

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)
NATIONAL TRANSPORT RESEARCH CENTRE(NTRC)
MINISTRY OF COMMUNICATIONS, GOVERNMENT OF PAKISTAN

PAKISTAN TRANSPORT PLAN STUDY
IN THE ISLAMIC REPUBLIC OF
PAKISTAN

Final Report

March 2006

NIPPON KOEI CO.,LTD.
ALMEC CORPORATION

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PREFACE

In response to a request from the Government of Pakistan, the Government of Japan decided to conduct the Pakistan Transport Plan Study in the Islamic Republic of Pakistan, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Minoru Shibuya of Nippon Koei Co., Ltd. and consists of Nippon Koei Co., Ltd. and Almec Corporation from June 2005 to March 2006.

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

I hope that this report will contribute to the economic and social activities of Pakistan and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Pakistan for their close cooperation and friendship extended to the study.

March, 2006

Kazuhisa Matsuoka
Vice President
Japan International Cooperation Agency

March, 2006

Letter of Transmittal

We are pleased to submit herewith the Final Report of the Pakistan Transport Plan Study in the Islamic Republic of Pakistan. This study was entrusted to Nippon Koei Co., Ltd. in association with Almec Corporation, under a contract with Japan International Cooperation Agency (JICA), during the period from June 2005 to March 2006.

The report contains the advices and suggestions of the concerned authorities of the Government of Japan and your agency as well as the comments made by the concerned authorities of the Government of Pakistan.

We would like to take this occasion to express our sincere gratitude to JICA and the Ministry of Communications for providing an opportunity to conduct this Study. We are also the most grateful for the cooperation, guidance and assistance of the Steering Committee, the Embassy of Japan in Pakistan and the JICA Pakistan office. We have to appreciate the Advisory Committee Members from Tokyo Institute of Technology and Ministry of Land, Infrastructure and Transportation of the Government of Japan for extending advices and comments towards the Study.

We hope that this report will contribute to the economic and social activities of Pakistan.

Yours Faithfully,

Minoru SHIBUYA
Team Leader, JICA Study Team for
the Pakistan Transport Plan Study
in the Islamic Republic of Pakistan



**Pakistan Transport Plan Study
 in
 The Islamic Republic of Pakistan**

Location Map

Abbreviations /Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADA	Airport Development Authority
ADB	Asian Development Bank
ADS	Automatic Dependent System
ADSB	ADS Broadcast
AGR	Annual Growth Rate
AH	Asian Highway
AIDS	Acquired Immuno-Deficiency Syndrome
AIP	Aeronautical Information Publication
AIS	Aeronautical Information System
AJK	Azad Jammu and Kashmir
APCC	Annual Plan Coordination Committee
APL	American President Lines
ASEAN	Association of Southeast Asian Nations
ASF	Airport Security Force
ATC	Air Traffic Control
ATM	Air Traffic Management
ATP	Automatic Train Protection System
BDA	Balochistan Development Authority
BOO	Build, Operate and Own
BOT	Build, Operate and Transfer
BPK	billion passenger- km
BTK	billion ton-km
C&W	Communication and Works
C&WD	Communication and Works Department
CAA	Civil Aviation Authority
CAREC	Central Asian Republics Economic Cooperation
CAS	Compulsory Acquisition Surcharge
CATC	Civil Aviation Training Centre
CBMs	Confidence Building Measures
CDLs	Cash Development Loans
CDWP	Central Development Working Party
CEO	Chief Executive Officer
CNG	Compressed Natural Gas
Cosco	China Ocean Shipping Co.
CSN	Communication Navigation Surveillance
CTC	Centralized Traffic Control
DE	Diesel Electric
DE	Diesel Locomotive
DFI	Direct Foreign Investment
DWT	Deadweight Tonnage
ECNEC	Executive Committee of National Economic Council
ECO	Economic Cooperation Organization
EDI	Electronic Data Interchange
EI	Economic Indicator
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EL	Electric Locomotive

EMP	Environmental Management Plan
EP	Environment Protection
EPA	Environmental Protection Agency
EPAs	Environmental Protection Acts
EPZ	Export Processing Zone
ERP	Emergency Repair Plan
ESAs	Equivalent Standard Axles
ESCAP	Economic and Social Commission for Asia and the Pacific
F. Aid	Foreign Aid
F/S	Feasibility Study
Fahr.	Fahrenheit
FATA	Federally Administered Tribal Areas
FBS	Federal Bureau of Statistics
FC	Frontier Customs
FCL	Full Container Load
FDI	Foreign Direct Investment
FHA	Frontier Highway Authority
FOTCO	Fauji Oil Terminal and Distribution Company Ltd.
FWO	Frontier Works Organization
FY	Fiscal Year
GDP	Gross Domestic Product
GMS	Greater Mekong Subregion
GNP	Gross National Product
GOP	Government of Pakistan
GT road	Grand Trunk Road
HDM	Highway Development and Management System
HIES	Household Integrated Survey
HIV	Human Immunodeficiency Virus
HMM	Hyundai Merchant Marine
HP	Horsepower
HSD	High Speed Diesel
IAS	International Accounting Standards
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
IEE	Initial Environmental Examination
ILS	Instrument Landing System
IOCB	Iron Ore and Coal Berth
IPO	Initial Public Offering
IRI	International Roughness Index
IRR	Internal Rate of Return
IT	Information Technology
ITPS	Institute for Transport Policy Studies
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KICT	Karachi International Container Terminal
KKH	Karakoram Highway
KPT	Karachi Port Trust
LCL	Less than Container Load
LGRD	Local Governmental and Rural Development Department
LOA	Length Overall

LoC	Line of Control
Loco	Locomotive
LPG	Liquefied Petroleum Gas
MOC	Ministry of Communications
MOD	Ministry of Defence
MOE	Ministry of Environment
MOF	Ministry of Finance
MOIT	Ministry of Information and Technology
MOPS	Ministry of Ports and Shipping
MOR	Ministry of Railways
MPK	Million Passenger Kilometre
MTDF	Medium Term Development Framework
MTK	Million Ton Kilometre
MW	Motorway
NATCO	Northern Area Transport Corporation
NDB	Non-Directional Beacon
NEC	National Economic Council
NGO	Non-Governmental Organization
NH	National Highway
NHA	National Highway Authority
NHB	National Highway Board
NHC	National Highway Council
NHIP	National Highway Improvement Programme Council
NHMP	National Highway and Motor Police
NLC	National Logistic Cell
NM	National Monument
NOTAM	Noticed Air Man
NP	National Park
NPV	Net Present Value
NSCSA	The National Shipping Company of Saudi Arabia
NTPS	National Transport Planning Study
NTRC	National Transport Research Centre
NWFP	North West Frontier Province
O&M	Operation and Maintenance
OAP	Open Access Policy
OD	Origin and Destination
OECD	Overseas Economic Cooperation Fund
OOCL	Orient Overseas Container Line
OP	Oil Pier
OPEC	Organization of Petroleum Exporting Countries
P&D	Planning and Development
PEPA	Pakistan Environmental Protection Act
PFI	Private Financing Initiatives
PIA	Pakistan International Airlines
PIAC	Pakistan International Airlines Corporation
PICT	Pakistan International Container Terminal
PNSC	Pakistan National Shipping Corporation
POL	Surcharges on Petroleum, Oil and Lubricants
PONL	P&O Nedlloyd
PPP	Public Private Partnership

PQA	Port Qasim Authority
PR	Pakistan Railways
PRC	Pakistan Railways Corporation
PSC	Pakistan State Oil
PSDP	Public Sector Development Program
PTPS	Pakistan Transport Plan Study in the Islamic Republic of Pakistan
QICT	Qasim International Container Terminal
R&D	Research & Development
R/W	Runway
RAMD	Road Asset Management Directorate
RAMS	Road Asset Management System
RC	Reinforced Concrete
RDA	Road Development Account
RGDP	Regional Gross Domestic Products
RMA	Road Maintenance Accounts
RMU	Road Management Unit
ROW	Right of Way
Rs.	Rupees
SEA	Strategic Environmental Assessment
ST	Strategic Road
TA	Technical Assistance
TEU	Twenty Feet Equivalent Unit
TOR	Terms of Reference
TSDI	Transportation Sector Development Initiative
TSK	Tokyo Senpaku Kaisha
TTC	Travel Time Cost
UK	United Kingdom
UN	United Nations
USA	United States of America
USD	US Dollars
VDL	VHF Data Link
VHF	Very High Frequency
VOC	Vehicle Operating Cost
VOR	VHF Omnidirectional Range
WB	World Bank
WCH	World Cultural Heritage
WHO	World Health Organization
WSD	Works and Services Department
WTO	World Trade Organization

Executive Summary of PTPS Recommendations

1. Introduction

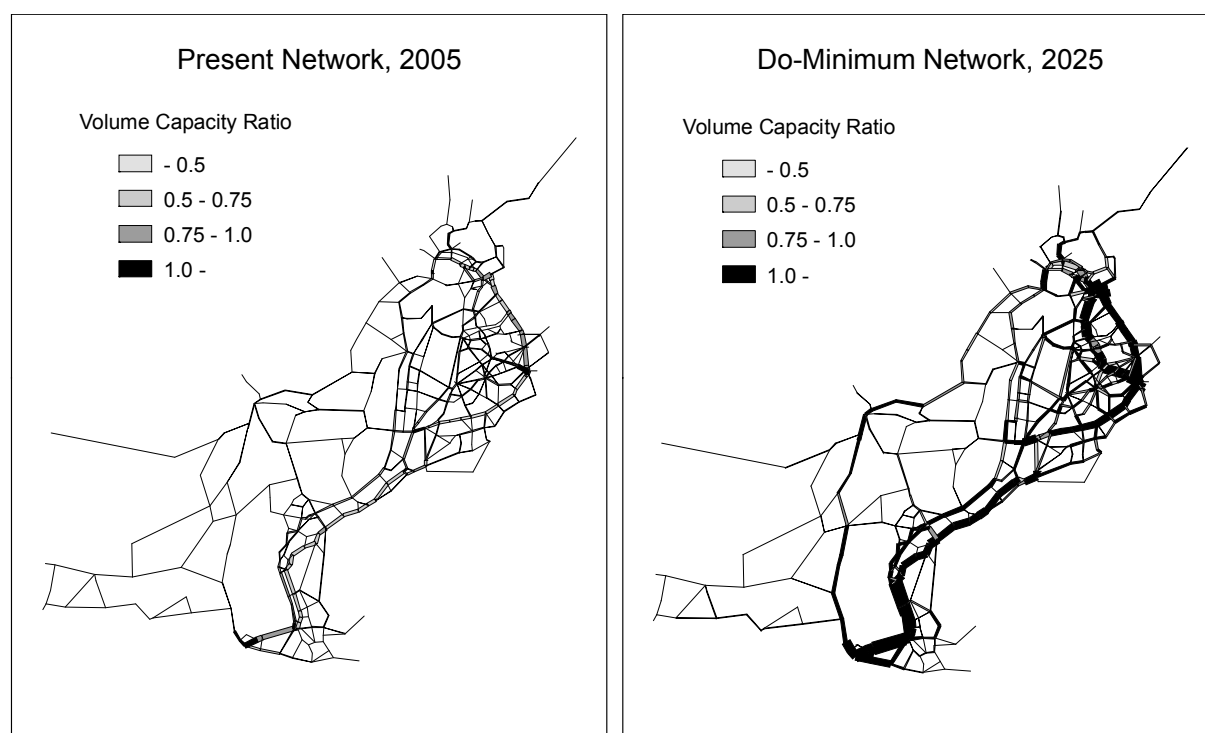
The Medium Term Development Framework (MTDF) published in May, 2005 declares an ambitious goal for Pakistan to be a developed, industrial, just and prosperous country within 25 years, by attaining 7-8 per cent annual economic growth. Followed the economic growth scenario, the future transport demand was estimated to grow to three times the present demand as shown in the table below.

Table-1 Growth of Transport Demand (Inter-zonal Transport)

Year	Passenger		Freight	
	No. of Passengers	Passenger-km	Tons	Ton-km
	Million/year	Billion-km/year	Million/year	Billion-km/year
2005	780	154	241	99
2015	1,455	293	440	185
2025	2,497	517	748	329

Source: JICA Study Team

In order to achieve the goal, Pakistan has to develop infrastructure in transport sector. A demand and supply analysis in PTPS indicates that the present road network will not be able to deal with the future transport demand that will be generated if Pakistan achieves the target economic growth, even if all ongoing and committed projects are completed. Figure-1 depicts the results of the traffic assignment on present and “Do-Minimum” network for 2005 and 2025. “Do-Minimum” means a scenario in case that only ongoing and committed road projects are carried out.

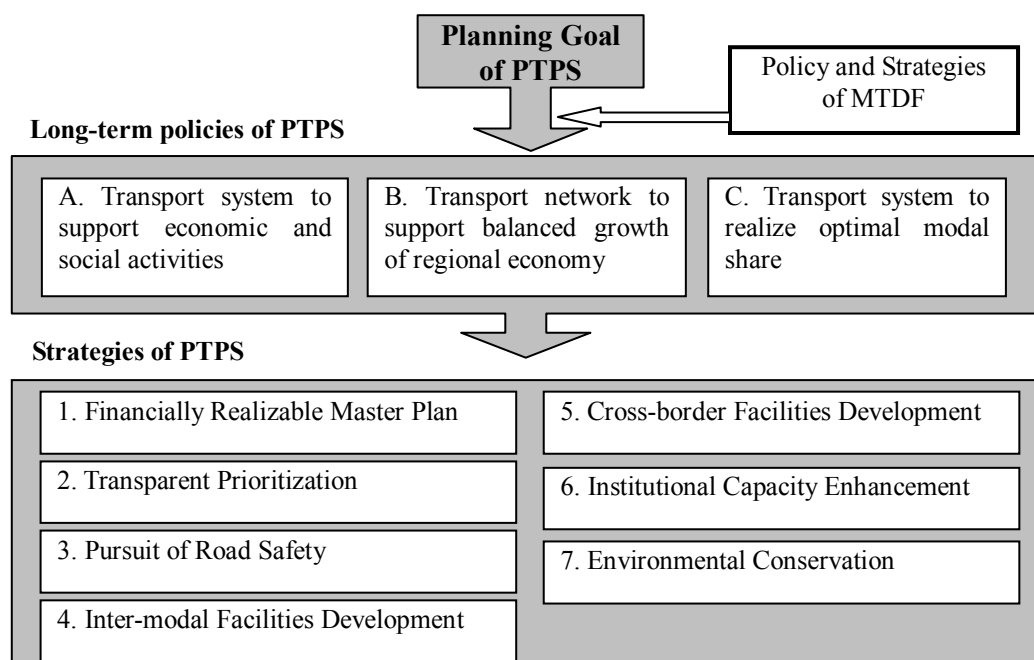


Source: JICA Study Team

Figure-1 The Results of Traffic Assignment for 2005 and 2025

2. Goal, Policy and Strategy

Based on the understanding of policies and strategies of the current MTFD, the Study Team set up a planning goal as: “Accomplishment of safe, stable and sustainable transport system and network with proper level of services, enough to support people’s economic and social activities”. To approach the goal, three policies and seven strategies have been selected as shown in the figure below.



Source: JICA Study Team

Figure-2 Long-Term Policies and Strategies of PTPS

Policy A: Development of transport system to support economic and social activities

- Supporting economic activities by connecting major economic centres with motorways or national highways
- Demand oriented project formation to avoid traffic congestion
- Establishment of stability by providing alternative mode or route
- Increase of urban bypasses
- Development or improvement of inter-modal facilities
- Strengthening of international routes
- Management and effective utilization of existing resources

Policy B. Development of transport network to support balanced growth of regional economy

- Harmonization of transport network development with regional development policies and plans
- Network development aiming at alleviation of poverty and regional disparity
- High priority setting on transport projects in poorer areas
- Project implementation by utilization of local materials and procurement of local labor force
- Effective monitor of how poverty alleviation measures and projects affect

Policy C. Transport system to realize optimal modal share

- Minimization of transport cost by multi-modal transportation
- Fare competition between road and rail

- Modernization of railway system through rehabilitation with improvement to railway infrastructure and facilities, renewal of rolling stock and institutional reform of management and operation
- Development and improvement of inter-modal facilities
- Introduction of research works suitable for local conditions

3. Action Plan for non-Investment Projects

The action plan for legislative, institutional and enforcement improvement recommended in the Master Plan is summarized as listed in Table-2. These actions are essential for developing a rational plan and effective use of infrastructure.

Table-2 Recommended non-Investment Projects

Sector	Code	Project	Policy			Strategy							
			Support economic & Social Activities	Support regional Balanced growth	Realize optimal modal share	Financially realizable Master Plan	Transparent prioritization	Pursuit safety	Inter-modal facilities	Cross-border Facilities	Institutional capacity enhancement	Environmental consideration	
General	NG-01	Establishment of Transport Coordination Mechanism - Transport Policy Council - Transport Coordination Committee - Institute of Transport Policy Studies											
General	NG-02	Adoption of Quake resistant Design Standard											
General	NG-03	Review and Amendment of Cross Border Trade Agreement											
General	NG-04	Capacity Building of Environmental Protection Agency (EPA)											
Road	NR-01	Establishment of Highway Research and Training Center											
Road	NR-02	Implementation and Enforcement of Traffic Safety Improvement Measures											
Road	NR-03	Implementation and Enforcement of Anti-overloading Measures											
Road	NR-04	Database Building on Traffic Accident											
Road	NR-05	Road Development Account and Capitalization of NHA Debt											
Road	NR-06	Introduction of Road Tax											
Rail	NL-01	Reform & Restructuring of PR											
Rail	NL-02	Privatization of PR in long-term											
Rail	NL-03	Computer-aided ticketing system											
Rail	NL-04	Study on Conversion to Bus Transport of Less-demanded Railway Lines											
Rail	NL-05	Review and Revise of Rail Transport Fare											
Port	NP-01	Computerization of Port Cargo Statistical System											

4. Projects and Implementation Plan

The Master Plan Projects

The implementation plan of the Master Plan was prepared by each transport sub-sector in the period of:

- Short-Term: FY2005/06 – 2009/10
- Medium-Term: FY2010/11 – 2014/15
- Long-Term: FY2015/16 – 2024/25

The projects composing the Master Plan for the road and rail sub-sector are listed in Table-3 and Table-4, respectively. As for the port and airport sub-sectors, PTPS focused on demand forecast and review of existing plan and project.

