

3. LAND TRANSPORT ROUTES FROM CENTRAL ASIA TO SEA PORTS OF THE ISLAMIC REPUBLIC OF IRAN AND PAKISTAN IN THE SOUTH AND CHINA IN THE EAST

3.1 Routes Development Scenarios

Figure 3.1 shows potential land transport corridors from Central Asia to sea ports in the South and East.

A scenario approach has been applied in the course of the study, that is to attempt to foresee the complex development along the particular corridors during the period up to the year 2000 and beyond using the all available information and data on existing networks, the improvements or new constructions underway, as well as national and subregional ECO land transport development plans.

Three following scenarios have been considered for possible options of developing land transport routes from Central Asia to sea ports in the South and East:

Scenario 1 - Existing rail and road routes;

Scenario 2 - covering the period 1995-1997 when the railway line linking Central Asia via Turkmenistan with the port of Bandar Abbas in the Islamic Republic of Iran is planned to be operational;

Scenario 3 - the year 2000 and beyond when the railway networks of ECO member countries are expected to be interconnected and construction of some additional links to ports is completed.

The above scenarios are based on the already indicated fact that railways, because of its advantages for bulk, containerized and long distance transport, will play the key role in freight movement from Central Asia to and from the sea ports, as well as on the fact that the new improved railway line linking Central Asia with the sea ports in China will provide for faster movement of much higher cargo volumes than at present.

3.2. Scenario 1 Existing Rail and Road Routes Railways

There is no direct railway connection at present (Fig. 3.2) of CAR with the ports in the South in the Islamic Republic of Iran and Pakistan.

However, the CAR railway networks are linked via Druzba station at the Kazakhstan/China border with a main railway line in China which provides access to three major sea ports (Fig.3.3).

This railway line stretching from major ports of China (Lianyungang, Qindao, Shanghai) to Urumqi-Druzba-Almaty-Tashkent-Mary-Parahat-Ashgabat and later to Seraks-Meshad (when it is completed in 1996) is foreseen to be an additional to Trans-Siberian railway link between China, via CAR and ECO subregion, and Europe.

China considers it to be a portion of the "Asia-Europe landbridge" on the Chinese territory and is attaching great attention to its promotion and development.

FIGURE 3.2. SCENARIO 1: LAND TRANSPORT ROUTES TO SEA PORTS IN THE SOUTH

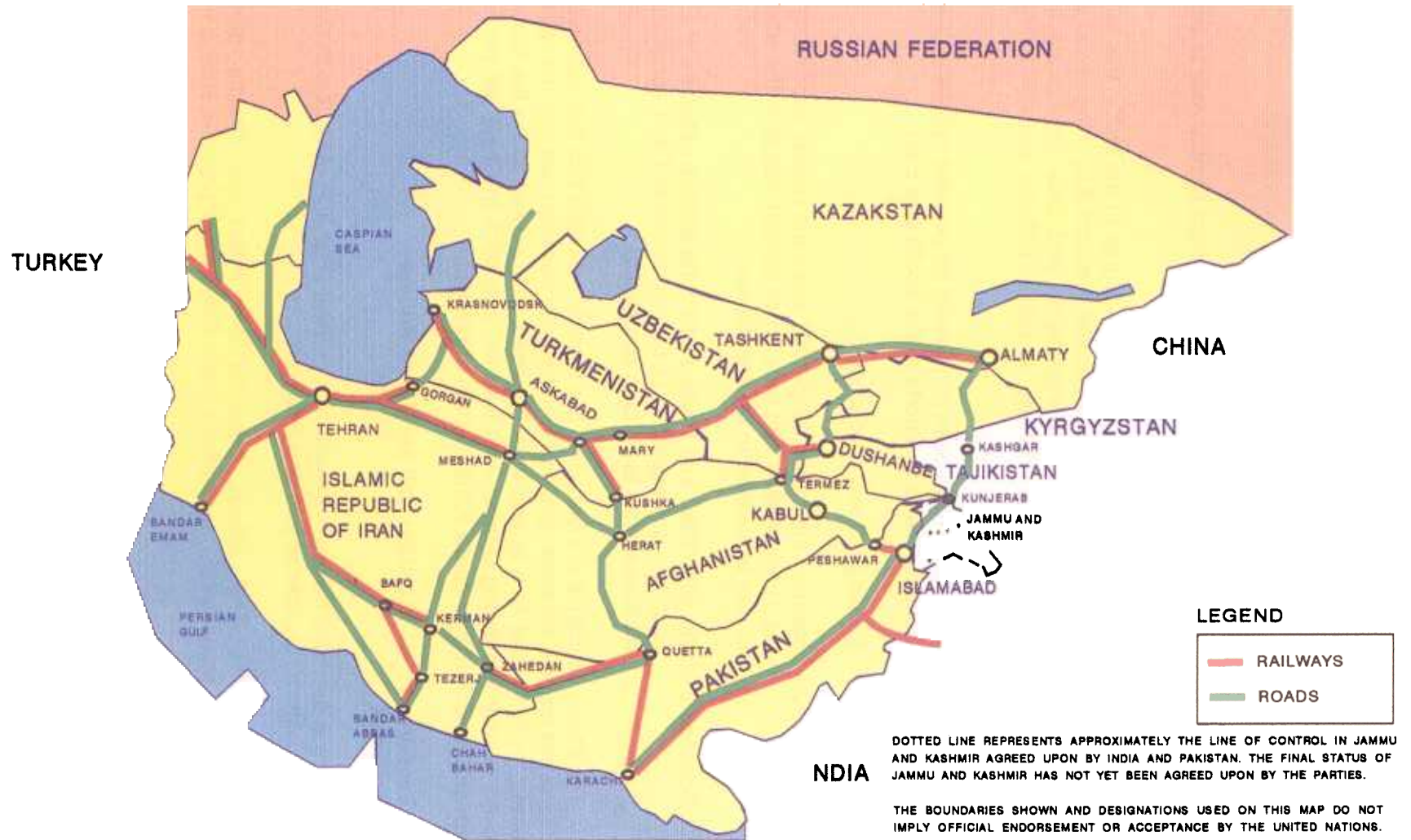
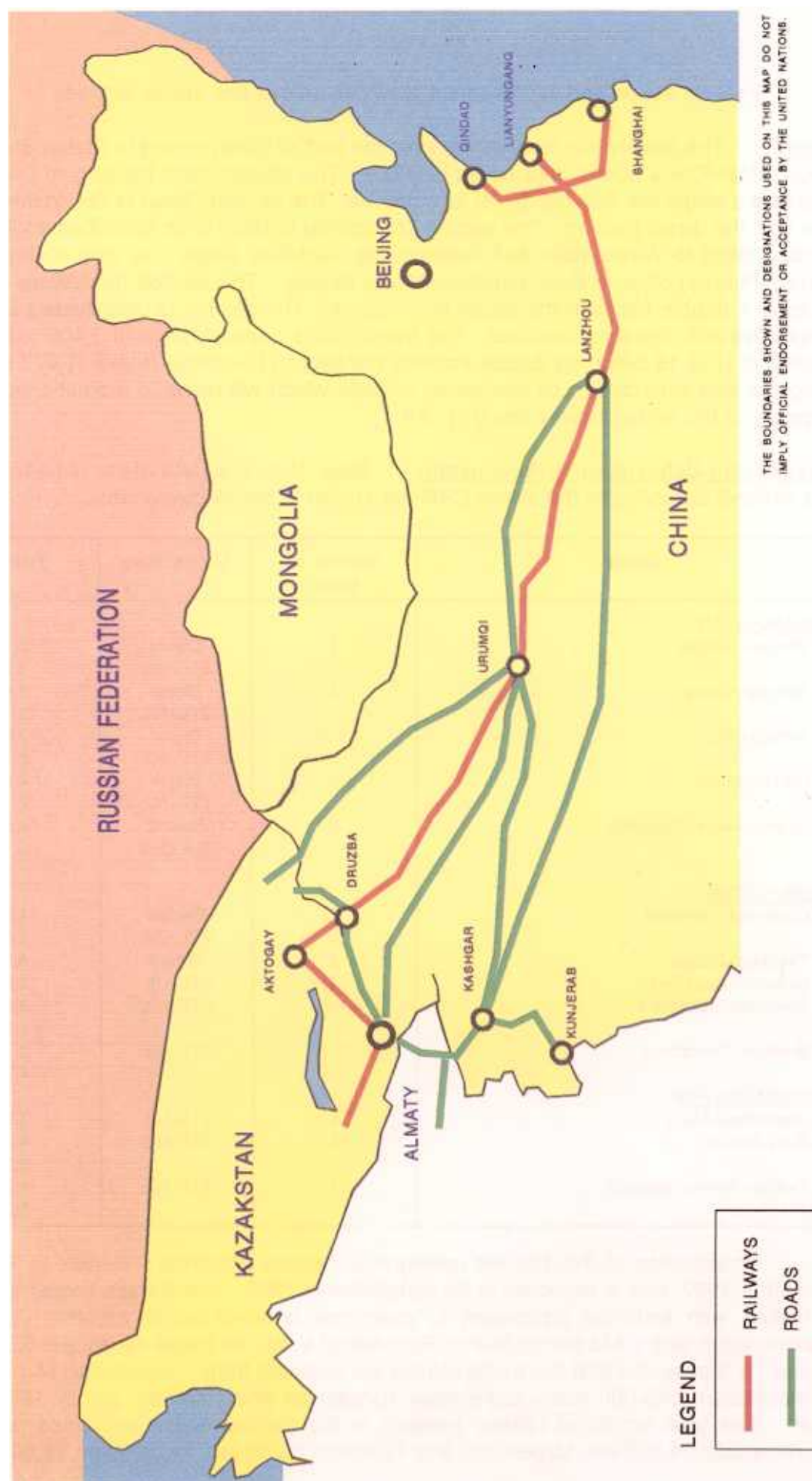


FIGURE 3.3. SCENARIO 1: LAND TRANSPORT ROUTES TO SEAPORTS IN THE EAST (CHINA)



Present status and improvement activities on this line are as follows:

