ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Priority Investment Needs for the development of the Trans-Asian Railway Network

UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

UNITED NATIONS

ST/ESCAP/2557

CONTENTS

ANNEX

PROFILE OF PRIORITY PROJECTS ALONG TRANS-ASIAN RAILWAY NETWORK

LIST OF TABLES

I. INTRODUCTION

The Trans-Asian Railway is a significant regional transport cooperation initiative aimed at enhancing the operational efficiency, economic relevance and commercial utilization of Asia's rail transport infrastructure.

In recognition of the facts that (i) under globalization national economies have become interdependent and (ii) the benefits of recent economic development have mostly benefited coastal areas, the key objectives behind the development and operationalization of the network is to:

(i) promote regional economic integration through enhanced international trade and tourism,

(ii) put in place transport infrastructure of adequate territorial coverage and providing quality services likely to attract the establishment of industry,

(iii) serve the manufacturing base of the continent by meeting the requirements of efficient logistics, and

(iv) distribute the benefits of growth throughout the breadth and length of the Asian continent.

The Trans-Asian Railway initiative is one component of the Asian Land Transport Infrastructure Development (ALTID) project launched by the Economic and Social Commission for Asia and the Pacific (ESCAP) at its forty-eighth session in 1992. The Trans-Asian Railway network is being developed in parallel with the Asian Highway network and related policy measures in the area of transport facilitation.

The Trans-Asian Railway network (Map 1) was identified by member countries through the following corridor studies carried out over the period 1995-2001:

(i) Feasibility study on connecting the rail networks of China, Kazakhstan, Mongolia, the Korean Peninsula and the Russian Federation (1996);

(ii) Development of the Trans-Asian Railway in the Indo-China and ASEAN subregion (1996);

(iii) Development of the Trans-Asian Railway, Trans-Asian Railway in the Southern Corridor of Asia-Europe Routes (1999);

(iv) Development of the Trans-Asian Railway, Trans-Asian Railway in the North-South Corridor Northern Europe to the Persian Gulf (2001).

These corridor studies identified 81,000 route kilometres of international importance serving 28 member countries. The network was later refined during the negotiation of the Intergovernmental Agreement on the Trans-Asian Railway Network and additional route kilometres completed the network to ensure greater connectivity between countries and subregions as well as between the ESCAP region and other economic regions. The Trans-Asian Railway network now comprises 114,300 route kilometres, including 8,300 kilometres of missing links.

The current configuration of the network is reflected in Annex I to the Intergovernmental Agreement on the Trans-Asian Railway Network which was adopted by the Commission at its 62nd Session through Resolution 62/4 of 12 April 2006. To date the Agreement has been signed by 22 member countries out of which 12 have already deposited their instrument of ratification, acceptance or approval with the Secretary-General of the United Nations at UN headquarters in New York. The Agreement entered into force on 11 June 2009. Annex 1 reflects the status of signatories and Parties to the Agreement.

The Agreement was negotiated with the idea that it will play a catalytic role in the coordinated development of railway infrastructure in Asia. Under the terms of the Agreement, a Working Group has been established to consider the implementation of the Agreement and consider any amendments proposed. It will meet every two years and be a forum within which transport policy makers and railway managers will define a common vision, adopt joint programmes of actions, identify investment requirements and sources, and benchmark progress. It was also developed as a tool to evaluate investment requirements along international corridors and strengthen the case for railway expansion in loan negotiations with financial institutions such as *inter alia* the Asian Development Bank, the European Investment Bank, the Islamic Development Bank or the World Bank.

The main obligations of the Contracting Parties within the Agreement are to: (a) adopt the Trans-Asian Railway network as a coordinated plan for the development of railway routes of international importance; and (b) bring the network into conformity with a set of guiding principles related to technical characteristics when constructing new lines or upgrading existing ones.

While some States are capable of mobilizing the resources to fulfil the obligations of the Agreement, other States will need development assistance from multilateral and bilateral donors as well as international financial institutions in order to meet those obligations.

In the context of these funding constraints, ESCAP implemented a project with funding provided by the Government of the Republic of Korea to review the status of development as well as identify investment needs and priorities for the development of the Trans-Asian Railway network.

The project was based on extensive research regarding railway development in individual member countries and the findings were corroborated during a series of workshops organized by ESCAP. Such workshops took place in (i) New Delhi, India, 13 December 2007, for countries of South Asia; (ii) Tehran, Islamic Republic of Iran, 18 February 2008, for countries of Central Asia, the Caucasus region as well as the Islamic Republic of Iran and Turkey; and (iii) Ulaanbaatar, Mongolia, 14-15 May 2008, for countries of North and North-East Asia. Meanwhile, railway infrastructure development in South-East Asia, in particular along the routes of the Trans-Asian Railway network, was reviewed with the Chief Executive Officers of the concerned railways attending the "10th Working Group on the Singapore-Kunming Rail Link Project" held in Putrajaya, Malaysia, on 22 October 2008 and the "30th Conference of Chief Executive Officers of ASEAN Railways" held in Bangkok, Thailand, from 24 to 27 November 2008.

This publication consolidates the outcomes of this research, workshops and official discussions. It provides subregional overviews of the status of the Trans-Asian Railway in: (a) South-East Asia, (b) the Caucasus region and Central Asia, including the Islamic Republic of Iran and Turkey, (c) South Asia and (d) North-East Asia.

This subregional approach was adopted for the following reasons:

(i) it is similar to the methodology adopted for the corridor studies carried out by ESCAP and its member countries for the identification of the network (see above);

(ii) member countries are familiar with it;

(iii) a main priority area for the future development and operationalization of the Trans-Asian Railway is to ensure continuity of infrastructure throughout the network. This requires the construction of a number of missing links which are best addressed at the subregional level; and

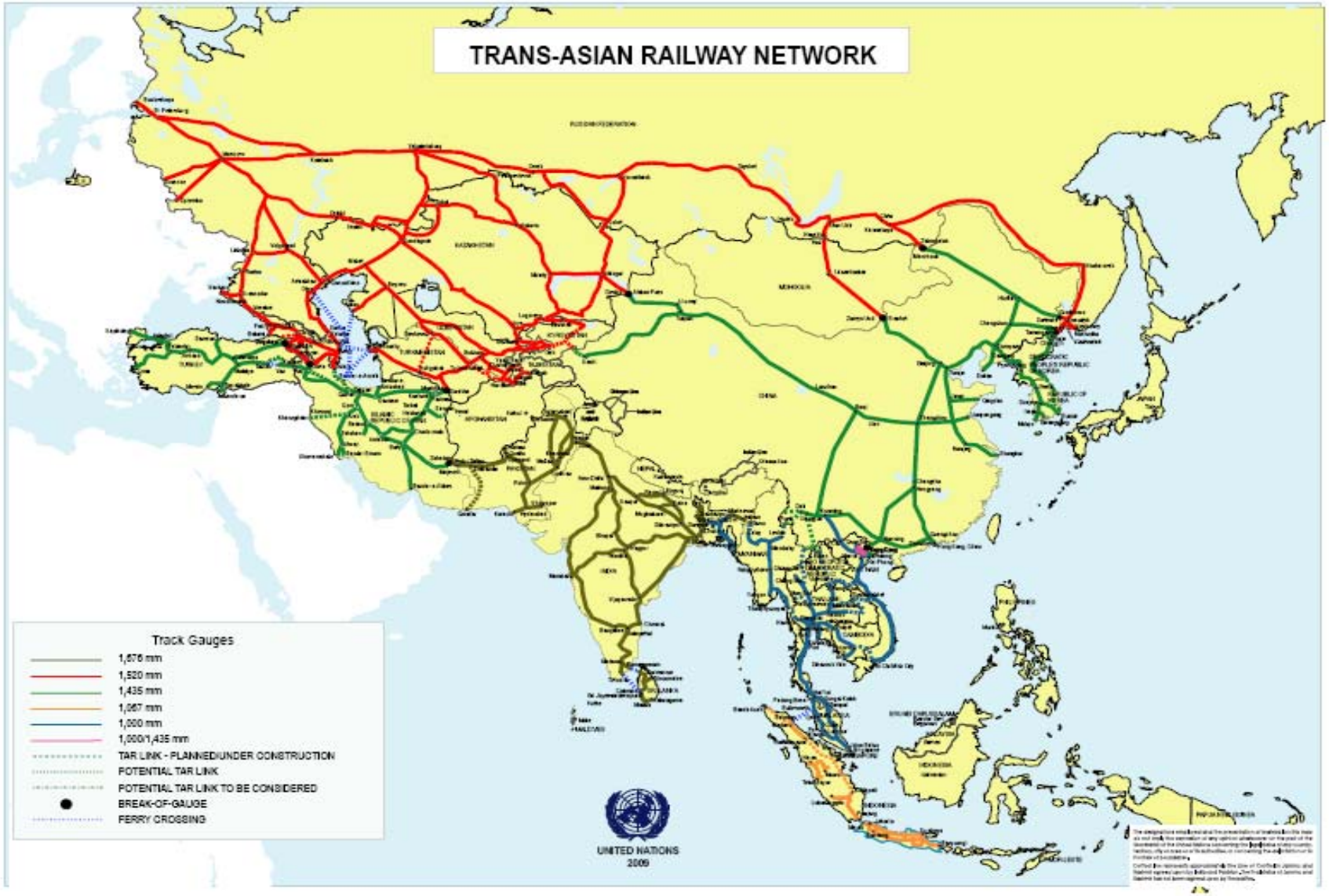
(iv) the importance to coordinate ongoing and future activities with existing subregional groupings to ensure consistency amongst technical assistance programmes and develop a cohesive development strategy that meets the support of all stakeholders. Such major regional groupings include the Association of South-East Asian Nations (ASEAN), the Economic Cooperation Organization (ECO), the South Asian Association for Regional Cooperation (SAARC) and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic cooperation (BIMSTEC).

Annexed to the subregional overviews are project profiles containing detailed information on specific projects with the objectives of promoting investment and highlighting these identified projects for interested bilateral and multilateral donors or private sector investors.

In working on its railway-related activities, the ESCAP secretariat also cooperates closely with a number of technical organizations, in particular the International Union of Railways (UIC) and the Organization for Railways Cooperation (OSJD). It also collaborates actively with the Asian Institute of Transport Development (AITD), a region-wide, inter-disciplinary centre for research, studies and training in the area of transport with special consultative status with the United Nations Economic and Social Council and a collaborative Memorandum of Understanding with ESCAP.

It is hoped that the present publication will facilitate interaction and dialogue among member countries and international financing institutions, bilateral donors and subregional organizations on financing the development of the Trans-Asian Railway network.

Map 1


TRANS-ASIAN RAILWAY NETWORK
Track Gauges
1,676 mm
1,520 mm
1,435 mm
1,067 mm
1,000 mm
1,000/1,435 mm
TAR LINK - PLANNED/UNDER CONSTRUCTION
POTENTIAL TAR LINK
POTENTIAL TAR LINK TO BE CONSIDERED
BREAK-OF-GAUGE
FERRY CROSSING
UNITED NATIONS
2009

II. STATUS OF THE TRANS-ASIAN RAILWAY NETWORK

A. Introduction

The physical status and operational readiness of the Trans-Asian Railway network vary considerably, both across and within the subregions of Asia. In its present configuration, the network is a mix of double-track and single-track routes operated under diesel or electric traction and comprising of four main track gauges.

Track standards also vary within as well as between countries in terms – among other technical characteristics – of rail weight, ballasting, axle-load, maximum gradient, loading gauge and design speed. In addition, different signal and telecommunication systems are in use and different characteristics are applied in the design of rolling stock. Finally, the tasks of railway organizations also differ as a direct result of a country's land mass, population, industrial output and the availability and strength of other modes. Consequently, while railways of the region serve both freight and passenger transport, the above elements dictate the share of rail on each market. Finally, it must be noted that in many countries, rail transport also fulfils an important social function by bringing affordable mobility to the less affluent segments of population.

In general terms, the development of efficient international rail infrastructure and services within the region is supported by the following elements:

(i) twelve of the 30 landlocked countries of the world are located on the Asian continent with the nearest ports often several thousands of kilometres away;

(ii) the distances linking the main origins and destinations, both domestically and internationally, are of a scale on which railways find their full economic justification;

(iii) the reliance on ports to connect national economies to the world's markets with the need to clear landside port areas quickly to avoid congestion, especially in the context of growing containerization and the development of intermodal transport;

(iv) a number of countries are major exporters or importers of mineral resources in the logistic of which rail transport plays a crucial role;

(v) the continuing surge in the volumes of goods being exchanged,

(vi) increased recognition of rail as an energy-efficient mode of transport, and

(vii) increased recognition of the environmental impact of rail transport on the environment compared with other modes.

The commitments shown by participating member countries and their increased investment in rail infrastructure hold significant promise for the development of the Trans-Asian Railway network to the level of quality and standards envisaged in the Intergovernmental Agreement on the Trans-Asian Railway Network. However, considerable efforts will be required in finding and allocating sufficient financial resources and ensuring a uniformity of standards and an identical level of operational readiness throughout the network.

B. Overall status of the Trans-Asian Railway network

The Trans-Asian Railway activities have so far involved 28 member countries whose rail networks add up to a total of 312,726 route-kilometres. 33.9 per cent of these national networks, i.e. 106,000 km, have been formally designated to form the Trans-Asian Railway network as reflected in Map 1. This figure does not include 8,300 km of missing links whose construction would ensure greater rail connectivity in the region. Table 1 sums up the overall route length of individual railway networks in the member countries and their most common track gauge(s) as well as the route length of these networks that have been selected to be part of the Trans-Asian Railway network. Table 2 presents the same figure on a subregional basis and the share of each subregion in the overall length of the Trans-Asian Railway network.

Given that the network aims to facilitate international trade and, in particular, provide access to the main international ports for the landlocked countries of the region, the level of operational readiness calls first and foremost for the construction of the missing links in the network and the establishment of efficient transhipment facilities where a break-of-gauge occurs. Finally, future investment will need to aim at greater compatibility of operational procedures amongst railway organizations to ensure that the rail infrastructure of individual countries can be grouped into a single network. These three points are briefly elaborated upon hereafter.

1. Missing links

A 'missing link' results from the absence of physical linkages between the railway networks of neighbouring countries or the absence of continuous railway infrastructure within one country. Missing links between networks of neighbouring countries are due either because the link was never there in the first place, e.g. between Kalay (Myanmar) and Jiribam (India), or because it ceased to exist due to political events, e.g. between Sisophon (Cambodia) and Aranyaprathet (Thailand). Meanwhile, missing links within a country is often the result of local geography, e.g. crossing of Lake Van in eastern Turkey.

Bridging the gaps in the Trans-Asian Railway network will require a joint approach by the railways concerned and by their respective governments. The traffic-generating potential of each route compared to the cost of constructing the necessary infrastructure will no doubt be a crucial factor in deciding to implement specific projects, especially if private sector investment or assistance from financial institutions are to be sought. However, the importance of the link in the region's overall economic and social development, its potential to facilitate intra-Asian trade and how it fits in the development strategy of individual countries will also influence the decision to consent to a particular project. The missing links in the Trans-Asian Railway and their investment requirements are detailed in the subregional overviews in part III.

2. Break-of-gauge issue

The track gauge is the distance between the inner surfaces of each rail of a same track and is conventionally measured in millimeters. A break-of-gauge occurs when the railways of neighbouring countries have different track gauges with the consequence that rolling-stock cannot be exchanged across borders, thereby calling for measures to transfer people and cargo. Although rarer, discontinuity of track gauge also occurs within individual railway networks.

Table 1. Track gauges and overall length of rail routes in national networks and share of TAR route-length in indivisual countries

Country	Gauge (mm)	Route length		Country	Gauge (mm)	Route length	
		National network	TAR route length			National network	TAR route length
Armenia	1,520	845 km	582 km	Mongolia	1,520	1,810 km	1,110 km
Azerbaijan	1,520	2,100 km	1,261 km	Myanmar	1,000	5,099 km	1,740 km
Bangladesh	1,000 1,676	2,835 km	1,115 km	Nepal	1,676	53 km	29.4 km
Cambodia	1,000	750 km	602 km	Pakistan	1,676 1,000	7,791 km	3,700 km (App.)
China	1,435 1,000	77,966 km	19,750 km	Russian Federation	1,520 1,067[1]	86,660 km	21,453 km
Georgia	1,520	1,513 km	970 km	Rep. of Korea	1,435	3,382 km	925 km
DPR Korea	1,435	4,400 km	1,512 km	Singapore	1,000	23.5 km	23.5 km
India	1,676 1,000 762	63,465 km	12,103 km	Sri Lanka	1,676	1,143 km	691 km (App.)
Indonesia	1,067 750	4,675 km	4,035 km	Tajikistan	1,520	616 km	527 km
Islamic Republic of Iran	1,435 1,676	8,596 km	7,200 km	Thailand	1,000	4,071 km	3,526 km
Kazakhstan	1,520	14,205 km	9,548 km	Turkey	1,435	8,697 km	4,397 km
Kyrgyzstan	1,520	417 km	280 km	Turkmenistan	1,520	3,081 km	1,741 km
Lao PDR	n.a.	3.5 km	3.5 km	Uzbekistan	1,520	4,230 km	3,235 km
Malaysia	1,000	1,699 km	1,566 km	Viet Nam	1,000 1,435 Mixed 1,000/1,435	2,600 km	2,424 km

[1] Track gauge on Sakhalin island in the Far East region of the Russian Federation. Russian Railways have started to implement a programme to convert the island track gauge to 1,520mm.

Table 2. Trans-Asian Railway Network by subregion

	TAR Route-km	Share in overall TAR Route-km
South-East Asia Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore, Thailand, Viet Nam	13,920 km	13.13%
North-East Asia China, Democratic People's Republic of Korea, Mongolia, Republic of Korea, Russian Federation	44,750 km	42.20%
Cacucasus region and Central Asia + Islamic Republic of Iran and Turkey Armenia, Azerbaijan, Georgia, Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan	29,741 km	28.04%
South Asia Bangladesh, India, Nepal, Pakistan, Sri Lanka	17,638 km	16.63%
Total TAR (existing route-km):	**106,049 km**	

The mainline railway networks making up the TAR network incorporate five main different track gauges, i.e. 1,676 mm, 1,520 mm, 1,435 mm, 1,067 mm and 1,000 mm (Map). It must be noted that other gauges are also found in some countries (e.g. 762 mm in India) but the route-kilometres operated under these gauges are marginal and not part of the Trans-Asian Railway network. Finally, although not part of the Trans-Asian Railway network, Japan operates two distinctive rail networks separate from one another, namely: the Shinkansen high-speed train network on a 1,435-mm gauge and the so-called 'conventional' network for non-high-speed passenger services and freight on a 1,067-mm gauge.

2.1. Break-of-gauge locations on the Trans-Asian Railway network

There are currently ten border locations at which railway systems of different gauges meet, they are:

(i) China, station Pinxiang, (1,435 mm) and Viet Nam, station Dong Dang (1,000 mm),

(ii) China, station Manzhouli, (1,435 mm) and Russian Federation, station Zabaikalsk, (1,520 mm),

(iii) China, station Suifenhe, (1,435 mm) and Russian Federation, station Grodekovo, (1,520 mm),

(iv) China, station Erenhot, (1,435 mm) and Mongolia, station Zamyn Uud, (1,520 mm),

(v) China, station Alanshankou, (1,435 mm) and Kazakhstan, station Dostyk, (1,520 mm),

(vi) Democratic People's Republic of Korea, station Tumangang, (1,435 mm) and Russian Federation, station Khasan, (1,520 mm),

(vii) Islamic Republic of Iran, station Sarakhs, (1,435 mm) and Turkmenistan, station Sarakhs (1,520 mm),

(viii) Islamic Republic of Iran, station Jolfa (1,435 mm) and Azerbaijan, station Djulfa, (1,520 mm),

(ix) Islamic Republic of Iran, station Zahedan (1,435 mm) and Pakistan (1,676 mm)[2]

(x) Turkey, station Dogukapi (1,435 mm) and Armenia, station Akhuryan, (1,520 mm).

Not all of the above locations are currently in operation. In particular, following political instability in the Caucasus region in the early 1990s, cross-border rail operation was discontinued through Dogukapi/Akhuryan at the border between Turkey and Armenia, and Jolfa/Djulfa at the border between the Islamic Republic of Iran and Azerbaijan.

The above list will incorporate additional locations where break-of-gauge occurs when some of the missing links that have already been nominated as part of the Trans-Asian Railway network are completed. This will notably be the case between Turkey (1,435-mm gauge) and Georgia (1,520-mm gauge) when the ongoing construction of the 105-km line between Kars and Akhalkalaki is completed. Additional break-of-gauge locations will also occur in the medium to long term when missing links are completed between India and Myanmar, China and Myanmar, and China and Lao PDR on the assumption that the Government of Lao PDR will opt for metre gauge operation similar to that of its ASEAN neighbours.

In addition to the above, discontinuity of track gauge also occurs within individual domestic railway networks, primarily Bangladesh and India. For many years, Indian Railways (IR) has been allocating a share of its annual investment budget to converting tracks from narrow to broad gauge. IR's budget for track conversion in fiscal year 2009-10 is US$ 372 million[3].

In Bangladesh, meanwhile, Bangladesh Railway (BR) has traditionally operated its East Zone on metre-gauge and its West Zone on a mix of metre and broad gauge. In 1998, the opening of the multipurpose bridge over the Jamuna river and the provision of dual gauge operation over the bridge provided BR with an opportunity to launch a dual gauge development programme starting with the 245-km broad-gauge line from Jamtoil to Parbatipur and the metre-gauge line section from Dhaka to Joydepur[4]. Eventually, BR plans to extend broad-gauge throughout its entire network[5].

Other cases of track gauge discrepancies within one country also occur, albeit marginally, in countries such as China and the Russian Federation. In China, where the

[2] In this particular case, the station of Zahedan is not located right at the border between the two countries but 92 km inside Iranian territory. The 92-km line from Mirjaveh, the Iranian border town, to Zahedan is of broad gauge configuration, i.e. 1,676 mm.

[3] Source: International Railway Journal, *"Indian Railways to invest US$ 8.65 billion"*, August 2009.

[4] Source: Bangladesh Railway, Information Book, 2006.

[5] Source: Bangladesh media, The Daily Star, *"Government to lay broad-gauge rails all over the country"*, 16 April 2009.

railways operate on 1,435-mm gauge, it must be noted that for historical reason, the 468-km line between Kunming and Hekou, at the border with Viet Nam, is of metre-gauge configuration. Similarly, in the Russian Federation, which operates on 1,520-mm gauge, track gauge on the island of Sakhalin is of 1,067-mm gauge.

2.2. Overcoming the break-of-gauge[6]

A break-of-gauge is an obstacle to the smooth flow of traffic causing in-transit delays to freight and passengers. However, while it cannot be denied that track continuity between countries is desirable, it is unrealistic to envisage unified track gauge throughout the Trans-Asian Railway network. The consequence is that technical solutions have to be implemented to reduce the impact on the efficiency of rail services. These solutions include transhipment, bogie changing, the use of wagons with 'variable-gauge' bogies and gauge unification methods, i.e. dual or composite gauge.

(i) *Transhipment* is the transfer of freight by manual or mechanical means from wagons of one gauge to wagons of another gauge.

(ii) *Bogie changing* is the operation by which wagons are lifted on a set of jacks, bogies of one gauge rolled out and bogies of the other gauge rolled in.

(iii) The *Use of wagons with 'variable-gauge' bogies* enables wagons to be pulled along a special transition track at reduced speed. During the process, the distance between wheels is adjusted from one track gauge to another.

(iv) *Gauge unification* involves the provision of dual gauge, i.e. the provision of two different track gauges on a single track foundation through the insertion of a third rail (or sometimes a fourth rail to obtain the so-called 'composite gauge'). Another option is to convert tracks of different gauges to a single gauge standard. However, these two solutions are viable only when different standards are applied within the same country or for cross-border movements over a very short distance to fit specific requirements such as extending a line section of one country onto the territory of another country to gain access to specific installations or sites, e.g. ports or mining sites.

Of the above solutions the first two solutions are the ones most commonly found at the break-of-gauge locations along the Trans-Asian Railway network. Either one of these solutions, or both of them are to be found at the following break-of-gauge locations currently opened to cross-border traffic:

(i) China, station Manzhouli, (1,435 mm) and Russian Federation, station Zabaikalsk, (1,520 mm),

(ii) China, station Suifenhe, (1,435 mm) and Russian Federation, station Grodekovo, (1,520 mm),

(iii) China, station Erenhot, (1,435 mm) and Mongolia, station Zamyn Uud, (1,520 mm),

(iv) China, station Alanshankou, (1,435 mm) and Kazakhstan, station Dostyk, (1,520 mm),

[6] A detailed analysis of the break-of-gauge issue in the ESCAP region was published by ESCAP in 1996 under the title *"The railway break-of-gauge problem and possible solutions in the ESCAP region"*.

(v) Democratic People's Republic of Korea, station Tumangang, (1,435 mm) and Russian Federation, station Khasan, (1,520 mm),

(vi) Islamic Republic of Iran, station Sarakhs, (1,435 mm) and Turkmenistan, station Sarakhs (1,520 mm),

(vii) Islamic Republic of Iran, station Zahedan (1,435 mm) and Pakistan (1,676 mm).

In terms of operation and investment these two solutions present the following advantages and disadvantages:

Transhipment

Advantages	Disadvantages
• Low capital cost compared to other solutions	• Imposes significant delays in wagon transits for non-containerized cargo and is incompatible with through scheduling (thereby adding to locomotive and wagon requirements). • Significant additional operating costs in case of manual transfer techniques).

Bogie exchange

Advantages	Disadvantages
• Comparatively low cost (relative to gauge unification options, but not to transshipment)	• Imposes significant delays to wagon in transit and is incompatible with through scheduling (thereby adding to locomotive and wagon requirements). • Large operating costs, particularly for non-automated exchanges which have large labour requirements). • If traffic flows are imbalanced, additional costs are incurred to maintain a pool of bogies.

The use of wagons with adjustable wheelsets is not currently applied at any break-of-gauge locations on the Trans-Asian Railway network. The technique is not yet widely in use world-wide and most of the related research has been taking place in Europe, Japan and Canada. While the technique avoids lengthy delays to rolling-stock in transit, development and maintenance costs are high and the technique has not been tested on long distances similar to those of the routes of the Trans-Asian Railway network.

Finally, gauge unification is found at the two following break-of-gauge locations:

(i) China, station Pinxiang, (1,435 mm) and Viet Nam, station Dong Dang (1,000 mm) with the use of a dual-gauge track that extends 157 km from the sino-vietnamese border to Gialam, 5.5 km north of Hanoi, and

(ii) Democratic People's Republic of Korea, station Tumangang, (1,435 mm) and Russian Federation, station Khasan, (1,520 mm) with the use of a 48-km composite-gauge track from the border to the port of Rajin.

These solutions avoid the cost associated with transshipment or bogie exchange and produce faster transit times. However, they require special design and engineering for track components such as sleepers and turnouts, and specialized track circuits for train detection. They also require specialized workforce and equipment for track and signaling maintenance. At this stage only Bangladesh Railway seems to develop an extensive dual gauge programme to allow easy rail movement between its two operational zones. However, recent indications point out to this solution being a transitory step towards gauge unification.

While continuity of gauge along all routes of the Trans-Asian Railway would be ideal, a break-of-gauge does not constitute a major problem to efficient services. With limited exception, break-of-gauges occur mostly at border points where a range of operations already require trains to stop. These operations are generated by railway needs (e.g. change of locomotives, change of crew), or the requirements of other administrations (e.g. Customs, border police). Well-designed and well-organized facilities allow for transhipment to take place within the time allocated for these operations, the disappearance of which cannot yet be realistically envisaged.

In addition, time-sensitive traffic is mostly made up of containerized cargo which lends itself well to fast and efficient transshipment, much as has been taking place in ports since the early days of containerization. Railways of the region facing a break-of-gauge problem should therefore invest in efficient facilities accompanied by related facilitation measures.

3. Interoperability

A primary requirement of the Trans-Asian Railway network is that it should in future permit rail conveyance of shipping containers of all types and sizes either currently used or likely to be used in international trade, at speeds which are competitive with those of alternative transport modes.

At the time of drafting of the Intergovernmental Agreement on the Trans-Asian Railway Network, the practical implications of this requirement have been reflected in Annex II to the Agreement: “Guiding Principles Relating to Technical Characteristics of the Trans-Asian Railway Network”. These characteristics are recalled hereunder in general terms. A detailed assessment of the same for individual countries along the routes of the Trans-Asian Railway network is available in the respective corridor studies[7].

[7] All corridor studies that led to the formulation of the Trans-Asian Railway network are available through the ESCAP website at: http://www.unescap.org/ttdw/common/TIS/TAR/identification.asp#corridor.

3.1. Structure gauge

The limiting dimensions of structures throughout this network should be sufficient to allow unrestricted passage of wagons carrying all kinds of freight. When it comes to structure gauge, however, limitations may most likely be reached by wagons conveying the highest and widest containers used in international trade, as a result of which the structure gauge adopted for the Trans-Asian Railway network should provide adequate clearance for such containers carried at normal running speeds.

Table 4. Dimensions and Maximum Weights of Most Commonly Used ISO and non-ISO Containers

Freight container designation	External height			External width			External length			Maximum gross weight (tonnes)
	ft	in	mm	ft	in	mm	ft	in	mm	
ISO										
1A	8	0	2,438	8	0	2,438	40	0	12,192	30
1AA	8	6	2,591	8	0	2,438	40	0	12,192	30
1B	8	0	2,438	8	0	2,438	30	0	9,125	25
1BB	8	6	2,591	8	0	2,438	30	0	9,125	25
1C	8	0	2,438	8	0	2,438	20	0	6,058	24
1CC	8	6	2,591	8	0	2,438	20	0	6,058	24
1D	8	0	2,438	8	0	2,438	10	0	2,991	10
Non-ISO										
(1)	9	6	2,896	8	0	2,435	48	0	14,630	35
(1)	9	6	2,896	8	0	2,435	45	0	13,716	35
(1)	9	6	2,896	8	0	2,435	40	0	12,192	35
(1)	9	6	2,896	8	0	2,435	20	0	6,058	35
(2)	9	6	2,896	8	6	2,591	53	0	16,150	35
(2)	9	6	2,896	8	6	2,591	48	0	14,630	35
(2)	9	6	2,896	8	6	2,591	45	0	13,716	35

(1) = High Cube Container; (2) = Super High Cube Container

As may be observed from Table 4, the super high cube container, with dimensions of 40-53 ft (length) x 8ft 6ins (width) x 9ft 6ins (height) is the largest container which is currently carried or likely to be carried by the railways of the region and thus provides the constraint which must be satisfied by the dimensions of structures throughout the Trans-Asian Railway network. These structures, such as tunnels and through truss bridges, must be sufficiently wide and high to provide adequate clearance for super high cube containers

loaded on conventional container wagons (with a typical height of 1.1 metres above the rails) to pass at normal speed.

To allow for vertical and lateral movement of wagons due to track irregularities or vehicle dynamics on curved track sections, a clearance of about 40 cm between the outside dimensions of wagons and their loading and the inside dimensions of structures typically has to be allowed. Investment to expand the inside dimensions of structures may be quite prohibitive. However, the use of low profile wagons (i.e. wagons with wheels of small diameter or with dropped centre sections) can sometimes be used to overcome structure constraints without resorting to major expenditures.

3.2. Axle-load

The maximum allowable axle loads throughout the Trans-Asian Railway network should be sufficient to allow conveyance of trainloads of economic size and configuration. Although the Trans-Asian Railway network was primarily identified with the transport of container in mind, Annex II of the Intergovernmental Agreement also stipulates that railway lines and related infrastructure and equipment should meet international requirements, including those for the transport and transfer of heavy trains carrying goods such as petroleum products, coal, mineral ores, cement and grain.

There is disparity of axle-loads across the Trans-Asian Railway network reflecting the tasks of railways in different countries. Metre-gauge networks, predominantly found in South-East Asia, have traditionally operated on a light axle-load in the range of 12.5 to 15 tons, while railways in countries used to carrying heavy mineral products such as Chinese Railways or Russian Railways have operated on axle-loads of up to 25 tons.

There is region-wide evidence that railway organizations are gradually opting for heavier axle-loads, thereby reflecting the political will to induce a modal shift for the long haul of freight and enhance the market share of rail transport. In China, Chinese Railways are now taking measures to implement a 30-ton axle-load on its heavy haul freight lines and in India, Indian Railways have designed its dedicated freight corridors with a similar axle-load to accommodate wide-range operation of double-stack container trains on the Western Corridor and the haul of heavy mineral trains on the Eastern Corridor. Similar trends are also visible in other countries such as Sri Lanka, Malaysia or Thailand where a 20-ton axle-load is being implemented on new lines as well as during the upgrading of existing trunk lines.

