No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF TRANSPORT, VIETNAM

THE COMPREHENSIVE STUDY ON THE SUSTAINABLE DEVELOPMENT OF TRANSPORT SYSTEM IN VIETNAM (VITRANSS 2)

Subsector Report No. 01
ROAD AND ROAD TRANSPORT

May 2010

ALMEC CORPORATION
ORIENTAL CONSULTANTS CO. LTD.
NIPPON KOEI CO. LTD.

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Exchange Rate Used in the Report

USD 1 = JPY 110 = VND 17,000

(Average Rate in 2008)

PREFACE

In response to the request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct the Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2) and entrusted the program to the Japan International cooperation Agency (JICA)

JICA dispatched a team to Vietnam between November 2007 and May 2010, which was headed by Mr. IWATA Shizuo of ALMEC Corporation and consisted of ALMEC Corporation, Oriental Consultants Co., Ltd., and Nippon Koei Co., Ltd.

In the cooperation with the Vietnamese Counterpart Team, the JICA Study Team conducted the study. It also held a series of discussions with the relevant officials of the Government of Vietnam. Upon returning to Japan, the Team duly finalized the study and delivered this report.

I hope that this report will contribute to the sustainable development of transport system and Vietnam and to the enhancement of friendly relations between the two countries.

Finally, I wish to express my sincere appreciation to the officials of the Government of Vietnam for their close cooperation.

May 2010

HIROYO SASAKI,
Vice President
Japan International Cooperation Agency

May 2010

HIROYO SASAKI
Vice President
Japan International Cooperation Agency
Tokyo

Subject: Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the final report of the Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2).

This report compiles the results of the study which was undertaken both in Vietnam and Japan from November 2007 to May 2010 by the Team comprising ALMEC Corporation, Oriental Consultants Co., Ltd., and Nippon Koei Co., Ltd.

We owe a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation and deep gratitude to all those who extended their extensive assistance and cooperation to the Team, in particular the Ministry of Transport of Vietnam.

We also acknowledge the officials of your agency, the JICA Advisory Committee, and the Embassy of Japan in Vietnam for their support and valuable advice in the course of the Study.

We hope the report would contribute to the sustainable development of transport system and Vietnam.

Very truly yours,

IWATA Shizuo
Team Leader
The Comprehensive Study
on the Sustainable Development
of Transport System in Vietnam
(VITRANSS2)

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ABBREVIATION

ADB	Asian Development Bank
ASEAN	Association of South East Asian Nations
BIDV	Bank for Investment and Development of Vietnam
Bil.	Billion
BMS	Bridge Management System
BOT	Build-Operate-Transfer
BT	Build and Transfer
CB	Construction Bond
CBTA	Cross Border Transportation Agreement
CFEZ	Central Focal Economic Zone
CIENCOS	Civil Engineering & Construction Corporation
CPC	Communal People's Committee
CPT	Cone Penetration Test
CPTU	Undrained Cone Penetration Test
DBST	Double Bituminous Surface Treatment
D/D	Detailed Design
DPC	District People's Committee
DPWH	Department of Public Works and Highways
DQIZ	Dung Quat Industry Zone
DSRC	Dedicated Short Range Communication
EIRR	Economic Internal Rate of Return
ETC	Electronic Toll Collection
FEZ	Focal Economic Zone
FIDIC	Federation Internationale Des Ingenieurs-Conselis (International Federation of Consulting Engineers)
FIRR	Financial Internal Rate of Return
F/S	Feasibility Study
GDP	Gross Domestic Product
GOV	Government of Vietnam
HCMC	Ho Chi Minh City
HDM-4	Highway Development and Management Version 4
HPM	Highway Planning Manual
IDICO	Urban and House Development Investment Joint Stock Company
IICPTA	Initial Implementation of Cross Border Transportation Agreement
IRR	Internal Rate of Return
ITS	Intelligent Transport Systems
IWT	Inland Waterway Transport
IZ	Industrial Zone
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
LTPBMC	Long-Term Performance-Based Maintenance Contract

MBC	Maintenance by Contract
MCA	Multi-Criteria Analysis
Mil.	Million
MOC	Ministry of Construction
MOF	Ministry of Finance
MOT	Ministry of Transport
M/P	Master Plan
MPI	Ministry of Planning and Investment
MTEF	Medium-Term Expenditure Framework
MYPS	Multi-Year Programming and Scheduling
N/A	Not Available
NFEZ	North Focal Economic Zone
NH	National Highway
NTSC	National Traffic Safety Committee
N-S	North-South
OBU	On Board Unit
ODA	Official Development Assistance
O&M	Operation and Maintenance
PC	People's Committee
PC	Pre-stressed Concrete
PDOT	Provincial Department of Transport
PHD	Prefabricated Horizontal Drain
PM	Prime Minister
PMD	Prime Minister Decision
PMS	Pavement Management System
PMU	Project Management Unit
PPC	Provincial People's Committee
PPP	Public-Private Partnership
PR	Provincial Road
PTSC	Provincial Traffic Safety Committees
PVD	Prefabricated Vertical Drain
RBIA	Road and Bridge Information Application
RR	Ring Road
RRMC	Regional Road Maintenance Company
RRMU	Regional Road Management Unit
RSA	Road Safety Audit
RSMS	Road Safety Management System
RTIA	Road Traffic Information Application
R&D	Research and Development
SB	State Bond
SC	State Credit
SCF	Standard Conversion Factor
SEDP	Socio-Economic Development Plan
SFEZ	South Focal Economic Zone
SOE	State Owned Enterprise
TARAS	Traffic Accidents Recording and Analysis System

TASCO	Tasco Joint Stock Company
TCVN	Vietnamese Standards
TEC	Transport Engineering Company
TEDI	Transport Engineering Design Incorporated
TUWPS	Transport Urban Work Public Service
UPC	Urban People's Committee
USD	United States Dollar
UXO	Unexploded Ordnance
VCB	Joint Stock Commercial Bank for Foreign Trade of Vietnam
VDB	Development Bank of Vietnam
VEC	Vietnam Expressway Corporation
VIDIFI	Vietnam Infrastructure Development & Finance Investment Joint Stock Company
VITRANSS	The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam
VITRANSS2	The Comprehensive Study on the Sustainable Development of Transport System in Vietnam
VND	Vietnamese Dong
VRA	Vietnam Road Administration
VRSP	Vietnam Road Safety Project
WB	World Bank

1 INTRODUCTION

1.1 Overview

Subsector Report No. 1 on Road and Road Transport presents a comprehensive analysis of the road and road transport subsector as part of "The Comprehensive Study on the Sustainable Development of Transport System in Vietnam" (VITRANSS 2). It presents the overall findings and major results of various technical discussions, information and data gathered from the field, as well as meetings with various government agencies and counterpart organizations.

The road subsector is important to the overall transport system of Vietnam as the country moves towards greater economic integration of its major economic growth centers. It is noted that the current state of the national road infrastructure needs to be improved particularly the expressways, the primary and secondary networks of which are critical to sustaining the gains of major economic development projects taking place in the whole of Vietnam. Further, road transport services must be made efficient and affordable to productive sectors such as agriculture, services and industry to enhance the investment climate in major growth centers in the northern, central and southern regions as well as in poorer areas of the country.

A number of major road projects have been implemented, which included bridges and tunnels construction, since the introduction of the Doi Moi policy in Vietnam. These major road improvement, rehabilitation and construction projects were made possible with the assistance of international donor countries. However, improving the road infrastructure alone is not sufficient in making the subsector relatively more efficient. There are other issues that are equally important to enable the road subsector to become more responsive to the needs of the economic sectors and to sustain the economic gains made in the past years. Further, the subsector must be integrated more effectively with other transport subsectors, such as shipping, rail and air transport, to further enhance the economic gains of transport investments as a whole.

Other equally important issues that need to be addressed to enable the road infrastructure system to be more operationally efficient include the following: making the road institutional system more adapted and responsive to the needs of the economic sectors; better and more effective road operation and management; and more effective road safety in the country.

Subsector Report No. 1 provides an analysis of the existing situation of the road subsector, the current state of its infrastructure network in relation to the economic development needs of major growth centers and developing areas, and its institutional system and current road management practices. Based on the analysis of the subsector, the report also provides short- to medium-term and long-term strategies to enable the road subsector to function more efficiently.

1.2 Study Objectives

Subsector Report No. 1 on Road and Road Transport has the following objectives:

(i) The formulation of long-term development strategies for the road transport subsector up to year 2030;

(ii) The formulation of a national road transport development master plan up to year 2020; and

(iii) The strengthening of planning capabilities of road transport agencies and the undertaking of necessary technology transfer.

1.3 Scope and Coverage of the Subsector Report

Subsector Report No. 1 is organized to provide a logical framework of analysis and comprises the following chapters:

Chapter 1: Introduction. This chapter presents an overview of the study, its objectives, scope, and coverage.

Chapter 2: Present Conditions. This chapter summarizes the results of the review of the present state of the road transport network, traffic volumes, road conditions, road construction and maintenance, traffic management and safety, as well as the road subsector's existing administrative and management systems.

Chapter 3: Current Policy, Plans and Projects. This chapter summarizes the results of the review of present policies, plans and projects aimed at improving the road subsector infrastructure and management systems. This chapter also provides an update of proposed road transport plans and projects and the progress of ongoing and committed projects.

Chapter 4: Main Planning and Management Issues. This chapter summarizes main planning and management issues pertaining to roads extracted from the above reviews, and presents recommendations for each issue.

Chapter 5: Development Strategy. This chapter presents the long-term development strategies in the road subsector. Key policy directions aimed at enhancing the delivery of road services and infrastructure are presented.

Chapter 6: Road Master Plan. This chapter presents a road investment program for the periods 2011-2020 and 2021-2030.

2 PRESENT CONDITIONS OF THE ROAD SUBSECTOR

2.1 Overview

1) Road Development

Currently, Vietnam's road network has a length of 256,684km, of which 17,228km are national highways, 23,520 km are provincial roads, and the rest are other local roads (i.e., district roads, commune roads, urban roads, and exclusive roads). From 1999 to 2006, 33.399 km road were build. The network grew by 1.6% p.a.

The paved ratio also significantly improved. From 1999 to 2008, the percentage of national highways that remain unpaved was reduced from 22% to 6%. While paved ratio is high, the surface conditions of national roads are not satisfactory, with only National Highway (NH) No.1 and the roads around the primary cities of Hanoi and HCMC being in relatively good condition. Unpaved provincial roads also decreased from 40% to 21% in the same period. Still, the overall pavement conditions of roads have a long way to go before they can be considered good, especially since the overall network is only about 30% paved with a significant share of district and commune roads remaining unpaved.

The road network can be considered as properly distributed when demand and terrain are considered, although it is narrow and has a limited capacity. Four percent (4%) of the network has 4-lane carriageways; 36% has 2-lane carriageways and the rest have less than two lanes.[1] The connectivity of the network also leaves much to be desired, and it is not well articulated in a hierarchical manner. National roads often provide local access where national roads should cater primarily to interprovincial through traffic. This is due to a weak secondary road network. Nearly 300 communes (of the 8,950 nationwide) are still inaccessible by vehicles[2], which is nevertheless an improvement from ten years ago.

There are 7,200 bridges along the primary road network with less than 80% considered in good condition.[3] Thirty percent (30%) of the bridges need to be upgraded and rehabilitated and 20% are narrow. There are 2,200 and 630 temporary bridges along national roads and provincial roads, respectively, which have low permissible loads. There are also 500 points along the primary network that are impassable during the rainy season. Approximately 60% of roads are in mountainous terrain; therefore, they are vulnerable to landslides and require higher O&M costs than those in flat areas.

Traffic safety statistics show an improvement reduction in the number of accidents and injuries; but, contradictorily, the number of fatalities is still increasing. At any rate, the 12,757 road accident fatalities in 2006 highlight the need for stronger measures. Intelligent transport systems (ITSs) have only been recently introduced in Vietnam through electronic toll collection (ETC) in a few locations.

Traffic demand, however, is growing. From 2000 to 2005, road traffic in terms of passenger-kilometer and ton-kilometer increased by 12%-17% p.a. This growth is accompanied by motorization and increasing heavy-vehicle traffic. Infrastructure development has so far been unable to cope with such growth. Congestion points, especially around key cities, are becoming more evident. And, while there has been significant overall growth in vehicles, the exceptionally

[1] The Plan for Development of Vietnam Expressway Network (MOT-VRA/ TEDI 2007).
[2] Updating rural transport development strategy DFID/MOT (2007).
[3] Ibid.

high growth in motorcycle and truck traffic is a cause for concern in terms of road safety. The increase in heavy vehicles has also caused accelerated pavement deterioration.

2) Road Hierarchy

Road administrative classification such as national highway, provincial road and etc were identified the size of the road network that both the national and local authorities are currently in charge of, along with (i) their existing administrative responsibility, (ii) their technical capability to manage and (iii) their financial capacity. It is important that administrative classification is defined in line with management requirements to maintain good road conditions; e.g. in charge of road network development, responsibility in road works, financing, management, and right of usage.

However, road administrative classification does not always correspond with road functional classification in Vietnam.

A road functional classification enables the systematic ranking of roads according to their socio-economic significance. This functional classification allows a definition of technical standards for each type of road and can become an important tool for investment planning. Functional and administrative classification can coincide, which is the case in some developing countries, or in most OECD countries. However, differences exist such as: (i) functional classification can include a greater number of road classes to define more road standards; (ii) the administrative and socio-economic ranking of a road might differ for historical reasons; (iii) a functional classification can be changed more easily than an administrative classification. However, a single classification may be preferred to simplify its use by management bodies.

It is recommended that a comprehensive Road Classification Study be undertaken to define the functional and administrative reclassification of the Vietnamese road network to:

Rank roads according to their socio-economic importance (functional classification) and associate design and maintenance standards to each road class;

Identify short-, medium- and long-term financial needs of each road class;

Table 3.8.2 is an example of a possible hierarchy to be considered under the functional classification.

Prepare on this basis an administrative reclassification of the network to rationalize the responsibility of General Road Administration (GRA) and the provinces for managing the road network; and

Formalize methods of setting priorities in the short term by implementing a Pavement Management System.

Table 2.1.1 Framework for a Road Functional Classification

Issues to be Addressed	Possible Functional Classification of Interurban Roads			
	Primary Roads	Secondary Roads	Feeder Roads	Local Roads
Road Hierarchy	Roads linking first class traffic- generator center (TGC)	Roads linking 2nd-class TGC to primary network	Roads linking 2nd- and 3rd-class TGCs to primary and secondary networks	Other roads
Possible standard	Paved road with international standard	Paved road	Gravel road	Earth road

Source: Highway Functional Classification Study Guidelines (World Bank)

3) Institutional Developments and Funding

The improvements in the road network in the last decade were notable. This was because the road subsector received the bulk of the funds allocated for the transport sector. Roads have

received more than 80% of the funds allocated for transport development, which is equivalent to around 2.2% of the GDP. Much of the funding went to road construction and improvement, while funds for road maintenance were substantially lower than what was required. Given the continued demand for more and better roads, GRA desires to increase spending levels on roads to 3.0–3.3% of the GDP.

Road development, which also covers maintenance works, is funded through the "General Account." Recently, the National Assembly approved a law establishing a Road Maintenance Fund, the operational parameters of which are currently under discussion.

There were also other significant institutional developments in the road subsector. Various legal documents were enacted that govern road administration, technical standards, expressway development, principles for planning and project approval, regulations to govern BOT schemes for roads, acquisition of land, and environmental assessment.

In recognition of the importance of transportation safety, a nationwide vehicle inspection system covering 4-wheel vehicles was established and the National Traffic Safety Committee (NTSC) was created. For expressway development, the Vietnam Expressway Corporation was established in 2004.

4) Road Construction and Maintenance

Road construction technology and management has been improving through technology transfer from foreign contractors and training. The Ministry of Transport (MOT) and the Ministry of Construction (MOC) have updated related laws, regulations, specifications, and guidelines. The privatization of the road construction industry has also progressed. Private contractors now account for 40% of the number of awarded contracts, compared to almost none in the 1990s. The role of private contracts, however, is still low.

Maintenance standards of national highways are stipulated in the "Technical Standards for Road Routine Maintenance" and the "Road Maintenance Routine Standards." The GRA is responsible for the maintenance of national roads through the Regional Road Maintenance Management Units (RRMU) and the provincial Department of Transportation. The GRA has prepared a 10-year maintenance plan. Maintenance works are mainly undertaken by state-owned enterprises (SOEs) through force account and restrictive bidding among SOEs.

5) Traffic Safety

Vietnam's traffic accident situation is worsening and is getting more serious than that of other ASEAN countries. According to the traffic accident data of ASEAN countries, the level of traffic safety in Vietnam is very low. Regarding the total number of fatalities, Vietnam ranked third after Thailand and Indonesia in 2000 but has overtaken them to become No.1 by 2006. Recently, traffic accidents have become critical social problems and traffic safety is addressed as one of the urgent policy issues of the government.

2.2 Road Inventory

1) Road Classification

Decree No.186/2004/ND-CP categorizes roads into national highways, provincial roads, district roads, commune roads, urban roads and exclusive roads. Exclusive roads are special roads that connect to industrial zones, military zones, forests, etc. Arterial roads that cater for nationwide traffic are classified as national highways. Roads that serve regional and local traffic are classified as either provincial, district, commune, or urban roads. The classification also identifies the agency responsible for the construction and maintenance of the road (see Table 2.2.1).

Table 2.2.1 Administrative Classification of Roads

Classification	Definition	Agency Responsible	Total Length (km)
National Highway	The main axial roads of the nationwide land road network, which are of particularly important effect in service of national or regional socio-economic development, defense and security, including: • Roads linking Hanoi capital with the centrally-run cities; and with administrative centers of the provinces; • Roads linking administrative centers of three or more provinces or centrally-run cities (hereinafter called provinces); • Roads linking international seaports with international border gates and main land border gates.	GRA (MOT)	17,228
Provincial Road	Axial roads within one province or two provinces, including roads linking a province's administrative center with districts' administrative centers or with adjacent provinces' administrative centers; roads linking national highways with districts' administrative centers.	PDOT (PPC)	23,520
District Road	Roads linking districts' administrative centers with the administrative centers of communes or commune clusters or with adjacent districts' administrative centers; roads linking provincial roads with administrative centers of communes or centers of commune clusters.	(DPC)	49,823
Commune Road	Roads linking the communes' administrative centers with hamlets and villages, or roads linking communes together.	(CPC)	151,187
Urban Road	Roads lying within the administrative boundaries of inner cities or urban centers.	TUWPs (UPC)	8,492
Exclusive Road	Roads used exclusively for transport and communication by one or a number of agencies, enterprises and/or individuals.	(Investor)	6,434
Total			256,684

Source: Vietnam Road Administration, Decree No.186/2004/ND-CP
Note: Total length is as of 2008.