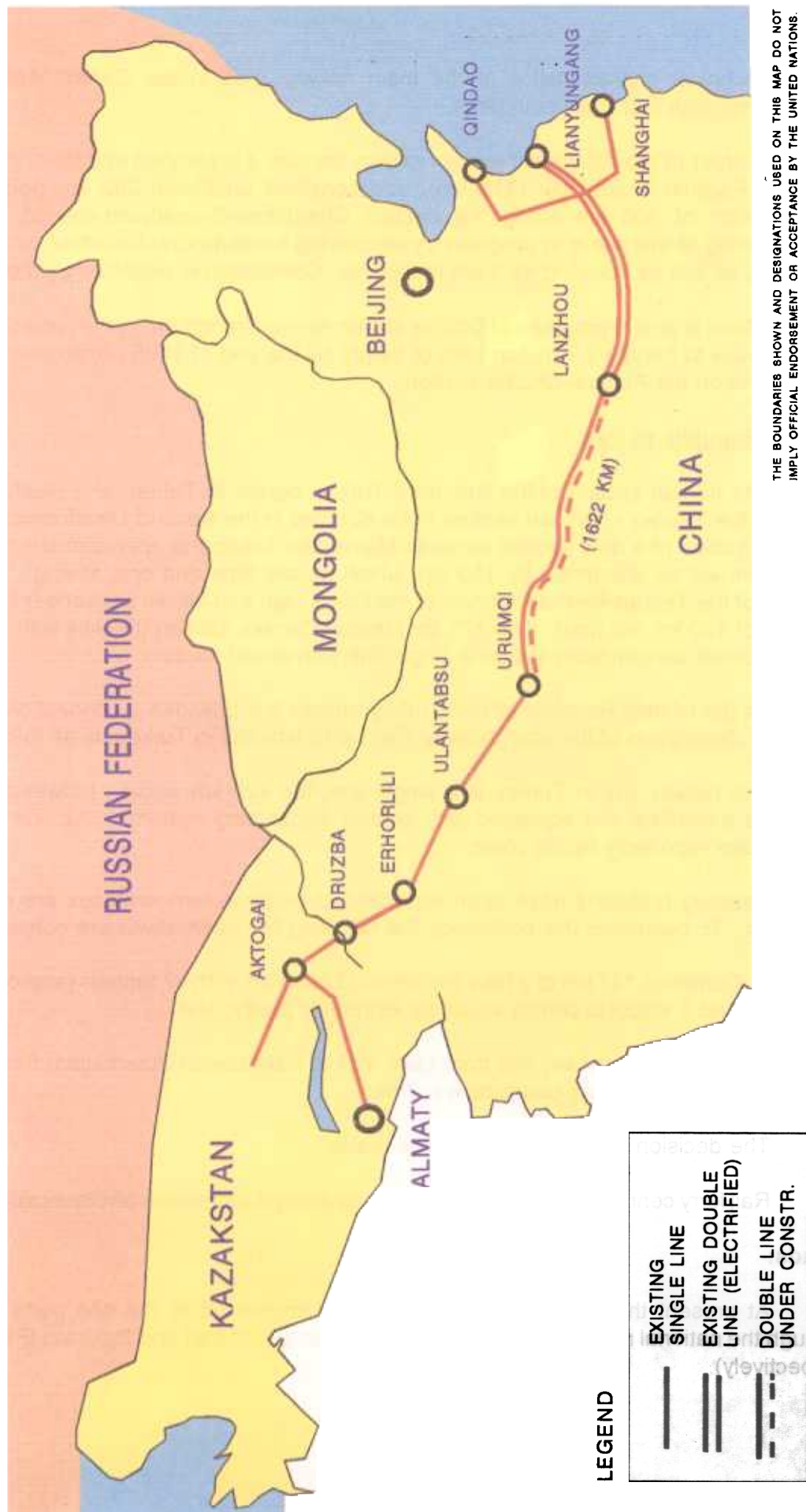
China: The railway line is 4,130 km from the port of Lianyungang to Alatan Shankow at the Kazakhstan/China border with seven sections. The section from the port of Lianyungang to Pisian is a single line with the diesel locomotives. The section Pixian to Zhengzhou is a double line with the diesel traction. The section Zhengzhou to Baoji is an electrified double line. The section Baoji to Wuwei have two independent electrified single line, one is Baoji-Zhongwei-Wuwei railway, other is Baoji-Lanzhou-Wuwei railway. The section from Wuwei to Urumqi is already a double line with the diesel locomotives. The section Urumqi-Alatan Shankow is a single line with diesel locomotives. The freight trains capacities are of 3,400 to 3,800 t. The project of US\$ 18 billion on double tracking the section Lanzhou-Urumqi (1,622 km) is well in progress and expected to be completed in 1995 which will result in dramatic increase of the capacity of this whole railway line (Fig. 3.4).

Kazakhstan-Uzbekistan-Turkmenistan: Basic technical data of the main railway lines in the national territories of the above CAR are shown in the following table.

Sections	Number of tracks	Locomotives	Train load
KAZAKHSTAN			
Druzba-Aktogai	1	Diesel 2TE-10L	3,200 3,200
Aktogai-Almaty	1	Diesel 2TE-10L	3,600 2,700
Almaty-Chu	1-2	Diesel 2TE-10L	3,600 2,700
Chu-Dzambul	2	Diesel 2TE-10L	4,500 2,700
Dzambul-Aris-Chengeldi	2	Electric 3VL-805	4,500 2,700
UZBEKISTAN			
Chengeldi-Tashkent	2	Electric 2VL-60K	4,500 2,800
Tashkent-Dzizak	2	Diesel	4,500
Dzizak-Samarkand	2	2TE-10L	2,800
Samarkand-Bukhara	1-2	2TE-10L	3,800 2,800
Bukhara-Chardzhov	1-2	2TE-10L	3,200 4,200
TURKMENISTAN			
Chardzhov-Mary	1	2TE-10L	3,200
Mary-Tedzen	1	2TE-10L	4,200 3,200
Tedzen-Seraks (project)	1	2TE-10L	4,200 3,200

Construction of the 132 km railway line Tedzen (Parahat) - Seraks in Turkmenistan started in 1992, and is expected to be completed in 1996. The Seraks border station will be furnished with technical equipment to overcome break-of-gauge problem (1,520 mm in Turkmenistan and 1,435 mm in Islamic Republic of Iran). Its target capacity is 5.3 million tons a year. It is expected that this traffic volume will originate from: Kazakhstan (4,150,000 tons), Turkmenistan (545,000 tons), Uzbekistan, Kyrgyzstan and Tajikistan (jointly 195,000 tons) a year. The total length of railway network in the Central Asian subregion is 19,500 km (Turkmenistan 1,800 km, Uzbekistan and Tajikistan 4,200 km; Kazakhstan 13,500 km).

FIGURE 3.4. SCENARIO 1: RAILWAY ROUTE FROM
CENTRAL ASIA TO SEAPORTS IN CHINA



Technical characteristics of the main railway lines in the Central Asian subregion corresponds with first class standards.

In order to provide higher level of railway service, it is planned to double the line section between Parahat-Chardzhou (315 km), and construct additional 202 km double line, with electrification of 605 km along the section Chardzhou-Samarkand-Mehrat. At present strengthening of this line is in progress by electrifying sections Chu-Dzambul, and Chu-Almaty (316 km), as well as doubling 42.1 km of the line. Completion is expected by the end of 1995.

Works is also in progress at Druzba station where strengthening the capacity takes place with the view to handle 2.7 million tons of freight by the end of 1995. Improvements are also being done on the Aktogai-Druzba section.

Islamic Republic of Iran

The Iranian section of the line, from Turkish border to Tehran and Meshad is a single line, with the Tehran - Meshad section to be doubled in the Second Development Plan. With the construction of a new section between Maine and Tabriz the operation length of the main railway line will be shortened by 110 km, which means time and cost saving. The technical capacity of the Tehran-Meshad section of the line is high and allows passenger trains to run at a speed of 120 km per hour. The 170 km Meshad-Seraks section (the link with Turkmenistan which is under construction) will be a single line with diesel traction.

As the Islamic Republic of Iran/Turkey railway link provides a connection to Europe, a very brief description of the main railway line, up to Istanbul in Turkey, is as follows:

The railway line in Turkey is a single line, the 420 km section between Istanbul and Ankara is electrified and equipped with central dispatching system. The line improvement activities are reportedly taking place.

Capacity problems have been experienced because ferry services are used over the Lake Van. To overcome this bottleneck the following two alternatives are considered:

1. Construct 127 km of a new line around Lake Van, with 37 tunnels (approximate length of 62 km) and 5 viaducts (which would be extremely costly; and
2. Construct a railway line from Lake Van to Nahichavan (Azerbaijan) from which point there is an existing railway connection to Iran.

The decision however has yet to be made.

Rail ferry connection across the Bosphorus straight represents another capacity problem.

Roads:

At present the Central Asian subregion is connected to the sea ports in the South through the national road networks in the Islamic Republic of Iran and Pakistan (Fig. 3.5 and 3.6 respectively).

FIGURE 3.5. SCENARIO 1: EXISTING ROAD ROUTES FROM CAR TO SEA PORTS IN ISLAMIC REPUBLIC OF IRAN

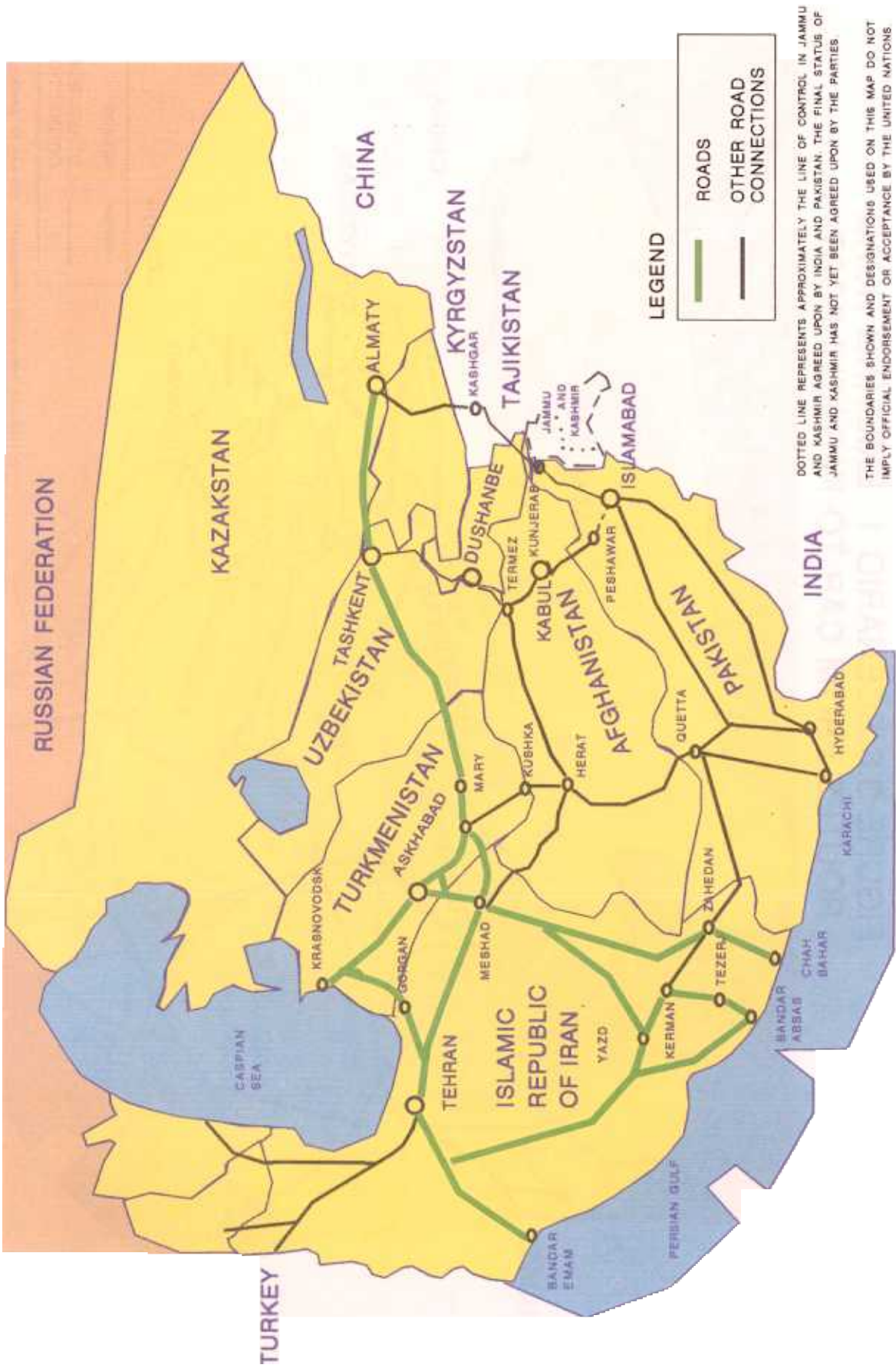
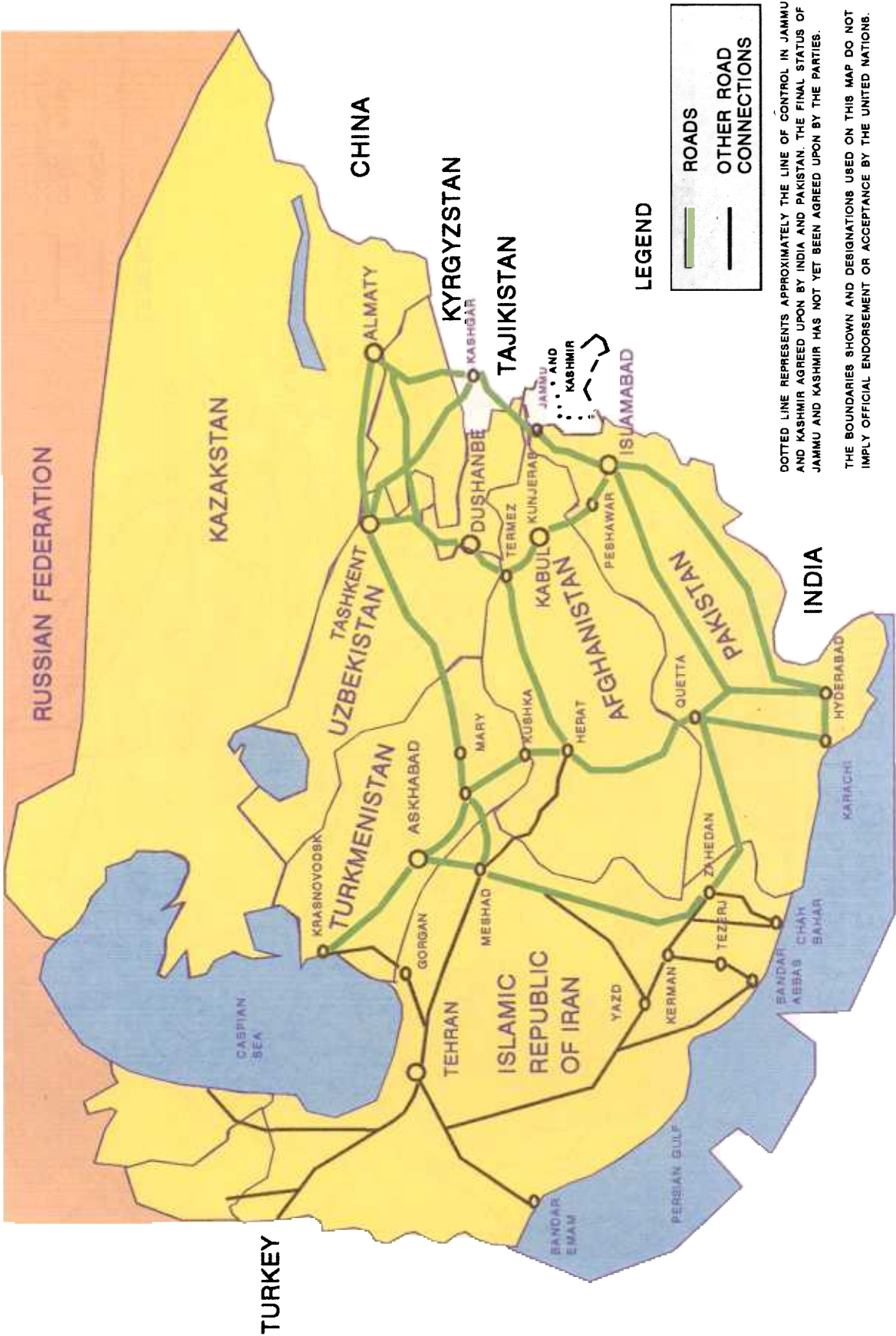


