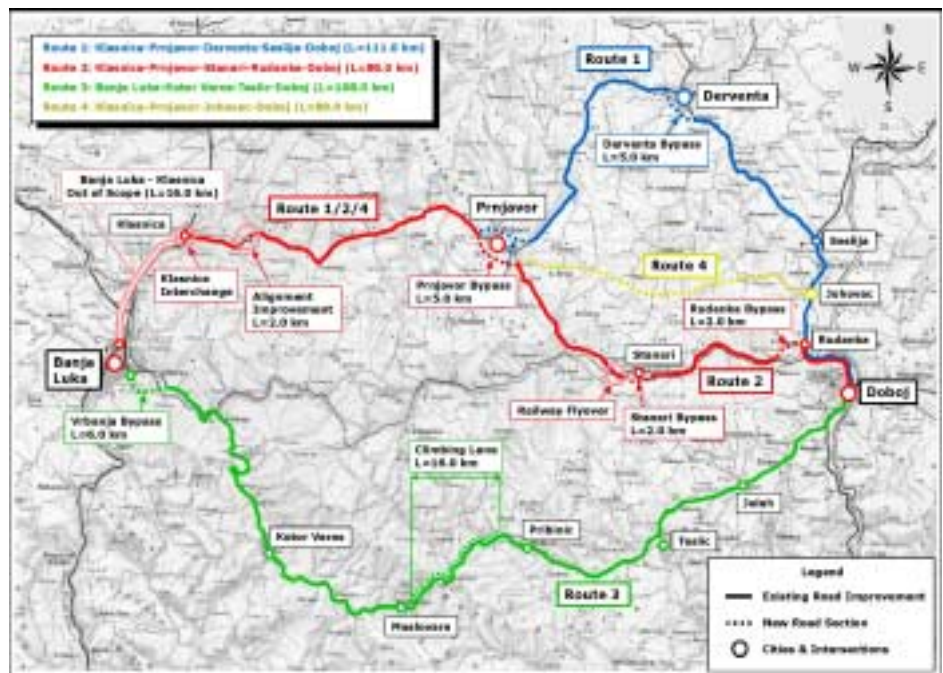


Figure 18.1: Banja Luka - Doboј Alternative Routes

the hilly section and a bypass for Vrbajna. It is also necessary to provide a bypass for Banja Luka in the future, although this is not included in this study.

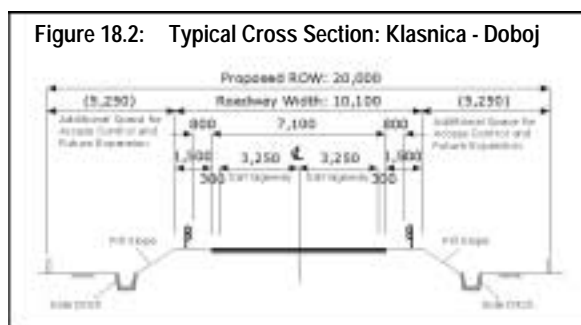
Route 4 has a new road section between Prnjavor and Johovac. It has a short connection, but needs more investment than other routes because of the new road section.

ASSUMPTIONS

Major assumptions for the study are:

- Major pavement improvement will be provided along all routes to accommodate future heavy commercial vehicle traffic.
- All existing bridges will be reconstructed.
- The existing Banja Luka - Klasnica road section will be excluded from the project.
- The free flow speed after improvement will be 80 km/hr with minor exceptions.
- The project will be implemented during 2002 - 2004, and the start of operation will be from 2005.
- The project life is assumed to be 30 years.
- The economic project cost is assumed to be 87 percent of the financial cost.

Figure 18.2: Typical Cross Section: Klasnica - Doboј



TRAFFIC DEMAND

Table 18.1 shows the expected average traffic volume for WITH and WITHOUT project conditions. The traffic volume of each route under WITHOUT conditions is lower because the traffic is dispersed among several available routes.