2) Road Network

The road network totals 256,684km, of which 17,228km are national highways (see Table 2.2.2 and Figure 2.2.1). Much of the highway network is composed of commune roads, accounting for nearly 60% of the total road network. Forty percent (40%) of the road network is in mountainous terrain.

The national highways function as the primary arterials of the road network. The national highway network forms two north–south corridors, coastal and upland, with east–west highways along the central part of Vietnam. In the north, the national highways form a radial circumferential pattern. In the south, the national highway network forms a grid pattern. The coverage of the national highways seems adequate. However, due to the topographic conditions of Vietnam, 39% of the national highway network is in mountainous terrain. Therefore, the design standards of nearly half of the national highways are constrained. It also creates problems for road maintenance and is vulnerable to natural disasters, such as landslides.

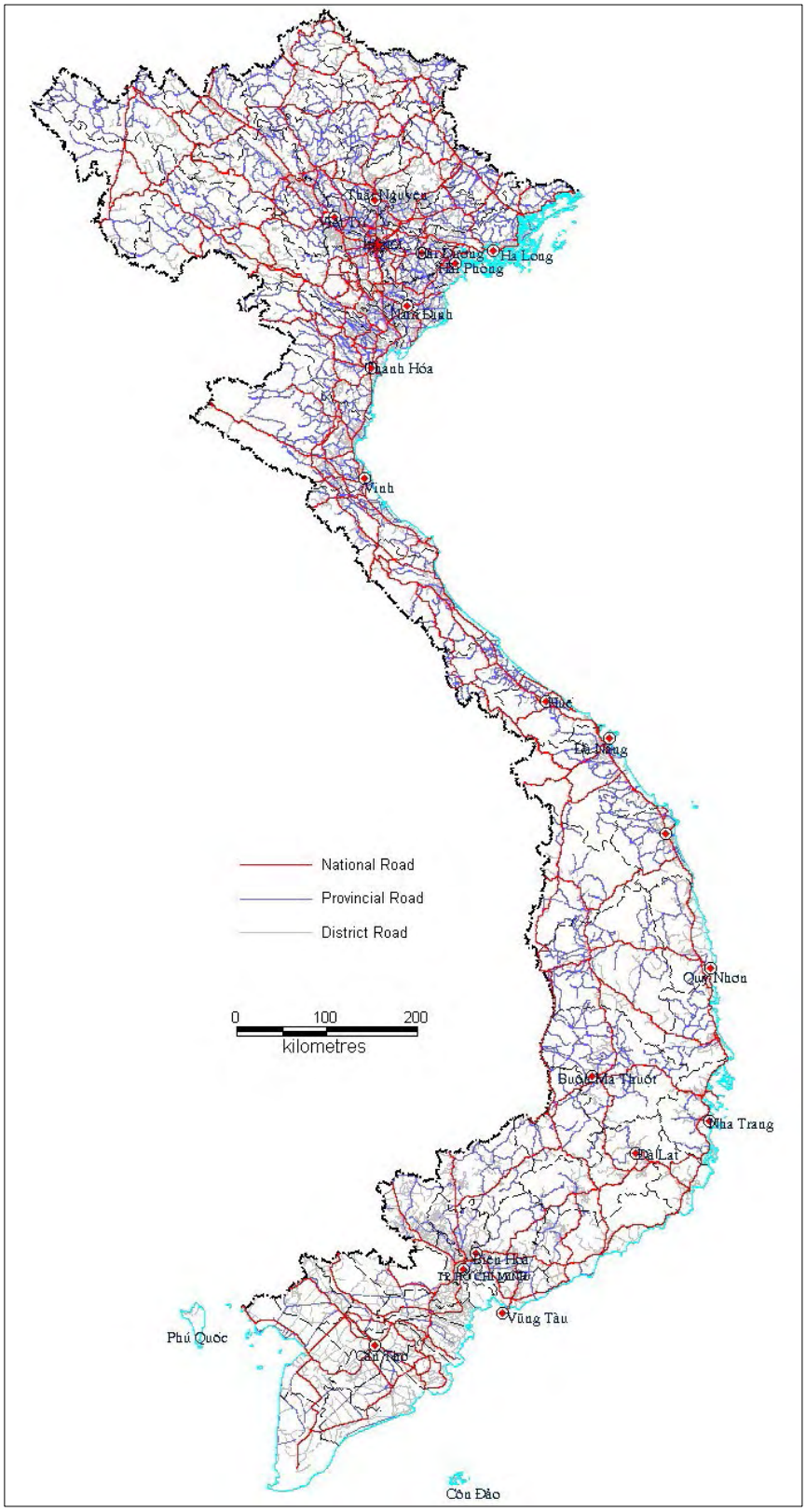
The provincial roads are supposed to serve as collector roads for the national highways and to service intra-provincial traffic; but their limited length and poor conditions prevent them from functioning as intended. Provincial roads in Vietnam are only 28% longer than the national highway network. In most developed countries, the collector road system is at least double the length of the main road system. As a result, intra-provincial traffic tends to use the national highways, resulting in a mix of local traffic, mostly motorcycle, and through traffic composed of more cars and heavy vehicles on the national highways. A mixed traffic flow is both unsafe and inefficient.

Table 2.2.2 Road Network by Classification and Pavement Type in Vietnam

Classification	Year	Total Length (km)	Length by Pavement Type (km)					
			Asphalt Concrete	Cement Concrete	DBST	Gravel	Earth	Other
National Road	1999	15,520	5,354	94	5,828	3,178	-	-
	2006	17,295	7,705	342	6,410	2,838	-	-
	2008	17,228	9,384	626	6,304	912	-	-
Provincial Road	1999	18,344	829	157	5,609	7,309	-	-
	2006	23,138	3,474	701	11,030	4,816	3,073	44
	2008	23,520	N/A					
District Road	1999	37,437	-	-	-	-	-	-
	2006	54,962	739	1,082	4,608	14,631	32,392	1,510
	2008	49,823	N/A					
Commune Road	1999	134,463	-	-	-	-	-	-
	2006	141,442	1,616	18,442	9,226	34,897	77,261	-
	2008	151,187	N/A					
Urban Road	1999	5,919	2,297	-	3,622	-	-	
	2006	8,536	2,465	776	2,750	976	1,568	-
	2008	8,492	N/A					
Other Road	1999	5,451	-	-	-	-	-	-
	2006	6,414	-	169	575	2,726	2,944	-
	2008	6,434	N/A					
Total	1999	224,639	-	-	-	-	-	
	2006	251,787	15,999	21,512	34,600	60,884	117,238	1,554
	2008	256,684	N/A					

Note: Prepared by VITRANSS 2 Study Team based on the information from Transport Development Strategy Institute and Vietnam Road Administration.

Figure 2.2.1 Road Network in Vietnam



Source: Vietnam Road Administration

3) Road Density

Table 2.2.3 summarizes the road density and road density index of Vietnam. Table 2.2.4 tabulates road density and road density of other countries. Vietnam compares favorably with other ASEAN countries both in terms of the overall road network and primary road network (Figure 2.2.3 and Figure 2.2.4, respectively). Developed countries have much higher road densities.

Japan, which has similar topographical characteristics as Vietnam, could be used as a rough benchmark for future road density improvement. Based on this assumption, Vietnam needs to expand its current primary road network by 10,000km more. That will bring road density of 0.083 for primary road network which is deemed appropriate in terms of population and the number of vehicles in 2030.

Table 2.2.3 Road Density and Road Density Index of Vietnam

Road Length, L (km)	All Roads	256,684
	National Highways	17,228
Total Land Area, A (km^2)		329,314
Population, P (x1,000)		82,895
Road Density, RD (km/km^2) RD = L / A	All Roads	0.78
	National Highways	0.053
Road Density Index, RDI RDI = L / √ PxA	All Roads	1.55
	National Highways	0.11

Source: Prepared by VITRANSS 2 Study Team

Table 2.2.4 International Comparison on Road Density and Road Density Index

ITEM	Vietnam	Laos	Cambodia	Thailand	Malaysia	Indonesia	Philippines
Area (km2)	329,314 *7	236,800 *1	181,035 *9	514,000 *6	330,000 *6	1,890,754 *3	299,404 *6
Population (x 1,000)	82,895 *7	6,678 *1	12,762 *9	62,830 *6	26,640 *6	237,512 *1	92,681 *1
Registered vehicles (x 1,000)	973					22,985 *3	2,466 *5
Road length (km)							
Expressway	(5,753) *7				1,192 *10		
Primary network (National roads or equivalent)	17,385 *7	6,515 *8	4,695 *9	57,403 *2		26,328 *3	30,161 *5
Secondary network (Provincial roads or equivalent)	22,783 *7	8,880 *8	6,615 *9			47,877 *3	27,076 *5
Local network and others	215,936 *7	10,605 *8	18,948 *9	137,403 *9		287,577 *3	144,845 *5
Total length (km)	256,104 *7	26,000 *8	30,258 *9	194,806 *9	69,300 *9	361,782 *3	202,082 *5
Road density (km/km2)	0.78	0.11	0.17	0.38	0.21	0.19	0.67
Road density index	1.55	0.65	0.63	1.08	0.74	0.54	1.21
Road density for primary network (km/km2)	0.053	0.028	0.026	0.112	N/A	0.014	0.101
Road density index for primary network	0.11	0.16	0.10	0.32	N/A	0.04	0.18

ITEM	China	Japan	USA	UK	France	Germany	Italy
Area (km2)	9,596,960 *1	377,887 *4	9,826,630 *1	244,820 *1	547,030 *1	357,021 *1	301,230 *1
Population (x 1,000)	1,330,045 *1	127,288 *1	303,825 *1	60,944 *1	64,058 *1	82,370 *1	58,145 *1
Registered vehicles (x 1,000)	19,518 *2	75,680 *4	237,243 *2	30,518 *2	36,039 *2	47,875 *2	35,248 *2
Road length (km)							
Expressway	34,288 *2	7,383 *4	75,377 *2	3,523 *2	10,490 *2	12,044 *2	6,621 *2
Primary network (National roads or equivalent)	33,522 *2	54,264 *4	267,776 *2	46,669 *2	25,730 *2	41,139 *2	46,009 *2
Secondary network (Provincial roads or equivalent)	231,715 *2	129,139 *4	1,651,008 *2	114,400 *2	365,000 *2	86,809 *2	119,909 *2
Local network and others	1,571,136 *2	1,002,185 *4	4,439,111 *2	223,082 *2	550,000 *2	91,428 *2	312,149 *2
Total length (km)	1,870,661 *2	1,192,971 *4	6,433,272 *2	387,674 *2	951,220 *2	231,420 *2	484,688 *2
Road density (km/km2)	0.19	3.16	0.65	1.58	1.74	0.65	1.61
Road density index	0.52	5.44	3.72	3.17	5.08	1.35	3.66
Road density for primary network (km/km2)	0.003	0.144	0.027	0.191	0.047	0.115	0.153
Road density index for primary network	0.01	0.25	0.15	0.38	0.14	0.24	0.35

Sources:

*1 THE WORLD FACTBOOK, CIA

*2 World Road Statistics 2006, IRF

*3 Road Sector Study in Indonesia, 2004, JBIC

*4 Ministry of Land, Infrastructure and Transport, 2006, Japan

*5 ROADS in the PHILIPPINES 2003, JICA

*6 Ministry of Foreign Affairs, Japan

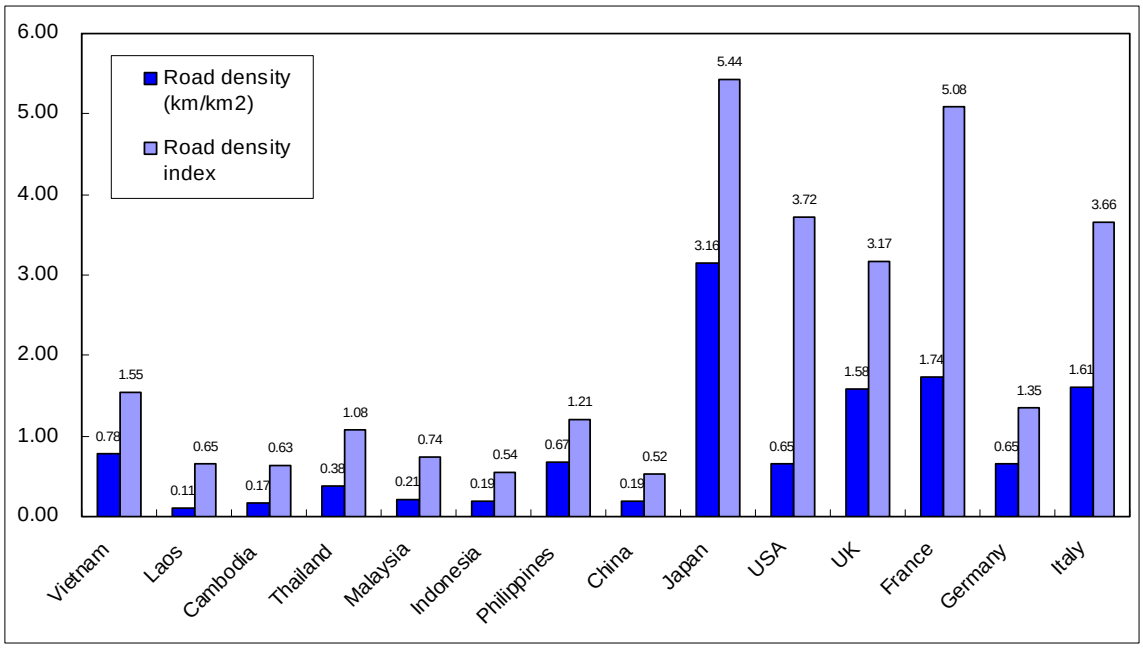
*7 Vietnam Road Administration

*8 http://laotimes.exblog.jp/3524424/

*9 The Study on the Road Network Development in the Kingdom of Cambodia, 2006, JICA

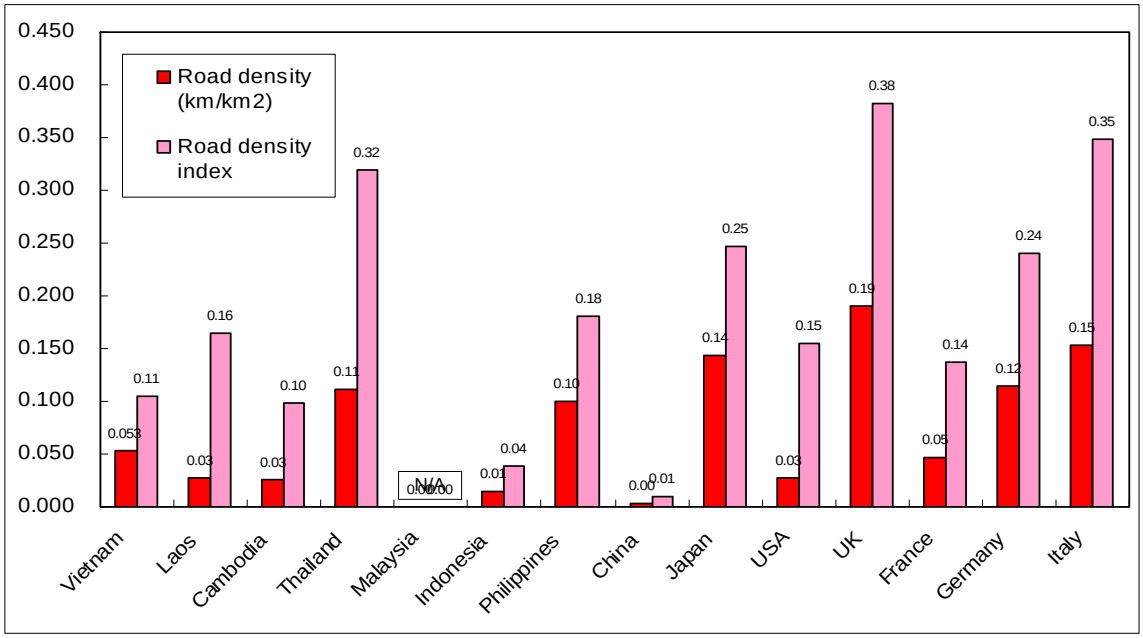
*10 http://www.mlit.go.jp/kokudokeikaku/international/sp/jp/general/pdf/05_Malaysia/05_02_jp.pdf

Figure 2.2.2 International Comparison on Road Density and Road Density Index (All Roads)



Source: Prepared by VITRANSS 2 Study Team based on the sources shown in Table 2.1.11

Figure 2.2.3 International Comparison on Road Density and Road Density Index (Primary Road Network)



Source: Prepared by VITRANSS 2 Study Team based on the sources shown in Table 2.2.4.

4) National Highways

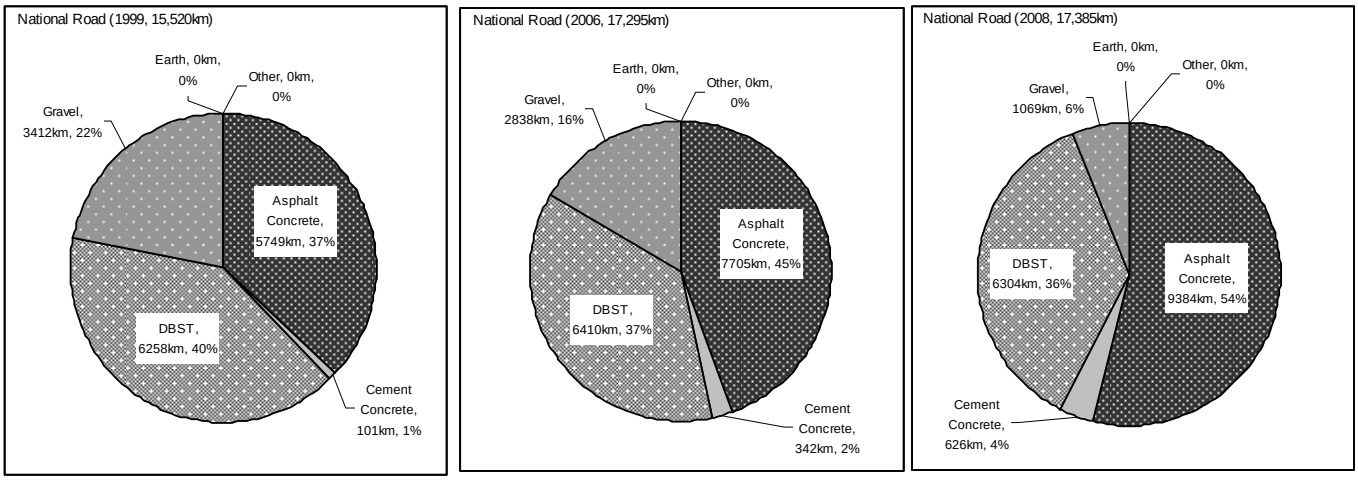
(1) Pavement Conditions

Figure 2.2.5 illustrates road length by pavement type of national highways for the years of 1999, 2006 and 2008. DBST constituted the largest share at 40% of the whole national highway network length in 1999, while asphalt concrete comprised 37%. Because of the progressive upgrading of pavement from DBST to asphalt concrete, the share of DBST has been decreasing and that of asphalt concrete has been increasing.

