

Transport Sector in Mongolia :

It's Current Status and Long Term Highway Development Program

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I. Introduction

This paper first presents overview of the geographic, social, political and economic background of Mongolia which is to be followed by the overall Mongolian transport sector in brief and air and railway sub-sectors. Then presented are road transport sub-sectors and further the long term highway development program, known as "Millennium Road Project", will be introduced which has been recently ratified by Parliament for strengthening the transport sector aiming at further socio-economic development of Mongolia.

II. Geographic and Social Background

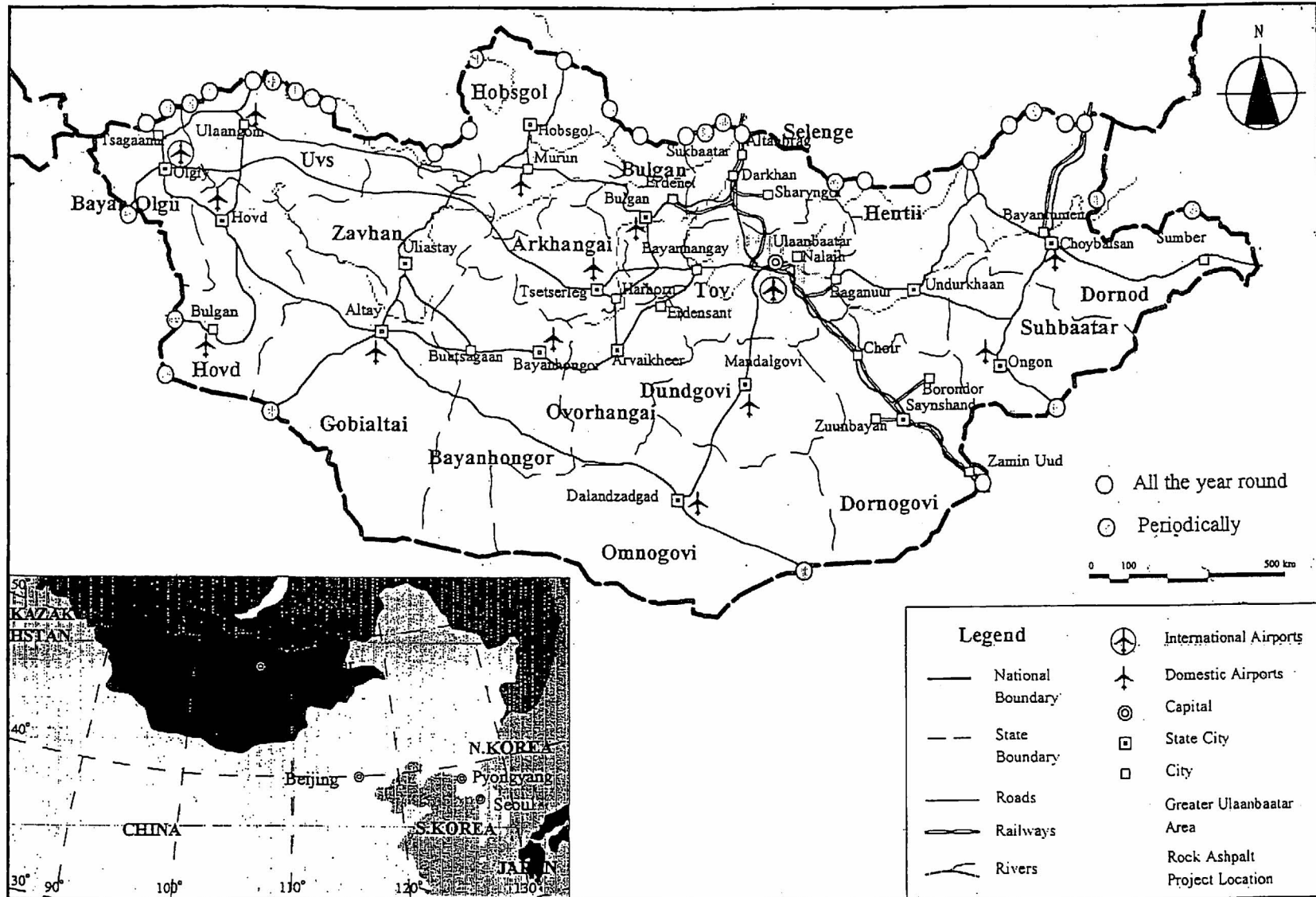
Located in Central Asia, Mongolia lies between Russia in the north and the People's Republic of China (PRC) in the east, west and south. With a total area of 1,564 thousand sq km, Mongolia is the fifth largest country in Asia and the seventeenth in the world. Mongolia is, on average, 1,580 m above sea level. The Yellow Sea, which is more than 700 km from its eastern border, is the closest access to ocean shipping (Map 1). In contrast to its huge landmass, the population of Mongolia is small (2.41million in 2000), and population growth rate is low (1.4 percent per annum).

Key features of Mongolia's climate include : (i) sharp variations in temperature not only during the seasons of the year but also during the day ; (ii) constant, high atmospheric pressure ; and (iii) low humidity. The average yearly temperature is below the freezing point over much of its territory, except for the eastern and

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Map 1 Location of Mongolia, Main Transport Network

southern regions, which have a yearly average temperature of +4C'. Mongolia's mountainous terrain plays a major role in determining climatic conditions. There are grazing lands with lush, grassy growths and forests on the windward slopes of the mountains, which receive substantial moisture, up to 400 millimeters (mm) of precipitation per year. A large part of Southern Mongolia receives only 100 to 200mm of precipitation.

The capital city of Ulaanbaatar is in the north central part of the country and accounts for 25 percent of the country's population. The other major urban centers are Darkhan, Erdenet and Choibalsan, all of them are located in the north. The rest of the country is largely pastoral, with animal husbandry (sheep, goats, cattle, camels and horses) being the main economic activity.

The country is divided into 22 administrative units including Ulaanbaatar (UB), the capital city and 21 provinces known as aimags in Mongolian Language.

The main ethnic group is Khalkha Mongol (80 percent). Kazakhs, in the western part of the country, are the largest ethnic minority group (5 percent). Durbet and Buryat Mongols are other significant communities.

The lingua franca is Mongolian, which uses the Cyrillic script. As part of the cultural revival process that has accompanied recent political and economic developments, the Government has decided to revert to the traditional script. The practice of Lamaist Buddhism, which was dormant under the socialist regime, has been revived recently.

Mongolia was characterized by a feudal, nomadic and agrarian society until the early 1920s. Two features of the social life in Mongolia are striking. First, there is a vast difference between the living conditions and facilities available in the urban areas, notably Ulaanbaatar, and in the rural pasture lands across the wide expanse of the steppes. On the steppes, the life in the felt-covered tents of nomadic herdsman, transport modes have been mainly the horse and the camel until recently and eating habits (mainly a meat and milk based diet) have not changed during the last several centuries. But recently, some evidence of rural development is to be seen.

Mongolia is a land of numerous lakes. Most of lakes are situated relatively high above sea level in the northwest. The lakes differ in size, origin and salinity. The major lakes include: (i) the Uvs, the largest saline lake without an outlet, having an area of 3,350 sq km; and (ii) the Khovsgol, the largest (2,620 sq km) and deepest (238m) freshwater lake in Mongolia, which is filled by the flow of 46 rivers. Large nonsaline lakes are generally rich in fish, while saline lakes are sources of

table salt, sodium sulfate and soda.

III. Natural Resources

Geological explorations have identified more than 80 types of mineral ores in Mongolia. The most important of which is coal and lignite, oil and oil shale, iron ore, ores of nonferrous rare metals and fluorite. Large deposits of graphite and construction materials (marble, gypsum, limestone, granite, mineral dyes, quartz sands and others) have also been discovered.

In terms of volume and variety of mineral resources Mongolia ranks among Asia's potentially richest countries. However the viability of developing much of this natural wealth is yet to be clearly established.

Several major rivers of Asia have their origin in Mongolia including the Yenisei, the Irtysh and the Selenge. Most rivers flow through mountainous terrain with steeply sloping beds and rapid currents. Because of the mountainous terrain, there is a great potential for the development of hydropower in the north. The principal sources of water for the rivers of this region are rains; melt waters make up only 15-20 percent of the yearly runoff. To the south, the shallow watercourses of the Gobi are fed almost exclusively by subterranean water. Many rivers are used as sources of water for livestock and for the irrigation of fields and pastures.

IV. Current Economic Profile

The main industry is livestock and crop. Most of rural households with private cattles are engaged in livestock production whole year and earn income for their lives from its products. Main grains of crop production are cereals, potatoes, vegetables and fodder. Individuals and enterprises that are engaged in crop production earn income by supplying the crop to enterprises of food products.

Centralization of the industry and population and unsatisfactory provision of social and economic infrastructures which have been inherited from the former regime of centrally controlled socialist economy has brought certain difficulties to the population in the remote areas and gobi regions during the current transitional period to market economy. According to the statistical survey as of 1999, there was rise of 10% in all-item consumer prices with the highest rate of 27.4% in transport and communication sector mainly because of long-distance from the market and

poor road conditions. In 1999 the output of livestock production amounted to 43 million tugrug (tug), 12% increase compared with the previous year, with the number of livestock reaching 33.6 thousand. Compared with the previous year, the 1999 crop output declined by 6.6% mainly because of hot summer.

The industrial sector produced 491 billion tug worth of products in 1999 and the sectoral value added was 19.7% of GDP. Industrial output increased by 1.3% in 1999, compared with the previous year, mainly because of favourable performance of mining sector which consists of coal, petroleum and natural gas, metal ores, and quarry. Also included in the industrial sector are manufacture of food products and beverages, textiles, apparel, tanning and dressing of leather, woods and wooden products, chemicals and chemical products, rubber products, non-metallic products, furniture, and electricity and thermal energy generation. In 1999 the output of industrial products consisted of; mining of metal ores 43%, manufacture of food products 12%, manufacture of textiles and apparel 9%, electricity and thermal energy generation 18%, mining of coal and others 11%, and other industrial products 7%. In 1999 the volume of the external trade reached to 871 million US dollar, with exports 358 million dollars and import 513 million dollars. Trade deficit was 154.5 million dollars, decreased by 3.6 million dollars compared with the previous year. Main export commodities consist of copper, molybdenum, flour-spar, coal, cement, timber, sawn wood, camel wool, goat down, cattle hide, horse skin, sheep and goat skin, bonedust, knitted goods, qualified steel, leather, chevette, leather clothes, carpets, woolen fabrics, woolen blankets, marmot skins, wheat, vodka, meat, and intestine. Mongolia exports its products to 26 countries of which main trade partners are PRC, United States, Russian Federation, South Korea, Italy, United Kingdom, and Japan.

V. Transport Sector

While transport sector consists of three modes: (i) air transport, (ii) rail transport and (iii) road transport, in this chapter an overview of transport sector excepting road transport is introduced. Road transport is reviewed in more detail in the following chapter.