In the WITH conditions, traffic volume will be more and concentrated due to the improvements of each alternative route.

ECONOMIC ANALYSIS

The results of the cost benefit analysis are summarized in Table 18.2. The project costs for Route 1, 2 and 3 are not much different because of the dominance of pavement improvement cost for all cases. The cost of Route 4 is much higher due to the new road section of Prnjavor - Johovac.

The results of the cost benefit analysis suggest that Route 2 is the optimum alternative, followed by Route 1.

RECOMMENDATIONS

The economic analysis shows that Route 1 and Route 2 are the preferred alternatives. However, the Route 2 option is recommended because Route 1 has a longer travel time than Route 2 for the Banja Luka - Doboje connection. It also supports that the role of Prnjavor - Derventa road section be separated from the Banja Luka - Doboje connection for functional reasons since higher traffic demand is expected for other OD pairs such as Banja Luka to Brod and Brcko.

The recommended project implementation schedule is shown in Figure 18.3. A more detailed analysis is recommended to assess the existing pavement conditions of each alternative to ensure more refined pavement design, and to examine the necessity of reconstruction of individual bridges.

Table 18.1: Traffic Demand for WITH and WITHOUT Cases

Case	Route	Section	FF Speed	Daily Traffic Volume		
			(km/hr)	2005	2010	2020
Base (WITHOUT)	1,2,4	Klasnica-Prnjavor	64	5,100	6,000	8,300
	1	Prnjavor-Doboje	75	2,600	2,800	4,200
	2	Prnjavor-Stanari	30	1,400	1,900	2,400
	2	Stanari-Doboje	45	1,200	1,600	1,900
	3	Banja Luka-Kotor Varos	52	3,200	3,700	6,300
	3	Kotor Varos-Teslic	64	2,100	2,500	4,800
Case 1 (WITH)	3	Teslic-Doboje	50	5,300	6,100	9,300
	1	Klasnica-Prnjavor	80	10,100	11,800	18,800
	1	Prnjavor-Doboje	80	7,900	9,200	14,200
Case 2 (WITH)	2	Klasnica-Prnjavor	80	10,900	13,000	21,000
	2	Prnjavor-Stanari	80	8,700	10,100	14,500
	2	Stanari-Doboje	80	7,900	9,100	13,100
Case 3 (WITH)	3	Banja Luka-Kotor Varos	80	5,800	6,900	10,100
	3	Kotor Varos-Teslic	80	4,000	4,700	7,100
	3	Teslic-Doboje	80	7,100	8,200	11,400
Case 4 (WITH)	4	Klasnica-Prnjavor	80	10,400	12,400	20,100
	4	Prnjavor-Doboje	80	8,400	9,700	13,300

Table 18.2: Summary of Cost Benefit Analysis

Item	Route 1	Route 2	Route 3	Route 4
Project Length	111.0 km	86.0 km	108.0 km	89.0 km
Financial Project Cost ('000KM)	165,215	168,638	154,967	265,574
Economic Project Cost ('000KM)	143,737	146,715	134,821	231,049
Economic Internal Rate of Return (EIRR)	18.0 %	19.1 %	15.2 %	12.8 %
Net Present Value (NPV) ('000KM)	80,946	100,451	35,802	14,490
Benefit – Cost Ratio (B/C)	1.84	2.04	1.40	1.09

Note: NPV and B/C are computed at a discount rate of 12 %.

Figure 18.3: Implementation Schedule

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

Financing of the project is recommended via low-interest foreign loans from international project finance organizations due to limited domestic resources. A private finance scheme is not recommended for this project because application of a toll system is not expected to function efficiently due to the possible usage of alternative routes.