FIGURE 3.6. SCENARIO 1: EXISTING ROAD ROUTES FROM CAM TO KARACHI PORT



Connections to/from the ports in the South via Islamic Republic of Iran

From Turkmenistan, via four border-crossing points, the following road routes provide access to the Iranian ports in the Persian Gulf:

1	Gudriolum/Incheborum	- Tehran-Bandar Imam	
		- Bandar Abbas	1,310 km
		- Chah Bahar	2,190 km
2.	Gaudan/Badjigiran	- Rajai, Bandar Abbas	1,971 km
		- Chah Bahar	1,858 km
3.	Artik/Loftabad	- Rajai, Bandar Abbas	1,562 km
		- Chah Bahar	1,925 km
4.	Seraks	- Rajai, Bandar Abbas	1,469 km
		- Chah Bahar	1,832 km

The road sections Badjigiran-Imamgholi-Ghoochan and Loftabad-Dargar-Ghoochon are under construction to ensure linkage with CAR via Turkmenistan.

From Almaty (Kazakhstan) and Tashkent (Uzbekistan) the road route options to ports of Bandar Abbas and Chah Bahar are the following:

a)	Almaty-Ashgabat-Meshad-Yazd-Bandar Abbas	5,300 km
b)	Tashkent-Bandar Abbas	4,800 km
c)	Almaty-Bandar Abbas (via Yazd, road under construction in Iran) . . .	4,008 km
d)	Tashkent-Bandar Abbas (via Yazd)	3,218 km

Connections to the sea ports in Pakistan are as follows:

1. From Turkmenistan: Kushka-Turghundi (Afghanistan)-Herat-Kandahar-Chaman (Pakistan)-Port Karachi (1,658 km);
2. From Uzbekistan: Termez-Kabul (Afghanistan)-Kandahar-Chaman- (Pakistan)-Port Karachi (1968 km);
3. Termez (Uzbekistan)-Kabul (Afghanistan)-Peshawar (Pakistan)-Port Karachi (2,318 km);
4. Almaty (Kazakhstan)-Torogart (China)-Kunjerab-Gilgit-Rawalpindi (Pakistan)-Port Karachi; (3,517 km);
5. Ashgabat (Turkmenistan)-Badjigiran (the Islamic Republic of Iran)-Zahedan-Kohi Taftan (Pakistan)-Quetta-Port Karachi (2,575 km);
6. Baku (Azerbaijan)-Astara (the Islamic Republic of Iran)-Zahedan-Kohitaftan (Pakistan)-Quetta-Port Karachi (3,600 km).

It is to be noted that the Karachi Port and Port Qasim are located close to each other and for practical purposes, e.g. distance/time calculation to remote destinations in CAR, may be considered as one location. The distances by sections are as indicated below:

ROAD DISTANCES FROM KARACHI TO MAJOR DESTINATIONS IN CAR

Karachi	- Chaman	= 840 km
Chaman	- Kandahar	= 120 km
Kandahar	- Herat	= 573 km
Herat	- Kushka	= 125 km
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Karachi	- Kushka	= 1,658 km
<hr/>		
Karachi	- Chaman	= 840 km
Chaman	- Kandahar	= 120 km
Kandahar	- Kabul	= 508 km
Kabul	- Termez	= 500 km
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Karachi	- Termez	= 1,968 km (via Kandahar)
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Karachi	- Peshawar	= 1,504 km
Peshawar	- Kabul	= 314 km
Kabul	- Termez	= 500 km
<hr/>		
Karachi	- Termez	= 2,318 km (via Kabul)
<hr/>		
Karachi	- Rawalpindi	= 1,568 km
Rawalpindi	- Khunjerab	= 901 km
Khunjerab	- Torogart	= 562 km
<hr/>		
Karachi	- Almaty	= 3,517 km
<hr/>		

From Almaty (Kazakhstan) to Karachi port (Pakistan) there are the following road route options (Fig. 3.6):

- a) via Tashkent (Uzbekistan) & National Highway No. 5 in Pakistan:
 Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Tashkent-Samarkand-Termez (Uzbekistan)-Kabul-Torkham (Afghanistan)-Peshawar-Lahore-Karachi (Pakistan) (4,099 km)
- b) via Tashkent (Uzbekistan), Afghanistan and Indus Highway in Pakistan:
 Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Tashkent-Samarkand-Termez (Uzbekistan)-Kabul-Torkham (Afghanistan)-Peshawar-D.G.Khan-Kotri-Karachi (Pakistan) (3,727 km)
- c) via Afghanistan and National Highway No. 25 in Pakistan:
 Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Tashkent-Samarkand-Karshi -Termez (Uzbekistan)-Mazar-i-Sharif-Herat-Kandahar (Afghanistan) -Quetta-Khuzdar-Karachi (Pakistan) (3,783 km)
- d) via Karakoram Highway and Pakistan National Highway No. 5:
 Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Torogart-Kushka-Khunjerab (China)-Hassanabdal-Rawalpindi-Lahore-Karachi (Pakistan) (3,708 km)

- e) via Karakoram Highway and Indus Highway in Pakistan:
Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Torogart-Kashgar-Khunjerab
(China)-Hassanabdal-Peshawar-D.G. Khan-Kotri-Karachi 3,570 km)
- f) via Turkmenistan and Afghanistan:
Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Tashkent-Samarkand
-Bukhara (Uzbekistan)-Mary (Turkmenistan)-Torogart-Herat
-Kandahar (Afghanistan)-Quetta-Khuzdar-Karachi (Pakistan) (3,827 km)
- g) via Tajikistan Afghanistan and Indus Highway in Pakistan:
Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Dushanbe (Tajikistan)
-Termez (Uzbekistan)-Kabul (Afghanistan)-Peshawar-
D.G.Khan-Karachi (Pakistan) (3,751 km)
- h) via Tajikistan, Afghanistan and National Highway No. 25 in Pakistan:
Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Dushanbe (Tajikistan)
-Termez-Mazar-i-Sharif-Herat-Kandahar (Afghanistan)-Quetta
-Khuzdar-Karachi (Pakistan) (3,893 km)

According to the Ministry of Transport and Communications of Kazakhstan, the following road routes from Kazakhstan to the sea ports in Pakistan, appear to be most feasible and safe:

via Karakoram Highway between China and Pakistan and the national highways N5 or N6 in Pakistan;

Almaty (Kazakhstan)-Bishkek (Kyrgyzstan)-Torugart-Kashgar-Khunjerab (China)-
Hasanabdan-Rawalpindi-Lahore-Karachi;

Via Islamic Republic of Iran:

Almaty-Tashkent (Uzbekistan)- Askhabad (Turkmenistan)- Badjigiran-Zahedan-
Kohitaftan (Pakistan)-Quetta-Karachi;

To provide connection for road transport with western Kazakhstan, Russian Federation, and Europe, the following route would be proposed: Karachi-Quetta-Kohi Taftan-Zahedan-Badjigiran-Askhabad-Krasnovodsk-Bekdash-Aktau-Atyrau-Saratov (Russian Federation).

Connections to the sea ports in China

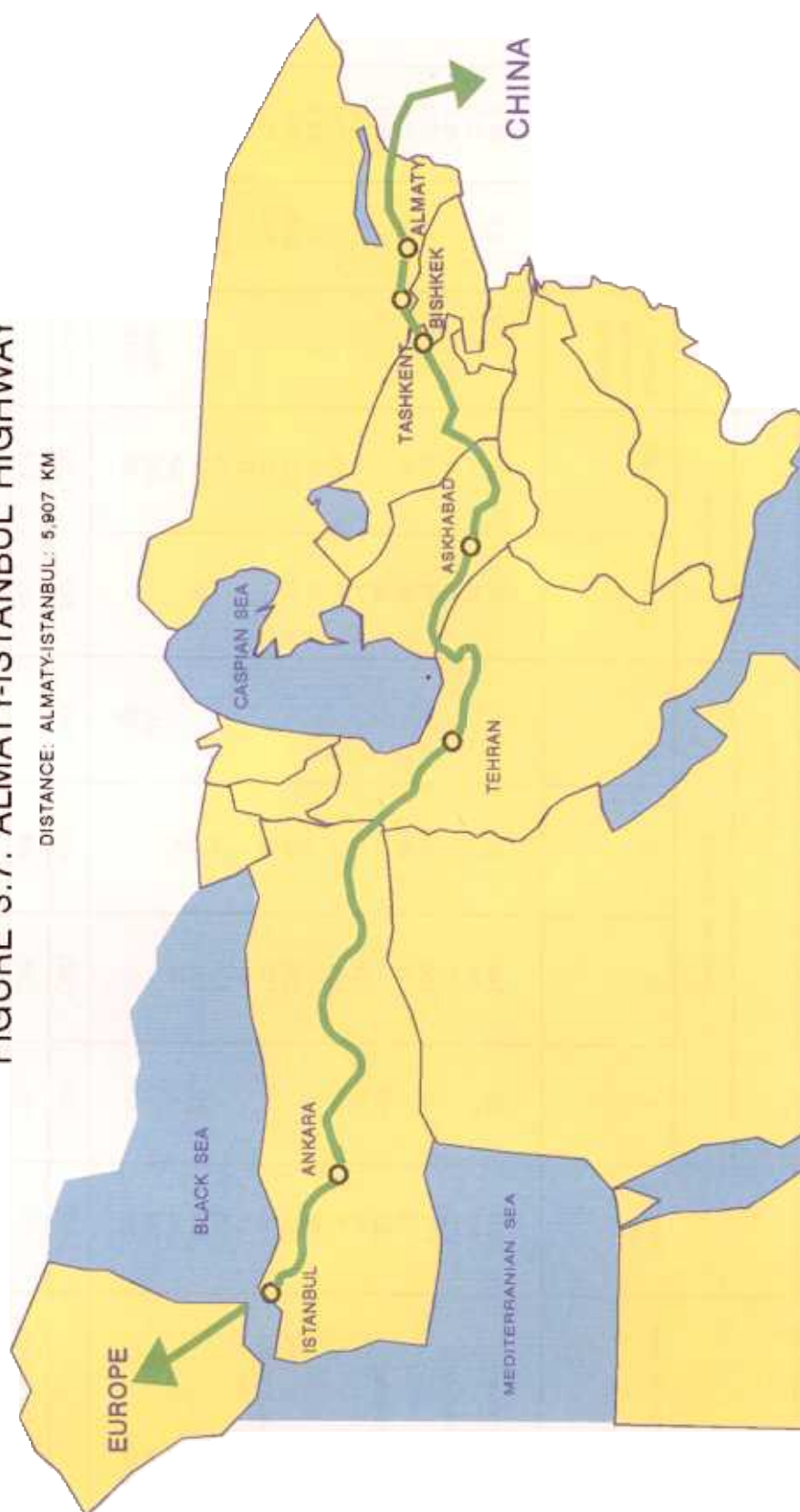
Road connections from CAR to sea ports in China are in principle via road border-crossing points in Kazakhstan, Kyrgyzstan and Tajikistan. All major road routes from those points lead to the capital city of Urumqi in western China, which is located in around 700 km distance from the border.