In addition, efforts have been made to pave gravel roads with bituminous material. Accordingly, in 2008, the length of roads paved by asphalt concrete exceeded 50% for the national highway network, and the paved ratio (including asphalt concrete, cement concrete, or DBST) increased to 95%. The remaining 5% of roads is surfaced with gravel. Unpaved sections remain mostly in northern Vietnam, inland areas and near the Cambodia border.

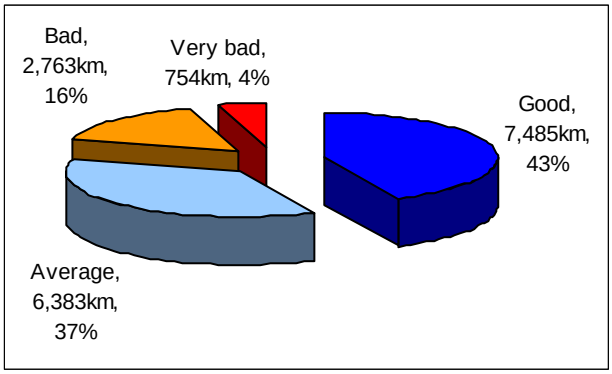
Figure 2.2.5 shows the surface conditions distribution of national highways based on MOT inventory. The surface conditions of the national highway network are still inadequate. Twenty percent (20%) of the roads are in bad and very bad condition, and only 43% are in good condition, with the remaining 37% in average condition.

Figure 2.2.4 Pavement Type Distribution of National Highways (1999, 2006 and 2008)



Source: Prepared by VITRANSS 2 Study Team based on Road Inventory provided by TDSI, MOT

Figure 2.2.5 Surface Conditions of National Highways



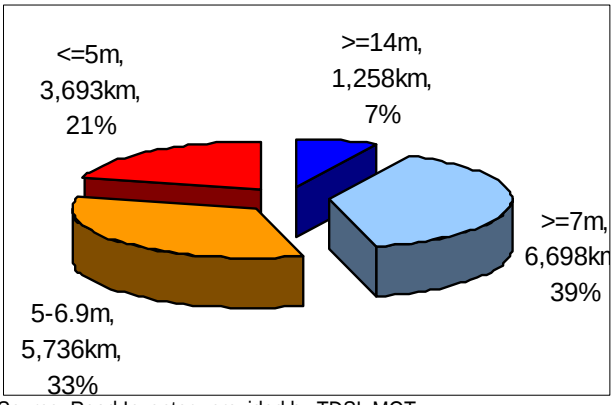
Source: Road Inventory provided by TDSI, MOT

(2) Road Width and Number of Lanes

Figure 2.2.6 shows the distribution of carriageway widths of national highways. More than 50% of the roads have a paved width of less than 7m.

Almost all national highways in Vietnam are composed of two (2) lanes (one direction one lane). These are used by a mix of vehicles—dominated by motorcycles and alongside cars, heavy trucks, buses, and bicycles—with some segments in the vicinity of cities already getting congested. With these road and traffic characteristics, 40% of traffic accidents are caused by speeding and passing when high-speed vehicles overtake low-speed vehicles and/or motorcycles. Motorcycles are involved in 70% of all road accidents.

Figure 2.2.6 Carriageway Width Distribution of National Highways



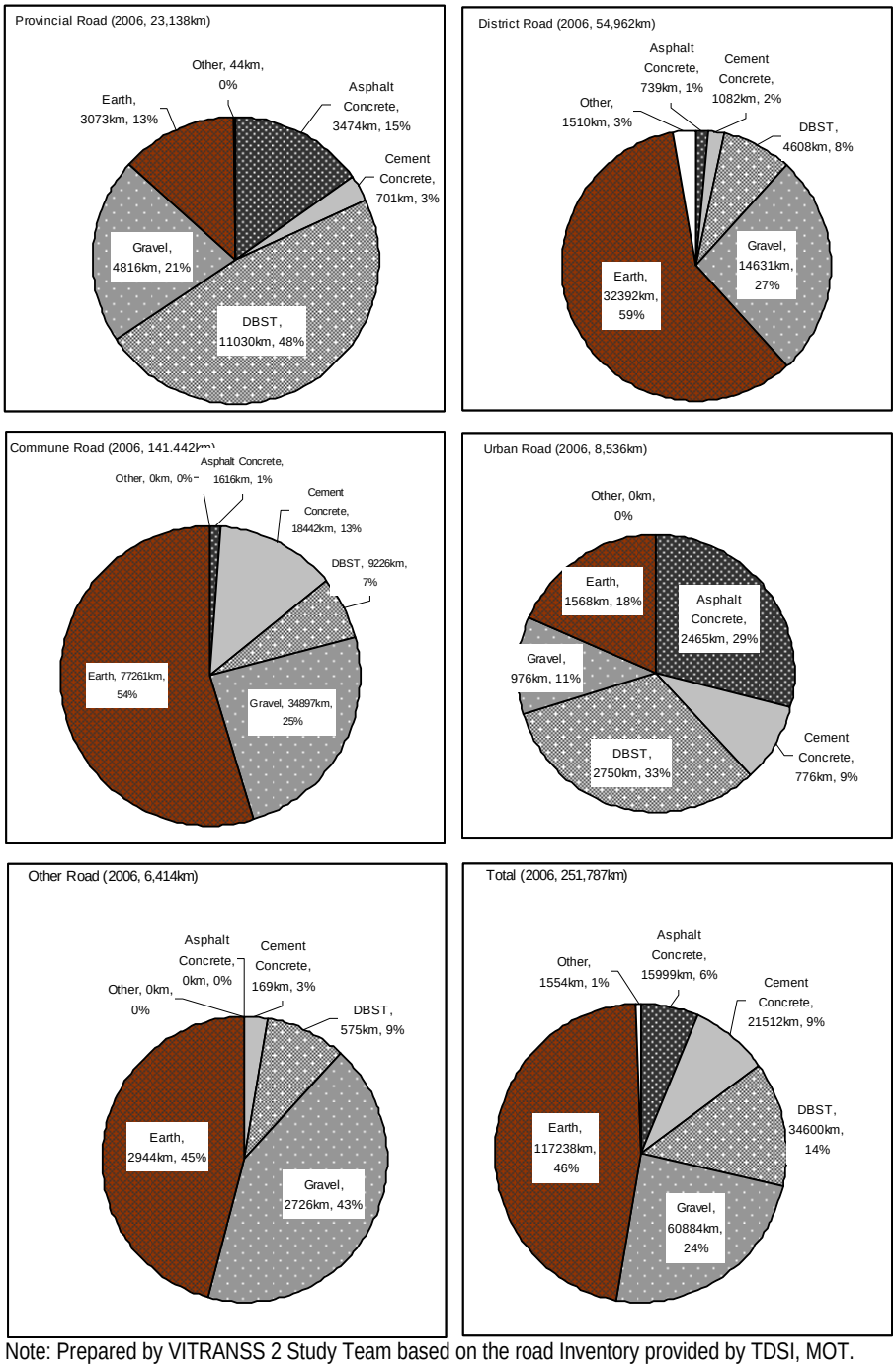
Source: Road Inventory provided by TDSI, MOT

5) Provincial Roads and Other Roads

Provincial roads (23,520km), district roads (49,823km), commune roads (151,187km), urban roads (8,492km), and other local roads (6,434km) support the national highways by playing their respective roles in the road network system in Vietnam.

However, the conditions of these local roads are considerably worse compared with national highways. Figure 2.2.7 illustrates the pavement conditions of local roads, showing deficiency in terms of paved ratio. It is essential to improve the conditions of these local roads due to their predominance in the entire road system.

Figure 2.2.7 Road Conditions of Provincial and Other Roads



Note: Prepared by VITRANSS 2 Study Team based on the road Inventory provided by TDSI, MOT.

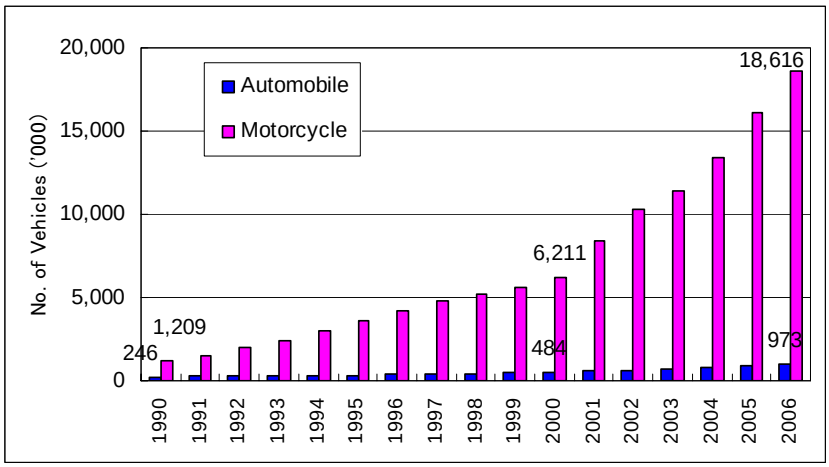
2.3 Road Transport and Traffic

1) Registered Vehicles in Vietnam

In the 1990s, the number of registered motorized vehicles rapidly increased, with high annual growth rates of 17.8% for motorcycle and 7.0% for car. The number of motorcycles and cars increased from 1.2 million and 246 thousand in 1990 to 6.2 million and 484 thousand in 2000, respectively.

This increase accelerated after 2000 due to the import of cheaper vehicles from China. The number of motorcycles and cars further increased and reached about 19 million and 1 million, with higher annual growth rates of 20.1% and 12.3%, respectively. In 2006, the vehicle ownership rates were 220 motorcycles and 12 cars per 1,000 persons. In HCMC and Hanoi, ownership rates of car and motorcycle per 10,000 persons were calculated at 37 cars and 548 motorcycles in HCMC and 41 cars and 349 motorcycles in Hanoi. Using HCMC and Hanoi as benchmarks, the vehicle ownership level of Vietnam is expected to continue to increase as average income increases in the future.

Figure 2.3.1 Number of Registered Vehicles (2006)



Source: Progress Report of The Study on National Road Traffic Safety Master Plan in the Socialist Republic of Vietnam

2) Motorization

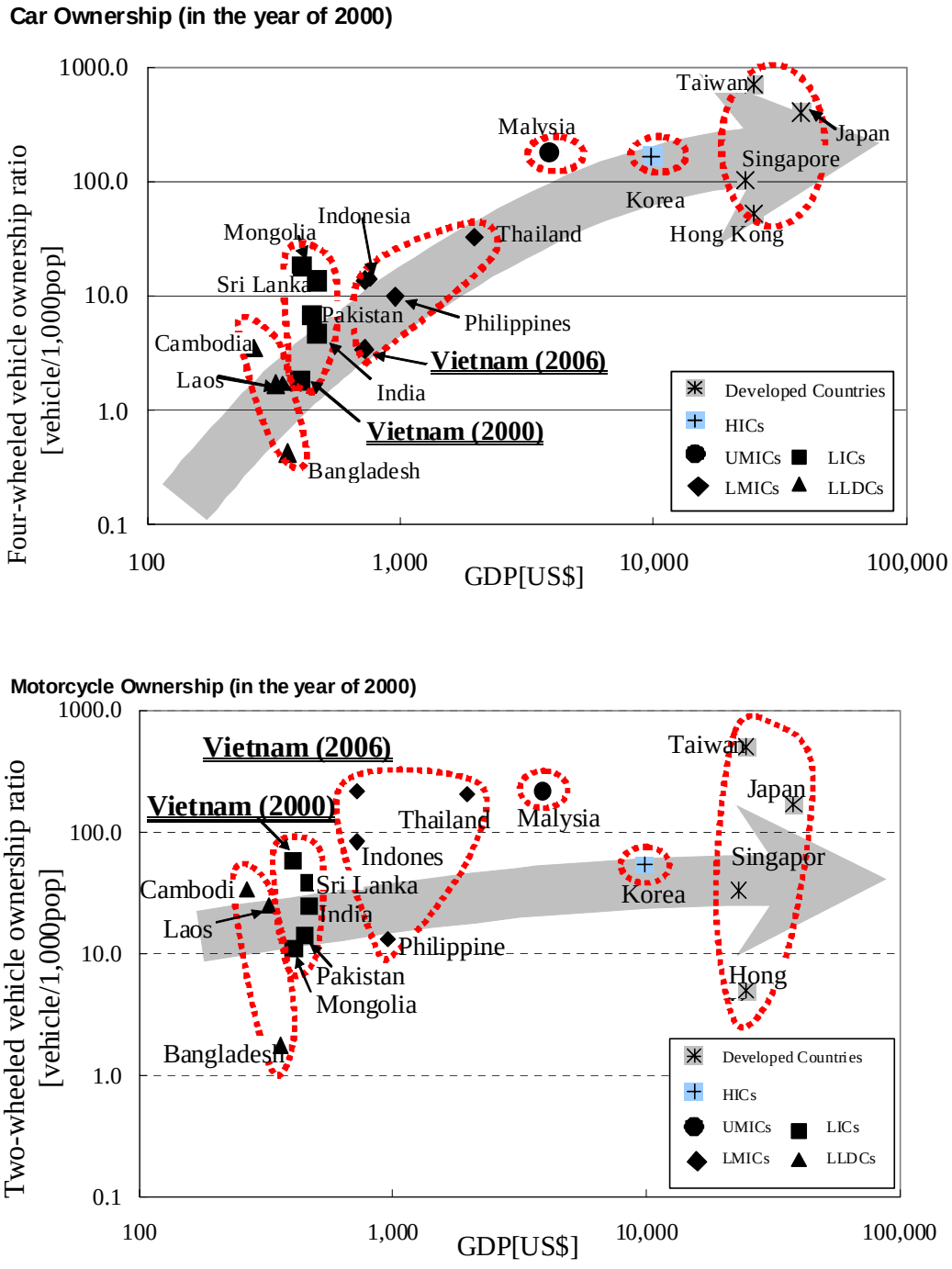
Parallel to population growth, motorization has made rapid progress, too. Vehicle ownership, particularly that of motorcycle, has increased sharply. As of 2006, there were 286 thousand cars and 17,901 thousand motorcycles in Vietnam, which increased from 142 thousand and 4,496 thousand, respectively. In the period of 2000-2006, the number of cars and motorcycles has increased with 24 thousand and 2,234 thousand or at an average annual growth rate of 12.4% and 25.9%, respectively. On the other hand, the number of motorcycles has increased with an annual growth rates of 17.8% in the 1990's. The motorcycle growth rate of 2000-2006 has increased rapidly, posing a threat to smooth traffic flow in some locations. This figure Rapid economic growth at a rate of 10.3% per year from 2000 to 2006 is expected to further accelerate ownership of private vehicles such as motorcycles and cars.

Table 2.3.1 Number of Vehicles in Hanoi by Type

Vehicle Type	No. of Vehicles ('000)		Annual Growth	Ownership Per '000 Persons	
	2000	2006		2000	2006
MC	4,496	17,901	25.9%	57.9	215.2
Car	142	286	12.4%	1.8	3.4
Total	4,638	18,187	25.6%	59.7	218.6

Note: Prepared by VITRANSS 2 Study Team based on various sources

Figure 2.3.2 International Comparison of Vehicle Ownership and Per-capita GRDP



Note: Prepared by VITRANSS 2 Study Team based on various sources

3) Road Traffic

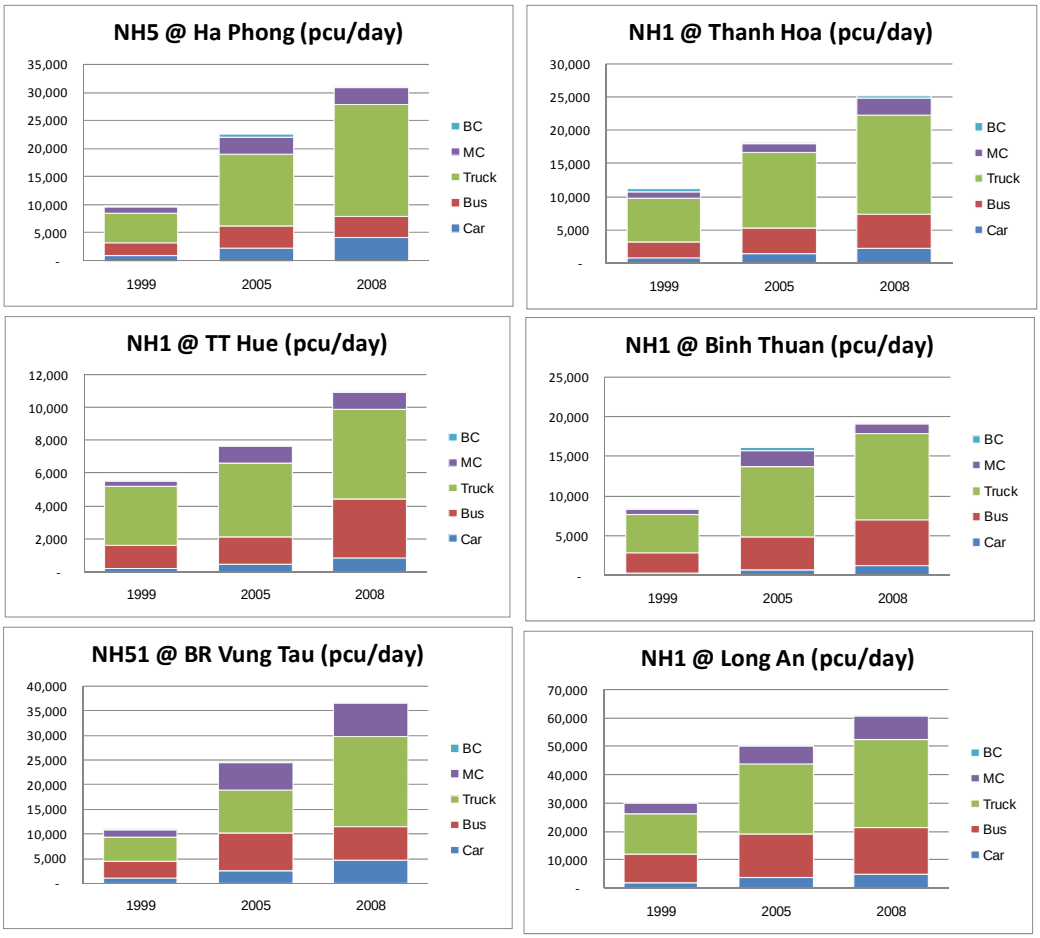
Road accounts for much of interprovincial passenger traffic, i.e., 85% and 63% in terms of passengers and passenger-kilometers, respectively. In interprovincial freight traffic, the share of roads is 68% in terms of tonnage and 15% in terms of ton-kilometers. From 2000 to 2006, road traffic demand increased by 12% and 17% p.a. (for both pax-km and ton-km, respectively) (source: Vietnam Statistical Yearbook 2007). It is therefore not surprising that congestion levels have significantly risen not only in urban centers but also on major inter-city links, such as NH1, NH5, and NH18 (see Figure 2.3.2). Furthermore, there has been a significant growth in truck traffic, contributing significantly not only to congestion but also to accelerated deterioration of pavements.