There are compelling arguments in favour of adopting harmonized axle-load standard for those parts of the TAR network for which interchangeability of rolling stock, and possibly of locomotives, between railway systems is a practical option. In this regard, the future structure of trade amongst countries of the region should be analyzed and railways most likely to exchange goods across borders should strive for the adoption of common standards on the routes of the Trans-Asian Railway network.

3.3. Line speed

The maximum allowable line speeds throughout the network must be consistent with the realization of commercial speeds which are competitive with those of alternative transport modes (bearing in mind that maximum line speed is only one of the factors influencing

commercial speed, other important ones being operational and border crossing stopping times, signalling system performance, infrastructure condition, and motive power and rolling stock condition and performance).

Commercial speed, or the speed derived by dividing the distance travelled between ultimate origins and destinations by the total time taken to cover this distance, is one of the principal factors influencing mode choice decisions. Commercial speed itself is influenced by numerous factors, the main ones being:

(1) Technical

Factors which may be classified under this heading include the design and standard of maintenance of the permanent way, signalling, motive power and rolling stock, all of which will have an influence on the maximum speeds which will be permitted on individual lines. Attainment of target commercial speeds will depend in part on the percentage of the journey which may be run at or near maximum permissible speeds;

(2) Operational

Factors of this type include delays to the passage of trains resulting from the need to satisfy operational requirements, such as wagon loading/unloading, train marshalling (assembly/disassembly), brake and other safety checks, wagon number taking, locomotive fuelling and servicing, bogie exchange or other forms of inter-gauge transfer of rolling stock;

(3) Institutional

Delays to trains at national borders resulting from completion of customs and border security formalities are examples of the effect of institutional influences on train commercial speeds.

In establishing *technical* standards for the Trans-Asian Railway network, due regard should be given to the first of these factors - i.e. a desirable maximum speed for trains, in particular freight trains, which will be compatible with the attainment of a commercial speed competitive with alternative transport modes. Related studies attempted to make an evaluation of appropriate commercial speeds for international freight trains operating on specific Trans-Asian Railway corridors in order to provide transit times which are competitive with the principal alternative transport modes, i.e. mainly shipping.

However, these speeds were mainly evaluated with door-to-door Asia-Europe trade in mind. The new economic paradigm that is starting to emerge in the wake of the 2008 financial crisis and the increasing share of intra-Asian trade in the region's overall exchanges may shift the focus from a comparison with competing modes to the ability of rail to serve the manufacturing base of the continent by meeting the requirements for efficient logistics. Yet, speed and overall door-to-door delivery time will remain an important factor for industry in choosing a location for production units and selecting a transport mode. In this regard, a combination of adequate track and rolling stock standards as well as their optimal maintenance will be crucial to the future ability of the Trans-Asian Railway network to be an important component in an integrated international intermodal transport and logistics system for the region and investment is required to ensure uniform speed throughout the network.

III. SUBREGIONAL OVERVIEWS OF INVESTMENT REQUIREMENTS FOR THE TRANS-ASIAN RAILWAY NETWORK

A. Trans-Asian Railway in Central Asia and the Caucasus region, including the Islamic Republic of Iran and Turkey

Railways in the Caucasus region[8] and Central Asia[9] were inherited from the Soviet Union and therefore present a series of common design standards. However, the networks of the then-soviet republics were primarily conceived to serve trade within the Soviet Union and a number of links now need to be constructed or upgraded to serve a greater diversification of trade patterns. In addition, all countries of Central Asia and two of the three countries in the Caucasus region, i.e. Armenia and Azerbaijan, are landlocked and need efficient rail transport to gain access to Persian Gulf ports in the Islamic Republic of Iran, Mediterranean ports in Turkey and Pacific and Baltic Sea ports in the Russian Federation.

The networks in the concerned countries are mostly single-track, which limits traffic flows on several of the busiest routes. Another cause of impediment to through traffic is the existence of different track gauges. While railways in the Islamic Republic of Iran and Turkey operate on the 1,435-mm standard gauge, railways in the Caucasus region and Central Asia operate on a 1,520-mm gauge. In addition, the Caspian Sea that separate the Caucasus region and Central Asia is a natural physical obstacle to through rail operation and requires transhipment to ferry services.

As a result of the above, investment also needs to target the establishment of efficient transfer facilities at ports on the Caspian Sea and at break-of-gauge locations which, except for the break-of-gauge between the Islamic Republic of Iran and Pakistan, are located at border points.

Another break-of-gauge will occur between the Islamic Republic of Iran and Turkmenistan when a new 677-km corridor is completed from Uzen in Kazakhstan to Gorgan in the Islamic Republic of Iran. About 137 km of the line will be in Kazakhstan, 470 km in Turkmenistan and 70 km in the Islamic Republic of Iran, where it will link with Iran's rail network allowing connection to ports of the Persian Gulf. Completion of the link is scheduled for 2011.

A number of missing links exist between countries that share a common land border. Following the breakup of the Soviet Union and political tensions between Armenia and Azerbaijan in the early 1990s, rail operation was discontinued along the southern route between Yerevan and Baku via Jolfa. At the same time, maintenance of track infrastructure was abandoned and some rails are reportedly missing. Both Armenia and Azerbaijan are now trying to construct new routes to reconnect their respective rail network with that of the Islamic Republic of Iran. Azerbaijan, Georgia and Turkey are also cooperating on developing the Baku - Tbilissi - Kars corridor. Realization of the project entails construction of a missing link between Kars in Turkey and Akhalkalaki in Georgia. The missing links within the subregion as well as the missing links to connect the subregions with its immediate neighbours are summarized in table A.1. and described in greater details thereafter.

[8] Railways of Armenia, Azerbaijan and Georgia.
[9] Railways of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

Table A.1. Investment requirements for the Trans-Asian Railway missing links and associated cost of construction

Links	Countries concerned	Distance *(km)*	Cost *(US$ million)*
1. Missing links within the subregion			
Gagarin - Meghri	Armenia	469.6	2,000
	IR of Iran		
Tatvan - Van	Turkey	240	n.a.
Qazvin - Rasht - Anzali - Astara	IR of Iran	370	969
	Azerbaijan	8.2	12.4
		378.2 km	**981.4**
Akhalkalaki - Kars	Turkey	76	
	Georgia	29	
		105 km	**420**
(cost includes upgrading of Akhalkalaki-Tbilisi-Baku line section)			
Balykchi - Arpa	Kyrgyzstan	357	2,000
2. Missing links within neighbouring subregions			
Uzgen - Arpa - Torugart - Kashi *(China, North Asia)*	Kyrgyzstan	270	1,350
	China		
Arak - Khosravi - *(Khaneghein, Iraq, Western Asia)*	IR of Iran	566 km *(up to border)*	820
	Iraq		
Sangan - Herat *(Afghanistan, South Asia)*	IR of Iran	77 km	78
	Afghanistan	114 km *(61 + 53)*	75 *(for 61-km section)*
		191 km	**153**

1. Missing links in the subregion

Armenia – Islamic Republic of Iran

During the period of the Soviet Union, Armenia had a rail link with the Islamic Republic of Iran. The line started in Yerevan and continued along the banks of the Araks River, through Nakhichevan in the Azerbaijani republic, stretching all the way to Julfa. From there the line crossed the Araks River to Jolfa station in the Islamic Republic of Iran. This was the flattest and shortest route, i.e. 200 km from Yerevan to the Iranian border. However, operation was discontinued in the early 1990s following hostilities in the region. In April 2009, the Governments of Armenia and the Islamic Republic of Iran signed a preliminary "memorandum of understanding" formalizing construction of a 470-km railway line to

reconnect the two countries and contribute to an increase in their bilateral trade[10]. As planned, the line will go through mountainous terrain starting in Gagarin and going through Kamo, Martuni, Jermuk and Kapan before reaching Meghri at the border with the Islamic Republic of Iran. Construction cost are estimated to be in the order of US$ 1.5 to 2 billion. When completed the line will not only rail-connect Armenia with the Islamic Republic of Iran but will open up long-distance transportation from Armenia to (i) Central Asia via the Tehran – Mashhad line, (ii) China via Turkmenistan, Uzbekistan and Kazakhstan, and (iii) India via the Islamic Republic of Iran and Pakistan. Finally, Armenia will also gain access to the ports of Bandar Abbas and Chabahar for shipping connections to Australia, the Indian subcontinent, North-East Asia and South-East Asia. In 2008, a subsidiary from Russian Railways took over management of Armenia's rail system under a 30-year concession with the aim of upgrading it. However, assistance from international financial institutions will be sought for construction of the line.

Azerbaijan – Islamic Republic of Iran

Under a tripartite Agreement between the Governments of Azerbaijan, the Islamic Republic of Iran and the Russian Federation, the Iranian Islamic Republic Railways are pursuing the construction of a line that will eventually connect Qazvin, east of Tehran, to Astara at the border between the Islamic Republic of Iran and Azerbaijan. The line comprises of approximately 370 km in Iranian territory and 8.2 km in Azerbaijan. The first phase of the project, from Qazvin to Rasht, is nearing completion. When completed continuous rail infrastructure will be in place along a North-South corridor stretching from the Baltic Sea to the Persian Gulf. The corridor will run along the western shore of the Caspian Sea and eliminate the need for transshipment onto ferry services across the Caspian Sea. Branching off the North-South corridor are main trunk line to eastern and central Europe via Belarus, Poland and Germany, and to South Asian, i.e. India and Bangladesh, via Pakistan. The estimated investment cost for the project is US$ 981 million.

Turkey – Georgia

In February 2007, the governments of Azerbaijan, Georgia and Turkey signed a framework agreement to strengthen cooperation. The Agreement includes the Baku-Tbilisi-Kars rail project that encompasses the construction of a 105-km rail line between Akhalkalaki in Georgia and Kars in Turkey. This new line will circumvent the former line that ran through Armenia and was closed in the early 1990s due to political tensions between Armenia and Azerbaijan. Construction started in 2008 on the 76-km section in Turkey. The project has an estimated cost of US$ 420 million and will also include the upgrading of the single-track section from Akhalkalaki to Tbilisi. The long-term plan provides for double-track and electrification along the entire corridor.

Turkey, Lake Van by-pass

The backbone of the Trans-Asian Railway network in Turkey has long been the east-west main line that runs from Kapikoy at the border with the Islamic Republic of Iran to Kapikule at the border with Bulgaria in the European part of Turkey. 114 km west of Kapikoy, the line reaches the ferry terminal at Van on the eastern shore of the lake where

[10] Source: Armtown.com, "Armenia, Iran agree on ambitious rail link", 3 April 2009.

trains are disassembled into short rakes for loading onto ferries with a capacity of 10 to 12 wagons.

The 91-km crossing of the lake is a major obstacle to rail operation, especially for traffic to/from the Islamic Republic of Iran. However, although the Government of Turkey had earlier envisaged the construction of a line circumventing Lake Van, the project seems to have been abandoned and investment plans now target the upgrading of the ferry terminals and the purchase of vessels able to accommodate 50 wagons.

The decision may also be a consequence resulting from the construction of the line between Kars and Akhalkalaki in Georgia (see above). When the line is completed, the mainstay of the Trans-Asian Railway in Turkey will likely shift to the line Istanbul-Cetinkaya-Kars. Indeed, there would be limited economic justification to build the line around Lake Van once the Kars-Akhalkalaki section is in operation. The line will facilitate the movement of trade between Turkey and the Caucasus region without substantially increasing distances for volumes moving to the Islamic Republic of Iran and beyond to Central Asia or South Asia after the Qazvin - Astara section of the North-South corridor is fully in place. For example, the rail distance between Istanbul and Sarakhs, the gateway to Central Asia at the border between the Islamic Republic of Iran and Turkmenistan, is 4,030 km via Lake Van (not including the distance across the lake) and 4,500 km via Georgia and Azerbaijan.

In addition to constructing the above missing links, most countries also pursue capacity expansion through electrification and signaling projects, and seek to expand their networks to facilitate trade and transit with other subregions. Some of the main projects – ongoing or being considered – to develop international linkages are listed hereafter.

2. Connections with other subregions

2.1 Connections to South Asia

Islamic Republic of Iran - Pakistan

The 319 km link between Faragh, east of Bam, and Zahedan was inaugurated in the first half of 2009 allowing direct rail movement between the Islamic Republic of Iran and Pakistan. Completion of the section also means that uninterrupted rail infrastructure now exists from Dhaka in Bangladesh to Tehran in the Islamic Republic of Iran with only one break-of-gauge at Zahedan between the 1,676-mm gauge used on Trans-Asian Railway routes in Pakistan, India and western Bangladesh and the 1,435-mm standard gauge used in the Islamic Republic of Iran and Turkey.

Islamic Republic of Iran - Afghanistan

Under technical expertise from the Iranian Islamic Republic Railways construction work is progressing on the Torbat Heidarieh (Iran) – Herat (Afghanistan) line. Although at this stage the line is only significant within the framework of bilateral cooperation between Afghanistan and the Islamic Republic of Iran, it is the embryo of a wider rail system that is taking shape in northern Afghanistan with support from the Government of Uzbekistan and the Asian Development Bank (ADB). From Herat, the line could in future be extended to Mazar-e-Sharif, the second largest city in Afghanistan which, under financial assistance from

the ADB, is soon to be at the end of a 75-km line section that will start in Khairaton, a northern town at the border with Uzbekistan and the gateway for almost half of Afghanistan's imports. The project will also upgrade Khairaton station yard, build a transshipment terminal and provide institutional support to develop a railway sector plan. Railway development plans for Afghanistan are detailed in part C point 1.

2.2. Connections to Europe

Turkey, Marmaray project

The Government of Turkey is currently implementing the US$ 3.5 billion Marmaray project to link Halkalı, on the European side of Istanbul, and Gebze, on the Asian side of the city, via a rail tunnel under the Bosphorus. The project includes nearly 12.2 km of bored tunnel, including a 1.4-km tube section lying in a trench at a depth of 58 metres, making it the deepest immersed tunnel in the world. The project also includes capacity upgrade on the 43.4-km and 19.6-km approach to the tunnel on the Asian and European sides, respectively. The line, which is expected to open in 2012-13, will cater for both freight and passenger traffic with transit time on the 76-km journey between Halkalı and Gebze set at 105 minutes, with the Bosporus crossing taking just 4 minutes. The tunnel will allow direct rail connection to Kapikule at the border with Bulgaria for onward connection to Europe.

2.3 Connections to North-East Asia

Kazakhstan – China

In 1992, a first rail connection was established between China and Kazakhstan via the Alashankou - Dostyk border point. In view of increasing trade between the two countries and the potential to serve transit traffic between China and other Central Asian countries as well as the Russian Federation, Kazakhstan is actively seeking the development of a second route that will go from Zhetigen in Kazakhstan to Korgas on the Kazakhstan-China border, about 290 km, before connecting with the Urumqi line in western China at a point 295 km from the border[11].

Kyrgyzstan – China

The construction of a 270-km new railway line is planned to connect the rail system of China with that of Kyrgyzstan. The route will start from the Chinese town of Kashgar, cross the border in Torugart pass and travel along the Arpa river valley and across the Fergana mountains before joining the existing railway network near the town of Karasu at the border between Kyrgyzstan and Uzbekistan. In 2002, the Government of China provided assistance for a pre-feasibility study. A detailed design study still needs to be made and funding sources have yet to be identified for the US$ 1.35 billion construction cost.

2.4 Connections to Western Asia

Islamic Republic of Iran - Iraq

The Islamic Republic of Iran has formulated plans to connect its rail network with that of Iraq via a line that will go from Arak, 300 km south of Tehran on the line to the ports of Khorammshahr and Bandar Emam line, to Khosravi at the border with Iraq.

[11] Source: Railway-technology.com, 6 August 2009.

B. Trans-Asian Railway in South-East Asia

The ASEAN countries that are part of the Trans-Asian Railway network are Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore and Thailand. Collectively, these countries constitute a subregion in which metre-gauge railways predominate. The most notable exception is to be found in Indonesia where Indonesian Railways operates on a 1,067-mm track gauge and in the north of Viet Nam where some line sections are of standard gauge design, i.e. 1,435 mm. Another feature of the rail infrastructure in the region has been the reliance on light track structures with low axle loads, i.e. 15 tons or lower, and relatively low speeds, although investment in building new lines or upgrading existing ones make provisions for heavier axle-loads, i.e. 20 tons, and higher speed of 80 km/h for freight and 100 km/h to 120 km/h for passengers.

In recent years, a number of countries have started to develop more active rail infrastructure development policies to address new mobility requirements for people as well as accommodate increased volumes of trade, especially within the subregion and between the subregion and China.

However, these policies are still in the early stage of implementation and the emergence of a subregional network still remains hampered by a lack of inter-country connectivity. To date, rail connections within the subregion are limited to the connections between Malaysia and Singapore, and Malaysia and Thailand. In March 2009, a 3.5-km section was inaugurated between Nongkhai (Thailand) and Thannaleng (Lao PDR) extending the network of Thailand into the territory of its northern neighbour. In addition to the work of ESCAP, efforts to improve rail transport in the subregion and put in place the missing links are pursued within the framework of the Singapore-Kunming Rail Link (SKRL) project driven by the ASEAN secretariat and the Greater Mekong Subregion Transport Forum under the aegis of the Asian Development Bank (ADB). The Trans-Asian Railway missing links within the subregion as well as the missing links to connect the subregion with its immediate neighbours are summarized in the following table. They are described in greater details hereunder.

Table B.1. Investment requirements for the Trans-Asian Railway missing links in South-East Asia and associated cost of construction

Links	**Countries concerned**	**Distance** *(km)*	**Cost** *(US$ million)*
1. Missing links within the subregion			
Sisophon - Aranyaprathet	Cambodia	48	80
	Thailand	6	0.5
		54 km	**80.5 km**
Bat Deng – Loc Ninh	Cambodia	257	480
	Viet Nam	129	570
		385 km	**1,050**
Vientiane - Mu Gia - Vung An	Lao PDR	526	732
	Viet Nam	119	143
		645 km	**875**

Bua Yai - Savannakhet	Thailand	283	908
	Lao PDR	4	6.3
		287 km	**914**
Ubonratchatani - Pakse - Savannakhet - Densavanh - Dong Ha	Thailand	90	288
	Lao PDR	415	710
	Viet Nam	84	226
		589 km	**1,224**
Namtok - Thanpyuzayat	Thailand	153	491
	Myanmar	110	246
		263 km	**737**
2. Missing links within neighbouring subregions			
Thannaleng - Xiangun *(China, North/North-East Asia)*	Lao PDR	570	1,000
	China	599	2,980
		1,169 km	**3,980**
Lashio - Dali *(China, North /North-East Asia)*	Myanmar	142	480
	China	350	2,162
		492 km	**2,612**
Denchai - Tachilek - Jinghong *(China, North /North-East Asia)*	Thailand	326	
	Myanmar	195	
	China	141	
		589 km	**2,138**
Kalay - Jiribam *(India, South Asia)*	Myanmar	127	98
	India	219	649
		346 km	**747**

1. Missing links in the subregion

Cambodia and Thailand

Reconnecting the rail networks of Cambodia and Thailand requires restoring (i) the 48-km missing link between Sisophon and Poipet, on Cambodian territory, which was closed to traffic in 1980, and (ii) the 6-km section between Aranyaprathet and Poipet on the Thai side of the border. In Cambodia, work is being planned by TOLL Holdings Ltd. of Australia with which the Government of Cambodia signed a 30-year concession in June 2009. Under the concession Agreement, TOLL will operate and maintain Cambodian railways. In addition, in March 2007, the Government of Cambodia signed a US$ 55 Million loan agreement with ADB for rehabilitation of the railway, including re-construction of the connection to Thailand, for which the country is also receiving development assistance from the Government of Australia. Work is expected to be completed in the fist half of 2012 on the Sisophon-Poipet section. However, the relevant Thai authorities have not yet given any indication of budget allocation or construction deadline for the Aranyaprathet - Poipet section.

Cambodia and Viet Nam

The line being currently considered to rail-connect Cambodia and Viet Nam will go from Bat Deng, 31.5 km north-west of Phnom Penh to Ho Chi Minh City (HMC). The overall length is 386 km, comprising of 257 km in Cambodia and 129 km in Viet Nam. Feasibility studies have been completed for both sections and current projections target a start of work in 2010 with completion of the Vietnamese and Cambodian sections in 2012 and 2015, respectively. Investment requirements have been estimated at US$ 480 million in Cambodia and US$ 570 million in Viet Nam.

Viet Nam and Lao PDR

The Government of Lao PDR and Viet Nam are planning a 645-km rail link between the port of Vung Ang and Vientiane. The line will travel from Vientiane to Thakkek, 380 km, then to Mu Gia, a further 146 km east at the border between the two countries, and then continue to Vung Ang, 119 km. Pre-feasibility studies on the Vung Ang - Mu Gia and Mu Gia - Thakkek sections were completed in 2007 and 2008, respectively, and alignment survey have been completed on the Thakkek - Vientiane section. Neither cost, nor construction schedule have yet been officially indicated. However, a straight extrapolation of the per-km cost for the Thannaleng - Nongkhai and Ho Chi Minh City - Loc Ninh lines would put construction cost at US$ 732 million in Lao PDR and US$ 525 million in Viet Nam.

Thailand – Lao PDR – Viet Nam

Under the SKRL project two rail routes are considered to connect Thailand and Viet Nam via Lao PDR. One option consists of a 582-km line section from Bua Yai, on the Bangkok - Nongkhai main line, to Dong Ha, on the Ho Chi Minh City - Hanoi main line. The line breaks down in a 283-km section in Thailand from Bua Yai to the Thai-Lao border point at Mukdahan/Savannakhet, a 215-km section in Lao PDR from Savannakhet to the Densavanh/Lao Bao border point between Lao PDR, and an 84-km section in Viet Nam from Lao Bao to Dong Ha. An extrapolation of the per-km cost of recently completed projects or feasibility studies in the countries concerned would put the construction cost at US$ 908 million for the section in Thailand, US$ 338 million in Lao PDR and US$ 371 million in Viet Nam.

The other option follows the Thai northeastern main line to Ubonratchathani with a 90-km extension to Chongmek, opposite Pakse in Lao PDR. From Pakse, the line travels 200 km north to Savannaketh from where it follows the alignment of the previous option to Lao Bao and Dong Ha. The total distance between Ubonratchathani and Dong Ha is 664 km.

It must be noted than none of these two options are mentioned in the current investment plans of the three countries concerned.

Thailand and Myanmar

As part of the SKRL project, a feasibility was completed in 2007 under assistance from the Korea International Cooperation Agency on the 263-km line section between Namtok in Thailand and Thanpyuzayat in Myanmar. The missing section is of 153 km between Namtok and the border at Three Pagoda Pass and 110 km from there to Thanpyuzayat. The study, which showed poor viability for the project, put the cost of construction at US$ 491 million for the section in Thailand and US$ 246 million for the section in Myanmar.

2. Connections with other subregions

2.1 Connections to North / North-East Asia

The geographic scope of the SKRL project and the activities carried out under the Greater Mekong Subregion also encompass Yunan Province of China. A number of projects are being implemented or considered to develop rail linkages between ASEAN and China. These projects, most of which are missing links in various stages of progress, are recalled hereafter.

China and Viet Nam

Two rail connections already exist between Viet Nam and China. One goes from Hanoi to Dong Dang in the north of Viet Nam where it connects with the railways of China at Pinxiang. From Gialam, a freight terminal and rolling stock workshop located 5.5 km north of Hanoi, a 163-km dual gauge (1,000mm/1,435mm) track goes to Dong Dang. The other connection, which caters for the majority of bilateral rail-carried traffic between the two countries, goes from Hanoi to Lao Cai, 296 km, and on to China via the border point at Hekou. From Hekou, a metre-gauge line section continues to Kunming, the capital city of Yunan Province, 468 km further west. Under mixed funding from the ADB, the Government of France and national allocation, rehabilitation and upgrading of the Hanoi - Lao Cai section is taking place at a cost of US$ 160 million, while the signaling and telecommunication system is being modernized at a cost of US$ 70 million under financial assistance from the Government of China.

Meanwhile, on the Chinese side work is progressing to develop the Kunming-Hekou line into a high-capacity corridor to Hanoi and Haiphong port. Work started on the Yuxi (south of Kunming) to Mengzi line in 2005 and is expected to be completed in 2001, while work on the Mengzi - Lao Cai section started at the end of 2008.

China and Lao PDR

Under the SKRL project, a direct connection between Singapore and China through Malaysia, Thailand and Lao PDR is planned. The alignment constitutes Route 3A/3B of the SKRL project. However, a 1,170-km missing link between Thanaleng, 3.5 km into Lao PDR from the border with Thailand, and Yuxi, south of Kunming, needs to be constructed comprising of 600 km in China at an estimated cost of US$ 2.98 billion and 570 km in Lao PDR at an extrapolated cost of US$ 793 million.. While both countries are potentially interested in the construction of the line, they have not yet committed any budgetary resources.

A variant to the above option is also being considered under the SKRL project. It consists of a 246-km line section from Denchai on the Bangkok-Chiangmai main line to Changrai and then a further 80 km to the Thai-Lao border point at Chianglhong/Houy Sai. From Houy Sai the line will continue through Lao to Luang Namtha and finally to Boten at the border between Lao PDR and China. Early estimates put the construction cost of the Thai section at around US$ 1 billion. However, the alignment, which will avoid the main economic centre of Lao PDR, does not seem to be yet a part of Lao PDR’s railway development plan.

China and Myanmar

Connecting the railways of China and Myanmar requires the construction of a 492-km link between Dali (China) and Lashio (Myanmar). Construction of the Chinese section, which goes from Dali to Ruili (350 km), started in 2008 and is due to be completed in 2013 at a cost of US$ 2.16 billion. In 2007, in conjunction with construction of the Dali-Ruili section, Chinese Railways also started capacity increase on the Kunming-Guangtong section with related work expected to be completed in 2011. Similar work on the Guangtong-Dali section has already been approved by the China National Development and Reform Commission and is expected to start in late 2009/early 2010. As regards, the 142-km Muse-Lashio section on the territory of Myanmar, no indication has yet been given relating to its realization. Alignment surveys have already taken place but external resources are needed to cover the US$ 480 million construction cost.

2.2. Connections to South Asia

Possible future connections exist between South-East Asia and South Asia via the construction of links between Myanmar and Bangladesh or India.

Myanmar and Bangladesh

All existing rail heads in Myanmar are located a long distance away from the border with Bangladesh, and Myanma Railways have no plan at this point in time to construct a link towards the border with Bangladesh. However, Bangladesh has done some preparatory planning with a view to connecting its rail infrastructure to that of Myanmar in future. This would be through a link going from Chittagong, Bangladesh's main port, to Dohazari and Cox's Bazaar and on to the border with Myanmar. Estimated cost for the 128-km missing section between Dohazari and Gundum at the border with Myanmar is estimated at US$ 300 million.

Myanmar and India

Both India and Myanmar have expressed interest in connecting their rail networks via a 346-km line section that will extend from Kalay (Myanmar) to Jiribam (India) via the border point at Tamu/Moreh. The construction needs are 127 km from Kalay to Tamu in Myanmar at an estimated cost of US$ 98 million, and 219 km from Tamu to Jiribam in India at an estimated cost of US$ 649 million. In addition, Myama Railways estimate that a further US$ 162 million must be spent on upgrading the 513-km line section between Kalay and Mandalay. The link, which in the advent of the future reconnection between Myanmar and China via the Muse/Ruili border point will allow rail movements between India and China, is considered a priority project by Indian Railways.

In a subregion marked by a relatively low level of intercountry rail connectivity, most of the investment-related discussions focus on putting in place the missing links to serve the growth in intra-ASEAN trade. However, other projects aiming to increase capacity on existing lines are also envisaged, most notably in Cambodia, Malaysia, Thailand and Viet Nam.

In Cambodia, major work is taking place to rehabilitate the entire network, including reconstruction of the 48-km missing link between Sisophon and Poipet, and rehabilitation of tracks and bridges on the 338-km line between Phnom Penh and Sisophon and 266-km line between Phnom Penh and Sihanoukville. Since June 2009, TOLL Holdings Ltd. of Australia

manages, operets and maintain the railways under a 30-year concession. Investment requirements are currently being mostly covered through assistance from ADB and Overseas Development Aid from the Government of Australia.

In Malaysia, two significant projects under progress are the double-tracking and electrification of the 329-km Ipoh - Padang Besar and 98-km Serembas - Gemas line sections. 30 per cent of the work has already been accomplished on each of the projects which are due for completion in 2013 and 2012, respectively.

In Thailand, reports indicate investment of US$ 3.75 billion over 2008-2016, incl. 72%, i.e. US$ 2.52 billion, for track doubling projects and US$ 430 million for rolling-stock investment. Aimed at increasing the rail share of rail for freight and passenger, the objective is to reduce the country's road maintenance cost by US$ 190 million per year and reduce fuel consumption by 280 million litres of Diesel per year.

The Eastern Seaboard project is a priority project involving track-doubling the 78-km section between Chachoengsao, Si Racha and Laemchabang Port to support the port expansion project promoted by the Thai government. Work is expected to be completed in 2010 at a cost of US$ 172 million. Other track-doubling projects under consideration by the State Railway of Thailand (SRT) target 418 km of tracks along SRT's Northern line from Bangkok to Chiangmai, 78 km along the Northeastern line from Bangkok to Nongkhai, and 336 km along the Southern Line from Bangkok to Padang Besar. In order to improve freight transport between Thailand's north and northeastern regions and the port of Laemchabang, SRT is also planning to expand rail capacity by double-tracking some of the sections along its 106-km route between Chachoengsao and Kaeng Khoi. Cost of the project is estimated to be US$ 220 million.

In Viet Nam, investments are mostly taking place on modernizing the Hanoi - Ho Chi Minh City main line which is up for sleepers and rails replacement along almost the entire 1,726-km route. Related work will cost US$ 200 million and be carried out in phases over the period to 2015. Other planned investment on the line includes a rehabilitation programme for 44 old bridges, US$ 235.7 million, and the installation of new signaling and telecommunication systems along the line, US$ 133.6 million, and at selected stations, US$ 21 million.

C. Trans-Asian Railway in South Asia

The countries of South Asia that are part of the Trans-Asian Railway network are Bangladesh, India, Nepal, Pakistan and Sri Lanka.

Collectively, these countries constitute a subregion in which railways have had a history of operating on a mix of metre gauge and 1,676-mm broad gauge.

Inter-connectivity between neighbouring countries exist but is often limited to one, or at most two lines, and traffic volumes exchanged by rail are often vey limited. Meanwhile, there is no rail link between any country and Afghanistan, which is not yet part of the Trans-Asian Railway network.

Within the framework of the South Asian Association for Regional Cooperation (SAARC), a new political commitment is emerging to develop transport linkages, including

by rail, within the subregion to enhance cooperation and facilitate economic integration. In 2007, the South Asia Centre for Policy Studies (SACEPS) recognized that overland transport connectivity was still fragmented and that a number of other problems prevented smooth seamless cross-border movements. Foremost among these problems are an absence of transport and transit Agreements requiring transshipment at border points, a lack of compatibility among the rolling stock in use in the different railways and disparity in track gauges, especially for goods transiting Bangladesh[12].

Improving the efficiency of transport is crucial given that three countries of the subregion are landlocked, namely: Afghanistan, Bhutan and Nepal. In future, Afghanistan's most direct future access to international ports can be through the Islamic Republic of Iran or Pakistan. Meanwhile, for Bhutan and Nepal, it can be through either India, or India and Bangladesh.

In addition, some hinterland areas require transit through a neighbouring country for easy access to maritime ports. Such is the case for the states in north-east India for which the most direct access to ports in the subregion is via Bangladesh.

A notable feature of rail development in the subregion is that, with the notable exception of India, all countries need international assistance to develop their rail infrastructure.

There are two missing links in the Trans-Asian Railway within the subregion as summarized in Table C.1. One is within Pakistan and aims in the long-term to connect the port of Gwadar to Dalbandin on the Koh-i-Taftan - Chaman line section. The other missing link lies within Bangladesh and aims to rail-connect Bangladesh and Myanmar.