The Central Asia subregion is also connected with the backbone east-west highway (Almaty-Istanbul) which may provide a road link between China and Turkey.

The route has a total length of 5,907 km with three border-crossing options between Turkmenistan and Islamic Republic of Iran, namely at Seraks, Gaudan and Gudriolum. The importance of this route (Fig. 3.7) was recognized and supported in 1992, through the agreement between seven ECO member countries: the Islamic Republic of Iran, Republic of Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Turkey and Pakistan. Design, construction and reconstruction of some sections has already started. The highway linking Istanbul, Tehran, Ashgabat, Tashkent, Bishkek and Almaty is expected to be completed with the high technical standards required for international traffic.

The above highway when it is completed might be considered as a partly achievement of objective 1 of the ECO Outline Plan.

FIGURE 3.7. ALMATY-ISTANBUL HIGHWAY



THE BOUNDARIES SHOWN AND DESIGNATIONS USED ON THIS MAP DO NOT IMPLY OFFICIAL ENDORSEMENT OR ACCEPTANCE BY THE UNITED NATIONS.

**TABLE 3.1 TECHNICAL DATA OF THE ALMATY - ISTANBUL HIGHWAY
ALMATY - TASHKENT - ASHGABAT - GUDRIOLUM (Central Asian Part)**

City and State Borders	Distance Km	Length Km				Reconstruction cost in million ruble				Total	
		Technical category				Pavement		(in 1991 prices) Upgrading			
		I	II	III	IV	Capital	Overlay	Up to technical category III	Up to technical category III		New overlay roads at category I,II
Almaty (Kyrgyzstan border)	220	62	148	10	-	190	30	-	8.0	97.0	105.0
Bishkek	24	-	24	-	-	24	-	-	-	10.0	10.0
(Kazakhstan border)	112	-	112	-	-	70	42	-	-	46.0	46.0
Dzambul	177	6	156	15	-	74	103	-	12.0	67.0	79.0
Chimkent	174	-	91	83	-	98	76	-	68.0	37.0	105.0
(Uzbekistan border)	102	102	-	-	-	98	4	-	-	59.0	59.0
Tashkent	18	-	14	-	-	14	4	-	3.0	8.0	11.0
Dzizak	170	-	170	-	-	110	60	-	-	70.0	70.0
Samarkand	106	-	-	-	-	70	36	-	-	43.0	43.8
Buhara	268	-	226	42	-	35	233	-	35.0	93.0	128.0
(Turkmenistan border)	125	-	105	20	-	-	125	-	16.0	43.0	59.0
Chardzhov	31	-	31	-	-	-	31	-	-	13.0	13.0
Mary	239	-	114	125	-	-	239	-	103.0	47.0	150.0
Ashgabat	352	21	331	-	-	65	287	-	-	148.0	148.0
Kizil Avrat	224	-	53	171	-	-	224	-	141.0	22.0	163.0
Kizil Atrek	242	-	-	-	242	-	242	109.0	-	-	109.0
Gudriolium	22	-	-	-	22	-	22	10.0	-	-	10.0
Total:	2,606	191	1,681	470	264	848	1,758	119.0	386.0	803.0	1,308.0
On Kazakhstan territory:	673	170	395	108	-	460	213	-	88	260	348

If Gudriolum is selected as the border-crossing point, respective sections of the highway will be: Kazakhstan - 673 km; Kyrgyzstan - 136 km; Uzbekistan - 687 km; Turkmenistan - 1,110 km, Islamic Republic of Iran - 1,440 km and Turkey - 1,861 km.

Technical data on reconstruction and upgrading of the highway sections in Central Asia, with related cost estimates, are given in the Table 3.1.

Thus Scenario 1 features railway route from Central Asia to sea ports of China and road and/or road-cum-rail routes to sea ports of the Islamic Republic of Iran and Pakistan.

In general it is very likely that the existing rail and road routes are in different conditions with some routes/sections in need of improvement or renovation. Unfortunately due to time and budgetary constraints it was not possible to undertake detail survey of the routes.

3.3 SCENARIO 2 (1996-1997 period)

Scenario 2 is based on existing and available by 1996 infrastructure as well as on projections for the period 1996-1997 when a number of on-going national rail and road projects, being at the same time important international links, are to be completed (Fig. 3.8).

Railways

The construction of Tedzen (Parahat)-Seraks-Meshad missing railway link between Turkmenistan and the Islamic Republic of Iran is expected to be completed in 1996 to make feasible movement of 1.5-2 million tons of freight a year.

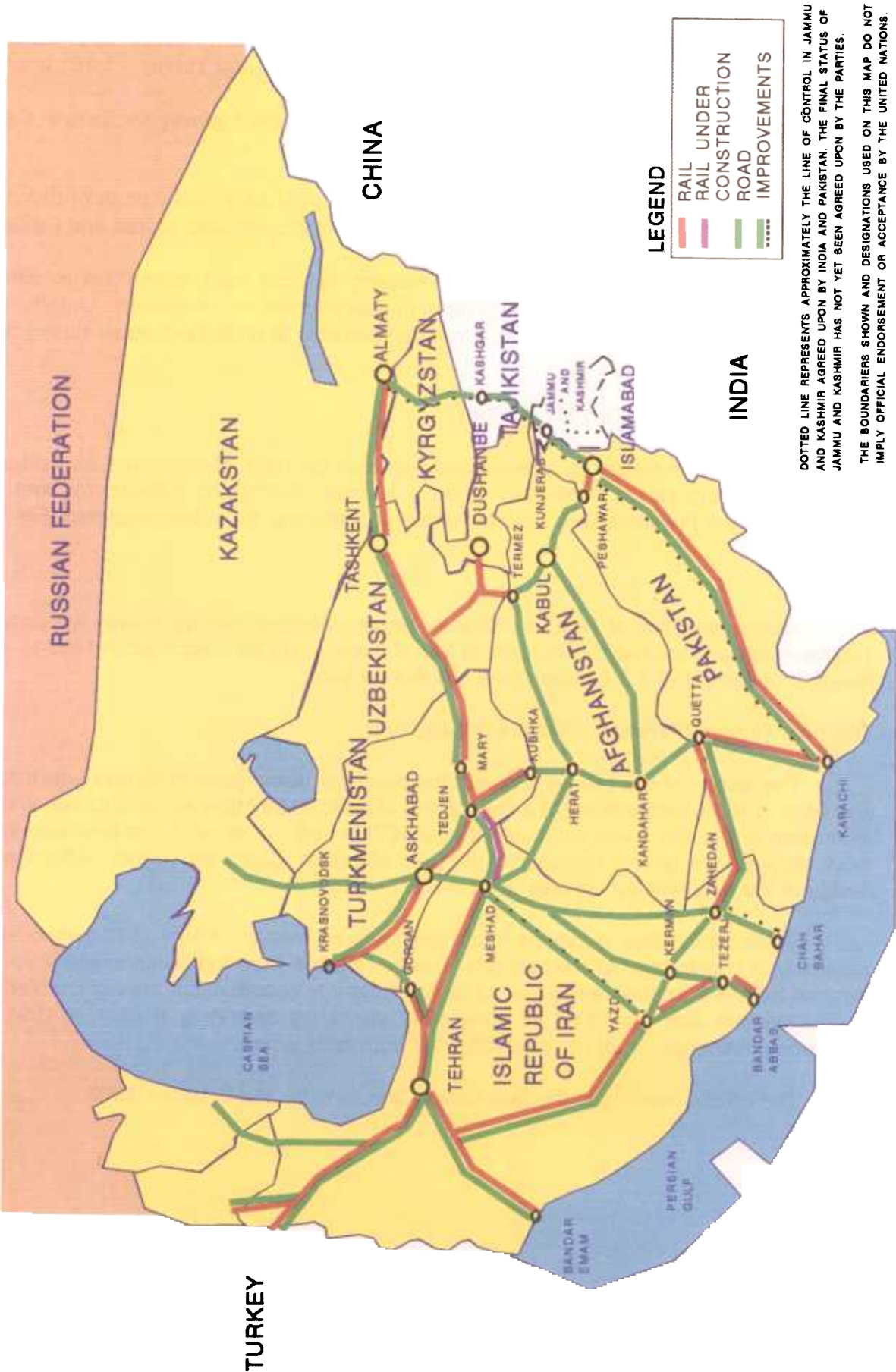
The new Tedzen (Parahat) - Seraks railway line

The design of this railway line with the border-crossing point at Seraks was initiated way back in 1968, but because of a low volume of traffic at that time its construction was not recommended. Later it was estimated that in 1975 a traffic of about 1.5 m tons/year would move between the Islamic Republic of Iran and Mongolia, China and Japan. After that the design of the new railway line was done in 1977-1978.

A joint committee of experts from both countries met on 31 May 1989 to discuss the possibility of construction of the sections: Tedzen-Seraks from the Turkmenistan side and Meshad-Seraks from the Iranian side, and Agreement to construct the railway line Tedzen-Seraks-Meshad was signed on 28 June 1989 stipulating beginning of work in 1991 and simultaneous completion of construction work from both sides.

The official opening of the new railway line, is expected in March 1996.

FIGURE 3.8. SCENARIO 2 (1996- 997)



In the first year of operation movement of 1.5 m tons of freight traffic is expected, with the respective figures for the years 2000 and 2005 reflected in the table below.

Type of traffic	Year 2000		Year 2005	
	'000 t	% of total	'000 t	% of total
1. Export	771	20.2	812	17.2
2. Import	1,774	46.5	1,807	38.4
3. Inter-station	70	1.8	86	1.8
4. Total (1+2+3)	2,615	68.5	2,705	257.4
5. Transit - for Iran	1,160	30.4	1,930	41.0
- for CIS	40	1.1	70	1.6
Total	3,815	100.0	4,705	100.0

Source: New Railway Line - Tedzen (Mary) - Seraks, Tashgiprotrans, Tashkent, 1991. The movement of tourists to explore the historic and cultural treasures of Middle East and Central Asia is also expected with the forecast for passenger traffic in the years 2000 and 2005 as follows:

From-to	Train category	Number of wagons	Pairs of trains per day	
			2000	2005
Tashkent-Tehran	Express	10	0.5	0.5
Ashgabat-Tehran	Express	10	0.5	0.5
Ashgabat-Seraks	Local	10	0.5	0.5
Chardzhov-Mary-Seraks	Local	10	0.5	0.5
Beijing-Istanbul	Express	10	0.5	0.5
TOTAL	-	-	2.5	2.5

*) Source: New Railway line Tedzen (Mary) - Seraks, Mintransstroy USSR, GUP and KS. Tashgiprotrans, Tashkent 1991.

It is important to note that for the expected traffic only 40% of the available line capacity will be reportedly used in 2005.

Basic technical data of the Tedzen-Seraks railway line project are:

Line	Single
Rolling gradient	9‰
Operating length of line (between stations)	121.2 km
Construction length:	
new railway lines	133.08 km
secondary lines	16.48 km
Length of tracks in stations	850 m

Construction time	57 months
Locomotives for freight trains	2 TE 10
Signalling and communication (when trains passing)	
Frequency of trains in the 10th year of operation	DC EC arrows
Freight trains (Pairs)	6
Passenger trains (Pairs)	2.5

The Seraks railway station is designed as a complex with railway operations and custom services facilities provided, including all physical infrastructure and facilitation services required at border-crossing points. The station lay-out, technical equipment and facilities will enable: change of wheels - bogies on wagons from 1,520 gauge to 1,435 railway gauge and back, freight transshipment including 20' containers. Switch yards for train make-up, depots, maintenance workshops, passenger terminal, custom services, etc. will also be in place.