In the northern region, the highest traffic is along the National Highway (NH) No.1 corridor, the Hanoi – Hai Phong corridor, and along the periphery of Hanoi up to a 50km radius. In particular, the NH1 and NH5 corridors experienced significant growths in vehicular traffic, and this was mostly brought about by the rapid increase in truck traffic.

In the case of the central region, traffic is comparatively low, even along the NH1 corridor. However, the results of the traffic survey indicated that growth was accelerating. Expectedly, growth in the periphery of Danang was particularly strong, and traffic was highest there as well. The growth in truck in central Vietnam was likewise a key factor, as it was in the north. However, a big share of the growth in traffic was the increase in motorcycle traffic.

Traffic in the southern region features the section between HCMC and Dong Nai as the road section with the highest interprovincial traffic volume in the country. Overall road traffic increased sharply and even some sections showed signs of accelerated growth. Truck traffic is the source of traffic growth, although motorcycle traffic is likewise a strong contributor.

Figure 2.3.3 Road Traffic on Selected Road Sections



Sources: 1999 data, VITRANSS; 2005 data (VITRANSS Follow-up study); and 2008 (VITRANSS 2).

2.4 Road Development Administration and Funding

1) Institutions

The principal governing law for road transportation is the Law on Road Traffic (No. 26/2001/QH10) enacted by the National Assembly on 29 June 2001 and was adjusted revised and enacted by resolution Nr.23/2008/QH12 dated November, 13, 2008 and just in effect on July, 1, 2009. It contains provisions on road infrastructure and road use. The six administrative classifications of roads are set out in this document, including responsibilities for their financing and management. The Government Decree No. 186/2004/ND-CP regulated the management and protection of road transport infrastructure .Its key provisions include technical standards for the different road classes, principles for planning and project approval, regulations to govern BOT schemes for roads, acquisition of land, and environmental assessment.

The MOT charter is contained in Government Decree No. 51 /2008/ND-CP, dated 22.04.2008 (replaced degree Nr. 34/2003/ND-CP). The creation of the VRA is set out in MOT Decision No. 3525/1998/QD-BGTVT, while that of the Vietnam Expressway Corporation (VEC) is in the MOT Decision No. 3033/QD-BGTVT issued in October 2004. According to the Decree No. 51/2008/ND-CP on regulating the function, tasks, responsibilities, power and organizational structure of MOT, the VRA became General Road Administration (GRA).

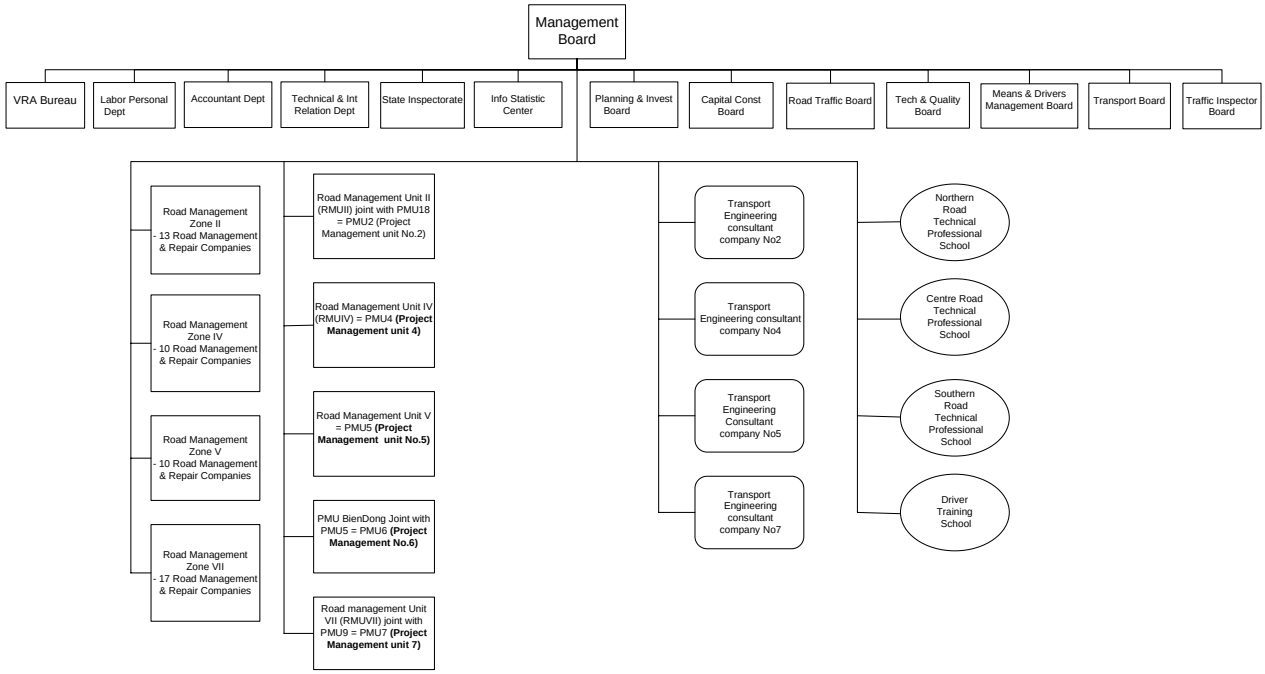
In recognition of the importance of transportation safety, MOT Decision No. 4134/2001/QD-BGTVT established a nationwide vehicle inspection system covering 4-wheel vehicles, while the National Traffic Safety Committee (NTSC) was created, because of the increasing important role of traffic safety.

The planning and development of all national roads rest with the GRA, one of many semi-autonomous modal agencies under the Ministry of Transport. Its internal organizational structure is shown in Figure 2.4.1. Actual execution of road functions is decentralized into four (4) geographical zones. Likewise, the construction of roads is managed by four project management units, and the maintenance delegated to four management and repair companies. The engineering design is delegated also into four consulting companies. The actual construction work on national roads is contracted out to several domestic construction companies, most of whom are SOEs attached to the MOT and to provincial governments. The MOT has over 200 SOEs, with 100 of them devoted to construction.

Previously, the GRA also had freight and passenger transportation companies under its wing, although all these companies were moved to VINAMOTOR. They operate like private companies getting paid for services rendered to clients. It is estimated that the market share of freight companies is less than 5%, and generally provide fixed-rate, subsidized services in mountainous and low-income regions.

VEC is a fully State owned Enterprise under MOT. VEC was established in October 2004 to develop the expressways by means of diversified investment capital including concessions of toll plaza. By 2008, VEC reported to have built 369km of expressways with a total investment of VND43 trillion (USD2.5 billion), including the first phase of the Cau Gie–Ninh Binh expressway worth VND8 trillion (USD500 million), the VND20 trillion (USD1.25 billion) Ha Noi–Lao Cai project and the VND15 trillion (USD937.5 million) HCM City–Long Thanh- Dau Giay projects. ADB is providing technical assistance for the last-mentioned project. VEC is also reportedly preparing for the construction of other expressways including Ninh Binh–Thanh Hoa and Hanoi–Lang Son, Ha Long–Mong Cai and Ben Luc–Long Thanh lines which have a combined length of 370km and a cost of VND35 trillion (USD2.3 billion).

Figure 2.4.1 Organization of the General Road Administration



Source: VITRANSS 2 Study Team

2) Funding

Road development is mainly funded by the "Government Fund and Bond Issue". All budgets for road development are controlled by the Ministry of Finance (MOF). Recently, the National Assembly approved a road traffic law. One clause of this law (clause 49, section 1) regulated to establish a Road Maintenance Fund. The detailed structure and system to make this fund operational are being prepared, which include specifying sources and utilization of the fund.

The capital and operating expenses of the GRA, as well as its four regional offices, mainly come from the State budget. Direct user charges are still minor and limited to tolls collected on bridges and roads. Most of the road infrastructure projects were funded from a combination of ODA, State budget, and bond issue. About 23% of investments came from ODA during the period 2000–2005 (see Table 2.4.1).

Historically, roads have gotten the bulk of the budget for infrastructure (see Table 2.4.2), equivalent to 1.0–1.5% of the GDP, which the GRA wants to raise to 3.0–3.3%.

Table 2.4.1 Investment in the Transportation Sector, 2001–2005[1)]

Fund Source	Whole Country 2001–2005[2)]	%	MOT 2001–2005[3)]	%
1. State Budget	42,149	35.2	18,312	28.7
2. State Credit	6,780	5.7	7,026	11.0
3. ODA	27,798	23.2	15,777	24.8
4. Government Bond	13,899	11.6	17,329	27.2
5. SOEs	4,746	4.0	3,294	5.2
6. FDI	5,876	4.9	n.a.	-
7. Private Sector Capital/BT/BOT	18,645	15.6	2,000	3.1
Total	119,893	100.0	63,738	100.0
% against GDP, current prices	3.89		2.10	

1) In billion VND at current prices.
2) Converted from the 2001 price, Socio-Economic Development Plan (SEDP), 2006-2010, MPI, November 22 2006
3) 4823/BGTVT-KHDT dated 09/08/2005.

Table 2.4.2 Investment Allocation by Transportation Mode of Government Fund

Subsector	1999	2000	2001	2002	%
Roads	4946	5272	5112	7182	82.8
Railways	389	568	867	273	7.7
Waterways	178	141	212	282	3.0
Ports & Shipping	142	139	170	247	2.6
Airways	50	80	75	278	1.8
Others	196	190	146	43	2.1
Total Transportation	5,901	6,390	6,582	8,305	100.0
National GDP	399,942	441,646	481,295	535,762	
Transportation/GDP (%)	1.48	1.45	1.37	1.55	1.46

Sources: Ministry of finance (Public expenditure review for transportation/ 2004WB)

3) Laws and Regulations

In the last decade, most laws and regulations related to road and road transportation were revised, while many were newly established (tables 2.4.3 and 2.4.4). Recent developments in terms of technical standards are as follows:

(i) TCVN 4054: 2005 which provides geometric standards for highways in accordance with technical classification;

(ii) TCVN 5729-07, Freeway/Expressway Specification for Design, stipulates standards for expressways; and

(iii) TCXDVN 104-07 sets design standards for urban roads.

Table 2.4.3 Laws Related to Road Construction

No.		Title	Code
Law	1	Law on Land	13-2003-QH11
	2	Law on Construction	16-2003-QH11
	3	Law on Land Road Traffic	23 2008-QH12
	4	Law on Fire Prevention and Fighting	27-2001-QH10
	5	Electricity Law	28-2004-QH11
	6	Law on Cultural Heritage	29-2001-QH10
	7	Law on Protection of the Environment	52-2005-QH11
	8	Law on Investment	59-2005-QH11
	9	Law on Enterprises	60-2005-QH11
	10	Law on Tendering	61-2005-QH11
	11	Law on Standards	8-2006-QH11
Decree	1	Management of Investment Project	112-2006-ND-CP
	2	Implementation of the Law on Standards	127-2007-ND-CP
	3	Management of Investment Project	16-2005-ND-CP
	4	State Management over Products and Goods	179-2004-ND-CP
	5	Quality Management of Construction Works	209-2004-ND-CP
	6	Urban Underground Construction	41-2007-ND-CP
	7	Recruitment & Management of Foreigners	4-2008-ND-CP
	8	Implementation of the Bidding Law	58-2008-ND-CP
	9	Construction Investment Activities	59-2007-NQ-CP
Decision	1	Working Regulation of State Council	04-2007-QD-HDNTNN
	2	Railway Master Plan to 2020	06-2002-QD-TTg
	3	Foreign Standard	09-2005-QD-BXD
	4	HCMC Transport Master Plan	101-QD-TTg
	5	Approve Investment Project Report of Line1	1453-QD-UBND
	6	Standard Application	25-2005-QD-BGTVT
	7	Ha Noi Regional Master Plan	490-QD-TTg
	8	Relics_29-10-1957	519-QD-TTg
	9	State Council for Pre-acceptance Test	68-2006-QD-TTg
	10	Approval of Standard	77-QD-UBND
	11	Management & Implementation of UXO	96-2006-QD-TTg
Circular	1	Inspection & Certification of Quality Conformity	11-2005-TT-BXD
	2	Urban Greenery Management	20-2005-TT-BXD
	3	_Contracts in Construction Activities	06-2007.TT-BXD
	4	Formulation & Application of Standards	21-2007-TT-BKHCN
	5	Guiding the Implementation of Tax Policy and Tax Incentives for Programs and Projects Funded with Official Development Assistance (ODA)	123-2007-TT-BTC
	6	Recruitment & Management of Foreigner	08-2008-TT-BLDTBXH
	7	Adjustment of Construction Price	09-2008-TT-BXD
	8	National Railway Infrastructure Charge	21-2008-TT-BTC

Table 2.4.4 Standards and Specifications Related to Road Construction

No.		Title	Code
Survey Standards	1	Calculation of flood and current properties	22TCN 220-95
	2	Standard for Environmental Impact Assessment for transport projects	22TCN 242-98
	3	Standard for soil investigation drilling	22TCN 259-2000
	4	Standard for soil investigation for waterway projects	22TCN 260-2000
	5	Standard for highway survey	22TCN 263-2000
	6	Standard for topographical mapping	96TCN 43-90
	7	Technical grading of inland river waterway	TCVN 5664-92
Design Standards	1	Standard for tunnel design	11TCN 19-84
	2	Piles foundation - Design Standard	20TCN 21-86
	3	Standard for soil investigation and treatment design for embankment stabilization	22TCN 171-87
	4	Standard of bridge and culvert design based on limit state (applied for culverts design)	22TCN 18-79
	5	Standard for design of rural roads (applied for connections, collector roads)	22TCN 210-92
	6	Standard for design of flexible pavement	22TCN 211-06
	7	Transport projects in areas with earthquakes - Design Standard	22TCN 221-95
	8	Standard for design of rigid pavement	22TCN 223-95
	9	Regulations of highways signs	22TCN 237-01
	10	Standard for soft soil treatment design with PVD	22TCN 244-98
	11	Geo-textile fabric in construction of embankment on soft soil	22TCN 248-98
	12	Standard bored piles-design, construction and inspection	22TCN 257-2000
	13	Standard for survey and design of highway embankment on soft soil foundation	22TCN 262-2000
	14	Prestressed concrete anchor T13, T15, & D13, D15	22TCN 267-2000
	15	Bridge design standard	22TCN 272-05
	16	Highway Design Specifications	22TCN 273-01
	17	Signs in Expressways	22TCN 331-05
	18	Design of drainage network outside the project site	22TCN 51-84
	19	Highways - Design Standard (applied for connections, collector roads)	TCVN 4054-2005
	20	Procedure of establishing the organization construction and planning design	TCVN 4252-88
	21	Expressways - Design Specifications	TCVN 5729-2007
	22	Standard for design of urban roads and streets	TCXDVN 104-2007
	23	Standard for artificial lighting design for highways, urban roads and streets	TCXDVN 259:2001
	24	Steel structures-technical specifications	TCXDVN 338-2005
	25	Concrete and reinforced concrete structures-design standards	TCXDVN 356-2005
	26	Concrete and reinforced concrete structures-design specifications for earthquakes	TCXDVN 365-2005
Testing Standards	1	Specifications for dense bitumen - Technical specifications and method for testing	22TCN 297-01
	2	Method for Constructing and Checking Laterite Material	22TCN 304-03
	3	Technical specifications and method for testing Polymer bitumen	22TCN 319-04
	4	Procedure for Cone Penetration Test (CPT and CPTU)	22TCN 320-2004
	5	Aggregates for Road Specifications	22TCN 334-06
	6	Method for Determination of Physical-mechanical Properties of Rock	22TCN 57-84
	7	Procedure of cement concrete testing	22TCN 60-84
	8	Procedure of water testing in traffic construction	22TCN 61-84
	9	Standard for plant	529/BXD/VTK-19 97
	10	Reinforcement - Part 2 - Hot rolled round steel	TCVN 1651-2:2008
	11	Load and impact	TCVN 2737-95
	12	Soil - Laboratory Method of Determination of Shear Resistance in a Shear Box	TCVN 4199-95
	13	Aggregates for Concrete and Mortar Specifications	TCVN 7570:2006
	14	Aggregates for Concrete and Mortar Test methods	TCVN 7572-1:2006- TCVN 7572-20:2006
Supervision Standards	1	Technical survey for piles foundation construction and design	20TCN 160-87
	2	Geodesic work in project construction - General Requirements	TCXDVN 309-2004

2.5 Road Construction

1) 5 Ms of Construction

Road construction involves the 5 Ms, that is, man (labor), machine (construction equipment), materials (construction materials), method (construction technology), and money (funding). Land acquisition, however, remains a significant bottleneck. These aspects are reviewed below.

(1) Man (Labor)

With the rapid increase in construction projects in Vietnam, the number of skilled labor is constantly in short supply. On the other hand, unskilled labor can be sourced easily from project area vicinities.

(2) Machine (Construction Equipment)

In the last decade, thousands of pieces of construction equipment, although mostly second-hand, were imported from other countries. Mobilization time for construction equipment to project sites is now much more improved.

(3) Material (Construction Materials)

Northern and central Vietnam have a high potential for providing the necessary amount of materials for construction, particularly aggregates. However, the provision of aggregates is seriously short in southern Vietnam, especially in the Mekong Delta Region. Aggregates are imported from Cambodia or hauled from faraway mountainous areas which incur high transportation costs.

Regarding metal materials, there was a shortage of these all over the world in summer 2008 and the price hike was serious in all projects. The unit price of metal materials is approximately 30% higher in 2009 than in 2007.

(4) Method (Construction Technology)

Over the last decade, several new construction technologies were introduced in Vietnam.

(a) Roads

(i) **PHD (Prefabricated Horizontal Drain):** Like SBD (super board drain), PHD is a horizontal drain method recently getting popular as a substitute for sand mat because sand is costly nowadays.

(ii) **Vacuum (Consolidation) Method:** “Vacuum + PVD” introduced recently to accelerate the consolidation process of soft ground under the road. This will be popular for road construction in the Mekong Delta Region.

(b) Bridges

(i) **Cable-stayed Bridge:** Introduced through the My Thuan Bridge Construction Project completed in 2003, the construction of cable-stayed bridge is getting popular and the number of such bridges is increasing.