19. PRE-FEASIBILITY STUDY (ROADS)

Sarajevo - Mostar Road Improvement Project

PROJECT DESCRIPTION

The existing road link between Sarajevo and Mostar is the most hilly section along E-73, which coincides with Corridor Vc. Although a Corridor Vc motorway for Sarajevo - Mostar is not warranted at this time based on traffic demand, the Vlakovo - Tarcin section near Sarajevo could be considered given that the Sarajevo Bypass is under development.

The purpose of this pre-feasibility study is to conduct a cost-benefit analysis of a preliminary plan for a Corridor Vc bypass between Vlakovo and Tarcin, and propose an improvement plan for the Tarcin - Mostar segment of E-73.

Figure 19.1 shows the improvement plan for Vlakovo – Mostar, which consists of:



Figure 19.1: Sarajevo-Mostar Improvement Plan

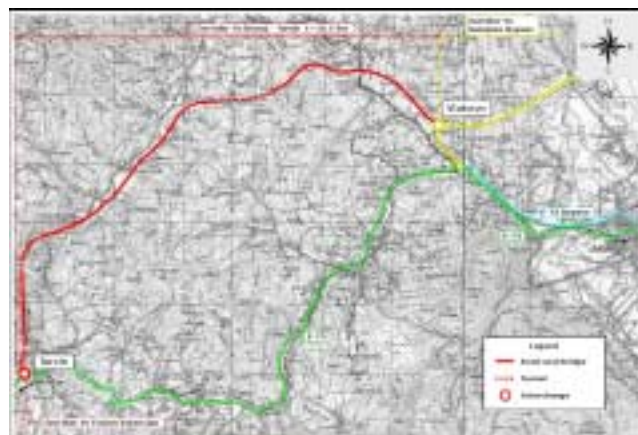


Figure 19.2: Preliminary Alignment for Vlakovo-Tarcin

- Corridor Vc Vlakovo – Tarcin, a new high-order 2-lane highway (proposed preliminary alignment is shown in Figure 19.2);
- Structural pavement rehabilitation, minor re-alignment and tunnel lighting for the Tarcin – Mostar segment; and
- Widening to full 2 lanes with climbing lane and alignment improvement for a 5-kilometer section south of Jablanica.

Two alternative scenarios are designated in Table 19.1. These focus on examining WITH and WITHOUT cases for the Corridor Vc Vlakovo - Tarcin Bypass. The Tarcin – Mostar segment improvement is identical under both cases.

ASSUMPTIONS

Major assumptions for the analysis are:

- Pavement will be fully improved over about 50 percent of the 93-kilometer Tarcin - Mostar segment, and bridges will not be reconstructed except south Jablanica.
- South Jablanica section (5 kilometers) will be fully improved as explained in the description.
- The free flow speed after improvement will be 100

Table 19.1: 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.

km/hr for Corridor Vc Vlakovo - Tarcin, and an average of 64 km/hr along the Tarcin - Mostar segment.

- The project will be implemented during 2002 - 2004, operation will begin from 2005, and the project life will be 30 years.
- The economic project cost is assumed to be 87 percent of the financial cost.

TRAFFIC DEMAND

Table 19.2 shows the expected average traffic volume for WITH and WITHOUT project conditions.

The volume for existing Vlakovo - Tarcin section is very high for a 2-lane road, suggesting saturated conditions.

Table 19.2: Traffic Demand for WITH and WITHOUT Cases

Case	Project No.	Section	FF Speed (km/hr)	Daily Traffic Volume		
				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

Case and Case 1.

RECOMMENDATIONS

The economic analysis suggests that the EIRR for the two cases are almost identical. However, Case 2: Corridor Vc development for Vlakovo - Tarcin Bypass will improve the expected future traffic congestion on the existing road, and can separate long distance trips from local traffic. Furthermore, it offers continuity in design, ultimate cross-section, and capacity along three abutting road projects: Sarajevo - Zenica motorway, Sarajevo Bypass, and Vlakovo - Tarcin Bypass.