Table C.1. Investment requirements for the Trans-Asian Railway missing links in South Asia and associated cost of construction

Links	**Countries concerned**	**Distance** *(km)*	**Cost** *(US$ million)*
1. Missing links within the subregion			
Dalbandin - Gwadar	Pakistan	515	1,250
2. Missing links within neighbouring subregions			
Dohazari - Gundum *(border with Myanmar for connection with South-East Asia)*	Bangladesh	129	300

The largest infrastructure development project in the subregion is the construction of two dedicated freight corridors in India. The "Eastern corridor" will connect Ludhiana to Sonnagar over a distance of 1,760 km and is mainly intended for heavy industrial products such as steel or mineral ores. Its construction cost is estimated at US$ 3.93 billion. Construction started in March 2009 and is scheduled for completion within 5 years. The "Western corridor" will connect Tughlakabad ICD to JNP/Mumbai over a distance of 1,485 km and will cater for container traffic out of ports on India's west coast, primarily

[12] South Asia Centre for Policy Studies, "Recommendations to the 14th SAARC Summit, New Delhi, April 2007".

Jawaharlal Nehru Port in Mumbai. Its construction cost is estimated at US$ 3.69 billion. Both corridors are designed for the operation of long and heavy trains of up to 1.5 km, with a loading gauge suitable for double-stack operation and an axle-load of 30 tons.

Currently, India has rail connectivity with Bangladesh and Pakistan. There is also rail connectivity to Nepal, although only to the Birgunj ICD, 5 km into Nepal. Indian Railways recently carried out a number of feasibility studies to increase rail connectivity with neighbouring countries, in particular with Bhutan and Nepal with the following lines being considered[13]:

> *With Bhutan*, feasibility studies have been completed with respect to: (i) a 51-km track from Assam's Pathshala to Bhutan's Nanglam, (ii) a 58-km track from Assam's Kokrajhar to Gelephu, and (iii) a 17-km track from West Bengal's Hasimara to Phuentsholing. Estimated cost for the projects have not yet been indicated.
>
> *With Nepal*, feasibility studies have recently been completed with respect to: (i) a 16-km track from Bengal's Naxalbari to Kankarvitta and (ii) a 15-km track from Bihar's Jogbani to Biratnagar. Estimated cost for the projects have not yet been indicated.

Bangladesh is also actively pursuing the development of its rail infrastructure with major projects being planned over the entire network. The underlying principle of Bangladesh Railways' development policy is to gradually convert the entire network to a system of broad-gauge (1,676 mm) double-track with modern signalling and an axle-load of 25 tons on all major routes.

Major projects being considered include the construction of a new rail bridge across the Jamuna river (US$ 200 million) and the construction of a new line between Laksam and Dhaka to reduce overall distance and transit time between the port of Chittagong and the capital (US$ 1 billion).

To promote regional economic integration, the Government of Bangladesh is also planning to implement projects aiming to facilitate east-west transit with India. These projects include re-commissioning of the 39.5-km line section between Kulaura and Shahbazpur at the border with India (US$ 45 million), construction of a 46-km Akhaura bypass between Noapara and Asuganj (US$ 100 million), construction of two new bridges on the Bharaib Bazar - Akhaura section (US$ 100 million), gauge-conversion of the 40-km Birol - Parbatipur line section (US$ 60 million) and modernization of signalling and telecommunication systems at major stations on the Parbatipur - Ishurdi (US$ 35 million) and Ishurdi - Darsana line sections (US$ 25 million).

Other projects include the reconstruction of the Hardinge bridge over the Padma river (US$ 180 to 250 million) as part of a wider project to develop the port of Mongla, and the construction of a line to the border with Myanmar (see below).

In Nepal, recognizing the role of railways in facilitating national integration and economic growth, the Government is considering a master plan to develop a rail network of approximately 2,500 route-kilometres. The backbone of the network will be a 917-km east-west line across the Terai from Kakarvitta to Mahendranagar. While detailed design studies

[13] Source: Railway-Technology.com, 8 October 2009.

have yet to be finalized and associated costs assessed, it is evident that the Government of Nepal will require overseas assistance to carry out related projects.

In Sri Lanka, Sri Lanka Railways operate a network of 1,143 route-kilometres. Only 147 km are double or multiple tracks, track-gauge is of 1,676 mm and axle-load is between 16.5 and 20 tons. Inn the past few years, investment has given priority to the rehabilitation of existing lines over major construction projects. Related work has targeted the replacement of wooden sleepers and reballasting. A number of projects are also aiming at double-tracking short sections of the network and achieve a uniform axle-load of 20 tons throughout the network.

A main project currently being considered by the Government of Sri Lanka is the extension of the Colombo-Matara line to Kataragama, a distance of 113 km. Work will soon start on a first 27-km section between Matara and Beliatta at a cost of US$ 52.2 million. Current plan is to complete work by 2017 although finances have yet to be identified. Investment requirements and sources have yet to be identified for a number of other projects such as track doubling of the 131-km section between Polgahawela to Anuradhapura on the Northern Line; extension of Kelani Valley line from Padukka to Ratnapura and Hambantota on the southern coast; track doubling of the 55-km section between Seeduwa and Chilaw on the Puttalam Line; rehabilitation of the 129-km section between Rambukkana and Badulla on the Main Line, including rehabilitation of track with short welded new rail panels, sleeper, ballast and turnouts.

Pakistan Railways are also seeking to implement capacity-enhancement projects through upgrade and re-signalling. Now that rail connectivity has been established between Pakistan and the Islamic Republic of Iran, Pakistan Railways is seeking US$ 500 million for upgrading the 650-km line section between Quetta and Koh-i-Taftan at the border between the two countries for 145 km/h operation. In addition, the Islamic Development Bank is planning a loan of US$ 140 million to resignal the 433-km section between Lodhran - Multan - Khanewal - Lahore - Shahdara - Bagh line and fit locomotives with automatic train protection.

Another important project is the construction of new 515-km line to connect the port of Gwadar to Dalbandin on the Koh-i-Taftan - Chaman line section. Earlier research had reportedly put the cost of construction at US$ 1.25 billion, although this needs official confirmation. In future the line could be extended to Kandahar in Afghanistan and further north to Khairaton and Shirkhan Bendar at the border with, respectively, Uzbekistan and Tajikistan to offer another possible maritime access to these three landlocked countries.

1. Railway development in Afghanistan

Afghanistan, which is not yet part of the Trans-Asian Railway project, is seeking to develop a rail network that will allow the country to exploit its mineral and agricultural resources. One project has already received support from the Asian Development Bank which has approved a US$ 165-million grant for the construction of a 75-km single-track line section from Khairaton, on the Afghan side of the border with Uzbekistan, to Mazar-i-Sharif. Khairaton is already connected to the city of Termez in Uzbekistan.

Feasibility studies are also to be carried out on two proposed lines. One would link Khairaton to Herat in western Afghanistan from where a 205-km connection is currently being built to Sangan in the Islamic Republic of Iran. Another line would travel from

Khairaton to Kunduz and further to Shirkhan Bendar at the border with Tajikistan. These projects would allow easier connections for Afghanistan, Tajikistan and Uzbekistan to the ports of Bandar Abbas and Chabahar in the Islamic Republic of Iran.

From Khairaton another 643-km line is considered to Kabul and Torkham at the border with Pakistan. South of Kabul, a branch line would travel to the copper mine at Logar. Finally, a 103-km section is also being considered from Kandahar to Spin Boldak at the border with Pakistan.

Although these links may take some time to materialize, they all raise the profile of Afghanistan as a transit country for trade between Central Asian countries, the Islamic Republic of Iran and South Asia.

2. Connections with other subregions

Connections to South-East Asia

Bangladesh and Myanmar

A project currently considered by Bangladesh Railways is the construction a line section from Dohazari to Ramu and Gundum at the border with Myanmar. At Ramu a line section will go to Cox's Bazar. The project cost is estimated to be US$ 300 million. However, the relevant authorities in Myanmar have not yet developed any specific project to extend their rail network westwards towards Bangladesh.

India and Myanmar

A priority project of Indian Railways is the construction of a 219-km line section between Jiribam and Moreh at the border with Myanmar at an estimated cost of US$ 653 million. The line will open up new trade opportunities for India's northeastern states and will also be an important first step towards the realization of rail corridors to China (Yunan Province) and South-East Asia. The Government of India has already approved construction of a first 125-km section from Jiribam to Imphal (US$ 589 million) due for completion in 2013-14.

D. Trans-Asian Railway in North and North-East Asia

The subregion offers a contrasted picture. It harbours the two largest rail networks in the region, i.e. the rail networks of China and the Russian Federation, and therefore the ones contributing the longest route-kilometres to the Trans-Asian Railway network.

Two other countries, i.e. Mongolia and the Republic of Korea, also seek to exploit the benefit of efficient rail transport. Mongolia, which is landlocked and mineral-rich, needs rail corridors for efficient access to maritime ports and as a channel for its exports of heavy mineral products. Meanwhile, the Republic of Korea is pursuing rail development to achieve balanced sustained development through greater mode integration.

Finally, the railways of the Democratic People's Republic of Korea reportedly need substantial investment to modernize its infrastructure.

The subregion is entirely rail-connected and offers direct rail connectivity with other subregions, except South-Asia. In addition, the railways of the Russian Federation offer connectivity with the European rail system. Capacity and efficiency of operation of the rail networks of the subregion, i.e. Chinese Railways and Russian Railways, are also of crucial importance to a number of ESCAP member countries as they provide transit to maritime ports for nearly all the landlocked countries of the region, in particular Mongolia and countries of Central Asia.

Under a mix of government funding, internal resources, private sector participation and loans from international financial institutions, railways in China, the Republic of Korea and the Russian Federation finance their rail development policies. However, the Democratic People's Republic of Korea and Mongolia rely on external assistance for most of their development programmes.

In China, a major drive is underway to ensure that rail can continue to assist the country's future economic development. At the end of 2008, China's rail network totalled 80,000 km, of which 36 per cent was double-track and 35 per cent electrified. The current long-term development plan being implemented by Chinese Railways aims to bring the network to 120,000 km by 2020, of which 50 per cent will be double-track and 60 per cent electrified.

An important part of this programme is the construction of 35 passenger-dedicated lines for operation at 200 km/h to 350 km/h. By 2020, the combined length of these lines is expected to reach 16,000 route-km. The flagship of these projects is the 1,318-km Beijing-Shanghai high-speed line that is being constructed at a cost of US$ 32.9 billion and is scheduled for completion in 2013. In parallel, Chinese Railways is planning to electrify 25,000 route-km and double-track 19,000 route-km of existing lines[14].

The construction of passenger-dedicated lines will free network capacity for freight. In addition, 10,000 km of heavy haul line are to be built with axle-loads of 30 tons for transport of mineral products, in particular coal.

Chinese Railways also plan to tap more into the potential of domestic as well as transit container traffic and are developing 18 logistics hubs at a cost of US$ 2 billion with the participation of outside local as well as international investors. Two terminals have already been inaugurated in Kunming and Shanghai, while four more are under construction at Chongqing, Zhengzhou, Qingdao and Dalian. The remaining twelve are under planning and are to be located in Beijing, Chengdu, Guangzhou, Harbin, Lanzhou, Ningbo, Shenyang, Shenzhen, Tianjin, Urumqi, Wuhan and Xi'an. Each facility will cover an area of 6-12 sq. km (1,500-3,000 acres) with the capacity to handle between 200,000 to 300,000 containers a year. A number of these facilities will be served by double-stack container trains.

In the Russian Federation, Russian Railways have adopted a development plan extending to 2030 aiming to create the conditions for rail transport to support the economic growth of the country. The Plan provides for US$ 383 billion of investment in its minimal version and up to US$ 462 billion in its maximal version. The Plan includes projects targeting enhancement of existing infrastructure such as the upgrading of 13,800 km of freight

[14] Source: Railway Gazette International, "Seizing the golden opportunity", September 2009.

lines for heavy axle-loads as well as new line construction. Under the minimal version of the Plan, 16,000 km of lines are to be constructed and 20,730 km in its maximal version.

In the area of passenger service, Russian Railways is adopting a three-prong approach to accelerate long-distance passenger train, reconstruct existing between key regional centres to accept speeds of up to 200 km/h and develop new high-speed routes for 350 km/h operation[15].

In the area of freight transport, in the period to 2015, Russian Railways is planning to invest US$ 5.7 billion in developing capacity along the Transiberian main line between Nizhniy Novgorod and Nakhodka. Related work includes the development of border stations, double-tracking the Karymskaya - Zabaykalsk line section to facilitate exchanges with Chinese Railways with the possibility of future electrification, construction of new tracks around Perm and Chita rail junctions, construction of new container terminals along the route, modernization and enhancement of energy supply, telecommunications and automatic systems and completion of the bridge across the Amur river near Khabarovsk The objective of the project is allow container block-trains to transit the Transiberian main line in seven days".

Another priority investment project is the US$ 2.2 billion upgrade of sections of the North-South corridor located in Russian territory. Related work includes double-tracking and electrification of Trubnaya - Aksaraiskaya line section (368 km), construction of a new track around Saratov, reconstruction of the Akhtuba railway bridge near Astrakhan, and the development of a border station at Verhny Baskunchak. The North-South project is a tripartite project between the Governments of Azerbaijan, the Islamic Republic of Iran and the Russian Federation to develop a corridor linking the Baltic Sea to the Persian Gulf. The corridor, which will be operational upon completion of the Qazvin-Astara section between the Islamic Republic of Iran and Azerbaijan, will allow direct rail movements between Europe and the Indian subcontinent.

Finally, with the idea of further boosting the emergence of international corridors, the Russian Federation is also cooperating with the railways of the Democratic People's Republic of Korea on a US$ 190 million project to rehabilitate the 50-km section between the border station at Khasan / Tumangang and the port of Rajin with development of intermodal facilities in Rajin.

In Mongolia, railways are now managed by a newly-formed company owned jointly by Russian Railways (50%), the state mineral company Erdenes MGL (25%), and the former Mongolian national railway (25%). Recent information from Russian Railways indicates that investment could reach US$ 6.5 billion in the coming years with US$ 2.2 billion allocated to the modernization of existing lines and US$ 3.9 billion for the construction of two new lines. One line will go from Zuun-Bayan to Dalanzadgad, a region rich in minerals, while another one will connect Saynshand on the existing main trunk line between Sukhbaatar and Zamyn Uud to Bayan-Tumen the terminal station on the north-eastern line from Ereentsav. This particular project will also open a second transit route between China and the Russian Federation[16].

[15] Source: Railway Gazette International, "Upgrading paves the way for network expansion", July 2009.
[16] Source: International Railway Journal, September 2009.

Future development is driven by the country's policy to exploit its mineral resources and new lines being considered are primarily designed for the transport of minerals, in particular coal from Ovoot Tolgoi in the South Gobi region of Mongolia to Sekhe, 40 km south of the mining site, on the Mongolian-Chinese border. At Sekhe, a 450-km rail line already exists and joins China's main rail network at Jiuquan from where traffic can be directed to destinations in China, Central Asia and the Russian Federation.

In the Republic of Korea, railway development seeks to strike a balance between social responsibility and economic growth. High population density and advanced industrial development has pushed towards more active rail development policies with the result that by 2015 the country's rail network is expected to grow by 12 per cent to reach 3,815 route-kilometres through investment coming from central government and local authorities as well as private sector participation. Over the period 2011-2015, central and local government will contribute US$ 160.5 billion and US$ 12.5 billion towards railway development. Over the period, double-track lines will rise from 41.3 per cent to 63.8 per cent of the network. Other capacity enhancement measures will also contribute to doubling the overall market share of rail. They include a projects to increase the share of electrified lines to 79 per cent by 2014 and the installation of new signalling and automatic train protection[17].

Main projects include an extension of the high-speed network, the double-tracking of several main lines and expansion of rail capacity in Seoul metropolitan area. In particular, full completion of the Gyeongbu high-speed line between Seoul and Busan with construction of the Daegu-Busan section will allow Korea Rail Network Authority (KR) to transform the original line into a freight corridor, including the establishment of intermodal facilities. In addition, eager to develop international rail corridor, KR is looking at the development of connections with the rail networks of the Democratic People's Republic of Korea. However, progress is linked to the uncertainties of international politics.

IV. CONCLUSION

In view of continued demand for efficient transport infrastructure and the increasing share of intra-Asian trade in the region's overall exchanges, identifying investment needs for the Trans-Asian Railway is an important task for the future and timely development of the network.

The entry into force of the Intergovernmental Agreement on the Trans-Asian Railway Network on 11 June 2009 ushered in a new phase for the Trans-Asian Railway which now extends across 28 member countries and totals more than 114,000 km. To date, 22 member States have signed the Agreement, of which 12 have already deposited their instrument of ratification, approval or acceptance with the Secretary-General of the United Nations at UN headquarters in New York.

The lines contained in Annex 1 to the Agreement were adopted as a coordinated plan for the development of railway lines of international importance which countries intend to pursue within their respective national programmes. In this regard, although many sections of the Trans-Asian Railway network are already supporting substantial traffic volumes, more

[17] Source: Railway Gazette International, "South Korea – A growing network", August 2008.

actions need to be undertaken to ensure full network connectivity between countries and subregions and ensure interoperability across border.

Although many regional, subregional and bilateral initiatives support the development of regional transport infrastructure, countries still face many challenges in mobilizing the resources required for the upgrading and extension of the Trans-Asian Railway routes within their territories.

The activities of ESCAP aims to assist in providing a global picture of the future regional rail network best able to serve anticipated trade patterns, while offering alternative transport options for existing flows. In addition, by exploiting the long-distance competitive advantage of rail transport, the Trans-Asian Railway has a major role to play in bringing a more even distribution of economic opportunities and benefits. To realize these objectives, building the missing links in the network is an urgent necessity for which US$ 24 billion are required.

The study provides a chance for all member countries to express a long-term vision, categorize projects, rationalize their planning activities and refine implementation schedules. It is therefore important that all countries communicate and update the status of their planning to ESCAP's Transport Division for consolidation.

The Working Group on the Trans-Asian Railway network will provide a forum to jointly refine the network and strengthen its relevance for business.

In addition to their specific focus on rail infrastructure, countries are also encouraged to integrate projects into the wider planning of their future transport policy to ensure integration with other modes and give due importance to the development of intermodal interfaces.

ANNEX

PROFILE OF PRIORITY PROJECTS ALONG TRANS-ASIAN RAILWAY NETWORK

A. Armenia

1.	**Project name:** Construction of a new railroad connection between Armenia and the Islamic Republic of Iran, including construction of the missing link Vanadzor – Fioletovo / Dilijan).
2.	**Location:** In Armenia the new line will have the following alignment: Gagarin – Kamo – Martuni – Jermuk – Kapan – Meghri *(Mehrand - Iranian border).*
3.	**Brief outline of the project:** The project will have great regional significance by promoting transit potential between the ports of the Black sea and the Persian Gulf. The potential of the envisaged rail line can also play a role in the development of the International North – South Transport corridor. The line will also facilitate future bilateral trade between Armenia and the Islamic Republic of Iran. Finally, it will have specific economic significance for Armenia's Syunik region which is rich in ore and mineral water, has a powerful mining industry and a developed agriculture, and produces construction material. The main cities in the Syunik region are Goris and Kapan. The new line will connect this economically vibrant region with the existing rail network via the stations of Kamo in the north and Meghri in the south opposite Merand in the Islamic Republic of Iran.
4.	**Rationale and objectives:** The construction of the rail connection with the Islamic Republic of Iran is a priority infrastructure project for the Government of Armenia and is reflected in the country's Transport Strategy. The construction of this rail line will help promote transit through the territory of Armenia and will be a regional strategic junction giving Armenia direct rail connections with all its neighbouring countries.
5.	**Scope of work:** The new line is 469.6 km. It is of category III one line with a steering leaning of 28 per cent. Length of maximum leaning is 30 per cent. The number of bridges and over-bridges is 54; the tunnels are 7/23.95 each/km. 9 main stations and 30 substations will be built along the line. The average altitude above sea level is 1,760 m and the envisaged average speed of movement will be in the 40-60 kmp/h range.
6.	**Expected impacts and benefits:** Railway line construction will connect railway network of the Republic of Armenia with Islamic Republic of Iran, as well as provide additional access for freights from Iran to Black Sea Ports. Construction of the railway line section Fioletovo – Vanadzor (30 km) will give opportunity passing by railway route legs Yerevan - Vanadzor go straight to the north of Georgia and further Russian Federation shortening the route by approximately 100 km.

7.	**Estimated cost:** Standard with expenses for the route defined by the analogy with constructed railways in mountainous area in the territory of Republic of Armenia: Ijevan-Hrazdan and Masis – Nournus. The route is divided on several separate sections by complication of the relief, excavation volume and small engineering structures quantity. Route division on the sections is done to equate them to the analogous routes of the above mentioned railways. Based on the preliminary calculations, the construction cost will be as follows: Feasibility studies lasting 4-6 months: up to US$ 500,000, whilst the construction cost will be approximately in the range of US$ 1.5 - 2 billion.
8.	**Project duration:** Construction is expected to take place over 5 years.
9.	**Proposed project financing arrangements:** Funding support is requested from interested international financial institutions. Other funding arrangements can be discussed in due course.
10.	**Implementation arrangements:** All options are open for consideration keeping into consideration the existing concession agreement for railway management and other related local and international legislation.
11.	**Project status:** Preliminary technical and economical appraisal of the project is being prepared by "Transproject" CJSC, Ministry of Transport and Communication of Armenia.
12.	**Critical success factors:** The required amount of bilateral trade between Armenia and the Islamic Republic of Iran and the expected volumes of transit cargo need to be carefully appraised and materialize to justify the cost of the project. In spite of recent industrial and agricultural developments in the Syunik region of Armenia, the area remains without a rail link. According to the statistics issued by the Customs-house of Meghri, freight turnover between the Republic of Armenia and Islamic Republic of Iran constantly increases and the construction of the rail will further boost future volumes.
13.	**Other project-related information:** None
14.	**Contact address:** Ministry of Transport and Communication of the Republic of Armenia, 28 Nalbandyan Street, Yerevan 0010, Republic of Armenia, c.o. Mr. Gagik Grigoryan, Head of Foreign Relations Department, Tel.: +374 10 59 00 88, Fax: +374 10 52 38 62.


Dmanisi
Ayrum
Akstafa
Enikend
Tovuz
19
Mingechevir
Ninotsminda
18
Gazakh
Ganja
Yevlakh
Shamkir
Geranboy
Spitak
Vanadzor
Dilizhan
Gadabey
Terter
Gumri
Razdan
Sevan
Sotk
Aghdam
Talin
Abovyan
Tsovak
Kelbajar
Ashtarak
EREVAN
Martuni
Oktemberyan
ARMENIA
Goris
Ekhegnadzor
Karakese
Sisian
Sharur
Khynlyk
Kafan
Julfa
Megri
Nakhichevan
Ordubad

B. Bangladesh

1.	**Project name:** Construction of Dohazari – Ramu – Cox's Bazar and Ramu – Gundum metre-gauge line sections.
2.	**Location:** South of Bangladesh line from Dohazari to Cox's Bazar via Ramu and from Ramu to Gundum (border with Myanmar).
3.	**Brief outline of the project:** The project goes back to colonial times and since 1908 a number of engineering surveys have been carried out by local and foreign engineers with the objective of extending the existing railhead south of Chittagong to Cox's Bazar to facilitate the haulage of agricultural products, timber and salt to the country's urban areas. Additional studies and data collection surveys were carried out in the 1970s with technical assistance of Japan Railway technical Service (JRTS) and led to the decision by the Government of Bangladesh to construct a rail link from Dogazari to Cox's Bazar. In 2000, the Prime Minister expressed support for an alternate proposal to extend the project scope to Ramu and Gundum at the border with Myanmar as part of Trans-Asian Railway development in Bangladesh. Subsequently, a feasibility study was conducted by Consultants who found the project to be financially and economically viable.
4.	**Rationale and objectives:** The proposed rail link offers rail connection with Myanmar and is one of the missing links in the Trans-Asian Railway network. At present, road is the principal mode of transport between Cox's Bazar and Chittagong, followed by water transport. However, these two modes are inadequate to cater to the mobility needs of people and traders. In addition, the rail link will facilitate the development of tourism in and around Cox's Bazar which is famous for its tourism sights, fishing activities and wide sandy beach regarded as the world's longest natural sandy sea beach.
5.	**Scope of work:** Construction of Railway track from Dohazari to Cox's Bazar via Ramu and Ramu to Gundum near Myanmar Border with BGML standard bridge & track sub-base. Planned axle-load is 25 tons and the envisaged loading gauge will accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation. Design speed is 100 km-h.
6.	**Expected impacts and benefits:** • The project will plug a gap in the Trans-Asian Railway network and offer rail connection between South and South-East Asia. • Seamless rail movement of all types of domestic and cross-border traffic will be facilitated. • The people of Bangladesh will get fast, safe and low cost rail service to the South of the country. • The line will generate new employment opportunities, in particular through tourism activities, in the southern region of Bangladesh and help reduce poverty.
7.	**Estimated cost:** Approximately US$ 300 million.

8.	**Project duration:** 54 months.
9.	**Proposed project financing arrangements:** Financial assistance from international financing institutions/donor countries will be sought.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway after completion of detailed design. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.
11.	**Project status:** Search for financing support for investment project is going on.
12.	**Critical success factors:** • Availability of fund for detailed design and investment project. • Effective and efficient cooperation between donor(s) and the Government of Bangladesh. • Efficient and timely land acquisition process. • Establishment of an efficient project management framework.
13.	**Other project-related information:** None
14.	**Contact address:** i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413. ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120. iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Construction of a railway bridge with provision of dual gauge double track over the river Jamuna.
2.	**Location:** Near the existing Jamuna Multipurpose Bridge.
3.	**Brief outline of the project:** The Jamuna river bisects Bangladesh into a western zone and an eastern zone. The two zones remained separated until 23 June 1996, when the Jamuna Multipurpose Bridge (JMB) was officially opened to traffic, thereby greatly facilitating domestic trade flows through unhindered road and rail movements across the river. At the same time, Bangladesh Railway developed a vision of seamless train movements across the country using the bridge as a first step towards the objective of realizing gauge unification between the meter-gauge East Zone and the broad-gauge West Zone. With this objective in mind, 99.71 km of dual gauge were constructed from Jamtoil to Joydebpur and 240 km of broad-gauge were converted to dual gauge from Jamtoil to Parbatipur. Currently another 57 km of metre-gauge are being converted to broad gauge between Joydebpur and Dhaka. The anticipated benefits of constructing the JMB have been fully achieved so far as road traffic is concerned and partially met so far as passenger rail traffic is concerned. However, the expectations in the area of freight traffic by rail have not materialized due to the severe load restrictions across the bridge. This hindrance has wider subregional impact as it represents a barrier to subregional economic cooperation under the ambit of SAARC. In addition, recent development of cracks in the JMB necessitates the construction of a separate bridge for rail traffic only.
4.	**Rationale and objectives:** The current bridge allows train loads of up to 43.70 KN/M. As a result, oversized consignments, heavy-load BCXC wagons and non-vaccuamized freight trains are not allowed over the bridge even at limited speed. The only rail operation allowed is that of metre-gauge and broad-gauge passenger trains as well as light-weight freight train with brake powers. Moreover, the recent cracks that have appeared on the bridge have worsened the situation. The existing bridge has become a bottleneck to rail operation and its future safety dictates that a new bridge be built and dedicated to rail traffic only.
5.	**Scope of work:** Construction of a rail-only bridge over the Jamuna river with provision of dual gauge operation. Planned axle-load is 25 tons and the envisaged loading gauge will accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation. Design speed is 100 km-h.
6.	**Expected impacts and benefits:** • The project will facilitate seamless movement of all types of rail traffic within Bangladesh as well as between Bangladesh and its neighbours, especially in the SAARC subregion. • The use of the Trans-Asian Railway network in international trade will be enhanced.

- People and industry all over Bangladesh will get improved mobility.
- The project will greatly facilitate economic integration between the country's western and eastern zones and will assist the Government of Bangladesh in its efforts to meet the United Nations Millennium Development Goals in the area of poverty reduction.

7. **Estimated cost:** Approximately US$ 200 million.

8. **Project duration:** 48 months.

9. **Proposed project financing arrangements:** Financial assistance from international financing institutions/donor countries will be sought.

10. **Implementation arrangements:** The investment project will be implemented under Bangladesh Railway after completion of feasibility study and detailed design. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.

11. **Project status:** Search for financing support for investment project is going on.

12. **Critical success factors:**

- Funding is made available for feasibility study.
- Funding is made available for implementation of project.
- Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh.
- Establishment of an efficient project management framework.

13. **Other project-related information:** None.

15. **Contact address:**

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; e-mail: keya_rail@yahoo.com.

1.	**Project name:** Strengthening/Reconstruction of Hardinge Bridge.
2.	**Location:** Kakshey, Pabna district, South-western Bangladesh.
3.	**Brief outline of the project:** The Hardinge Bridge over the river Padma plays a major role in connecting the southwest of the country with the northwest as well as with the capital city. It is the country's longest and largest rail bridge. Opened to traffic in 1915, the bridge has a span of 15x360' + 6x75' and is fitted with double track. The bridge was badly damaged during the war of liberation and, since 1975, a 25 km-h speed restriction is imposed on the weakened structure although the section on which it is built has the potential to allow trains to run at a permissible speed of 80 km-h. The design load for girders allows a total live load of 1,937 tons on two tracks.
4.	**Rationale and objectives:** The train speed over the Hardinge Bridge is restricted to 25 km-h and design standards are old, i.e. Indian Railways' broad-gauge standard of the year 1903 + 33 per cent safety factor. This is a marked discrepancy with standards being applied now by the railways of both India and Bangladesh and constitutes a bottleneck to efficient operation. To overcome the operational bottleneck in Hardinge Bridge an investment project for strengthening or reconstructing the Hardinge Bridge is essential for both domestic as well as international traffic with the long term vision of seamless connectivity and interoperability between neighbouring railways along the Trans-Asian Railway.
5.	**Scope of work:** Strengthening or reconstructing the Hardinge Bridge with provision of a dual gauge double-track designed for 100km-h operation. Basic design standards should also provide for a minimum axle-load of 25 tons and a loading gauge that can accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation.
6.	**Expected impacts and benefits:** • The project will facilitate the economic integration of the south-western part of Bangladesh with the rest of the country. • It will also contribute to the development of Mongla port which fails to attract traffic due to poor communications and will allow the link to become part of the Trans-Asian Railway network. • More efficient access to and from the region will generate new employment opportunities, in particular through the development of tourist activities. Travel time will be reduced between the capital city and the Sundarbans mangrove forest, a UNESCO World Heritage site. This will assist the Government of Bangladesh in its efforts to meet the United Nations Millennium Development Goals in the area of poverty reduction.
7.	**Estimated cost:** Approximately US$ 180 to 250 million.
8.	**Project duration:** 48 months.
9.	**Proposed project financing arrangements:** Financial assistance from international financing institutions and donor countries will be sought.
10.	**Implementation arrangements:** The investment project will be implemented under

Bangladesh Railway after completion of feasibility study and detailed design. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.

11. Project status: No action has been taken yet.

12. Critical success factors:

- Funding is made available for feasibility study.
- Funding is made available for implementation of project.
- Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh.
- Establishment of an efficient project management framework.