(ii) **Super-Tee Girder:** Introduced through the My Thuan Bridge Construction Project completed in 2003, it has become a standard girder for long bridges with multiple spans.

(iii) **Suspension Bridge:** Thuan Phuoc Bridge over the Han River in Danang City, the first suspension bridge in Vietnam was constructed and now in operation.

(c) Tunnels

(i) **NATM (New Austrian Tunneling Method):** Introduced through the Hai Van Tunnel Construction Project completed in 2005.

(ii) **Immersed Tunnel:** Thu Thiem Tunnel, the first immersed tunnel in Vietnam, is now under construction in HCM City.

(5) Money (Funding)

Road construction has historically been allocated a big share of the transportation development budget; it is expected that roads will continue to receive the same priority in the future. In 2008, the total amount was around USD2 billion. Funds will be sourced from the state budget, ODA, and private investment. Table 2.5.1 lists the approved BOT projects.

Table 2.5.1 List of BOT Projects Approved by MOT

No.	BOT Project Name	BOT Company	Features	Status
1	(NH1A) Thanh Hoa City Bypass Construction Project:	BITEXCO	Length: 9.98km Cost VND822 billion	Under Construction
2	(NH1A) Ha Tinh Town Bypass Construction Project	Song Da	Length: 16.327km Cost: VND353 billion.	Under Construction
3	(NH1A) Dong Hoi City Bypass Construction Project		Length: 19.3km Cost: VND417 billion.	Under Construction
4	(NH1A) Hoa Cam – Hoa Phuoc Section Project		Length: 8.405km Cost: VND330 billion.	Under Construction
5	(NH2) Vinh Yen City Bypass Construction Project		Length: 10.6km Cost: VND409 billion.	Under Construction
6	(NH1A) New Dong Nai Bridge Construction Project	CC1		Under Construction
7	Hanoi – Hai Phong Expressway Construction Project	VIDIFI	Length: 105km Cost: VND21,888 billion.	Under Construction
8	NH10 Widening (Tan De Br – La Uyen Br) and Improvement Project	TASCO	Length: 5.5km.	Under Negotiation
9	(NH1A) Phan Rang City - Thap Cham Bypass Widening Project	Construction JSC No.577 and HCM CII	Length: 8.3km.	Feasibility Study
10	(NH1A) Widening of Dong Ha Town – Quang Tri Town	Truong Thinh Construction Company	Length: 13.74km. Cost: VND482 billion	Feasibility Study

2) Land Acquisition

Land acquisition for road construction projects is getting to be a serious issue, to wit:

(i) The unit price of land has increased considerably, doubling or tripling in the last decade. As a result, the land acquisition process has taken longer and adversely affected the implementation of projects, and

(ii) Some road construction projects commenced without proper land acquisition. It resulted in stalled construction works.

2.6 Road Operation and Maintenance

1) General

It was confirmed that the MOT/GRA has serious concerns on operation and maintenance (O&M) of the road subsector, not only of expressways but also of regular or ordinary road networks.

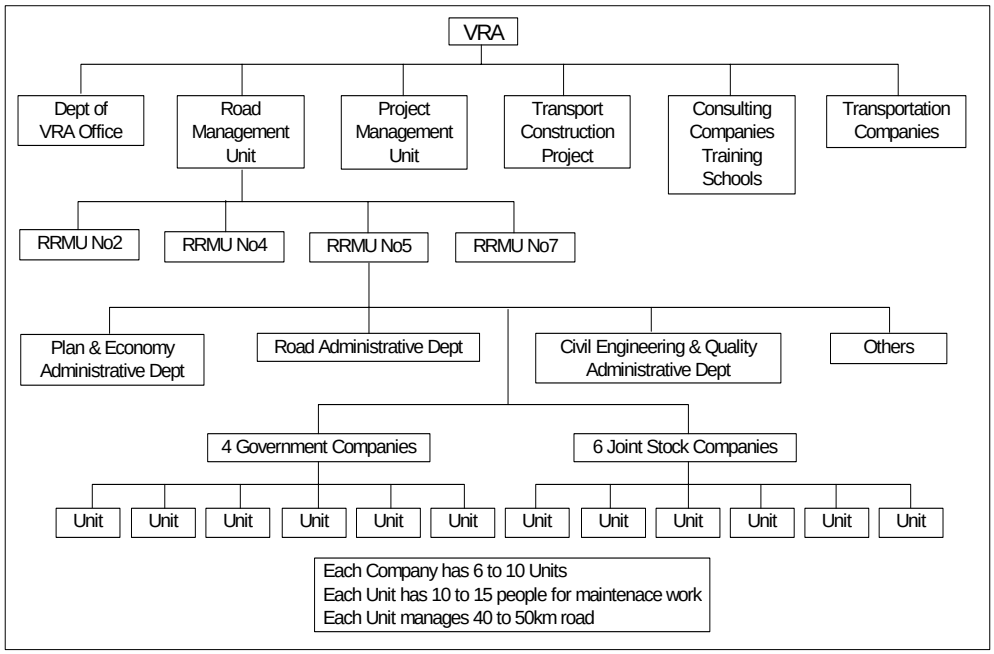
In the past, the design load for bridges was 8 tons; accordingly, all bridges and pavements were built to bear this load. However, in the last decade, heavier industrial trucks have started to be used. Consequently, many bridges and pavements have been damaged and have quickly deteriorated.

2) O&M Organization

(1) National Highways

The GRA is responsible for the O&M of national highways, and the organization is as shown in the figure below. Four (4) regional road management units (RRMUs) cover the whole country.

Figure 2.6.1 O&M Organization Chart of the GRA



Source: JETRO Study, 2007

(2) Expressways

As of February 2009, there was no expressway open to the public yet; therefore, no O&M organization for an expressway exists in Vietnam. Possible options for expressway O&M are as follows:

(i) Directly managed by the MOT;

(ii) Through an O&M subsidiary company established under the MOT; or

(iii) Through an O&M concession.

3) O&M Funding

O&M funds for national highways are provided in the annual government budget. The GRA reported that the allocated amount is insufficient, and thus the RRMUs cannot perform satisfactory road maintenance.

The funds for maintenance of national roads in Vietnam constitute only 10% of the total road budget in 2006. This could cover only about 40% of the estimated maintenance needs.

Recently, the National Assembly approved a law to establish a Road (Maintenance) Fund. The detailed structure and system to make this fund operational are being prepared, which include specifying sources and utilization of the fund.

4) O&M Standards

(1) National Highways

There are two standards for the maintenance of national highways: one is “Technical Standards for Road Routine Maintenance,” and the other is “Road Maintenance Routine Standards.”

The first defines the items for road inspections, procedures for pavement repair, and quantitative technical standards such as the international roughness index (IRI). The second provides the frequency of road patrol and inspections of different types of road, frequency of road or waterway cleaning, and quantitative standards for road repair.

During maintenance work, some traffic regulations, such as those on lane use, are also implemented, and the standards for these are provided in the “Regulations of Road Signals.”

(2) Expressways

As of February 2008, there were no standards for O&M of expressways.

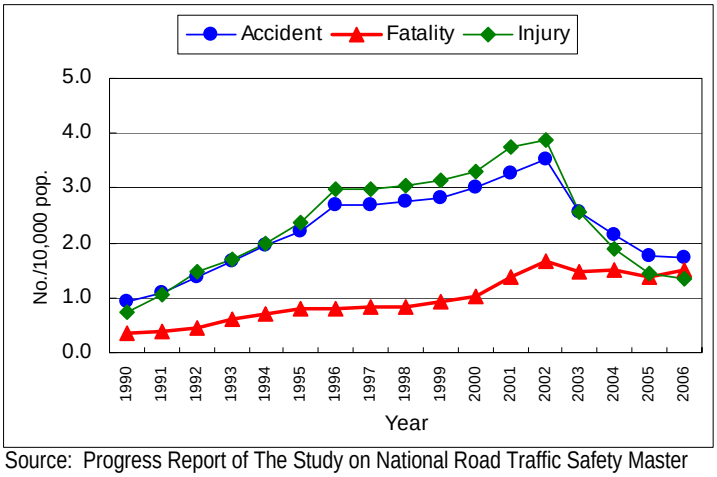
2.7 Traffic Safety

1) Road Traffic Accidents in Vietnam

In 2006, there were 14,727 road traffic accidents which resulted in 12,757 fatalities and 11,288 injuries. Road traffic accidents increased rapidly from 1990 to 2002, the peak year of traffic accidents, with an annual increase rate of 13.5%. During this 12-year period, the number of fatalities increased 5.8 times. The number of accidents, fatalities, and injuries reached 27,993, 13,186 and 30,999, respectively. After 2003, the number of traffic accidents and injuries dramatically fell, although the number of fatalities remained high and relatively constant at around 12,000 per year.

Figure 2.7.1 shows the fluctuations of the indices of traffic accidents per 10,000 persons. Rates of accidents and injuries increased until 2002, but decreased after by less than 2 per 10,000 persons. However, the fatality rate was still high, at about 1.5 per 10,000 persons. In comparison, the fatality rate in Japan is 0.7 per 10,000 persons, which is half of the rate in Vietnam.

Figure 2.7.1 Road Traffic Accidents per 10,000 Population, 1990 2006



Source: Progress Report of The Study on National Road Traffic Safety Master Plan in the Socialist Republic of Vietnam

2) National Traffic Safety Program

The proposed National Traffic Safety Program (NTSP) for the period 2001-2005 was approved and implemented as the "Scheme to Ensure Traffic Safety Order 2001-2005." With numerous efforts, traffic accidents seemed to be under control; but the results were still unstable and the number of traffic accidents, especially the number of fatalities, was still high. Consequently, the government through Directive No.22/CT/TW instructed the NTSC to formulate an NTSP for the period 2006 2010 and a traffic safety strategy up to 2020.

3) Traffic Safety Organization

The Prime Minister issued Directive No. 718/TTg, dated 1 September 1997, establishing the National Traffic Safety Committee (NTSC) to coordinate all efforts on traffic safety improvement in lieu of the Inter-ministerial Central Steering Committee on Traffic Safety. The core team of the NTSC is a Standing Board with members accorded ministerial status. This Board carries out regular meetings to comply with the NTSC's function as an advisory board.

Based on the NTSC's Official Letter No. 160/UBATGTQG dated 22 July 1998, the Provincial Traffic Safety Committees (PTSC) was established to coordinate traffic safety activities as well as monitor and report to the NTSC traffic safety conditions in local areas.

4) Traffic Safety Management

Major traffic safety management includes black spot treatment and traffic safety audit. In addition, several technical cooperation projects are underway.

(1) Black Spot Treatment

The regulation of black spot treatment was issued by MOT through Decision No.13/2005/QD-BGTVT dated February 02, 2005, as summarized in Table 2.7.1. With MOT's issuance of its directive for black spot treatment, the GRA has regularly conducted black spot identification and has taken measures for black sport treatment. Such actions are performed by RRMUs and the provincial departments of transport, which are assigned the operational management of national roads.

Table 2.7.1 Major Contents of MOT's Black Spot Treatment

Item	Content
Definition of Black Spot	Black spot is a dangerous position, either a road section or a road intersection, where traffic accidents often occur.
Criteria of Determination	Determination of black spot is based on the frequency of and degree of loss due to an accident situation that occurs in one year: 1) 2 serious accidents (causing fatality), or 2) 3 accidents or more, in which there is 1 serious accident, or 3) 4 accidents or more resulting only to injuries.
Responsible Agency of Implementation	- GRA is responsible for guiding implementation of black spot treatment. - for National Road : GRA or Provincial Transport Department / Provincial Transport and Public Works (if assigned for management) - for Local Roads : Provincial Transport Department / Provincial Transport and Public Works - for BOT Road : Owner - for road undergoing repairs or rehabilitation: Project owner / investor
Implementation Procedure	Step-1 : Determining and primary classifying priority order Step-2 : Initial site inspection Step-3 : Collecting additional data and conducting analysis Step-4 : Conducting second site inspection for determining cause Step-5 : Selecting overcoming solutions Step-6 : Responsibility of black spot organization Step-7 : Realizing treatment of black spot Step-8 : Monitoring and evaluating result of treatment

Source: Decision No.13/2005/QD-BGTVT by MOT (02/February/2005)

(2) Traffic Safety Audit

Through Decision No.23/2007/QD-BGTVT dated 7 May 2007, the MOT decided to implement a traffic safety audit to identify and improve potential safety hazards. The outline of the safety audit is summarized in Table 2.7.2. The traffic safety audit is to be conducted under Vietnam Road Safety Project Phase-1 and will be a key component of an integrated Road Safety Management System (RSMS).

Table 2.7.2 Outline of MOT's Road Traffic Safety Audit

Item	Content
Implementation Stage	One or similar of the following stage: (1) Investment report (pre-F/S) preparation stage, (2) F/S report preparation stage, (3) Detailed design stage, (4) Construction stage, (5) Operation stage
Audit Group	Independent consultant or person from design consulting group, supervision consultant, contractor, and project owner.
Responsible Agency of Implementation	New construction / upgrading / improvement project : Project owner After operation : Road management agency
Audit Procedure	Step-1 : Decision to conduct safety audit by responsible authority Step-2 : Selection of audit organization Step-3 : Supplying related documents to audit organization to study Step-4 : Site survey by audit organization Step-5 : Preparation of safety audit report Step-6 : Evaluation of the audit report Step-7 : (New construction / Upgrading / Improvement Project) Modifying design or adjusting construction and final certification for completion of safety audit, (After operation) To allocate budget for modification / improvement works
Audit Cost	New construction / upgrading / improvement project : To be included in investment budget After operation : Road management agency : To be allocated from annual maintenance budget

Source: Decision No,23/2007/QD-BGTVT by MOT (07/May/2007)

(3) Technical Cooperation Projects

In addition to the above initiatives of the MOT, the following ODA-supported traffic safety management projects are being implemented as of February 2009:

(i) Word Bank's "Vietnam Road Safety Project" (VRSP);

(ii) ADB's "National Road Action Plan";

(iii) JICA's "The Project for Traffic Safety Human Resource Development in Hanoi";

(iv) JICA's "The Study on National Road Traffic Safety Master Plan in the Socialist Republic of Vietnam"; and

(v) JBIC's "Traffic Safety Improvement Project"

2.8 Intelligent Transportation System (ITS)

Intelligent transportation systems (ITSs) will provide advanced services to road users using a communications network. An ITS includes road traffic information/control system and electronic toll collection system as primary components. The present conditions of these two systems in Vietnam are described below.

1) Road Traffic Information/Control System

It has been determined that there is no road traffic information/control system yet in Vietnam. This system will allow the detection and dissemination of traffic accidents and other critical traffic conditions.

2) Electronic Toll Collection (ETC) System

In Vietnam, toll collection is operated on many bridges, tunnels, and access roads to the airports. In several toll gates, electronic toll collection (ETC) systems have been installed. These systems adopted infrared ray communication for data exchanges between roadside units and vehicles. ETCs are adopted in the following toll plazas:

(i) Binh Bridge toll plaza in Hai Phong province (ETC installed in 2 lanes in 2006);
(ii) Ha Noi Highway toll plaza in HCMC (ETC installed in 2 lanes in 2007);
(iii) Kinh Duong Vuong toll plaza in HCMC (ETC installed in 2 lanes in 2007); and
(iv) Binh Duong Boulevard toll plaza in Binh Duong province (ETC installed in 4 lanes in 2007 and additional 4 lanes in 2008).

Figure 2.8.1 Toll Gate Lanes and Monitor Screen in Management Office

Source: Oriental Consultants Co., Ltd.

Figure 2.8.2 Toll Gate Lanes and On-board Unit with Intelligent Card

Source: VITRANSS 2 Study Team

3 CURRENT POLICY, PLANS AND PROJECTS

3.1 General

National transport development strategies have been updated several times. There is considerable discussion on prioritization of investments in the country, and the consensus of investment priority has become difficult to settle, year by year, among different modes of transport. The road subsector has been given higher priority for investment. Presently many road projects, including expressways, are being formulated in the country and awaiting appropriate and timely investment decisions. The status of current policy, plans and projects in the road subsector can be summarized as follows:

(i) The Socio-Economic Development Plan (2006-2010) stipulates overall development strategy of the government. It sets key policy directions and transport development plans will align to.

(ii) Prime Minister Decision No. 412/QD-TTg dated 11 April 2007 and No. 1290/QD-TTg of Prime Minister dated 26 September 2007 describes the general policy the transport development. It enumerates projects and project cost. The investment priority is however left open.

(iii) Prime Minister Decision No. 35/2009/QD-TTG dated 3 March 2009 describes revised transport development strategy up to 2020 with a vision toward 2030. The decision states that there is a need to upgrade national highways and provincial roads to reach prescribed technical standards, to expand and build national highways with great transport demands and to build a system of expressways.

(iv) MOT submitted an updated expressway master plan to the Prime Minister on 5 November 2007 though letter No. 7056/TTr-BGTVT. The expressway network is 5,873km long, costing about 766,220 Billion VND (equivalent to 50 Billion USD). The MOT plan adjusted the ADB Master Plan (TA 4695-VIE) issued April 2007. A rough land acquisition plan was also developed. This MOT expressway master plan was approved by the Prime Minister through letter No. 1734/QD-TTg dated 1 December 2008 without major modification.

(v) There are also road master plans up to 2020 and direction to 2030 prepared by TDSI/GRA, which now was submitted to Prime Minister for approval and the ITS development plan.

(vi) The list of on-going projects and planned projects was updated in the following categories: 1) Expressway Projects, 2) Urban Street Projects, 3) Primary Road Projects, 4) Secondary Road Projects, 5) Traffic safety Projects.

3.2 Government Plans and Directions

1) Strategies and Policies

The Socio-Economic Development Plan (SEDP), which has been constantly updated, sets the overall direction of the national development, including policies in the road sub-sector. Development direction in the SEDP (2006-2010) for the road sub-sector is as follows:

(i) Complete the north-south transportation axis for major transportation modes in important economic areas.

(ii) Focus on the development of roads in the mountainous regions, the Central Highlands, and the Mekong delta.

(iii) Develop the highway system, with emphasis on developed economic zones with heavy traffic to avoid traffic congestion.

(iv) Invest more in infrastructure at international border gates, especially inland borders to facilitate faster throughputs and increase goods circulation.

(v) Complete border roads, especially the patrol roads and roads to border patrol stations, in combination with people's welfare improvement. Build up some routes for combined economic and defense purposes.

(vi) Upgrade district roads to ensure normal traffic operations year-round. Complete the construction of roads leading to communes or commune centers.

(vii) Develop rings and bypasses for big cities and towns.

(viii) Invests in traffic systems in big cities; it is expected that public transportation will be responsible for 30% of urban traffic, and will help substantially reduce traffic accidents and traffic congestion in cities.