It is therefore recommended that Corridor Vc new bypass for Vlakovo - Tarcin be developed as soon as possible. However, it is further recommended to consist of 2 lanes at the initial stage within a 4-lane right-of-way. Widening to full 4-lane motorway may occur at a later time, as

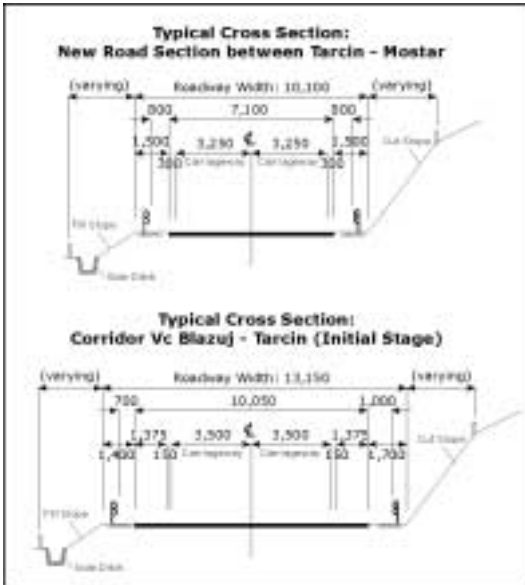


Figure 19.3: Typical Cross Sections

ECONOMIC ANALYSIS

The results of the cost-benefit analysis are summarized in Table 19.3. In spite of the major difference in project cost, the EIRR is almost the same for Cases 1 and 2 because Case 2 will generate huge time savings within the Vlakovo - Tarcin section against the conditions in Base

Table 19.3: Summary of Cost Benefit Analysis

Item	Case 1	Case 2
Project Cost (Vlakovo-Tarcin)	17,511	243,417
Project Cost (Tarcin-Mostar)	67,628	67,628
Financial Project Cost (1,000KM)	85,139	311,045
Economic Project Cost (1,000KM)	74,071	270,609
EIRR (%)	15.5 %	15.0 %
NPV (1,000KM)	22,388	62,377
B/C	1.48	1.33

Note: Case 2 Vlakovo-Tarcin Cost is for initial 2-lane bypass only. NPV and B/C are computed at a discounted rate of 12 %.

Figure 19.4: Implementation Schedule

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

warranted by traffic demand.

The recommended project implementation schedule is shown in Figure 19.4. In reality, however, the Vlakovo - Tarcin Project is feasible only if Sarajevo - Zenica and Sarajevo Bypass projects are realized. The Vlakovo - Tarcin section should be considered as the next step following these two projects.

The finance of the project is recommended to be by a toll system based on a user-pay principle because of its high level of service. Private finance is recommended whenever possible. However, it is urged that a uniform toll collection system be instituted along the entirety of the Tarcin - Zenica alignment.

Refer to Chapter 8 of Volume II for more details.

20. PRE-FEASIBILITY STUDY (RAILWAYS)

BACKGROUND

Since cessation of hostilities several railway reconstruction programs have been focused on the immediate alleviation of physical war damages and the re-activation of basic transport services and facilities. Toward this end, significant improvements of transport infrastructure have been achieved, mainly within the framework of the Emergency Transport Reconstruction Program. Participating donors include the EBRD, the World Bank, the European Union, and other bilateral donors.

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. Some additional projects have recently been committed for financing and implementation.

The railway sector plan of BiHTMAP has a concept that the railway system in BiH will be rehabilitated / reconstructed

and sustainably operated on a commercial basis, aiming to integrate with the European railway network. The improvement program has been proposed based on a phased implementation schedule. Phased targets include recovery of railway operation to the condition before the war, then strengthening to UIC standard, followed by modernization of the railway system.

PHASED PROGRAM

The railway recovery schedule is comprised of three phases:

- Phase 1 (up to 2005) is defined 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



Figure 20.1: BiH Railways and Focused Railway Facilities for Improvement

“functionally strengthening period” including railway system modernization under commercial operation as a part of European railway network.