13. Other project-related information: None.

14. Contact address:

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Re-commissioning of line between Kulaura – Shahbazpur – (Karimganj, India).
2.	**Location:** Moulavibazar District, North-eastern Bangladesh
3.	**Brief outline of the project:** The Kulaura-Shahbazpur section was opened to traffic in 1896 as part of the Bangladesh & Assam Railway. It was a secondary section of Bangladesh Railway with Shahbazpur being an interchange station. The section is 39.46-km long and has 7 stations out of which 5 are 'B'-class stations. Station buildings are of primitive design dating back to 1896. Signalling, interlocking and telecommunication systems are old and obsolete. The last rehabilitation was carried out over the period 1958 - 1960 with second-hand 60lb rails and steel/wooden sleepers. However, the section gradually deteriorated until the track and structures reached un-repairable condition. Following a number of derailments the section was finally closed to operation in July 2002. The section is part of the Trans-Asian Railway network and an entry/exit point between the railways of Bangladesh and India. Operation of the Trans-Asian Railway network necessitates the re-commissioning of the section.
4.	**Rationale and objectives:** The section Kulaura – Shahbazpur is part of the Trans-Asian Railway network and is essential to facilitate rail movements from the Indian provinces of Assam and Manipur to the nearest ports, in particular Chittagong. The re-commissioning of the line section will also, in the long-term, make possible through rail movement from Yunnan province of China to India. In this context, it supplements the project considered by Indian Railways to build the missing link between Jiribam and Moreh at the border with Myanmar.
5.	**Scope of work:** Re-commissioning of Kulaura – Shahbazpur meter gauge section with BGML standard bridge & sub-structures. Planned axle-load is 25 tons and the envisaged loading gauge will accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation. Design speed is 100 km-h.
6.	**Expected impacts and benefits:** • The project will improve transport connections in the north-eastern region of Bangladesh and states of India. • It will shorten distances to the existing ports in both Bangladesh (Chittagong) and India (Kolkatta). • The concerned region and states in Bangladesh and India will benefit from economic integration. The people will get improved mobility.
7.	**Estimated cost:** Approximately US$ 45 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** Financial assistance from international financing institutions/donor countries.
10.	**Implementation arrangements:** The investment project will be implemented under

	Bangladesh Railway. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.
11.	**Project status:** Feasibility study has been completed. Financial arrangements still need finalizing.
12.	**Critical success factors:** • Funding is made available for implementation of project. • Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh. • Establishment of an efficient project management framework.
13.	**Other project-related information:** None
14.	**Contact address:** i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413. ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120. iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Conversion of Birol – Parbatipur line section from metre gauge metre gauge to dual gauge.
2.	**Location:** Radhikapir (India)/Birol (Bangladesh) border station to Parbatipur. North-western Bangladesh.
3.	**Brief outline of the project:** Birol is one of the Railways transit point and land port of Bangladesh. It is located at the border with India and used to be connected with Radhikapur station in India via a metre-gauge line. However, although the line is in operation the transit function of the station ceased to exist after Indian Railways converted to broad-gauge their line section leading to Radhikapur. The transit function of Birol can be restored by converting the existing metre-gauge line section from Parbatipur to Birol to dual gauge (approx. 40 km).
4.	**Rationale and objectives:** The conversion will lead to the restoration of cross-border traffic with India via Radhikapur/Birol border point.
5.	**Scope of work:** Conversion of section to dual gauge with raising of the axle-load to 25 tons and provision of a loading gauge able to accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation. Design speed is 100 km-h.
6.	**Expected impacts and benefits:** • The project will facilitate movement of all types of cross-border rail traffic through and Trans-Asian Railway Traffic through Radhikapur/Birol border point.
7.	**Estimated cost:** Approximately US$ 60 million.
8.	**Project duration:** 30 months.
9.	**Proposed project financing arrangements:** Financial assistance from international financing institutions/donor countries.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.
11.	**Project status:** Financial support for feasibility study is being sought.
12.	**Critical success factors:** • Funding is made available for feasibility study. • Funding is made available for implementation of project. • Establishment of an efficient project management framework.
13.	**Other project-related information:** none
14.	**Contact address:** i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii.	Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.
iii.	Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Construction of a transshipment yard in Muladuli / Ishurdi.
2.	**Location:** Muladuli or Ishurdi in Pabna district. Western Bangladesh.
3.	**Brief outline of the project:** Almost half of BR's freight tonnage is cross border traffic. A major part of this traffic is received from India and carried mainly on Indian Railways' broad-gauge wagons to its final destinations in Dhaka and Chittagong. Currently, a significant number of these wagons are being handled at different interchange points such as Darsana, Rohanpur and Benapole on BR's broad-gauge network. Following growth in bilateral trade, cross-border freight tonnage has been increasing regularly and heightened the need for the efficient handling of wagons. The gradual operationalization of the Trans-Asian Railway network will see further growth in traffic to Dhaka and Chittagong as well as transit traffic through Bangladesh to the eastern states of India. However, due to load restrictions, loaded broad-gauge wagons from Indian Railways (IR) cannot pass over BR's bridges, including the current Jamuna Bridge.
4.	**Rationale and objectives:** The current bridge allows train loads of up to 43.70 KN/M. As a result, oversized consignments, heavy-load BCXC wagons and non-vaccuamized freight trains are not allowed over the bridge even at limited speed. The only rail operation allowed is that of metre-gauge and broad-gauge passenger trains as well as light-weight freight train with brake powers. Moreover, the recent cracks that have appeared on the bridge have worsened the situation. Unless a new rail bridge is constructed over the Jamuna river, a new transshipment yard is required to transfer cargo from IR's broad-gauge wagons to BR's metre-gauge wagons. Proposed locations are Muladuly / Ishurdi stations in BR's West Zone.
5.	**Scope of work:** Construction of transshipment yard at Muladuli / Ishurdi with all necessary facilities to allow all types of cross-border freight traffic to be handled efficiently.
6.	**Expected impacts and benefits:** • The project will facilitate movement of all types of cross-border freight traffic to, from and through Bangladesh and enhance the role of the Trans-Asian Railway network in Bangladesh. • A new yard will create new employment opportunities in the area and induce greater economic activity.
7.	**Estimated cost:** Approximately US$ 10 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** Financial assistance from international financing institutions/donor countries.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway after completion of the feasibility study and detailed design. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.

11. Project status: No action has been taken yet.

12. Critical success factors:

- Funding is made available for feasibility study.
- Funding is made available for implementation of project.
- Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh.

13. Other project-related information: None.

14. Contact address:

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Construction of 2nd Bhairab Bridge and 2nd Titas Bridge between Bhairab Bazar and Akhaura, including construction of approach track.
2.	**Location:** Near the existing Bhairab Bridge and Titas Bridge.
3.	**Brief outline of the project:** The Bhairab Bazar - Akhaura line section is utilized by traffic on the Dhaka-Sylhet and Dhaka-Chittagong corridors. The section is double-tracked except across the bridges at Bhairab Bazar and Titas as well as their approach track. The resulting capacity constraint has an impact on rail operation, especially the container landbridge between Dhaka and Chittagong. The loss in market shareworsens BR's financial performances.
4.	**Rationale and objectives:** The Tongi-Bhairab Bazar and Laksam-Chinkiastana line sections are being double-tracked with financial assistance from the Asian Development Bank (ADB) and the Japan Bank for international Cooperation (JBIC), respectively. Meanwhile, the World Bank (WB) has shown interest in financing the double tracking of the Laksam-Akhaura line section. Once these three projects are completed, the entire Dhaka - Chittagong corridor will be double-tracked except across the two bridges. Consequently, the full benefits of the ongoing double-tracking projects will not fully materialize unless two new bridges are constructed.
5.	**Scope of work:** Construction of two rail bridges, i.e. Bhairab Bridge and Titas Bridge, and approach tracks with BGML loading designed for 100km-h operation. Basic design standards should also provide for a minimum axle-load of 25 tons and a loading gauge that can accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation.
6.	**Expected impacts and benefits:** • Increase line capacity and fully exploit the potential of rail transport on the Dhaka – Chittagong corridor. • The Dhaka – Chittagong corridor is Bangladesh's most utilized transport corridor and plays a crucial role in the mobility of people and goods. Increased efficiency of rail movement along the corridor is crucial to the country's future economic development. • Increased economic activities along the Dhaka – Chittagong corridor will assist the Government of Bangladesh in its efforts to meet the United Nations Millennium Development Goals in the area of poverty reduction.
7.	**Estimated cost:** Approximately US$ 100 million.
8.	**Project duration:** 48 months.
9.	**Proposed project financing arrangements:** Financial support from international financing institutions/donor countries.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway after completion of the feasibility study and detailed design. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.

11. **Project status:** Financial assistance for feasibility study and implementation of project is being sought.

12. **Critical success factors:**

- Funding is made available for feasibility study.
- Funding is made available for implementation of project.
- Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh.
- Establishment of an efficient project management framework.

13. **Other project-related information:** None.

14. **Contact address:**

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; e-mail: keya_rail@yahoo.com.

1.	**Project name:** Track doubling of the Akhaura - Laksam line section.
2.	**Location:** Akhaura-Laksam line section. Eastern Bangladesh.
3.	**Brief outline of the project:** The Chittagong – Dhaka transport corridor plays a crucial role in the economy of Bangladesh. The corridor sees the country's main export and import flows which it collects and distributes from and to other parts of the country. The rail component of the corridor is a main artery for the transport of both people and goods. The remaining single-track sections along the corridor are important bottlenecks and impede efficient operation.
4.	**Rationale and objectives:** The Tongi-Bhairab Bazar and Laksam-Chinkiastana line sections are being double-tracked with financial assistance from the Asian Development Bank (ADB) and the Japan Bank for international Cooperation (JBIC), respectively. Meanwhile, the World Bank (WB) has shown interest in financing the double tracking of the Laksam-Akhaura line section. Once these three projects are completed, the entire Dhaka - Chittagong corridor will be double-tracked except across two bridges, i.e. Bhairab Bazar Bridge and Titas Bridge, and along the Akhaura – Laksam line section. Consequently, the full benefits of the ongoing double-tracking projects will not fully materialize unless two new bridges are constructed and the Akhaura – Laksam section is double-tracked.
5.	**Scope of work:** Doubling the track between Akhaura-Laksam with BGML standard for 100km-h operation. Basic design standards should also provide for a minimum axle-load of 25 tons and a loading gauge that can accommodate all types of containers commonly used in maritime shipping, including the possibility of future double-stack operation.
6.	**Expected impacts and benefits:** • Increase line capacity and fully exploit the potential of rail transport on the Dhaka – Chittagong corridor. • The Dhaka – Chittagong corridor is Bangladesh's most utilized transport corridor and plays a crucial role in the mobility of people and goods. Increased efficiency of rail movement along the corridor is crucial to the country's future economic development. • Increased economic activities along the Dhaka – Chittagong corridor will assist the Government of Bangladesh in its efforts to meet the United Nations Millennium Development Goals in the area of poverty reduction.
7.	**Estimated cost:** Approximately US$ 120 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** Financial support from World Bank is under process.
10.	**Implementation arrangements:** The investment project will be carried out under Bangladesh Railway after completion of the TA project. The work will be executed through international competitive bidding under supervision of renowned consulting firm.

11.	**Project status:** A technical Assistance project has been taken in hand to complete preparatory works of the project.
12.	**Critical success factors:** • Confirmation of WB funding assistance. • Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh. • Establishment of an efficient project management framework.
13.	**Other project-related information:** Not available.
14.	**Contact address:** i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413. ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120. iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Modernization of signalling and interlocking system at 20 stations on the Parbatipur – Ishurdi line section.
2.	**Location:** Parbatipur - Ishurdi line section. Western Bangladesh.
3.	**Brief outline of the project:** The Parbatipur – Ishurdi line section is one of the most important rail lines in the West Zone of Bangladesh Railway and is part of the Trans-Asian Railway routes through Bangladesh. The section leads to two interchange points with Indian Railways at Birol (Bangladesh)/Radhikapur (India) and Chilahati (Bangladesh) / Haldibari (India). The current signalling and interlocking systems along the section have reached the normal end of their life-cycle and need urgent replacing at 20 stations, namely: Parbatipur, Bhawanipur, Phulbari, Charkai, Hili, Panchbibi, Joypurhat, Jamalganj, Akkelpur, Tilakpur, Santahar Junction, Raninagar, Shahagola, Atrai, Madhnagar, Basudebpur, Natore, Yasinpur, Malanchi and Ishurdi.
4.	**Rationale and objectives:** The existing signalling and interlocking systems of the section are 35 to 80 years old. Their frequent failures result in speed restrictions and pose a threat to the safety of operation. In addition, it prevents BR from making optimum use of the line which is an important rail route in the western part of the country and is a Trans-Asian Railway through Bangladesh.
5.	**Scope of work:** Installation of new signalling and interlocking systems at 20 stations, including 2-year warranty period.
6.	**Expected impacts and benefits:** • Realization of the project will contribute to restore normal rail operation in the western part of Bangladesh. • Adequate safety of operation along the Parbatipur – Ishurdi line section will be guaranteed. • The potential of the line to carry future cross-border freight traffic to/from India will be enhanced.
7.	**Estimated cost:** Approximately US$ 35 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** Financial support from international financing institutions donor countries will be sought.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.
11.	**Project status:** No action has been taken yet.
12.	**Critical success factors:** • Funding is made available for implementation of project. • Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh. • Establishment of an efficient project management framework.

13.	**Other project-related information:** None.
14.	**Contact address:**
i.	Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.
ii.	Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.
iii.	Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Modernization of signalling and interlocking systems at 14 stations on the Ishurdi – Darsana line section.
2.	**Location:** Ishurdi - Darsana line section. Western part of Bangladesh.
3.	**Brief outline of the project:** The Ishurdi – Darsana line section is one of the most important rail lines in the West Zone of Bangladesh Railway and is part of the Trans-Asian Railway routes through Bangladesh. Its continuation in India via the border station at Gede is also part of the Trans-Asian Railway through India. The current signalling and interlocking systems along the section have reached the normal end of their life-cycle and need urgent replacing at 14 stations, namely: Jessore, Jessore Cantonment, Darsana Junction, Joyrampur, Chuadanga, Maminpur, Munshiganj, Alamdanga, Halsa, Poradaha Junction, Mirpur, Bheramara and Paksey.
4.	**Rationale and objectives:** The existing signalling and interlocking systems of the section are 35 to 80 years old. Their frequent failures result in speed restrictions and pose a threat to the safety of operation. In addition, it prevents BR from making optimum use of the line which is an important rail route in the western part of the country and is a Trans-Asian Railway through Bangladesh. Its continuation in India is also part of the Trans-Asian Railway network in India.
5.	**Scope of work:** Installation of new signalling and interlocking systems at 14 stations.
6.	**Expected impacts and benefits:** • Realization of the project will contribute to restore normal rail operation in the western part of Bangladesh. • Adequate safety of operation along the Ishurdi – Darsana line section will be guaranteed. • Bilateral trade with India will be facilitated. • Transit traffic through Bangladesh to/from the eastern States of India will improve and their economic development will gain momentum.
7.	**Estimated cost:** Approximately US$ 25 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** The project is included in an umbrella project under technical assistance from the Asian Development Bank (ADB). Release of the required financial resources is conditional to the implementation of some restructuring measures by BR. A proposal for financing under an EDCF loan is also under process.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.

11. **Project status:** The project has been approved in principle.

12. **Critical success factors:**

- Funding is made available for implementation of project.
- Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh.
- Establishment of an efficient project management framework.

13. **Other project-related information:** None.

14. **Contact address:**

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Modernization of signalling and interlocking systems at 5 stations on the Abdulpur – Rajshahi line section.
2.	**Location:** On the Abdulpur – Rohanpur line section. Western part of Bangladesh.
3.	**Brief outline of the project:** The Abdulpur – Rajshahi line section is one of the most important rail lines in the West Zone of Bangladesh Railway and is part of the Trans-Asian Railway routes through Bangladesh. The current signalling and interlocking systems along the section have reached the normal end of their life-cycle and need urgent replacing at 5 stations, namely:
4.	**Rationale and objectives:** The existing signalling and interlocking systems of the section are 35 to 80 years old. Their frequent failures result in speed restrictions and pose a threat to the safety of operation. In addition, it prevents BR from making optimum use of the line which is an important rail route in the western part of the country and is a Trans-Asian Railway through Bangladesh.
5.	**Scope of work:** Installation of new signalling and interlocking systems at 5 stations.
6.	**Expected impacts and benefits:** • Realization of the project will contribute to restore normal rail operation in the western part of Bangladesh. • Adequate safety of operation along the Abdulpur – Rajshahi line section line section will be guaranteed. • The potential of the line to carry future cross-border freight traffic to/from India will be enhanced.
7.	**Estimated cost:** Approximately US$ 10 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** The project is included in an umbrella project under technical assistance from the Asian Development Bank (ADB). Release of the required financial resources is conditional to the implementation of some restructuring measures by BR. A proposal for financing under an EDCF loan is also under process.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway. Contractors will be selected through international competitive bidding under supervision of renowned consulting firms.
11.	**Project status:** The project has been approved in principle.
12.	**Critical success factors:** • Funding is made available for implementation of project. • Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh. • Establishment of an efficient project management framework.
13.	**Other project-related information:** None.

14. Contact address:

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Construction of Dhaka to Jessore/Pukuria broad-gauge line section over Padma Bridge.
2.	**Location:** Some where from Dhaka-Narayanganj section to Pukuria/Jessore over Padma Bridge.
3.	**Brief outline of the project:** Government of Bangladesh has decided to construct a Rail-cum-road Bridge over Padma River at Maowa Point. It provides an opportunity for linking Capital City Dhaka with the shortest route connecting South—West part of Bangladesh and Cross border connectivity with India under greater perspective of SAARC and Trans-Asian Railway. The proposed railway link will provide quick communication to and from Dhaka with the south west part of Bangladesh. Many people will be able to move conveniently from their homes to their business and working places, residing outside Dhaka by availing commuter train services. Conveyance between the Divisional town Khulna and the Capital city Dhaka will require a few hours instead of present day long or over night journey. Moreover, at present there is some load constraint on Jamuna Multipurpose Bridge and some heavier type of goods wagons are restricted to pass over it. As such, this new route may become future trade corridor of BR.
4.	**Rationale and objectives:** The route will be the most important route of Bangladesh Railway Network as it provides shortest connectivity between Dhaka & the south-west part of the country. As the route will be broad gauge it will allow seamless movement of cross border & Trans Asian Traffic up to Dhaka. The objective of the project is to construct a broad gauge railway link over the proposed Padma Bridge.
5.	**Scope of work:** Construction of broad gauge railway link over the proposed Padma Bridge having load capacity (minimum 25 tons per axle). The section will have moving dimension to allow all type of containers commonly used in maritimeshipping, double staking of containers and cross border traffic to a design speed of 110 km-h with long term vision of seamless connectivity with Trans Asian Railway route.
6.	**Expected impacts and benefits:** This project will reduce travel distance and time and will benefit a huge number of people. More over, connection with Mongla Port will enhance carrying container freight by Railway. Railway being a cheap mode of transport, the project will help improve the socio-economic condition of Bangladesh as well as earning of BR.
7.	**Estimated cost:** Approximately US$ 200 million.
8.	**Project duration:** 48 months.
9.	**Proposed project financing arrangements:** Financial support will be sought from international financing institutions/donor countries for feasibility study, detailed design and implementation of project.
10.	**Implementation arrangements:** The investment project will be implemented under Bangladesh Railway after completion of the feasibility study and detailed design. Contractors will be selected through international competitive bidding under

supervision of renowned consulting firms.

11. Project status: Financial support for feasibility study is being sought.

12. Critical success factors:

- Funding is made available for feasibility study.
- Funding is made available for implementation of project.
- Effective and efficient cooperation between lender(s)/donor(s) and the Government of Bangladesh.
- Efficient land acquisition process.
- Establishment of an efficient project management set-up.

13. Other project-related information: None.

14. Contact address:

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Construction of Asuganj-Noapara chord line.
2.	**Location:** Ashuganj to Noapara railway station.
3.	**Brief outline of the project:** At present Dhaka-Syslhet Railway line passes through Tongi-Bhairab bazaar-Ashuganj-Akhaura-Noapara—Shistaganj. The existing distance between Ashuganj-Akhaura-Shaistaganj is 86.82 km. The proposed Ashuganj-Noapara chord line will shorten the distance by 40.45 km. The section connects Shahbazpur-Karimganj interchange point and is a part of Trans Asian Railway network. Construction of Ashuganj-Noapara chord line will shorten the Trans Asian Railway route resulting less operational cost.
4.	**Rationale and objectives:** The proposed Ashuganj-Noapara chord line (46.37) will reduce the distance by 40.45 km and time will saved around 40 minutes. As a result the overall line capacity will be increased in both Dhaka-Chittagong and Dhaka-Sylhet corridor. The chord line will facilitate quick movement of domestic and cross border traffic with long term vision of seamless connectivity with Trans Asian Railway route.
5.	**Scope of work:** Construction of Asuganj - Noapara chord line including other allied works. The rail line will be double Track with BGML standard bridges & sub—structure having load capacity (minimum 25 tons per axle) & moving dimension to allow all type of containers commonly used in maritime shipping, double staking of containers and cross border traffic to a design speed of 100 kmph with long term vision of seamless connectivity with Trans-Asian Railway route.
6.	**Expected impacts and benefits:** • The project will facilitate quick movement of all types of Railway domestic & cross border traffic on Dhaka-Sylhet corridor. • Provide a shorter route to the Trans-Asian Railway Traffic. • Line capacity improvement in both Dhaka-Chittagong and Dhaka-Sylhet corridor. • Poverty reduction.
7.	**Estimated cost:** Approximately US$ 100 million.
8.	**Project duration:** 36 months.
9.	**Proposed project financing arrangements:** Financing support will be sought from international financing institutions/donor countries.
10.	**Implementation arrangements:** The investment project will be carried out under Bangladesh Railway after completion of the feasibility study and detailed design. The work will be executed through international competitive bidding under supervision of renowned consulting firm.
11.	**Project status:** Search for financing support for feasibility study will be sought.
12.	**Critical success factors:** • Availability of fund for feasibility study. • Availability of fund for investment project. • Effective & efficient cooperation between donor(s) and the Government of People's Republic of Bangladesh.

- Efficient land acquisition process.
- Establishment of an efficient project management set-up.

13. Other project-related information: Not available.

14. Contact address:

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

1.	**Project name:** Construction of Dhaka-Laksam chord line.
2.	**Location:** Fatullah, Narayanganj to Laksam.
3.	**Brief outline of the project:** Present distance between Chittagong-Dhaka is about 320 Km. as against the road distance of about 260 Km. This has put the Railway into tremendous competition with road and Railway has been forced to keep its fare structure low compared with the operational cost. lf the Dhaka-Laksam Chord Line is established, the distance between Dhaka-Chittagong Railway will be reduced by about 80 Km. and as such the running time will be reduced by one and half hour. Railway will be in a position to compete with road in a better manner and people will be attracted to travel and carry their goods by Railway. Presently, the Inter-city trains are running at a speed of 72 Km. and requires about 5.30 hours to cover the journey between Dhaka-Chittagong. If Dhaka-Laksam Chord Line is constructed, the running time will be less than the time required by bus. Besides, the train journey is safer and comfortable. As such more passengers will be attracted towards Railway journey. Population in this vast area will get opportunity for quick transport facility for business and other social activities. A new area will be opened for traffic which will get advantage for economical development.
4.	**Rationale and objectives:** The proposed Dhaka-Laksam chord line (99km) will reduce the distance by 80 km and time will saved around 1.5 hours. As a result the overall line capacity will be increased in both Dhaka-Chittagong corridors. The chord line will facilitate quick movement of domestic and cross border traffic with long term vision of seamless connectivity with Trans-Asian Railway route.
5.	**Scope of work:** Construction of Dhaka-Laksam chord line including other allied works. The rail line will be single broad/dual gauge track with future double Track provision having load capacity (minimum 25 tons per axle) & moving dimension to allow all type of containers commonly used in maritime shipping, double staking of containers and cross border traffic to a design speed of 110 kmph with long term vision of seamless connectivity with Trans-Asian Railway route.
6.	**Expected impacts and benefits:** • The project will facilitate quick movement of all types of Railway domestic & cross border traffic on Dhaka-Sylhet corridor. • Provide a shorter route to the Trans-Asian Railway Traffic. • Line capacity improvement in Dhaka-Chittagong corridor. • Poverty reduction.
7.	**Estimated cost:** Approximately US$ 1 billion.
8.	**Project duration:** 54 months.
9.	**Proposed project financing arrangements:** Financing support of ADB & WB is under process. More financing support from other international financing institutions/donor countries is needed.
10.	**Implementation arrangements:** The investment project will be carried out under Bangladesh Railway after completion of the detailed design. The work will be executed through international competitive bidding under supervision of renowned consulting firm.
11.	**Project status:** Search for financing support for investment project is going on.

12. Critical success factors:

- Availability of fund for feasibility study.
- Availability of fund for investment project.
- Effective & efficient cooperation between donor(s) and the Government of People's Republic of Bangladesh.
- Efficient land acquisition process.
- Establishment of an efficient project management set-up.

13. Other project-related information: Not available.

14. Contact address:

i. Mr. Tohidul Anwar Chowdhury, Additional Director General/Marketing & Corporate Planning, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 9563450; Mobile: 01711 505302; Fax: +880 2 956 3413.

ii. Mr. Habib Ahmed, Chief Planning Officer, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone: + 880 2 956 8975; Mobile: 01711 506120.

iii. Mrs. Najnin Ara Keya, Senior Planning Oficer-2, Bangladesh Railway, Rail Bhaban, 16 Abdul Gani Road, Dhaka-1000. Phone +880 2 9569179; Mobile: 01711 692968; E-mail: keya_rail@yahoo.com.

C. Georgia

1.	**Project name:** Marabda – Kartsakhi project.
2.	**Location:** Southern part of Georgia, bordering Turkey.
3.	**Brief outline of the project:** The project is the Georgian part of a wider project aiming to construct a rail connection between Turkey and Georgia as part of a future Baku – Tbilisi – Kars rail corridor. The project considers the (i) rehabilitation of the existing 153-km line section between Marabda (23 km south of Tbilisi) and Akhalkalaki and (ii) construction of the Akhalkalaki - Kartsakhi line section (25.6 km) leading to the border with Turkey and (iii) construction of a station at Akhalkalaki, including bogie-changing facilities. In January 2007, "Marabda - Kartsakhi Railway LLC" as a special vehicle for the implementation of the project. An agreement signed between the Governments of Azerbaijan and Georgia outlines the scope of the project for the Marabda-Kartsakhi (Turkish border) line section. Meanwhile, the Governments of Azerbaijan, Turkey and Georgia have formalized their political desire to build the Baku-Tbilisi-Kars rail corridor in a tripartite agreement. A credit Agreement has also been signed between the Ministry of Transport of Azerbaijan, "International Bank of Azerbaijan joint-stock company", "International bank of Azerbaijan – Georgia joint-stock company-" and "Marabda-Kartsakhi Railway LLC". The Agreement lay the principles for the implementation of the project, the nature of work (technical design, construction, rehabilitation, etc) and operation of the future line.
4.	**Rationale and objectives:** Changing international relations following the break-up of the Soviet Union had an impact on the former main transport routes in Armenia, Georgia and Azerbaijan with a number of trunk routes becoming fragmented or being closed completely. As a result, rail transit traffic plummeted as passengers and freight shippers switched to road or developed different trading partners. When completed, the 180-km Baku – Tbilisi – Kars project will be an important corridor between Asia and Europe. Its importance will be further enhanced with the completion of the Marmaray project in Turkey, i.e. the Bosphorus tunnel, and the North-South corridor ending in the Persian Gulf at the port of Bandar Abbas in the Islamic Republic of Iran. Furthermore, the countries concerned by the project will be linked via a train ferry across the Caspian Sea to Central Asia and China. All the above line sections are part of the Trans-Asian Railway routes in the countries that they transit.
5.	**Scope of work:** **Section of Marabda - Akhalkalaki (rehabilitation)** Project is being realized in three stages: • Stage I – section Marabda - Tetritskaro (29.2 km). • Stage II – section Tetritskaro - Tsalka (49.7 km).

	• Stage III – section Tsalka - Akhalkalaki (74.1 km). **Section of Akhalkalaki - Kartsakhi (construction)** • Construction of standard-gauge section (25.6 km) **Akhalkalaki railway station (construction)** • Construction of new station • Bogy-changing facilities
6.	**Expected impacts and benefits:** • The project will contribute to restoring efficient international rail connection in the Caucasus region. • It will also link the region to Central Asia and China in the East and Turkey and Europe in the west. • It will facilitate Georgia's international trade and help the country's economic development. • It will allow operationalization of the Trans-Asian Railway network between capital cities, ports and economic centres, e.g. Ankara, Baku, Tbilisi, Istanbul, Mediterranean ports in Turkey, ports of Poti and Batumi in Georgia and Bandar Abbas in the Islamic Republic of Iran.
7.	**Estimated cost:** The project will be finished in 2009/10. Cost has been estimated in the order of US$ 200 - 250 million with the exact total cost subject to adjustment during construction. • Rehabilitation of Marabda - Akhalkalaki section, US$ 140 million. • Construction of Akhalkalaki - Kartsakhi section, US$ 75 million
8.	**Project duration:** Not available.
9.	**Proposed project financing arrangements:** Credit of amount of US$ 200 million allocated by Republic of Azerbaijan, beneficiary "Marabda-Kartsakhi railway" LLC.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Full feasibility study has yet to be completed.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Mr. Gogita Gvenetadze, Chief Specialist of Transport Department, Ministry of Economic Development of Georgia, Mob: (995 95) 96-03-50, Tel: (+995 32) 98-94-66, Fax: (+995 32) 93-45-45, ggvenetadze@economy.ge, www.economy.ge.

D. India

1. Project name: Dedicated Freight Corridors (DFC)

(i) Eastern Dedicated Freight Corridor: construction of a 1,345-km broad-gauge double-track line between Dankuni and Khurja and a 412-km broad-gauge single-track line between Khurja and Ludhiana.

(ii) Western Dedicated Freight Corridor: construction of a 1,451-km broad-gauge double-track line between Dadri/Tughlakabad and Jawaharlal Nehru Port Trust (JNPT) and a 32-km broad-gauge single-track line between Tughlakabad and Pirthala.

Both Eastern and Western Corridors will be connected via a 46-km chord line between Dadri and Khurja.

2. Location:

(i) Eastern DFC: the corridor will start from Ludhiana in Punjab and terminate at Dankuni in West Bengal. It will be routed via Ambala, Saharanpur, Khurja, Allahabad, Kanpur, Mugalsarai and Sonnagar.

(ii) Western DFC: the corridor will start from Jawaharlal Nehru Port (New Mumbai area in Maharastra) and terminate at Tuglakabad and Dadri near Delhi. It will be routed via Vadodara, Ahmedabad, Palanpur and Rewari.

3. Brief outline of the project: The Delhi - Mumbai and Delhi – Kolkata are two of Indian Railways' (IR) major trunk lines. They are mostly double-track and electrified and serve both freight and passenger traffics. Traffic density has now reached levels at which available capacity has been fully used up. The construction of the DFCs will decongest the existing lines and bring much needed additional capacity.

The proposed alignment runs mostly parallel to the existing routes with detours to avoid heavily constructed areas. Both Eastern and Western DFCs will be built to run freight trains that are longer and heavier than the ones currently operated by IR. Important feeder routes, serving ports, power stations, collieries will be connected to the corridors and upgraded to design standards similar to the ones selected for the DFCs. The Eastern DFC will mainly carry bulk industrial products such as coal, steel and cement, while the Western DFC will mainly carry containers.

4. Rationale and objectives: IR's high density trunk lines connecting the country's main metropolises as well as their diagonals – popularly referred to as the "Golden Quadrilateral" – have become saturated on most of their sections. In view of India's annual GDP growth of 8 per cent, IR expect to increment its freight traffic by 95 million tonnes per year and about 1,100 million tonne-kilometres by the end of 11th five-year plan (2008 - 2012). To sustain this high rate of growth, large investment is needed to increase IR's capacity. The DFCs are part of IR's efforts to address its capacity constraint and serve the Indian economy.

5. Scope of work:

(i) Eastern DFC, 1,757 km: construction of a 1,345-km broad-gauge double-track line between Dankuni and Khurja and a 412-km broad-gauge single-track line between Khurja and Ludhiana. Axle load will be 30 tons and

maximum moving dimension on the routes will be wide enough to accommodate the operation of double-stack container trains running on electric traction. Operation will be supervised through Computerised Train Control System.

(ii) Western DFC, 1,483 km: construction of a 1,451-km broad-gauge double-track line between Dadri/Tughlakabad and Jawaharlal Nehru Port Trust (JNPT) and a 32-km broad-gauge single-track line between Tughlakabad and Pirthala. Axle load will be 30 tons and maximum moving dimension on the routes will be wide enough to accommodate the operation of double-stack container trains running on electric traction. Operation will be supervised through Computerised Train Control System.

(iii) Construction of a 46-km chord line between Khurja on the Eastern DFC and Dadri on the Western DFC to connect the two DFCs. Design standards will be the same as for the DFCs.

6. Expected impacts and benefits:

- Create a rail infrastructure to carry high volumes of freight
- Reduce unit cost of transportation which will result in decline in rail tariff for customers making rail more competitive
- Deliver customer-oriented services through improved reliability of operation, greater availability of rolling-stock and reduced transit times
- Increase IR's share of freight market
- Speed up freight train operations and achieve higher productivity through better utilization of railway assets
- Introduce high end technology in freight operations
- Increase throughput by higher axle loads, moving dimensions, track loading density, improved pay load/tare weight ratio
- Relieve existing rail corridor
- Decongest busy terminals & junction stations
- Improve and upgrade passenger train operations on existing network by segregating passenger and freight operations
- Make greater utilization of rail transport to reduce the impact of the transport sector on the environment.
- Facilitate India's international trade and offer efficient linkages to the ports of Mumbai and Kolkata for landlocked Nepal
- Boost employment opportunities along the Western DFC which will be part of the Delhi – Mumbai economic corridor.