The customs control is foreseen to take place at the same time when bogies are changed and will last one hour for freight trains and 1-12 hours for passenger trains.

Total construction cost of 132.48 km of new main railway lines, and of 15.28 km secondary lines in Turkmenistan, was estimated (in 1991 prices) 433,219,660,000 rubles, out of which, construction and mounting works was 328,197,200,000 roubles, plus cost of other structures and facilities such as: production plants 303,334,210,000 rubles, construction of civil objects 92,027,000 rubles, industrial objects 27,866,510,000 rubles.

Railway transport activities at the border-crossing station will follow the same activities as stated in the Iran-Soviet (former) Agreement for the railway border station in Julfa, according to which each country has to do the transloading and change of bogies at its territory. It means that all handling of freight, containers, wagons, etc. of domestic export or transit goods has to be done at Seraks stations on Turkmenistan side, as well as on the Iranian side. There are costs and also revenues from operations such as: transport costs and revenues of export, import and transit goods, handling charges at border-crossings for changes of wagons bogies with export, import or transit goods, for handling transit containers, compensation for use of wagons adapted to 1,435 mm gauge at Iranian railways etc.

Revenues are calculated for transit goods according to the agreement between two countries.

Following the above principles total revenues of the Tedzen-Seraks railway line from transport of export, import and transit goods were estimated for the year 2000 and 2005, as follows:

Revenues:	Year 2000	Year 2005
Total	63.8 ^{*)}	114.0 ^{*)}
Out of it:		
1. For freight train operations at Seraks station	1.7	2.6
- for wagon bogie changes with export, import and transit goods	1.4	2.1
- for transloading transit goods in containers	0.3	0.5
2. For time the wagons are used by Iranian railways	0.4	0.6
3. For transporting export and import goods on the railway network	4.2	6.3
4. For transporting transit goods on	57.5	104.5

^{*)} in million rubles (1991 year)

The unloading space for railway at Loftabad is established and it is connected to Turkmenistan railway network at Artik station. The loads shall be carried by railway at Loftabad station and from there to Meshad they will be transported, either by rail or road, to other destinations. The distance between Meshad and Loftabad is about 270 km.

The completion of the missing railway link Tedzen-Seraks-Meshad is certainly of paramount importance as railway networks of Central Asia, the Islamic Republic of Iran and Turkey as well as China will be interconnected thus providing the countries in the corridor with an opportunity of direct railway communication, providing a direct rail link to and from Central Asia (and China), as well as to/from Turkey (and onward to Europe).

The construction of a missing link in the Islamic Republic of Iran between Tezerj and Bandar Abbas port has been completed, and this railway section has been officially opened for operation on 18 March 1995.

Improvement of the Central Asian main railway lines is also programmed, as reflected in Table 3.2.

**TABLE 3.2 PLAN FOR THE IMPROVEMENT OF THE
RAILWAY LINES IN KAZAKHSTAN, UZBEKISTAN AND TURKMENISTAN**

NO.	ITEMS	TIME OF COMPLETION YEAR	COST IN Million RB (1991)	LENGTH
1.	Completion work at Druzba Station and reconstruction of the line from Druzba to the border	1990-1997	211.5	87 km switch 12 km main line
2.	Strengthening of the line Aktogay-Druzba	1990-1997	48.0	3.5 km switch 16 traffic lights 165 km commu.
3.	Development of Druzba station and strengthening of Aktogay-Druzba-state border railway line (second stage)	1996-2000	760	304 km
4.	Second line on the section Aktogay-Almaty	2002-2006	591.0	557 km
5.	Electrification of the section-Almaty-Chu	1996-2001	262.0	318 km
6.	Electrification of the section Almaty-Sari-Ozek	1997-2000	136.0	190.6 km
7.	Second line on the section Almaty-Chu	2001-2003	155.0	142 km
8.	Development of telecom. and information systems on section: Druzba-Aktogay-Almaty-Aris-Chengeldi	1995-1998	5.0	1,800 km
9.	Development of marketing and commercial links	1995-2000	-	-
10.	Reconstruction of national sections of the Trans Asian Railway Mainline increasing travel speed of passenger trains (double)	1995-2005	-	-
11.	Modernization and construction of new objects for providing international standard services for passenger and tourist trains	1995-2005	-	-
12.	Construction of a container terminal in Almaty	2002-2005	-	-
13.	Reconstruction of freight terminals for efficient freight handling at stations Almaty, Dzambul and Chimkent	2002-2005	-	-
14.	Electrification of sections in Uzbekistan and Turkmenistan	1994-2000	-	-
15.	Electrification of sections: - Dzizak-Superfosfatnaya - Superfosfatnaya-Buhara	1994 up to 2000	- -	131 km 231 km
16.	Completion of construction of missing railway link Tedzen-Seraks (Turkmenistan)	1996	-	132 km
17.	Completion of construction section Seraks-Meshad (Islamic Republic of Iran)	1996	-	165 km
18.	Strengthening of the Seraks station and electrification of Seraks-Tedzen line	1996-2000	-	132 km

Roads:

Improvement of road network and construction of missing links and rehabilitation of existing roads has been listed as one of key elements (4.1.3) of the ECO Outline Plan to be completed in stages by the year 2000.

According to that, and as access from CAR to the sea ports in the South is at present provided mostly by roads, a number of road projects are in progress either to complete the missing links or improve the network.

Along the road corridor from Turkmenistan to Iranian ports, the road from both side at Gaudan-Badjigiran border-crossing is planned to be improved to allow heavy trucks and containers to cross all year round.

Road improvements at other border-crossing points are also expected to be accomplished, such as the road sections Kizil Atrek-Gudriolum and Seraks-Meshad. Improvements are also to be carried out in the corridor to ports of Bandar Abbas (Meshad-Gonabad-Yazd, and Gonabad-Kerman section), as well as on Zahedan-Chah Bahar port section.

Routes via Afghanistan to Karachi port in Pakistan are in principle the shortest (Fig. 3.9). There is however a great need for rehabilitation of the whole road system, construction of missing links, reconstruction and improvement of the existing roads to provide reliable road transport services. If the situation in Afghanistan is normalized, intensive road infrastructure development activities can be expected.

The Pakistan National Highway Development Programme stipulates the intensive upgrading of the existing and construction of new roads and major highways to meet increasing domestic and also transit needs. Progress is also expected in dualization of highways, upgrading the standards, and increasing the capacity of those sections of national highways that carry traffic to ports. (For example, Indus Highway, National Highway No. 25 Chaman-Karachi, etc). Improvement of sections of the Karakoram Highway is also worth mentioning.

Along with the rail and road infrastructure development, the ports in the Islamic Republic of Iran and Pakistan are also accomplishing their investment programmes to provide sufficient capacities for efficient handling of the growing volumes of Central Asian cargo.

According to adopted Scenario 2, it is expected that the basic improved land transport infrastructure will be in existence by 1997 to provide much better access of CAR to the sea ports in the South and the East. For railways, it is the completion of the two most crucial missing links, namely the Tedzen-Seraks-Meshad and the Sirjan (Tezerj)-Bandar Abbas railway links, both of them of national, subregional, and regional importance. One of those two links, namely the missing railway section Tezerj-Bandar Abbas has been already opened for operation in 1995.

Thus the major transport change to happen during the Scenario 2 period 1996-97, is the establishment of direct railway link from Central Asia to the port of the Bandar Abbas in the Islamic Republic of Iran via Tedzen-Seraks-Meshad-Tehran-Bafq-Sirjan-Tezerj.

The northern corridor of the Iranian land transport network has capability to transport and transit about 5 million tons of goods at the north-eastern borders, and about 3 million tons to the neighbouring CAR at the Caspian Sea shores. This network could be expanded to a great extent in a near future.

The improvement of roads will also significantly contribute to the improvement of the whole land transport in service of transit to/from the sea ports.

In this connection it needs to be kept in mind that the whole land transportation "landscape" will change accordingly, since railways would likely gradually pick up and intercept servicing transit cargo which is at present done by partly or mostly (depending on what corridor and what port destinations) road transport.

Lastly, the pace of growth of the demand for railway services and their use will greatly depend on how aggressive and effective is going to be marketing of newly available railway services under the changed conditions of the free market oriented economies of the all countries concerned.

3.4 Scenario 3 (year 2000 and beyond)

This scenario covers the period from the year 2000 capitalizing on long term planning and the results from implementation of the ECO Outline Plan for the Development of Transport Sector of 1993 and the improvement of the railway line to sea ports of China.

In adopting the Outline Plan the transport ministers of the ECO countries decided to provide the shortest connections of land-locked Central Asian countries to Persian Gulf ports as well as Ports of Karachi and Qasim in Pakistan. Based on the existing by 1997 ECO railway networks, a completion of missing railway links by the year of 2000 is to start with design and construction of the following railway lines:

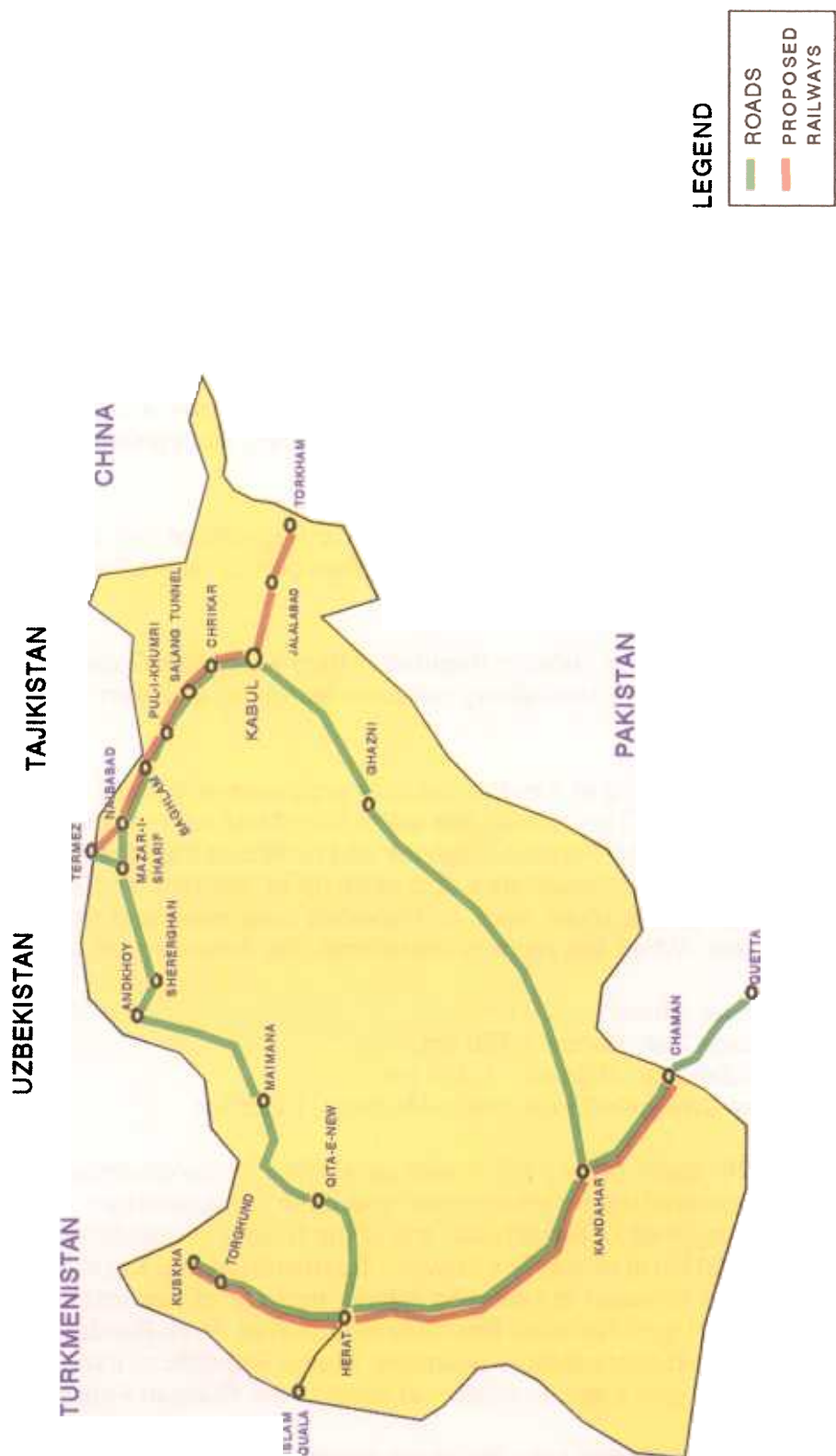
1. Kushka (Turkmenistan) - Herat (Afghanistan) - Kandahar-Chaman (Pakistan);
2. Kerman-Zahedan (Islamic Republic of Iran);
3. Meshad-Bafq (Islamic Republic of Iran);
4. Bandar Torkmen (Islamic Republic of Iran) - Ghizil Atrek (Turkmenistan) Gazandzik.