Out of the above phased program, Phase I is treated as an objective of the pre-feasibility study.

PROJECT COMPONENTS

Phase 1 strives to ensure that maintenance conditions of facilities, track, rolling stock, electrical power supply system, signal / telecommunication system, and train control system be recovered to prewar levels. Phase 1 projects include:

- Procurement of rolling stock,
- Reconstruction of machines at rolling stock workshops,
- Supply of maintenance parts related to rolling stock,
- Reconstruction of signal and telecommunication systems,
- Reconstruction of track maintenance engineering facilities,
- Maintenance of tracks,
- Reconstruction of power maintenance facilities,
- Reconstruction of catenary, and
- Reconstruction of border stations.

The estimated investment cost is as shown in Table 20.1. This cost estimate excludes those for the committed projects as of December 2000.

Table 20.1: Investment Costs of Phase 1 (financial price) (KM million)

Category	Cost Component	Total
Rolling Stock	Rolling Stock	158.9
	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

TRANSPORT DEMAND

The expected railway transport demand (in 2005) by implementation of Phase I project is as follows.

Passenger-kilometer	553 million
Ton-kilometer	879 million

ECONOMIC ANALYSIS

The incremental costs and the incremental benefits between “With project” and “Without project” are treated. The following benefits are estimated:

- Saving in time cost for railway passengers and freight based on the transport demand of “Without” condition;
- Saving in time cost for railway passengers and freight on the incremental transport demand; and
- Saving in operating cost for railway passengers and freight based on the incremental transport demand.

(Note: “Without project” is assumed to be a condition where only “committed projects” are implemented.)

The economic analysis results in an EIRR of 17.6 percent. This means that the Phase 1 package is economically feasible.

Table 20.2: Summary of Economic 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

FINANCIAL ANALYSIS

The incremental costs and the incremental revenues between “With project” and “Without project” are subjected to a financial analysis. Regarding operating revenues in FIRR calculation, a few alternative cases of “tariff level” were examined, assuming the current tariff level prevailing in Railway Public Corporation to be as a “base fare case”, and considering the internationally competitive fare level of world railroad industry (according to the World Bank) which is about the half of that of Railway Public Corporation.

In order to make the financial environment favorable, an alternative of the rental revenues of optical fiber cables, which are to be laid in the railway right-of-way, is assumed.

The results of the financial analysis are summarized as shown in Table 20.3. It can be said that if the base case fare level is adopted, the project will be financially feasible because FIRRs are expected to be 11.9 ~ 13.6 percent, however, should the fare level be set equivalent to world railroad industry norms, it would be difficult to support a sound financial condition.

Table 20.3: FIRR for Phase 1 Railway Project

Fare Level	Condition	
	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%

Refer to Chapter 9 of Volume II for more details.

21. PRE-FEASIBILITY STUDY

Transport Training Institute Development Project

PROJECT DESCRIPTION

Professional training and education of public and private organizations are one of crucial needs for the future sustainable development of the BiH transport sector. Expertise building is a critical success-factor to guarantee that the future transport system is used, maintained, and improved in accordance with EU standards. The lack of modern training and education constitutes at present a serious cross-modal problem. Three evolutions caused the present situation, namely:

- The out-migration of high quality professionals immediately after the war;
- The lack of training and education for the remaining experts, which causes a substantial gap between their present knowledge and the modern techniques and technologies applied in modern logistics; and
- The present need to train local experts in European institutes enables BiH experts to find employment in Europe, however they do not return home.

To ensure that sustainable expertise is built in BiH, the creation of a **Transport Training Institute (TTI)** should be a priority 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 encouraged to use this instrument to address ongoing and coming required changes within and outside the Transport Training Institute in an efficient and effective way.

The project consists of the following three phases:

- Phase 1: Roll-out plan;
- Phase 2: Establishment of TTI, and
- Phase 3: Help the TTI to become self-supporting organization.