7. Estimated cost: As per the Preliminary Engineering Survey – cum Traffic Survey Report the cost of the projects are as under:

(i) Eastern DFC: Rs.17,678 crores (Approx. US$ 3,928 million)

(ii) Western corridor: Rs.16,592 crores. (Approx. US$ 3,687 million)

8.	**Project duration:** The completion period of the project is expected to be 5 years from the date of commencement of work.
9.	**Proposed project financing arrangements:** The project will be financed through a mix of internal budgetary allocation, borrowings on the financial market, budgetary and non-budgetary resources including multilateral and bilateral funding. Negotiations are underway for loan from the Japan Bank for International Cooperation for funding of the Western DFC. Meanwhile, discussions are under way with the Asian Development Bank and World Bank for the funding of the Eastern DFC.
10.	**Implementation arrangements:** the two project are being implemented through a Special Purpose Vehicle named DFCCIL (Dedicated Freight Corridor Corporation of India Ltd.).
11.	**Project status:** final "Location Surveys" are under way and will be completed shortly. The process of land acquisition is in progress.
12.	**Critical success factors:** the success of the projects critically relies on early tie-up for loan/funds on timely execution of the projects to avoid cost over-run and time over-run.
13.	**Other project-related information:** the projects has to be approved by the Cabinet.
14.	**Contact address:** P.R. Parhi, Joint Director Transport Planning, Ministry of Railways (Railway Board), Room No. 140 B, Rail Bhavan, Raisina Road, New Delhi 1 10 001 India**;** Tel/Fax no : + 91-1-1 233 888 58; e-mail dtp@rb.railnet.gov.in

1.	**Project name:** Construction of Jiribam - Moreh (India)/Tamu (Myanmar) – Kalay line section to rail connect India - Myanmar (US$ 649 million (for Jiribam - Tamu section). Ministry of Railways had sanctioned the construction of rail link between Jiribam - Tupul in 2004. The extension of this link up to Imphal is likely to be sanctioned by the Government of India soon. Further extension of this corridor upto moreh will be taken up at an appropriate time.
2.	**Location:** North –Eastern State of Manipur
3.	**Brief outline of the project:** the project will rail-connect India's North-Eastern State of Manipur with Myanmar. As per a report by the Rail India Technical and Economic Services (RITES) Ltd., the take off point will be Jiribam, which is the last rail head of Indian Railways (IR) in the North Front Railway Zone. The proposed alignment will be parallel to National Highway 53 in certain portions with detour in other sections due to the difficult mountainous terrain and forestry areas which the alignment traverses. The topography in the area will result in steep gradient and sharp curves. An estimated 253 bridges and 34 tunnels will also need to be constructed.
4.	**Rationale and objectives:** the Government of India lays emphasis on the development of transport infrastructure in the North-Eastern parts of the country. This link is a missing link in the southern corridor of the Trans-Asian Railway and its construction will also be a step towards the realization of a rail link between India and China via northern Myanmar.
5.	**Scope of work:** on the Indian side of the border the total length of the link between Jiribam and Moreh is 219 km. Construction of a 125.25-km broad-gauge single-track line section has already been approved between Jiribam and Imphal.
6.	**Expected impacts and benefits:** • The project will improve transport infrastructure in the State of Manipur and provide better connectivity for India's North-Eastern region. • It will also facilitate trade between India and Myanmar as well as between countries in the SAARC and ASEAN subregions. • It will facilitate economic development in the State of Manipur and raise living standards for the people through increased business opportunities. • It will fill a gap in the Trans-Asian Railway network.
7.	**Estimated cost:** the Preliminary Engineering – cum - Traffic Survey carried out by IR pegged the cost of the broad-gauge single-track line section between Jiribam and Imphal at Rs. 2,650 crores (US$ 589 million). In 2005, RITES Ltd also conducted a preliminary survey for the construction of a new 219-km rail link from Jiribam to Moreh via Imphal and put the cost at Rs 2,941 crores (US$ 653 million).
8.	**Project duration:** The completion period of the project between Jiribam and Imphal is targeted for completion by 2013 - 14.
9.	**Proposed project financing arrangements:** The project will be implemented through a mix of IR's internal resources and extra-budgetary allocation from the

	Government of India. The project has been given the status of "national project" to reflect its importance and facilitate its quick implementation.
10.	**Implementation arrangements:** The project will be implemented through the construction organisation of North - East Frontier Railway, a Zonal Railway unit of IR.
11.	**Project status:** The project has been sanctioned by the Ministry of Railways. Work for the first 10 km from Jiribam has already started.
12.	**Critical success factors:** The success of the project critically relies on the early tie-up for loan/funds on timely execution of the project to avoid cost over-run and time over-run.
13.	**Other project-related information:** The full scope of the project has yet to be approved by the Cabinet.
14.	**Contact address:** P.R. Parhi, Joint Director Transport Planning, Ministry of Railways (Railway Board) Room No. 140 B, Rail Bhavan, Raisina Road, New Delhi 1 10 001 India**;** Tel/Fax no: + 91-1-1 233 888 58; e-mail dtp@rb.railnet.gov.in.

E. Islamic Republic of Iran

1. **Project name:** Railway Connection of Chabahar Port to Kerman-Zahedan Rail axis.

2. **Location:** This project is located in extreme southeast of Iran in Sistan & Balouchestan province. Due to being adjacent with Pakistan and Afghanistan (around 1,200 km common border)as well as accessing to international waters of Oman Sea and Indian Ocean (270 km sea border) plus enjoying Chabahar port and Chabahar free zone, this province is considered one the country's extensive and important provinces.

3. **Brief outline of the project:**

The length of project is around 698 km, which it's main line, with the length of 605 km, starts from Chabahar Port and after passing from Iran shahr, Nik shahr, Bampoor and Bazman cities it ends in Fahraj station located in kerman-Zahedan rail axis at the distance of 269 km from Kerman. For making short the movement of trains from Chabahar free zone port to the center of Sistan & Balouchestan province (Zahedan city) a branch line with the length of 93 km has been designed which deviates from km of 482 on main route (Heydar Abad branch) and joins to Kalat station in km of 405 on Kerman-Zahedan rail line.This branch shortens the route from Chabahar to Zahedan around 177 kms. The following table shows the technical specifications of the route.

Technical specifications of the project

Track Type		Single Track – Diesel Traction
Length of the main route (Chabahar-Fahraj) Km.		605
Length of Heydar Abad branch (Km.)		93
Axle load (Ton)		25
Route topology	Plain	58
	Rising hump	18
	Mountain	24
Minimum longitudinal Curve Radius (m)		1500
Maximum longitudinal gradient (mm/m)		15
Maximum gradient at stations (mm/m)		2.5
Length of technical structure (Km.)	Bridge	9.2
	Tunnel	6.2
Signaling and Telecommunications		CTC - Interlocking
Designed Speed (km/h)	Passenger	160
	Freight	120

4. **Rationale and objectives:** Eastern regions of Iran due to having common borders with Afghanistan and Pakistan from east, Turkmenistan in north, and accessing to Oman Sea and Indian Ocean via Chabahr Port are considered the main passages and corridors for international cargo exchanges of Southeast Asian Countries and Indian subcontinent with Central Asia and Afghanistan (landlocked courtiers). Crossing international transportation corridors (such as Trans Asian Railway and Asian

Highway Network) is a reason for this claim. Considering this special importance, I.R.Iran has ratified establishing country's east transit corridor starting from Chabahar Port and covering Mirjaveh (border with Pakistan), Dogharoon (Border with Afghanistan), Sarakhs, LotfAbad and Bajgiran (border with Turkmenistan) on its way. Chabahar – Fajraj railway is regarded part of the east transit corridor of the country.Main objectives of this project are:

• Connecting Chabahar port to railway network of Iran and accelerating economic, social and political development of Sistan & Balouchestan province;

• Establishing a new rail-based transit route in north-south international corridor from Chabahar port to Sarakhs (common border with Turkmenistan), Jolfa And Astara (common border with Azerbaijan republic), Anzali and Amir Abad ports (in border of Caspian sea), Razi (common border with Turkish), Khosravi (common border with Iraq).

• Future development of this project in East of country and reducing the rail travel length of commercial products to/from Central Asia (about 700 Km) and Afghanistan (about 400 Km)

• Establishing required transportation infrastructure in order to accelerate development of Chabahar port (nominal capacity of Chabahar port is 2/5 million tons now, which would be increased to 6 million tons in the development plan.)

On the basis of feasibility studies, traffic rate of this rail line is predicted about 1.4 Million tons freight transportation and 300,000 passengers at the first year of operation (2014) that will be increased to about 4 million tons of freight and 500,000 of passengers . In case of increase in rail cooperation of countries in North-South corridor, the predicted freight cargo of this rail line will significantly be increased.

Construction of the Railway track from Dohazari to Cox's Bazar via Ramu and Ramu to Cundum is very much essential for seamless connectivity with Trans Asian Railway route and movement of both domestic & cross border traffic.

5. Scope of work:

5-1 Internal scope: freight and passenger exchange of country provinces with Chabahar free zone and Chabahar port

5-2 Regional scope: Cargo exchanges between neighboring countries of Iran (Afghanistan, Pakistan, Central Asia, Azerbaijan, Turkey, Iraq) and with Chabahar free zone, Oman Sea and Indian Ocean

5-3 International scope: Transit exchange of Southeast Asian countries and Indian subcontinent to/from Central Asia countries, Afghanistan, Russia, Caucuses, Turkey, Eastern and Central European countries (north- south corridor)

6. Expected impacts and benefits:

- Suitable distribution of internal and external loads to southern ports and reduce of delays arising from congestion of load in this port.
- Increasing Chabahar port and Chabahar free zone productivity and getting use of potentialities of these areas in suitable distribution of transit cargoes in the region.
- Suitable access of country provinces to free zone and oceanic port of Chabahar

	• Improving transportation in Sistan & Balouchestan Province (extensive province in the country). • Socio-economic and tourism development of Sistan & Balouchestan Province and Chabahar port. • Increasing safety, saving fuel consumption and decreasing environmental pollutions.
7.	**Estimated cost:** US$ 626 million (Based on 2008 prices and assuming currency exchange rate of 9500 Rials against one US$)
8.	**Project duration:** 4 years
9.	**Proposed project financing arrangements:** Participation of private sector, foreign financial and credit institutions.
10.	**Implementation arrangements:** BOT
11.	**Project status:** Detailed designed studies of this axis have been completed and tender documents are ready.
12.	**Critical success factors:** • Obtaining required legal permissions (In case of private investors contribution, legal authorizations would be issued by Iranian government); • Timely supply of required budget allocation; • Employing experienced contractors who are familiar with the region • Setting up strong project management team and proper organizing of construction force.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation, Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Zahedan-Birjand-Mashhad railway

2. **Location:** This project is located in east of Iran and in two provinces of Sistan and southern Khorasan. Due to being neighbor with Afghanistan and Pakistan and considering crossing of North-South transit corridor and Asian Highway Network, this part of country is of particular importance in exchange of cargoes of Afghanistan, Central Asia (landlocked countries) with southern international waters and Indian subcontinent.

3. **Brief outline of the project:**

Total length of this project is 737 km. This rail axis starts from Doomak station in Kerman-Zahedan railway and after passing from Nehbandan, Birjand (center of Southern Khorasan Province), Ghaen and Gonabad cities it ends in Bafgh-Mashhad railway. Technical specifications are shown as follows:

Technical specifications of the project

Track Type		Single Track – Diesel Traction
Length of the main route (km)		737
Route topology	Plain	16
	Rising hump	70
	Mountain	14
Length of technical structures(Km)	Bridge	1
	Tunnel	12
Axle load (Ton)		25
Minimum longitudinal Curve Radius (m)		1000
Maximum longitudinal gradient (mm/m)		15
Maximum gradient at stations (mm/m)		2/5
Signaling and Telecommunications		CTC - Interlocking
Designed Speed (km/h)	Passenger	160
	Freight	120

4. **Rationale and objectives:** Eastern regions of Iran due to having common borders with Afghanistan and Pakistan from east, Turkmenistan in north, and accessing to Oman Sea and Indian Ocean via Chabahr Port are considered main passages and corridors for international cargo exchanges of Southeast Asian Countries and Indian subcontinent with Central Asia and Afghanistan (landlocked courtiers). Crossing main international transport corridors (such as Trans Asian Railway and Asian Highway Network) is a reason for this claim. Considering this special importance, I.R.Iran has retified establishing country's east transit corridor starting from Chabahar Port and covering Mirjaveh (border with Pakistan), Dogharoon (Border with Afghanistan), Sarakhs, LotfAbad and Bajgiran (border with Turkmenistan) on its way. With creating this axis, country's east transit corridor will be completed. Main objectives of creating this axis are:

• Connecting Southern Khorasan province center to railway network of Iran
• Completing east railway transit corridor of country and decreasing transit distance of landlocked courtiers with Oman Sea and Indian Ocean.

On the basis of feasibility studies, traffic rate of this railway line is predicted about 3 Million tons for Freight Transportation and 1,000,000 passengers for passenger handling at the first year of operation (2015), that will increase to about 5 million tons of load and 2/5 million of passengers in a 20-year horizon. Also, on the basis of the performed evaluations, Mashhad-Birjand part is of priority for implementation and constructing Chabahar-Fahraj railway is justifiable after construction of Zahedan-Birjand section.

5. Scope of work:

5-1 Internal scope: freight and passenger handling between Sistan & Balouchestan province and east and east- north provinces of country.
5-2 Regional scope: rail freight and passenger exchange between Pakistan, Afghanistan and Central Asia.
5-3 International scope: Transit exchange of Southeast Asian countries, Indian subcontinent countries and Pakistan to/from Central Asia, Afghanistan and Russia.

6. Expected impacts and benefits:

- Decreasing transit rail route of Sarakhs-Mirjaveh (cargo exchange between Central Asia and Pakistan) at about 650 km and Sarakhs-Chabahar port route up to 340 km.
- Improving transportation in eastern and border provinces of country
- Establishing required transportation infrastructure for economic, social, commercial and touristic development of the region.
- Easy access of eastern provinces of country to the Chabahar free zone and Chabahar oceanic port.
- Increasing safety, saving fuel consumption and decreasing environmental pollutions in eastern regions of the country.

7. Estimated cost: US$ 1 billion (Based on 2008 prices and assuming currency exchange rate of 9500 Rials against one US$).

8. Project duration: 5 years.

9. Proposed project financing arrangements: private sector Participation, foreign financial and credit institutions.

10. Implementation arrangements: BOT.

11. Project status: preliminary studies of this project have been performed and basic designing studies as well as final justification studies are underway.

12. Critical success factors:

- Obtaining required legal authorizations (In case of private investors' contribution, legal authorizations would be issued by Iranian government).
- Timely supply of required budget allocation;
- Employing experienced contractors who are familiar with the region
- Setting up strong project management team and proper organizing of construction force.

13. Other project-related information: Not available.

14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation, Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Isfahan-Shiraz railway.

2. **Location:** Located in southwest of Iran, this project is placed in Isfahan and Fars provinces. These provinces are considered as main industrial and touristic poles of country with high demand for rail carriage of passengers and cargo.

3. **Brief outline of the project:** With total length of 506 km, this line starts from Dizicheh station at the present railway of Isfahan-Dizicheh and while passing from Shahreza, Abadeh, Saadat shahr, Marvdasht and Eghlid cities it ends in Shiraz city (center of Fars province).Due to the congestion of local transportation, 56 km from Marvdasht to Shiraz has been designed in double track and the rest is in single track.Technical specifications are shown as follow:

Technical specifications of the project

Total length of the line (km)		506
Length of Double-Track section (km)		56
Maximum gradient of the route		In Single-Track section 15(mm/m) In Double-Track section 20 (mm/m)
Minimum Curve Radius		In Single-Track section 1500(m) In Double-Track section 1000 (m)
Axle load (ton)		25
Signaling and Telecommunications		CTC - Interlocking
Technical structures	Bridge	9 bridges , with total length of 4/5 km
	Tunnel	16 tunnels , with total length of 13/4 km
Designed Speed (km/h)	Passenger	160
	Freight	120

4. **Rationale and objectives:**

- Connecting Fars province to railway network of Iran (This province is one of populous and touristic centers of country as well as considered as origin of agricultural and petrochemical products).
- Possibility of extending the project towards Bushehr province and connecting this province to railway network.

According to feasibility studies, traffic rate of this rail axis has been estimated about 2.5 million passengers and about 3.5 million tons freight at the first year of operation (2009), which it will increase to 3 million passengers and 5 million tons of freight during its 20 years operation.

5. **Scope of work:** Considering the situation of this axis in the rail network of Iran, the scope of this project limits to exchange of passenger and freight between Fars province and other provinces.

6. **Expected impacts and benefits:**

6-1 Advantages:

- Economic, Social, and commercial development of Fars province and located

	cities on the route due to suitable access to other provinces of country. • Improving transportation of the province and increasing transportation safety • Development of tourism in Fars province due to enjoying fast and safe transportation. • Saving fuel consumption and decreasing environmental pollutions. • Possibility of extending the axis to southern coasts of country. **6- 2 Effects** Since this axis crosses from northern margin of National Bemoo Park, necessary environment protection measures have been taken for reducing destructive environmental effects in its construction.
7.	**Estimated cost:** US$ 772 million (Based on 2008 prices and assuming currency exchange rate of 9500 Rials against one US$).
8.	**Project duration:** The project is under construction and it will be operated in 2009.
9.	**Proposed project financing arrangements:** Government budget fund.
10.	**Implementation arrangements:** Employing of Iranian consultants and contractors.
11.	**Project status:** This project will become operational in 2009.
12.	**Critical success factors:** • Timely supply of required budget allocation; • Employing experienced contractors.
13.	**Other project-related information:** Not-Applicable.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. Project name: Shiraz-Bushehr-Asaluyeh railway.

2. Location: This project is located in two provinces of Fars and Bushehr. This rail axis starts from center of Fars province and ends at the center of Bushehr province and Pars Special Economic Zone at the coast line of Persian Gulf.

3. Brief outline of the project: Having the length of 442 km, this project starts from Marvdasht, located at the Isfahan-Shiran Railway axis, and after passing from Firouzabad, Farashband and Ahrom cities it reaches Bushehr port .Also, for connecting South Pars Special Economic Zone located at the coast of Pesian Gulf to the rail network of country, a route with the length of 205 km starts from Ahrom and ends in Asaluye region. Following Table shows the technical specifications of this axis:

Technical specification of project

Route	Description		Amount
Shiraz-Bushehr	Track Type		Single Track – Diesel Traction
	Length of route (Km)		442
	Route topology (per cent)	Plain	44
		Rising hump	22
		Mountain	34
	Maximum longitudinal gradient (mm/m)		15
	Minimum Curve Radius (m)		1000(in regions with high topographical features 700m)
	Total length of the Tunnels (Km)		22
	Total length of Big Bridges (Km)		2
	Designed Speed (km/h)	Passenger	160
		Freight	120
Ahrom-Asaluyeh	Track Type		Single Track – Diesel Traction
	Length of route (Km)		205
	Route Topology (per cent)	Plain	53
		Rising hump	23
		Mountain	24
	Maximum longitudinal gradient (mm/m)		15
	Minimum Curve Radius (m)		1000
	Total length of the Tunnels (Km)		2.5
	Total length of the Bridges (Km)		4.5
	Designed Speed (km/h)	Passenger	160
		Freight	120

4. Rationale and objectives:

	Main objectives of this project are: • Connecting Bushehr province, Bushehr port and South Pars Zone to country rail network • Making suitable rail hinterland for developing operation of Bushehr Port, area at the sideline of Persian Gulf • Constructing new railway in North-South transit corridor On the basis of feasibility studies, traffic rate of this rail axis will amount to 800,000 passengers and 3 million tons freight at the first year of operation (2013) and it is predicted that during 20 years of operation it will increase to 2 million passengers and 7 million tons freight.
5.	**Scope of work:** Regarding the situation of the axis in country rail network, its internal scope involves cargo and passenger movement (domestic, exports, imports) from Bushehr Province and South Pars Zone to other provinces and its regional scope involves the possibility of cargo transit to/from coastal states of Persian Gulf, Turkey, Central Asia, Caucuses and Russia.
6.	**Expected impacts and benefits:** • Economic, Social and commercial development of Bushehr province and port • Touristic Development of Bushehr province with providing fast and safe transportation • Improving transportation of the province and increasing transportation safety of the region • Meeting transportation demand of South Pars Zone and facilitating supply of primary material needed for energy industries and expediting its development trend in • Reducing fuel consumption and environmental pollutions of the region
7.	**Estimated cost:** US$ 1 billion (based on 2008 prices and assuming currency exchange rate of 9500 Rials against one US$).
8.	**Project duration:** 7 years.
9.	**Proposed project financing arrangements:** through government budget fund.
10.	**Implementation arrangements:** By local consultants and contractors.
11.	**Project status:** This project is under construction and would be operated by 2014.
12.	**Critical success factors:** • Timely supply of required budget allocation. • Employing experienced contractors who are familiar with the region. • Setting up strong project management team and proper organizing of construction force.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Gorgan-Bojnourd-Mashhad rail line.

2. **Location:** This project is located in east-north of Iran and in three provinces of Khorasan Razavi, Northern Khorasan and Golestan. Having common border with Turkmenistan, passing through green nature and accessing to the eastern coast of Capian Sea are the main features of these areas. This project starts from Golestan province.

3. **Brief outline of the project:** With total length of 640 km, this rail line starts from Gorgan, the extreme point of rail network in North of Iran, and after passing from Gonbad, Bojnourd (center of North Khorasan Province), Ghoochan, Chenaran cities, it reaches to Mashhad (center of Korasan Razavi) and on its way covers main freight centers in Mashhad-Ghoochan-Chenaran rail axis. Moreover, this axis joins to rail transit axis of east of Capian Sea from Gorgan station and connects to Sarakhs-Mashad transit axis via Mashad Station.

Technical specifications of the project

Track Type		Single Track – Diesel Traction
Length of the main route (km)		640
Route topology	Plain	52
	Rising hump	13
	Mountainous Area	9
	Hard Mountainous area	17
Designed Speed (km/h)	Passenger	160
	Freight	120
Maximum longitudinal gradient (mm/m)		15 (mm/m)
Minimum Curve Radius (m)		1500
Axle load (Ton)		25
Signaling and Telecommunications		CTC - Interlocking
Length of technical structures (km)	Big Bridges	8/5
	Tunnels	4/7

4. **Rationale and objectives:**

Main objectives of this project are:

- Connecting North Khorasan province to country's rail network.
- Constructing direct rail route from Northern provinces to Khorasan Razavi province and Holy Shrine of Imam Reza (PBUH).
- Carrying transit cargoes of Russia and Caucuses to/from International waters of south (transit route of east of Caspian Sea).

On the basis of feasibility studies, traffic rate of this route is predicted to around 1.6 million tons freight and 1.6 million passengers at the first year of operation (2012),

	which this amount will increase to 2.5 million tons freight and 2.3 million passengers during 20 years of operation. It should be mentioned that with construction of transit axis of east of Caspian Sea, some percentage of transit cargoes of Russia will cross from this axis.
5.	**Scope of work:** **5-1 Internal scope**: Cargo and passenger transfer between northern provinces (Golestan, Gilan, Mazandaran) and east and east-north provinces of country (Northern Khorasan, Khorasan Razavi, South Khorasan and Sistan & Balouchestan) **5-2 Regional and National scope**: Cargo exchange of Russia, Caucuses Region to/with Afghanistan, Pakistan and south International waters.
6.	**Expected impacts and benefits:** • Providing safe and comfortable trip for pilgrims of country's Northern provinces to Holly Mashhad • Socio-Economic, and commercial development of North Khorasan province through improving transport infrastructures of the province • Developing of tourism in northern and east-northern provinces of country • Meeting the requests of transport industries in Northern Khorasan and Khorasan Razavi provinces. • Increasing the transport capacity of Russian transit cargoes to/from Afghanistan, Pakistan and international waters of South in country rail network.
7.	**Estimated cost:** US$ 982 million (Based on 2008 prices and assuming currency exchange rate of 9500 Rials against one US$).
8.	**Project duration:** 4 years.
9.	**Proposed project financing arrangements:** Participation of private sector and foreign financial and credit institutions.
10.	**Implementation arrangements:** BOT**.**
11.	**Project status:** EPC Tender Documents of the project is ready. Also, detailed designing is under process.
12.	**Critical success factors:** • Obtaining required legal authorizations (In case of private investors contribution, legal authorizations would be issued by Iranian government). • Timely supply of required budget allocation. • Setting up strong project management team and proper organizing of construction force.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Sangan-Herat railway line.

2. **Location:** This railway line with the total length of 191 km is located in Khorasan Razavi Province and extends to Afghanistan. About 77 km of this project is located in I.R. Iran and the rest 114 km is in Afghanistan, which connects Herat Province in Afghanistan to the railway network of Iran.

3. **Brief outline of the project:** Khaf-Herat railway route with the total length of 191 km starts from Khaf station on the present railway line of Torbat Heydarieh - Sangan Mine and after passing 77 km in Iran territory this line arrives to Afghanistan and after crossing Ghoorian, Zendehjan cities in Afghanistan with the length of 114 mm, it arrives in Herat city (One of the agricultural and economic poles of Afghanistan).

About 140 km of this project, from Khaf station in Iran till Jono station in Afghanistan, is under construction by the financial and credit assistance of Iranian government to Afghanistan and rest of the route to Herat city would be constructed by Afghanistan.

Technical specifications of the axis are as follow:

Technical specifications of the project

Track Type		Single Track – Diesel Traction
Length of the main route (km)		191
Length of the route in territory of Iran		77
Axle load (ton)		25
Minimum longitudinal Curve Radius (m)		1500
Maximum longitudinal gradient (mm/m)		15 (mm/m)
Maximum gradient at stations (mm/m)		2/5
Signaling and Telecommunications		CTC with Interlocking
Designed Speed (km/h)	Passenger	160
	Freight	120
Length of technical structures (m)	Bridges	500
	Tunnel	not having

4. **Rationale and objectives:**

Main objectives of this project are:

- Connecting Afghanistan to the railway network of Iran and TAR corridors.
- Launching quick and safe transportation between Iran and Afghanistan.
- Constructing proper infrastructures for carriage of transit freights of neighbour countries of Iran, Caucuses, Russia, Eastern and Central Europe, Southern international waters to/from Afghanistan.
- Improving and consolidating international relations in the region and increasing regional security.

	On the basis of the feasibility studies, traffic rate of this railway line, in case of inauguration of the whole route, is estimated around 2 million tons freight and 173,000 passengers at the first year of operation.
5.	**Scope of work:** Regarding the location of this axis in Iran and in the region, the scope of this project considered to be: **5-1 internal scope**: transfer of passengers and commercial exchanges between Iran and Afghanistan. **5-2 International and regional scope**: Freight and passenger transit of the neighbour countries of Iran, Russia, Caucuses, Eastern and central Europe and Persian Gulf states from/to Afghanistan.
6.	**Expected impacts and benefits:** • Development of commercial exchanges between Iran and Afghanistan. • Transfer of passengers and pilgrims between Iran and Afghanistan safely and in great numbers. • Economic, Social and political development of border regions through suitable access to these regions. • Straight Railway access of Afghanistan to international corridors of railway transportation. • Decrease of costs and increase of safety in transport of transit freights to/from Afghanistan.
7.	**Estimated cost:** Total Construction costs of this project is estimated around 127 million US$ (Based on 2008 prices and assuming currency exchange rate of 9,500 Rials against one US$. Presently this project is under construction by Iran up to Jono station in Afghanistan (about 51 km from Herat city) with the cost of US$ 93 million.
8.	**Project duration:** 3 years.
9.	**Proposed project financing arrangements:** Construction of this line up to Jono station in Afghanistan (51 km from Herat) by the assistant of the government of I.R..Iran and from Jono station up to Herat by Afghanistan.
10.	**Implementation arrangements:** From Herat to Jono station by Iranian contractors and engineers and rest is decided by Afghanistan government.
11.	**Project status:** 140 km of this project, from Khaf to Jono station (51 km from Herat) is expected to be operational in 2009 and rest of it will be constructed by Afghanistan government.
12.	**Critical success factors:** • Providing security within the region and political stabilization in Afghanistan. • Timely supply of required budget allocation. • Employing experienced contractors who are familiar with the region. • Setting up strong project management team and proper organizing of construction force.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Khoramshahr-Basreh railway line.

2. **Location:** This border axis is located at the extreme south-west of I.R. Iran and south of Khuzestan province. This rail line connects both Iran and Iraq rail networks through Shalamcheh border.

3. **Brief outline of the project:** Total length of this project is around 51 km, which is branched off from Khoramshahr station and after passing 16 km it arrives in Shalamcheh border.After covering about 35 km inside the Iraq territory and passing over Arvand River it ends in Basrah city in Iraq through a special bridge with the length of 750 Meters.

Iran has started construction of 16 Km of this route in its territory and it will be completed soon. Technical specifications are shown as follows:

Technical specifications of the project

Track Type		Single Track – Diesel Traction
Length of the main route (Km)		51
Length of the route inside Iran (Km)		16
Maximum longitudinal gradient (mm/m)		15 (mm/m)
Minimum Curve Radius (m)		1000
Length of Bridges (m)		750
Axle load (Ton)		25
Signaling and Telecommunications		CTC - Interlocking
Designed Speed (km/h)	Passenger	160
	Freight	120

4. **Rationale and objectives:**

- Connection of Railway networks of Iran and Iraq for achieving the following aims is important.
- Improving transportation between Iran and Iraq and providing safe and quick transportation for traveling pilgrims between two countries.
- Economic and social development of border regions of both countries.
- Improving and stabilizing international relationship in the region and increasing regional security.
- Connecting Iraq railway network to the corridors of TAR.
- Railway connection of Syrian Lattakia port on the coast of **Mediterranean Sea** to the corridors of TAR.
- Using high capacity of Imam Khomeiny port for freight transit to/from Iraq.

Therefore, in order to having linkage between the two countries, Islamic Republic of Iran has started two rail projects of Khoramshahr-Shalamcheh-Basrah (a short term plan) and Kermanshah-Khosravi-Khaneghein(long term plan) which are under construction and in this connection an agreement has been concluded between transport authorities of Iran and Iraq.

	On the basis of feasibility studies, traffic rate of this railway line is expected to amount to 3 million tons Freight Transportation and 800,00 passengers at the first year of operation (2013),which it will increase to about 7 million tons freight and 2 million passengers during 20 years of operation .
5.	**Scope of work:** **5-1 internal scope:** Commercial exchange and transfer of passengers of southern regions of Iran to Iraq. **5-2- Regional and international scope:** Transit exchange among Indian subcontinent, south-east Asia and Pacific to/from Iraq and Syria.
6.	**Expected impacts and benefits:** • Facilitating movement of pilgrimage passengers between Iran and Iraq (especially southern regions of two countries.) • Railway covering of Shalamcheh region which is martyrdom place of many Iranian soldiers and has about 1 million pilgrims annually. • Regional development, deprivation removal and job production within Khoramshahr and Abadan region. • Decreasing costs and increasing safety in commercial exchanges (import and export) between Iran and Iraq (especially in southern regions of the two countries). • Possibility of transiting export and import cargoes of Iraq via Imam Khomeiny port (regarding the limitation of Iraqi ports). • Possibility of developing railway for connecting to Kuwait, Saudia Arabia and Arabic states of southern area of Persian Gulf (bypass plan of Persian Gulf). • Developing international relationship and increasing regional security. • Decreasing environmental impacts of transportation by attracting transportation from road to rail.
7.	**Estimated cost:** Construction cost of 16 km of the route inside of Iran country (Khoramshahr-Shalamcheh) is estimated about US$ 32 million (Based on 2008 prices and assuming currency exchange rate of 9,500 Rial against one US$).
8.	**Project duration:** Khoramshahr to Shalamcheh route is expected to be operated in 2009.
9.	**Proposed project financing arrangements:** the part inside Iran (Khoramshahr-Shalamcheh) by assistant fund and credit of the government of I.R. ran to Iraq and from Shalamcheh to Basrah will be funded by Iraqi government.
10.	**Implementation arrangements:** From Khoramshahr to Shalamcheh is under construction by Iranian contractors and engineers and rest of the route will be constructed by Iraq country and in the form EPC.
11.	**Project status:** 16 km of the route located in Iran is under construction and will be operated by 2009 and detailed design studies of rest of the route up to Basrah are made by Iraq.
12.	**Critical success factors:** • Suitable cooperation between the two countries in construction and operation

	• Providing security and stabilization of the region • Timely supply of required budget allocation • Employing experienced contractors who are familiar with the region • Setting up strong project management team and proper organizing of construction force
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Mianeh-Bostan Abad-Tabriz double track rail line

2. **Location:** This project is located in north-west of Iran and in East Azerbaijan province. Constructing this rail line will shorten about 92 km the present rail line between Mianeh-Tabriz. Due to being part of Northern corridor of TAR crossing Iran (Sarakhs-Razi and Mirjaveh-Razi), this route is of high importance.