The identified projects were evaluated and prioritized primarily based on the Economic Internal Rate of Return (EIRR). Secondly, projects were examined from such viewpoints as regional balanced growth, profitability, network integration, international linkage, social equity/poverty and environmental issues. Finally, based on the comprehensive evaluation results, projects were classified into short-, medium- and long-term, also considering possible budget envelope.

PTPS Priority Projects

The PTPS Priority projects have been selected for the next stage of MTDF (or in parallel with MTDF) in view of urgency from viewpoints of contribution to national economy, alleviation of traffic congestion, and safety improvement:

- Capacity Expansion of Karachi – Lahore Railway Corridor;
- The Second Khohat Tunnel;
- M-13 (Lahore – Sialkot Motorway) Construction;
- M-16 (Hyderabad – Nawabshah – Khaipur Desert Road) Construction;
- Murree – Muzaffarabad Road Improvement;
- Bridge Construction in Punjab;
- Karachi Southern Bypass ;
- Qasim Port Access;
- Lahore Strategic Peripheral Route Development;
- Lahore Multi-modal Terminal Construction;
- Bypass Construction

It is recommended to carry out feasibility studies and plan the implementation program for these projects as soon as possible.

Pakistan Transport Plan Study in the Islamic Republic of Pakistan (PTPS)

Table-3 Master Plan Projects for Road Sector

Rs. Million

PTPS Code	Project Name	Project Cost Rs. M	Accumulated Expenditure , June 05	MTDF (2005/06 - 2009/10)			Medium 2010/11- 2014/15	Long 2015/16- 2024/25
				PSDP 2005/06	Short-term 2006/07-09/10			
Ongoing Project								
10	Marakan Coastal Road	15,010	10,153	4,366	1,500	2,866	492	0
20	M-1	26,862	23,882	2,980	2,370	610	0	0
30	M-3	6,877	6,010	611	1	610	0	0
40	Karachi Northan Bypass	2,928	2,704	800	800	0	0	0
50	Lyari Express Way	5,081	2,420	2,661	600	2,061	0	0
60	N75, Islamabad-Muzaffarabad Road	7,660	3,324	4,206	950	3,256	0	0
72	N55, Indus Highway Project (Phase III)	0	633	5,923	750	5,173	0	0
80	N15, Mansehra Naran Jalkhad Road	3,821	3,625	196	154	43	0	0
100	N5, Rahim Yar Khan-Bahawarpur	7,283	5,322	1,961	400	1,561	0	0
110	N5, Okara-Lahore (Okara bypass)	4,462	4,405	190	190	0	0	0
120	N5, Kharian-Rawalpindi	5,554	5,479	40	40	0	0	0
130	N5, Chablat Nowshera (incl. flyover)	3,700	3,546	295	100	195	0	0
140	Lowari Tunnel & Access Road	7,983	1,239	6,745	1,150	5,595	0	0
150	Bridge on River Jhelum at Azad Pattan AJK	71	45	26	13	13	0	0
160	N65, Dera Allah Yar-Nutal Section	771	979	50	50	0	0	0
170	N65, Nutal-Sibi-Dhadar Section	1,710	733	977	150	827	0	0
180	Improvement of KKH (N-35) NWFP	552	540	12	0	12	0	0
190	N50, D.I. Khan-Mughalkot Road	1,903	1,753	350	350	0	0	0
200	N70, Qila Saifullah-Loralai-Bewala	2,841	1,304	1,537	350	1,187	0	0
220	M-8, Gwadar-Hoshab-Khuzdar Road	16,640	2,144	8,450	1,450	7,000	6,046	0
230	M-8, Khori-Quba Saeed Khan	4,000	456	3,544	500	3,044	0	0
240	N65, Realignment of N65 near Jaccobabad	478	258	220	100	120	0	0
250	Bridge over River Chenab at Sharshah	1,023	393	630	370	260	0	0
260	M2, Khanqah Dogran Interchange	144	43	101	100	1	0	0
280	Lalamusa-Thotha Rai Bahadur	60	38	22	0	22	0	0
290	N45, Noshera-Chakdara	1,620	142	1,478	1	1,478	0	0
300	F/S	700	62	410	50	360	228	0
470	N5 Highway Rehabilitation Project, WB	19,943	1,116	15,616	3,116	12,500	3,211	0
540	N25, Kalat-Quetta-Chaman (ADB)	6,671	0	6,671	2,300	4,371	0	0
551	Peshawar-Torkham Dual Carriageway	12,787	1	10,669	1,169	9,500	2,117	0
552	Malana Junction- Sarai Gambia Dualization	0	0	0	0	0	0	0
553	Badabher-Dara Adam Khel, Rehab of existing road	0	0	0	0	0	0	0
554	Sarai Gambila-Bannu-Miran Shah-Ghulam Khan	0	0	0	0	0	0	0
650	Kohat Tunnel Access Road	6,627	6,568	58	0	58	0	0
670	N25, Karao-Wad Section	2,500	0	2,000	10	1,990	500	0
Ongoing Projects Sub-total		178,261	89,316	83,794	19,084	64,710	12,594	0
Committed Projects								
480	Rehabilitation of 518km of N5	14,610	0	6,500	0	6,500	8,110	0
530	Motorway Link (Gujranwala-Pindi Bhattian)	6,000	0	0	0	0	6,000	0
561	N25, Hab-Utral	3,176	0	1,003	37	966	2,173	0
562	N70, Multan-Muzaffargarh	1,352	0	426	16	410	926	0
563	N50, Khanozai-Mughalkot Section	12,422	0	3,926	143	3,783	5,576	2,939
564	N35, Dualization of Hassanabdal-Mansera	3,363	0	1,062	39	1,023	2,301	0
565	N65, Sukker - Jacobab Bypass	2,429	0	765	28	737	1,664	0
566	Tarnol-Fatejang-Kohat Road	3,848	0	1,215	44	1,171	2,633	0
567	N70 (Qila Saifullah-Wiagum Rud)	4,632	0	1,463	53	1,410	3,170	0
570	Malakand Tunnel/Bypass	6,000	0	500	0	500	5,500	0
902	N70, Mughalkot-Zhob Road	2,100	0	0	0	0	0	0
Committed Projects Sub-total		59,932	0	16,860	360	16,500	38,053	2,939
MTDF New Projects								
310	Quetta Western Bypass	226	0	226	80	146	0	0
335	Larkana Bridge	2,500	0	2,000	0	2,000	500	0
340	Five bridges on Gilgit-Shardu Road (S-1)	215	0	215	80	135	0	0
350	N40, Noshki-Dalbandin	1,986	0	2,110	129	1,981	0	0
360	N15, Jalkhad-Chillas	1,827	5	1,822	1	1,821	0	0
370	KKH-Skardu Road	4,000	0	1,300	0	1,300	2,700	0
380	N5, Ghaggar Phatak Bridge to Kotri	2,850	0	2,850	0	2,850	0	0
390	N80, Jand-Kohat Road	1,000	0	1,000	0	1,000	0	0
400	Hassan Abdal Bypass	500	0	0	0	0	500	0
410	Dhakpattan Bridge	520	0	520	50	470	0	0
415	N55 Dadu Ratodero Fence+Ser. Rd.	3,750	0	0	0	0	3,750	0
420	Other Projects	1,214	0	1,000	0	1,000	214	0
421	Interchange at Kot Sarwar for Hafizabad	86	0	0	0	0	86	0
422	Roads in Rawalpindi	1,000	0	0	0	0	1,000	0
450	Hoshab-Srab	12,100	0	10,500	0	10,500	1,600	0
460	M-7	18,000	0	15,000	0	15,000	3,000	0
491	Bridge (Kotri-Sajawal bridge), jerruk	2,500	0	0	0	0	0	2,500
492	Bridge (Kotri-Dadu Moro bridge),San-Sakar	2,500	0	0	0	0	2,000	500
493	Bridge (Kahndhok-Ghotki)	2,500	0	0	0	0	0	2,500
494	Rail cum Road Bridge, Chachran-Mithankot	2,500	0	0	0	0	2,000	500
495	Bridge (Taunsa-Leiah)	2,500	0	0	0	0	2,000	500
496	Bridge over River Indus at Kalur Kot	2,500	0	0	0	0	0	2,500
497	Bridge over River Indus (Mianwali-Isa Khel)	2,500	0	0	0	0	0	2,500

Source: JICA Study Team

Pakistan Transport Plan Study in the Islamic Republic of Pakistan (PTPS)

cont. of Table-3

Rs. Million

PTPS Code	Project Name	Project Cost Rs. M	Accumulated Expenditure , June 05	MTDF (2005/06 - 2009/10)			Medium	Long
				PSDP 2005/06	Short-term 2006/07-09/10	2010/11- 2014/15	2015/16- 2024/25	
500	ITS Corridor	6,000	0	2,200	0	2,200	3,800	0
510	M5, Khanewal-Rajapur	42,000	0	2,000	0	2,000	22,000	18,000
520	N5, Service Road along with Fence, WB	4,200	0	0	0	0	4,200	0
580	N45	6,000	0	200	0	200	5,800	0
590	Kohala-Muzafarabad Road	3,000	0	250	0	250	2,750	0
591	Murree-Kohala Road	3,000	0	250	0	250	2,750	0
600	N40, Lakpass-Noshki	3,600	0	450	0	450	3,150	0
610	Hyderabad-Mirpurkhas-Khokhropar Road	8,880	0	700	0	700	8,180	0
620	Chakdara - Kalam Road	6,500	0	500	0	500	6,000	0
630	Khawaza Khala-Besham Road	3,300	0	350	0	350	2,950	0
640	N65, Sibi-Quetta	6,350	0	3,200	0	3,200	3,150	0
660	N70, D.G.Khan-Sakhi Sarawar-Bewala	6,200	0	2,810	10	2,800	3,390	0
661	2nd Bridge on Indus at Gazi Ghat (N70)	500	0	0	0	0	495	0
680	Khushalgar Birdge(N80)	3,500	0	2,100	100	2,000	1,400	0
690	N55, Indus Highway Project (Phase III-a)	6,000	0	4,000	0	4,000	2,000	0
700	KKH	18,500	0	3,000	0	3,000	10,000	5,500
810	M-4, Faisalabad-Multan	22,080	0	8,832	0	8,832	13,248	0
820	Periodic Overlay on M2 & Realignment of Salt Rang	8,000	0	2,400	0	2,400	5,600	0
830	M-6, Ratodero-Rajapur	21,600	0	8,000	0	8,000	13,600	0
840	M-9, Karachi-Hyderabad	6,000	0	6,000	0	6,000	0	0
850	Peshawar Northan Bypass	3,078	0	3,173	100	3,073	0	0
860	Rawalpindi Bypass	3,489	0	3,489	45	3,444	0	0
870	N25, Lakpass Tunnel	570	3	567	1	566	0	0
890	N-5, Shahdara Flyover	4,500	0	3,746	146	3,600	900	0
	<i>MTDF New Projects Sub-total</i>	266,121	8	96,760	742	96,018	134,713	35,000
	PTPS New Projects							
330	Bridge over Chenab at Riwaz	700	0	0	0	0	700	0
655	Second Kohat Tunnel	6,000	0	0	0	0	6,000	0
900	Panjab East-West Corridor-1	55,068	0	2,203	0	2,203	17,071	35,794
901	Mianwali-Lakki Road	5,378	0	807	0	807	4,302	269
905	Panjab East-West Corridor-2	60,618	0	2,425	0	2,425	15,761	42,433
910	Panjab East-West Corridor-3	69,420	0	2,083	0	2,083	20,826	46,511
915	Panjab North-South Corridor-1	70,122	0	0	0	0	10,518	59,604
920	Bahawalpur, Bahawal Nagar, Sulemanki Road	34,722	0	1,736	0	1,736	12,153	20,833
925	Panjab North-South Corridor-2	11,232	0	1,685	0	1,685	3,931	5,616
930	Sialkot, Wazirabad, Pindi Bhattian Road	24,648	0	0	0	0	0	24,648
935	Sialkot, Gujranwala, Sheikhpura Road	14,838	0	0	0	0	0	14,838
940	Faisalabad, Samundari, Kacha Khu Road	22,818	0	0	0	0	5,705	17,114
945	Lahore, Jaranwala, Faisalabad, Jhang Road	31,770	0	0	0	0	15,885	15,885
951	M11	29,645	0	0	0	0	0	29,645
952	M12	0	0	0	0	0	0	8,673
953	M13	12,575	0	0	0	0	10,060	2,515
954	M14	11,395	0	0	0	0	0	11,395
955	M15&M19	51,230	0	0	0	0	0	0
956	M16	29,336	0	0	0	0	7,334	22,002
957	M17	20,526	0	0	0	0	0	0
958	M18	20,273	0	0	0	0	0	0
959	N55 (Dadu-Kotri) 4-Lane	10,000	0	0	0	0	10,000	0
961	Garh Maharaja Bridge	1,000	0	0	0	0	1,000	0
962	Chistian-Burewala Bridge	500	0	0	0	0	500	0
963	Mohammadwala Bridge	600	0	0	0	0	600	0
964	Jhelum, Gatalian Mirpur Bridge	1,250	0	0	0	0	1,250	0
966	Samundari-Shahiwal Road	2,660	0	0	0	0	1,862	798
967	Jaranwala-Okara Road	2,700	0	0	0	0	1,890	810
968	Lahore Bridge	950	0	0	0	0	475	475
969	Victoria Bridge	1,000	0	0	0	0	1,000	0
971	Pind D. Khan-Jhelum Road	4,462	0	892	0	892	3,570	0
972	Hyderabad-Bidin-Thata Road	11,048	0	0	0	0	0	11,048
973	Mianwali-Shakardarra-Lachi Road	6,517	0	652	0	652	5,865	0
974	N65 Dualization	23,645	0	0	0	0	0	23,645
975	Lower Topa – Mansehra Road	11,616	0	2,323	0	2,323	9,293	0
980	Qasim Port Access	3,878	0	3,878	0	3,878	0	0
981	Karachi Port Access	15,000	0	0	0	0	15,000	0
982	Bridge on River Indus (Khanote-Hala old)	2,500	0	0	0	0	2,500	0
983	Bridge on River Indus (Daultpur-Shehwan)	2,500	0	0	0	0	2,500	0
985	N55 Dualization (Kohat-D.I.Khan)	14,230	0	0	0	0	14,230	0
986	N55 Dualization (D.I.Khan-D.G.Khan)	9,600	0	0	0	0	9,600	0
987	N55 Dualization (Rajapur-Ratodero)	11,630	0	0	0	0	5,815	5,815
990	Sindh Coastal Highway	20,309	0	2,031	0	2,031	16,247	2,031
1000	Urban Bypass	45,536	0	3,188	0	3,188	10,929	31,420
1002	Lahore Peripheral Road	24,299	0	2,430	0	2,430	21,869	0
	<i>PTPS New Projects Sub-total</i>	818,417	0	26,331	0	26,331	266,241	433,816
	Grand Total	1,322,731	89,325	223,745	20,186	203,559	451,601	471,755

Source: JICA Study Team

Table-4 Master Plan Projects for Railway Sector

Rs. Million

PTPS Code	Project Name	Project Cost Rs. M	Accumulated Expenditure , June 05	MTDF (2005/06 - 2009/10)			Medium 2010/11- 2014/15	Long 2015/16- 2024/25
				PSDP 2005/06	Short-term 2006/07-09/10			
	Ongoing Project							
1	Procurement/manufacture of 175 passenger coaches	7,776	5,953	1,823	1,401	422	0	0
2	Procurement of 69 DE locos	11,151	4,188	6,963	2,234	4,729	0	0
3	Track rehabilitation and modernization of sleeper factory	11,192	5,686	5,506	2,000	3,506	0	0
4	Recommissioning of 55 DE locos	879	232	647	500	147	0	0
5	Replacement of breakdown cranes and procurement of relief train	407	286	121	63	58	0	0
6	1,300 high capacity wagons	5,870	1,727	4,143	1,500	2,643	0	0
7	Doubling of track Lodhran-Multan-Khanewal	3,297	433	2,864	750	2,114	0	0
8	Rehabilitation of 450 passenger coaches	2,145	1,300	845	575	270	0	0
9	Other projects	148	122	26	26	0	0	0
	<i>Ongoing Projects Sub-total</i>	42,865	19,927	22,938	9,049	13,889	0	0
	MTDF New Projects							
10	Conversion of Mirpur Khas - Khokhropar section to broad gauge	700	300	400	400	0	0	0
11	Dualization of track from Khanewal to Raiwind	5,712	0	5,712	400	5,312	0	0
12	Dualization of track from Shahdara Bagh to Lala Musa	3,600	0	1,288	0	1,288	2,312	0
13	Upgrading and improvement of track from Khampur to Lala Musa	3,500	0	3,500	0	3,500	0	0
14	Doubling of track from Lahore to Faisalabad section	3,840	0	2,940	0	2,940	900	0
15	Procurement/manufacture and assembling of 75 diesel locomotives	12,700	0	12,700	0	12,700	0	0
16	Procurement/manufacture and assembly of 1,000 freight wagons	4,800	0	3,600	0	3,600	1,200	0
17	Procurement/manufacture and assembly of 150 passenger coaches	5,977	0	5,977	0	5,977	0	0
18	Railway yard and railway linkage from Gwadar Port to container yard	2,500	0	2,500	0	2,500	0	0
19	Rail link to Gwadar Port	12,000	0	6,500	0	6,500	5,500	0
20	Up-gradation Rohri - Quetta - Taftan	15,000	0	0	0	0	4,450	10,550
21	Feasibility study for rail link from Kundian to Peshawar	10	0	10	0	10	0	0
22	Feasibility study for rail link from Bostan to Peshawar	10	0	10	0	10	0	0
23	Provision of road over bridge at Chowrangi Chowk EPZ (50%)	250	0	250	0	250	0	0
	<i>MTDF New Projects Sub-total</i>	70,599	300	45,387	800	44,587	14,362	10,550
	PTPS New Projects							
24	Improvement of signalling system Karachi - Lahore	15,000	0	15,000	0	15,000	0	0
25	Improvement of signalling system Lahore - Rawalpindi	2,900	0	900	0	900	2,000	0
26	Improvement of signalling system Rawalpindi - Peshawar	1,300	0	0	0	0	1,300	0
27	Improvement of signalling system Faisalabad - Lahore	1,700	0	1,000	0	1,000	700	0
28	Improvement of signalling system Khanewal - Wazirabad	2,100	0	0	0	0	2,100	0
29	Improvement of signalling system Rohri - Quetta	2,900	0	0	0	0	2,900	0
30	Improvement/rehabilitation of telecommunication system (1st phase)	5,000	0	5,000	0	5,000	0	0
31	Improvement/rehabilitation of telecommunication system (2nd phase)	3,000	0	0	0	0	3,000	0
32	Improvement of signalling system Multan - Attock City	2,500	0	0	0	0	2,500	0
33	Improvement of signalling system Kotri - Habib Kot	1,700	0	0	0	0	1,700	0
34	Improvement of signalling system Jacobabad - Kot Adu	2,100	0	0	0	0	2,100	0
35	Improvement of signalling system other lines continued	9,000	0	0	0	0	0	9,000
36	Improvement/rehabilitation of telecommunication system (3rd phase)	2,000	0	0	0	0	0	2,000
37	Urgent rehabilitation of signalling and telecommunication systems	1,000	0	1,000	0	1,000	0	0
38	Doubling of track Lala Musa - Rawalpindi	7,100	0	0	0	0	7,100	0
39	Doubling of track Lodhran - Khanewal (Via Chord)	2,100	0	0	0	0	2,100	0