(ix) The density of urban roads should reach 3.5–4km/km^2 and land reserved for transportation is to reach 10% of the total urban land. Build bridges over rivers for settlement and reduction of the density of traffic in cities. Upgrade or build roads in developing districts.

2) Government Decisions on Road Projects

There are two (2) Prime Minister Decisions related to the road subsector development, No.412/QD-TTg dated 11 April 2007, and No.1290/QD-TTg dated 26 September 2007 as shown in Table 3.2.1. As shown in the table, Decision 1290 shows a more comprehensive coverage, including projects for primary roads and secondary roads.

3) Expressway Master Plans

The latest expressway master plan was prepared by MOT in letter No.7056/TTr-BGTVT dated 5 November 2007. This plan was approved by Prime Minister by decision No. 1734/QD-TTg dated 1 December 2008. The total length of the expressway is 5,873km and the estimated investment amount is 766,220 Billion VND (equivalent to approximately 50 Billion USD).

Table 3.2.1 Road Projects Listed in Two PM Decisions (No. 412/QD-TTg & No. 1290/QD-TTg)

Project No.	Project	Decision 412 (Apr 2007)	Decision 1290 (Sep 2007)	Cost in 1290 (Cost in 412) (USD Mil.)
Expressway Projects	CauGie-NinhBinh (50km)	Yes	-	(441)
	Ninh Binh-Thanh Hoa (96km)	Yes	Yes	NB-TH-VI
	Thanh Hoa-Ha Tinh (157km)	Yes	Yes	960
	QuangTri-Hue (73km)	-	Yes	QT-HU-DN
	Hue-Da Nang (105km)	Yes	Yes	750
	Da Nang-Quang Ngai (125km)	Yes	Yes	755
	Quang Ngai-Quy Nhon (180km)	Yes	-	(1562)
	Nha Trang-Dau-Giay (400km)	Yes	Yes	2000
	HCMC-Long Thanh-Dau Giay (50 km)	Yes	-	(1,180)
	HCMC-TrungLuong (45km)	Yes	-	(600)
	Trung Luong-MyThuan-CanTho (82 km)	Yes	Yes	1006
	HCMC-ThuDauMot (40km)	-	Yes	125
	BienHoa-VungTau (68km)	-	Yes	325
	BenLuc-LongThanh (58km)	-	Yes	1,200
	NoiBai-LaoCai (264 km)	Yes	-	(770)
	HaNoi-HaiPhong (105km)	Yes	-	(939)
	BacNinh-LangSon (140km)	Yes	Yes	(1,400)
	NoiBai-HaLong (110 km)	-	Yes	655
	Ha Long-Mong Cai (170km)	Yes	Yes	1,000
	DauGiay-DaLat (189km)	Yes	Yes	500
Urban Street Projects	Hanoi Ring Road 3 (NoiBai-MaiDich 20km)		Yes	540
	Ring Road 3 HCMC (91km)		Yes	1,550
Primary Road Network Development Projects	Upgrading NH 18A, MongDuong-MongCai (122km)		Yes	200
	Economic axle-road: DanPhuong-PhucTho-SonTay (24km)		Yes	70
	DoXa-QuanSon highway (30km)		Yes	100
	Upgrading NH 6: BaLa-XuanMai (20km)		Yes	45
	Expanding NH 51 DongNai, BaRia-VungTau		Yes	38
	Upgrading NH 14: DongXoai-ChonThanh (34km)		Yes	32
	Upgrading NH 21: PhuLy-NamDinh		Yes	38
	Upgrading NH 14: GiaLai-KonTum section GiaLai-KonTum		Yes	58
	Upgrading NH 1: DongHa- QuangTri (10km)		Yes	19
	LaHa-DucPho bypass-NH1 (15km)		Yes	29
	DinhVu bridge		Yes	97
	VanTien bridge		Yes	n.a
	VinhThinh bridge		Yes	59
Secondary Road Network Dev't	Upgrading NH 20: DauGiay-LienKhuong (250km)		Yes	26
	New Coastal Road (100km)		Yes	335
Traffic Safety				

Source: Decision No. 412/QD-TTg & No. 1290/QD-TTg

Table 3.2.2 List of Expressway Master Plans

Title	Issued by	Issue Year	Remarks
Approval of MOT Expressway M/P	GOV	01/12/2008	No.1734/QD-TTg
Summary report of Expressway M/P	MOT	05/11/2007	No.7056/TTr-BGTVT
Expressway Network Development Plan Project, No. TA 4695-VIE	VEC	Apr 2007	ADB Master Plan

Table 3.2.3 shows the expressway project list approved by PM letter No. 1734/QD-TTg dated 1 December 2008. Three (3) expressway segments were changed as to the timing of their implementation. Figure 3.2.1 shows the expressway network proposed in the MOT Master Plan.

Table 3.2.3 Approved Expressway Master Plan

No.			Section	Length (km)	No. of lanes	Cost (Billion VND)	1734	
							Before 2020	After 2020
Eastern North-South Expressway	1	1	Cau Gie – Ninh Binh	50	6	9,300	Under Construction	
	2	2	Ninh Binh – Thanh Hoa	75	6	12,380	Yes	
	3	3	Thanh Hoa – Vinh	140	6	22,120	Yes	
	4	4	Vinh – Ha Tinh	20	4-6	2,580	Yes	
	5	5	Ha Tinh – Quang Tri	277	4	21,610	Yes	
	6	6	Quang Tri – Da Nang	178	4	18,160	Yes	
	7	7	Da Nang – Quang Ngai	131	4	17,820	Yes	
	8	8	Quang Ngai – Quy Nhon	150	4	23,700	Yes	
	9	9	Quy Nhon – Nha Trang	240	4	24,960		Yes
	10	10	Nha Trang – Dau Giay	378	4-6	55,940		Yes
	11	11	HCMC – Long Thanh – Dau Giay	55	6-8	18,880	Yes	
	12	12	Long Thanh – Nhon Trach – Ben Luc	45	6-8	12,340	Yes	
	13	13	HCMC- Trung Luong	40	8	13,200	Under Construction	
	14	14	Trung Luong – My Thuan – Can Tho	92	6	26,250	Yes	
Western North-South Expressway	15	1	Doan Hung – Hoa Lac – Pho Chau	457	4-6	53,930		Yes
	16	2	Ngoc Hoi – Chon Thanh	864	4-6	96,770		Yes
Northern Region	17	1	Lang Son – Bac Giang – Bac Ninh	130	4-6	12,220	Yes	
	18	2	Ha Noi – Hai Phong	105	4-6	16,800	Yes	
	19	3	Ha Noi – Lao Cai	264	4-6	15,580	Yes	
	20	4	Ha Noi – Thai Nguyen	62	4-6	4,220	Yes	
	21	5	Thai Nguyen – Cho Moi	28	4-6	2,940		Yes
	22	6	Lang – Hoa Lac	30	6	7,650	Under Construction	
	23	7	Hoa Lac – Hoa Binh	26	4-6	2,550		Yes
	24	8	Bac Ninh – Ha Long	136	6	19,040	Yes	
	25	9	Ha Long – Mong Cai	128	4-6	13,820	Yes	
	26	10	Ninh Binh – Hai Phong – Quang Ninh	160	4	13,760		Yes
Central Region	27	1	Hong Linh – Huong Son	34	4	2,450		Yes
	28	2	Cam Lo – Lao Bao	70	4	4,900		Yes
	29	3	Quy Nhon – Pleiku	160	4	12,000		Yes
Southern Region	30	1	Dau Giay – Da Lat	189	4	19,280	Yes	
	31	2	Bien Hoa – Vung Tau	76	6	12,160	Yes	
	32	3	HCMC – Thu Dau Mot – Chon Thanh	69	6-8	20,010		Yes
	33	4	HCMC – Moc Bai	55	4-6	7,480		Yes
	34	5	Soc Trang – Can Tho – Chau Doc	200	4	24,200		Yes
	35	6	Ha Tien – Rach Gia – Bac Lieu	225	4	27,230		Yes
	36	7	Can Tho – Ca Mau	150	4	24,750		Yes
Ha Noi City Ring Road System	37	1	Ring road No 3	56	4-6	17,990	Yes	
	38	2	Ring road No 4	125	6-8	34,500		Yes
Ho Chi Minh City Ring Road System	39	1	Ring road No 3	83	6-8	20,750	Yes	
Total				5,753		766,220		

Note: This table does not include Bac Ninh – Phap Van section (40km), Phap Van – Cau Gie section (30km), Noi Bai – Bac Ninh section (30km), Lien Khuong – Da Lat section (20km)

Figure 3.2.1 Approved Expressway Network (No.1734/QD-TTg)

Source: VITRANSS2 Study Team

4) Other Road Master Plans

In addition to the above government strategies and master plans, there are also other road master plans. TDSI was preparing a road transport master plan up to 2020 and direction to 2030 and GRA/MOT have reviewed and submitted to the Government for approval. This plan contains 101 projects of various types in the interim report. Most of the cities also have their own urban transport master plan, particularly HCMC (decision No. 101/QD-TTg dated 22.01.2007) and Hanoi (decision No. 90/2008/QD-TTg, dated 09.07.2008).

Table 3.2.4 Road Transport Master Plan (Interim Report)

Category	Item	No. of Projects
New Construction	Extension	18
	Bypass	80
	Bridge	7
	Tunnel	0
	Subtotal	105
Improvement	Widening	26
	Upgrade	74
	Intersection	1
	Subtotal	101

Source: VITRANSS2 Study Team

There are also strategic projects being studied in more detail. Particularly, GRA is now developing the detailed plan for the North-South Expressway (Eastern Side) under a sub-contract to TEDI. This plan consists of a route location on a scale of 1/100,000 to 1/250,000. However, as of March 2009, the alignment is not finalized yet.

5) ITS Development Plan

In step with the beginning of construction of the expressways, discussion on ITS introduction has been getting active. Focus of the discussion is the following two systems.

(1) Road Traffic Information/Control System

Road traffic information/control system is to be consolidated under centers appropriately located in the country. Several candidates of the center location as shown in Figure 3.2.2 are presently discussed in MOT and VEC. According to the notice No.41/TB- BGTVT by MOT in February 2009, a center in Candidate-1 will be constructed for the Cau Gie–Ninh Binh Expressway.

Figure 3.2.2 Candidates of Traffic Information/Control Center Location

Candidate -1 :
- Ha Hoi
- Ha Tinh
- Da Nang,
- Nha Trang
- TP. Ho Chi Minh

Candidate -2 :
- Ha Hoi (2 places)
- Da Nang
- TP. Ho Chi Minh (2 places)

Candidate -3 :
- Ha Hoi
- Da Nang
- TP. Ho Chi Minh

Source: VITRANSS 2 Study Team

(2) ETC System

Existing ETC system in Vietnam is based on IR communication technology. However, GRA recommended ETC system based on DSRC (Dedicated Short Range Communication) technology in the submission letter No.323/TT-CDBVN to MOT in January 2005. Additionally, GRA recommended to adopt non-stop toll collection process based on “DSRC 5.8GHz active radio technology following European standards CEN/TC278”. However at present there is no established technical standards yet for ETC.

3.3 Commentary

1) Priorities and Investment Scale

The assessment of present government plans is that there is too much emphasis on highway construction, in particular expressways. The issue is that if too much funds are to be invested in expressways, it will deplete funds that could be used for other road projects or other subsectors. Prioritization of proposed projects needs to be carefully addressed. The State cannot provide all the desired projects at the same time and must therefore make hard choices on which ones can be deferred, cancelled, or pushed back in line.

To put the government expressway plan in perspective, the proposed expressway network targets 5,753km by 2030; this means a future ratio of about 1,100 vehicles per km of expressway. It is equivalent to 33% of the total length of national roads of Vietnam. In comparison, the vehicle-to-expressway ratio for Japan is 8,400 veh/km. Thailand, which has a similar land-mass configuration as Vietnam but with more than 4 times its GDP/capita, has a motorway network of about 145km, or a ratio of 22,000 vehicles/km. One of the more extensive expressways in the region is Malaysia, which has 1,238km in operation; equivalent to 7% of its national road length. Its GDP per capita is 8 times that of Vietnam, yet its corresponding ratio stands at only 9,900 vehicles per km. It is therefore evident that Vietnam's level of motorization and economy will not require such an extensive network as proposed by the expressway master plan.

In financial terms, the US$50 billion cost of the expressway network means that annually cost will be the equivalent of 3 times the MOT yearly budget for all – road, rail, water, and air - transportation projects. It is also akin to allocating more than 1.3% of Vietnam's GDP every year - from 2008 to 2030 for expressway development only - and that assumes a continuous growth of 7.5% per annum. Funding of the expressway master plan could not be sustained. Selective implementation of expressways is therefore recommended.

2) Financing the Plan

The funding hurdle is what ultimately will determine the success of plans. Hence, the plans ought to include a careful assessment of the most-likely budget envelope over the planning period. This information should be fed back into the capital budgeting cycle, so that the physical targets for roads get adjusted – mostly downward, and in rare instances, upward. This element is somehow missing in the formulation of road plans. It is recommended to coordinate funding and the proposed implementation schedule of projects.

3) Multi-modal and Integration with Other Modes

Vietnam's transport sector is fast developing and there are many developments in road sub-sector as well as other sub-sectors (i.e. rail, ports and shipping, aviation, and IWT). How the government plans in the road sub-sector relate to other transport sub-sectors is not apparent. It is necessary to put road sub-sector plans in the overall transport development context.

4) New Expressway Links for Consideration

The expressway master plan already includes an extensive network. However, a review of the existing master plan revealed some links that could be included for further consideration. These links include: (i) Danang–Ngoc Hoi (250km); (ii) Quang Ngai–Dak To (170km); (iii) Nha Tran–Da Lat (80km); and (iv) Binh Son–Gia Ray (30km) (see Annex 3A). The viability of these links would have to be further studied, along with other routes proposed in the expressway master plan.

4 MAIN PLANNING AND MANAGEMENT ISSUES

4.1 Overview

There is a need for increased investments in roads to meet the national development goals. Vietnam had a rapid economic growth during the 1990s, and is believed capable of sustaining 7% per annum growth in the foreseeable future. Demand for road transport is increasing with freight and passenger traffic growing more than 12-17% annually (based on statistic year book). The number of road transport vehicles is also growing, due to motorization as personal income increase and the economy becomes more industrialized. In particular truck traffic is increasing significantly, mainly as a by-product of the increase in demand for logistics in the industrial and manufacturing sector. Yet the Vietnamese road infrastructure remains inadequate.

(a) **Road Hierarchy:** The hierarchy of roads in Vietnam is skewed: of the total network length of 256,684km, national highways or primary roads comprise 6.8%, while provincial roads which represent the secondary roads constitute 8.9% only or just 28% longer than primary network; in more developed countries the secondary roads are at least double the length of the primary network. Inadequate coverage of secondary roads funnels local traffic towards the primary arterials, creating concentration of demand at the primary arterials and conflict of movements with local traffic and through traffic.

(b) **Road Density and Capacity:** In comparison to ASEAN countries, Vietnam has favorable road network coverage, for both the overall network and the primary network (i.e. national highways). Compared to developed countries, Vietnam's road density is still below par. Using Japan (which has similar area and geography) as a benchmark for future road network expansion, the national roads network needs to be expanded by at least 10,000km by 2030 for the road network coverage to be considered well-developed. Road capacity of the national highway is however inadequate. Only a small percentage (4%) of the national highway network is at least 4-lanes.

(c) **Road Conditions:** The overall road network is only 30% paved, particularly due to the large share of local roads that remain unpaved. Although more than 90% of the national highways are paved with at least double bituminous surface treatment (DBST), the surface condition of national roads is still unsatisfactory: 20% of the length is in bad and very bad condition, and only 43% is in good condition. Road deterioration is becoming more apparent, as heavy truck traffic is increasing.

(d) **Secondary Road Network Development:** Eighty-five percent (85%) of the road network is composed of local roads or secondary road network which gives access to the less developed areas in the country. The quality of this network is unsatisfactory. The local governments are responsible for the investment and maintenance of the secondary road network, thus their capability to handle the large investment and the complicated planning and engineering process needed is crucial for the successful alleviation of the poor secondary road network in the country. The capacity building of local government units therefore is identified as the key thrust to the accelerated development of the secondary network.

(e) **Traffic Accidents:** Road traffic safety is a major national concern because of the high accident rates, i.e., 14,727 accidents per year with 12,757 fatalities, and 11,288 injuries.

While a safety program has been developed, its implementation is inadequate. Road accidents are caused mainly by driver error, especially speeding. The mixed traffic, heavily dominated by motorcycles, also contributes to the high accident rates; where about 70% of accidents involve motorcycles. The present road design standards do not adequately consider this peculiar traffic mix. Increasing truck traffic also raises the risks of accidents.

(f) **Traffic Congestion:** Congestion is observed along main corridors, especially in and near large urban areas and ports. This is expected to worsen with the rapid urbanization and increase in vehicles.

(g) **Road Transport Services:** The quality of long-distance passenger and goods services has been substandard. Vehicles and on-board amenities require substantial improvements. In addition, roadside facilities are not adequate. While there are many commercial facilities, such as restaurants, coffee shops, fuelling stations, and hotels, these are scattered along the roads in an unorganized manner, thereby failing to provide comfort and convenience to both passengers and drivers. The development of roadside stations (michinoeki)[1] as an integral part of road facilities needs to be considered to enhance safety and comfort of road users, and at the same time promote local economic development.

Addressing the above issues requires substantial funding. For instance, the government's strategy for the road sector calls for very high expenditures of 3% of GDP (compared to the 1.8-2.0% historical rates) and donor support of 50% more than current rates. The high target investment level is understandable with the high demands for road improvement; however it is likely that such level of investment would not be achieved. It is therefore necessary to consider efficiency in utilizing the funds that are available to achieve as much as possible with the desired outcomes at the least cost. There are five strategic issues along this line that need to be addressed:

(i) Road planning and financing – to improve fund utilization in prioritizing use of limited funds, not just for capital projects but also in asset management.

(ii) Operation and maintenance – to address growing concerns on road deterioration and to program asset management, such that limited funds are not needlessly spent on expensive repair works, where it could have been prevented by timely maintenance.

(iii) Road construction – to enhance quality of construction works, thereby limiting the need for maintenance and repairs, as well as to encourage cost-effective construction techniques and management to reduce contract prices.

(iv) Road hierarchy – to maximize the impact of road investments by strengthening the existing network's connectivity and by focusing synergizing the roles of links, resulting in a better network performance. It will also be a strategic solution to the issue of traffic safety, by segregating car and truck dominated fast-moving through traffic from local traffic which is mostly by motorcycles.

(v) Traffic management and road services – to utilize road assets fully, traffic management and road services should be improved. Road traffic accidents should be put in check, anticipating that higher traffic demand will increase traffic accidents.

[1] The JICA-funded "Master Plan Study on Development of Roadside Stations" is currently undertaken under the GRA.