3. **Brief outline of the project:** This axis with the length of 205 km starts from the existing rail station of Mianeh which is on the railway route of Tabriz-Tehran and by passing through a mainly mountainous area which involves Torkamanchai, Bostan Abad and Basmmaj towns it finally links to the existing rail station in Tabriz. This line reduces the present rail route of Mianeh-Maragheh-Tabriz around 100 km. Technical specifications of this axis are as follow:

Technical specifications of the project

Track Type		Single Track – Diesel Traction
Length of the main route (Km)		205
Axle load (Tons)		25
Minimum longitudinal Curve Radius (m)		500
Maximum longitudinal gradient (mm/m)		15 (mm/m)
Maximum gradient at stations (mm/m)		2/5 (mm/m)
Signaling and Telecommunications		CTC - Interlocking
Length of technical structure (Km.)	Bridge	4/7
	Tunnel	7
Designed Speed (km/h)	Passenger	160
	Freight	120

4. **Rationale and objectives:** The present Mianeh-Tabriz railway line with total length of 297 Km not only is located on the transit route to/from Turkey and consequently on the transit route to Central and Eastern Europe countries, but also is located in populous regions of Iran and therefore there are high transport demands for this route. However, due to low geometric specifications and high length of the route in comparison to the present road route, it enjoys of low rail transport attractions. Therefore, in order to reduce the present Mianeh-Tabriz rail route by 100 km and to reduce travel time of passenger and freight trains up to 4 and 5 hours, the crosscut double track axis of Mianeh-Bostan Abad-Tabriz has been designed and is under construction.

On the basis of feasibility studies, traffic rate of this railway line has been estimated to amount to 2/3 million ton Freight Transportation and 2/2 million passengers at the first year of operation (2010). Also, 7/2 million tons Freight Transportation and 8/9 million passengers is predicted for the twentieth year of operation (2030).

5. **Scope of work:**

5-1 internal scope: freight and passenger exchange between country provinces and East Azerbaijan province and border regions with Turkey.

5-2 Regional scope: freight exchanges of Turkey to/from other neighbour countries of Iran and international waters of Oman Sea and Indian Ocean and Persian Gulf States.

	5-3 International scope: Transit exchange of countries located at the southern branch of Trans Asian Railway Corridor to/from Turkey, Eastern and Central Europe.
6.	**Expected impacts and benefits:** • Reducing travel time of passenger trains (to/from center of East-Azerbaijan Province (Tabriz city) and border regions with Turkey) up to 4 hours. • Reducing travel time of freight trains (internal and transit) to Turkey and autonomous Republic of Nakhjavan, up to 5 hours. • Increasing capacity of Tehran-Razi railway line and increasing attraction of southern branch of TAR. • Improving transport in the region and increasing safety of passengers. • Saving fuel consumption and decreasing environmental pollutions. • Accelerating economic, social and tourism development of East Azerbaijan and border regions with Turkey.
7.	**Estimated cost:** US$ 688,000 (Based on 2008 prices and assuming currency exchange rate of 9,500 Rials against one US$).
8.	**Project duration:** This project would be operated in 2010.
9.	**Proposed project financing arrangements:** through government budget fund.
10.	**Implementation arrangements:** By employing Iranian contractors and consultants.
11.	**Project status:** This project is under construction and would be operated in 2010.
12.	**Critical success factors:** • Timely supply of required budget allocation. • Employing experienced contractors who are familiar with the region. • Setting up strong project management team and proper organizing of construction force.
13.	**Other project-related information:** The government of Islamic Republic of Iran is doing studies of double tracking Tehran-Mianeh rail line as well as electrifying Tehran-Tabriz axis and is following their accomplishment, because these projects certainly will lead to increase in attraction of crossing Southern Corridor branch of TAR in Iran. Moreover, interactions and negotiations are made with Turkey for removing the problem of missing link bypassing Van Lake and its capacity and the possibility for constructing rail line bypassing Van Lake in Turkey.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir

1. **Project name:** Double-tracking of Tehran - Mianeh rail line.

2. **Location:** Tehran - Mianeh rail line is located in the North and North-West of Iran. It is one of the main rail lines of the country, and is part of the Southern Corridor of the Trans Asian railway. Starting from Tehran province, this line after passing through Qazvin and Zanjan provinces, reaches the railway station of Mianeh in the Eastern Azerbaijan province in Iran.

3. **Brief outline of the project:** The total length of Tehran - Mianeh rail line is 440 km from Tehran railway station. The route after passing through the main stations of Hashtgerd, Abyek, Kohandezh, Ziaran, Qazvin, Siah Cheshmeh, Takestan, Siah Bagh, Khorram Darreh, Zarrin Dezh, Pir zagheh, Soltanieh, Zanjan, Khorram Pey, Azar Pey, Sarcham, Pol-e-Dokhtar, Rejein reaches Mianeh railway station. The second line of this route mainly will remain along the present track, which needs some renovation.

Technical specifications of the project

Track type		**Double diesel track, with possibility of electrification in the future**
length of the route (km)		440
Route classification (per cent)	Plain	78
	Rising hump	16
	Mountain	6
	Hard mountainous areas	-
Land usage (km)	Arid land	80
	Agricultural lands	240
	Gardens, urban and industrial lands	120
Design speed (km/h)	Passenger	200
	Freight	120
Max. gradient of the project line (‰)		15
Min. curve radius (m)		1000
Axle-load (ton)		25
Length of technical structures(Km)	Tunnels	3.2
	Bridges	1.6

4. **Rationale and objectives:** The main objectives of double-tracking of Tehran - Mianeh route are as follows:

a. High growth of passenger and freight demand in the region;
b. Increasing capacity of the axis by construction of new rail lines in the region (Qazvin-Rasht–Anzali/Astara, Mianeh-Ardebil, Maragheh-Orumiyeh, Mianeh-Bostan Abad–Tabriz axes).

	Based on the feasible studies, the traffic volume at the first year of operation (2013) is estimated around 9 million tons of freight and 2 million passengers that during 20 years will reach up around 17 million tons of freight and 6 million passengers.
5.	**Scope of work:** With regard to the situation of this route in the country and its location on the Asian railways transit corridor, it covers a vast functional scope: **5-1 internal scope**: Commercial and passenger rail exchanges among the railways of the provinces in the country. **5-2 Regional scope:** Full rail exchanges of Azerbaijan and Turkey with other neighbor countries. **5-3 International scope**: Transit exchanges of the countries located on the Southern Corridor TAR as well as North-South corridor.
6.	**Expected impacts and benefits:** • Facilitating transportation in the region and promoting rail transport share. • Increasing transport safety, decreasing fuel consumption and environmental pollutions. • Avoiding long delays in transport by high traffic volume on the existing route and decreasing transport costs. • Removing potential bottlenecks on the existing route, in case of operation of the under construction projects in the region. • Accelerating socio-economic development procedure in Qazvin, Zanjan and Eastern Azerbaijan provinces.
7.	**Estimated cost:** US$ 632 million (Based on 2008 prices and assuming currency exchange rate of 9,500 Rials against one US$).
8.	**Project duration:** 4 years.
9.	**Proposed project financing arrangements:** Partnership of the private sector, and local/ foreign financial and credit institutions.
10.	**Implementation arrangements:** Initial designing studies, final justification and EPC documentation are being completed.
11.	**Project status:** No action has been taken yet.
12.	**Critical success factors:** • On time provision of required financial sources; • Employing experienced contractors who are familiar with the region • Setting up a strong project management team and proper organization of construction force
13.	**Other project-related information:** With regard to the high traffic volume of the route, its electrification would be appropriately justifiable, for which the studies are under way.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Double-tracking of Tehran-Qom–Isfahan high-speed rail line.

2. **Location:** Tehran, Qom and Isfahan provinces are the most important and populated provinces in Iran, therefore facilitation of passenger transport on this route is necessary. This route begins from Tehran and after passing from Qom, links to Isfahan province.

3. **Brief outline of the project:** Beginning of the main rail route of Tehran–Qom–Isfahan has been determined from Tehran railway station. Total length of the route is 412 km. This line reaches Isfahan after passing through Qom, Delijan, Meimeh and Shahin Shahr.

Technical specifications of the project

Track type		**High-speed double-track, 300 km/h**
length of the route (km)		412
Route classification (per cent)	Plain	81
	Rising hump	17
	Mountain	2
	Hard mountainous area	-
Land usage (km)	Arid land	132 km
	Agricultural land	160 km
	Gardens, urban and industrial lands	120 km
Design speed		300 km/h
Max. gradient of the project line		18.5 ‰
Min. curve radius		4400 m
Length of technical structures (km)	Tunnels	0.3
	Bridges	1.5
Number of stations		10
Min. station length		2400 m

4. **Rationale and objectives:** Tehran–Isfahan route is one of the most high traffic lines that several lines are connected to it, and currently has a suitable traffic in terms of passenger transport. However, it is estimated to have a significant growth in traffic and in order to avoid any traffic bottlenecks in upcoming years, studies were made for the estimation of traffic demand of the route as well as finding the best approach to increase the transport capacity and responding to the required speed and welfare of the passengers. Following these studies, construction of a double-track high-speed rail line of Tehran-Qom-Isfahan was recommended for this route. This railway is considered as the first high-speed rail line in Iran.

	Based on the feasible studies, the traffic volume has been calculated according to the various scenarios. This route would carry around 1.7 million passengers at the first year of operation (2013) and it will reach about 5 million passengers per year after 20 years.
5.	**Scope of work:** With regard to the situation of this route, it has a local scope of function, undertaking the rail passenger handling of Tehran-Isfahan, as well as the passengers between the North and the South of Iran.
6.	**Expected impacts and benefits:** • Facilitating the rail traffic and transportation, particularly from Tehran towards the center and the South of Iran; • Removing the potential transportation bottlenecks of Tehran and Isfahan; • Avoiding long delays in the passenger handling due to high traffic volume on this route; • Accelerating the socio-economic development procedure of Qom and Isfahan provinces; • Localizing the construction technology of the high-speed railway in Iran, and the possibility to develop the high-speed rail lines using the local capability and knowledge.
7.	**Estimated cost:** Basic cost of 2008 has been estimated around 1,500 billion Rials. (US$ 0.15 billion)
8.	**Project duration:** 5 years.
9.	**Proposed project financing arrangements:** Governmental civil works budget.
10.	**Implementation arrangements:** Sub-structuring in two sections between Qom and Isfahan is under way. Studies on super-structuring and determination of the type of high-speed system, EPC documentation for super-structuring of the route is on the verge of completion.
11.	**Project status:** The project is on principally approved.
12.	**Critical success factors:** • On time provision of the required financial sources. • Employing experienced contractors who are familiar with the region. • Setting up a strong project management team and proper organization of construction force. • Using the optimum system for super-structuring of the high-speed fleet.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1. **Project name:** Rail project in west of Iran (Arak-Kermanshah and the branch of Hamedan-Malayer).

2. **Location:** This route is located in west of Iran and in 3 Central, Hamedan and Kermanshah provinces. In addition to connection of Iran rail network to Iraq through border of Shalamcheh (extreme south-west of Iran), this project connects the rail network of Iran and Iraqthrough the Khosravi border.

Starting from Arak in the Central province, this route passes from Sangan, Shazand, Malayer, Jokar, Sahneh and Kermanshah and then extends towards Ghasre-e-Shirin and Khosravi border. Of course, the line branched from Malayer towards Hamedan creates the possibility of the rail connection with Sanandaj (center of Kordestan province).

3. **Brief outline of the project:** Total length of this route (west of Iran) is 641 km, including the railway project of Arak-Kermanshah-Khosravi as well as the branch of Hamedan-Jokar. The rail line of Arak-Kermanshah-Khosravi, with total length of 566 km, starts from Samangan station near Arak (first station on the rail route of Arak-Ahvaz),and while passing through Sangan, Shazand, Malayer, Jokar, Sahneh, Kermanshah and Ghasr-e-Shirin, it reaches Khosravi (official border between Iran and Iraq). This route connects to Syria through the territory of Iraq by passing through Khaneqein, Moswel and Ghameshli, and after passing through Dei Alzour, Ragheh and Aleppo, ends in Lattakia port at the Mediterranean Sea. Following table shows the technical specifications of the route.

Technical specifications

Description		**Samangan-Kermanshah**	**Kermanshah-Khosravi**	**Hamedan-Jokar**	**General information of the route**
Track type		Diesel single-track			
Length (km)		266	300	75	641
Max. Longitudinal gradient (per cent)		15	15	15	15
Min. curve radius (m)	Plain	1500	1500	1500	1500
	Rising hump	1000	1000	1000	1000
	Mountain	700	700	700	700
Max. designed speed (km/h)	Passenger	160	160	160	160
	Freight	120	120	120	120
Route topology (per cent)	Plain	53	23	40	42
	Mound	19	54	40	26
	Mountain	28	23	20	32
Length of technical structure (km)	Tunnels	1.5	10	0	11.5
	Special bridges	1.5	2	-	3.5
Signaling & Telecommunications		CTC – Interlocking			
Axle-load (ton)		25			

4. Rationale and objectives:

The main objectives for construction of Arak-Kermanshah-Khosravi rail line are as follows:

- Connecting Western provinces of Iran to the rail network.
- Establishing rail link between Iran and Iraq via Khosravi border, and consequently connection with the Holy places such as Karbala, Najaf and other pilgrimage centers in Iraq.
- Connecting the railway network of Iran to Lattakia port at the Mediterranean Sea via Iraq and Syria.
- Connecting the rail network of Iraq to the Asian railways corridors.

5. Scope of work:

5-1 internal scope: Railway commercial and passenger exchanges of the other provinces with the Western points in Iran.

5-2 Regional scope: Full railway exchanges of Iraq with Iran and the neighbor countries.

5-3 International scope: Rail exchanges of the countries located in TAR corridors with Iraq, Syria and the port of Lattakia at the Mediterranean Sea.

6. Expected impacts and benefits:

- Socio-economic-commercial and tourism development in the Western regions and borders of Iran through improvement of transportation in them.
- Increase in passenger and freight demand between both countries via establishment of a safe and fast transport system.
- Promoting passenger services to the pilgrims in Iran and Iraq.
- Facilitating commercial (import/export) exchanges between Iran and Iraq.
- Enhancing attractiveness of using rail system in the transit exchanges to/from Iraq, Syria and Lattakia port through reduction of transport costs and promotion of movement safety.
- Promoting transport safety between both countries and reducing negative impacts on the environment
- Improving socio-political relations of Iran and Iraq, developing international relations and increasing regional security.

7. Estimated cost: US$ 820 million (Based on 2008 prices and assuming currency exchange rate of 9500 Rials against one US$).

8. Project duration: 4 years.

9. Proposed project financing arrangements: In Arak-Kermanshah section using Governmental credits and budget and in Kermanshah-Khosravi by attracting foreign or internal investors as much as possible.

10. Implementation arrangements: employing internal contractors and consultants.

11. Project status: This project is under construction and Arak–Kermanshah section will be operated in 2010. Kermanshah–Khosravi will be operated in 2012 and Hamadan–Jokar section will be operated in 2010.

12. Critical success factors:

	• On time provision of the needed financial sources. • Employing experienced contractors who are familiar with the region. • Setting up a strong project management team and proper organization of construction force.
13.	**Other project-related information:** rest of the route in Iraq is worn out and has metric gauge, which it is necessary to be constructed as normal line by Iraq and negotiations with Iraqi part are on the way.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir

1. **Project name:** Ghazvin–Rasht–Anzali–Astara railway line**.**

2. **Location:** This project is located in North part of the I.R. ran and in Gilan province. This axis is located in the main route of North-South Corridor of TAR (Trans Asian Railway) in Iran and is connected to the railway network of Republic of Azerbaijan via border of Astara. Through connection to the Bandar Anzali Port, it will be connected to Caspian Sea and Russia, Azerbaijan and Caucasus region ports.

3. **Brief outline of the project:** The length of route in Ghazvin–Rasht–Anzali section is 205 Km branched off from Siah Cheshmeh railway station located in 15 km of west-south of Ghazvin and after passing from Kouhin defile and cities of Loshan, Manjil, Roodbar, Emamzadeh Hashem, Rasht (center of Gilan province) it ends to Anzali port.

Rasht–Astara axis with the length of about 165 km is separated from Rasht station and while passing through Rezvanshahr and Hashtpar cities it reaches Astara port. The main route of this rail mainly passes through green and cultivated plains of Gilan province, which is limited the distance between Caspian Sea and Alborz Mountains.

The area passing the distance between Kouhin-Loushan (in Ghazvin-Rasht axis) is highly mountainous and so this line should pass from a valley which the present asphalt road and under construction Ghazvin-Imamzadeh highway crosses from it. Therefore, due to being a unique corridor and unavoidable height difference between Kouhin to Loushan, the gradient has been considered maximum 30‰ in some parts of the route for making the project economical. In order to compensating the capacity, about 40.6 km of the route has been designed in double track. However, the area passing Rasht-Astara axis is located mainly in green and cultivated plains of Gilan Province, which are located at the distance between mountain and Caspian Sea.

With regards to the difference between rail gauges between Iran and Azerbaijan and problems which this matter will cause for exchanging of cargoes in Astara border, according to concluded agreement with Azerbaijan party, it is due that a rail line with standard gauge to be constructed from Astara wharf in Iran up to exchange station in Republic of Azerbaijan and a broad gauge line to be constructed from exchange station up to Astara wharf too. This would require construction of 6 km rail line in the territory of Azerbaijan Republic and 3 km rail line in Iran territory, moreover, construction of a bridge with the length of 80 meters over border river of Astara Chai as well as bogie exchange installations in both parties. In order to facilitate the exchanges of cargoes in border it could be acted for construction of the bridge and above mentioned lines (the distance between exchange station in Azerbaijan Republic up to Astara wharf in I.R. Iran).The following table shows the technical specifications of the axis:

Technical specification of the project

Technical specifications	Ghazvin – Rasht – Anzali port	Rasht - Astara
Length of the main route (Km)	205	165
Length of the double track section of the route (Km)	40.6	---
Bed width (m)	7 m in Single track and 11.7 m Double track	

Minimum Curve Radius (m)		1500 m In regions with high topographical features 500 m	1500 m
Maximum gradient at stations		2.5 (mm/m)	
Maximum gradient of the route	Single track section	15 (mm/m)	15 (mm/m)
	Double track section	30(mm/m)	
Axle load (Ton)		25	
Type of the rail		UIC 60	
Width of the line		Standard (1435 mm)	
Length of stations (m)	Single track section	1200	1200
	Double track section	1000	
Length of the largest tunnel (m)	Single track section	1550	-------
	Double track section	2075	
Total length of tunnels (Km)		17.4	
Length of the largest bridge (m)	Single track section	650	Under study
	Double track section	200	
Max. height of the bridge (m)	Single track section	30	
	Double track section	52	
Sum of the length of single track and double track bridges (Km)		6.9	
Signaling and Telecommunications		Electronic Interlocking, CTC system and Fiber Optic communication cable along the route	
Design Speed (Km/h)	For passenger locomotives	160	
	For freight locomotives	120	
Traction Type		Diesel Electric with possibility of electrifying in future	
Route topology	Plain	50	93
	Hill	10	7
	Mountain	40	--

4. Rationale and objectives:

- Connecting Gilan province, Anzali port and border of Astara to the railway network of Iran

- Increasing transportation safety of Gilan province and tourism development in this province
- Establishing whole railway transit route in international transit corridor of north-south (crossing route from Astara border)

On the basis of the feasibility studies, traffic rate of Ghazvin-Rasht-Anzali) will be about 2.7 million ton Freight Transportation and 1 Million passengers at the first year of operation (2012) and traffic rate of Rasht – Astara rail axis will amount to about 2 million tons Freight Transportation and 157000 passengers at the first year of operation (2013).

5. Scope of work:

5-1 Internal scope: Railway exchanges of country provinces to/from Gilan province, Anzali port and Astara border.
5-2 Regional scope: Commercial exchanges of Azerbaijan with Iran and neighbours countries in east and west of Iran.
5-3 International scope: Transit exchanges in north-south corridor and countries located in southern corridor of Trans Asian railway with/from Russia, Caucuses region and Azerbaijan.

6. Expected impacts and benefits:

6-1- Advantages:

- Establishing straight railway route between Europe, Russia and Caucuses via the rail network of I.R.Iran to Persian Gulf
- Facilitating import and export activities between region countries by developing north-south transit corridor and increasing the level of exchanging (Significant reduction in travel time and cost)
- Developing transportation network for Gilan province and increasing social facilities
- Increasing transportation safety in Tehran-Gilan axis
- Saving fuel consumption in Tehran-Gilan axis

6-2 Effects:
Due to nature of the region geography of which Ghazvin-Rasht-Anzali/ Astara axis passes, the environmental impacts are considerable, necessary actions will be done in order to reduce the destructive environmental effects during the construction and operation period on the basis of studies which have been made.

7. Estimated cost:

- Ghazvin-Rasht-Anzali Axis: US$ 537 million (Based on 2008 prices and assuming currency exchange RATE of 9500 Rial against one US$).
- Rasht-Astara Axis: US$ 432 million (Based on 2008 prices and assuming currency exchange value of 9,500 Rials against one US$).

8. Project duration: 4 years.

9. Proposed project financing arrangements: Ghazvin-Rasht-Anzali section by using government civil works budget.

10.	**Implementation arrangements:** employing internal contractors and consultants.
11.	**Project status:** Ghazvin-Rasht-Anzali is currently under construction and would be operated by (2011). Studies of comprehensive designing of Rasht-Astara railway line is progressing and tender documents of the axis would be ready by early (2009).
12.	**Critical success factors:** • Timely supply of required budget allocation. • Employing experienced contractors who are familiar with the region. • Setting up strong project management team and proper organizing of construction force.
13.	**Other project-related information:** For implementing Rasht–Astara project attempts are made for trilateral cooperation of Iran, Azerbaijan and Russia for participating in construction of this axis.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1.	**Project name:** Electrifying Tehran-Mashad Two Track railway.
2.	**Location:** The present line starts from Tehran Station and after passing from 48 stations arrives in Mashhad station. This route is in double track with the length of 926 km and its share in railway passenger movement of the country is 50per cent. Continuation of this route links to the railways of the Common Wealth Countries via Sarakhs Station and we can say this line is part of Iron Silk Road.
3.	**Brief outline of the project:** Regarding the share of this axis in transportation of passenger in the country and carriage of transit freights from East Asia to Europe via Turkey, it will have a significant role in the fuel economy and reduction of death toll originated from road accidents.
4.	**Rationale and objectives:** Regarding the fact that 80per cent of the transportation of this axis is for passenger carriage, it is expected that, with electrifying of this axis, 13 million passengers will be carried at the first year of operation and 30 million passengers in the 20 year- horizon of this plan.
5.	**Scope of work:** This plan includes electrifying of Tehran-Mashhad double track and newly constructed double track of Tehran-Garmsar along with the supplying 70 electrical locomotives which are required for this plan. The maximum speed of passenger trains will amount to 200 km/h in the formation of locomotive wagon and with EMU equipped to tilting system will amount to 250 km/h.
6.	**Expected impacts and benefits:** **Benefits:** i. Increasing East West transit capacity. ii. economy in fuel consumption. iii. Transfer of technology. iv. Reduction of road toll. v. Improving tourism in the region.
7.	**Estimated cost:** US$ 1 billion.
8.	**Project duration:** 30 months after concluding of the contract.
9.	**Proposed project financing arrangements:** 85 per cent in the form of foreign finance and the rest through the budget of government's civil plans.
10.	**Implementation arrangements:** This project will be carried out as EPC by the railways of the Islamic Republic of Iran.
11.	**Project status:** The RFP documents of tender have been delivered to selected bidders and reception of suggestions and announcing of the winner is expected.
12.	**Critical success factors:** 1) financial supply of the plan, 2) Government supports, 3) relying on the strength of the internal specialists of the country.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir

1.	**Project name:** Double Tracking and Electrifying Tehran-Tabriz railway.
2.	**Location:** The length of this project is 730 km, which approximately 140 km of it is in double track and is regarded as part of east-west junction.
3.	**Brief outline of the project:** Regarding the share of this axis in transportation of transit cargoes from East Asia to Europe via Turkey, it will have a significant role in the fuel economy and reduction of death toll originated from road accidents.
4.	**Rationale and objectives:** make preparation for electrifying some part of the linkage of East Asia to Europe and reviewing electrical industry of railway in Iran after 30 years.
5.	**Scope of work:** This plan includes construction of power stations and overhead network alongside the route and supplying the plan locomotives together with completing double tracking of the route.
6.	**Expected impacts and benefits:** **Benefits:** i. Increasing transport capacity of the route. ii. strengthening East-West Corridor. iii. Economy in fuel. iv. Job production.
7.	**Estimated cost:** € 1.3 billion. (US$ 1.7 billion)
8.	**Project duration:** 4 years.
9.	**Proposed project financing arrangements:** via foreign investment.
10.	**Implementation arrangements:** In the form ob BOT and transfer to the railways of the Islamic Republic of Iran.
11.	**Project status:** Performing techno-economic justification studies by investor companies.
12.	**Critical success factors:** 1) availability of the capital , 2) Government supports, 3) correct leading of the project .
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir

1.	**Project name:** High Speed railway of Tehran-Qom.
2.	**Location:** This line will be constructed in parallel with Tehran-Qom Highway and with the approximate length of 120 km for the speed of 350 km/h. In addition to solving the problem of the movement of passengers to the Imam Khomeini International Airport and Parand Industrial town, it will have a vital role in prevention of road accidents in this route.
3.	**Brief outline of the project:** Considering the fact this route has the highest statistics of road traveling in the country, this line may have a significant role in movement of pilgrimage and tourist passengers to the cities of Qom and Esfahan in the region, and prominent role in fuel economy and reduction of death toll originated from road accidents.
4.	**Rationale and objectives:** With attention to the construction of this route at the present highway area and no need to land occupation, this plan seems fully justified and paying attention to the statistics of road travailing, this route will have the potential of carrying 30,000 passengers daily.
5.	**Scope of work:** This plan includes studying and executing construction of Tehran-Qom express train alongside Tehran-Qom highway together with the supplying of required rolling stock.
6.	**Expected impacts and benefits:** **Benefits:** i. Improving tourism in the region. ii. Economy in fuel consumption. iii. Technology transfer. iv. reduction of road death toll.
7.	**Estimated cost:** € 1 billion. (US$ 1.3 billion)
8.	**Project duration:** 36 months after the conclusion of the contract.
9.	**Proposed project financing arrangements:** via foreign investment.
10.	**Implementation arrangements:** In the form of BOT and transfer to the railways of the Islamic Republic of Iran.
11.	**Project status:** Negotiations with companies are progressing for making zero phase studies.
12.	**Critical success factors:** 1) financial supplying of the plan, 2)Government supports, 3) relying on the potential of country's inter specialists.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir

1.	**Project name:** Double Tracking and Electrifying Tehran-Bandar Abbas railway.
2.	**Location:** The length of this project is 1438 km, which approximately 400 km of it is in double track and operation of double tracking the rest of Bafq-Bandar Abbas route is under implementation.
3.	**Brief outline of the project:** Having the highest share of freight transport in railway, this axis is part of North-South Corridor for linking Caspian Sea to Persian Gulf, which it's electrifying, will cause the increase in capacity of this route and will pave the way for multimodal and container transportation. Moreover, this route can be used for transportation of freight cargo especially containers from Persian Gulf to Europe via Turkey.
4.	**Rationale and objectives:** Regarding the fact that 80per cent of rail transportation of this route is for freight, its double tracking as well as electrifying can lead to the carriage of 100 million tons freight on this route annually.
5.	**Scope of work:** This plan includes construction of power stations and overhead network alongside the route and supplying the plan locomotives together with completing double tracking of the route.
6.	**Expected impacts and benefits:** **Benefits:** i. Increasing transport capacity on the route. ii. strengthening North-South Corridor. iii. Economy in fuel. iv. Job production.
7.	**Estimated cost:** € 2.2 billion. (US$ 2.9 billion)
8.	**Project duration:** 4 years.
9.	**Proposed project financing arrangements:** via foreign investment.
10.	**Implementation arrangements:** In the form ob BOT and transfer to the railways of the Islamic Republic of Iran.
11.	**Project status:** Performing techno-economic justification studies by investor companies.
12.	**Critical success factors:** 1) availability of the capital, 2)Government supports, 3) correct leading of the project.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir

1.	**Project name:** Electrifying Amir Abad Port-Garmsar railway.
2.	**Location:** The length of this project is 320 km and in single track.
3.	**Brief outline of the project:** This route is considered a line as part of North-South Corridor for connecting Caspian Sea to Persian Gulf, which electrifying of this axis will cause the increase of the capacity of this route and will prepare the ground for multimodal transportation.
4.	**Rationale and objectives:** Noting that the route is mountainous, electrifying of it may double its transportation capacity and as a result it will be a suitable solution for strengthening North-South Corridor junction.
5.	**Scope of work:** This plan includes construction of power stations and overhead network alongside the route and supplying the plan locomotives.
6.	**Expected impacts and benefits:** **Benefits:** i. Increasing transport capacity of the route. ii. strengthening North-South Corridor. iii. Economy in fuel. iv. Job production.
7.	**Estimated cost:** € 93 million. (US$ 122 million)
8.	**Project duration:** 2 years.
9.	**Proposed project financing arrangements:** via foreign investment.
10.	**Implementation arrangements:** In the form ob BOT and transfer to the railways of the Islamic Republic of Iran.
11.	**Project status:** feasible studies are under way.
12.	**Critical success factors:** 1) availability of the capital , 2)Government supports, 3) correct leading of the project.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

1.	**Project name:** Electrifying of Tabriz -Azarshahr railway.
2.	**Location:** This project with the length of 46 km and in single track starts from Tabriz station and after crossing Abbasi and Zareie stations reaches to Tarbiat Moalem University. This route is part of East-West linkage.
3.	**Brief outline of the project:** Electrifying of this route and its connection to the present electric railway of Tabriz-Jolfa not only will remove the problems of the students of Tarbiat Moalem University but also it will lead to the development and improvement of Salimi industrial town.
4.	**Rationale and objectives:** Preparing part of the linkage of East Asia railway to Europe in electric form and reviewing electrical industry of railway in Iran after 30 years.
5.	**Scope of work:** constructing overhead network alongside the route and using traction station of Tabriz station and doing rail transport by using the present electric locomotives in the area.
6.	**Expected impacts and benefits:** **Benefits:** i. Increasing East-West transit capacity. ii. Economy in fuel consumption. iii. Transfer of technology. iv. Removing transport problems of the students. v. Development of industry in Salimi industrial town. vi. Job production.
7.	**Estimated cost:** € 9 million. (US$ 11.8 million)
8.	**Project duration:** 6 month from the time of financing.
9.	**Proposed project financing arrangements:** from governments' civil projects.
10.	**Implementation arrangements:** In the form ob EPC and will be done by the railways of the Islamic Republic of Iran.
11.	**Project status:** The contract has been concluded and it is waiting for financing.
12.	**Critical success factors:** 1) financing, 2)Government supports.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Construction and Development of Transportation Infrastructure Company (CDTIC), Ministry of Road and Transportation Arazi Abbas Abad – Argentine SQ., Tel: 88776987-8, Fax: 82244034-88797003, E-mail: cdtic2@yahoo.com , Web site: www.CDTIC.ir.

F. Kazakhstan

1.	**Project name:** Electrification of Mointy-Aktogay rail Line (Concession).
2.	**Location:** Mointy-Aktogay (Length 521 km).
3.	**Brief outline of the project:** Not available.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Forecast throughput volume -25 million tons.
7.	**Estimated cost:** KZT 31 billion (US$ 258 million).
8.	**Project duration:** Project realization period from 2010-2011.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Feasibility study to be completed in October 2008.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Mointy-Aktogay is part of the Northern corridor of the Trans-Asian Railway route.
14.	**Contact address:** Not available.

1.	**Project name:** Electrification of Aktogay-Dostyk Rail Line (Concession).
2.	**Location:** Aktogay-Dostyk (Length 312 km).
3.	**Brief outline of the project:** Not available.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Forecast throughput volume -25 million tons.
7.	**Estimated cost:** KZT 17 billion (US$ 142 million).
8.	**Project duration:** Estimated realization period – 2010-2012.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Feasibility study to be completed in October 2008.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Aktoday – Dostyk is part of the Northern and Central corridors of the Trans-Asian Rail Route and the TRACECA transport corridor.
14.	**Contact address:** Not available.