Source: JICA Study Team

Pakistan Transport Plan Study in the Islamic Republic of Pakistan (PTPS)

cont. of Table-4

Rs. Million

PTPS Code	Project Name	Project Cost Rs. M	Accumulated Expenditure , June 05	MTDF (2005/06 - 2009/10)			Medium	Long
				PSDP 2005/06	Short-term 2006/07-09/10	2010/11- 2014/15	2015/16- 2024/25	
PR40	Rehabilitation of track Rawalpindi - Peshawar	700	0	0	0	0	700	0
PR41	Rehabilitation of track Multan - Attock City	2,000	0	0	0	0	2,000	0
PR42	Rehabilitation of track Kotri - Habib Kot	1,400	0	0	0	0	1,400	0
PR43	Rehabilitation of track Jacobabad - Kot Adu	1,700	0	0	0	0	1,700	0
PR44	Rehabilitation of track other lines continued	6,000	0	0	0	0	0	6,000
PR45	Planning investigation and rehabilitation of structures	200	0	200	0	200	0	0
PR46	Rehabilitation/replacement of structures Karachi - Lahore (1st phase)	5,000	0	2,000	0	2,000	3,000	0
PR47	Rehabilitation/replacement of structures Karachi - Lahore (2nd phase)	5,000	0	0	0	0	0	5,000
PR48	Urgent rehabilitation of structures of other lines	2,000	0	2,000	0	2,000	0	0
PR49	Rehabilitation/replacement of structures of other lines	10,000	0	0	0	0	0	10,000
PR50	Improvement of passenger station and ticketing system	3,000	0	2,000	0	2,000	1,000	0
PR51	Improvement of freight stations in Karachi for container/bulk transport	3,000	0	3,000	0	3,000	0	0
PR52	Expansion/improvement of container stations in up-country area	5,000	0	5,000	0	5,000	0	0
PR53	Expansion of freight stations in Karachi for container/bulk transport	5,000	0	0	0	0	0	5,000
PR54	Expansion/improvement of container stations in up-country area (2)	7,000	0	0	0	0	0	7,000
PR55	Procurement/manufacture/assembling of 120 diesel locomotives (3000HP)	22,000	0	3,000	0	3,000	19,000	0
PR56	Procurement/manufacture/assembling of 180 diesel locomotives (2000HP)	27,000	0	3,000	0	3,000	24,000	0
PR57	Procurement/manufacture/assembly of 150 electric locomotives (Passenger)	30,000	0	0	0	0	0	30,000
PR58	Procurement/manufacture/assembly of 180 electric locomotives (Freight)	50,000	0	0	0	0	0	50,000
PR59	Procurement/manufacture/assembly of 550 passenger coaches	25,000	0	0	0	0	25,000	0
PR60	Heavy rehabilitation/modification of 530 passenger coaches	11,000	0	5,000	0	5,000	6,000	0
PR61	Procurement/manufacture/assembly of 1,230 passenger coaches	56,000	0	0	0	0	0	56,000
PR62	Procurement/manufacture/assembly of 1,050 freight wagons	5,800	0	0	0	0	5,800	0
PR63	Procurement/manufacture/assembly of 7,600 freight wagons	25,000	0	0	0	0	0	25,000
PR64	Expansion and modernisation of locomotives/rolling stock repair shops	15,000	0	0	0	0	0	15,000
PR65	Expansion and modernisation of locomotives/rolling stock depot	15,000	0	0	0	0	0	15,000
PR66	Feasibility study of electrification Karachi - Lahore	50	0	50	0	50	0	0
PR67	Construction/rehabilitation of electrification Karachi - Lahore	27,000	0	0	0	0	7,000	20,000
PR68	Increase of transport capacity Karachi - Lahore in addition to electrification	3,800	0	0	0	0	1,200	2,600
PR69	New link Bostan - Zhob - D.I.Khan - Kohat - Peshawar	20,000	0	0	0	0	7,000	13,000
<i>PTPS New Projects Sub-total</i>		451,050	0	48,150	0	48,150	132,300	270,600
<i>Grand Total</i>		564,514	20,227	116,475	9,849	106,626	146,662	281,150

Source: JICA Study Team

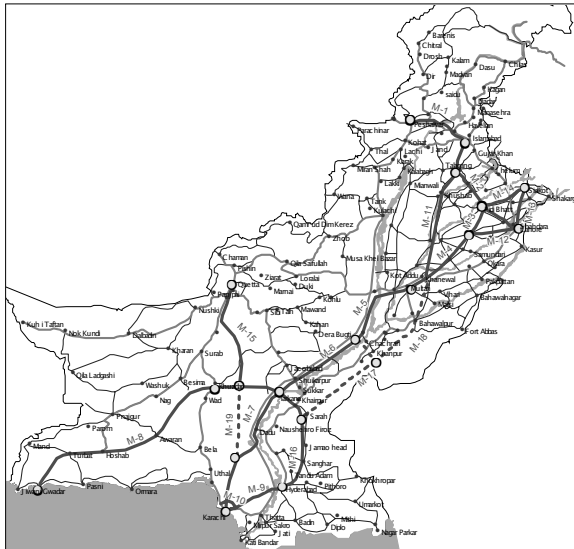


Figure-3 Proposed Motorway Network



Figure-4 Highway Improvement and Widening



Figure-5 Proposed Bridges

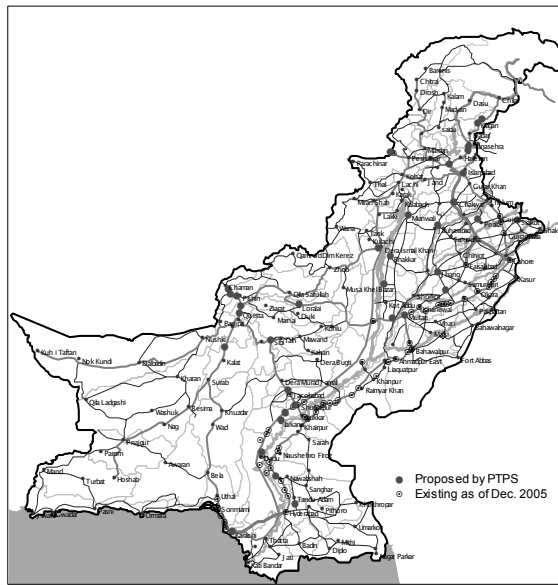


Figure-6 Proposed Bypasses

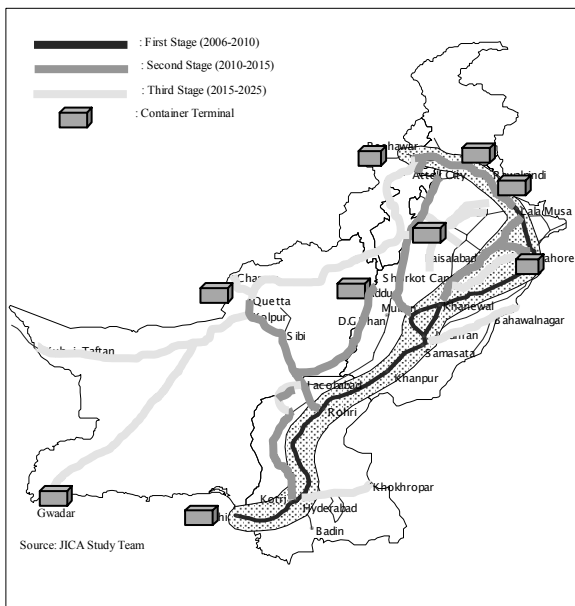


Figure-7 Railway Plan

Currently, 10 motorways (M1-M10) of 2,667 km are operated or planned already. In addition to these, nine motorways of 2,140 km were proposed by PTPS.

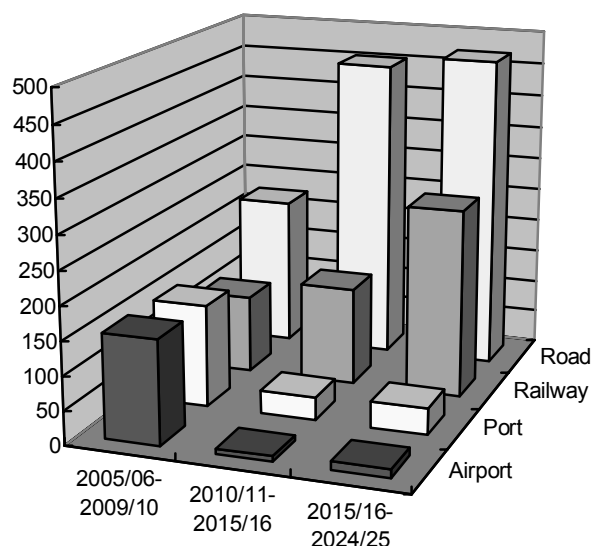
As the highway network configuration has almost completed, main stream of road investment is “widening and improvement” rather than “new construction”.

In connection with the highway development, 17 new bridges were proposed over the Indus river and its tributaries in addition to the existing 48 bridges. Urban bypasses are also proposed for 37 cities, additionally to the 65 existing bypasses.

The railway networks were classified into three categories according to their importance and the period of improvement stages, together with the development of container terminals.

5. Cost and Budget

Based on the implementation schedule, the required investment over the next 20 years was calculated at Rs. 2.06 trillion in total, of which the road sector accounted for 1.13 trillion (54.7%) and the railway sector Rs. 537 billion (26.1%).



Note: Purchase and lease of new aircrafts are excluded from projects in “Airport” Sector after 2010/11.
Source: JICA Study Team

Figure 8 Required Investment in Transport Sector over the next 20 years

In addition to the project costs in the Master Plan, the private sector is expected to play an important role to make investments in transport services in Pakistan. For example, the total procurement cost for new motor vehicles over the next 20 years was estimated at approximately Rs. 5.5 billion.

Including the private sector investments, about 2% of GDP should be allocated for the transport sector. In this case, the total investments will amount to Rs. 5.1 trillion over the next 20 years as shown in the table below.

Table-3 Investment Allocation for Transport Sector

	Road	Railway	Port & Shipping	Airport	Total
2005-2010	453.7	129.0	94.5	77.2	754.4
2010-2015	630.1	179.1	131.2	107.2	1,047.6
2015-2020	854.7	242.9	178.0	145.4	1,421.0
2020-2025	1,132.4	321.8	235.9	192.7	1,882.7
Total	3,070.8	872.8	639.6	522.4	5,105.7

Source: JICA Study Team

6. Recommendation

(1) Private Sector Involvement

The private sector involvement in transport development in Pakistan is an important mechanism for the Master Plan to implement the projects. Particularly, private financing is essential to the development of the Motorway Network. Private sector investments in airport and port development should be farther promoted. The railway system should be improved to the extent that private forwarders willingly choose the railway. Privatization of PR is a long-term target.

It is necessary to evaluate any candidate project for BOT/PPP carefully, because the failure in private sector investment will significantly increase the burden of the public sector. Capacity building and transparent prioritization are important for the success of the private sector participants.

(2) Establishment of Transport Coordination Mechanism

Efficient transport sector development involves intra-sectoral coordination; however, the current system for project prioritization does not necessarily work adequately. In order to remedy the current status of transport system and create a sustainable planning and implementation of sector development programs a three-tiered coordination mechanisms consisting of (i) high level transport policy council, (ii) a working level transport coordination committee, and (iii) institute for transport policy studies should be established.

(3) Improvement of Data Collection and Management for Transport Planning

Reliable traffic data are the basis for formulating objectives of transport development and action plans. Particularly, road accident data should be systematically collected, managed and analyzed in order to set priorities for road traffic safety. Without reliable traffic accident data, it is difficult to establish policies to reduce traffic accidents.

PTPS carried out a nation-wide O/D survey in 2005, and compiled O/D matrices and relevant traffic data that are useful for transport planning. The National Transport Research Centre should maintain and make full use of the database.

**PAKISTAN TRANSPORT PLAN STUDY
IN THE ISLAMIC REPUBLIC OF PAKISTAN**

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Chapter 1. INTRODUCTION

1.1 Outline of the Study

1.1.1 Background of the Study

The Islamic Republic of Pakistan is a large territory (land area of 796,000km²) located north-east of the Arabian Sea and extending towards the Himalayas on the border of China. The country has four provinces (Punjab, Sindh, Balochistan, and North-West Frontier Province), two territories (Islamabad Capital Territory and Federally Administrated Tribal Area), and the Pakistan parts of Kashmir. The distance between Islamabad (the capital of Pakistan) and Karachi (the provincial capital of Sindh having two important international ports) is about 1,200km in a straight line. The transport system in Pakistan plays an important role in unification of these regions in terms of political and economic activities.

In order to realize efficient and effective investment with limited resources, it is necessary to develop a comprehensive transport plan. At present, the Medium Term Development Framework covers projects up to the year 2010. However, the socio-economic situation in Pakistan has drastically changed due to globalization and political and economical changes in surrounding countries such as Afghanistan. An extensive review of the present development strategies for the transport sector is urgently required in order to reflect recent trends in the socio-economic conditions.

The Government of the Islamic Republic of Pakistan has requested the Government of Japan to provide technical assistance in carrying out a comprehensive transport development study titled “the Pakistan Transport Plan Study in the Islamic Republic of Pakistan” (hereinafter referred to as “the Study” or “PTPS”). In response to this request, the Government of Japan agreed to conduct the Study and has entrusted its execution to the Japan International Cooperation Agency (hereinafter referred to as “JICA”), the official agency responsible for implementing technical cooperation programs for the Government of Japan.

Northern Pakistan Earthquake, October 8, 2005

On October 8 in 2005, the M7.6 Earthquake hit the northern Pakistan and left the devastating damage on infrastructure in AJK and NWFP. The emergency repair works were required for the reconstruction of the area, and JICA decided to rearrange of the Study to investigate the urgent works of road sector in accordance with a request from the Government of Pakistan. In the beginning of the Study, AJK was excluded from the Study but a series of field surveys along Murry - Muzaffarabad Road and Jhelum Varry were carried out. The results of the field survey are described in Chapter 12 of this report.

1.1.2 Objectives of the Study

The major objectives of the Study are:

- To formulate a short term plan (2005/6~2009/10) and a master plan (2005/6~2024/25) for the development strategy of the national transport system of Pakistan covering all transport modes.
- To identify priority projects and carry out feasibility studies (F/S) for selected projects.
- To promote the transfer of knowledge and technology so that the counterparts in the transport sector of the Pakistan authorities are able to modify, revise and update the master plan after the Study is completed.

1.1.3 Study Area

- The study area is the entire territory of Pakistan.

- International cargo traffic to and from neighbouring countries (i.e. Afghanistan, India and China) is included in the Study.
- The Study covers all transport modes, i.e. land transport (roads and railways), sea transport and civil aviation except inland water transport. As land transport is dominant in Pakistan, the Study paid special attention to this transport mode.

The Study Team concentrated on the land transport sector, especially the road sector. Judging from the density of the transport network, the transport capacity and the size of investments, the importance of the road sector is apparent. With respect to the railway, the Study Team considered the role of railway from the viewpoint of the national economy. The private sector takes the initiative in business activities for the marine transport/port sector and aviation/airport sector in the PTPS and consequently studies are confined to the consideration of the validity of existing projects based on demand forecasts.

1.1.4 Flow and Contents of the Study

The overall work flow is shown in Figure 1.1.1 and the contents of each phase of PTPS were:

(1) Preparatory Work

The Study Team collected and analyzed relevant information and materials, and established a basic policy for the Study. Based on this information, the Study Team prepared the Inception Report.

(2) First Stage Field Work

The Study Team submitted and explained the policy and the contents of the Inception report to the Pakistani counterpart. After the consensus of both sides, the Study Team prepared the Progress Report based on the information and results obtained through following activities: analysis of present condition; review of previous studies on transport in Pakistan; identification of problems; and field reconnaissance.

In addition, the Study Team commenced the following works for the formulation of the draft final report (Master Plan):

- Setting up socio-economic framework;
- Traffic survey and analysis;
- Forecast of traffic demand;
- Listing of priority projects and analysis of present situation

(3) Second Stage Field Work

The Study Team submitted and explained the contents of the Progress Report to the Pakistani side, and a consensus was reached between both sides.

Based on the result of discussions on the Progress Report and the results of the First Stage, the Study Team formulated the Pakistan Transport Master Plan for the year 2025 as the draft final report.

(4) Third Stage Field Work

The Study Team held a seminar on the Study and explained the contents of the draft final report (Master Plan) to the Pakistani and Japanese sides.

Based on the comments on the draft final report, the Study Team finalized the Master Plan and submitted it to Pakistani side.