Ministry of Infrastructure (MOI), Government of Mongolia plays a dominant role in the stewardship of transport sector and policy making body. Its organization chart is given in Figure 1. As shown, the Roads-Transport-Information-

Communications Tourism Policy and Coordination Department conducts strategic planning and policy development for all modes of transport including roads. The MTZ, Mongolian Railways, is administered through the Railways Administrative Department. The Civil Aviation Department administers MIAT, the Mongolian national airlines and airports. The Transport department enforces the regulation of road transport and river transport. The Department of Roads administers the State Roads network.

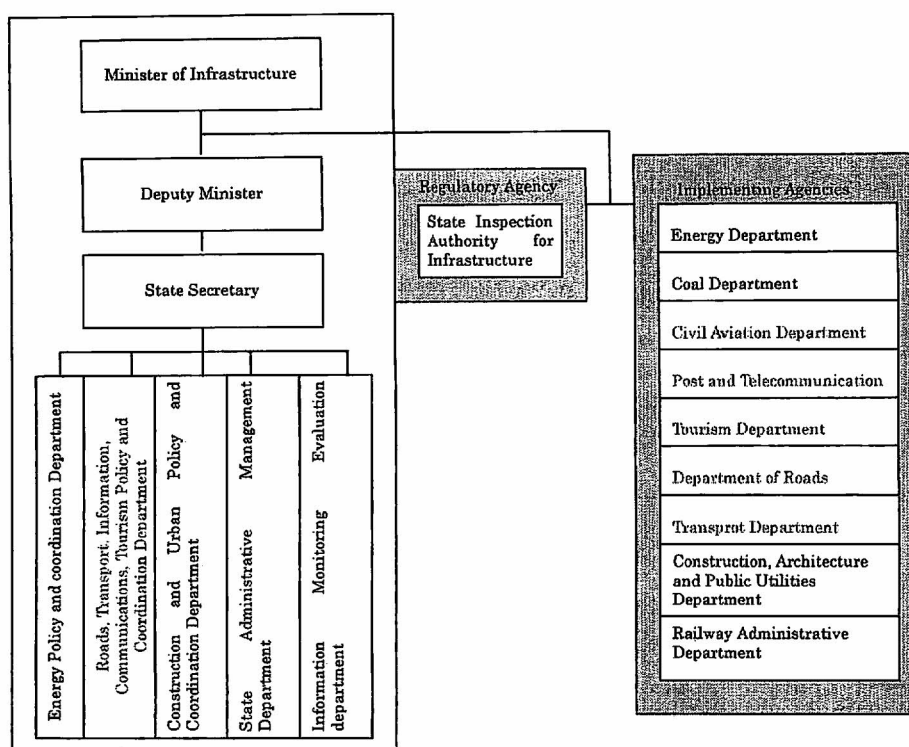


Figure 1: Organization Chart of Ministry of Infrastructure

5.1 Pre-transitional Period

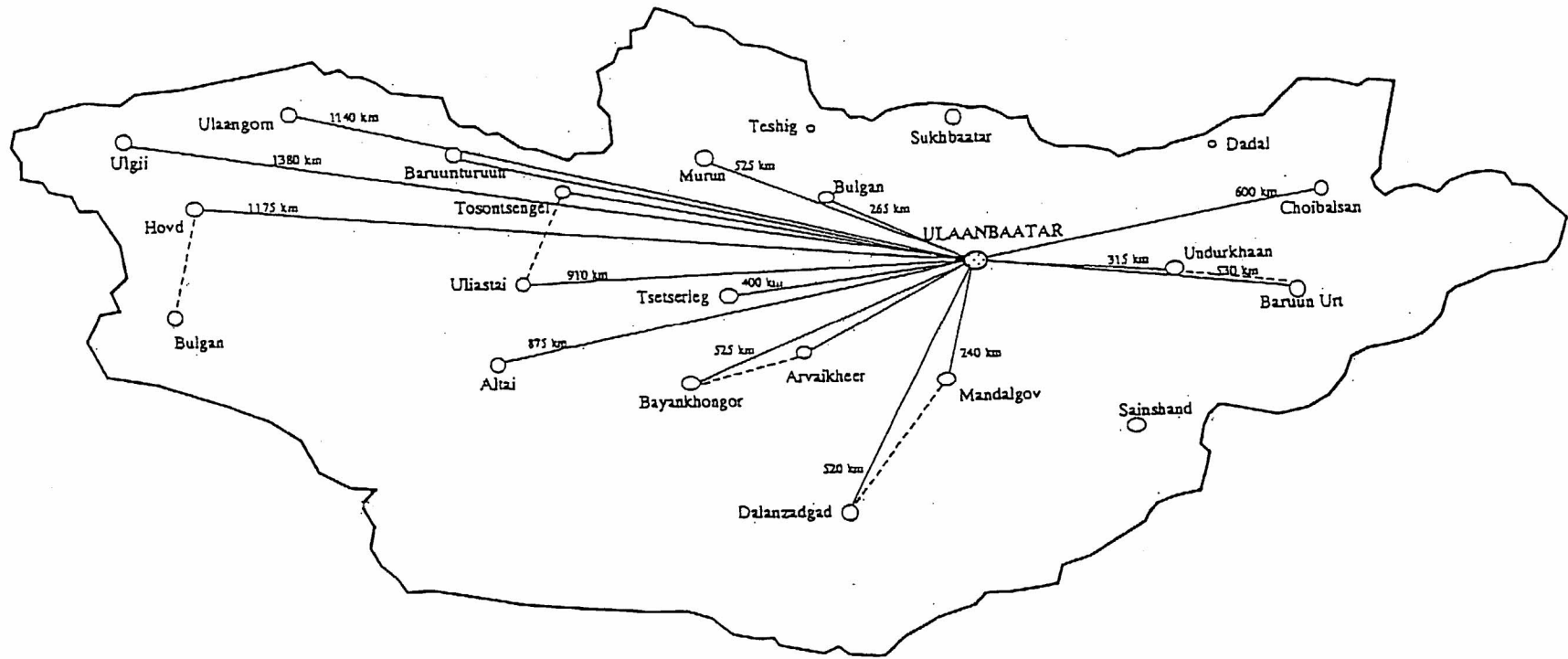
When the country stepped into the transitional economy, the development of adequate transport infrastructure was urgently required for sustained social progress and economic development, particularly in view of Mongolia's large expanse and the wide geographical dispersion of its natural resources and population. This is still a complex task to be accomplished. Between 1960 and 1986, the transport sector consistently grew faster than real National Material Product (NMP). Consequently, transport's contribution to NMP increased from 5.9 percent in 1960 to 10.4 percent in 1986. Since 1986, the transport sector grew more slowly and, in real terms, it contracted in both 1989 and 1990. As a result, in 1990 the transport sector accounted for 9.1 percent of NMP.

Ulaanbaatar, the capital, is the main generator of traffic ; the corridor north to the Russian border has been the most intensively used. Darkhan, the second largest city, is about half way along this corridor, at the junction with a branch road to the west that serves the third largest city, Erdenet. These three cities accounted for about 35 percent of the population and most industrial activity throughout 1980s. Population densities in the rest of the country were and still are very low, averaging less than one person per sq km. Outside this main corridor and its extension to the southern border with PRC the transport network has been rudimentary, comprising low standard roads, some navigable rivers, and one rail line.

Between 1980 and 1989, total freight increased from a little under 5 billion to 8.1 billion ton-km, equivalent to an average annual growth rate of 5.5 per cent. There was steady growth from 1980 to 1986. During the late 1980s, performance was erratic, with declines in 1987 and 1989. The railway is the dominant mode in terms of freight transport, accounting for nearly three quarters of the total in 1989. Road transport accounted for most of the remainder. Only a small proportion of freight was transported by air.

The transport modes have been growing at different rates. Between 1980 and 1989, air was the most dynamic freight transport mode, growing at 9.2 percent per annum followed by rail at 6.3 percent per annum. Growth was slower for roads (3.0 percent). In addition to the formal, mechanized transport modes, the informal transport sector using animal power (mostly horses and camels) plays an important role in Mongolia. Between 1980 and 1989, passenger transport increased at an average annual growth rate of 8.5 percent from one billion to 2.1 billion passenger-km. In contrast to freight transport, passenger transport grew steadily throughout the 1980s. In 1989, the road mode accounted for 46 percent of the total, rail for 28 and air for 27 percent. As was the case of freight, air transport was the most rapidly growing mode during the 1980s (11.5 percent per annum). During this period, the rail and road modes grew at average annual rates of 7.7 and 7.5 percent, respectively. and other major centers.

In 1990 air transport carried 10,913 tons of goods, of which 3,443 tons were mail, 2,189 tons baggage and 5,281 tons freight. The airport infrastructure in Mongolia includes 20 airports (Map 2). The largest airport is in Ulaanbaatar, which is the only airport capable of accommodating the large aircraft used in international flights. Because of the proximity of high hills, the Ulaanbaatar Airport has a one direction runway. Most of the aimag centers have rudimentary



Source: K. Maruoka & Y. Akatsuka "Mongolia: Current Status of Rail Transport of International Cargoes and Its Development Issues (in Japanese)" Journal, Transport and Economy, Vol. 60, No. 12, pp.71-77, December 2000

Map 2 Civil Aviation Network of Mongolia

airports. Of the 19 airports other than Ulaanbaatar, four (Choibalsan, Murun, Bayankhongor, Khovd) have asphalt runways which can accommodate YAK-42 planes. The remaining 15 have earth runways capable of accommodating AN-24 planes, many of which the Government plans to upgrade.

The railway in Mongolia play important role in the economy, particularly for long-distance transport. The railway serves eight urban centers. The Mongolian Railway has a route length of 1,815 km from Zamin-Uud on the Chinese border through Ulaanbaatar to Sukhbaatar on the Russian border, with major branch lines to the industrial copper center of Erdenet and to coal mining areas such as Baganuur, Sharingol and Nalaikh. A separate line links Choibalsan to Ereentsav on the Russian border (Map 3). During the 1980s the length of the system increased by 468 km from 1,347 km in 1980 to 1,815 km in 1989. Mongolia is linked by rail to three ports: (i) Leningrad for European trade; (ii) Nakhodka in Russia for Pacific Ocean trade; and (iii) Tianjin in PRC for Pacific Ocean trade. The Trans-Siberian route through Russia has recently encountered problems and its costs are high. Internal problems in Russia resulted in shipments taking three months or more between Mongolia and Europe, and sometimes getting lost. Freight costs \$1,800 per TEU. The route north and east to Vladivostok or Nakhodka, over 2,000 km away, also took some three months. The route south across PRC is much shorter, 1,400 km from the border to the port of Tianjin, but was little used until recently.

Mongolian Railway is linked with the Russian and PRC railway systems. Gradients up to 2 percent and many bends limit train weight and speed. The Mongolian/Russian railway gauge is 1,520 mm and the PRC gauge is 1,435 mm. Thus, there is a gauge change at the PRC/Mongolian border. The distance to Tianjin is considerably shorter than the distance to Nakhodka, which has the additional disadvantage of ice during the winter months. It is more cost-effective to ship more cargo via Tianjin.