As regards the railway links from sea ports of Pakistan to CAR via Afghanistan, there are two possible alternative routes (Fig. 3.9):

(a) Missing (approximately 750 km) link from Landikotal (Pakistan) to Termez (Uzbekistan) via Jalalabad, Kabul and Mazar-i-Sharif in Afghanistan. The terrain is mountainous and the alignment will entail sharp curves, steep gradients (requiring banking of locomotives) and has to pass through tunnels at some sections. Even the existing alignment between Jamud and Landikotal (Pakistan) has a steep gradient and sharp curves, requiring reversing of trains with restricted maximum load of 225 tons only.

(b) Missing link (about 800 km) from Chaman (Pakistan) to Kushka (Turkmenistan) via Kandahar and Herat, which would traverse generally plain and semi mountainous area. It would not reportedly make much problem for the construction of the line at moderate cost. There is however a problem in haulage of loads up to 500 tons per train on Sibi-Quetta Section (40 km), where banking engines have to be deployed.

FIGURE 3.9. ROADS AND PROPOSED RAILWAYS IN AFGHANISTAN



THE BOUNDARIES SHOWN AND DESIGNATIONS USED ON THIS MAP DO NOT IMPLY OFFICIAL ENDORSEMENT OR ACCEPTANCE BY THE UNITED NATIONS.

The track gauge of Pakistan railways is 1,676 mm and that in the CAR 1,520 mm. It would thus be essential to provide facilities for transshipment or bogie change of wagons at the break-of-gauge points at Kushka or Chaman, depending which gauge will be adopted in Afghanistan in a future.

A feasibility study and detailed engineering survey of that route is estimated to cost \$US 1.5 million. According to information from Pakistan railway authorities the study would take about one and a half year.

The project itself is estimated to cost \$US 500-600 million approximately.

The Zahedan-Kerman 540 km railway link is the missing section in the Iranian network to provide connection to Pakistan. In addition simultaneous and coordinated action is required to upgrade the Quetta-Taftan section in Pakistan. Both governments are mobilizing resources to accomplish the tasks.

The Meshad-Bafq railway link in the Islamic Republic of Iran is also under study to provide connection between CAR and Bandar Abbas port, once the Tedzen-Seraks-Meshad railway link is completed.

The Bandar Turkmen (Islamic Republic of Iran)-Kizil Atrek-Gozandzil (Turkmenistan) railway link will connect the two railway networks along the southern coast of the Caspian Sea.

The Islamic Republic of Iran has put in its programmes a study of a railway line from Meshad to Chah Bahar. This railway line starts from Meshad and after passing Torbat-e-Heidarieh reaches Bajestan-Ferdous-Dayhook and continues from the most eastern point of Loot desert crossing Nosratabad area and ends up at Iransahr and Chah Bahar. From Dayhook a branch of this route leads to Parvadeh coal mine and from there it goes to Chadarmaloo mine. When this route is operational, the distances will be as follows:

Seraks-Bafq-Bandar Abbas: 1,700 km

Seraks-Nosratabad-Chah Bahar: 1,750 km

Seraks-Bajestan-Zahedan-Mirjaveh: 1,430 km

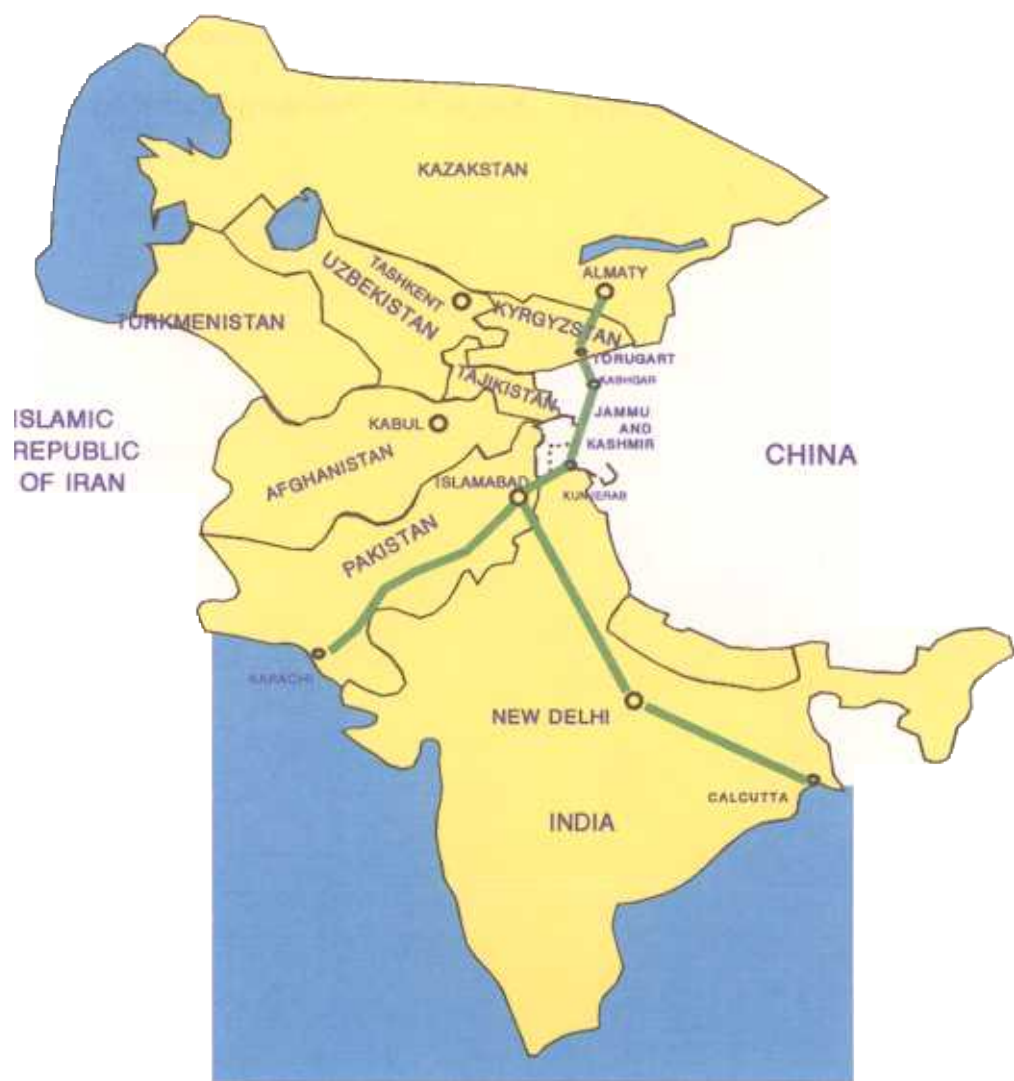
Mirjaveh-Zahedan-Dayhook-Chadormaloo-Meybod: 1,295 km

A new north-south railway line is also considered for construction between Turkmen Bashi (former Krasnovodsk) in Turkmenistan and Uzen in Kazakhstan. Uzen is connected with the main railway lines of Kazakhstan and of the Russian Federation. The construction of approximately 650 km of railway link between Turkmenistan and Kazakhstan would reduce the railway distance between the existing railway network of two countries by more than 1,500 km. The line Uzen-Turkmen Bashi-Gazandzik-Kizil Atrek-Bandar Torkmen (Islamic Republic of Iran) would connect three countries: Islamic Republic of Iran, Turkmenistan and Kazakhstan and also give them an additional outlet to the Russian Federation and Europe.

Construction of missing links and reconstruction of existing parts of the road network will be continued from period 1995-97 and completed by stages, as programmed in the national development plans. There are four major routes from CAR to ports in the Islamic Republic of Iran and Pakistan via Afghanistan and China:

1. Almaty-Bishkek-Tashkent-Termez-Hairaton-Mazar-i-Sharif-Kabul-Jalalabad-Peshawar-Karachi;
2. Almaty-Bishkek-Tashkent-Termez-Hairaton-Herat-Islam Qala-Meshad Persian Gulf;
3. Herat-Frah-Kandahar-Helmand-Karachi, also, Kandahar-Zahedan;
4. Almaty-Torogart-Kashgar (China)- Kunjerab (Pakistan)-Islamabad-Karachi (Fig.3.10).

FIGURE 3.10. ROAD CONNECTIONS:
ALMATY-KARACHI-CALCUTTA



DOTTED LINE REPRESENTS APPROXIMATELY THE LINE OF CONTROL IN JAMMU AND KASHMIR AGREED UPON BY INDIA AND PAKISTAN. THE FINAL STATUS OF JAMMU AND KASHMIR HAS NOT YET BEEN AGREED UPON BY THE PARTIES.

THE BOUNDARIES SHOWN AND DESIGNATIONS USED ON THIS MAP DO NOT IMPLY OFFICIAL ENDORSEMENT OR ACCEPTANCE BY THE UNITED NATIONS.

DISTANCE FROM	
ALMATY TO:	KM
ISLAMABAD	1,790
KARACHI	3,240
NEW DELHI	2,590
CALCUTTA	3,940

The Pakistan Highway Authority has also in its programme to reconstruct and improve the sections of the 806 km Karakoram Highway from Kunjerab (border with China) to Hassanabdal.

Road connection from Almaty to Islamabad is providing the shortest land transport link of Central and Northern Asia with the sea port of Karachi. The distance from Almaty to Islamabad by road is 1,776 km (of which 126 km in Kazakhstan, and 440 km in Kyrgyzstan).

From Islamabad there are two options: to port of Karachi (1,450 km) and via New Delhi to port of Calcutta (approximately 2,150 km). The 61 km section from Almaty to Uzun-Agach is on the main highway to Tashkent. The section to Bistrovka (88 km) is mountainous, climbing up to 2,400 m above the sea level. The road is narrow, needs widening, some engineering structures, improving drainage systems and protection galleries from avalanche.

The Bistrovka-Torogart section (border with China) is of III and IV technical category, but new 40 km construction is needed (see Annex III for technical standards).