In Phase 1, detailed design and plan are formulated to establish the TTI, including investigation of the present situation of BiH, location of the TTI, expertise needs, a timetable allocation of human and financial resources for the project. Three critical issues of the TTI establishment will be regulatory, operational and location issues.

Phase 2 is the implementation of the roll-out plan made in Phase 1. It includes expertise building, establishment of the TTI and transport training curricula. The expertise building consists of practical training courses/study tours and a "Train-the-Trainers" Program with state-of-the-art transport training and education. Expected trainees would be persons that are directly involved in the transport training activities (training and teaching staff). Regarding establishment of the TTI, foreign experts are expected to assist on location, cooperation agreements with related local/international organizations (Figure 21.1), regulatory issues, procurement of training staff, curriculum design, necessary teaching equipment and so on. The curricula should cover a wide range of training courses from vocational skill building to professional/lecturer training with transport simulation tools. Interactive training courses and distant learning courses should be prepared.

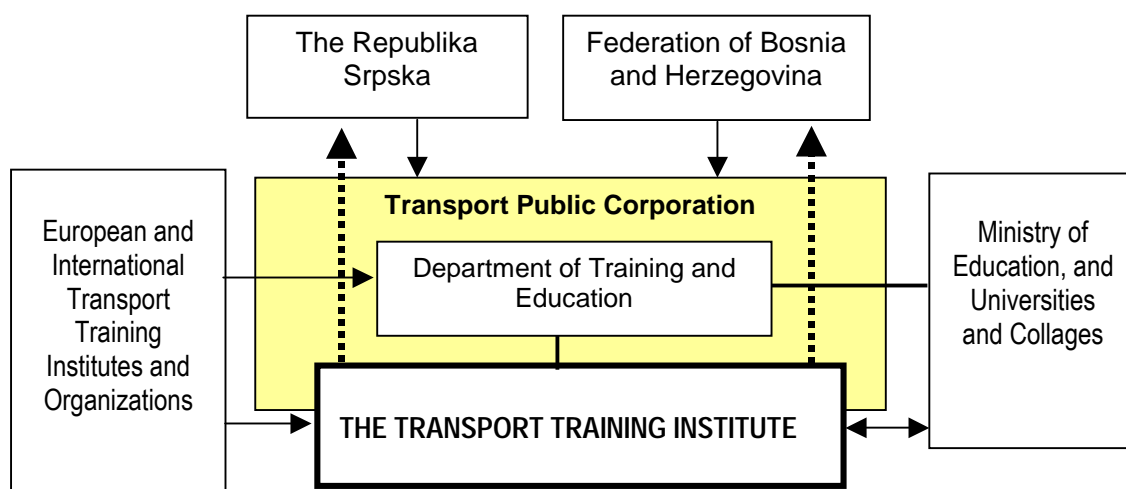


Figure 21.1: A Proposed Structure and Organizational Context

Phase 3 is the final phase to make the TTI self-supporting. Major contents by expert assistance will be (1) expert assistance for transition period and (2) financial business plan.

Figure 21.2 shows a proposed implementation time framework for the TTI project. Estimated project cost is KM 4,533,200 as shown in Table 21.1.