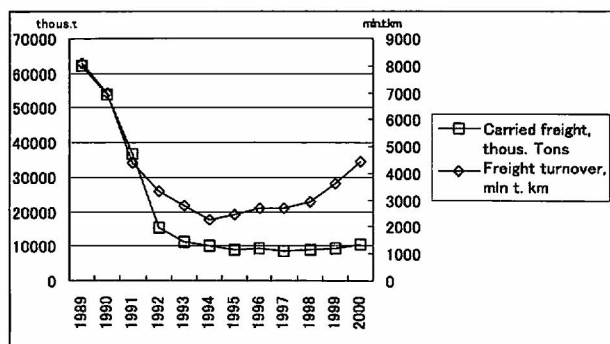
During the period of administered prices in the 1980s, the Mongolian Railway achieved an acceptable level of financial performance. The working ratio ranged from 34.9 to 46.4 percent. The working ratio rose sharply in 1986 when fuel costs tripled. Freight revenue per ton-km and revenue per passenger-km remained approximately constant in the 1980s, which implies that tariffs were not significantly altered during this period. Since 1989, the financial position of the railway has deteriorated. Three factors have contributed to this decline: (i) falling traffic;

(ii) increasing operating costs ; and (iii) Decree No. 20, which increased operating costs by 80 percent but raised tariffs by only 44.5 percent. The recent deterioration of the financial performance of the railway is a matter of concern.

5.2 Transport Sector in Transitional Period

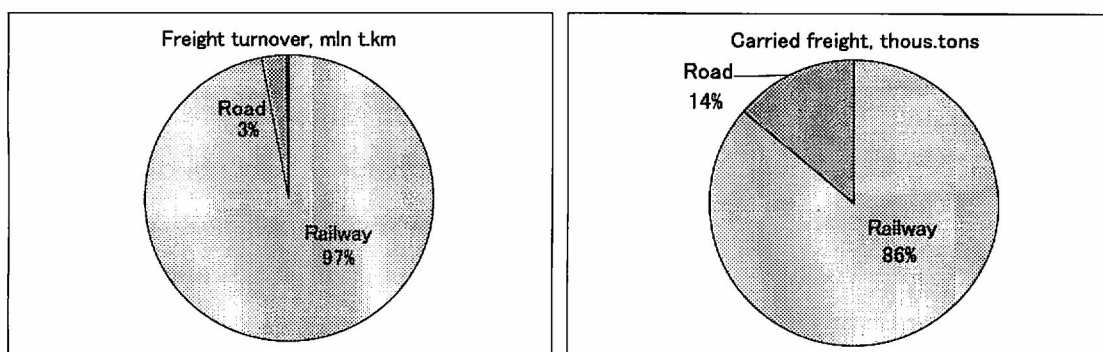
Transport sector has been affected very seriously by the down turn trends of the Mongolian economy during the transitional period from the controlled economy to the market economy. Annual gross freight traffic volume declined to 2.3 billion ton-km in 1994 from 8.0 billion ton-km in 1989. While it is now on its upward trends, it is still on a level of 4.4 billion ton-km in 2000. If evaluated on the real terms of weight basis, the adverse impacts of the national economy has been more severely demonstrated, it declined from 62,000 tons in 1989 to 8,400 tons in 1997. As evaluated on the ton-km basis, it is considered on its upward trend but it is yet on a very low level of 10,600 tons in 2000. (refer to Figure 2.)

Railway is the most important transport mode in Mongolia, occupying 97 percent of the entire freight traffic volume in the ton-km basis as shown in Figure



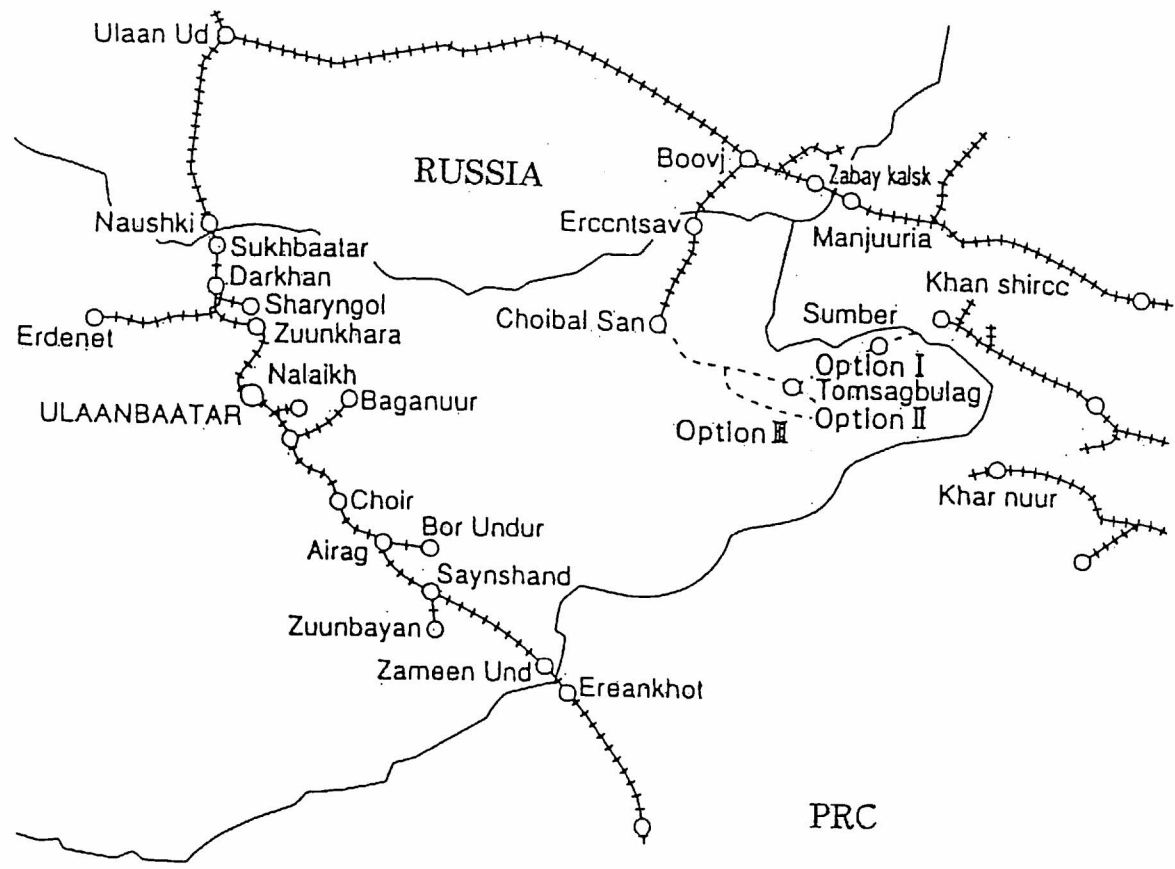
Sources: Mongolian Statistical Yearbook 1996, 1999, 2000

Figure 2. Freight Transport Volume 1989-2000



Sources: Mongolian Statistical Yearbook 1996, 1999, 2000

Figure 3. Share of Transport Mode, 2000



- +++++ Existing railway
- Railway to be Constructed in Dornod aimag
- Option I : Choibalsan-Tamsagbulag-Sumber-China
- Option II : Choibalsan-Tamsagbulag (existing embankment)
- Option III : Choibalsan-Toson Uul-Sangiin dalai-Bulangiin khooloi-China

Source: K. Maruoka & Y. Akatsuka "Mongolia: Current Status of Rail Transport of International Cargoes and Its Development Issues (in Japanese)" Journal, Transport and Economy, Vol. 60, No. 12, pp.71-77, December 2000

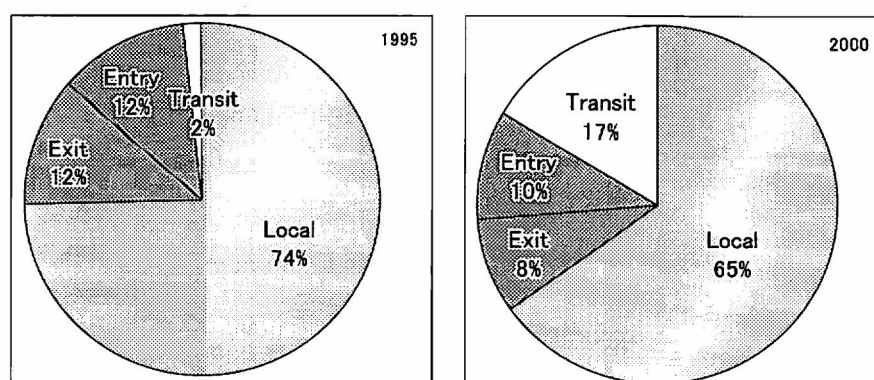
Map 3 Railway Network of Mongolia and Connected Areas

3, reflecting the particular structure of Mongolian economy.

Before transitional period, railway transport demonstrated the important role with road transport, as allocated in the framework of the centrally controlled economy of Soviet Union. However, since when the Soviet Union disintegrated into newly borne independent countries, the entire economic systems of the former Soviet Union including Mongolia have collapsed and transport demand was rapidly decreased consequently. Also, this has brought the structural change of railway transport. Although share of local transport (mainly coal) was 74 percent in 1995, it has decreased by 65 percent, in 2000. It relates the growth of international transport (Figure 5).

New perspectives have developed for the Mongolian Railways since when cargo transfer facilities were completed at the border station Zamin-Uud on the Mongolia side between Mongolia and PRC. Such facilities have been acutely needed to overcome the extremely time-consuming transfer of transit cargoes arising from substantial rail gauge difference between the Mongolian railways with Russian gauge and the Chinese railways with standard gauge. The transfer facilities were completed under the Japan's official development aid in 1995. The new cargo transfer facilities have removed away the physical bottlenecks for the transit cargoes and brought an yearly increasing trend for the Mongolian railways. In particular, the cross-border freight traffics have achieved remarkably high records both in 1999 and 2000 (Figure 4). Majority of the transit cargoes are logs imported by China from Siberia. The cross-border traffic level has been higher than the highest level achieved before the transitional period.

Air transport of international passengers has been steadily increasing in recent years. While the traffic level of international passengers were on the level of 70,000



Sources: Mongolian Statistical Yearbook 1996, 1999, 2000

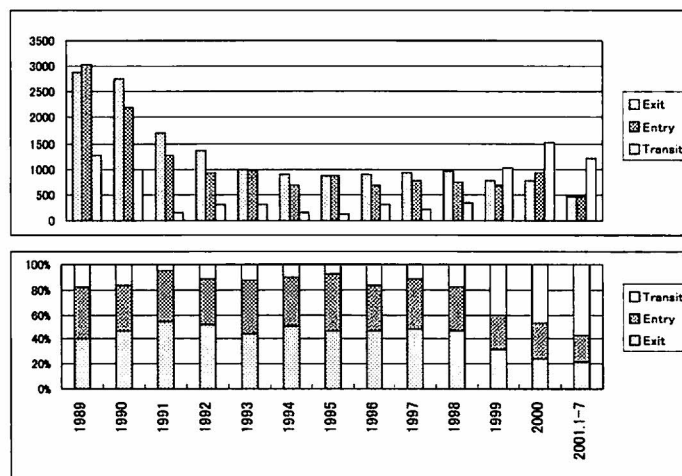
Figure 4. Structure Change of Railway Transport

persons during the early 1990s, it reached to 80,000 person level in 1996, and further to 117,000 persons in 2000. The Mongolian national airlines have provided periodical transport services to Moscow, Novosibirsk, Irkutsk and Ulaan-Ude in Russia ; to Beijing and Fufuhoto in China ; to Seoul in Korea ; to Osaka in Japan and some other capitals in Asian countries. In addition, the periodical air transport services have been provided with Germany, Turkey and most of the Central Asian countries. The air-route between Beijing and Ulaanbaatar is the most popular among the international passengers to and from Mongolia in recent years.