4.2 Road Planning and Financing

1) Problems and Opportunities

During the period of reconstruction, the demands for sophisticated road planning and financing was limited. Decisions on what roads to build or rehabilitate and where does not require sophisticated planning. In the last decade the network has grown from 224,639km to 256,684km. Despite the growth in the network, demand for better road infrastructure and services continues to increase with accelerating levels of motorization of passenger and freight transport. Requirements for funds are mounting due to numerous projects being proposed. This is exacerbated with growing needs for maintenance funds as the network increases in length and roads constructed a decade ago starts to deteriorate.

There is therefore a need to improve the efficiency in the fund utilization and service delivery for roads. In particular, the planning process is fragmented and not linked to the budget, the selection of projects and allocation of funds are not clearly founded on well-formulated plans and economic principles, and the delivery of construction and maintenance services has not been very efficient. Key observations are as follows:

(i) National roads planning in Vietnam is undertaken within a fragmented framework, with many players (GRA presides over the plan while MOT, other sectoral departments, VEC, MPI, PDOTs play role of partners) preparing different levels of plans by mode and geographical area, which are not well integrated and consistent with each other. This tends to lead to gaps and overlaps in investment decisions within and among transport modes. GRA needs to enhance its capability to undertake the integrated planning of roads, particularly at the network level.

(ii) There is a significant disconnect between road planning and budgeting. Road development and master plans and public investment programs (PIPs) are often prepared and approved without adequately considering budget constraints. Projects in the annual budget do not always include those prioritized in the PIPs. Only 47% of the planned road investments for 1996-2007 were actually funded. Furthermore, according to a World Bank (WB) report, about 35% of total road expenditures was approved by the Prime Minister but not allocated funding. For 2005-2008, on-going construction projects and existing maintenance programs already exceeded available funds by 14%; if approved new planned projects were to be added, the budget shortage would exceed 50%. To fund the shortfall, the government would often resort to off-budget credits and bonds to comply with the budget deficit limit, but repayments of these mounting debts has become a problem, especially because the direct revenues generated by most transport projects is low.

(iii) New road investments (capital outlays for construction) and funding for road maintenance (recurrent expenditures for repair/maintenance) are planned and budgeted separately by MOT/MPI and MOT/MOF, respectively. Thus, this process does not consider the close interdependence and trade-offs between the two types of intervention works. There appears to be a strong bias towards construction. Road maintenance/asset preservation of roads is not given enough emphasis, accounting for only 10% of the road budget which could cover only 40% of the maintenance needs. This is despite the fact that the net economic returns per unit cost for asset preservation are proven to be two or more times higher than that for construction projects.

(iv) The criteria used in selecting projects for inclusion in the road plans and programs are not clearly defined. GRA officials explained that projects are chosen on the basis of

their traffic volumes and development impact. These appear to be broad parameters which allow a considerable amount of discretion. In a regime of scarce resources, this process tends to lead to sub-optimal allocation of funds for marginally feasible or unfeasible projects which goes against the economic efficiency principle of assigning funds to the projects that would generate the highest net economic returns. A preliminary evaluation of 45 expressway projects in the existing master plan showed that only 17 hurdled the economic internal rate of return (EIRR) threshold of 12% and no one passed the minimum required financial internal rate of return (FIRR) of 15%.

(v) Although integration of expressway planning into national highway network has been attempted in existing strategy or plan, such as road transport master plan up to 2020 and direction up to 2030, there is still a need to enhance such effort to raise development efficiency. GRA is supposed to be responsible for the integrated planning of the national roads network. It is unclear how involved it was in the formulation of the existing master plan for expressways – which, by its scale seemed to have been formulated independently of the national road network. Under PM Decision No. 1734/QD-TTg dated 01 Nov 2008, MOT was designated as the authority to do network planning. Coordination will automatically follow if MOT delegates this road network planning to GRA. The expressway plan appears very ambitious relative to traffic levels and available resources, with a target of building 5,500km by 2030 - or 1km per 1,100 vehicles, which is 10 times denser than the present ratio of Japan. The total cost is 766,200 billion VND which would dwarf the current budget levels, even considering the likely shares of private investments. There is a need to revisit the expressway plan using the corridor approach.

(vi) There is no adequate and sustainable road database institutionalized at MOT/GRA to support the formulation of long-range/medium-term/annual plans and programs for road network development and asset preservation which are most responsive to transport needs at least economic cost to the country. Most road and traffic data have been provided by “one-off” transport surveys and studies designed to produce specific transport strategies and plans. There is a need for a system that would collect, update, and process - on a regular and sustained basis - accurate and relevant information on road inventory and conditions, traffic counts and axle loads, road accidents, and related data needed. This is the main stumbling block of the modern Highway Development and Management 4 (HDM 4) planning tool for road maintenance, which could not be made fully operational until the huge amount of supporting data required are collected systematically.

(vii) Road users do not adequately pay for the road services that they get. The National Assembly, however, recently passed road traffic law (resolution No. 23/2008/QH 12), which will become effective in July 2009, to establish a road maintenance fund consisting of road user charges, supplemented by annual budget allocations. The road traffic law instructs the government to decide on the specific sources of funds. An inter-agency group, headed by an MOT Vice Minister, is formulating the detailed content of the fund including the fund sources and utilization of the fund.

(viii) MOT/GRA should mount an intensive and continuing program to develop their capability in road planning and related fields focusing on the key aspects discussed above. These should include the establishment of appropriate modern planning systems and processes, as well as the training of staff to implement and operate them on a sustained basis.

2) Agenda to Improve Road Planning and Financing

It is proposed that an action program consisting of the following interrelated measures be undertaken to address issues in road planning and financing.

(i) Enhancing needs-based and process-oriented road network planning
(ii) Planning roads within and overall transport policy framework
(iii) Linking planning with budgeting
(iv) Enhancement of integration of expressways and urban roads into overall national roads planning
(v) Improving the database for road planning
(vi) Mobilizing private sector resources
(vii) Rationalizing the road hierarchy
(viii) Improving road safety and environmental standards
(ix) Intensive capability build-up

The government has already taken several initiatives related to these measures, and what is needed is to intensify and enhance them. Details of the abovementioned measures are as follows.

3) Enhancing Needs-Based and Process-Oriented Road Network Planning

The capability of GRA should be strengthened to effectively perform its important role of national road planning at the network level (in addition to project-level planning). Road network planning by GRA should have the following features:

(i) The planning should be process-based and proceed systematically, from strategic analysis and development of road scenarios to the formulation of long-term plans and the preparation of medium-term and annual programs. The road network plan should be driven by an overall framework of national transport policies and strategies covering all modes. The road plan should be coordinated with the plans for the other modes through this transport policy framework.
(ii) Road network planning should be needs-based, and integrate the dual needs of road network development and asset preservation based on realistic estimates of future transport demand and road network conditions. Network planning should encompass the whole arterial road system consisting of national highways and expressway systems to achieve their connectivity and interdependence. It should also consider the trade-offs among different options for intervention works (i.e. construction, improvement, rehabilitation and maintenance) to meet the network needs.
(iii) Planning for roads should be fiscally constrained – i.e., the plans and programs should be formulated within the limits of the funds that can be realistically raised for road development, from both government and private sources.
(iv) Within the fiscal constraints, GRA should identify projects from the road network plans and evaluate and prioritize them based on firm economic grounds. This would ensure that the limited funds are allocated to projects that would generate the greatest net economic returns at the lowest economic cost to the country.
(v) Network planning should initially focus on the major transport corridors and economic areas/zones prioritized by the government. This should be the basis to evaluate and search for the most feasible combination of network links to be developed – national

highways-cum-expressways supported by local roads and other modal facilities – in order to efficiently meet the corridor/area transport needs.

(vi) Road planning should provide for adequate consultations with, and participation of, the key stakeholders concerned. This would obtain their views and suggestions on road development needs and proposals, which should then be considered in the formulation or revision of the plans. The stakeholders would include road users, local governments, other government agencies (responsible for finance, trade and industry, agriculture, police, etc.), farmers, business groups, private sector, and other interest groups affected by road development. Involving them in the planning process would help make the plans socially acceptable, as the stakeholders would have a sense of "ownership" of the plans. To formalize the process, GRA could organize regular consultation forum or workshops with the stakeholders at different stages of road planning.

In undertaking road network planning, GRA could make effective use of modern and proven road planning and programming tools using objective technical and economic criteria for planning at the network and project levels. These would guide decision making towards the efficient (or optimum) allocation of funds for road investments and maintenance works, and thus prevent sub-optimal fund allocation based on subjective judgment and discretion.

GRA might also consider adapting, with adjustments to suit the institutional environment in Vietnam, applicable best practices in road planning employed in other countries. An example is the system used in the Philippines which has successfully developed and used IT-based road planning systems and applications. These include:

(i) Pavement Management System (PMS)
(ii) Highway Development and Management Version 4 (HDM-4),
(iii) Bridge Management System (BMS),
(iv) Multi-Year Programming and Scheduling (MYPS) System,
(v) Multi-Criteria Analysis (MCA), and
(vi) Traffic Accidents Recording and Analysis System (TARAS).

It includes as well an overall Highway Planning Manual (HPM) which describes the entire network planning process including the use of the planning tools mentioned above (See Box 4.1.1).

For instance, GRA could evaluate and prioritize candidate projects for the multi-year program using the MYPS in tandem with the MCA and the HDM-4 tool. The MCA would prioritize the projects based on the relative degree to which they meet the following criteria which are assigned weights according to the collective values and goals of the stakeholders:

(i) Project preparedness - current project status, detailed design, economic feasibility, environmental impact assessment, and social impact;
(ii) Road network importance - road category and strategic role;
(iii) Economic and social development policy - e.g., access to basic services, development of undeveloped areas, agricultural modernization, traffic decongestion, industrial and tourism development.

As part of the improved planning system, feasibility analyses, covering technical, economic, social, financial, and environmental aspects, should invariably be carried out for new candidate road projects identified through the road network plan. Pre-feasibility evaluation

of these projects should have been carried out beforehand at the network planning stage. In general, full feasibility studies should only be required for the following project types which cannot be handled in normal network analysis: (i) bypasses and diversion roads; (ii) new roads, including expressways and missing links; (iii) major road alignments and/or widening; (iv) new bridges or replacement of existing bridges; and (v) all cases where land acquisition and resettlement action plans are required to seek the least disturbance options.

Box 4.2.1 Planning Systems of the Department of Public Works and Highways, Philippines

The significant improvements achieved in the road planning systems of the Philippine Department of Public Works and Highways (DPWH) is part of a larger program initiated in the mid-90s under the Road Information and Management System (RIMSS). DPWH management understood at that time that, to effectively deal with the planning and management of some 29,000km of national roads and address the pressures to provide better service at reduced costs to road users, a new strategic approach to road planning and development was needed. This required (a) emphasis on customer needs, (b) focus on re-engineering the most important processes in the planning and delivery of road services, (c) identifying and prioritizing opportunities to reduce costs and improve efficiency and effectiveness, and (d) use of technology to enable these steps to be taken.

To improve past practices, DPWH introduced a new road planning process which is embodied in a Highway Planning Manual (HPM). This process involves the following phases: (a) strategic analysis, (b) development of highway network scenarios, (c) development of long-term plan, and (d) preparation of multi-year program and annual program – to meet the dual needs of road network development and asset preservation in the most efficient manner considering funding constraints. To implement the new road planning process, since 2001 DPWH has developed, installed, and employed the following planning tools and systems, as incorporated in the HPM:

- Road and Bridge Information Application (RBIA): This is the main database on road network inventory and conditions used for the planning and programming processes, e.g. HDM-4, PMS, BMS, etc.
- Road Traffic Information Application (RTIA): This is the repository of traffic and axle load data used for traffic demand projections and project analyses.
- Pavement Management System (PMS): This is a set of tools to find optimum strategies for providing and maintaining pavements in a serviceable condition.
- Highway Development and Management Version 4 (HDM 4): This generates optimum short, medium and long-term programs for given budget constraints, including objective prioritization of investments in asset preservation and network development.
- Bridge Management System (BMS): This is a system to monitor and record the condition of bridges and to program and rank bridge asset preservation and development works.
- Routine Maintenance Management System: This is a tool for estimating and managing routine maintenance resources for roads and bridges to meet specified results.
- Traffic Accident Recording and Analysis System: This stores and processes data on road traffic accidents to identify blackspots and prioritize road safety measures.
- Multi-Year Programming and Scheduling System: This tool, together with Multi Criteria Analysis, generates multi-year programs as the basis for the medium-term and annual programs.
- Multi-Criteria Analysis: This tool gives values and weights to economic feasibility and other relevant factors to evaluate and prioritize projects - e.g. project preparedness, environmental and social impact, road network importance, and economic and social development policy.
- Other Planning Systems and Tools: These include (a) Environmental Impact Analysis, (b) Social Impact Assessment, (c) Right-of-Way Acquisition and Resettlement Action Plan, and (d) road classification system, among other planning systems/tools.

These modern IT-aided planning systems have greatly rationalized decision-making in the selection of road projects and the allocation of funds to them, based on objective technical, economic and related criteria, thereby leading towards the efficient use of scarce resources and reducing the opportunities for choosing projects based on arbitrary political factors. The use of the PMS/HDM-4 planning tool, for example, has already been recognized by law: the 2008 and 2009 General Appropriations Acts passed by Congress require that this planning tool be used as the basis for allocating funds for the rehabilitation and preventive maintenance of national roads.

Source: Department of Public Works and Highways, Philippines

4) Planning Roads within an Overall Transport Policy Framework

National roads planning should, first of all, be linked to and be driven by a well-articulated and overarching national transport policy framework covering all modes. This policy framework should embody the following core policies of the government to provide clear directions for the development and management of roads in coordination with the other transport modes:

(i) Market Orientation: Along with transport operations, the provision of construction and maintenance services should generally be undertaken by the private sector under a market environment. Where the market fails, government intervention in some form may be appropriate.

(ii) Competition: Competition within transport modes and among modes should be encouraged to drive efficiency. This also includes competition in the provision of road construction and maintenance services.

(iii) Regulation: Emphasis should be placed on technical regulations - particularly those relating to public safety, quality of service, and environmental impact - as well as on traffic management and strict enforcement of traffic regulations. Economic regulation within a market environment - e.g., for market entry, capacity supplied, routes operated and fares/charges – should be limited to essential criteria.

(iv) Pricing and cost recovery: The “user pays” principle for cost recovery should be applied where appropriate. This would call for road user charges, where the motorists pay for at least the maintenance cost of the roads through fees and levies on the vehicles and fuel that they use. Special policies may be considered for low-density routes and agricultural roads. Any subsidy should be direct, specific and transparent.

(v) Government role: There should be a clear separation between the entity responsible for policy/regulation and the entity charged with operations/ management, as well as between the asset owner/service customer and the service provider, to avoid conflicts of interest. The role of government in transportation should relate to infrastructure provision, policy and strategy formulation, overall sector planning, safety and environmental regulation, and research and development.

(vi) Asset management: Priority should be given to making the best use of existing road and other transport assets before additional investments are considered. Adequate and stable funding for asset preservation and maintenance should be assured.

(vii) Least cost mode/route: The allocation of traffic to the least cost mode/route should be the underlying aim of a welfare maximizing transport system. The overall cost should include the sum of the generalized cost to the user, the net cost to the transport supplier (cost less revenue), the net cost to the government, and the net cost of externalities (e.g., congestion and pollution). Prices (fares/charges) should, as far as possible, reflect these costs.

(viii) Investment analysis: Investments in transport should be economically viable, and preferably financially viable. Investment plans should be based on a realistic extrapolation of the existing traffic situation. Forecasts should be realistic, relying mainly on ‘normal’ traffic, with possible generated (induced) traffic treated with caution.

(ix) The VEC Director has underscored the need to review and rationalize the numerous existing legal documents providing policies, decisions and rules affecting roads, expressways, and other transport modes. This is because many of them are

outdated or inconsistent with each other or have gaps. This point to the need to formulate a single code of coherent policies and instructions. This would provide a clear and unified direction for the development and management of the entire transport sector including its component modes. An overall national transport policy framework as suggested above would address this need.

5) Linking Planning with Budgeting

To ensure that road plans and programs are consistent with the budget levels or fiscal constraints, the following arrangements should be considered:

(i) The government, through MOT/MPI/MOF, should set achievable global spending levels for transport infrastructure over the medium-term as a percentage of GDP to support the development needs of the country. These would serve as indicative targets and could be disaggregated by transport mode.

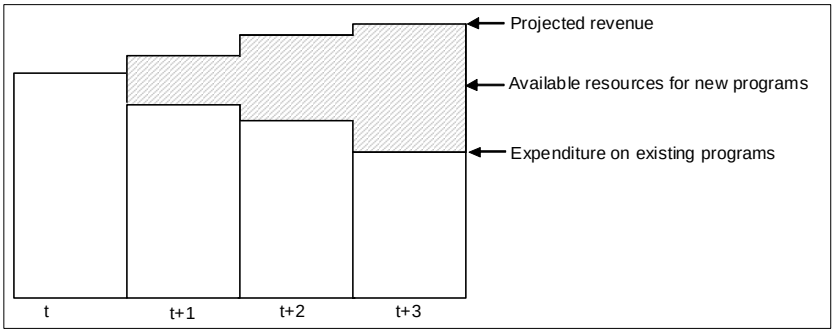
(ii) Within these indicative spending targets, GRA could estimate the likely financing levels for the national roads sector, covering both construction and maintenance. These would provide the funding envelopes delimiting the scope of plans and programs that can be realistically achieved. This should be done at various planning stages with progressive refinements, starting with the strategic long-term analysis, through medium-term planning and programming, to annual programming and budgeting. The estimates should cover the main sources of government funds for national roads, viz., (a) state budget covering both government revenues and loan/grant/bond proceeds; (b) corporate funds covering internally generated income and loans; and (c) special funds from road user charges. In addition, indicative levels of private investments should be estimated based on pre-feasibility or feasibility studies of potential toll expressway projects. The government counterpart for the PPP projects should be accounted as well.

(iii) MOT/MPI/MOF and GRA in particular should adopt and institutionalize the use of the Medium-Term Expenditure Framework (MTEF) (Figure 4.2.1). Introduced recently, the MTEF could serve as the context for multi-year planning and programming under budget constraints for national roads and other transport infrastructure. The MTEF would first determine the “fiscal space” – i.e., the funds or revenues that could be realistically raised and allocated for road development and maintenance over the medium term, i.e., the next 4-6 years. Given this fiscal space, the MTEF would allocate the funds according to the following priorities, using the concept of “forward estimates” – i.e., the annual costs to pursue programs and projects in the succeeding years until their completion.

(a) **Existing or Committed Program Funding:** This deserves the first claim on the available funds. Existing programs would include the following: (i) maintenance and rehabilitation of existing roads over their life cycle and (ii) on-going or unfinished road construction projects.