Figure 21.2: Proposed Implementation Schedule of the TTI

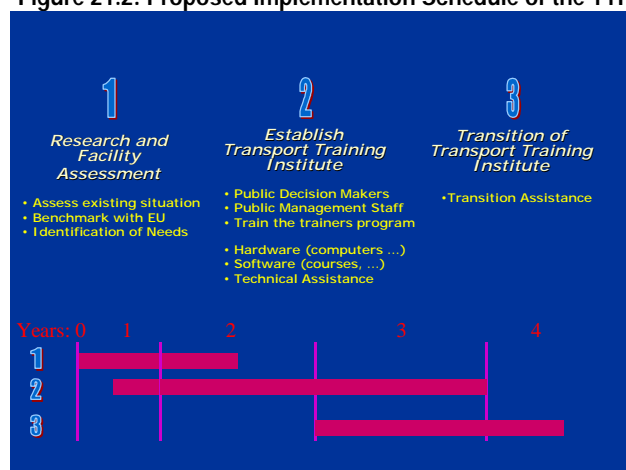


Table 21.1: Estimated Project Cost of TTI

Item	Goal	Time (months)	Budget (KM)
Phase 1			
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 (<i>for details see above</i>)	10	320,000
Conclusions	Development and approval by client of roll-out plan (including budget for phase 2 of the project)	4	60,000
Sub-total		18	500,000
Phase 2			
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	(<i>for details see the main report</i>)	4	1,088,200
Courses	Development of courses and syllabi in local language	18	1,150,000
Sub-total		18	3,783,200
Phase 3			
Indicative investment cost			250,000
Estimated Total Project Cost			4,533,200

improving the know-how of both public and private transport experts and professionals so that activities of the transport sector will become more efficient while reducing negative impacts on the environment at an acceptable level. Keeping this in mind, the TTI development project was evaluated on a qualitative, not quantitative, basis. The establishment of the TTI in BiH will generate qualitative benefits in three major fields, namely, regulatory, operational and impact level.

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. The *second* level of qualitative effects can be found in the sector itself. The TTI 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 BiH to expand their business and participate in international transport activities. The *third and last* important level of qualitative benefits is related to the impact of transport activities on the community and the environment.

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 BiH to set forward the necessary conditions for the integration of BiH in the international community and in particular in the EU.

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. Furthermore, increased safety and security and reduced external environmental effects will generate huge benefits to the country.

RECOMMENDATIONS

The project is judged feasible in the medium- and long-term and indispensable in the short-term vis-à-vis future development of the BiH transport sector. It is strongly recommended to implement the Transport Training Institute Development Project, with good coordination among those international donors' programs possibly available to assist in human resource development.

PROJECT EVALUATION

The most important rationale behind the project is that the Institute should be a public service with the objective of

22. INITIAL ENVIRONMENTAL EXAMINATION

OUTLINE

To ensure sustainability for the proposed urgent transport improvement projects for Bosnia and Herzegovina, an **Initial Environmental Examination (IEE)** of these projects has been carried out as part of the pre-feasibility studies. The IEE has indicated the potential negative environmental impacts (as well as the positive environmental impacts) to be expected from the proposed priority transport development projects. Consequently, it could be determined whether follow-up detailed environmental studies are needed. Besides screening the proposed projects on potential significant environmental impacts, and scoping, also an indication of mitigation measures - required to alleviate the identified adverse environmental impacts - has been provided.

From the proposed priority transport improvement projects, two major road projects have been selected for environmental site surveys. Local consultants were contracted to carry out the site surveys, whose results helped to reveal the present environmental condition of the project areas and the environmental impacts to be expected from the proposed transport projects.

Screening of the potential impacts on the physical/biological and the socio-economic environment (whereby European Union guidelines and guidelines from the Japan International Cooperation Agency have been applied) has resulted in identification of one of the following analysis requirements for each proposed priority transport project:

- A full **Environmental Impact Assessment (EIA)** plus Environmental Management and Monitoring Plans are required, because *significant* adverse environmental impacts are to be expected;
- Only Environmental Management and Environmental Monitoring Plans (or limited versions of these Plans) are required; and
- No further environmental actions are required, as none, or only *minor* (no significant) adverse environmental impacts are to be expected.

Besides the recommended environmental studies, it is assumed that for all projects proper operation and maintenance plans will be prepared and executed.

RESULTS

Table 22.1 presents the outcome of the **Initial Environmental Examination**; the weight of the potential impacts has been indicated as well as the recommended follow-up environmental studies.

Two proposed major road projects might have *significant* environmental impacts. Consequently, EIA's are required for these priority transport improvement projects. Scoping has identified the most significant environmental issues and thus the key-items to be investigated in the required environmental studies.