Pakistan Transport Plan Study in the Islamic Republic of Pakistan (PTPS)

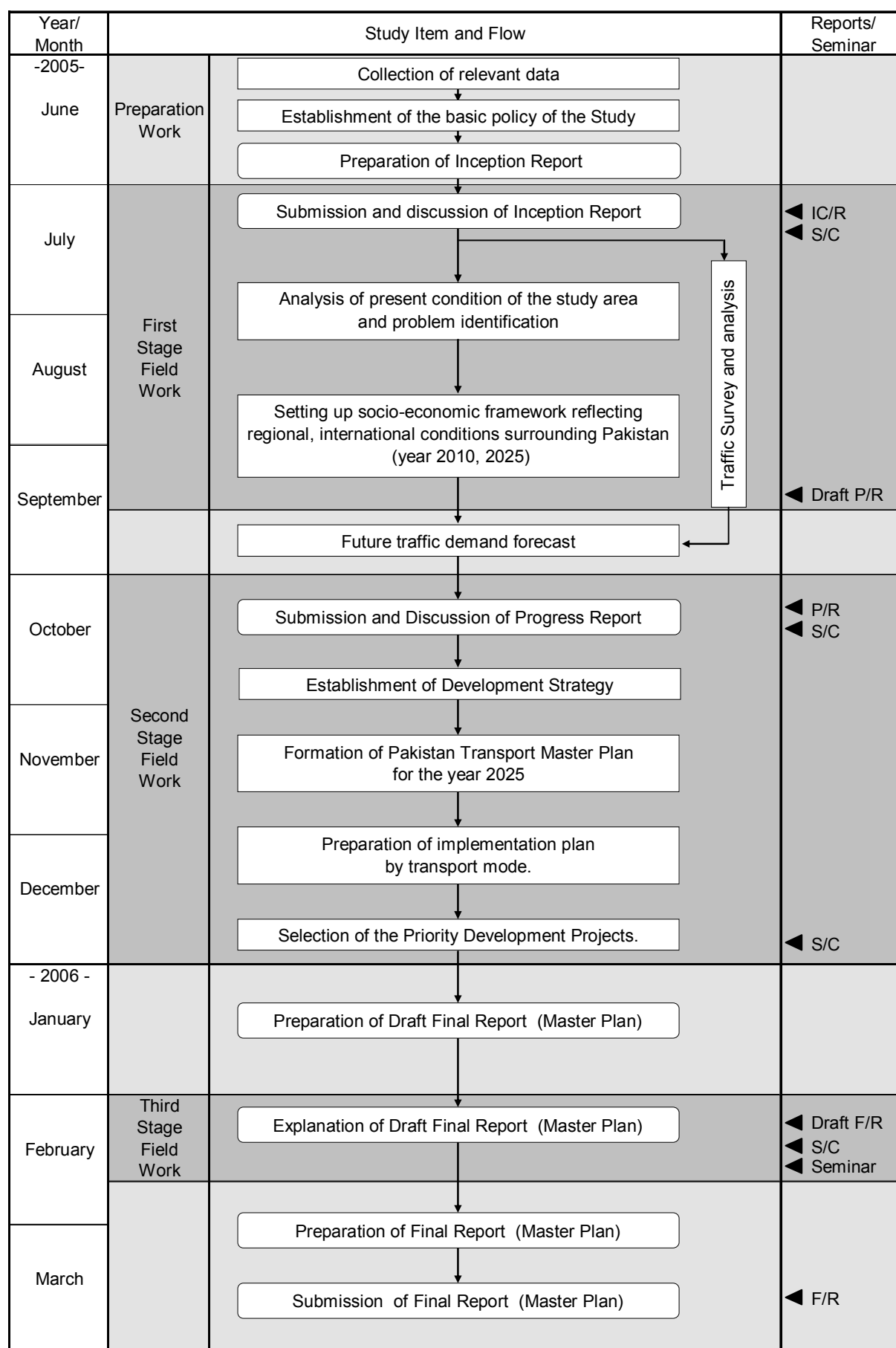


Figure 1.1.1 Overall Flow of the Study (Master Plan)

1.2 Output of the Study

1.2.1 Reporting

The Study team completed and submitted the following reports in English.

Name of report	Submission date
Inception Report	End of June 2005
Progress Report	End of September 2005
Draft Final Report	End of January 2006
Final Report	End of March 2006

In addition to the reports above, an annex volume was submitted, reporting the results of analysis on present conditions of transport demand and future demand forecast, in the form of database. Those results were transferred to the Pakistani side through joint-works, seminars and workshops, in order to make effective utilization possible after the PTPS.

1.2.2 Seminars

The Study Team held two seminars for NTRC and other stakeholders on the subjects of traffic study, demand forecast and the Master Plan as follows:

	1 st Seminar	2 nd Seminar	3 rd Seminar
Date	August 17, 2005	December 22, 2005	February 16, 2006
Venue	NTRC Auditorium	NTRC Auditorium	Marriott Hotel
Subjects	- Traffic Survey Contents - Methodology of Demand Forecast - Database	- Traffic Survey Results - Transport Analysis - Demand Forecast - VOC and TTC	- Master Plan



Photo: 1st Seminar



Photo: 1st Seminar, NTRC Auditorium



Photo: 3rd Seminar, Marriott Hotel



Photo: 3rd Seminar, Marriott Hotel

1.3 Organization and Participants of the Study

1.3.1 Organization of the Study

The organization is shown in Figure 1.3.1.

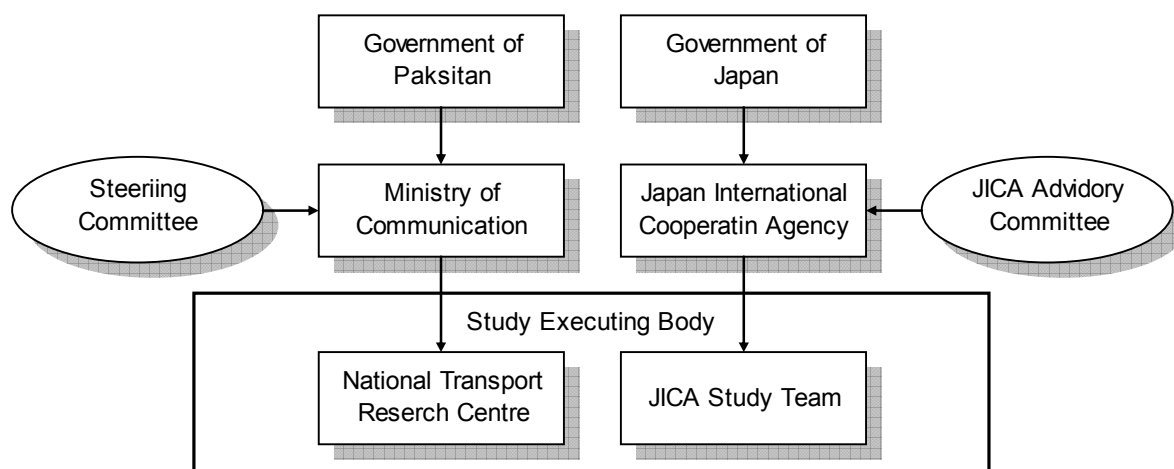


Figure 1.3.1 Organization of the Study

1.3.2 Member of Counterpart

The Government of Pakistan nominated the National Transport Research Centre (NTRC) as the Pakistani counterpart for the Study.

The Study Team collaborated closely with the NTRC personnel and conducted many works and investigations with the assistance of relating Ministries, agencies and entities of Pakistan.

The members of the counterpart are as follows;

Mr. Muhammad Kazim Idris	Chief of NTRC
	Comprehensive transport planning
Mr. Bashir Ahmed	Deputy Chief of NTRC
	Roads, airports and aviation planning (1)
Mr. Sajid Mansoor	International trade and multi-modal transport (1)/
	Transport statistics
Mr. Muhammad Naeem	Road planning / Transport design, evaluation and
	Appraisal (1)
Mr. Masoud Bakht	Economic, financial planning / Traffic surveys and
	analysis
Mrs. Fouzia Sultana	Demand forecast / Women mobility and gender issues
Mr. Mumtaz Hussain Malik	Highway safety and road transport planning
Mr. Hameed Akhter	Transport research and planning
Mr. Tariq Aleem	International trade and multi-modal transport (2)
Mr. Khizer Javed	Railway planning / Port / Shipping and IWT (1)
Mr. Shahzad Ahmed Mirza	Transport statistics (2)
Mr. Tanseer Ahmed Khan	Railway planning / Port/Shipping and IWT (2)
Mr. Shahbaz Latif Mirza	Environmental planning

1.3.3 Study Team

The members of the Study Team are as follows;

Mr. Minoru Shibuya	Team Leader / Comprehensive transport planning
Mr. Tetsuo Wakui	Deputy team leader /Road planning (1) /Transport planning
Mr. Koichi Tanuma	Deputy team leader /Road planning (2) /Road facility planning
Mr. Hiroshi Hotta	Social economic / Industrial development

Mr. Haruhiko Imai	Development strategy / Regional planning
Mr. Osami Matsumoto	Railway planning / Railway business strategy
Mr. Saneyuki Nishi	Railway facility planning
Mr. Masayuki Fujiki	Port planning
Mr. Hiroshi Mizumasa	Airport planning
Mr. Khushal Khan	Traffic survey / Traffic analysis
Mr. Shogo Uchida	Traffic demand analysis / Traffic demand forecast
Mr. Daisuke Nagao	Financial resource planning
Dr. Katsuhiko Takahashi	Management and organization / Privatization
Mr. Mazhal Iqbal	Cargo transport policy / Cargo facility planning
Mr. Kazuharu Koishikawa	Road design / Natural condition survey
Dr. Ahmed Morgan	Structural design / Natural condition survey
Mr. Masahito Homma	Economic / Financial analysis
Mr. David Gordon Lees	Social environmental specialist
Mr. Hironori Kuroki	Natural environmental specialist
Mr. Takashi Shoyama	Border traffic analysis
Mr. Hisatoshi Naito	Road restoration plan
Mr. Takeshi Yoshida	Bridge design
Dr. Pucai Yang	Disaster prevention
Mr. Masaru Homma	Construction plan and cost estimation
Mr. Mineo Endo	Preparation of tender documents
Mr. Yoshitaka Motomura	Coordinator

1.3.4 JICA Advisory Committee

JICA organized the Advisory Committee to provide advice and guidance. The members are given below;

Mr. Tetsuo Yai	Chairperson
Mr. Keiji Hashida	Member

1.3.5 Steering Committee

The Pakistani side organized the Steering Committee to discuss the Study.

The members of the Steering Committee are given below;

- 1 Ministry of Communications
- 2 Planning Commission
- 3 National Highway Authority
- 4 Planning & Development Department, Govt. of Punjab
- 5 Planning & Development Department, Govt. of NWFP
- 6 Planning & Development, Govt. of Sindh
- 7 Planning & Development, Govt. of Balochistan
- 8 Ministry of Local Government & Rural Development
- 9 Ministry of Defense — Civil Aviation Authority
- 10 Ministry of Commerce
- 11 National Highways & Motorway Police, Islamabad
- 12 Ministry of Railways
- 13 Ministry of Petroleum & Natural Resources
- 14 Ministry of Environment
- 15 National Logistic Cell
- 16 Japanese International Cooperation Agency (JICA)

1.4 Components and Structure of this Report

This report consists of 12 chapters and seven appendices. Chapter 2 describes the present situation and identifies problems and issues by each sub-sector. Chapter 3 sets up the socio-economic framework such as population by region and economic growth rate. Chapter 4 estimates the future transport demand and analyzes the desirable modal share between road and rail. The result of the Traffic Survey underlies Chapter 4, and the survey itself is described in Annex A in detail. Based on Chapter 2 – 4, Chapter 5 establishes three transport policies and seven development strategies. Chapter 6 deeply analyzes and clarifies planning directions for the seven strategies. Sector plans are described in Chapter 7 – 10. Chapter 11 summaries projects proposed in the sector plans, and formulates cost allocation program for the Master Plan period and short-term program. Chapter 12 is an independent chapter that describes recommendation for road restoration in AJK and NWFP where the earthquake caused devastating damage in October 8, 2005.

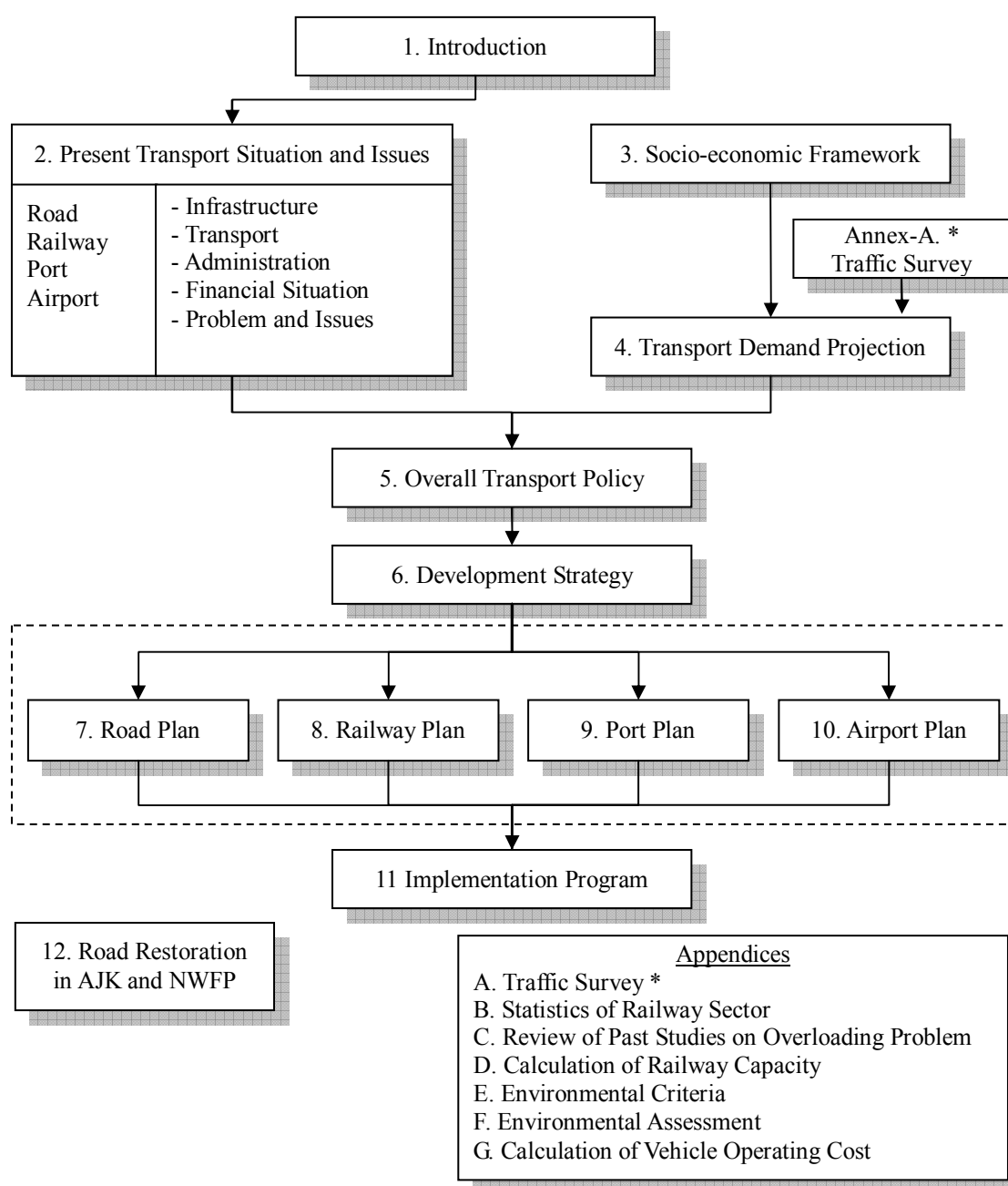


Figure 1.4.1 Structure of this Report

Chapter 2. PRESENT TRANSPORT SITUATION AND ISSUES

2.1 Overview of Transport Sector

Pakistan has a population of approximately 160 million and is the sixth most populated country in the world. Real GDP is Rs. 6,548 billion (2004/05 est.), and per capita income was estimated at \$736 in 2004/05¹, while per capita income in terms of PPP (Purchasing Power Parity) was estimated at \$2,160 in 2004². Exports and imports in 2004/05 amounted to \$13.7 billion and \$16.7 billion, respectively. With this economic scale, the total inland traffic by road and rail amounts to 246 billion passenger-km of passenger traffic and 119 billion ton-km of freight traffic (2004/05).

Road is the dominant mode of inland traffic and carries 91% of passenger traffic and 96% of freight traffic. The total length of roads is approximately 258,000 km, which includes 7,967 km of National Highways, 711km of Motorways, and 207km of Strategic Roads. The National Highway Authority (NHA) operates and maintains the National Highway network.



Photo: N-5



Photo: M-2

The Pakistan Railways (PR) has 11,515km of tracks and 7,791km of route network with 633 stations. Out of the total route-kilometres, 1,043km are double track. There is an electrified section between Lahore and Kanewal of 285km in length. PR operates passenger and freight services, and carried 5.46 billion ton-km of freight and 23.8 billion passenger-km in 2004/05.



Photo: Karachi Cant. Station



Photo: North bound train carrying oil at Pano Akil Station

¹ Pakistan Economic Survey 2004

² World Development Indicators database, World Bank, 15 July 2005

Around 95% of imports and exports are handled through Karachi Port and Port Qasim. Another deep-sea port is now under construction in Gwadar. Karachi Port handles about 30 million tons of cargo, while Port Qasim handles about 11 million tons. Approximately 60% of the imported cargo is transported inland from the two ports by road and rail to the upcountry.

There are 44 airports including five international airports located in Islamabad, Karachi, Lahore, Peshawar, and Gwadar. PIA (Pakistan International Airlines) is the national flag carrier, while Aero Asia, Shaheen Air International, Royal Airlines, and Airbule are private airlines in Pakistan. These Pakistani airlines carried 2.8 million domestic passengers in 2003/04.

The Indus, Chenab, Jhelum, Ravi, and Sutlej rivers flow through the territory of Pakistan, but inland water transport is very limited.

Table 2.1.1 shows the transport volumes by road and rail from 1990/91 to present.