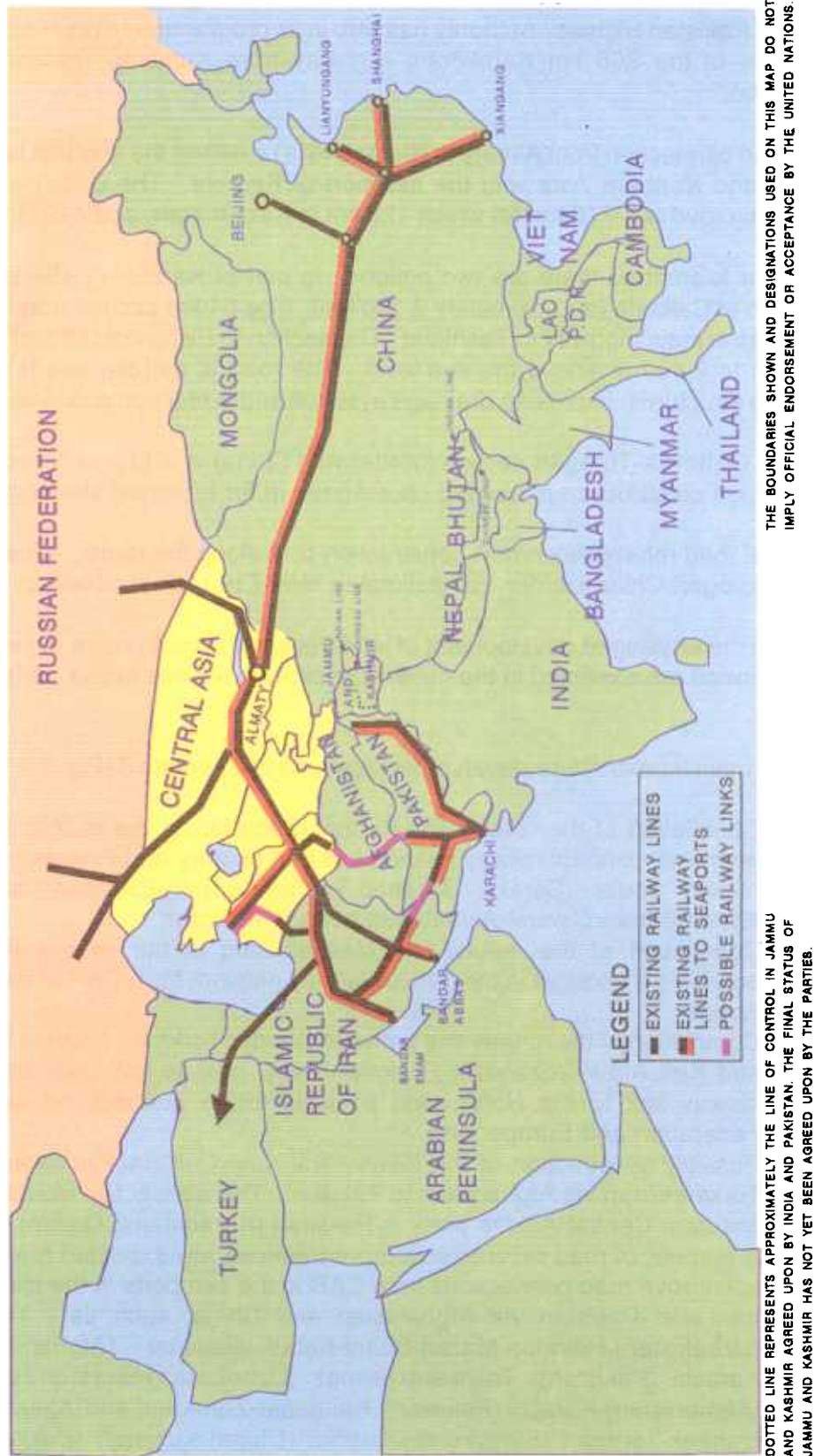
Total road rehabilitation/new construction cost along the route: Almaty-Uzun Agach-Bistrovka-Torogart-China border was estimated total 719 million rubles (in 1991 prices).

With the envisaged development of land transport infrastructure in year 2000, no new routes in general are expected in the network to provide access to sea ports in the South or East.

The main infrastructure development features of Scenario 3 (Fig. 3.11) are as follows:

- (a) Completion of the railway link Kerman-Zahedan in the Islamic Republic of Iran which will connect railway networks of that country and Pakistan thus providing a railway route (Seraks, Meshad-Tehran-Kerman-Zahedan-Kohitaftan-Quetta-Karachi) from Central Asia to sea ports in Pakistan.
- (b) Completion of the railway link Meshad-Bafq in the Islamic Republic of Iran providing a shortcut in the Iranian railway network from CAR to the port of Bandar Abbas.
- (c) Completion of the railway line between Bandar Torkmen (Islamic Republic of Iran) and Kizil Atrek-Gozandzik (Turkmenistan), next to the Caspian Sea, providing railway link to the North, with possible future connections with the Russian Federation and Europe, and
- (d) Possibly construction of the railway link Kushka-Herat-Kandahar-Chaman from Turkmenistan via Afghanistan to Pakistan. This connection would provide a direct link from Central Asia to ports in Pakistan (Karachi and Qasim).
- (e) A number of road reconstruction programmes are expected to be accomplished to improve road connections from CAR to the sea ports in the Islamic Republic of Iran and Pakistan via Afghanistan and China, such as: Tashkent-Termez (Uzbekistan)-Hairaton-Mazari-Sharif-Kabul-Jalalabad (Afghanistan)-Peshawar-Karachi (Pakistan); Tashkent-Termez (Uzbekistan)-Hairaton-Herat-Islam Qala (Afghanistan)-Karachi (Pakistan); Kandahar-Zahedan; and, Almaty (Kazakhstan)-Bishkek-Torogart (Kyrgyzstan)-Kushka (China)-Kunjerab (Pakistan)-Islamabad-Karachi.
- (f) Improved railway route linking Central Asia with sea ports of China.

FIGURE 3.11. SCENARIO 3: (YEAR 2000 AND BEYOND) RAILWAY CONNECTIONS



3.5 OPERATIONAL ASPECTS OF RAILWAY OPTIONS

In general for long distances and low value goods land transport services can be economically provided only by railways. Railways are expected to satisfy the needs for transportation of raw materials and containerized goods from the Central Asian subregion, and it is correct to expect that freight trains and container block trains will handle the long distance traffic.

At present there is no railway link between Central Asia and sea ports in the South.

Railway connection from Central Asia to sea ports are available only to the East. The Druzba-Urumqi-Lianyungang (Kazakhstan/China) railway line with a temporary schemes of operations, provides twice a week regular passenger train services from Almaty to Urumqi and back. Freight services are limited and restricted to Kazakhstan and western province of China only. The border-crossing of Druzba features also a railway break-of-gauge problem (1,520 mm in Kazakhstan and 1,435 mm in China). Absence of regular operational schemes of railway operations is due to present technical limitations of the line and border-crossing stations at Druzba and Alatan Shankow, as well as coordination problems in providing services between China and Kazakhstan railway authorities. In addition, application of higher tariffs on this line is diverting the traffic to much longer route via the Trans-Siberian line to the Russian sea ports of Nakhodka and Vostochni in the East.

However, an agreement between China and Kazakhstan railways has been signed on 4 June 1994, on railway operations along the whole railway line, and container train services of one 45 TEU container train a week could be practically available within a short period of time.

The volume of cargo traffic by rail between Kazakhstan and China reached 525,000 tons in 1994.

The railway line Druzba - Urumqi has the fixed timetable for passenger trains and provides twice a week round connection service between those two destinations.

The transit traffic of freight trains between Turkmenistan, Uzbekistan, and Russian Federation and China has started and is developing across the border at Druzba-Alatan Shankow.

As mentioned earlier in Scenario 2, by 1996-7, (when the missing railway link Tedzen-Seraks-Meshad will be established) Central Asia will have rail access to sea ports in the South, along the corridor Almaty-Tashkent-Seraks-Meshad-Tehran-port Bandar Emam and/or port Bandar Abbas. The main line will have the technical capacity to handle passenger and different categories of freight trains. Due to difference in railway gauges at Seraks station on both sides (Turkmenistan - 1,520 mm and Islamic Republic of Iran - 1,435 mm) an appropriate equipment (like in the case of Kazakhstan/China route) to change the wagon wheels/bogies will be installed, along with transloading equipment to facilitate border-crossing traffic.

It is envisaged that about 25 percent of the forecasted freight volume of the railway traffic may be container transport, with gradually increasing volume of box traffic from Central Asia to sea ports.

To achieve maximum benefits, container unit/block trains within the national railway network boundaries should have priority in operational schemes. Therefore average train speed and delivery time should be respectively higher, and lower at least by 20 per cent as compared with those of original freight trains, as maximum advantages are expected to be given to container movement using technical, organizational and managerial means. At international border-crossing points (in our case at Seraks and Druzba stations) an additional problem may arise, i.e. the use of rolling stock across the border. For technical arrangements to adjust the wagon wheels for rolling stock crossing the border (at break-of-gauge point) or transloading freight or containers at those stations, etc. sufficient infrastructure capacity must exist. The development of such facilities on both sides of a border is required to improve services and cut delivery time.

Assurances were given by the competent railway authorities in Turkmenistan and in the Islamic Republic of Iran that by the completion of this railway missing link between the two countries all the required facilities will be in place and operational.

Maximum utilization of the length of track sidings at the stations and terminals has to be given proper attention because it will determine the maximum number of wagons and containers in the train.

For a 30 bogie container flat car the minimum crossing loop length is 670 metres.

With the average load factor 2.5 container in a flat car, a 50 bogie car container train will carry 125 TEU or 75 TEU respectively for a 30 bogie car container train.

The railway operational schemes in the corridor to the South can only be practically formulated when the missing link between Turkmenistan and the Islamic Republic of Iran is accomplished, i.e. after 1996, and when the tariffs on the railway system are worked out and agreed upon. This exercise is already under way as far as the corridor to the East is concerned.

In general the anticipated operational schemes for railways will depend on the accomplishment and availability of the physical infrastructure with necessary technical capacities on one side, and on future traffic volume growth on the other. While the first is being secured, the traffic growth needs to be forecasted.

3.5.1 Traffic Forecast

Based on information received from railway authorities in CAR (Kazakhstan, Uzbekistan and Turkmenistan) the volume of traffic during first year of operation in the corridor (at Seraks station) to the South will be close to 1.5 million tons. This volume includes imports, exports and transit both ways.

The traffic forecast for the first ten years of operation has been developed in three variants: "optimistic", "pessimistic" and "medium", the latter representing the most likely forecast.

The "optimistic" forecast anticipates higher growth rates of traffic in the first few years, assuming the presence of the existing potential traffic volumes, diverted traffic from other modes, and new generated traffic. The traffic growth rate after year 2000 is assumed to be a constant growth of 5 per cent per annum.

The "pessimistic" forecast starts with 1 million tons of traffic in the first year of railway operation with a constant growth rate of two per cent per annum over the period of ten years.

The "medium" forecast follows the most likely traffic development behaviour. There are roughly three periods in the first ten years of operation of the railways. First 2-3 years, when the traffic will remain constant because of the transitional period and adaptation of the system to new capacity and operations. (For example, a provision of sufficient rolling stock is unknown). In the second five year period (1998-2002) traffic will presumably grow from 5 to 7.5% per annum as a result of the new generated and diverted traffic, as well as of the new railway system's ability to handle the traffic. In the years after 2002 a permanent growth rate of 3% per annum is anticipated.

The "medium" traffic forecast will be used in further analysis.

RAILWAY TRAFFIC FORECAST IN CORRIDOR TO THE SOUTH (Seraks Station)

YEAR		OPTIMISTIC		MEDIUM		PESSIMISTIC	
		000 t	Rate of growth %	000 t	Rate of growth %	000 t	Rate of growth %
1	1996	1500	8	1500	-	1000	2
2	1997	1620	8	1500	-	1020	2
3	1998	1750	9	1575	5	1040	2
4	1999	1890	9	1653	5.5	1080	2
5	2000	2000	5	1732	7.5	1102	2
6	2001	2100	5	1784	7.5	1124	2
7	2002	2205	5	1891	7.5	1146	2
8	2003	2315	5	2033	3	1169	2
9	2004	2431	5	2094	3	1192	2
10	2005	2553		2157		1221	

Container trains

If 10 % of the forecasted volume of traffic is containerized in 1996, 20% in year 2000, and 25% in year 2005, the volume of container traffic would be as follows:

Year	Medium traffic volume forecast (in 000 t)	Containerized volume (in 000 t)
1996	1500	150 (10%)
2000	1732	346 (20%)
2005	2157	539 (25%)

Under assumptions, that:

gross load per TEU is 13.5 tonnes;

30 bogie vehicles can be accommodated in 1 container train;

2.5 containers in a wagon, in total 75 TEU per train;

container train operations are provided 300 days in a year, (as an average working days in container business in a number of countries in the region); the anticipated volumes of container traffic are shown in the following table:

**CONTAINER TRAIN FORECAST IN
CORRIDOR TO THE SOUTH (SERAKS STATION)**

	1996	2000	2005
Containerized traffic volume in 000 tonnes	150	346	539
TEU	11,100	25,630	40,000
Container trains per year	148	342	533
Container trains per day	0.5	1	2

The number of container trains may be higher than the numbers indicated in the forecast due to usual imbalance of loaded and empty container traffic.