1.	**Project name:** YeraLiyevo-Kuryk Rail Line Construction (Concession).
2.	**Location:** YeraLiyevo-Kuryk (Length 14.4 km).
3.	**Brief outline of the project:** A concession agreement was signed on 14 December 2007 with TOO Astana-AREK. Duration of the concession – 22 years (to 2030).
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Annual throughput volume by 2015 – 5.5 million.
7.	**Estimated cost:** KZT 7.5 billion (US$ 63 million).
8.	**Project duration:** Estimated realization period from 2008-2011.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Feasibility study to be completed in October 2008.
11.	**Project status:** Construction launch – October 2008.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** The project objective is to create conditions for development of the onshore infrastructure for the Caspian territories of the Republic of Kazakhstan and to deploy transport infrastructure for the Kuryk port.
14.	**Contact address:** Not available.

1.	**Project name:** Khorgos-Zhetygen Rail Line Construction (Construction).
2.	**Location:** Khorgos-Zhetygen (Length 298 km).
3.	**Brief outline of the project:** A concession agreement was signed on 18 April 2008 with "ENRC Logistics Llp." Duration of the concession – 28 years (to 2036).
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Annual throughput volume – 15 million tons.
7.	**Estimated cost:** KZT 93 billion (US$ 775 million).
8.	**Project duration:** Estimated realization period – 2008-2012.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Feasibility study to be completed in October 2008.
11.	**Project status:** Construction launch in December 2008.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Khorgos – Zhetygeb is part of the TRACECA transport corridor.
14.	**Contact address:** Not available.

1.	**Project name:** Mangyshlak-Bautino Rail Line Construction (Construction).
2.	**Location:** Mangyshlak-Bautino (Length 135.1 km).
3.	**Brief outline of the project:** the project objective is to provide support services for offshore oil and gas production on the Caspian shelf.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Annual throughput volume by 2015 – 7.5 million tons.
7.	**Estimated cost:** KZT 22.7 billion (US$ 189 million).
8.	**Project duration:** Estimated realization period from 2009-2012.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

1.	**Project name:** Beyneau-Zhezkazgan Rail Line Construction.
2.	**Location:** Beyneau-Zhezkazgan (Length 988 km).
3.	**Brief outline of the project:** Beyneu-Saksaulskaya will be part of the TRACECA transport corridor.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Not available.
7.	**Estimated cost:** Oriented construction cost – KZT 274 billion (US$ 1.82 billion) 1) Beynau-Shalkar section: Length – 471 km Oriented construction cost – KZT 123.5 billion (US$ 820 million) 2) Saksaulskaya-Zhezkazgan section: Length – 517 km Oriented construction cost KZT 150.7 billion (US$ 1 billion)
8.	**Project duration:** Estimated realization period from 2009-2012.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

1.	**Project name:** Electrification of Makat-Kandyagash rail Line (Concession).
2.	**Location:** Makat-Kandyagash (Length 392 km).
3.	**Brief outline of the project:** Makat – Kandyagash is part of the TRACECA transport corridor.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Not available.
7.	**Estimated cost:** Project cost – KZT 35.7 billion (US$ 298 million).
8.	**Project duration:** Estimated realization period from 2008-2012.
9.	**Proposed project financing arrangements:** Forecast throughput volume – 20 million tons.
10.	**Implementation arrangements:** A concession agreement was signed on 14 December 2007 with "Nurzhol Energy Llp." (Almaty). Duration of the concession – 22 years (to 2030).
11.	**Project status:** Project launch – January 2009.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

1.	**Project name:** Electrification of Almaty-Aktogay Rail Line (Concession).
2.	**Location:** Almaty-Aktogay (Length 558 km).
3.	**Brief outline of the project:** Almaty-Aktogay is part of the Central corridor of the Trans-Asian Rail Route and the TRACECA transport corridor.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Not available.
7.	**Estimated cost:** Oriented cost – KZT 30 billion (US$ 250 million).
8.	**Project duration:** Estimated realization period from 2010 – 2012.
9.	**Proposed project financing arrangements:** Forecast throughput volume – 21 million tons.
10.	**Implementation arrangements:** Feasibility study to be completed in October 2008.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Almaty- Aktogay is part of the Central corridor of the Trans-Asian Rail Route and the TRACECA transport corridor.
14.	**Contact address:** Not available.

G. Kyrgyzstan

1.	**Project name:** China-Kyrgyzstan-Uzbekistan railway
2.	**Location:** The construction of the new railway line is planned on the territories of China and Kyrgyzstan. The route starts from the Chinese town of Kashgar, approaches the Kyrgyz-China state border and crosses it in the vicinity of the Torugart pass. It then crosses the Tuzbel pass, goes down along the Arpa river valley, crosses the Fergana range through a long tunnel, then runs south of Uzgen town before joining the existing railway network near the town of Karasu at the border between Kyrgyzstan and Uzbekistan.
3.	**Brief outline of the project:** Economic liberization in a number of countries and competition between rail, road and sea corridors linking Europe and the Far East has reduced transport costs and stimuled international trade. These developments are of considerable importance for the landlocked countries in Central Asia as they seek to expand their number of trading partners, improve their transport links to both Europe and Asia, and try to exploit transit opportunities between the two continents. Following independence in 1991, Kyrgyzstan recognised that it was well-placed geographically to share in this strategic development, but would need to improve its transport infrastructure to do so. In particular, the country inherited from the Soviet Union a number of dead-end railway lines with a total length of 425 km which is inadequate in meeting the country's requirements for international transport. The absence of direct transport links with international markets significantly hinders the development of Kyrgyzstan's international trade and increases the cost of the country's exports. Consequently, the backbone of the country's future rail network requires the construction of the Southern Corridor of the Eurasian transcontinental railroad, which will enter Kyrgyzstan from China and travel through Central Asia to ports on the Persian Gulf, i.e. Bandar Abbas and Chabahar in the Islamic Republic of Iran , as well as ports on the Mediterranean Sea, i.e. Iskenderun and Mersin in Turkey. A first step towards the creation of this corridor was taken in the 1990s with the construction of the 1,450-km line between Turpan and Kashi in western China.
4.	**Rationale and objectives:** In 2002 the Chinese Government allocated a technical grant worth RMB. 20 million to the Government of the Kyrgyz Republic for the preparation of a pre-feasibility study on the China-Kyrgyzstan-Uzbekistan railway corridor within the territory of Kyrgyzstan. The study conducted by the First Research and Development Institute of the Chinese Ministry of Railways confirmed the practicality of the construction of the corridor and concluded that it had certain advantages over existing transport corridors. It also confirmed the viability of the project, its technical and economic feasibility as well as environmental safety.
5.	**Scope of work:** Construction of a 268.4-km single-track Category III railway line with track gauge of 1,520 mm, an operating speed of 50 to 80 km-h and with maximum gradient of 20%. Traction will be diesel with allowance made for future electrification. Rugged topography of the surrounding area necessitates construction of a large number of complex engineering structures, including 48 tunnels with a total length of 48,9 km the longest of which will be the Fergana tunnel (14,1 km), the Torugart tunnel (3,4 km) and the Kurshab tunnel (1,7 km), and 95 bridges with a total length of 20,9 km the longest of which will be crossing the Kara-Darya river (214 m), the Kurshab river (157 m) and the Yassy river (157 m). Other structures include 5

	railway junctions, 4 intermediate depots, 1 section and 1 transhipment station.
6.	**Expected impacts and benefits:** Construction of the line will have a multiciply of benefits, not only for Kyrgyzstan but also for the neighbouring countries. In particular, it will: • Facilitate the development of Kyrgyzstan's international trade, promote the country's tourism and speed up its economic integration with other countries in the region. • Provide access to Chinese ports as well as ports on the Persian Gulf and the Mediterranean sea. • Create industrial and economic development in the Ferghana Valley which straddles Kyrgyzstan, Tajikistan and Uzbekistan. The region is rich in mineral resources which have not yet been exploited to their full potential because of a lack of proper transport infrastructure. • Allow easy access to/from China's Xinjian province which is developing into an important manufacturing hub in western China. • Shorten the route between East Asia, the Middle East and the south of Europe and reduce transit times.
7.	**Estimated cost:** The 2003 prefeasibility study estimated the construction cost at US$ 1.35 billion.
8.	**Project duration:** 60 months.
9.	**Proposed project financing arrangements:** The project is planned to be financed through foreign investment of both public and private origin. Strict distribution between local and foreign sources, including international institutions and donor-countries needs further elaboration.
10.	**Implementation arrangements:** The project will be implemented by a State enterprise called "Kyrgyz Temir Zholu" National Company, within an international consortium together with specialized railway construction companies.
11.	**Project status:** A full feasibility study is required.
12.	**Critical success factors:** • Availability of finance • Effective cooperation between investors and the Government of Kyrgyzstan • Creation of an efficient management team
13.	**Other project-related information:** Not available.
14.	**Contact address:** State Enterprize "Kyrgyz Temir Zholu" NC, Republic of Kyrgyzstan, Bishkek, Ul. Tolstogo 83. Abdykemirov Kanatbek, Head of Department of railroad design and construction, tel: +996 312 926086, fax: +996 312 926068, E-mail: ups-kjd@railway.aknet.kg**,** Kulov Ulan, Chief of engineering division, Tel: +996 312 926078, E-mail: orp-ulan@railway.aknet.kg

H. Mongolia

1.	**Project name:** construction of Naryn Sukhait – Shiveekhuren railway line (approx. 47.48 km).
2.	**Location:** Gobi region in Gurvantes sum (district) of Ömnögovi Province in the south of Mongolia at an a of 1,050-1,500 meters about sea level. The region is on the Mongolian-Chinese border.
3.	**Brief outline of the project:** the Naryn Sukhait mine holds substantial reserves of coal. Most of the production is destined for China via the Shiveekhuren (Mongolia) – Ceke (China) border point. In the first half of 2009, Inner Mongolia's Ceke Port imported nearly 1.53 million tonne of raw coal from Mongolia, a surge of 1.71 times year on year. Approximately 400 trucks haul the coal each day to the Ceke border station from where it is transported by rail to its final destinations in China. Ceke gives rail access to the major routes of the Trans-Asian Railway in China giving access to the port of Lianyungang in the east and Alanshankou at the border between China and Kazakhstan in the west from where markets in Central Asia and the Russian Federation can also be accessed. The project will connect this important industrial centre of Mongolia with the Trans-Asian Railway network of ESCAP as well as OSJD corridor No.2.
4.	**Rationale and objectives:** The proposed Gobi region project is part of the strategy espoused by the Government of Mongolia to boost overall economic development. Implementation of this policy entails connecting the region with major transport arteries, in particular main railway lines, to access world markets.
5.	**Scope of work:** The length of the project is 47.477 km. Track gauge will be 1,435 mm and axle-load will be 24 tons. The line will carry yearly volumes of 18 million tons of freight.
6.	**Expected impacts and benefits:** • The project will give landlocked Mongolia enhanced access to the world's markets. • It will also increase Mongolia's international trade and mineral-related revenues. • It will promote economic growth in the Gobi region of Mongolia, create employment opportunities for local population and assist the Government of Mongolia in its efforts to meet the United Nations Millennium Development Goals in the area of poverty reduction.
7.	**Estimated cost:** approximately US$ 61.2 million
8.	**Project duration:** 2 years
9.	**Proposed project financing arrangements:** the exact breakdown of investment between local sources and foreign companies still needs refinement. Partners in the project are: "Mongolyn Alt Corporation" / MAK / LLC will fund this project.
10.	**Implementation arrangements:** The project will be carried out by "Mongo alt"/

	MAK/ LLC in collaboration with foreign companies under overall supervision of MRTT and Mongolia Railway Authority (MRA).
11.	**Project status:** Full feasibility study has to be completed.
12.	**Critical success factors:** • Funding is made available for the project. • Efficient cooperation is established between implementing companies and the Government of Mongolia. • A capable project management team is established.
13.	**Other project-related information:** The project has yet to be approved by the Cabinet.
14.	**Contact address:** **i.** Mr. Ts. Enkhbayar, Head of the policy implementation and cooperation department, Mongolian Railway Authority. **ii.** Mrs. Kh. Togos, Foreign Relation Officer, Mongolian Railway Authority.

I. Republic of Korea

1.	**Project name:** Completion of Gyeongbu high-speed line.
2.	**Location:** Seoul – Busan corridor.
3.	**Brief outline of the project:** In 2004, the Government of the Republic of Korea inaugurated the 1st section of the Seoul - Busan high-speed line. Related work included construction of the 223.6-km high-speed infrastructure between Seoul and Daegu and electrification of the Daegu - Busan conventional line. The work was carried over the period 1992 - 2004 at a cost of US$ 9.4 billion. The 2nd phase of the project will see the construction of the second section, namely the 195-km section between Daegu and Busan, including 10 stations and 2 yards for rolling-stock maintenance.
4.	**Rationale and objectives:** The objective of the project is to alleviate current logistics difficulties in the Gyeongbu corridor (Seoul - Busan) and achieve balanced development.
5.	**Scope of work:** Construction of high-speed infrastructure, including ancillary facilities as follows: • Trackbed: Daegu-Busan, and Daejeon and Daegu downtown new lines. • Track: concrete track. • Buildings: 2 terminals, 8 intermediate stations, other transforming facilities. • Systems: 10 power stations, electric lines, signalling and telecommunications. • Rolling stock yard: constructing 2 sites.
6.	**Expected impacts and benefits:** • The passenger-only high-speed line will free capacity on the conventional line, thereby by transforming the he Gyeongbu corridor into a high-capacity freight corridor that will serve Korea's logistics industry. • The project will also reduce social and economic costs by mitigating road congestions and facilitating balanced national development. • The project will also promote national capabilities in research and development in high-speed train technology, including rolling-stock and infrastructure.
7.	**Estimated cost:** US$ 5.6 billion.
8.	**Project duration:** 2002-2014.
9.	**Proposed project financing arrangements:** Budgetary allocation from the Government of the Republic of Korea: 50% and funding from Korea Rail Network Authority: 50%.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** High-speed services opened in April 2004 over the first section of the line. As of December 2008, 49.2% of the second phase had been achieved.
12.	**Critical success factors:** reasonable budgeting and quality control through efficient

	project management.
13.	**Other project-related information:** none.
14.	**Contact address:** Mr. Kyungmin Hur, Deputy Director, Railroad Policy Division, Ministry of Land, Transportation and Maritime Affairs, Seoul, Republic of Korea, Fax: + 82 2 507 4491, E-mail : hkm98@korea.kr.

1.	**Project name:** Construction of Honam high-speed line (230.9 km).
2.	**Location:** Gangwoi-myeon, Cheongwon-gun, Chungcheongbuk-do-Seokhyeon-dong, Mokpo-si, Jeollanam-do along western coast of the Republic of Korea.
3.	**Brief outline of the project:** The project will see the construction of a high-speed line along the western coast of the Republic of Korea. The line will diverge from the Seoul - Busan high-speed line at Osong to serve Iksan, Gongju, Jeongeup, Gwangju (Songjeong-ri) and Mokpo.
4.	**Rationale and objectives:** The project will promote balanced national development and enhance growth engines in the South-western region of the Republic of Korea. It is also part of the government's policy to achieve an integrated national transport network.
5.	**Scope of work:** • Trackbed for double-track. • Track-laying. • Overhead catenary system. • Signalling and telecommunications. • Rolling-stock stabling and maintenance yard. • Procurement of trainsets.
6.	**Expected impacts and benefits:** The project will reduce the total distance between Seoul andf Mokpo to 320 km compared to 410 km for the existing route and fastest journey times will be halved to 1h45 minutes. The project will achieve balanced national development by facilitating investment in the Honam area and south-western region of the Republic of Korea. Economic impacts of the project have been estimated to be: • Economic activity worth US$ 15.4 billion. • Salary and income creation worth US$ 3.1 billion. • New employment in the order of 172,000 jobs.
7.	**Estimated cost:** US$ 8.4 billion, including US$ 0.5 billion for rolling-stock procurement.
8.	**Project duration:** 2006-2017.
9.	**Proposed project financing arrangements:** Budgetary allocation from the Government of the Republic of Korea: 50% and funding from Korea Rail Network Authority: 50%.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** • establishment of master plan: August 23, 2006. • Basic design: November 2006-November 2008.

	• Detail design for roadbed: November 2008-September 2009. • Commencement date of roadbed construction: September 2009.
12.	**Critical success factors:** filling the gaps among the regions to achieve balanced national development.
13.	**Other project-related information:** Detail design for Osong - Gwangju line section (230.9km).
14.	**Contact address:** Mr. Kyungmin Hur, Deputy Director, Railroad Policy Devision, Ministry of Land, Transportation and Maritime Affairs, Seoul, Republic of Korea, Fax: + 82 2 507 4491, E-mail : hkm98@korea.kr.

1.	**Project name:** Master Plan for the establishment of a National Railroad Network.
2.	**Location:** whole nation.
3.	**Brief outline of the project:** i. Establish a mid- and long-term plan to construct railroads through the promotion and implementation of 60 railroad construction projects over the period 2006 - 2015. ii. Establishing connected transport system with other transport modes. iii. Financing required resources.
4.	**Rationale and objectives:** To exploit the environmental and economic benefits of rail and transform railways into a major growth engine for the country's future economic development. With rail expected to meet a bigger share of national transport demand, much of the network needs upgrading to improve capacity and quality of service.
5.	**Scope of work:** iv. Construction of high-speed lines, including a dedicated high-speed line right into the centre of Seoul to relieve congestion on the Seoul - Siheung section currently shared by KTX and conventional trains. v. Double-tracking of several main lines to accommodate an increase in freight traffic. vi. Further expansion of rail capacity in metropolitan areas to help mitigate growing road congestion.
6.	**Expected impacts and benefits:** • Establishment of a faster, safer, more convenient and competitive railroad network of 3,816.5 km by 2015 with 64 per cent double-track (against 38 per cent in 2004) and 73 per cent electrified (against 40 per cent in 2004) • A 15.2 per cent market share for railroad (against 8.1 per cent in 2003) • US$ 66 billion worth of social and economic effects, i.e. 2.2 times the invested amount of US$ 30 billion, including saved hours in commuting time and the effect on regional development.
7.	**Estimated cost:** US$ 30 billion.
8.	**Project duration:** 2006-2015.
9.	**Proposed project financing arrangements:** Investment cost will break down over: • Budgetary allocation from the government of the Republic of Korea, US$ 23.6 billion. • Local funding, US$ 1.8 billion. • Private capital, US$ 2.3 billion. • Others, US$ 2.3 billion.
10.	**Implementation arrangements:** Not available.
11.	**Project status:**

	• December 2004: completion of research on developing the master plan for the 21st Century National Railroad Network. • June 2005: establishment of the task force to draw up the national railroad network Master Plan. • July 2005: legislation of the Railroad Construction Act passed. • December 2005: review by the Railroad Construction Review Committee. • March 2006: Finalization and notice of the Master Plan.
12.	**Critical success factors:** possibility of securing required financial resources within the scheduled period.
13.	**Other project-related information:** including all the high-speed, conventional and wide area railroads.
14.	**Contact address:** Mr. Kyungmin Hur, Deputy Director, Railroad Policy Devision, Ministry of Land, Transportation and Maritime Affairs, Seoul, Republic of Korea, Fax: + 82 2 507 4491, E-mail : hkm98@korea.kr.

J. Russia Federation

1.	**Project name:** Organization of the passenger-train traffic on the route Ussurisk-Vladivostok.
2.	**Location:** Ussurisk-Vladivostok.
3.	**Brief outline of the project:** The project investment is estimated to be over 38.8 billion roubles (US$ 1.16 billion) (for development of the transportation with speed up to 120 km/h) and 59.4 billion roubles (US$ 1.77 billion) if max-speed is up to 140 km/h. Total length of the line is 120 km. Taking into account the currency capacity of the route the government of the Primorsk. Region plans to realize the project after 2015.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Not available.
7.	**Estimated cost:** 38.8 billion roubles (US$ 1.16 billion) for max-speed up to 120 km/h and 59.4 billion roubles (US$ 1.77 billion) for max-speed up to 140 km per hour.
8.	**Project duration:** Region plans to realize the project after 2015.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

1.	**Project name:** Construction (second stage) of the railway bridge across the Amur river, near Khabarovsk.
2.	**Location:** Across the Amur river near Khabarovsk.
3.	**Brief outline of the project:** The first stage of the reconstruction was completed in 1999. New bridge superstructures are designed to carry a railway line and two lane highway. The implementation of the project also envisages the reconstruction of the Amur river tunnel. The works on the second stage of the construction started in 2005. Total investment is 6.6 billion roubles (US$ 197 million). The works will be finished in 2009.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Not available.
7.	**Estimated cost:** 6.6 billion roubles. (US$ 197 million).
8.	**Project duration:** The work will be finished in 2009.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

1.	**Project name:** Reconstruction of the Lagar-Aulskii, Kiparisovskii, Vladivostoksii and Oblucher shii tunnels.
2.	**Location:** Lagar-Aulskii, Kiparisovskii, Vladivostoksii and Oblucher shii tunnels.
3.	**Brief outline of the project:** Double track Lagar-Aulskii tunnel (total length 1,260 km) was constructed in 1914. The second tunnel (in parallel) was put into operation in 2006 (1,278 km). The first tunnel is currently under reconstruction. Total cost of the project is 2.7 billion roubles (US$ 80.7 million). The end of reconstruction is scheduled for 2009. Double track Kiparisovskii tunnel (945 m) was built in 1916. The second tunnel (in paralled) was out into operation in 2000 (946 m). The first tunnel is currently under reconstruction (total investment – 0.5 billion roubles (US$ 14.9 million)) . Double track Obluchen shii tunnel (311 m) was built in 1914. It will be closed after the new tunnel construction is completed. The implementation of the project will enhance capacity and security of transportation. Total investment into the project is 1.4 billion roubles (US$ 41.8 million). The second tunnel (in parallel) was put into operation in 2000 (946 m). The first tunnel is currently under construction (total investment – 0.5 billion roubles (US$ 14.9 million)). The reconstruction is planned to be completed by 2010.
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** Not available.
7.	**Estimated cost:** 1) Double track Lagar-Aulskii tunnel – 2.7 billion roubles (US$ 80.7 million). 2) Double track Kiparisovskii tunnel -0.5 billion roubles (US$ 14.9 million). 3) Double track Obluchen shii – 1.4 billion roubles (US$ 41.8 million).
8.	**Project duration:** Not available.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

1.	**Project name:** Second track Nakhodka – Khimilovskii construction.
2.	**Location:** Nakhodka – Khimilovskii.
3.	**Brief outline of the project:** Federal Program of Economic and Social Development of the Far East and Zabaikalsk regions by 2013, adopted by the Government, allocates 5 billion roubles (US$ 149 million) of investment for the period from 2010 to 2013 (incl. 0.5 billion roubles (US$ 14.9 million) from private investments in 2010 and 4.5 billion roubles (US$ 134 million)from federal budget in 2011-2013).
4.	**Rationale and objectives:** Not available.
5.	**Scope of work:** Not available.
6.	**Expected impacts and benefits:** 0.5 billion roubles (US$ 14.9 million) from private investments in 2010 and 4.5 billion roubles (US$ 134 million) from federal budget.
7.	**Estimated cost:** Not available.
8.	**Project duration:** Not available.
9.	**Proposed project financing arrangements:** Not available.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Not available.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Not available.

K. Republic of Tajikistan

1.	**Project name:** Regional railway improvement project Bekabad-Kanibadam section of Tajik Railway.
2.	**Location:** East-west Uzbekistan-Tajikistan-Uzbekistan.
3.	**Brief outline of the project:** Not available.
4.	**Rationale and objectives:** Enlarging, reconstruction and transfer to the electrical traction of the existing railway branch, saving of power resources, improving of the tracking capacity, joining the electrified sector Bekabad-Kanibadam with the existing electrified railway network of Central-Asian states.
5.	**Scope of work:** 110 km.
6.	**Expected impacts and benefits:** The railway line Bekabad – Kanibadam provides the linking and freight transportation of the northern area of Tajikistan during the period of 100 years. The electrification of the railway line will provide the modernization of the existing railway will improve the environmental situation and reduce the transport costs.
7.	**Estimated cost:** US$ 110 million.
8.	**Project duration:** 3 years.
9.	**Proposed project financing arrangements:** External resources (investment), Participation of private sector is encourage.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Regional.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** The length of the railway line is 110 km, the second lines are completed in the district of 70 km length. The ground facilities and the culture have been partially completed in the district Kairakkum – Kanibadam, 40 km length. In regard to the electrification, the mainting of the contract network support in the frame of some branches and railway stations is carried out. The feasibility study for the project is already made.
14.	**Contact address:** Not available.

1.	**Project name:** Construction of a new Dushanbe – Kyrgyzstan border railroad.
2.	**Location:** Tajikistan.
3.	**Brief outline of the project:** Providing with railroad communication Tajikistan and Kyrgyzstan with further access to PRC.
4.	**Rationale and objectives:** Opportunity to realize rail transportation between Afghanistan, Tajikistan and China.
5.	**Scope of work:** 296 km.
6.	**Expected impacts and benefits:** Reduction of transportation routes length between Afghanistan and China.
7.	**Estimated cost:** US$ 1 billion 610 million.
8.	**Project duration:** 7-8 years.
9.	**Proposed project financing arrangements:** External resources (investment), Participation of private sector is encourage.
10.	**Implementation arrangements**: Not available.
11.	**Project status:** Regional.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** **Follow up action required:** Development of feasibility study and attraction of investments. **Issues/Constraints:** Construction of 296 km of railroad and 16.1 km of tunnel.
14.	**Contact address:** Not available.

1.	**Project name:** Construction of a new Kolkhozabad – Nijniy Pyanj – Kunduz railroad.
2.	**Location:** South Tajikistan-Northern Afghanistan.
3.	**Brief outline of the project:** Providing with railroad communication Tajikistan and Afghanistan.
4.	**Rationale and objectives:** Coverage with rail transport North of Afghanistan with further access to seaports.
5.	**Scope of work:** 121 km.
6.	**Expected impacts and benefits:** Increasing of trade and transportation between Tajikistan, Afghanistan and other states. Opportunity of new workplace. Minimum detrimental effect to environment.
7.	**Estimated cost:** US$ 119 million.
8.	**Project duration:** 3 years.
9.	**Proposed project financing arrangements:** External resources (investment), Participation of private sector is encourage.
10.	**Implementation arrangements:** Not available.
11.	**Project status:** Regional.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** **Follow up action required:** Development of feasibility study and attraction of investments. **Issues/Constraints:** Construction of 121 km of railroad and boundary custom terminal in Nijniy Pyanj.
14.	**Contact address:** Not available.

L. Thailand

1.	**Project name:** Improvement of line section between Aranyaprathet and Klong Luk (6 km).
2.	**Location:** Begins at Aranyaprathet railway station in Aranyaprathet district in Sa Kaeo province and ends at Klong Luk, the border point between Thailand and Cambodia.
3.	**Brief outline of the project:** The section is one of the missing links in the Trans-Asian Railway in the ASEAN subregion and is part of the project to reconnect the railways of Cambodia and Thailand which also includes the restoration of the 48-km section between Poipet and Sisophon on the Cambodian side of the border. The existing line in Thailand territory is 6 km. Rail services between the two countries were discontinued over 30 years ago and in its present condition the line section is unfit for any kind of rail operation.
4.	**Rationale and objectives:** The project is part of the realization of the Singapore - Kunming Rail Link project. The restoration of cross-border rail services will help bilateral trade between Thailand and Cambodia, as well as trade within ASEAN member countries, in particular Cambodia, Malaysia, Thailand and Viet Nam.
5.	**Scope of work:** Restore the existing rail infrastructure between Aranyaprathet and the border with Cambodia, including earthwork, main line, sidings and bridge. Line section will be restored to a design speed of 120 km per hour for passenger trains and 80 km per hour for freight trains. Axle-load will be 20 tons.
6.	**Expected impacts and benefits:** **<u>Benefit</u>** i. Minimized cost, time and pollution ii. Increased employment and development of the related industries to trains. iii. Increased international trades, developed economics and industries in the region. iv. Promotion of tourism by train.
7.	**Estimated cost:** US$ 7 million (about 140 million baht at estimated exchange rate 40 bath per US$).
8.	**Project duration:** 10 months.
9.	**Proposed project financing arrangements:** Funding support will be allocated by Thai government.
10.	**Implementation arrangements:** The project will be carried out by State railway of Thailand (SRT).
11.	**Project status:** SRT proposed support budget from Thai government in the next budget year 2010. A consideration process to pass a budget bill will be finalized at the beginning of this September 2009.

12.	**Critical success factors:** i Thai and Cambodian policy. ii Thai and Cambodian economy.
13.	**Other project-related information:** Not available.
14.	**Contact address:** Mr. Pinyo Chanmaha Director, Project Planning and Development Center. Special Project and Construction Department, State Railway of Thailand. Krungkasem Road, Rong Muang, Pathumwan District, Bangkok 10330, Thailand, Tel. 02-220-4748 Mobile Phone: 081-707-4986 Fax. 02-220-4752 E-mail : pinyo_chanmaha@yahoo.com or pinyo_chanmaha@hotmail.com.

1. **Project name:** Construction of the Thai-Myanmar railway link (Nam Tok-Three Pagodas Pass).

2. **Location:** The line begins at Nam Tok Station in Sai Yok district, Kanchanaburi province, then runs across Sangkhla Buri district on a northwesterly bearing to the border checkpoint of Three Pagodas Pass, the Thai-Myanmar border, in Ban Pra Jadee Sam-ong, Tambon Nong Lu, Sangkhla Buri district, Kanchanaburi Province, with a total length of 153 km.

3. **Brief outline of the project:** This project is a part of the Thai-Myanmar railway linkage. The Cooperation of the Korea International Cooperation Agency (KOICA) in carrying out feasibility study of Thai-Myanmar railway missing-link under a project of Singapore-Kunming-Railway Link (SKRL). The line begins at Nam Tok station and ends at Three Pagodas Pass with 153 km in Thailand territory and 110 km in Myanmar territory begins at Three Pagodas Pass and ends at Thanbyuzayat. KOICA committed The Korea Transport Institute (KOTT) and Yooshin Engineering Corporation jointly to conduct a feasibility study which started in March, 2005 and completed in February, 2007.

4. **Rationale and objectives:** To promote a train network in transportation systems in a country, to decrease/ reduce a transportation cost and transportation resources in a country, to support a transportation of goods, to facilitate the industrial, economic and social development including international trades among Asian countries and to promote the cooperation in a region.

5. **Scope of work:** Construction of single-meter gauge track capable to carry trains operations with 20 tons axle load and maximum speed of 120 km/hr for passenger train and 80 km/hr for freight trains.

6. **Expected impacts and benefits:**

Benefits

i Minimized cost, time and pollution

ii Increased employment and development of the related industries to trains.

iii Increased international trades, developed economics and industries in the region.

iv Promotion of tourism by trains.

Impacts

The construction of this railway line is consisted of many viaducts and tunnels. The line passes mountainous area and conservation forests, therefore, it is unavoidable to affect trees and wild animals. However, the construction of the line includes mitigation measures to reduce these effects.

7. **Estimated cost:** US$ 0.613 billion

8. **Project duration:** 108 months (9 years)

9.	**Proposed project financing arrangements:** Fully funding support will be sought from international financing institutions. The exact distribution between local sources and international institutions and donor countries still need refinement.
10.	**Implementation arrangements:** The project will be carried out by State Railway of Thailand (SRT).
11.	**Project status:** Feasibility study is completed.
12.	**Critical success factors:** i Thai and Myanmar policy ii Thai and Myanmar economics
13.	**Other project-related information:** SRT has yet to complete a summarized of feasibility study to report to the Board of Commissioners and Ministry of Transport.
14.	**Contact address:** Mr.Pinyo Chanmaha Director, Project Planning and Development Center. Special Project and Construction Department, State Railway of Thailand. Krungkasem Road, Rong Muang, Pathumwan District, Bangkok 10330, Thailand, Tel. 02-220-4748 Mobile Phone: 081-707-4986 Fax. 02-220-4752 E-mail : pinyo_chanmaha@yahoo.com or pinyo_chanmaha@hotmail.com.