As for the air freight transport, while it recorded 13,133 tons in 1989, it substantially declined to 4,368 tons in 1991, to be followed by 2,662 tons in 1995. Since then it is on this low level as demonstrated by 2,877t record of 2000.

VI. Road Transport

In 1989 road transport accounted for one quarter of total freight ton-km and 45.5 percent of passenger-km. In terms of volume, 45.1 million tons of freight were carried by road in 1989, more than double the volume carried in 1980. In 1989, 238 million passengers traveled by road, about double the 1980 figure. Throughout 1980s the State Road and Transport Department was responsible for policy formulation, planning, transport coordination, approval of investment and allocation of foreign exchange among modes. The Department had two subsidiaries, which were responsible for vehicle repair factories and road transport. These two units were financially self-sufficient but the Department approved and provided the necessary funds for investment. Previously, investment was financed by loans from the



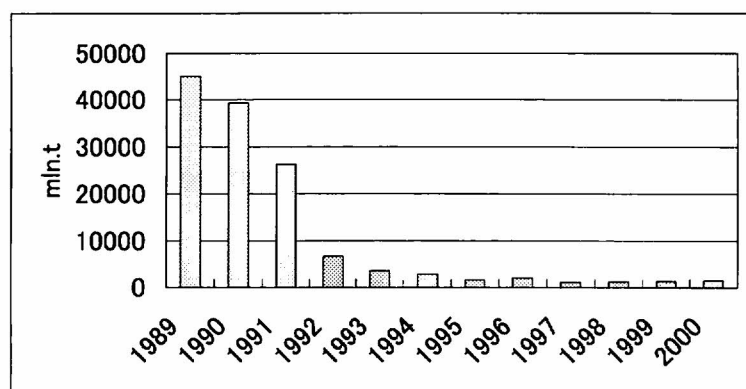
Sources: Mongolian Statistical Yearbook 1996, 1999, 2000

Figure 5. International Transport Volume and Structure, 1989-2000

USSR, but immediately after the collapse of the USSR, these funds had ceased and they faced an acute shortage of funds for infrastructure investment and the importation of vehicles, spare parts and fuel. There were five agencies responsible for inter-urban passenger and freight transport. The seasonal and directional imbalance of traffic, with 70 percent of freight being distributed from Ulaanbaatar and most of the rest going to Ulaanbaatar, increased transport costs, especially for long distances. Each aimag had its own transport company for shorter distances and their privatization is planned in the near future. Tariffs were officially set ; with the city tariff covering only 80 percent of costs.

While long distance transport companies probably were anticipated to remain under government ownership for the foreseeable future, aimag transport enterprises were divided into smaller units to facilitate privatization. As of 1990 there were about 80 companies with 200-500 vehicles each and many smaller ones, with 50-200 vehicles. In all, 70 percent of the companies had their own repair shops. Tariffs had to be liberalized in order to make privatization successful, and excessive subsidies were to be abolished for non-privatized enterprises.

Freight transport by trucks substantially declined from 45.1 million tons in 1989 to 1.48 million tons in 2000, being adversely affected by disintegration of the former systems of controlled economy in Soviet Union. Such disastrous situation



Sources: Mongolian Statistical Yearbook 1996, 1999, 2000

Figure 6. Road Transport Volume, 1989-2000

in road transport sector reflects rapid decline in imports of petroleum, spare parts, foods and others from Russia, and further decline in availability of movable trucks. Reduction of demands for construction materials and capital goods due to the currently depressing economy has also severed the situation (Figure 6).

The numbers of vehicles registered in Mongolia during 1995-2000 are given in Table 1. As shown, the number of registered vehicles has increased from 56,000 in

1995 to 82,000 in 2000, registering an average annual growth rate of 8%. The passenger vehicles comprising light vehicles and buses recorded a two-digit growth rate while the number of trucks remained same. It could be due to the declining economy during the period, while passenger mobility increased. Half the vehicles are either Jeeps or cars, while buses account only for 7% of the vehicles registered. Remaining are trucks and other vehicles.

Table 1. Growth in Registered Vehicles

Year	Number of Vehicles on Register				
	Light Vehicles	Buses	Trucks	others	Total
1995	23,975	2,790	25,198	4,465	56,428
1996	30,001	3,784	26,877	4,358	65,020
1997	35,578	3,982	26,473	4,055	70,088
1998	37,795	4,579	25,473	3,643	71,490
1999	39,921	6,012	25,049	3,858	74,840
2000	44,051	8,548	24,671	4,423	81,693

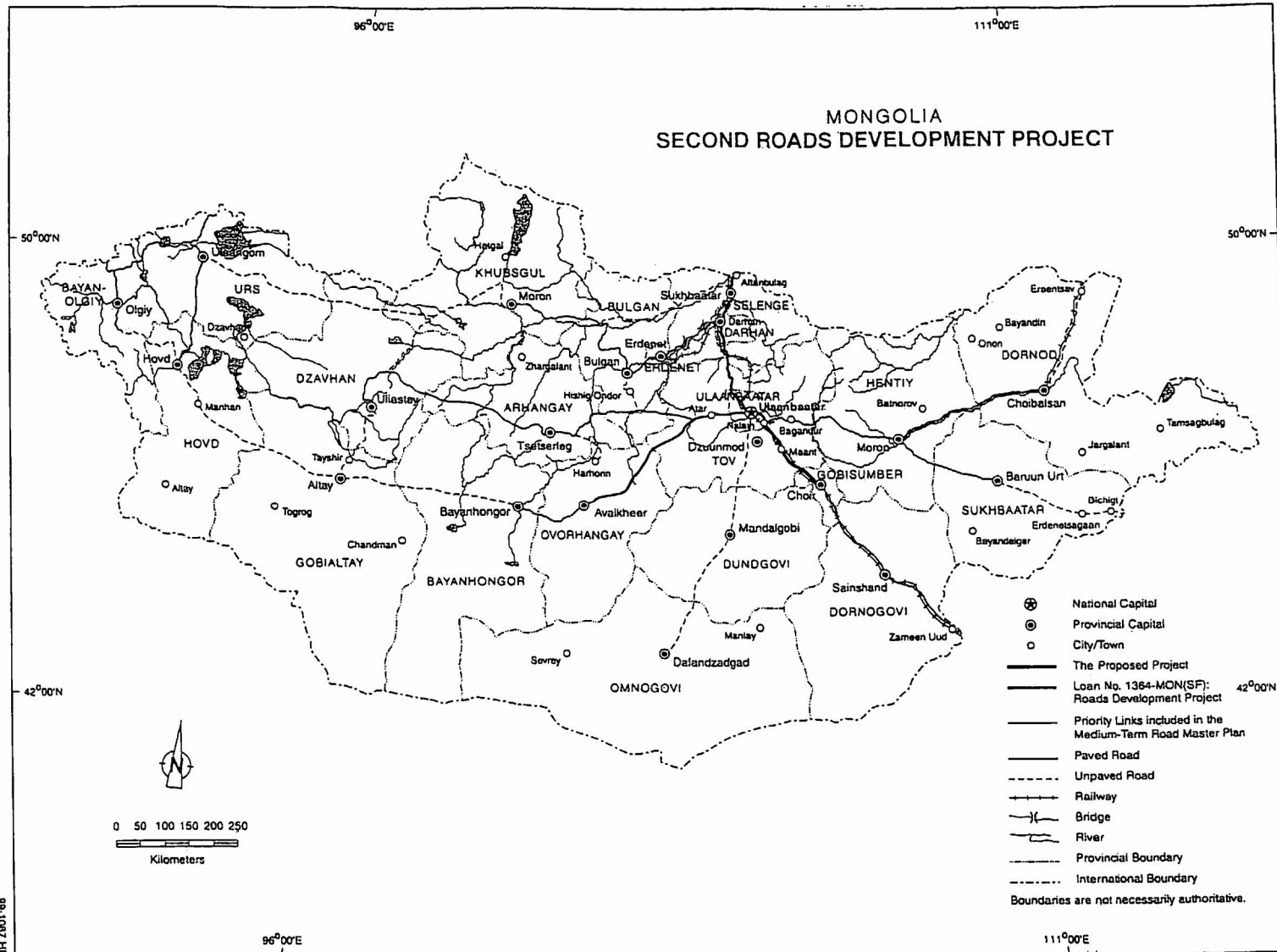
Source : Department of Roads

VII. Road System

7.1 Condition

The road system in Mongolia is not well developed, particularly in view of the country's large size with an average road density of 27 m per sq km (Map 4). The total road network is 200,000 km. And the most of road consists of dirt track. The publicly maintained road network comprises 42,418 km of which 8,942 km is classified as national/provincial/secondary roads and 33,476 km as tertiary roads. Of this, only 1,247 km was paved in 1990, an increase from 712 km in 1980. While the road network does not include any tunnels, there are six major (over 150m) reinforced concrete bridges, two of which (Kherulan Tobchoo, River Egiing) require major repair. Design, which is undertaken by the Road and Bridge Design Institute, follows USSR standards. The number of people employed in road construction and maintenance increased from 3,170 in 1986 to 4,240 in 1990.

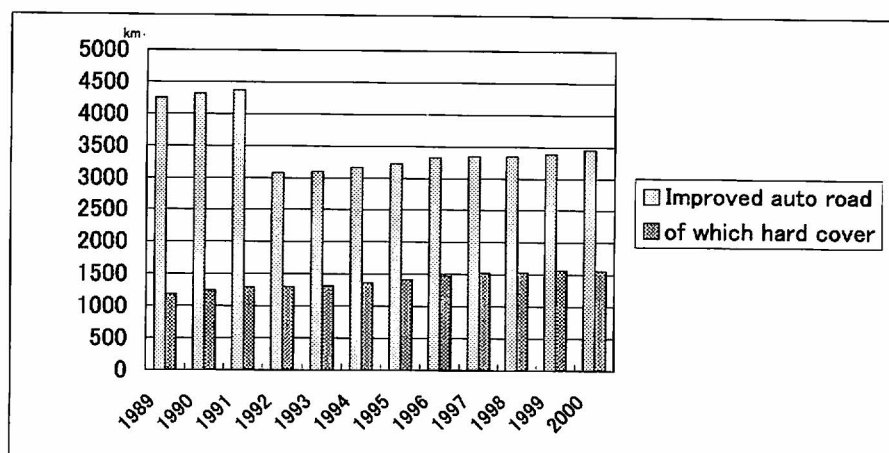
The government's statistics are not consistent on the route length of roads, depending on the publications. The total length amounts reportedly to approximately 150,000 km, including natural tracks frequently used by horse-ridden trav-



Source: ADB "RRP on a Proposed Loan and Technical Assistance Grant Second Roads Development Project

(Mongolia)" 73p, September 1999

Map 4 Road Network of Mongolia (ADB Project Map)



*Improved auto road length data rapidly decreased between 1991 to 1992. The reason was not clear
Sources: Mongolian Statistical Yearbook 1996,1999,2000

Figure 7. Road length

elers and automobiles. The total extension of the roads appropriately designed for automobile traffics amounts to 3,500 km, of which 1,500 km are paved either by concrete or asphalt (Figure 7).