Table 2.1.1 Past Trend of Railway and Road Transport Shares

Fiscal Year	Passenger Traffic					Freight Traffic				
	Road (MPK)	Rail (MPK)	Total (MPK)	Road (%)	Rail (%)	Road (MTK)	Rail (MTK)	Total (MTK)	Road (%)	Rail (%)
1990/91	128,000	19,964	147,964	86.51	13.49	35,211	5,709	40,920	86.05	13.95
1991/92	131,352	18,158	149,510	87.85	12.15	41,536	5,962	47,498	87.45	12.55
1992/93	135,000	17,082	152,082	88.77	11.23	53,719	6,180	59,899	89.68	10.32
1993/94	137,037	16,385	153,422	89.32	10.68	71,596	5,938	77,534	92.34	7.66
1994/95	146,132	17,545	163,677	89.28	10.72	75,770	5,661	81,431	93.05	6.95
1995/96	154,566	18,905	173,471	89.10	10.90	79,900	5,077	84,977	94.03	5.97
1996/97	163,751	19,114	182,865	89.55	10.45	84,345	4,607	88,952	94.82	5.18
1997/98	173,857	18,774	192,631	90.25	9.75	89,527	4,447	93,974	95.27	4.73
1998/99	185,236	18,980	204,216	90.71	9.29	95,246	3,967	99,213	96.00	4.00
1999/00	196,692	18,495	215,187	91.41	8.59	101,261	3,753	105,014	96.43	3.57
2000/01	208,370	19,590	227,960	91.41	8.59	107,085	4,520	111,605	95.95	4.05
2001/02	209,381	20,783	230,164	90.97	9.03	108,818	4,573	113,391	95.97	4.03
2002/03	215,872	22,306	238,178	90.63	9.37	110,172	4,820	114,992	95.81	4.19
2003/04	222,779	23,045	245,824	90.63	9.37	114,244	4,796	119,040	95.97	4.03
(Jul.-Mar. figures for comparison between 2003/04 and 2004/05)										
2003/04	166,761	16,692	183,453	90.90	9.10	85,025	3,348	88,373	96.21	3.79
2004/05	171,749	18,029	189,778	90.50	9.50	86,842	3,816	90,658	95.79	4.21

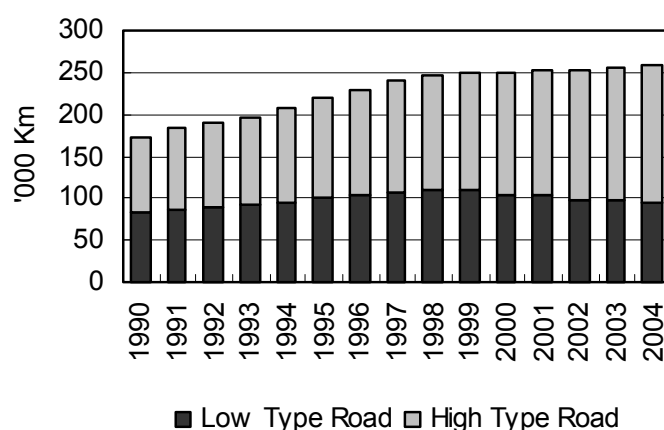
Source: Economic Survey, 2004

2.2 Road

2.2.1 Road Network

(1) Roads in Pakistan

The Pakistan road network is approximately 258,000 km in length. Approximately 60% of the network is paved. The length of roads has increased by 50,355km since 1994/95 however the increase since 1999/2000 has only been 9,660km. The recent trend is that “high type roads” are increasing while “low type roads” are decreasing as shown in Figure 2.2.1. The figure implies that the strategy for road development has been shifted from expanding the road network to expanding the capacity of the existing network.



Source: Economic Survey 2004-2005

Figure 2.2.1 Length of Roads in Pakistan

The road density in Pakistan is 0.32 km per square km, but the Medium Term Development Framework (MTDF) 2005-10 proposes to enhance this to 0.42 km per square km through construction of 80,000 km of roads in the years ahead. The road density in Punjab and Sindh is relatively high at 0.51 and 0.57 km/km², while it is extremely low in Balochistan as shown in Table 2.2.1. On the other hand, road length per population is highest in Balochistan, while it is the lowest in Punjab.

Table 2.2.1 Road Length and Density

	Pakistan	Punjab	Sindh	NWFP	Balochistan
Total Road Length (km)	258,214	106,140	79,834	30,049	42,191
Percentage of Paved Road	63%	78%	69%	46%	13%
Area (km ²)	796,095	206,250	140,914	101,741	347,190
Road Density (km/km ²)	0.32	0.51	0.57	0.30	0.12
Population (million)	148.72	85.33	32.99	23.26	7.14
Road Length per Mil. People (km)	1,736	1,244	2,420	1,292	5,909
Number of Registered Vehicles	4,974,000	2,920,984	1,457,323	430,429	165,264
Road Length per 1,000 Vehicles	52	36	55	70	255

Source :NTRC, prepared in 2003/04 based on the information of Provincial C&W Department, NHA, Provincial Excise & Taxation Department and Economic Survey 2003/04

The administrative classification categorizes the roads according to the government agency responsible for the construction and maintenance of the road as summarized in Table 2.2.2.

Table 2.2.2 Administrative Classification of Roads

Classification	Administration	Length	Function
National Highway Motorways Strategic Road	<ul style="list-style-type: none"> National Highway Authority (NHA), Ministry of Communications 	9,000km	Representing the main transport corridors and providing inter-provincial linkages and connections to the neighbouring countries
Provincial Roads	<ul style="list-style-type: none"> Communication and Works Department (C&WD), Works and Services Department (WSD), and Frontier Highway Authority (FHA) 	101,000km	Providing access to the economic and population centres in the four provinces
District Roads	<ul style="list-style-type: none"> District government 	94,000km	Providing access to villages and remote areas
Municipal and cantonment roads	<ul style="list-style-type: none"> Municipal government and army 	54,000km	Providing access to villages and remote areas

Source: JICA Study Team

Since the Study focuses on the inter-regional road network, the discussion hereinafter deals with National Highways, Motorways, Strategic Roads and Provincial Roads. The JICA Study Team reviewed the length of roads to identify “Provincial Roads” as shown in Table 2.2.3. The provincial “highways” with a total length of 21,000 km are regarded as “Provincial Roads” in the Study.

Table 2.2.3 Current Road Network Length in Four Provinces

(Unit: km)

Province	Federal Government			Provincial Government					District Council	Municipal	Cantonment	
	NHA		ST	C&WD		FHA	C&WD	C&WD				BDA
	NH	MW		H	H							
Punjab	1,764	462	0	8,664	-	9,672	20,906	-	37,079	21,995	N/A	
Sindh	1,198	136	0	2,499	-	7,049	245	-	N/A	N/A	N/A	
NWFP	1,527	0	0	398	1,999	6,127	4,272	-	13,867	885	N/A	
Balochistan	3,042	0	0	7,388	-	8,800	3,940	N/A	19,011	992	N/A	
Northern Area	583	0	207	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Subtotal	8,113	598	207	18,949	1,999	32,711	38,966	-				
Total	8,918			20,948					92,634	93,832	51,921	1,999

Note:

1. Abbreviation

NH : National Highway/ MW: Motorway/ ST: Strategic Road/ H: Highway/ S: Secondary road/ A: Access road

NHA : National Highway Authority/ C&WD: Communication and Works Department/ FHA: Frontier Highway Authority/ BDA : Balochistan Development Authority

2. MTDF indicates 101,000 km as provincial inter-city roads. However the study team confirmed that the actual provincial inter-city roads were different distances than expected in four provinces. Hence, 101,000 km in the MTDF seems to include all provincial roads such as provincial secondary roads and intra-district ones.

Source:

Prepared by NTRC 2003-04 based on the information of C&W Department, NHA, Provincial Excise & Taxation Department and Economic Survey 2003/04. Deducted by NTRC and the Study Team when the current road network was provided because overlapping was admitted for submitted listed networks.

(2) National Highways

There are 14 National Highways (8,600km), five Motorways (767km), and two Strategic Roads (207km) in Pakistan as listed in Table 2.2.4 and illustrated in Figure 2.2.2. N-5 is the longest and the most important National Highway. Due to its high importance, dualization of N-5 has almost been completed except for Karachi to Hyderabad, Peshawr to Torhan and other small portions. The other National Highways are 2-lane roads and only Kohat-Peshawar section of N-55 has a dual carriageway. N-55, named the Indus Highway, is the second longest National Highway. N-25 is an important international and national highway connecting Karachi with Quetta and Chaman on the Afghanistan border. Recently, N-25 has been significantly improved with the assistance of the ADB, WB and JICA.

Table 2.2.4 National Highways and Motorways

No.	Route	Length (km)
National Highways (8,113 km)		
N-5	Karachi - Hyderabad - Multan - Lahore - RWP - Pashawar – Torkham	1,819
N-10	(Makran Coastal Highway) Liari - Ormara - Pasni - Gwadar – Gabd	653
N-15	Nansehra - Naran - Jalkhad - Chilas Road	240
N-25	Karachi - Nela - Khuzdar - Kalat - Quetta – Chaman	813
N-35* ¹	(KKH) Hassanabdal - Abbottabad - Thakot - Gilgit – Khunjrab	806
N-40	Lakpss (near Quetta) - Dalbandin – Taftan	610
N-45* ²	Nowshera - Dir – Chitral	309
N-50	D.I. Khan - Zhob - Kuchlad (near Quetta)	531
N-55	(Indus Highway) Kotri - D.G. Khan - D.I. Khan - Kohat – Peshawar	1,264
N-65	Sukkur - Sibi - Saryab (Quetta)	385
N-70	Multan – D.G. Khan - Loralai - Qila Saifullah	447
N-75	Islamabad - Satra Mile - Lower Topa – Kohala	90
N-80* ³	Turnol - Fatehjang – Kohat	146
N-85	Hoshab – Panjgur – Nag – Basima – Surab	487
Motorways (711 km)		
M-1	Islamabad - Peshawar Motorway	155(35)
M-2	Lahore - Islamabad including 32 km links & Lahore Bypass	367
M-3	Pindi Bhattian - Faisalabad Motorway	53
M-9	Karachi - Hyderabad Motorway	136
Strategic Roads (207 km)		
S-1	Gilgit - Skardu Road	167
S-2	Kohala - Muzafarabad Road	40
Total		9,518

Note : M-1 has the remaining portion of 120km at present.

*1 : N35 is called as Karakoram Highway

*2 : N45 was federalized in 1999.

*3 : N80 was federalized in 2004.

Source : NHA



Source: JICA Study Team

Figure 2.2.2 National Highways and Motorways



M-1 (Islamabad – Murhan)



N-5 (Kabirwala – Multan)

There are many topographical obstacles on the National Highways. For example, the Kohat Tunnel has only 2-lane despite the importance of N-55. N-70 has a very dangerous mountainous section between D.G.Khan and Fort Munro, where, on a winding section, rocks are sticking out over the narrow road, and the slopes are very steep. The Khushalgarh Bridge over the River Indus on N-80 is old and narrow. The bridge crosses its access roads at right angles, and container trucks can not pass over the bridge. The Lowari Rail Tunnel Project is underway to overcome topographical obstacles on N-45. The Malakand Tunnel (N-45) and the Lakpass Tunnel (N-25) are also planned to improve road transport. Many new bridges over the River Indus and other big rivers are proposed. There are lots of at-grade cross sections between the railway and the National Highways.



N-70 (D.G.Khan – Fort Munro)



N-80 (Khushalgarh Bridge over the River Indus)

Tolls are collected at toll plazas on both the National Highways and the Motorways. Toll plazas were introduced by NHA in 1999.



Toll Gate (N-5)



Toll Gate (N-5)

(3) Motorways

NHA plans to develop a network of full access controlled Motorways as a new economic corridor to provide fast transportation of goods and passengers. The total length of the planned Motorway network is 2,734 km as shown in Figure 2.2.6.

Of the ten planned Motorways, M-2 (Islamabad - Lahore Motorway, 6-lane, 367 km), M-3 (Pindi Bhattian - Faisalabad Motorway, 4-lane, 53 km) and 35 km long Islamabad - Burhan section of M-1 (Islamabad - Peshawar Motorway, 4-lane) are already opened to the traffic. M-2 bears a horizontal radius in excess of 1,500m in hilly terrain, but has a applied maximum gradient of 7%.

M-9 (Karachi - Hyderabad Motorway, 136 km) is a 4-lane highway without access control at present. It will be expanded to a 6-lane access controlled Motorway in the future.

In August 2005, the government approved the construction of a motorway between Faisalabad and Karachi with four sections named M-4, M-5, M-6 and M-7 respectively.

Table 2.2.5 Present Status of Motorways

Name	Section	Length (km)	Number of Lanes	Status
M-1	Islamabad - Peshawar Motorway	153	6-lane	Islamabad - Burhan Section, 35 km long, was opened to traffic in September 2004. The remaining section is under construction with scheduled opening in January 2007.
M-2	Lahore - Islamabad including 32 km links & Lahore Bypass	367	6-lane	First Motorway of Pakistan, opened to traffic in 1997.
M-3	Pindi Bhattian - Faisalabad Motorway	53	4-lane	Completed. Opened to traffic in 2004.
M-4	Faisalabad - Multan Motorway	243	4-lane	Included in the Public/Private Sectors Programme of NHA 5-Year programme (2005-10).
M-5	Multan - D.G Khan Motorway	84	4-lane	
M-6	D.G.Khan - Kakkar Motorway	467	2-lane	
M-7	Kakkar - Karachi Motorway	280	2-lane	
M-8	Gwadar - Khuzdar - Ratodero Motorway	895	2-lane	Gawadar - Turbat - Khuzdar and Shahdadt Kot Ratodero sections, 284 km in total length, are under construction, to be completed in 2006.
M-9	Karachi - Hyderabad Motorway (Super Highway)	136	6-lane	At present 4-lane without access control. Expansion to access controlled 6-lane motorway is considered as a future BOT project.
M-10	Karachi Northern Bypass	56	2-lane	A 24 km long section was opened to traffic in 2004. The remaining section will be completed in December 2005. Mostly undivided 2-lane. ROW is secured to upgrade to divide 4-lane.
Total		2,734		

Source: NHA, JICA Study Team

(4) Provincial Roads

Provincial roads are managed by different systems and structures enforced by the provincial governments. For instance, the government of Sindh has reinforced the road maintenance management system funded by the ADB in 2000/2001, using an adjusted HDM-4 programme with local conditions and ranked maintenance priorities to estimate the annual maintenance cost of its Road Maintenance Unit. The Communication & Works Department of the government of Balochistan is responsible for the construct and maintenance of six categorized roads, including provincial highways because the Road Management Unit (RMU) in the province was abolished in 2000. Therefore, the Balochistan Development Authority has suggested that the restoration of the defunct RMU is essential in order to develop road reference and classification, and to collect data on traffic volumes and road conditions, including roughness.

Improvement of provincial roads is in progress, mostly with the active support of the ADB. Generally, it is to widen and rehabilitate the existing roads to 7.3 m carriageway paved with asphalt concrete, with 3.0 m wide shoulders. The applied design speed is 100 km/hr for flat terrain, 80 km/hr for rolling terrain and 60 km/hr for hilly terrain.

(5) Road Condition and Maintenance

A number of highway projects have been executed without a corresponding increase in the maintenance funds, and consequently a huge backlog of maintenance work has resulted in the loss of highway assets. This situation has increased the needs for major rehabilitation or new construction. The pavement condition survey in 2000 (NHA) indicated that:

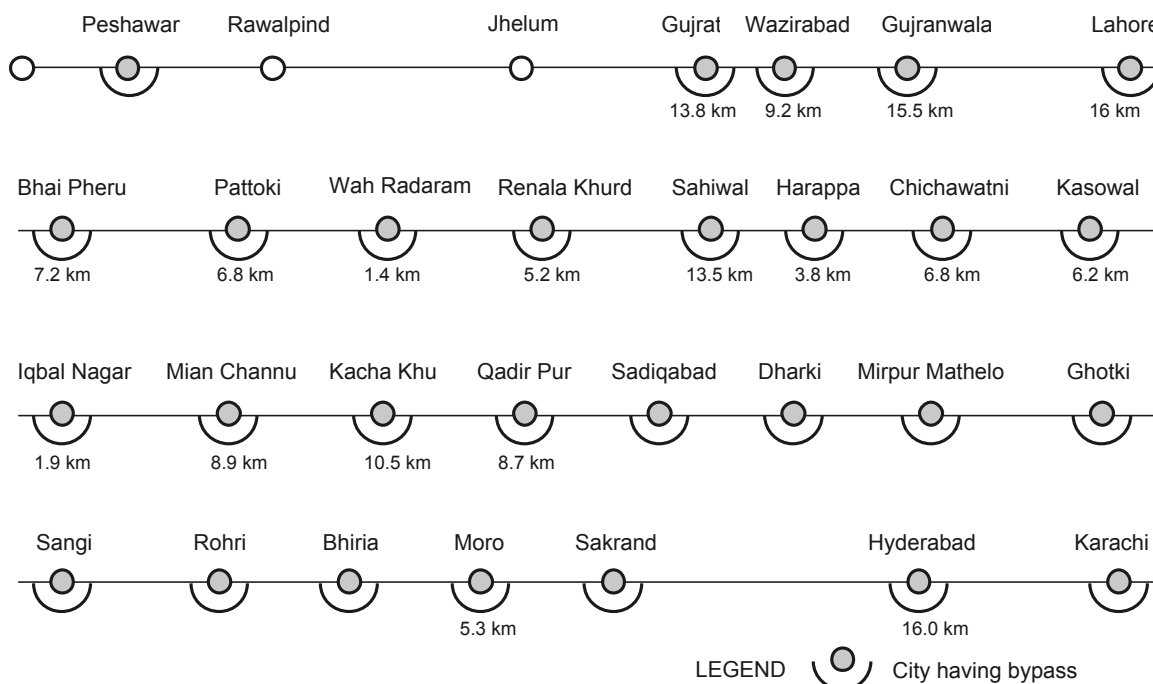
- 50% of the NHA's existing network is in need of major rehabilitation or reconstruction.
- The remaining 50% will be lost in the near future if adequate maintenance and rehabilitation actions are not taken in a timely and effective manner.

According to the results of "the 2004-05 RAMD Study on pavement condition by NHA", 47% of the national highway network is classified "Poor" to "Very Poor". Deterioration of provincial roads is relatively severe compared to national highways.

With the assistance of the World Bank, the Road Asset Management Directorate was established in NHA in 2000, and the Road Asset Management System (RAMS) was created to streamline the annual maintenance business plan. RAMS includes the collection and analysis of data such as a road and bridge inventory, traffic data and pavement condition based on IRI and crack ratio, etc., prioritization of road sections for maintenance and preparation of the maintenance plan using HDM-IV.