M. Turkey

1.	**Project Name:** Construction and upgrade of Kars – Tbilisi – Baku railway line.
2.	**Location:** The railway line that currently exists east of Kars goes to Dogukapi at the border with Armenia. However, the border is closed as a result of a political conflict. The new railway line will go north of Kars to the border with Georgia from where it will continue to the city of Akhalkalaki in Georgia. The existing railway line from Ahalkalaki to Baku in Azerbaijan is to be upgraded under the project.
3.	**Brief Outline of The Project:** The Project consists of two new sections, namely: (i) a 76-km line section from Kars to the border with Georgia in Turkish territory and (ii) a 25.6-km section from the border to Akhalkalaki in Georgian territory. Meanwhile, the 153-km section between Akhalkalaki and Marabda (23 km south of Tbilisi) section will be upgraded.
4.	**Rationale and Objectives:** Construction is planned to be completed in 2010. It is expected to transport 1.5 million passengers and 3 million tones of freight in 2010. When completed, the Kars – Tbilisi – Baku project will be an important corridor between Asia and Europe. Its importance will be further enhanced with the completion of the Marmaray project, i.e. the Bosphorus tunnel, and the North-South corridor ending in the Persian Gulf at the port of Bandar Abbas in the Islamic Republic of Iran. Furthermore, the countries concerned by the project will be linked via a train ferry across the Caspian Sea to Central Asia and China. All the above line sections are part of the Trans-Asian Railway routes in the countries that they transit.
5.	**Scope of Work:** **Turkey:** Substructure for double-track line will be constructed and a single-track conventional line will be laid down with electrification, signaling and communication systems. A tunnel of 1,287 m-length will be constructed within the project. **Georgia:** New railway line 29 km in length will be constructed between Georgia-Turkey border and Ahalkalaki. A tunnel of 1,073 m-length will be constructed as well. Operational speed on the line will be 120 kph. Minimum curve radius will be 1,000 m and maximum gradient will be 18 per cent.
6.	**Expected Impacts and Benefits:** **Benefits:** • The project will create an efficient high-capacity international rail connection between Turkey and the Caucasus region. • It will also link Turkey to Central Asia and China in the East and Europe in the west. • Currently, traffic between Turkey and the Islamic Republic of Iran and through the Islamic Republic of Iran to other destinations in South Asia is constrained by the capacity bottleneck at Lake Van where trains have to be shunted onto a ferry. The project will offer a land alternative. • Finally, the project will allow operationalization of the Trans-Asian Railway network between capital cities, ports and economic centres, e.g. Ankara, Baku, Tbilisi, Istanbul, Mediterranean ports in Turkey, ports of Poti and Batumi in Georgia and Bandar Abbas in the Islamic Republic of Iran.

7.	**Estimated Cost:** € 166 million (US$ 217.2 million).
8.	**Project Duration:** 2008-2010.
9.	**Proposed Project Financing Arrangements:** The part of project within Turkey is financed through internal budgetary resources.
10.	**Implementation Arrangements:** Not available.
11.	**Project Status:** The construction works for the line section in Turkey started in July 2008. Construction of the line section in Georgia started in September 2007.
12.	**Critical Success Factors:** Not available.
13.	**Other Project Related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Establishing signaling systems as well as infrastructure upgrade on the line sections Bogazkopru - Ulukisla - Yenice and Mersin - Adana - Toprakkale.
2.	**Location:** Kayseri-Mersin-Adana.
3.	**Brief Outline of the Project**: Currently, traffic management on both sections is through mechanical systems which limit capacity and hinders dense traffic flows. The existing traffic system lets trains follow each other with headway of station-by-station. Moreover, operation speed on the existing infrastructure is limited due to high gradient and tight curves. The development of rail traffic in recent times and the increasing use of ports on the Mediterranean Sea require capacity investment on the existing 78-km double-track and 349-km single track. This will be achieved through the installation of new signaling and infrastructure upgrade. The planned work will increase capacity by an estimated 30 per cent. 
4.	**Rationale and Objectives:** The aging signaling system and infrastructure constraints have prevented Turkish Railways to fully exploit the potential of rail transport on the passenger and freight markets. The project will enhance rail transport in the area and allow faster rail connections with the rest of Turkey. It will also open faster access to the Mediterranean ports of Mersin and Iskenderun for countries in the Caucasus region. The lines concerned by the project are part of the Euro-Asian Transport Links, European Agreement on Main International Railway Lines (AGC) and European Agreement on Important International Combined Transport Lines and Related Installations (AGTC) developed by the United Nations Economic Commission for Europe and the Intergovernmental Agreement on the Trans-Asian Railway Network developed by the United Nations Economic and Social Commission for Asia and the Pacific. They are also part of the future EUROMED network linking the European Union and 12 Mediterranean Partner Countries.
5.	**Scope of Work:** Open track infrastructure will be upgraded and station loops extended to allow the operation of longer trains. The Adana - Toprakkale line section will be double-tracked. Signaling and telecommunication systems along with necessary service buildings will be installed in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The new signaling system will shorten headway, allow higher operational speed and increase line capacity. • The new signaling system will also optimize staff utilization and reduce overall operating costs. • The project will enhance capacity and safety of domestic and international rail transport, particularly to/from Mediterranean countries via Ports in Mersin and Iskenderun. • The project will result in optimized traffic management that will allow a

	reduction of emission and noise levels.
7.	**Estimated Cost:** € 140 million (US$ 183.1 million).
8.	**Project Duration:** 2008-2011.
9.	**Proposed Project Financing Arrangements:** Investment cost will be through loan arrangement with the World Bank (85 per cent) and internal budgetary allocations from the Government of Turkey (15 per cent).
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of TCDD.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Electrification and signaling as well as infrastructure upgrade along the Irmak - Karabuk – Zonguldak line section (415 km).
2.	**Location:** Northern part of Turkey to Black Sea coast.
3.	**Brief Outline of the Project:** Currently, traffic management on the section is through mechanical systems which limit capacity and hinders dense traffic flows. The existing traffic system lets trains follow each other with headway of station-by-station. Moreover, operation speed on the existing infrastructure is limited due to high gradient and tight curves. The development of rail traffic in recent times and the haulage of heavy trains for the movement of coal and ores requires capacity investment on the section. This will be achieved through the installation of new signaling and infrastructure upgrade, including electrification for the use of greater traction power. The planned work will increase capacity by an estimated 30 per cent.
4.	**Rationale and Objectives:** The aging signaling system and infrastructure constraints have prevented Turkish Railways to fully exploit the potential of rail transport on the passenger and freight markets. The project will allow Turkish Railways to develop new high quality services and enhance its revenues.
5.	**Scope of Work:** The infrastructure will be upgraded and station loops extended to allow the operation of longer trains. New signaling and telecommunication will be installed along the entire line section with necessary service buildings in conformity with relevant EN and UIC Codes. The infrastructure will be electrified along with secondary lines at 25 kV and 50 Hz.
6.	**Expected Impacts and Benefits:** **Benefits:** • The signaling system will shorten headway, increase operational speed and line capacity, provide staff and time saving compared to existing system resulting in cost saving for actors in railways. • Improvement in domestic and international safer rail transport capacity along North-South direction, particularly for Black Sea countries via Ports in Zonguldak and in Filyos, which is to be constructed. • The use of electric traction will reduce gas emissions, noise and air pollutants. • It will also reduce operating costs relating to energy and rolling-stock maintenance. • Electrification system will provide time saving compared to diesel traction, such case will ensure cost saving and shorter journey times for actors in railways.
7.	**Estimated Cost:** € 160 million (US$ 209.3 million).
8.	**Project Duration:** 2009-2012.
9.	**Proposed Project Financing Arrangements:** 85 per cent loan financed by World Bank and 15 per cent from own resources of TCDD. The IPA - EU Funds is also planned for the project.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** The bids for the Feasibility Study, Environmental Impact Assessment study and Tender Dossier are under preparation.

12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Establishing signaling system as well as infrastructure upgrade along line section Pehlivankoy - Border with Greece (30 km).
2.	**Location:** Pehlivankoy - Border with Greece in western part of Turkey.
3.	**Brief Outline of the Project:** Currently, traffic management on the section is through mechanical systems which limit capacity and hinders dense traffic flows. The existing traffic system lets trains follow each other with headway of station-by-station. Moreover, poor characteristics of existing infrastructure impose speed restrictions. Current and future traffic levels call for additional capacity on the section. This will be achieved through the installation of new signaling and infrastructure upgrade. The planned work will increase capacity by an estimated 30 per cent.
4.	**Rationale and Objectives:** The aging signaling system and infrastructure constraints prevent Turkish Railways to fully exploit the potential of this link which offers the possibility of rail connections between southern Europe and Asia via the northern part of Greece. The establishment of signaling systems as well as infrastructure upgrade will increase line capacity and enhance the delivery capability of rail transport for the international movement of people and goods along the Trans-European Network and Trans-Asian Railway.
5.	**Scope of Work:** The infrastructure will be upgraded and a new signaling system installed along the entire line section with necessary service buildings in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits** **Benefits:** • The signaling system will shorten headway, increase operational speed and enhance line capacity. • It will also provide staff and time saving compared to the existing system resulting in cost saving for actors in railways. • International rail traffic to Southern Europe will be improved. • More efficient traffic flows resulting from the project will reduce gas emissions and noise.
7.	**Estimated Cost:** € 10 million (US$ 13 million).
8.	**Project Duration:** 2011-2013.
9.	**Proposed Project Financing Arrangements:** Funding by European Union and internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways until 2013.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Establishing signaling system as well as infrastructure upgrade along line section Bandirma – Menemen (341 km).
2.	**Location:** Bandirma – Balikesir – Manisa - Izmir in western Turkey.
3.	**Brief Outline of the Project:** Currently, traffic management on the section is through mechanical systems which limit capacity and hinders dense traffic flows. The existing traffic system lets trains follow each other with headway of station-by-station. Moreover, operation speed on the existing infrastructure is limited due to high gradient and tight curves. The development of rail traffic in recent times requires capacity investment on the section. This will be achieved through the installation of new signaling and infrastructure upgrade. The planned work will increase capacity by an estimated 30 per cent.
4.	**Rationale and Objectives**: The aging signaling system and infrastructure constraints prevent Turkish Railways to fully exploit the potential of this link. The establishment of signaling systems as well as infrastructure upgrade will increase line capacity and enhance the delivery capability of rail transport in western Turkey.
5.	**Scope of Work:** The infrastructure will be upgraded and station loops extended to allow the operation of longer trains. New signaling and telecommunication will be installed along the entire line section with necessary service buildings in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The signaling system will shorten headway, increase operational speed and enhance line capacity. • It will also provide staff and time saving compared to the existing system resulting in cost saving for actors in railways. • The rail movements of domestic and international traffic between Europe and Mediterranean Countries will be more efficient. • Efficient rail connections to the ports of Bandirma, Candarli and Izmir will be available. • More efficient traffic flows resulting from the project will reduce gas emissions and noise pollution.
7.	**Estimated Cost:** € 110 million (US$ 143.9 million).
8.	**Project Duration:** 2011-2013.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and/or internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	Contact Address: Not available.

1.	**Project Name:** Establishing signaling system as well as infrastructure upgrade along line section Eskisehir – Kutahya – Balikesir (318 km).
2.	**Location:** Eskisehir-Kutahya-Balikesir in western Turkey.
3.	**Brief Outline of the Project:** Currently, traffic management on the section is through mechanical systems which limit capacity and hinders dense traffic flows. The existing traffic system lets trains follow each other with headway of station-by-station. Moreover, operation speed on the existing infrastructure is limited due to high gradient and tight curves. The development of rail traffic in recent times requires capacity investment on the section. This will be achieved through the installation of new signaling and infrastructure upgrade. The planned work will increase capacity by an estimated 30 per cent.
4.	**Rationale and Objectives:** The aging signaling system and infrastructure constraints prevent Turkish Railways to fully exploit the potential of this link. The establishment of signaling systems as well as infrastructure upgrade will increase line capacity and enhance the delivery capability of rail transport in western Turkey.
5.	**Scope of Work:** The infrastructure will be upgraded and station loops extended to allow the operation of longer trains. New signaling and telecommunication will be installed along the entire line section with necessary service buildings in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The signaling system will shorten headway, increase operational speed and enhance line capacity. • It will also provide staff and time saving compared to the existing system resulting in cost saving for actors in railways. • The rail movements of domestic and international traffic in the East - West direction will be greatly improved. • More efficient traffic flows resulting from the project will reduce gas emissions and noise pollution.
7.	**Estimated Cost:** € 110 million (US$ 143.9 million).
8.	**Project Duration:** 2010-2013.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and/or internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related** Information**:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Establishing signaling system as well as infrastructure upgrade along line section Samsun – Kalin (378 km).
2.	**Location:** Samsun – Amasya – Sivas in central Turkey.
3.	**Brief Outline of the Project:** Currently, traffic management on the section is through mechanical systems which limit capacity and hinders dense traffic flows. The existing traffic system lets trains follow each other with headway of station-by-station. Moreover, operation speed on the existing infrastructure is limited due to high gradient and tight curves. The development of rail traffic in recent times requires capacity investment on the section. This will be achieved through the installation of new signaling and infrastructure upgrade. The planned work will increase capacity by an estimated 30 per cent.
4.	**Rationale and Objectives:** The aging signaling system and infrastructure constraints prevent Turkish Railways to fully exploit the potential of this link. The establishment of signaling systems as well as infrastructure upgrade will increase line capacity and enhance the delivery capability of rail transport in central Turkey, especially to/from the Black Sea port of Samsun.
5.	**Scope of Work:** The infrastructure will be upgraded and station loops extended to allow the operation of longer trains. New signaling and telecommunication will be installed along the entire line section with necessary service buildings in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The signaling system will shorten headway, increase operational speed and enhance line capacity. • It will also provide staff and time saving compared to the existing system resulting in cost saving for actors in railways. • Rail movement in the North - South direction will be improved as well as transit movement by rail to/from Black Sea Countries. • The project will provide high-capacity infrastructure and fast rail movement to the Black Sea port of Samsun and the adjacent Logistic Village. • More efficient traffic flows resulting from the project will reduce gas emissions and noise pollution.
7.	**Estimated Cost:** € 35 million (US$ 45.8 million).
8.	**Project Duration:** 2011-2013.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and/or internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Electrification of line section Pehlivankoy - Border with Greece (30 km).
2.	**Location:** Pehlivankoy - Border with Greece in western Turkey.
3.	**Brief Outline of the Project:** Currently, traffic management on the section is through mechanical systems which limit capacity and hinder dense traffic flows. Along with the installation of a new signaling system, the infrastructure will be upgraded to enhance capacity along the section, including through its electrification to provide greater traction power. Turkish Railways estimate that one new electric locomotive will be capable of hauling loads of up to 700 tones on hilly sections and 2,000 tons on flat terrain, while the hauling capability of the diesel locomotive currently in use is 500 tons.
4.	**Rationale and Objectives:** Upgrading infrastructure along the section, including electrification, will increase line capacity and allow Turkish Railways to position rail transport for the movement of people and goods to/from southern Europe via Greece.
5.	**Scope of Work:** The line section will be electrified with 25 kV - 50 Hz in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The use of electric traction will reduce gas emissions, noise and air pollutants. • It will also reduce operating costs relating to energy and rolling-stock maintenance. • The haulage of heavier trains will also lead to better fleet utilization through shorter turnaround of wagons and coaches. • Electrification traction will also allow faster transit times and make rail transport more competitive.
7.	**Estimated Cost:** € 5 million (US$ 65.4 million).
8.	**Project Duration:** 2011-2013.
9.	**Proposed Project Financing Arrangements:** Funding by European Union and internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Electrification of line section Samsun - Kalin (378 km)
2.	**Location:** Samsun - Amasya - Sivas in central Turkey.
3.	**Brief Outline of the Project:** The line section from the port of Samsun sees a substantial amount of heavy traffic requiring higher traction power that can only be delivered by electric traction. Turkish Railways estimate that one new electric locomotive will be capable of hauling loads of up to 700 tones on hilly sections and 2,000 tons on flat terrain, while the hauling capability of the diesel locomotive currently in use is 500 tons.
4.	**Rationale and Objectives:** Capacity needs to be enhanced along the line section to/from the Black Sea port of Samsun. This will be achieved through the installation of a new signaling system and infrastructure upgrade, including electrification to provide greater traction power.
5.	**Scope of Work:** The line section as well as branch lines will be electrified with 25 kV - 50 Hz in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits**: **Benefits:** • The use of electric traction will reduce gas emissions, noise and air pollutants. • It will also reduce operating costs relating to energy and rolling-stock maintenance. • The haulage of heavier trains will also lead to better fleet utilization through shorter turnaround of wagons and coaches.
7.	**Estimated Cost:** € 20 million (US$ 26.17 million).
8.	**Project Duration:** 2011-2013.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Electrification of line section Kayas - Cetinkaya (702 km).
2.	**Location:** Ankara - Kirikkale - Kayseri - Sivas in central Turkey.
3.	**Brief Outline of the Project:** Recent traffic growth has created a need to operate higher-capacity trains. This can only be achieved through electrification of the section to provide higher traction power. Turkish Railways estimate that one new electric locomotive will be capable of hauling loads of up to 700 tones on hilly sections and 2,000 tons on flat terrain, while the hauling capability of the diesel locomotive currently in use is 500 tons.
4.	**Rationale and Objectives:** Capacity needs to be enhanced along this line section which an important section on the east - west trunk line connecting Europe and Asia. It is the most important Trans-Asian Railway route through Turkey as it allows transit from Europe to the Caucasus region, Central Asia, the Islamic Republic of Iran and China.
5.	**Scope of Work:** The line section as well as branch lines will be electrified with 25 kV - 50 Hz in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The use of electric traction will reduce gas emissions, noise and air pollutants. • It will also reduce operating costs relating to energy and rolling-stock maintenance. • The haulage of heavier trains will also lead to better fleet utilization through shorter turnaround of wagons and coaches.
7.	**Estimated Cost:** € 90 million (US$ 117.8 million).
8.	**Project Duration**: 2011-2013.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and/or internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Electrification of line section Eskisehir - Kutahya - Balikesir (328 km).
2.	**Location:** Eskisehir - Kutahya - Balikesir in western Turkey.
3.	**Brief Outline of the Project:** This line section to/from the port of Izmir sees a substantial amount of traffic and capacity along the section needs to be enhanced through a series of measures, including electrification to allow the operation of heavier and longer trains. Turkish Railways estimate that one new electric locomotive will be capable of hauling loads of up to 700 tones on hilly sections and 2,000 tons on flat terrain, while the hauling capability of the diesel locomotive currently in use is 500 tons.
4.	**Rationale and Objectives:** The continued growth in traffic to/from the port of Izmir is putting pressure on this single-track diesel-operated section. Electrification of the section has now become urgent to remove capacity constraint to/from the port.
5.	**Scope of Work:** The line section as well as branch lines will be electrified with 25 kV - 50 Hz in conformity with relevant EN and UIC Codes.
6.	**Expected Impacts and Benefits:** **Benefits:** • The use of electric traction will reduce gas emissions, noise and air pollutants. • It will also reduce operating costs relating to energy and rolling-stock maintenance. • The haulage of heavier trains will also lead to better fleet utilization through shorter turnaround of wagons and coaches.
7.	**Estimated Cost:** € 110 million (US$ 143.9 million).
8.	**Project Duration:** 2010-2013.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Contractors will be selected through international bidding.
11.	**Project Status:** Included in the investment program of Turkish Railways.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

1.	**Project Name:** Lake Van - Procurement of ferry and development of piers.
2.	**Location:** Van - Tatvan (Bitlis) in eastern Turkey.
3.	**Brief Outline of the Project:** Lake Van is a major bottleneck on east - west rail movement. To improve operation 2 new ferries with 50-wagon capacity each are to be procured, existing piers need to be repaired and developed to provide greater capacity. In addition, new repair and maintenance facilities for ferries need to be established.
4.	**Rationale and Objectives:** Currently four ferries operate across Lake Van with a capacity of 10-12 wagons each. This seriously constricts traffic to/from the Islamic Republic of Iran and beyond to/from countries of Central Asia. In addition, the ferries have been in operation for a long time and reaching the end of their normal life-cycle. Their replacement is essential lest traffic by rail east of Lake Van becomes interrupted.
5.	**Scope of Work:** Procure two new ferries with 50-wagon capacity each, upgrade the piers to accommodate the larger vessels and provide new repair and maintenance facilities.
6.	**Expected Impacts and Benefits:** **Benefits** • The new ferries will increase operational capacity and speed for the movement of rail wagons across Lake Van. • New ferries will be more fuel efficient than the old ones and will require fewer staff to operate resulting in reduced operating costs. • The provision of new ferries will facilitate transit traffic to the Islamic Republic of Iran and the countries of Central Asia.
7.	**Estimated Cost:** € 70 million (US$ 91.6 million).
8.	**Project Duration:** 2006-2010.
9.	**Proposed Project Financing Arrangements:** Financial assistance from international financing institutions and internal resources of Turkish Railways.
10.	**Implementation Arrangements:** Awarded through an international bid.
11.	**Project Status:** Tendered in July 2008 and tender process is going on.
12.	**Critical Success Factors:** Not available.
13.	**Other project related Information:** None.
14.	**Contact Address:** Not available.

N. Viet Nam

1.	**Project name:** Upgrading and rehabilitation of the railway bridges on Hanoi-Ho Chi Minh City trunk Line.
2.	**Location:** Hanoi – Ho Chi Minh City trunk line.
3.	**Brief outline of the project:** the Hanoi to Ho Chi Minh City trunk line is Viet Nam's main transport artery. Many of the bridges along the line are 40 years old or more and need to rehabilitated or upgraded. Under the project a total of 44 bridges will be rehabilitated or upgraded.
4.	**Rationale and objectives:** the work to be undertaken will increase the capacity across the bridges and will assist Vietnam Railways in improving operation along the line. The reduced travel times will offer better mobility to passengers and shippers, and allow better turnaround times for rolling stock. As some bridges are old, safety of operation is achieved through speed restrictions. The new structures will offer enhanced safety of operation.
5.	**Scope of work:** Rehabilitate or upgrade 44 railway bridges and access tracks on each side of the bridges as well as some stations and procure some maintenance machines for bridges and track.
6.	**Expected impacts and benefits:** • The project will improve the safety of operation across bridges. • It will also allow speed increases for all trains, thereby improving the quality of rail services. • By procuring maintenance equipment, the project will give Vietnam Railways enhanced capabilities to plan and execute its maintenance schedule.
7.	**Estimated cost:** Vietnamese budget: 2,500 billion VND (US$ 140 million); Japanese ODA: 9.5 billion JPY (US$ 95.7 million).
8.	**Project duration:** 7 years.
9.	**Proposed project financing arrangements:** ODA funding and local-counterpart funding.
10.	**Implementation arrangements:** Vietnam Railways.
11.	**Project status:** Bidding for contractors is in progress.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** None.
14.	**Contact address:** Mr. Tran Van Luc, Director of Railway Project Management Unit, Vietnam Railways, Tel: + 84 903 450 918, Fax: + 84 4 394 20 144, E-mail: rpmu@hn.vnn.vn.

1. **Project name:** Modernization of signaling and telecommunication system on Hanoi – Ho Chi Minh City trunk line – Phrase I.

2. **Location:** Vinh to Ho Chi Minh City line section

3. **Brief outline of the project:** the signalling and telecommunication system on the railway is old. The outdated technology places capacity constraints on the country's rail network and severely limits the attractiveness of rail transport at a time when the Vietnamese economy has been experiencing rapid growth. The Vinh – Ho Chi Minh City line section is located on the Hanoi – Ho Chi Minh City trunk line. Increasing volumes of traffic on the section requires urgent upgrading of the signalling system to add much needed extra capacity to the network.

4. **Rationale and objectives:** the work to be undertaken will replace the outdated signalling and telecommunication system with advanced technology resulting in additional capacity on the network, faster train speed, reduced travel time and heightened safety of operation. It will also contribute to rail integration in ASEAN within the Trans-Asian Railway activities of ESCAP and the Singapore-Kunming Rail Link project of the ASEAN secretariat.

5. **Scope of work:**

Signalling

- Construct the interlocking equipment: install the relay interlocking equipment integrated with axles counting at 316 turnouts of stations between Danang and Ho Chi Minh City.
- Construct semi-automated block section system integrated with axles counting at 72 stations between Danang and Ho Chi Minh City.
- Construct train inspection and computer verification testing system at 54 stations between Danang and Ho Chi Minh City.

Telecommunication

- Construct new transmission system: 1,150 km optical cable, safety ring circuit equipment and install SDH transmission equipment and transmission network management system NMS between Vinh and Nhatrang.
- Construct the circuit commutation system: 26,000 numbers, install 950 subscribers.
- Construct the specialized telecommunication: 1,577 km coaxial cable for section dialog box, internal telecommunication network for 95 stations and install equipment, including monitor system at 97 stations.
- Construct the conference television system: 4 positions.

6. **Expected impacts and benefits:**

- The network will gain additional capacity.
- The increase in train speed will allow faster and safer services and help Vietnam Railways develop its market shares in both passengers and freight.
- The project, together with similar work undertaken along the Hanoi – Vinh line

	section (Phase II) will allow network integration aimed at offering high quality rail services throughout the country.
7.	**Estimated cost:** 1,080 billion VND (US$ 60.7 million) (Chinese ODA: 512.8 million NDT; Vietnamese budget 104.5 billion VND).
8.	**Project duration:** 3 years.
9.	**Proposed project financing arrangements:** ODA funding and local-counterpart funding.
10.	**Implementation arrangements:** Vietnam Railways.
11.	**Project status:** Construction stage.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** None.
14.	**Contact address:** Mr. Tran Van Luc, Director of Railway Project Management Unit, Vietnam Railways, Tel: + 84 903 450 918, Fax: + 84 4 394 20 144, E-mail: rpmu@hn.vnn.vn.

1. **Project name:** Modernization of signaling and telecommunication system on Hanoi – Ho Chi Minh City trunk line – Phrase II.

2. **Location:** Hanoi to Vinh line section.

3. **Brief outline of the project:** the signalling and telecommunication system on the railway is old. The outdated technology places capacity constraints on the country's rail network and severely limits the attractiveness of rail transport at a time when the Vietnamese economy has been experiencing rapid growth. The Hanoi – Vinh line section is located on the Hanoi – Ho Chi Minh City trunk line. Increasing volumes of traffic on the section requires urgent upgrading of the signalling system to add much needed extra capacity to the network.

4. **Rationale and objectives:** the work to be undertaken will replace the outdated signalling and telecommunication system with advanced technology resulting in additional capacity on the network, faster train speed, reduced travel time and heightened safety of operation. It will also contribute to rail integration in ASEAN within the Trans-Asian Railway activities of ESCAP and the Singapore-Kunming Rail Link project of the ASEAN secretariat.

5. **Scope of work:**

Signalling

- Construct the micro-processing interlocking centralized electrical equipment at 31 stations between Hanoi and Vinh.
- Construct the Centralized Train Control (CTC) system for the entire Hanoi – Vinh line section.
- Construct axles counting at 34 stations.

Telecommunication

- Construct telecommunication system at stations on branch lines for network integration.
- Construct the safety ring circuit at Hanoi and Vinh.
- Construct the ring circuit for signalling transmission line.
- Construct the data transmission system.

6. **Expected impacts and benefits:**

- The network will gain additional capacity.
- The increase in train speed will allow faster and safer services and help Vietnam Railways develop its market shares in both passengers and freight.
- The project, together with similar work undertaken along the Vinh – Ho Chi Minh City line section (Phase I) will allow network integration aimed at offering high quality rail services throughout the country.

7. **Estimated cost:** Euro 51.3 million (US$ 72.56 million) broken down as Euro 40.2 million (US$ 56.86 million) from ODA provided by the Government of France and Euro 11.1 million (US$ 15.7 million) from allocation by the Government of Viet

	Nam.
8.	**Project duration:** 4 years.
9.	**Proposed project financing arrangements:** ODA funding and local-counterpart funding.
10.	**Implementation arrangements:** Vietnam Railways.
11.	**Project status:** Awarded the EPC contract No.1, survey stage.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** None.
14.	**Contact address:** Mr. Tran Van Luc, Director of Railway Project Management Unit, Vietnam Railways, Tel: + 84 903 450 918, Fax: + 84 4 394 20 144, E-mail: rpmu@hn.vnn.vn.

1.	**Project name:** Modernization of signaling system at selected stations along Hanoi – Ho Chi Minh City trunk line.
2.	**Location:** Hanoi to Ho Chi Minh City trunk line.
3.	**Brief outline of the project:** the signalling system on the railway is old. The outdated technology places capacity constraints on the country's rail network and severely limits the attractiveness of rail transport at a time when the Vietnamese economy has been experiencing rapid growth. The provision of continued high quality rail services in the country requires urgent upgrading of the signalling system at some of the major stations on the Hanoi – Ho Chi Minh City trunk line which is the main Trans-Asian Railway route through Viet Nam.
4.	**Rationale and objectives:** the work to be undertaken will replace the outdated signalling system with advanced technology resulting in additional capacity on the network, faster train speed, reduced travel time and heightened safety of operation. It will also contribute to rail integration in ASEAN within the Trans-Asian Railway activities of ESCAP and the Singapore-Kunming Rail Link project of the ASEAN secretariat.
5.	**Scope of work:** **<u>Signalling</u>** • Installation of the electronic interlocking system integrated 64D block equipment at 7 stations. • Installation of the colour signalling system, interlocking relay and semi-automated blocked. • Construction of related facilities for operation and maintenance.
6.	**Expected impacts and benefits:** • The network will gain additional capacity. • The increase in train speed will allow faster and safer services and help Vietnam Railways develop its market shares in both passengers and freight. • The related work, together with Phases I and II of the rehabilitation of signalling and telecommunication along the Hanoi – Vinh – Ho Chi Minh City trunk line will allow network integration aimed at offering high quality rail services throughout the country.
7.	**Estimated cost:** CHF 22.7 million (US$ 20.9 million) broken down as CHF 16.5 million (US$ 15.2 million) from ODA provided by the Government of Switzerland and CHF 6.2 million (US$ 5.7 million) from allocation by the Government of Viet Nam.
8.	**Project duration:** 30 months.
9.	**Proposed project financing arrangements:** ODA funding and local-counterpart funding.
10.	**Implementation arrangements:** Vietnam Railways.
11.	**Project status:** Issued the bidding invitation for the EPC contract No.1, preparing for

	the bidding invitation for the EPC contract No.2.
12.	**Critical success factors:** Not available.
13.	**Other project-related information:** None.
14.	**Contact address:** Mr. Tran Van Luc, Director of Railway Project Management Unit, Vietnam Railways, Tel: + 84 903 450 918, Fax: + 84 4 394 20 144, E-mail: rpmu@hn.vnn.vn.

1.	**Project name:** Upgrading of Yen Vien – Lao Cai line section (285 km).
2.	**Location:** The line section is located in the north-western part of Viet Nam and connects Yen Vien, 10 kilometres from Hanoi, to Lao Cai (Lai Cai Station) at the border with China.
3.	**Brief outline of the project:** Bilateral trade between China and Viet Nam has been growing rapidly and the increasing volumes require efficient transport infrastructure between the two countries. Upgrading the Yen Vien – Lao Cai line section is part of the strategy of the Government of Viet Nam to develop efficient linkages to / from China. In addition, the line section is an important section on the Trans-Asian Railway and is part of Route 1 of the Singapore-Kunming Rail Link project being implemented by the ASEAN secretariat. It is also part of the Lao Cai – Hanoi – Haiphong corridor which the Government of Viet Nam is actively developing to transport freight from Yunan province of China to the port of Haiphong.
4.	**Rationale and objectives:** Viet Nam's international trade has been growing at a fast pace and the country's transport infrastructure needs to be expanded accordingly. In particular, Vietnam Railways need additional capacity to meet its 2020 traffic forecasts and ensure the long-term efficacy of rail transport as well as reinforce the attractiveness of rail transport in the eyes of potential private operators. The project is also part of a wider international strategy to strengthen subregional integration in the Greater Mekong Subregion.
5.	**Scope of work:** Increasing the capacity of the 285-km line through the rehabilitation and upgrading of tracks and bridges as well as construction and extension of passing loops at selected stations.
6.	**Expected impacts and benefits:** • Overall capacity of Viet Nam's rail system in the northern part of the country will be improved, especially around the capital and to/from the port of Haiphong. • Cross-border trade and tourism to/from China will be greatly facilitated. • Economic growth in the provinces along the Lao Cai – Hanoi – Haiphong corridor will receive new momentum. This will offset the impact of land clearance and resettlement for some population.
7.	**Estimated cost:** investment cost will be shared by the Asian Development Bank for US$ 60 million; the Agence Française de Développement for US$ 40 million; and the DGTPE for Euro 30 million (US$ 42.5 million).
8.	**Project duration:** 5 years.
9.	**Proposed project financing arrangements:** Co-financing by Asian Development Bank, Agence Française de Développement and the DGTPE.
10.	**Implementation arrangements:** Vietnam Railways.
11.	**Project status:** Technical design and pre-qualification selection of contractor.
12.	**Critical success factors:** Not available.

13.	**Other project-related information:** None.
14.	**Contact address:** Mr. Tran Van Luc, Director of Railway Project Management Unit, Vietnam Railways, Tel: + 84 903 450 918, Fax: + 84 4 394 20 144, E-mail: rpmu@hn.vnn.vn.