7.2 Road Development

During the last decade, international funding agencies such as World Bank (WB) and Asian Development Bank (ADB) have contributed significantly to the development of road sector in the country. The support came initially in the form of technical assistance for various studies including the ones for institutional strengthening and later the form of loans / grants for construction of new roads and rehabilitation of existing roads. Recently agencies like Kuwait fund Japanese International Cooperation Agency (JICA) have also come forward and are providing support for road construction and maintenance. The status of recently completed and ongoing road projects is given below :

Table 2. Status of Recent and Current Road Projects in Mongolia

Road	Length (km)	Feasibility Funding Agency	Implementation Funding Agency	Status
Maintenance and Improvement of Nalaikh-Baganuur (up to Erdene) Road	40	JICA	Government of Japan	Completed
Periodic maintenance of Ulaanbaatar-Darkhan-Altanbulag Road	345	ADB	ADB	Completed
Rehabitation and Improvement of Darkhan-Erdenet Road	180	ADB	Kuwait Fund	Ongoing

Road	Length (km)	Feasibility Funding Agency	Implementation Funding Agency	Status
Improvement of Kharakhorin-Tsetserleg-Tosontsengel Gravel Road	50	Road Fund	WB	Ongoing
Improvement of Arvaikheer-Khovd short sections Gravel Road	18	Road Fund	WB	Work award stage
Maintenace of Erdenesant-Arvaikheer Road	200	Road Fund	WB	Ongoing
Construction of Nalaikh-Maant Choir Road	200	ADB	ADB	Work award stage
Improvement of Nagoon Dov-Mandalgobi gravel Road	36	USAID	USAID	Completed
Ulaanbaatar Road Improvement project	8.4	JICA	Government of Japan	Ongoing
Total	1076.4			

Source : Department of Roads

7.3 Road Department (Government Implementation Agency)

The road agency is the Department of Roads (DOR), which was originally founded in 1929 while its functions and organizational structures are different from the current status, with the main responsibilities to maintain existing roads and bridges, to construct new ones, and to develop national human resources in the road and transport sector. Over the past 72 years since the establishment of the first Road organization, a total network of 49250 km has been developed of which 1711.7 km is paved, with 1877.1 km surfaced with gravel and 1923.6 km with the improved earth (or a total of 5515.6 km of engineered roads). In addition 666 bridges or 27101.4 meters of concrete and wooden bridges were constructed.

The legislative basis for the DOR to function as a Government Implementing Agency is defined by the national "Law of Road" ratified in 1998. The Department develops and operates the state road network, provides road construction and maintenance companies with professional management and coordination services and is responsible for technical supervision over road and bridge construction works. In other words, the Department is responsible for the overall implementation of Mongolia's road network development strategy.

For road transport, a major objective of the Government is to introduce modern technology and more fuel-efficient vehicles. The objectives for road infrastructure are to expand the paved road network as justified by economic analysis, first

concentrating on those links that have the highest economic return. In addition to expanding the existing road network, consideration is given to improving road connections to Russia and PRC by construction of the Mongolian portion of the Asian Highway, although this, *prima facie*, appears to have a low economic return.

7.4 Road Development fund

The main source of financing for the road sector is the Road Fund, established in 1991 and administered by DOR. Prior to June 1995, a 13 percent tax on the retail sale of gasoline and diesel fuel products was collected by the state-owned petroleum company, Neft Import Concern, and its proceeds were meant to be transferred to DOR for crediting to the Road Fund. Because legal and administration arrangements between DOR and Neft Import Concern were not well defined, the tax proceeds were not fully transferred, resulting in a shortfall in the road maintenance budget. To address the concerns raised by the Bank and rectify the situation, the Act on Taxation on Gasoline and Diesel was approved by Parliament in June 1995, it clarified the legal obligation of the Ministry of Finance to collect the gasoline and diesel tax, and pass the proceeds on to DOR. As a result of this Act, Road Fund revenue increased from Tug 2.9 billion in 1995 to Tug 4.1 billion in 1996, Tug 4.3 billion in 1997, Tug 4.8 billion in 1998, and Tug 11 billion in 2001. The funds for the development of state roads and bridges are collected into Mongolia's Road Fund which is allocated for various state road projects. Since 1992, over 20 road development projects were implemented within the Road Sector under Loans, Technical Assistance and Grant aids received from various sources such as the World Bank, Asian Development Bank, European Union, Japanese Government and Kuwait Fund for Arabic Development.

VIII. Millennium Road Project

8.1 Overview

In Mongolia, the main transport corridor consists of the north to south railway line and road, Sukhbaatar on the Russian boarder to Zamin-Uud on the Chinese boarder through Ulaanbaatar over 1815km, with rather minor branch lines, inspite of the huge east to west expanse of the country over 2,400 km. In other words, Mongolia has lacked an east to west transport corridor, horizontal arterial transport system.

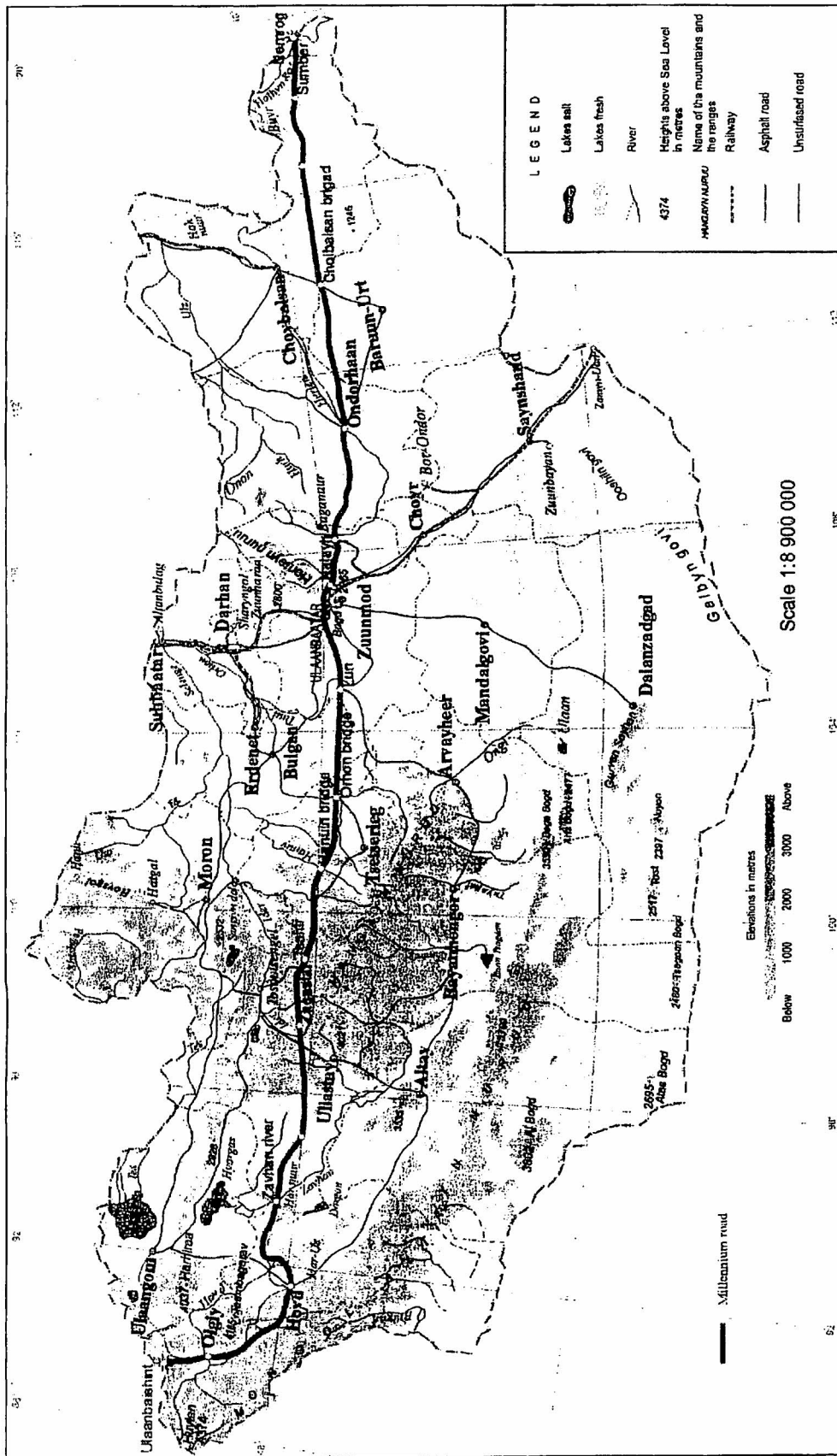
If such a horizontal transport system is to be developed with a view to providing the nation's population scattered sparsely all over the country with administrative, social and economic services, *prima facie*, a road transport system is the most suitable solution. As horizontal arterial road has never been developed in Mongolia, it is now considered urgently needed for improving living standard of the regional population by connecting remote aimags with roads and developing reliable road transport systems, thus facilitating provision for the consumers with daily necessities and services.

With this in view, the Government initiated and prepared "Millennium Road Project" which is strategically important for accelerating socio-economic and regional development of the country and for improvement of international relations with neighbouring countries and the project was approved by the Parliament on January 25, 2001. The Millennium Road Project is intended to provide horizontal arterial transport infrastructure for balanced socio-economic development of the state and further planned to be linked with five vertical arterial roads which are essential for socio-economic development of local communities scattered in the areas remotely located from the capital region as shown in Map 5.

In Mongolia, 77% of the population, 72% of the central provinces, 52% of the livestock are existing along the horizontal and vertical arterial roads. Also large deposits of natural resources are mainly located in the vicinity of the horizontal and vertical arterial roads. And therefore the Millennium Road Project is expected to promote socio-economic development of the country by providing easy accesses to the majority of the population and natural resources. Besides, the Project is anticipated to induce tourism industries since most attractive sightseeing spots and historical heritages are located along the roads. Consequently, the development of the horizontal and vertical arterial roads will provide the population with better opportunities for participating in the state's social, economic and industrial activities for further development.

In the local communities located in the vicinity of the international borders with Russia and PRC, construction of the horizontal and vertical arterial road networks will provide the communities with more opportunities to enhance transport of transit cargoes originated from / destined to the neighbouring countries and communications with the foreign markets being connected to the international road network.