(6) Bypass

The major function of National Highways is to carry inter-provincial traffic or long distance traffic along important national corridors, connecting large cities where commercial and industrial activity is very high. National Highways cross the centre of those large cities, where local traffic mixes with long distance traffic, which disturbs traffic flow. Accordingly, National Highways have many congested cities as bottlenecks along their routes. Many bypasses have been constructed in major cities for National Highways to avoid congestion. Figure 2.2.3 shows the cities that have bypasses along N-5. In addition to the cities in the figure, there are some bypasses under construction and many proposed bypasses along N-5. According to NHA, the number of cities with National Highway bypasses amounts to 61.



Source: NHA, JICA Study Team

Figure 2.2.3 Bypasses along N-5

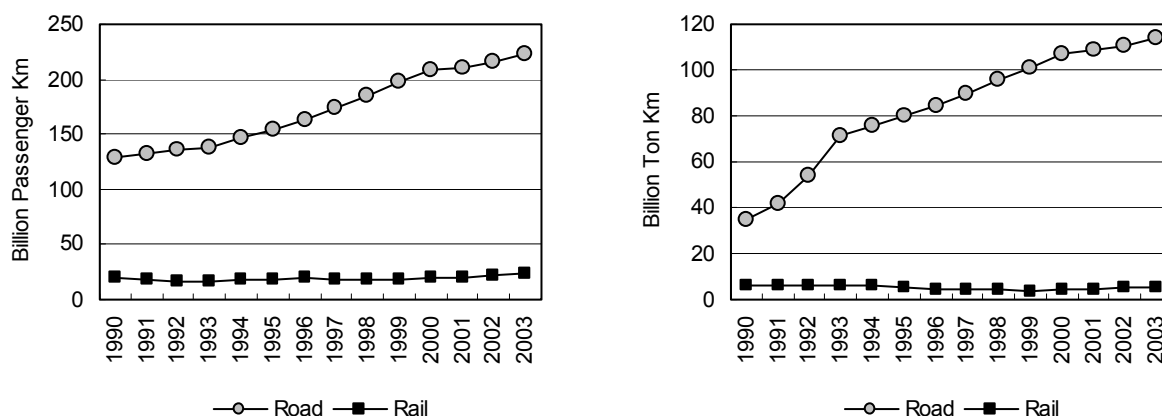
There is a dilemma about bypass construction. Cities in Pakistan have been growing along arterial roads, including bypass roads. Soon after opening a bypass for a city, the city begins to grow along the bypass, and the growth will continue until the bypass can no longer function as a bypass. This may be attributed to the lack of available funds for urban road development – local municipalities have to rely on national roads.

Instead of constructing a bypass, another solution to aid traffic congestion is to control access within urban areas. NHA intends to mount the carriageway and provide service road to segregate local traffic from National Highways.

2.2.2 Road Transport

(1) Passenger and Freight Transport Volumes

During the 1990s, transport volumes by road grew at 5% per year for passengers and 12% per year for freight in terms of passenger-km and ton-km, respectively. The growth rate for freight transport was high in the early 1990's as shown in Figure 2.2.4. The figure clearly illustrates that road transport is the dominant mode of inland transport. Roads carry 89% of passenger transport and 96% of freight transport.

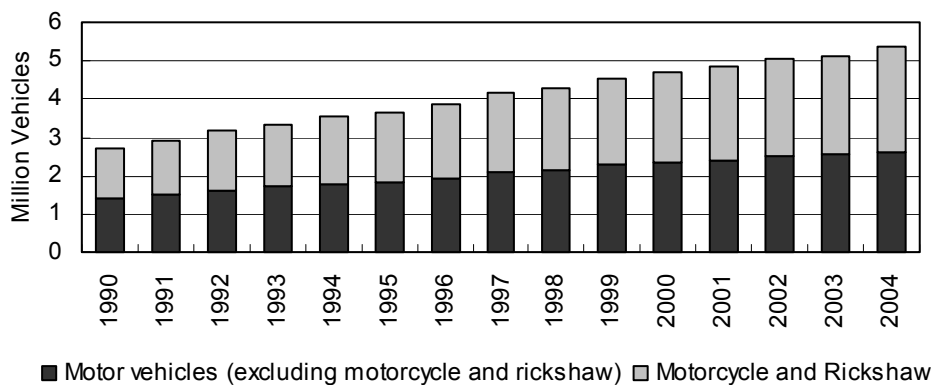


Source: Economic Survey 2004-2005

Figure 2.2.4 Past Trend in Freight and Passenger Transport

(2) Motor Vehicles

The number of registered motor vehicles has been gradually increasing (recently at an annual rate of 4.3%), and is projected to reach 5.4 million in 2004/05 as shown in Figure 2.2.5. Half of the registered motor vehicles are motorcycles and rickshaws, and their proportion has been slightly increasing.



Source: Economic Survey 2004-2005

Figure 2.2.5 Past Trend in the Number of Registered Vehicles

The share of cars has increased from 21% in 1995/96 to 37%, while the percentage of trucks has decreased from 48% to 37% as shown in Figure 2.2.6.

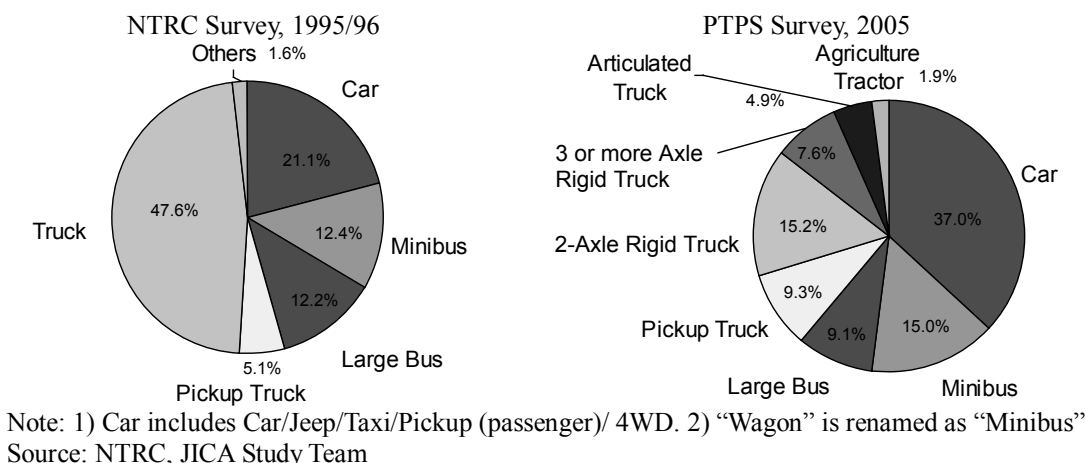


Figure 2.2.6 Vehicle Composition

Meanwhile, trucks still obstruct the smooth passage of cars on many National Highways, due to the slow speeds of trucks. Typical trucks run at speeds of only 40 – 50km/hr under free traffic flow situations.

(3) Traffic Volume by Road Section

The road section between Rawalpind and Lahore along N-5 has the heaviest traffic in Pakistan as far as inter-city transport is concerned. According to the PTPS Traffic Survey, the traffic volume between Lahore and Gujranwala was the highest at 22,760 vehicles a day, followed by the Gujranwala to Gujrat section at 19,900. As a whole, traffic volumes on N-5 range from 7,000 to 20,000 vehicles, while other national highways have smaller traffic volumes ranging from 1,000 to 4,000, except for some sections as shown in Table 2.2.6. The table indicates the ratio of traffic volume in the PTPS Traffic Survey (2005) to that of the NTRC Survey (1995/96). The ratio of about 1.3-1.6 means that the annual growth rate was 2.7 – 4.8%, which is similar to the change in other transport indicators. Traffic volumes decrease at several sections because of the opening of bypasses and alternative routes. Traffic volumes on provincial roads were very small at the survey sites of the PTPS Traffic Survey.

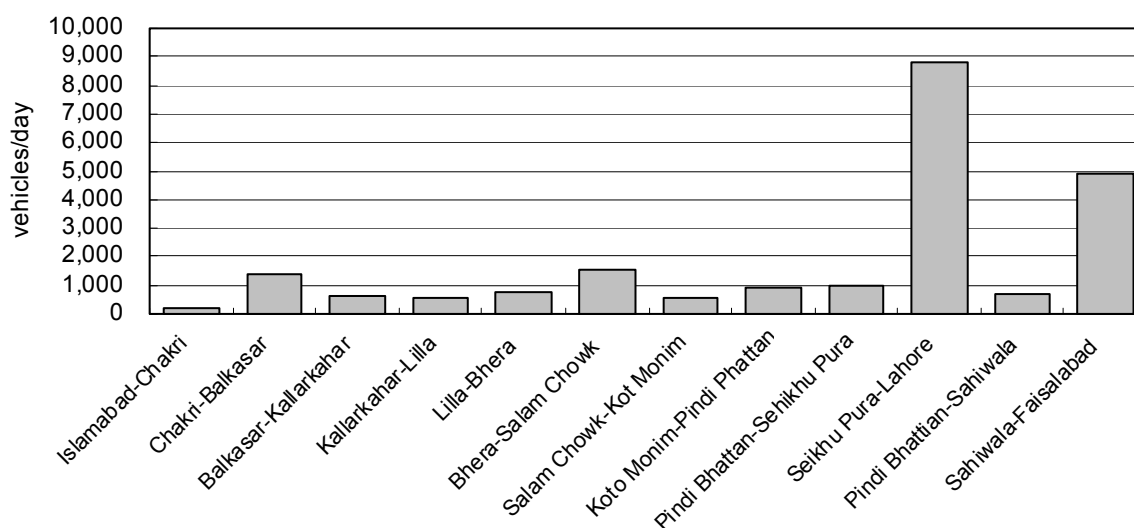
Note that this analysis is for inter-city transport. Traffic volumes are much higher within large cities; and where bypasses are not provided, such cities are the bottlenecks of the national transport system.

Table 2.2.6 Traffic Volume Data from the PTPS Traffic Survey

National Highway Code Road Section	PTPS #site	Traffic volume	Increase 2005/1995	Composition (%)		
				Car	Bus	Truck
N-5						
Peshawar-Rawalpindi	204	12,827	1.31	39.1	25.2	35.7
Rawalpindi-Lahore	256	17,287	1.56	47.7	14.9	37.4
Lahore-Multan	272	8,080	1.01	28.6	16.1	55.3
Multan-Sukkur	315	6,814	0.75	9.8	9.6	80.6
Sukkur-Hyderabad	345	7,332	N.A.	19.6	12.0	68.4
N-25						
Hub-Khuzdar	486	1,733	1.17	16.1	21.2	62.7
Khuzdar-Quetta	436	3,813	1.32	21.3	26.3	52.4
N-35						
Hassanabdal-Abbotabad	103	8,112	1.46	44.7	34.0	21.3
N-40						
Lakpass-Noshki	437	916	1.66	18.7	27.0	54.4
N-50						
D.I.Khan-Zhob	109	238	6.46	22.7	23.9	53.4
N-65						
Jacobabad-Sibi	412	2,997	1.03	14.7	21.1	64.2
N-70						
D.G.Khan-Loralai	411	1,392	1.31	11.7	17.8	70.4
N-55						
Peshawar-D.G.Khan	197	7,452	1.36	33.4	31.7	34.9
D.G.Khan-Jacobabad	313	1,924	1.90	11.7	23.5	64.8
Jacobabad-Hyderabad	343	1,353	0.49	30.6	39.5	29.9

Source: PTPS Traffic Survey

The volume of traffic on motorways is relatively small except for the bypass sections in Lahore and Faisalabad as shown in Figure 2.2.7. The average traffic volume is less than 1,000 vehicles along most sections.

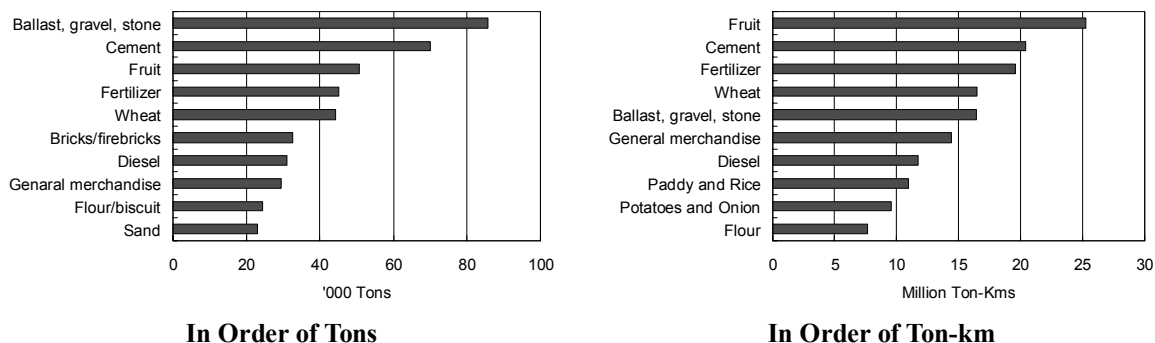


Note: Traffic volume recorded at computerized toll gate only
Source: NHA

Figure 2.2.7 Daily Traffic Volume of Motorway (July, 2004)

(4) Freight Transport

According to PTPS Traffic Survey, the major commodities in terms of tons carried by trucks are: 1) ballast, gravel, stone; 2) cement; 3) fruit; 4) fertilizer; and 5) wheat as shown Figure 2.2.8. In ton-km, the transport volume of fruits was the highest among all commodities.



Note: The volumes in ton-km were calculated by a distance matrix.
Source: PTPS Traffic Survey

Figure 2.2.8 Top 10 Commodities Carried by Truck

Fruits are perishable goods and are desirable not to be carried for a long distance without temperature control. Figure 2.2.9 illustrates the transport distance of perishable goods such as vegetables, fruit, meat, eggs, fishes, milk, etc. As can be seen in the figure, not a few perishable goods are transported for a long distance. However, the number of refrigerated vehicles is small in Pakistan. As the temperature control transport system is not established in the domestic market, the country loses opportunities to export or import fresh foods.

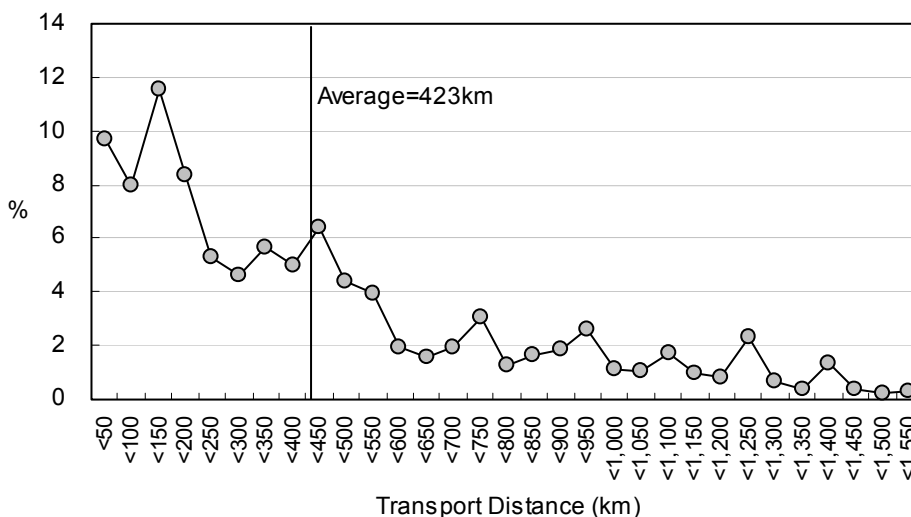


Figure 2.2.9 Transport Distance of Perishable Goods

Note: The commodity codes of “perishable goods” are 155, 165, 180, and 185 (Refer Annex-A).
Source: PTPS Traffic Survey, JICA Study Team

(5) Road Safety

Table 2.2.7 below summarizes the reported accidents obtained by the NTRC. The reported accident data for 2001 shows 4,527 fatal accidents and 6,060 non-fatal accidents resulting in 5,421 fatalities and 12,942 injuries.

Table 2.2.7 Accident Statistics

Year	Fatal	Non-Fatal	Others	Total	Killed	Injured	Total
1996	4,383	5,369	2,938	12,690	5,301	11,697	16,998
1997	4,407	5,249	2,737	12,393	5,141	11,229	16,370
1998	3,620	4,317	418	8,355	4,196	9,817	14,013
1999	4,637	5,635	449	10,721	5,371	11,797	17,168
2000	4,629	6,114	409	11,152	5,627	13,479	19,106
2001	4,527	6,060	338	10,925	5,421	12,942	18,363

Source: Accident Statistics (1991-2001), NTRC

While the road safety study conducted by the NHA in 1998-99 estimated 7,000 fatalities, 140,000 injuries and 1,400,000 property damages based on sample surveys carried out in four provinces, a recent study by the ADB indicated that the road traffic accidents involve over 10,000 fatalities per year (over 30 per 10,000 vehicles) and 150,000 injuries. There are high levels compared with Southeast Asia, although better than those in India and Bangladesh.

Traffic accidents are also recorded by the Federal Bureau of Statistics and they maintain records going back over 20 years. Despite a doubling of vehicle numbers, the number of fatal accidents and the number of fatalities remains the same over a 20-year period. This implies that the traffic accident statistics are not reliable in Pakistan. Regardless of this, according to the statistics, about 5,000 people are killed annually on the roads compared with 3,500 in the UK, however the number of vehicles in the UK is six times more than in Pakistan.