(1) Projects that Require a Full EIA

- Sarajevo – Mostar Road Improvement Project
 - Vlakovo – Tarcin Sub-Project
 - Tarcin – Mostar Sub-Project
- Banja Luka – Dobojski Road Improvement Project

(2) Projects that Require Environmental Management and Environmental Monitoring Plans

- Rehabilitation of the Sava River Navigation Channel
- Rehabilitation of the Port of Brcko
- Rehabilitation of the Port of Samac

(3) Projects that Require *Limited* Environmental Management and Environmental Monitoring Plans

- Priority Investment Projects, Sarajevo Airport
- Priority Investment Projects, Mostar Airport
- Priority Investment Projects, Tuzla Airport
- Priority Investment Projects, Banja Luka Airport

Table 22.1: Environmental Screening of Proposed Priority Transport Improvement Projects, and Recommended Environmental Studies

PROPOSED TRANSPORT PRIORITY PROJECTS	Potential Negative Environmental Impact	Recommended Environmental Study / Action
ROAD IMPROVEMENT PROJECTS		
Vlakovo – Tacin Road Improvement:	XXX	EIA + Env.Man.Plan + Env.Mon.Plan
Tarcin – Mostar Road Improvement:	XXX	EIA + Env.Man.Plan + Env.Mon.Plan
Banja Luka – Dobož Road Improvement:	XXX	EIA + Env.Man.Plan + Env.Mon.Plan
Heavily loaded road improvement: Brod-Seslija; Zenica-Maglaj:	X	Env.Man.Plan+ Env.Mon.Plan <i>Limited</i>
Banja Luka Urban Transport Study	Nil	None
Tuzla and Vicinity Urban Transport Study	Nil	
Mostar Urban Transport Study	Nil	
AIR SECTOR IMPROVEMENT PROJECTS		
Priority Investment Projects, Sarajevo Airport	X	Env.Man.Plan+Env.Mon.Plan <i>Limited</i>
Priority Investment Projects, Mostar Airport	X	Env.Man.Plan+Env.Mon.Plan <i>Limited</i>
Priority Investment Projects, Tuzla Airport	X	Env.Man.Plan+Env.Mon.Plan <i>Limited</i>
Priority Investment Projects, Banja Luka Airport	X	Env.Man.Plan+Env.Mon.Plan <i>Limited</i>
Development of smaller aerodromes and feasibility study	Nil	None
Training requirements	Nil	None
WATERWAY IMPROVEMENT PROJECTS		
Rehabilitation of the Sava River navigation channel.	XX	Env.Man.Plan+Env.Mon.Plan <i>Safety risk; dredge spoils</i>
Rehabilitation of the port of Brcko.	XX	Env.Man.Plan+Env.Mon.Plan <i>Safety risk; dredge spoils</i>
Rehabilitation of the Port of Samac.	XX	Env.Man.Plan+Env.Mon.Plan <i>Safety risk; dredge spoils</i>
RAILWAY IMPROVEMENT PROJECTS		
Reconstruction of signal and communication systems.	Nil	None, normal safety precautions
Recovery of disconnected catenary system.	Nil	None, normal safety precautions
Capacity improvement of catenary maintenance.	Nil	None, normal safety precautions
Installation of track maintenance machineries.	Nil	None, normal safety precautions,
Reconstruction of workshop facilities.	Nil	None, normal safety precautions,

Notes:

- XXX: negative impacts expected to be significant (long term impact)
- XX: negative impacts expected to be moderate
- X: negative impacts expected to be slight (temporary impact)
- Nil: no significant impact expected
- EIA: Environmental Impact Assessment
- Env.Man.Plan: Environmental Management Plan*
- Env.Mon.Plan: Environmental Monitoring Plan

* Environmental Management Plans should include resettlement plans if people have to be moved from their homes.