The future container traffic forecast is based on the presence in traffic of the commodity categories that can be containerized.

An indication could be volumes of major Central Asian commodities moved by rail in 1990, reflected in a following table:

million tonnes			
Commodities	in	out	Total
1. Coal	12	9	21
2. Oil products	27	16	43
3. Ores	4	3	7
4. Iron of steel	5	2	7
5. Forestry products	10	-	10
6. Construction materials	48	55	103
7. Cement	7	6	13
8. Fertilizers	8	5	13
9. Grain products	11	3	14
10. Other	27	24	51
TOTAL	160	122	288

Source: The Euro-Asian Corridor: Strategic Issues in the Transport, Telecommunications and Energy Sector, Consultant's Report EBRD, July, 1993. page 34.

As can be seen from the table, the traffic was dominated by low value and bulk commodities. Of the total 288 million tons carried, only 51 or 18% was the "other" category, covering relatively high value processed manufactured and "general" cargo, including cotton. It should be noted that 60 per cent of traffic was inter-regional, with about 50 per cent for construction materials and almost 20 per cent for coal and oil products.

For the purpose of the railway container traffic forecast, special consideration is given to commodities that can be containerized in the future. There are items of higher value categories from commodity groups, such as: "other" including a number of manufactured goods. The penetration rate of containers will also depend on readiness of manufacturers and traders to use containers for transport of their products.

If the container traffic by the year 2000 constitutes 20% and in 2005 increases to 25 per cent from the "medium" traffic volume forecast, the number of container trains may reach 1 per day in year 2000 or 2 per day in year 2005.

Freight Trains

The forecasted non-containerized traffic will be handled by freight trains. The number of freight trains per year and per day are anticipated under the following assumptions:

1. Train length for non-container trains will be the same order of magnitude as container trains, i.e. 576 metres for the wagon portion;
2. Axle load 20 tonnes;
3. Typical length for bottom discharging bulk wagon is 15 m;
4. Number of wagons per train: $\frac{576}{15} = 38$;
5. From assumption (2) maximum mass per wagon is $(4 \times 20) = 80$ tons minus assumed 22 ton tare, i.e. payload is $(80-22) = 58$ tons.
6. Assumed 80 per cent of payload capacity can be utilized by the bulk commodities carried, i.e. $58 \times 0.8 = 46$ tons per wagon;
7. From (4) and (6), the train payload will be $38 \times 46 = 1748$ net tonnes.

If the loading balance is one way empty, the number of trains are doubled. Necessary corrections should be calculated on the base of real practices.

FREIGHT (NON CONTAINER) TRAIN FORECAST FOR CORRIDOR TO THE SOUTH

	1996	2000	2005
- Non-containerized traffic volume in 000 tonnes	1,350	1,385	1,618
- Freight trains per year	772	792	926
- Freight trains per day	2.6	2.6	3

Analysis shows that the forecasted cross-border volume of traffic in the year of 2000 can be handled by 1 container train and 2.6 freight trains, or in year 2005 by 2 container trains and 3 freight trains per day. If the loading balance is 60% loaded and 40% empty, the

number of trains per day will increase. In a year 2000 to 1.6 container trains and 4 freight trains; or in a year 2005 to 3 container trains and 5 freight trains.

Technical facilities at Seraks station (please see Scenario 2 above) can easily accommodate the above forecasted number of trains.

3.5.2 Rail, Rail-cum-Road Routes

Present position

In the absence of rail infrastructure to provide direct freight transport services from CAR to sea ports in the South, the existing transport flows move along the combined rail-cum-road-cum-rail routes, using the advantages of both rail and road transport services. Direct road transport services are also in practice.

The existing combined rail and road routes from Central Asia to sea ports in the **South**, are the following;

1 To Pakistan

a) TURKMENISTAN - Kushka - AFGHANISTAN - Chamam - Karachi PAKISTAN
Rail ----- Road ----- Rail

b) TURKMENISTAN - Ashgabat - IRAN - Zahedan - Karachi PAKISTAN
Rail ----- Road ----- Rail

c) UZBEKISTAN - Termez - AFGHANISTAN - Peshawar - Karachi PAKISTAN
Rail ----- Road ----- Rail

d) KAZAKHSTAN - Kunjerab PAKISTAN - Rawalpindi - Karachi PAKISTAN
KYRGYZSTAN
CHINA
Road ----- Rail

2. To Islamic Republic of Iran

a) TURKMENISTAN- Ashgabat - Meshad/Gorgan - Bandar Emam Islamic Rep. of IRAN
Rail ----- Road ----- Rail

b) TURKMENISTAN - Ashgabat - Meshad/Gorgan - Sirjan - Tezerj - Bandar Abbas
Rail ----- Road ----- Rail ----- Road

base of shipments to and from CAR to Pakistan via Islamic Republic of Iran using road or rail-cum-road transport services.^{*/}

^{*/} Beshir Ahmed and Co. (Reg.). Relates based on 1 x 20 foot container, weight up to 10 metric tons or up to 30 cubic meters.

Related costs of rail and rail-cum-road transport services on the above-listed mentioned routes differ from case to case due to frequent changes in rates and prices of transport services. Based on information received related cost estimates are made on the

For road transport services estimated freight charges to and from Karachi port and destinations in Central Asia are the following:

Country/City	Freight charges in US\$	Distance km	Cost per	
	per TEU		TEU km	ntkm
TURKMENISTAN,	2,050	2,690	0.762	0.056
Ashgabat	2,800	3,999	0.700	0.052
UZBEKISTAN, Tashkent	2,900	4,988	0.584	0.043
KAZAKHSTAN, Almaty	3,350	4,708	0.711	0.052
TAJIKISTAN, Dushanbe				

For rail freight rates Pakistan railways are using from Karachi to Kohitaftan (Iranian border, a distance of 1,378 km) the following rates per one ton in US\$: rice 38.56; cotton yarn 48.33; textiles 48.33; leather 40.00; wheat 52.16; cooking oil 47.60; tea 46.00; cotton thread 47.80.

For the study an average of US\$ 48 per ton could be used, as based on figures relating to major commodities transported.

For the purpose of comparison the estimated railway cost per TEU km is US\$ 0.47, or US\$ 0.0348 per ntkm.

Existing railway routes from Central Asia to sea ports in the East are from Kazakhstan via Druzba-Urumqi line to sea ports in China, or via Trans-Siberian line to Nakhodka sea port in the Russian Federation.

On the base of present charges for transport services in China, a 20 foot container road charge is US\$ 0.7 per km (TEU = US\$ 0.7 per km), or US\$ 0.052 per ntkm.

China Railways are charging US\$ 1,000 for shipment of a 20 foot container from the port of Lianyungang to Alatan Shankow (4.134 km), making a railway transport cost of a TEU = US\$ 0.24 per km or US\$ 0.018 per ntkm, which reflects transport costs only.

3.5.3 Transportation of containers

In principle, much of the future freight traffic which could be generated in and outside Central Asia is likely to be container traffic. This applies to all corridors.

Route to the sea ports in the East is in fact the Druzba-Alatan Shankow-Lianyungang railway line in China.

Alatan Shankow-Druzba stations already have limited container handling facilities which make container handling at limited volumes possible. Arrangements between Kazakhstan and China railway authorities are under way for better utilization of existing capacities for container train transport and also foreign assistance is being used to improve and speed-up handling of containers.

With the above improvements an increased number of container trains, towards Central Asia and in transit via Central Asia to Islamic Republic of Iran/Europe, as well as to the Russian Federation/Europe is expected in the near future.

The railway route from Druzba via Almaty-Tashkent-Parahat-Seraks to Meshad (Islamic Republic of Iran) have another break-of-gauge point (1,520/1,435 mm) at the Seraks station (at present under construction) and the equipment being installed will provide for efficient handling of container movement, as well as of the break-of-gauge problem.

Container train operations on the railway line Lianyungang-Druzba-Central Asia are possible but are not yet widely practiced. At present containers are not passing through the Alatan Shankow station. The capacities and technical conditions on the Lianyungang-Alatan Shankow line allow one container train to pass everyday. The Lianyungang port is intensively developing its container handling and inter-modal facilities. The Sinatrans Lianyungang company has recently established several container terminals to develop door-to-door services in order to intensify container use on the main railway line. Lianyungang is expected to be a Far Eastern Terminal of the cross-continent landbridge to link Europe with the Far East.

Container traffic charges on this line will inevitably be set to compete with linear shipping by sea and with the northern railway (Trans-Siberian) route.

To promote, develop and operate rail container transport services, assurances have been given from countries involved to provide access to sea ports South and East, that 20 foot ISO containers are accepted as standard containers all along the main railway corridors, and technical capacities of the railways will allow to facilitate that movement.

Container traffic in the former USSR was well developed, also in the Republics. A network of container terminals was set up and maintained by railways. The whole infrastructure was oriented to handle ISO 20 foot and non-ISO domestic containers of varying dimensions. It reportedly continues to work that way.

Following is the number of container terminals in CAR:

Kazakhstan	3
Kyrgyzstan	6
Tajikistan	1
Turkmenistan	3
Uzbekistan	11

Detailed information about these terminals is provided in Annex VI

At present, except for the two terminals in Kyrgyzstan, all are used mainly by railways who owns and operates them. In fact, there is little evidence of any long haulage container movement by road in the past. The situation will change with the emergence of new

connections in the eastern and southern corridors, however, more visible movement of containers by road is yet to develop.

Access from CAR to sea ports in the South is provided by combined rail-cum-road or road transport only.

From Iranian ports limited number of 20 and 40 foot containers are crossing the Turkmenistan border by road at Gudriolum, Loftabad and Seraks. Twenty foot containers are being transported by road from Karachi port to Afghanistan (or rail-cum-road: Karachi-Peshawar by rail, and from Peshawar onwards to Afghanistan by road) and to Uzbekistan (Karachi-Tashkent by road).

Container movement by road has recently shown a slightly increasing trend by carrying, in general, to CAR consumer goods and cotton in return. ISO Containers are moving mainly from the United Arab Emirates and Turkey, transiting Iran to Turkmenistan, Uzbekistan, Kazakhstan, Armenia and Azerbaijan. Containerized goods to CAR are: medicines, tea (from India), electronics, tyres, vegetable oil, cigarettes, powdersoup (from Dubai and Singapore to Afghanistan and Turkmenistan), frozen chicken and soft drinks (from Turkey) etc. Non-ISO standard containers are also in use.

The cost of 40 foot container round trip by road from Bandar Abbas port to Ashgabat is US\$ 2,555, to Tashkent US\$ 3,250-3,500. Cost of an non-ISO container, one way, is US\$ 800-1,000. In some cases however container owners are reportedly reluctant to use ISO containers, so they buy non-ISO standard containers and use them one way only. This is a frequent case due to unsafe return and damages of containers.

The fact that within the CAR national railway networks, the ISO and non-ISO containers of different size were and still are in use, means that for international container transport, along the corridors to the South and the East, the whole infrastructure needs to be re-oriented.

The positive fact is that, as stated before, assurances from countries along the East and South corridors have been given that ISO 20 foot standard containers are accepted, and the railway technical standards will make in international container transport feasible and efficient.

The whole container transport issue is an area for further detailed studies to fully develop the system.

In general, the containerization scene in Central Asia may be described as follows:

Railways have been mainly involved in the carriage of containers. They are maintaining a number of container terminals at different locations. The condition of handling equipment is not well known.

The existing infrastructure is oriented to handle ISO 20 foot and non-ISO domestic containers.

For future international railway container transport only 20 foot containers are commonly accepted. Limited movement of 40 foot units is also possible on a member of railway sections.

The railway link between Kazakhstan and China can handle 160 TEU in 24 hours at Druzba station .

Natural conditions at Druzba station are difficult and at present affect handling of containers. Plans have been drawn to construct a closed terminal and negotiations are underway to use foreign technical assistance.

There is no regular container traffic between China and Kazakhstan, however, an Agreement has been signed between Kazakhstan and China authorities on June 4th 1994, regarding the regular railway operations including container movement between two countries.

The future railway border-crossing station between Turkmenistan and Islamic Republic of Iran at Seraks will have adequate infrastructure to handle containers. The railway link completion is targeted by 1996.

The role of roads in carriage of containers has been limited in the past. This, however, is changing and some container movement is taking place.