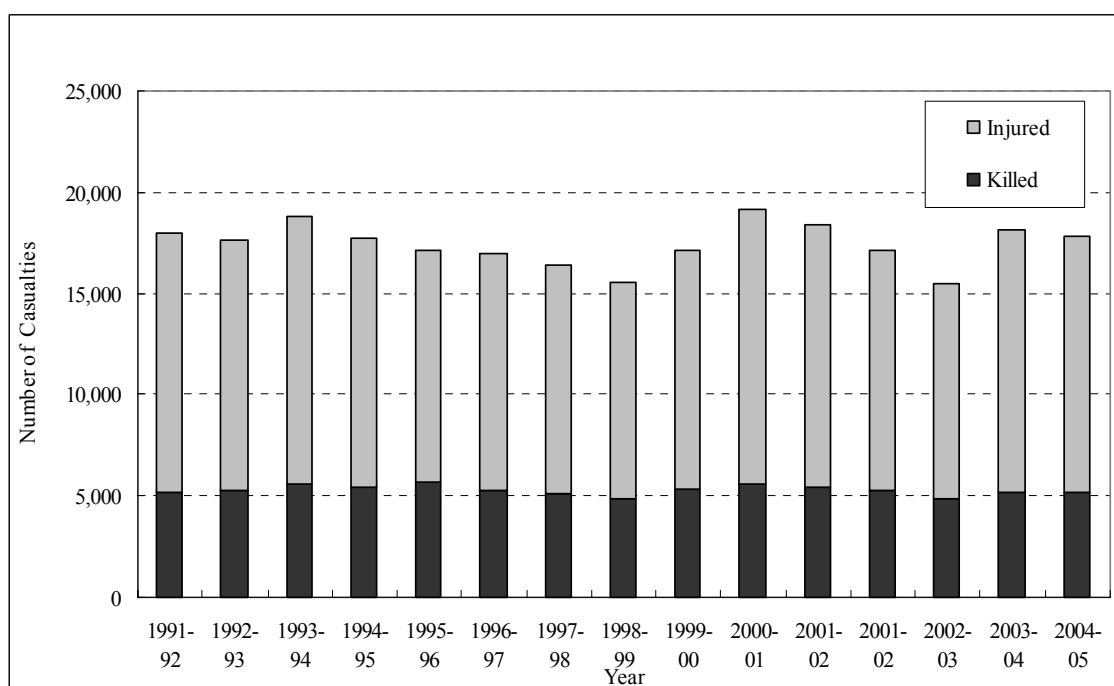
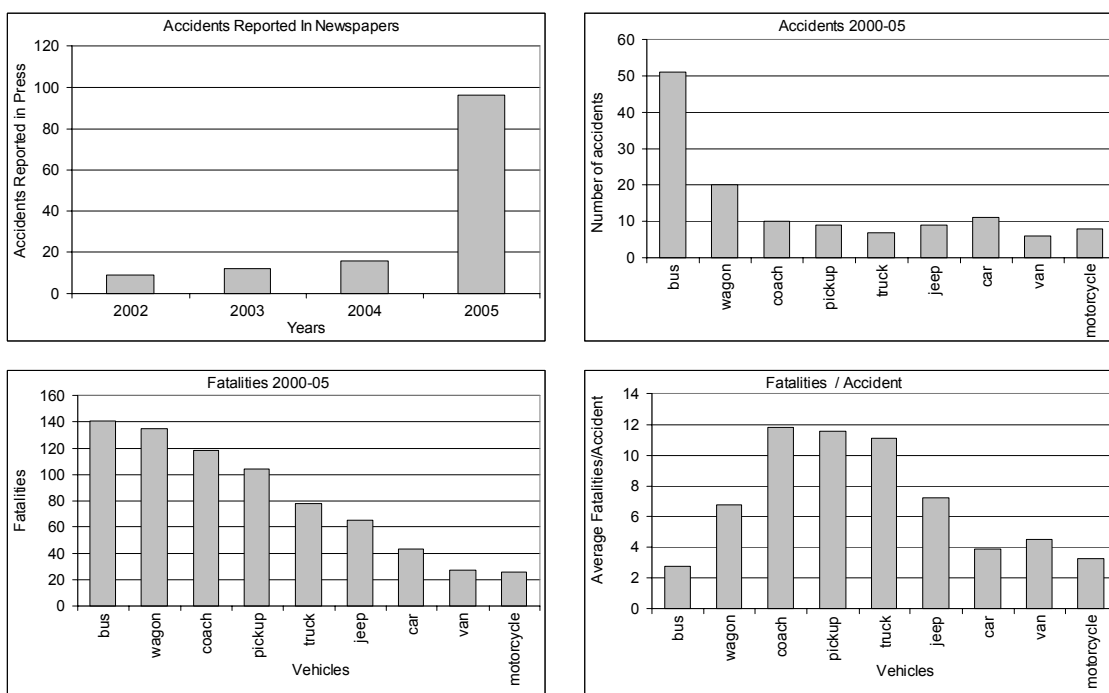


Figure 2.2.10 Number of Casualties

Traffic accidents are reported in the newspapers based on police reports. These are shown below for the previous 5 years. The location of the various reported accidents is shown on the map. There was a total of 133 incidents reported between 23rd October 2000 and 6th

August 2005. Some of these were single vehicles while others involved two or more vehicles.



Source: JICA Study Team

Figure 2.2.11 Numbers of Accidents reported in Newspapers

The figure cannot be taken as absolute, as not all accidents are reported, however they do give an indication of the severity and incidence of accidents. Passenger buses are involved in far more accidents than other vehicles. The level of fatalities in heavier vehicles, such as buses, trucks and wagons tends to be the same, presumably as it is the passengers in the front part of the vehicle who are most at risk. There are far more passengers injured in bus accidents than in other vehicles. Most reported motorcycle accidents are fatalities, probably because injuries are not reported. The conclusion is that the passenger groups most at risk of death or injury are bus passengers. Certain individual accidents stand out in their severity. In 2005 a leased passenger bus carrying a school outing crashed on the M-2 near the salt range causing 19 fatalities and 35 injured. No other vehicle was involved. The incident was attributed to poor vehicle maintenance and driver incompetence. Also in 2005 a passenger bus ran into the rear of a stationary gasoline tanker, resulting in 31 deaths and 12 injured.

(6) Overloading

Overloading by trucks is one of the most typical phenomena in the transport sector in Pakistan. It is commonly observed that 2-axle trucks, having a high vertical limit on the rear carry hundreds of heavy bags (40-100kg per bag) to the extents of the dimensional limit (not tonnage limit).

An Axle Load Study of the National Highways by the NTRC in 1995 has shown that 43% of rear axle loads exceed the 12 tonnes (the legal axle-load limit mandated by the Road Safety Act 2000). Two-axle trucks contribute the most to overloading, which is increasing at about 2.6% annually. Although the proportion of two-axle trucks in the fleet is declining, they still account for over 50% of truck traffic.

NHA calculated an average value of Equivalent Standard Axles (ESAs) for the various axle configurations of commercial vehicles in accordance with the AASHTO Pavement Design Guide 86, and these are compared with the axle load controlled trucks in the USA as shown in Table 2.2.8. This shows that in the case of a 2-axle truck, a Pakistan truck is equivalent to 22 USA trucks in terms of the effect on pavement structure. It is noted that the values shown below are for the average 2-axle truck. The maximum for 2-axle trucks was 13.09, 2.8 times the average.

Table 2.2.8 Average ESAs of Trucks

Truck Type	Axle Configuration	Truck Factor Pakistan	Truck Factor USA
2-Axle	Both Single Axles	4.67	0.21
3-Axle	One Single & One Tandem Axle	8.84	1.59
4-Axle	All Single Axles	12.99	1.32
4-Axle	Two Single & One Tandem Axle	10.35	1.32
5-Axle	One Single & Two Tandem Axles	14.73	1.39
6-Axle	One Single, One Tandem & One Tridem Axle	10.90	1.39

Source: Axle Load Study on National Highway, NTRC, 1995 and NHA



Overloaded Truck

The local truck manufacturers produce wider and more elevated truck bodies to enable truck owners to overload and reduce haulage costs. The tyres of overloaded trucks are also over-inflated resulting in a reduction in the contact areas between the tyre and the road surface. The excessive wheel loads combined with the reduced tyre contact area exert pressures far in excess of the bearing capacity of the pavement.

Allowable Axle Loads

The National Highways Safety Ordinance 2000 stipulates maximum axle loads and tyre pressures:

- Front axle – 5 tones
- Single axle - 12 tones
- Tandem axle – 22 tones
- Tridem axle – 33 tones
- Tyre pressure rear axle 120 psi
- Tyre pressure – front axle 100 psi

These regulations were passed in 2000 but an agreement was reached between NHA and the transport industry to allow some concessions on National Highways but not on motorways. The current situation for the various configurations is shown below.

Truck Type	Allowed on National Highways	Concession Granted by NHA in 2002	Allowed on Motor Ways
2 AX SINGLE (BEDFORD)	17.5	20	17.5
2 AX SINGLE (HINO / NISSAN)	17.5	23	17.5
3 AX TANDEM	27.5	32	27.5
3 AX SINGLE	29.5	32	29.5
4 AX SINGLE TANDEM	39.5	42	39.5
4 AX TANDEM SINGLE	39.5	42	39.5
4 AX SINGLE	41.5	44	41.5
5 AX SINGLE TRIDEM	48.5	51	48.5
5 AX TANDEM TANDEM	49.5	52	49.5
5 AX SINGLE SINGLE TANDEM	51.5	54	51.5
5 AX TANDEM SINGLE SINGLE	51.5	54	51.5
6 AX TANDEM TRIDEM	58.5	61	58.5
6 AX TANDEM SINGLE TANDEM	61.5	64	61.5

National Highway Safety Ordinance 2000 is being now amended after the steering committee held in Karachi in August 2005 to provide for the greater punishment of the originator of the overloading.

Weigh Stations

NHA has 54 weigh stations to enforce the axle load limit mentioned above. Currently, the fine for overloading is about Rs. 100 per ton but it occasionally a driver can not pay a fine of Rs. 1000 - 2000 when overloads exceed 10 – 20 tons and the weigh station operator will just overlook the fine. It is also reported that the fine may be set by negotiation between operators and drivers. It is observed that weigh stations do not have unloading space for overloads or parking space for overloaded trucks.



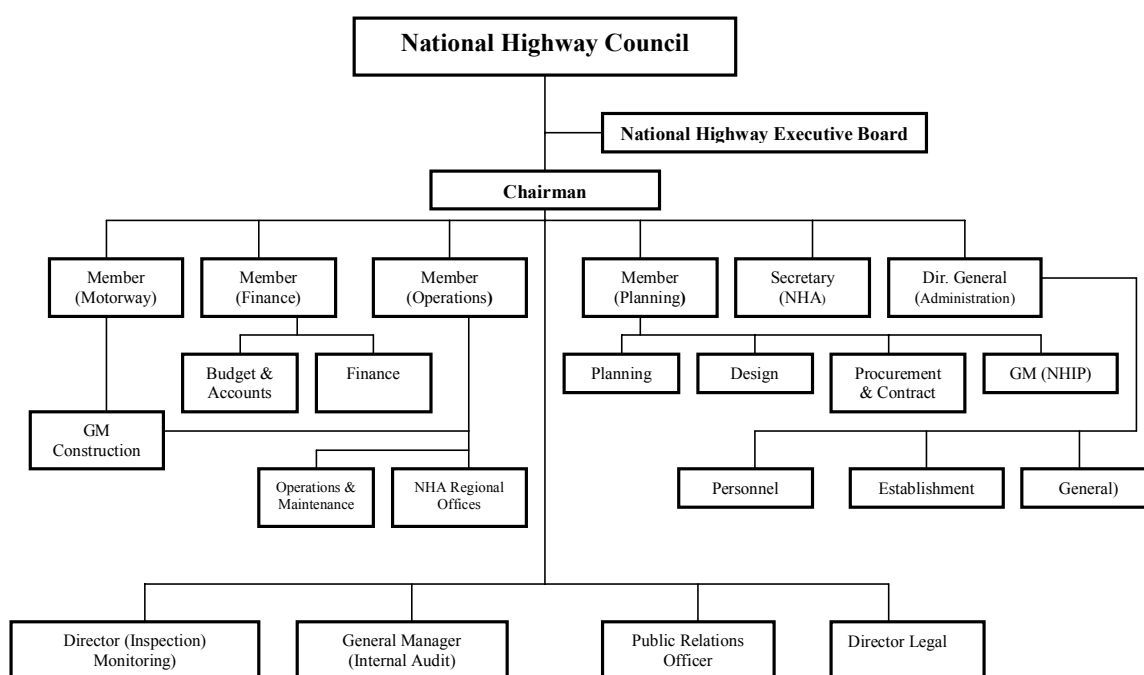
Weigh Station on the N-25

2.2.3 Administration of Road Sector

(1) National Highway Authority (NHA)

NHA was established by the National Highway Act of 1991 as a semi-autonomous organization to plan, promote, organize and implement programmes for construction, development, operation, repair and maintenance of national highways and strategic roads especially entrusted by the Federal Government, or by Provincial Governments or other authorities.

NHA's organizational set up comprises six core-wings: Motorway, Construction Planning, Operation, Finance and Administration. The organization chart of NHA is shown in Figure 2.2.12. NHA is administered by the NHA Executive Board. Members of the Executive Board are: Executive Officer/ Chairman of NHA (Chairman), Member (Finance), Member (Planning) and other the six other members are government official ex officio.



Source: NHA

Figure 2.2.12 Organization of NHA

The 2001 amendment removed the Boards power to approve projects more than Rs.50 million. For projects over Rs.100 million the NHA Executive Board is required to make recommendations to the Central Development Working Party (CDWP) and the Executive Committee of the National Economic Council (ECNEC).

(2) National Highway Council (NHC)

The National Highway Act also established the National Highway Council (NHC) as a decision-making group. The NHC comprises seven members and is responsible for appointing the Chief Executive/Chairman of the NHA who will also become a member of the NHC and act its secretary. The Minister of Communications is the President of the NHC and the remaining members are: the Secretary Finance Division, the Secretary Planning and Development, Secretary MOC, a professional in the field of highway construction and management, a professional in the field of finance and accounting and Chairman of NHA, three departmental secretaries, one highway professional and one finance/accounting professional. The NHC meets once a year. On the recommendation of the NHA Board, the

Minister of Communication can approve any matter falling under the NHC's jurisdiction. The NHC has the power to control, direct and regulate the NHA, to sets policies and guidelines to review projects and approve five-year plans and the annual budget.

(3) Communications and Works Departments

The organization of the provincial government is similar for the four provinces.

The Communications and Works Departments of the Provincial Government (PCWDs) are responsible for construction and maintenance of the provincial roads within their respective provinces. Routine maintenance works for improvement and reparation are executed by contractors through bidding procedures. PCWD is divided into Provincial Circles headed by a Superintendent Engineer and the circles are subdivided into Divisions headed by an Executive engineer. The Divisions are further subdivided into Subdivisions headed by a Subdivision Officer.

With the devolution programme, portions of local roads have been transferred from the PCWDs to the newly established district governments.

The Works and Services Department (WSD) is one of several departments under the Chief Secretary of the provincial government. Under the Secretary of WSD, there are two sections, one responsible for roads and the other responsible for water supply and buildings. The provincial highway department is responsible for the construction and maintenance of the Provincial Roads. In the NWFP Province, the department is named as the Frontier Highway Authority (FHA). The Managing Director of FHA coordinates with the District Coordination Officer of each district government for the construction of District Roads. After devolution, part of the Provincial Road network will be transferred to the City/District Governments, while the provincial highway departments will still be providing the employees and funds.

(4) Transport Authorities

The road transport services are regulated by the provincial governments through the Provincial Transport Departments. The Provincial Transport Authorities (PTAs) and Regional Transport Authorities (RTAs) plan, allocate routes, regulate, enforce and collect revenues and assert day-to-day control over inter- and intra- city passenger transport services, which are dominated by the private sector.

Road related public revenue collection is about Rs.32.5 billion per year (52% of these are from a surcharge on POL products). Total public expenditure on roads is over Rs.20 billion per year, with 65% on national roads. The road sector has been the main recipient of public sector funding and about 69% of the total PSDP allocation for the transport sector is earmarked for the road sector. However, road maintenance expenditure over the year has only been about 20% to 30% of the required expenditure.

(5) National Highway and Motorway Police (NH&MP)

The Motorway Police were established in 1997 as the traffic police for enforcement of traffic rule and traffic safety on the M-2. The GOP enacted in 2000 the National highway Safety Ordinance which provided the legal basis for establishing the National Highway and Motorway Police (NH & MP) Force under the MOC.

One of the important tasks of the NH&MP is to enforce axle load control. "The National Highway Safety Ordinance 2000" established the legal framework for overload control as follows:

- The National Highway and Motorway Police are empowered to enforce axle overload control.
- The driver of an overloaded vehicle is directed to convey the vehicle to the nearest place where facilities exist for the storage of goods, and not to remove the vehicle or trailer from that place until the laden weight or axle weight has been reduced.

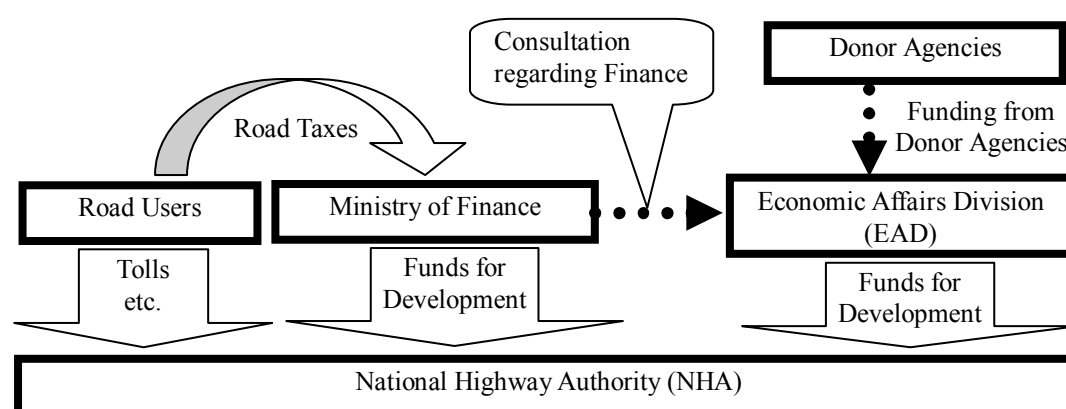
- Whoever drives a transport vehicle or causes or allows a transport vehicle to be driven on a National highway carrying in excess of 15 % of the permissible load for a goods vehicle shall be punished with imprisonment.
- A police officer shall direct the unloading of the excessive goods before allowing the vehicle to proceed.

It is noted that the NH&MP does not have retention powers and tends to avoid involvement in enforcement matters in which retention and/or legal proceedings are likely to be involved. The enforcement is therefore limited to implementation of a fine regime only and the quick disposal of violators.

2.2.4 Financial Situation

(1) Financial Resources for Roads

The agency for the road sector is the NHA, which is funded in the following manner.



Sources: Interview with NHA

Figure 2.2.13 Flow of Funds for the NHA

Until 1991, the national highway network was in the hands of the government department known as the National Highway Board. The Board work was funded by a grant from the Pakistan Government. In 1991, the Board became a semi-autonomous body, the National Highway Authority (NHA). The NHA collects tolls from the road users and borrows money or issues bonds after consultation with the Ministry of Communication (MOC). However, in 1991, the government decided for the development of roads should be switched from grants to loans, even though the NHA did not have the revenues to repay these loans.