With the background as mentioned above, the Government has decided to



C. Author: S. Uzunbilig

C. State Administration of Geodesy and Cartography
MONGOLIA
Ulaanbaatar 2002

Source: Department of Roads

Map 5 Millennium Road

implement the “Millennium Road Project” designating it as one of the most important national targets for all the population of the country and mobilizing domestic resources and work forces and soliciting supports of the international financial organisations and foreign investors. In 1994, the Master Plan for the national road development was approved, and in 2001, the Parliament and the Government made a significant resolution to develop the “Millennium Road Project”. The Project involves the creation of the state horizontal arterial road for national economic and social development, and vertical arterial roads for social infrastructure development.

8.2 Legal Frameworks of Millennium Road Project

Total length of the horizontal arterial road amounts to 2,249 km, of which 500 km road from the State border is affected by the Project. Having the high socio-economic and strategic priority, improvement of western and eastern links of the horizontal arterial main road was included in :

- ① Road Development Master Plan of Mongolia
- ② Government Action Program*
- ③ Order 111 of Prime Minister of Mongolia of 1997 concerning the intensification of natural resource utilization of the Eastern region according to the main direction to develop society and economy of Mongolia Free Market Economy Development Project in the North East Asia “Tumengol (Tumen river) Project”
- ④ Sustainable Development Program of Mongolia in the 21st Century
- ⑤ Road Development Plan of Department of Roads for 5 years
- ⑥ World Bank Loan Agreement

8.3 The Project Corridor

The project road mainly passes through steppe and rolling mixed terrain (70% of length) and the remaining through flat-steppes and rolling / mountainous terrain. Land use is predominantly grazing (95% of road length). Forest-use is local and accounts for less than 2% of project road length. The road is passing by agriculture lands only along 1% of its length. The project road, including alternative alignments is directly passing through aimag centers Olgii and Khovd in the west, Tsetserleg in the center and Undurkhaan and Choibalsan in the east, besides capital city Ulaanbaatar. Besides sand and gravel, stones such as granite and diorite are obtainable in the west, basalt, granite and diorite in the central parts and granite and porphyry in the east. Most of road sections primarily have clay-sand mixed soils

with gravel on the surface. The exceptions are clay-gravel mixed soils in Bayan Olgii aimag, sandy on soils on either side of Zavkhan River and clayey soils on the eastern steppes. The unhealthy combination of soft soils (with and without boulders) and marshy strata (with drainage problems) is observed in a few short stretches.

As the project road alignment is passing through three mountain ranges viz. Altai, Khangai and Khentii, there are quite a number of pass sections, with varying degrees of complexity. Some of these are quite steep sections (5 to 15% gradients) and a few also have both drainage complexities and poor soil conditions. The project road crosses many of the big rivers in Mongolia including Khovd and Zavkhan in west, Ider, Hanui, Orkhon and Tuul (and many other tributaries to Selenge) in the center and Kherlen and Khalkh in the east. The project road is passing by nearly 50 lakes, out of which five are big and famous for scenic beauty. The ground water table is in the range of 2.5 m to 3.0 m along the project road, during the spring season when it comes close to the surface.

Existing roads are predominantly naturally formed tracks, shifting from one route to another depending on the conditions, excepting asphalt roads in the vicinity of capital city. Many of the tracks are engineered by providing with timber or concrete bridges across rivers (both small and big), by lowering the pass sections and filling lower grounds / marshy areas. All the culverts and bridges along project road, including alternative sections, provide a cumulative linear waterway of 10 km.

Out of this 7 km is provided by 300 bridges and 3 km by 2000 culverts. About 20% of these structures can be retained, while the rest require either replacement or new constructions.

8.4 Donor Projects under Implementation

Projects being implemented are as follows :

- ① Construction for Darkhan-Erdenet 180 km asphalt paved road under the Loan of Kuwait Fund for Arabic Development
- ② Construction for Kharkhorin-Tsetserleg-Tosontsengel 80 km short section gravel road under the Loan of the World Bank
- ③ Feasibility Study of construction of Nalaikh-Choir 200 km paved road under the Loan of the Asian Development Bank
- ④ Feasibility Study of rehabilitation of Erdenesant-Arvaikheer 200 km road

under the Loan of the World Bank

- ⑤ Feasibility Study for construction of Erdene soum-Undurkhaan 250 km road under the Japanese Grant aid
- ⑥ Feasibility Study of construction of Erdenet-Bulgan-Murun road under the Loan of Kuwait Fund for Arabic Development.

8.5 Horizontal Arterial Links for the State Infrastructure Development

① Western link :

The link connecting aimags of Khangai region that have the largest number of population is a part of the main sections of vertical arterial road and the total length amounts to 1,719 km. Construction of Elsentasarkhai-Kharkhorin 31.6 km asphalt paved road connects the ancient and the modern capital cities by paved road. Kharkhorin-Tsetserleg-Tosontsengel 80 km short section gravel road has been constructed under the Loan of the World Bank since 1998. Construction of 36.3 km gravel road in 6 sections on Kharkhorin-Tsetserleg road and 8.9 km gravel road in Ikh Tamir was completed. Construction of 44 km gravel road in 6 sections on Kharkhorin-Tsetserleg road is currently being implemented as of 2000.

② Eastern link :

Construction of 13.3 km paved road between Ulaanbaatar and Erdene soum, Tuv aimag was completed under the Japanese Grant aid. Feasibility Study for construction of Erdene soum-Undurkhaan 250 km road under the Japanese Grant aid has started since 2001. Existing road network by pavement type is shown in Tables 3, 4 .

8.6 Road and Bridge Conditions

- ① Route : Ulaanbaatar-Lun-Dashinchilen-Bridge over Ugii Lake-Battsengel-Bridge over the Khanu River-Tariat-Tsakhir-Zagastai Hill-Ider-Zavkhanmandal-Dungun-Ulgii-Tsagaannuur-Ulaanbaishint

The total length of the road of 1,635 km which exist in the mountainous area of Khangai are often damaged by natural disasters. 1,420 km of gravel road and 21 concrete bridges with total length of 995 m are planned to be constructed in this direction under the Project. Existing type of the roads is as follows :

Table 3. Existing road type of ① route, by direction

No	Road direction	Road type	Paved road	Gravel road	Improved Earth road	Natural Earth road	Total
1.	Ulaanbaatar-Lun		131.0				131.0
2.	Lun-Dashinchilen					94.0	94.0
3.	Dashinchilen-Bridge over the Ugii Lake					137.0	137.0
4.	Bridge over the Ugii Lake-Battsengel					61.0	61.0
5.	Battsengel- Bridge over the Khanui river					140.0	140.0
6.	Bridge over the Khanui river-Tariat					36.0	36.0
7.	Tariat-Tsakhir					63.0	63.0
8.	Tsakhir-Zagastai hill					40.0	40.0
9.	Zagastai hill-Ider					129.0	129.0
10.	Ider- Zavkhanmandal					198.0	198.0
11.	Zavkhanmandal-Durgun					220.0	220.0
12.	Durgun-Erdeneburen					63.0	63.0
13.	Erdeneburen-Ulgii		3.2	24.0	107.7	83.1	218.0
14.	Ulgii-Tsagaannuur		4.0	20.0	16.0	30.0	70.0
15.	Tsagaannuur-Ulaanbaishint			33.0	2.0		35.0
Total			138.2	77.0	125.7	1294.1	1635

Source : Department of Roads

② Route : Ulaanbaatar-Undurkhaan-Sumber-State Border

The total length of the road is 960 km and there are 12 concrete bridges of total length of 1089 m and 5 wooden bridges of total length of 82 m along the road are in use. In addition, total length of 829 km of gravel road and concrete bridges with total length of 1036 m are planned to be constructed under the Project. Existing type of roads is as follows :

Table 4. Existing road type of ② route, by direction

No	Road direction	Road type	Paved road	Gravel road	Improved Earth road	Natural Earth road	Total
1.	Ulaanbaatar-Undurkhaan		98.7	32.0	77.5	131.8	340.0
2.	Undurkhaan-Sumber					577.0	577.0
3.	Sumber-State Border					43.0	43.0
Total			98.7	32.0	77.5	751.8	960.0

Source : Department of Roads

8.7 Traffic Survey and Forecast

- ① Route : Ulaanbaatar-Lun-Dashinchilen-Bridge over the Ugii Lake-Battsengel-Bridge over the Khanui River-Tariat-Tsakhir-Zagastai Hill-Ider-Zavkhanmandal-Durgun-Ulgii-Tsagaannuur-Ulaanbaishint

According to the latest traffic surveys conducted during the last years, Ulaanbaatar-Lun road had the largest traffic volume of 720-943 vpd. And in other roads, traffic volume are (1) Khovd-Ulgii road : 150-214 vpd, (2) Ulgii-Tsagaannuur road : 110-247 vpd, (3) Tsagaannuur-Ulaanbaishint road : 95-223 vpd. According to the traffic surveys for 2,000, on Khovd-Ulgii road and Ulgii-Ulaanbaishint roads traffic volume increased by 10% and 12% respectively compared with the previous year.

- ② Route : Ulaanbaatar-Undurkhaan-Sumber

According to the latest traffic surveys conducted during the past years Ulaanbaatar-Nalaikh-Baganuur road had the largest traffic volume as of May 1999. The traffic was 976 vpd for Ulaanbaatar-Nalaikh road, 569 vpd for Nalaikh-Baganuur road, and 328 vpd for Baganuur-Undurkhaan roads, respectively. In comparison with the traffic surveys for the years 1998 and 1999, an increase of 18% was noticed on Ulaanbaatar-Nalaikh road, 18.3% for Nalaikh-Baganuur road, 24.1% for Baganuur-Undurkhaan road. It is to be noted that the traffic survey was not conducted on Undurkhaan-Sumber road.

- ③ Traffic Forecast

Department of Roads has been conducting traffic surveys on 11,063 km state roads since 1997. Traffic forecast was done based on the traffic survey of 2000. Traffic forecast was estimated with due consideration of the gross domestic product, income elasticity of demand and population increase, applying internationally recognized methods. The income elasticity of demand was 1.8-2.0 for passenger traffics and 1.4-1.5 for freight traffics. The traffic-forecast includes international transportation. Implementation of "Millennium Road Project" is expected to provide for the possible increase in passenger and freight transportation between Russia and China. Thus traffic forecasts include traffics on the route : Erkhui-Chita-Khabarovsk-Vladivostok. Average annual increase in passenger and freight transports are expected to be 7.4-9.5% and 6.8-9% in 2020 respectively. The composition of the type of the vehicles in traffic are 59% for medium and heavy trucks, 19% for Cars, 14% for motorcycles, and 8 % for others. The traffic forecast are shown as below :

Table 5. Traffic volume forecast

No	Link	Traffic volume vpd.		
		Year 2000	Year 2007	Year 2020
1	Ulaanbaishint-Ulgii	263	846	2,657
2	Ulgii-Durgun soum	102	321	982

Source : Department of Roads

8.8 Project Framework

① Framework

Considering the current status of horizontal arterial roads and traffic levels and demand forecast, the project is intended : (1) to upgrade the state roads of natural earth and improved earth with total length of 2,249 km into gravel roads, (2) to construct drainage structures and concrete bridges of total length of 2031 m, and (3) to work out the designs for the roads and bridges to be constructed. The total extension of roads and bridges and the costs estimated for the project is as given below :

Total extension of the road	2,249 km
Total length of the bridge	2,031 m
Road and bridge construction cost	162.2 billion tug
Technical Innovation	20.3 billion tug

② Pavement Design

Pavement design was planned according to the pavement design standard prepared by the Transport Research Laboratory of UK in 1993, based on traffic volume, weather and soil CBR. As traffic forecast for the link road is 846 vpd in 2007 and 2,657 vpd in 2020, the road is to be constructed as of classification 3 according to the Road construction and design standard 32-01-00. Base strength is to be defined according to CBR specifications and CBR for each section of the road is to be defined according to the laboratory tests (AASHTO -T193).

Axle load, one of the important factor influencing on pavement, must be estimated. According to Axle load measurement conducted in Mongolia, load of one axle is 2-4 ton.

Weather influence is one of the main factor in pavement estimation and it is very important to select an appropriate pavement for Mongolia as the climate

is severe, temperature reaches $+30^{\circ}$ in summer and -30° in winter. The following type of pavement design is selected in accordance with CBR of embankment subgrade of the Project affected area, axle load standard and equivalent and climate :

- ① Double bitumuous surface treatment
- ② 250 ìì crushed subbase (filtered gravel with diameter less than 0.075 ìì is to be less than 10% of the content.)
- ③ 350 ìì rock embankement
- ④ Base soil

8.9 Environmental Assessment and Other Issues

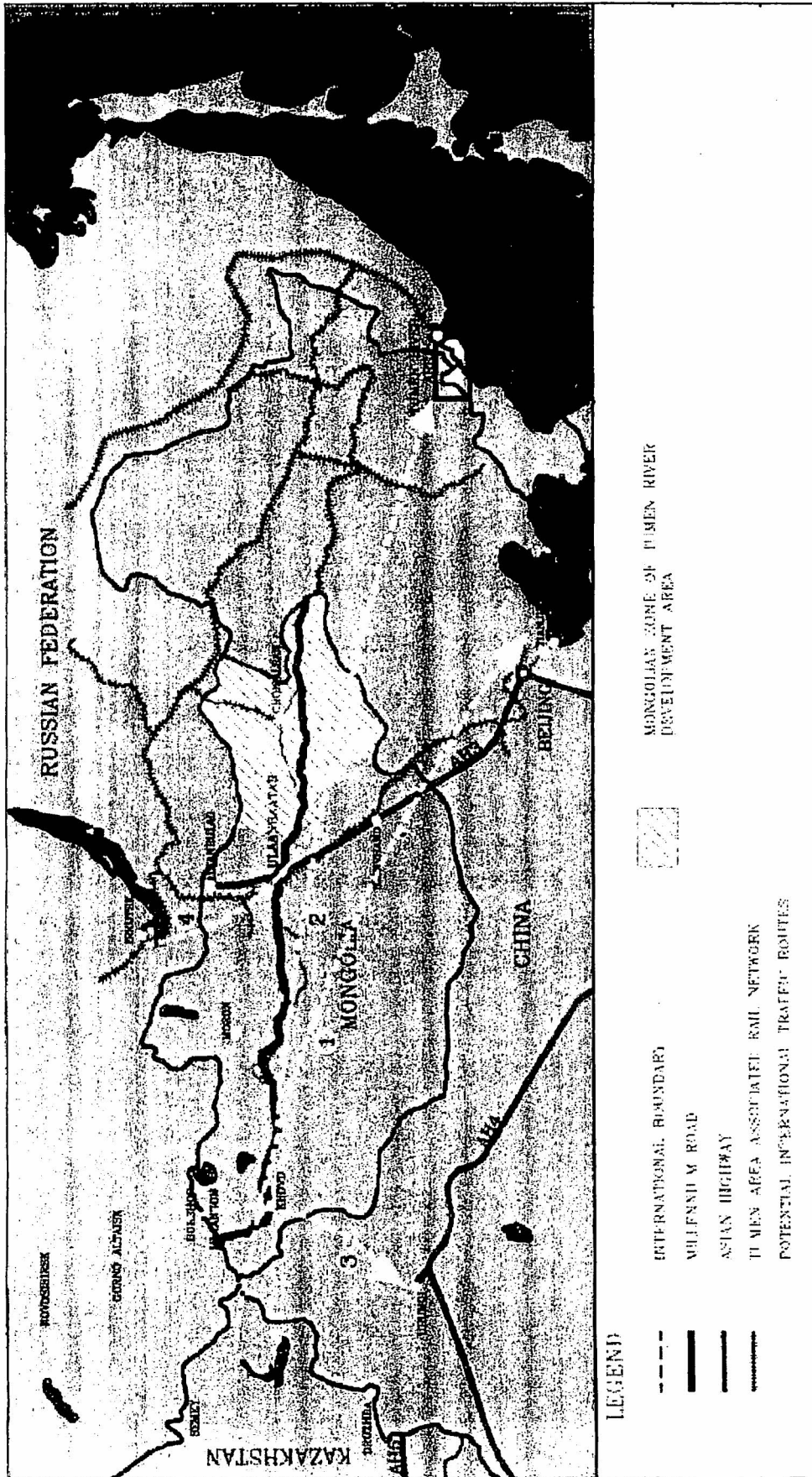
Environmental assessment for any feasibility study is to be approved by a responsible official of the Ministry of Nature and Environment. And environmental assessment for any road construction is to be approved by the Department of Nature and Environment Protection. Environmental assessment is to be executed in accordance with laws and regulations on Nature and Environment Protection with due consideration to protecting reserves, historical places and sihtseeings.

Considering the possible saving in the road and bridge construction costs and the fact that 33.5% of the unemployed laborers of the country are in the project affected area, provision has been made for best utilizing local labor forces comprising the local unemployed, soldiers and work force from various prisoners camps. Under such situations, some of road and bridge works are expected to be undertaken in manual methods and non-motorized transport means to certain extent.

For the improvement for horizontal arterial road, in total 2,249 km of gravel roads and 2,031m of concrete bridges will be built and the appropriate estimates are done based on the vehicle fleet in use in the road sector. Regarding the operational aspects of road transportation before 1990, the vehicle fleet in use in the road sector needed innovation in amount of 20.3 billion tug to implement the project. Some works will be executed by manual methods and non-motorized transport means with a view to saving the cost, reducing the local unemployment and contributing to improvement of the living standards in local communities.

8.10 International Traffic Routes

Construction of the Millennium Road can develop prospective international traffic routes in the region encompassing Russia in the north, China in South



Source: Department of Roads

Map6 Millennium Road In The International Perspective

Kazakhstan in the west and Tumen River Area in the east.

As shown in Map 6, the Tumen River serves as a border with Russia, China and North Korea. For the sustainable economic development of this area and its larger influence region (which includes eastern aimags of Mongolia in the west) and for regional economic cooperation, UNDP has initiated Tumen River Area development Program in 1991. Currently Mongolia, Russia, China, north Korea and South Korea are member countries to the program, while Japan and USA, the prospective investors, are also actively associating in developing the region.

The Tumen program focuses on the following sectors :

- ① Investment and trade,
- ② Transport,
- ③ Environment,
- ④ Tourism,
- ⑤ Human resource development,
- ⑥ Telecommunication,
- ⑦ Energy

In the transport sector improvement of highways is emphasized, as it lacks in comparison to well-developed rail network in the region. Construction of a proposed road upto the China border and linking it with the proposed extension of Changchun-arxan rail line is considered as one of the key transport infrastructure for the development program. This can provide a direct link between the land locked Mongolia and Tumen area, proposed free trade zone with port facilities.

As shown in the Map 6, Millennium Road can help in developing following important international routes.

- ① Kazakhstan, another huge landlocked country, can get access to Tianjing port in China via Millennium road upto Ulaanbaatar and then along Asian Highway 3 (passing through Sainshand) that is under construction
- ② Kazakhstan can also get access to proposed harbor at Tumen River Area through Millennium Road upto Chinese border and from there by rail/ road
- ③ Western Siberian Russia (Novosibirsk and Altaisk) can get access to China through Millennium Road upto Khovd and then through proposed vertical arterial road via Bulgan
- ④ Traffic plying between Siberian Russia (Novosibirsk and Irkutsk) and Vladivostok (port complex in the far east Russia near Tumen River Area) can possibly divert to a shorter route via Millennium Road and through China

(consultants attempted to study the traffic movement in this corridor with the expected cooperation from Mongolia's northern neighbor, which did not come forward.

As development of these routes and the success of Tumen program depend on many exogenous factors that are beyond the control of Mongolia, consultants consider the benefits (Due to international traffic on the Millennium Road) as intangible, through which can be significant. The project road can easily handle the marginal influx of international traffic but for eventual substantial international traffic, the project road needs to be upgraded justifiably. This aspect has been taken in to account while recommending the staged development for various pavement options.

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Appendix 1. Related Information for Status of Millennium Road Infrastructure
Objectives Comprised in the Government Guideline for 2001

**INFRASTRUCTURE OBJECTIVES COMPRISED
IN THE GOVERNMENT GUIDE LINE FOR 2001**

	Measures for implementation of objectives	Period	Responsible units
1	Organize postal saving system in soums in order to expand banking services for rural areas	I-II quarter	Road, Transport, Info Communication and Tourism Policy and Coordination Department /RTICTPCD/
2	Fuel and Energy sector Complete the rehabilitation of the Choibalsan TPS, supply the region with reliable energy and expand the consumers	2001	Fuel and Energy Policy and Coordination Department/FEPCD/
3	Formulate the Feasibility study for construction of Bayanteeg TPS, Uyench, Durgun, Chargait, Egin gol, Ulaanboom HPS and define the financing	2001	/FEPCD/
4	Restructure the energy sector	2001	/FEPCD/
5	Start implementation the project of "100 thousand solar ger" in meeting the needs and requirements of herder families to supply with solar batteries and wind generators	2001	/FEPCD/
6	Support the implementation of the technique and technology renovation of in coal mining and take measures in improvement of coal supply to rural areas.	2001	/FEPCD/
7	Explore a new high quality coal field/Ulaan-Ovoo, Alagtogoo/around the Sharin-gol coal mine and increase the resource for supplying coal in Darkhan and Erdenet regions.	2001	/FEPCD/
8	Tourism sector Redevelop management and coordination system of the sectors for implementation the National Tourism Master Plan.	2001	/RTICTPCD/
9	Implement foreign and domestic projects for development of tourism	2001	/RTICTPCD/
10	Research the resources of historical, natural and culture zones for expanding tourism	2001	/RTICTPCD/
11	Auto road and transport sector Establish 5 inspection laboratories of vehicle technical condition in UB and 3 mobile laboratories in rural areas.	2001	/RTICTPCD/
12	Conclude the agreement of "International autotransport relation" with Belarus Republic and some European countries	2001	/RTICTPCD/
13	In order to expand road network continue the construction of "Millenium road" linking Eastern region to Western region and concentrate the labor force and means for implementation this project, create the project of Western region vertical road and start its implementation	2001	/RTICTPCD/
14	Isolate the means for the road construction work in UB city from the Road fund	2001	/RTICTPCD/
15	Introduce new navigation, communication techniques and technologies in the civil aviation sector in order to increase reliability.	2001	/RTICTPCD/
16	To renovate technical conditions for connecting urban and aimag centers to the international and domestic information and telecommunication networks.	1001	/RTICTPCD/