The biggest components of the “Road Taxes” (refer Figure 2.2.13) are the surcharges on Petroleum, Oil and Lubricants (POL) from road users. Table 2.2.9 shows the trend in the surcharges on POL.

Table 2.2.9 Trends in Surcharges on POL from Road Users

(Unit: Rs. Million)

1990/91	1991/92	1992/93	1993/94	1994/95	1995/96
9,670	9,138	8,007	12,956	9,576	12,361
1996/97	1997/98	1998/99	1999/2000	Total	Average
15,861	17,661	26,128	32,101	153,458	15,346

Sources: Prepared by JICA Study Team with Data from World Bank

From the fiscal year 1990/01 to 1999/2000, the total amount of the surcharges on POL from road users was Rs. 153 billion and the annual road tax revenues amounts to Rs. 15 billion on average. On the other hand, the average annual funding to the NHA from 1990/91 to 1999/2000 amounted to Rs. 9.2 billion, which was 60% of the total road tax. The road taxes

were absorbed in the government's consolidated budget, and the most of the road tax revenues was used for other sectors. Table 2.2.10 shows the trend in funding to the NHA.

Table 2.2.10 Trends in Funding to the NHA

(Unit: Rs. Million)

Type of Funding	1990/91	1991/92	1992/93	1993/94	1994/95
Loan	250	5,152	9,498	8,084	7,406
Grants	287	384	426	447	468
for Maintenance	282	378	410	430	452
for Administration	6	6	16	17	16
for Others	-	-	-	-	-
Total	537	5,537	9,924	8,530	7,874
Type of Funding	1995/96	1996/97	1997/98	1998/99	1999/2000
Loan	6,100	7,183	9,952	17,325	16,364
Grants	371	532	620	625	681
for Maintenance	356	521	600	605	660
for Administration	15	11	20	20	21
for Others	-	-	-	-	-
Total	6,471	7,715	10,572	17,950	17,045
Type of Funding	Average 1990/2000	2000/01	2001/02	2002/03	2003/04
Loan	8,731	10,312	10,900	15,263	16,243
Grants	484	504	783	833	860
for Maintenance	469	482	760	800	825
for Administration	15	22	23	30	32
for Others	-	-	-	3	3
Total	9,215	10,816	11,683	16,096	17,103

Source: NHA

In order to prevent the road tax from being used for other sectors, segregating the road tax revenue from the general consolidated budget of the government by creating an independent account for road tax should be considered. This segregation would enable the road tax revenue to only be used in the development of the transport sector.

It may be controversial to only use all the road tax revenue for the development of the road sector because (1) the road taxes are sometimes levied for the reduction of traffic congestion and environmental protection and (2) the "Surcharges on POL" may be generated from the petroleum consumption in other sectors.

With regards to reason (1), the funds from road taxes may have to be allocated to the development of the railway network for the reduction of traffic congestion and environmental protection. Therefore, it is necessary for the government to clarify its policy of how to use the road tax revenue for the development of the entire transport sector. With regards to reason (2), the petroleum tax revenue can be separated into that received from the transport sector and the received from the non-transport sector. Therefore, only the revenue from the transport sector will be used for the development of the transport sector.

According to Table 2.2.10, the Pakistan government funds the NHA mainly with loans. However, as mentioned later, as the revenue collected from the tolls is not sufficient for the loan repayments and interest payments, the NHA has accumulated a massive debt, which amounts to Rs. 103 billion.

(2) Financial Outlook of the NHA

The NHA has engaged in commercial activities since 2001 and is now preparing the commercial based financial statements. Based on the draft financial statements (un-audited), the JICA study team has prepared Table 2.2.11 showing the financial status of the NHA.

Table 2.2.11 Financial Status of NHA*

(Unit: Million Rs.)

FY	1998/99	1999/00	2000/01	2001/02	2002/03	Data Sources
(1) Revenues						
Grants in Aid from Government	625	681	504	783	833	
Maintenance Grant	605	660	482	760	800	Data from NHA
Establishment Grants	20	21	22	23	30	
Other Grants	0	0	0	0	3	
Grants from Foreign Donors	3	3	2	2	2	
Toll Income**	184	1,022	2,186	2,220	2,570	Financial Statement (Draft)
Others***	121	355	241	369	591	
Total	933	2,061	2,933	3,374	3,996	
(2) Expenditures						
Maintenance & Restoration	621	756	1,051	2,355	1,406	Financial Statement (Draft)
Financial and Other Charges	28	1,522	367	240	712	
Others	748	2,874	1,913	1,333	666	
Total	1,397	5,153	3,332	3,929	2,785	
(3) Surplus before Depreciation (1)-(2)	-464	-3,092	-398	-555	1,211	
(4) Depreciation Charges	771	1,305	1,342	1,207	972	Financial Statement (Draft)
Surplus (3)-(4)	-1,235	-4,397	-1,740	-1,761	239	

* Since the accounting data of the NHA is premature, the table only shows the trend in the financial status and does NOT show exact figures.

** Costs of operational & mobile workshops are deducted from the gross toll incomes.

*** Recovery of disposal of assets is included.

Source: Prepared by JICA Study Team with NHA Financial Statement (Draft) and Other Documents from the NHA

As the financial statements of the NHA are currently under preparation, Table 2.2.12 was prepared from various data sources.

According to Table 2.2.12, the NHA continued to run at a loss until the fiscal year 2001/02. Even though the surplus shows a positive figure in the fiscal year 2002/03, this is due to the financial support received from the government. Accordingly, since the NHA does not have enough financial resources for the loan repayments and interest payments, the NHA owed the following loans amounting to Rs. 103 billion at the end of the fiscal year 2002/03.

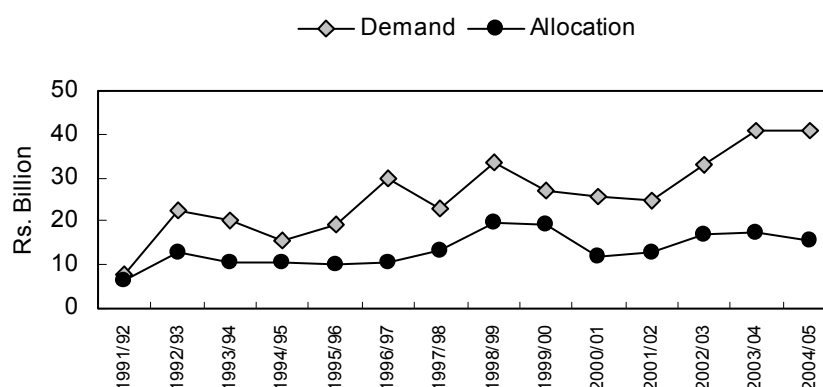
Table 2.2.12 Loans at the End of FY 2002/03

(Unit: Million Rs.)		
Lenders	Details	Amounts
Government of Pakistan	Cash Development Loans from the Government	68,082
Foreign Re-lent Loans	IBRD	6,274
	OECD	13,688
	International Development Association	78
	Asian Development Bank	232
	Islamic Development Bank	324
Foreign Direct Loans	Turk Exim Bank (for work on the M1)	934
	Dawwoo (for work on the M2)	13,447
Total		103,061

Source: NHA Financial Statement (Draft)

(3) Fund and Expenditure for Development

For the construction and improvement of national highways, NHA has received funding from the Government through the Public Sector Development Program (PSDP). However, it is understood that the allocations made available to the NHA always fell short of demand, as illustrated in Figure 2.2.14.



Source: NHA

Figure 2.2.14 Demand and Allocation of PSDP

(4) Road Maintenance Account (RMA)

Toll revenue is the major fund for maintenance of the national highway network. In addition, the Federal Government provides an annual Maintenance Grant to the NHA. The Maintenance Grant amounted to Rs. 825 Million in 2003/04.

In 2003/04, the total fund raised for maintenance was Rs. 3,774 million, 78% of which was the revenue generated, the remainder being the maintenance grant from the Federal Government, as shown in Table 2.2.13. However, the total fund for maintenance was insufficient to meet the increasing expenditure.

Table 2.2.13 Maintenance Fund and Expenditure

Fund					(Rs. in Million)
Source	2001/02	2002/03	2003/04	2004/05	Total
Maintenance Grant	760.00	800.00	825.00	828.93	3,213.93
Net Revenue Generated	2,023.79	2,432.49	2,948.85	3,704.26	11,109.39
Total Fund	2,783.79	3,232.49	3,773.85	4,533.19	14,323.32
Expenditure					(Rs. in Million)
Province	2001/02	2002/03	2003/04	2004/05	Total
Punjab	1,660.30	190.75	3,932.00	N.A.	5,783.05
Sindh	547.85	319.64	821.19	N.A.	1,688.68
NWFP	133.90	118.87	1,244.00	N.A.	1,496.77
Balochistan	311.11	510.10	1,036.00	N.A.	1,857.21
Total Expenditure	2,653.16	1,139.36	7,033.19	N.A.	10,825.71

Source: NHA RAMD(Road Asset Management Directorate)

In the financial plan for maintenance in 2005/06 (refer to Table 2.2.14), the required fund is estimated at Rs. 8.9 billion. The estimated fundraising can cover only 66% of the requirement even though there will be an increase in toll revenue due to an increase in the toll rates. The financing for the gap is to be secured from another account, which will be carried over to the next year as a liability.

Table 2.2.14 NHA Financial Plan for Maintenance in 2005-06

		(Rs. in Million)
Total Fund Required (based on HDM-IV Analysis)		8,900
Estimated Financial Resources		
Maintenance Grant		1,200
Revenue to be Generated		4,640
Net Toll Revenue		2,960
Net Revenue from Police Fine (NHA Share)		200
Net Revenue from Weigh Station (NHA Share)		100
Revenue from Regularization of Filling/CNG Stations		150
BOT Concessions for Bus Bays on GT Road		30
Reduction in percentage of Management Contractor like FWO, NLC, etc.		200
Expected Revenue from Increase in Toll Rates to Approved Limit (to be implemented from July 1, 2005)		1,000
Total		5,840

Source: NHA

Road Maintenance Accounts

The Road Maintenance Account (RMA) is an NHA fund for road maintenance, established in 2003 based on “National Highway Authority Roads Maintenance Account Rules, 2003”. According to the rules, the revenue of the NHA and the maintenance grants from the government shall be accumulated in the RMA and the funds in the RMA shall be used for maintenance of the roads. The mission of the RMA is to promote efficient road network maintenance, to a standard that road users want and are willing to pay for, by collecting the road tariff and allocating funds to road administrators for sound planning and execution of the works. The RMA can ensure that road users’ funds are efficiently and effectively spent by the road administrators undertaking the implementation.

The revenues that should be transferred into the RMA are:

From Road Users

- Tolls on roads and bridges;
- road use related fines (e.g., overloading, traffic offence);
- axle load charges;
- supplementary heavy vehicle fees;
- international transit fees; and
- border fees.

From Other Sources

- Charges for commercial use of right of way;
- profits on bank deposits and income on investment of moneys in the RMA;
- annual maintenance grant from the Federal Government;
- maintenance funds provided by international donor agencies;
- loans secured to finance any maintenance work shortfall; and
- endowments and donations for maintenance and road safety from any organization, group or person.

The activities eligible expenditure from the Road Maintenance Account are:

- Maintenance plan (routine and periodic maintenance);
- Rehabilitation of existing network assets of the National Highway Authority which have acceptable net present value and economic rates of return;
- geometric improvements of the existing network assets of the National Highway Authority;
- highway safety improvements;
- establishment of new toll plazas with automated electronic toll and traffic management systems, access control, and weigh stations; and
- expenditure related to corridor management.

(5) Financing of Provincial Roads

The financial system for the development and maintenance of the Provincial Roads is similar to that of the National Highways. For development works, the provincial highway departments receive an allocation as the PSDP of the provincial governments. For maintenance works, a maintenance grant is provided by the provincial governments. The provincial governments intend to introduce a revenue generation system including toll collection similar to the NHA, to secure a fund for road maintenance. The status of revenue appears to be different for the four provinces. Internal revenue generation for maintenance is minor in the Punjab Province, while, the FHA of the NWFP Province has substantial revenue generation, as shown in Table 2.2.15. In 2004-05, the FHA generated Rs. 58.822 million, which is more than the grant provided by the provincial government. Of the total revenue, toll revenue provided 33%, with the other revenue coming from the contractor's registration fee, the sale of application forms, rental charges for Right of Way, and income from machinery rental charges.

Table 2.2.15 Financing for Development and Maintenance of Provincial Roads in the NWFP Province

For Development		(Rs. in million)	
Year	Allocation	Expenditure	
2001-02	13.460	13.460	
2002-03	856.921	856.921	
2003-04	495.807	495.807	
2004-05	685.492	685.492	

For Maintenance			(Rs. in million)
Year	Maintenance Grant	FHA Own Receipt (Toll Revenue)	Total
2001-02	20.000	17.372 (13.443)	37.372
2002-03	20.000	69.921 (45.225)	89.921
2003-04	40.000	72.951 (48.749)	112.951
2004-05	50.000	58.822 (19.270)	108.822

Source: NWFP Provincial Government

2.2.5 Issues and Problems

(1) Incomplete Hierarchy of Road Network

Motorways are tolled national highways with controlled access and highspeed free flowing traffic lanes¹. Although the access control policy and the designed speed are different between Motorways and National Highways, the functional difference is not so clear at present because of the role of National Highways. It is expected that Motorways carry inter-provincial traffic between major cites at high-speed. On the other hand, National Highways carry a large volume of long-distance traffic because inter-provincial connection is the major role of National Highways. M-2 is a Motorway connecting Rawalpindi and Lahore at a distance of 367km, but traffic demand for M-2 is small and most drivers between the two cities prefer N-5 that connects the two cities at a shorter distance of 275km. The recent dualization and improvement are levelling up National Highway close to Motorway in terms of road network hierarchy. Meanwhile, development of feeder road network systems that connect National Highways is so insufficient due to lack of adequate investment that the hierarchy system has a gap between National Highway Network and the lower network systems.

(2) Insufficient Investment on Provincial Roads and Other Local Roads

National Highways form inter-provincial network together with Motorways, and the network connects four provinces along major national transport corridors. However, the National Highway network does not necessarily serve all the territory of Pakistan, because the area of provinces are very large in Pakistan, and the large area in each province, especially in Panjab, are covered by provincial road networks. Provincial roads are the primary feeder roads for National Highway network and the lower system in terms of road hierarchy. Accordingly, priority of investment on provincial roads is lower than that on National Highways. Provincial roads suffer from increasing traffic than National Roads, because of insufficient investment on capacity expansion and lack of maintenance works.

(3) Congestion in Urban Area

The National Highway Network has many congested sections in cities and towns along the roads, which reduce travel speeds and increase traffic accidents. As a cities and towns grow along arterial roads, a new bypass become an urban road soon after it is opened to the public. Therefore, construction of bypasses tends to be only a short-term countermeasure for congestion. The lack of local funds for urban roads and the absence of road network plans in local municipalities may contribute to this effect. Access control along National Highways is one of the solutions but it tends to divide local communities.



Photo: Pedestrians try to cross N-5.

¹ Performance Report, NHA

(4) Mix of Traffic (Freight and Passenger) on the National Highway

The mix traffic of freight and passenger traffic is another problems, Naturally, trucks need to use National Highways because one of the basic roles of National Highways is to serve as inter-provincial and long-distance routes for freight transportation. However, it is observed that passenger cars cannot travel at the desired speeds even if the volume if the traffic is low due to the presence of slow trucks.



Photos: Cars can not overtake trucks (N-5)

(5) Overloading

This is the aforementioned problem in the transport sector in Pakistan. Vehicle overloading is a major cause of premature pavement deterioration and an impediment to the sustainable development of the highway network. Overloading reduces the economic benefits of road projects and increases maintenance costs.

The main adverse effects of overloading are:

- Excessive axle loads and high tyre pressures lead to premature and rapid deterioration of existing and new roads in the form of cracking, rutting and potholes;
- Premature damage accelerates and increases the road maintenance budget;
- Public transport, such as overloaded buses may not be a source of damage to roads, but, together with overloaded commercial vehicles, they are the major safety road hazard and are involved in most accidents;
- Transport time is lost by trucks being off road for repairs due to overloading. Revenue is lost to the owner from down time and repair costs are borne by them;
- Marginalization of profitability of the trucking industry due to the overloading fines.

(6) Increase in Road Maintenance Work

The maintenance burden of the NHA has continued to increase because:

- A number of highway projects have been carried out without a corresponding increase in the maintenance budget;
- Several new routes have been federalized. NHA inherited the road network in a dilapidated condition from the provincial governments;
- Many sections of national highways have been dualized, which has virtually increased the length of the national highway network;
- Uncontrolled overloading, causing early damage on pavements;
- Increase in traffic volumes.

The NHA receives a maintenance grant from the Federal government, while the provincial highway department receives a maintenance grant from the provincial government. They are supplemented by their own revenue, including toll revenue. However, the secured fund is not sufficient to ensure a stable and secure source of maintenance funding. From an interview with the NHA, it was estimated that the revenues (without grants from the government)

would be able to surpass the maintenance costs in the future.

(7) Road Safety Problem

It is estimated that approximately 7,000 to 10,000 people die every year as a result of road accidents. The number of fatalities might be even higher because of an unsatisfactory system of reporting and follow-up.

Although intensive studies for road safety in Pakistan have been carried out, reliable statistics about traffic accidents is not available. It can be said that there are lots of traffic accidents that are not reported in Pakistan.

(8) Summary of Issues

The issues, which can be immediately identified from the problems mentioned above, are summarized as follows:

- To eliminate the bottlenecks in traffic flow along National Highways;
- To develop the urban road network to avoid unexpected urban growth along bypasses so that National Highways can function in their original role;
- To replace old truck fleets with new ones that can travel faster;
- To divert truck routes from National Highways to Motorways;
- To reduce the number of overloaded trucks;
- To improve or rehabilitate deteriorated roads to reduce maintenance cost;
- To check the under-reporting of accidents and ensure a rational and scientific approach is adopted to investigate accidents and take corrective actions accordingly.

Other issues are identified through more detailed analysis such as demand-supply analysis, administrative and institutional analysis and financial analysis as explained in the followings Chapters.