	Measures for implementation of objectives	Period	Responsible units
17	Work out Railway transportation network development master plan in order to increase its competitiveness	2001	/RTICTPCD/
18	Take a measures of adoption the "Construction sector development Master plan" and start its implementation	2001	Construction and urban development Policy and Coordination Department /CUDPCD/
19	All-round strengthen the enterprises in construction sector, get progressive technique and technologies and increase the competitiveness of construction sector in international standard	2001	/CUDPCD/
20	Implement the rehabilitation of public services in Ulaanbaatar, Khovd, Ulaangom, Ulgii, Murun, Uliastai cities, start implementing urban services rehabilitation projects in central and eastern aimags.	IV quarter	/CUDPCD/
21	Improve water supply and public services in aimag centers, take a set of measures in supplying with clean and safe water and meeting sanitary and health requirements to the population.	2001	/CUDPCD/
22	Start implementation that all centers of aimags and soums having public bathhouses.	2001	/CUDPCD/
23	Start to from a special fund for construction of apartments, increase the provisions of apartments and construct an apartment complex for 1,000 families of civil servants and young people in Capitol city.	2001	/CUDPCD/
24	Search and solve possibility to sell out government shares in stateowned, state share holding and joint venture enterprises' apartments	2001	/CUDPCD/
25	To introduce a new technology for cadastral mapping in line with the world information technology development, to establish national geodesic network, by forming foundation for land registration and information fund to renew land use linking with urban development and planning requirements	2001	/CUDPCD/
26	To certify the existing buildings and engineering network of the capitol city, provincial centers, bigger cities and settlements by evaluating their earthquake resistance	2001	/CUDPCD/
27	Develop water, communication, transportation and urban services of gerareas in accordance with the integrated policy matrix, support the concern of private sector in this area.	2001	/CUDPCD/
28	Regional development Take a measures for adoption of "Concept of regional development", start its implementation	I quarter	Ministry of Infrastructure/MOI/
29	According to the external and internal market demand and tendency of regional development policy in line of population settlement renovate policy matrix for Infrastructure development and urban development general plan	2001	/MOI/
30	Create policy of supplying civil servants' families with apartments	2001	/CUDPCD/
31	Cooperate with UNCTAD in order to conclude Transit transportation agreement with Russia and China	2001	/RTIRTPCD/

**LIST OF IMPLEMENTING PROJECTS ON FOREIGN LOAN AND GRANT AID
IN THE MONGOLIAN INFRASTRUCTURE SECTOR**

\01 July, 2000 \

Title of projects and implementation period	Name of consulting and implementing company and organization	The main operations of projects
1. ROAD		
A. LOAN :		
1. Sub-project Transport Rehabilitation project \1994-1999 \	Consulting company : "Scott Wilson Kricpatric" Co.,Ltd of UK Executing company : "Darzam" and "Erdene zam" Co.,Ltd of Mongolia.	Supply 10 complex laboratories, 20 computers and equipment for the road construction. Work out the road construction standard. Partly repair the road of Kharkhorin-Tsetserleg by the remainder of Loan.
2. Consulting Services on Technical and Finacial Proposal for Detailed Design and Construction Supervision \2000-2003 \	Consulting company : "Japan overseas Consulting" \JOC \	Work out the Feasibility study of the Nalaikh-Choir 200 km. Road and Terms of reference of the Loan.
3. Darhan-Erdenet Road Rehabilitation \1998-2000 \	Consulting company : "ICT" Britain-Indian jojnt Co. and "Scott Wilson Kricpatric" Co.	Reconstruct the 180 km paved road between Darkhan-Erdenet.
B : Assistance		
1. Rehabilitation of road construction design and standard \1998-2001 \	Cunsulting company : "Post Barklay International" Co. of USA	Formulate the road planing and constructing standard
2. Poldcy support in Road sector		Rehabilitate Legislative environment of road sector.
3. Feasibility study of Road Erdenet-Bulgan-Murun	Consulting company : intercontinental consultants & Tecgnocrats Co. of India	Formulate the study of construction of Erdenet-Bulgan-Moron direction road.
2. TRANSPORTATION		
A. Loan :		
1. Transport Rehabilitation Project \1995-2000 \	General consulting : Consultant of World bank-MecCae, Consulting of subproject Railway : "Transurb" Co. of Belgium. Supplier Bus and Trolleys : "Marubeni" Co. Executor : "Angelica International" of India "Marubeni" of Japan	Rehabilitate railway carriages, purchase equipment of road Laboratory, 44 bus, 9 trolleys for the public transportation of UB city and its spare parts.
-Sub-project of Rehabilitation urban road and establisation the diagnostic and repairment center		
-Sub-project of rehabilitation the management and financial system of Railway		
2. National Navigation project \1996-2000 \	Project consulting : "Michael Kelley International" Co., of Australia Executor : "Reption" Co., of USA	Create a reservation network in the communication system of aviation sector. Renovate communication and navigation equipment of airports.

Title of projects and implementation period	Name of consulting and implementing company and organization	The main operations of projects
3. ENERGY		
A. Loan :		
1. Power rehabilitation project/ 1995-1997/period has extended and continue in 1999	Consulting : "Hyundai constriction" of ROK Executing : "ABB" of Italy/1996.2/ "ÅÅÅ" Of Denmark/1997/	Consequently renovate central heating system and 5 boilers of TPS # 3
2. Energy Conservation project	Consulting : ÊÎÂÎ of Denmark	Supply central heating system equipment.
3. Heat efficiency project /1998-2000/	Consulting : ÊÎÂÎ of Denmark, "Fihther" of Germany	Transfer the district-heating systems' exploitation regime into variable flow.
4. Cogeneration Power Plant Project at Dalanzadgad /1998-2000/	General executing : "Hyundai engineering" of ROK 16.08.1997	Construct the TPS 6 mWt in Dalanzadgad soum of Omnogobi aimag.
5. Emergency District Heat Supply Choibalsan \1997-1999 \	Consulting : "ÊÅÅ" Co. of Germany 04.06.1998 General executing : "MFU" Co. of Germany 28.07.1998	Renovate some equipment of energy and heating system.
A. Assistance		
1. Energy training project	Consulting : Decon, Bävää, Öävårätsii of Germany	Renovate trainig center of energy sector.
2. Rehabilitation of power plants of sum centers (phase III)	Consulting : NIPPON KOIE Co, of Japan General executing : "Itochu" Corp, of Japan 24.03.2000	Renovate 25 soums' of 8 aimags diesel generators.
3. Master Plan for Rural power supply by renewable energy in Mongolia	Consulting : NIPPON KOIE Co., of Japan	Formulate the Master plan of supplying rural areas with renewable energy sources.
4. Economic Policy Support : Sub-project : Energy Sector Commercialization and Privatization	Consulting : "DAI"Co., of USA	Renovate energy legislative environment in order to organize most efficiency energy generation and restructure the energy sector.
5. Capacity building for energy sector planning	Consulting : "ElectroWatt engineering" Co., of Switzerland	Reformulate the General Energy Plan.
4. URBAN SERVICE		
A. LOAN :		
1. Provincial town's basic urban services project./1998-Nov. 2001/	Consulting : "Sveco" Co., of Sweden "Încînsultihg" Co., of Mongolia Executing : Public services of Khovd, Khovsgol, Uvs, Zavkhan, Bayan-Olgi aimag	<ul style="list-style-type: none"> - Renovate exacting water transmission lines and pumps of central water supply system - Put billing system of water exploitation - Rehabilitate the water supplying in Ger districts - Construct septic tank facilities

Title of projects and implementation period	Name of consulting and implementing company and organization	The main operations of projects
		<ul style="list-style-type: none"> - Renovate the baths and construct new baths in Ger district - Improve solid waste services and supply with exacting techniques
2. Urban services project Ulaanbaatar	Consulting : "PADCO" of USA, "Sincpār Naim Merz" co. of Australia, The Governor office of UB city	Rehabilitate the water supply system of Ulaan-Baatar city
B. Assistance		
1. Capacity Building for the Provision of Basic urban services in Provincial towns project	Consulting : "Co Water" Co., Ltd of Canada "City service" Co., Ltd of Mongolia	In areas of Public service sector
2. Development of a National Water, sanitation and hygiene education program for the 21 st century	Consulting : RWSG-EAP Ministry of Infrastructure	
3. Improvement of water treatment equipment	Consulting : On tender	Supply with reliable water treatment equipment
5. FUEL		
A.LOAN :		
1. Mongolia Coal Project \1996-2001 \	Consulting : "Northwest" USA, "Arthur Andārsfn" Australia, "Wārdāll Āristrong" UK. Executing : "Baganur" Holding of Mongolia.	Rehabilitate Baganuur coal mining
2. Baganuur and Shivee-Ovoo Coal mine Deve-lopment Project (I). \1997-2001 \	Consulting : Economy Institute of energy, Japan, ĪĪNĒĪN Co.,Ltd Mongolia Executing : Coal agency, Baganuur Holding, Shivee-ĪvĪĪ Holding.	Supply equipment and spare parts of equipment for coal mines
3. Baganuur and Shivee-Ovoo Coal mine Development Project (II). \1998-2003 \	Consulting : ĪĪN-P4 Executing : Coal agency, Baganuur Holding, Shivee-ĪvĪĪ Holding.	Purchase the high capacity walking excavator for Shivee ovoo coal mine and construct some buildings
A. Assistance		
1. Zamyn Uud transshipment facility \1998-2001 \	Consulting : "ETC" Co.,Ltd Germany Executing : On Tender	Work out the Feasibility study for construction of petroleum transloading facilities in Zamin-Uud and supply exacting equipment.

Title of projects and implementation period	Name of consulting and implementing company and organization	The main operations of projects
6. COMMUNICATION		
A. Loan :		
1. Telecom-2 project \1998-2001 \	Consulting : "DETECON-DECON" of Germany \1998.10.14 \ Executing : "Siemens" Co.,Ltd	Extend main telecommunication network in Western 4 aimags and rehabilitate rural communication system in Tov, Selenge aimag.
2. Telecom-3 project \1998-2002 \	Consulting : "DETECON-DECON" of Germany Executing : "Siemens" Co.,Ltd	Extend main telecommunication network in Eastern 5 and South 5 aimags
A. Assistance		
1. Renovation of International Toll exchange NEAX-61, signaling system No.7	Executing : NEC cirp., Japan	Renovate Long distance telecommunication station
2. The Study on the Postal Service Improvement Plan in Mongolia	Executing : JICA of Japan	Expand the post services
3. Privatization of Telecom sector \Phase-II \	Executing : "DETECON" of Germany	Formulate the draft of privatization of communication sector and legal environment