(b) **New Program Funding:** After satisfying the funding requirements of the existing programs, the MTEF would then allocate funding for new programs/projects. These new projects would be drawn from the approved road plans and public investment programs (PIPs) prepared by GRA, and are prioritized according to their feasibility/MCA ratings.

Figure 4.2.1 Fiscal Space in a Medium Term Expenditure Framework



Source: VITRANSS2 study team
Note: t = year and t+1 is the year after year t

6) Enhancement of Integration of Expressways and Urban Roads into Overall National Roads Planning

Planning for expressways and urban roads should be an integral part of national roads planning. GRA should be the sole entry point for planning and clearing proposed expressway projects, including those under PPP/BOT schemes. GRA should identify, prepare, appraise and pass upon expressway projects, based on the following guidelines and criteria, before the projects are bid out and implemented by Autorized State Agency (ASA):

(i) The toll expressway projects must be consistent and fit into the overall long- and medium-term plans for the national roads network prepared by GRA. This could be better determined using the corridor approach, where the expressways could be evaluated considering their connectivity and trade-offs with the national roads and other modal systems (ports, airports and rail facilities) in meeting the transport demand in the corridor.

(ii) The expressway projects must invariably be economically feasible as shown by appropriate indicators.

(iii) The expressway projects must be financially viable and provide for cost recovery from user fees over the project life cycle. Tolls/user charges should cover at least project operating and maintenance (O&M) costs and, to the extent feasible, capital costs. Any state financing support – for capital costs such as viability gap funding, O&M costs, and debt servicing – must be fully justified and made transparent. These could apply particularly to segments of expressways which are economically feasible, but whose traffic cannot generate sufficient toll revenues to recover the investment costs. Contingent liabilities and guarantees - e.g., for shortfalls in traffic and revenues - by the government must be identified and justified.

(iv) Risks should be allocated to the parties that can best manage them and control the outcomes. In general, the expressway project proponent or concessionaire must bear the traffic, commercial, financing, construction and operational risks, while the government should assume the political and regulatory risks including the provision of right-of-way and setting of toll rates.

(v) The sources of capital funds for construction – government and private, including domestic and ODA loans - must be clearly defined and justified, and the funds to be sourced from the government must fall within the budget ceilings. There should be a clear sharing of costs and revenues between the public and private sectors involved in

the project. For example, the government could consider funding the right-of-way and part of the civil works costs, and the private concessionaire would shoulder the remaining construction costs. Where the government would guarantee any traffic and revenue shortfalls below the estimated levels, it should also share in any surplus revenues according to a sharing formula.

GRA should review and, as necessary, improve the current MOT expressway master plan to conform to the above guidelines. It should prioritize the projects primarily according to their economic feasibility, and recommend the appropriate timing of the projects or phasing of their segments based on the feasibility indices under the budget constraints, seeing to it that the expressway capacities are commensurate with the estimated future traffic volumes. GRA should eventually assume ownership of the expressway master plan as part of its overall national roads plan.

VEC officials do not object to the scheme described above where GRA would prepare the entire road master plan which would encompass expressways. In fact, VEC is advocating an overall transport sector master plan which would include all modes in order to achieve full connectivity, not only between expressways and roads, but also between expressways and major ports and railways.

While GRA would identify, evaluate and prioritize expressway projects based on the overall roads master plan, VEC confirmed that it would concentrate in the development and implementation of the identified priority expressway projects as leading investor in the market as described by the approval letter of the Prime Minister for the MOT Expressway Master Plan (letter No. 1734/QD-TTg dated 1 December 2008). VEC would be appointed for construction of some expressway sections After the construction is completed, VEC intends initially to directly handle the operation and maintenance of the expressway. This is because expressways are a greenfield venture in the country and, therefore, VEC would like to run the expressway for the first few years and resolve any problems that may occur in the operation and management of the system, such as shortfalls in traffic and toll collections, traffic management, and maintenance. Once VEC has gained sufficient experience and demonstrated the proper management of the expressway, VEC plans to assign the expressway operation and management, including toll collections, to another entity. This approach appears to be a pragmatic strategy. It may be desirable to assign the operation and management under a long-term concession agreement to be awarded to a private entity via competitive bidding.

7) Improving the Database for Road Planning

As a prerequisite to good planning, GRA should enhance and institutionalize the database for road planning and management. The database should provide – on a regular and continuing basis – a comprehensive, accurate, and up-to-date set of information on road and bridge inventory and conditions, traffic data, accidents, and relevant socio-economic data. These would support the formulation and up-dating of network development and asset preservation plans, programs, projects, and budgets for national roads which are most responsive to transport needs. The data system should include the conduct - possibly by the Regional Road Management Units (RRMUs) under the supervision of GRA - of regular field surveys on road and traffic conditions in order to generate the information needed to populate and update the data base.

The database could adapt the surveys and data processing systems employed in

VITRANSS 2. The database could also profit from the best practices of other countries; an example would be the Philippines where the Department of Public Works and Highways (DPWH) has successfully installed the IT-based Road and Bridge Information Application (RBIA) and Road Traffic Information Application (RTIA) and used these in tandem with other planning tools to prepare responsive road plans and programs (see above Box 4.1.1). An institutional and staff capability program for GRA is needed to establish and operate a good road database.

8) Mobilizing Private Sector Resources

Given the pressing needs in the road sector and limitations on debt and official development assistance, MOT needs to explore approaches that leverage private sector know-how, efficiency, and resource for managing and financing road infrastructure. The government has changed the legal and regulatory framework and succeeded in attracting private foreign investment in the energy sector and private participation in road construction, but it should take full advantage of the potentials of PPP and BOT schemes. For example, since BOT toll roads are mostly unattractive for foreign investors because few transport projects in Vietnam offer sufficient traffic volumes to make the projects financially viable from user tolls alone, the government should develop a framework for revenue and cost sharing between the public and private sectors to make the projects financially viable, provided that the projects are economically feasible. Furthermore, government policies should clearly define the risk sharing and management rules, particularly to address the investor's concerns about regulatory and political risks which should be assumed by the government. A detailed program for private sector participation in the national road sector should be established in the context of the road development strategies and plans proposed in this report.

In this regard, the government, with WB assistance, is preparing a PPP model which would include the (1) guidelines and processes for developing, evaluating and implementing PPP projects, (2) model bidding documents and contracts, and (3) institutional arrangements with PPP financing framework based on the viability gap funding mechanism. This initiative should be fully supported by all concerned, and should be done in consultation with key stakeholders, including private sector groups that could be involved in investment, construction, and operation of PPP facilities. This undertaking could profit from a review of successful PPP practices in other countries which would be adapted to Vietnam.

4.3 Operation and Maintenance

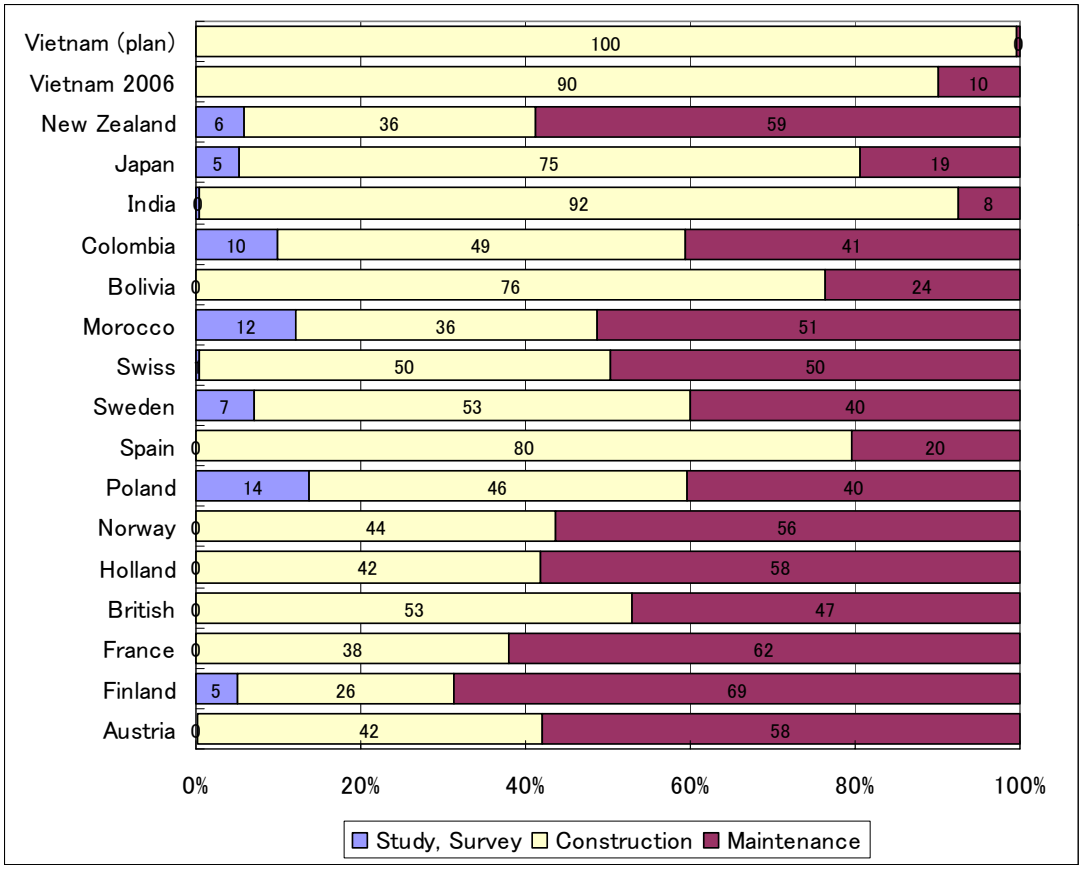
1) Problems and Opportunities

(1) Overview

The road conditions in Vietnam are poor, as evidenced by the fact that only 43% of the National Highway network is in good condition. Truck traffic is increasing and the situation would only get worse as heavy axle loads would accelerate road deterioration. Preventive maintenance is important to extend the serviceable life of pavements and avoiding costly reconstruction works.

The problem is that road maintenance in Vietnam has not received the high emphasis that it deserves. This is indicated by the low funding level for the maintenance of national roads, which stands at only 10% of the total road expenditures. This could fund only about 40% of the real maintenance needs. For comparison most developed countries allocate more than 20% of the road funds for maintenance (Figure 4.3.1). The share of road maintenance over new construction increases as the network becomes more mature. Japan which allocated only 19% for maintenance is expected to increase its allocation to 60% by 2030.

Figure 4.3.1 Comparison of the Road Investment Ratio by Work Type



Source: VITRANSS 2 Study Team

Funds for maintenance are not adequately provided under the State budget, and while going through the appropriation process the required funds tend get downsized to 30%–40% of the desired funds to maintain the roads properly. This delays maintenance or leads to cheaper but temporary or short-lived treatments. This creates a vicious cycle in that the next year's budgetary requirements would increase as roads deteriorate faster as a

result of the lack of timely maintenance and appropriate treatment. It is therefore important to build the maintenance budget from the appropriation process by reforming the fund sourcing and funds appropriation. More concretely, appropriated maintenance funds from the State budget should be minimized while dedicated and direct taxes and user fees should become primary sources. The latest development on the institutionalization of the road maintenance funds is a positive step towards this end.

A major breakthrough was achieved last year when the National Assembly approved the much awaited road traffic law and one clause of which regulated to establish a road maintenance fund from user charges . This law is just in effective by July, 1, 2009. This would be dedicated mainly to the maintenance of roads. The road traffic law did not stipulate the detailed sources and manner of utilization of the funds, but provided that the government will decide the specific sources of funds for national highways. The detailed systems and mechanisms to make the road fund operational are still to be established by the government.

GRA is responsible for the maintenance of the national roads network, through the Regional Road Management Units (RRMUs) and Provincial Department of Transportation (PDOTs). GRA has prepared a 10-year maintenance plan for national roads using the HDM 4 programming tool, but this plan has not been substantially implemented and translated into the annual maintenance programs and budgets. The main hindrance is the absence of a good database that would provide the extensive amount of data needed to properly run the HDM 4.

The maintenance of national roads is mainly undertaken by maintenance SOEs through force account and restricted bidding among SOEs. Small and medium maintenance works are awarded to Regional Road Maintenance Companies (RRMCs) within GRA's RRMUs. RRMCs compete with other SOEs for large maintenance works. Local roads are maintained by provincial and district SOEs. Commune roads are maintained using commune labor. Maintenance works in cities are done by Transport Engineering Companies (TECs).

Most maintenance SOEs have been established as public interest enterprises and thus have little incentive to modernize and adopt commercial practices. They also lack funding and skills. Several SOEs are financially distressed and are heavily indebted to the government.

Vehicle overloading is a major concern especially with the increase in the traffic of heavy trucks due to industrialization. This would result in early deterioration of roads and creates pressures for stronger vehicle load regulations, along with more effective road designs and preventive maintenance. The road network is also vulnerable to natural disasters – particularly in the northern mountainous regions and highlands due to landslides as well as flashfloods and river overflows.

(2) Need to Increase the Allocation of Funds for Maintenance

In Vietnam, road maintenance is categorized according to cost and type into small, medium and heavy repairs. Generally, small repairs encompass routine maintenance and medium and heavy repairs make up periodic maintenance. The General Road Administration (GRA) in the MOT has spent an average of US$23 million annually during the past five years for periodic maintenance (heavy and medium repairs as shown in Table 4.3.1). A recent analysis of rehabilitation and maintenance strategies conducted under its Ten-Year

Strategic Maintenance Plan found that funding for periodic maintenance should be twice as high, US$40-45 million per year. Routine maintenance of the national road system is of low quality, with funding at US$10-14 million, also less than half what is required. GRA's budget of maintenance is allocated annually by Government through the MOT and past requests for additional resources have been only marginally successful.

Table 4.3.1 Annual Allocation for Maintenance on National Roads (US$ million)

Maintenance Program	2000	2001	2002
Routine	13.2	13.1	12.9
Periodic	18.2	22.1	27.0
Total	31.4	35.2	39.9

Source: GRA. 10-year Strategic Maintenance Plan

Only about 10% of current road expenditures go to maintenance and minor rehabilitation and improvements. However VITRANSS 1 estimates that at least 20% of road sector budget should be allocated to maintenance. More recent studies estimate that maintaining the national road network (not including bridges) in its current condition would require a 60% increase in maintenance allocations, thereby budget allocation should be about 25% of the total budget. If the maintenance expenditure does not increase, the condition of the national road system will deteriorate during the next 5 to 10 years, and most high-traffic roads will require expensive reconstruction. The Ministry of Transport (MOT) has attempted to partly deal with this issue with its own internal budgeting process, but successes has been limited due to restriction in the budget law constraining the ability to reallocate funds from capital to recurrent budgets. The newly enacted Road traffic law regulating the road maintenance Fund is a positive, but while it is still growing its revenue base support will still be required from the general account of the government.

(3) Need to Ensure Stable Road Maintenance Funding

Tolls on publicly operated facilities have increased in recent years, as have licensing and other vehicle fees; however the funds do not go directly to and not earmarked for road maintenance, but instead accrue to the general revenues of the government. Ostensibly tolls go to pay back loan obligations; however often they are used as general revenue. Road users feel that they are already heavily taxed for a low level of road service and many resist paying higher fees unless the service improves accordingly. The Government's strategy has been to keep fuel taxes low (500 VND per liter) and to use the revenue for general expenditures, rather than directly for road maintenance and sector development.

MOT is keenly interested in establishing a road fund financed by dedicated user charges to increase resources for road development and provide a stable source of funds for road maintenance. Other ministries and the National Assembly have voiced concerns about this approach, however, and the lack of consensus and trust among stakeholders has impeded attempts to establish such a fund.

However, a roads traffic law was passed last year. One clause of this law regulated to create a road maintenance fund from user charges. This road traffic law was in effective by July 2009. The law instructed the government to decide on the specific sources of the fund. The government is also expected to come up with the rules and procedures governing the proper utilization and administration of the funds for maintenance. An interagency group chaired by MOT is currently formulating these detailed systems and rules, including the specific content of the fund, to make the road maintenance fund operational.

(4) Need to Build GRA's Institutional Capacity for Road Maintenance Management

The GRA's Regional Road Management Units (RRMUs) maintain a little more than half the national road network, and the Provincial Departments of Transport (PDOTs) maintain the rest, as provincial roads under their jurisdiction. GRA also plans the maintenance of the whole national network and commits a haft of the NH network to PDOTs for national road maintenance plans. Previously, GRA has concentrated on improving the RRMUs' ability to collect and maintain engineering and condition data for roads and bridges; however little has been done to improve GRA's planning, budgeting, and monitoring of maintenance activities. Improvements therefore have had little effect on asset management practices, and RRMUs have had little incentive to collect road condition and traffic information regularly. The institutional framework of the road maintenance program therefore still needs to be improved. The Government's strategy is for GRA to take the lead in setting a strategic vision for the national road system, implement a planning and monitoring framework, and introduce improved business practices.

(5) Need to Improve the Efficiency of Road Maintenance

Most road maintenance is currently executed by State Owned Enterprises (SOEs) – Road Repair and Management Companies (RRMCs) – under the direct control of the GRA through force account and restricted bidding among SOEs. Incentives for SOEs to modernize or adopt sound financial and commercial practices are low. Technical and personnel skills are lacking, and funding sources from planning and budgeting to execution, supervision, and monitoring. The Government's strategy has been to equitize transport SOEs (i.e., transfer ownership by selling shares); however progress on this and other reforms has been slow and has yet to reach the maintenance companies operating under GRA.

2) Agenda to Improve Road Maintenance

To address the abovementioned issues, the proposed agenda to improve road maintenance includes:

(i) Increased funding for maintenance
(ii) Making the road maintenance fund operational
(iii) Strengthening GRA's capacity to manage road maintenance
(iv) Reforming maintenance SOEs
(v) Expanding private participation in maintenance services
(vi) Strengthening measures against vehicle overloading
(vii) Redesigning roads.

Details of each measure are as follows:

(1) Increased Funding for Maintenance

In line with the policy emphasis on asset preservation, the government should substantially increase the funding for road maintenance in order to meet the actual needs on a sustained basis. The additional maintenance funds could be sourced as follows:

(i) The road maintenance fund, which is authorized to be established by recent road traffic law, would provide a stable and earmarked source of money for road maintenance. This would consist of road user charges imposed on vehicles and/or fuel under the "users' pay" principle. It is expected that at the start of the operation of the road maintenance fund, revenues generated would be small compared to the maintenance

budget. However over time the revenues would increase in proportion to the increase of road traffic and registered vehicles.

(ii) In the interim while the road maintenance fund is gradually increasing, appropriations for maintenance would continue to be provided in the annual budget of the government from general revenues. The government could combine the budgets for construction and maintenance of roads to give a higher percentage allocated to maintenance than the current level. This would require an adjustment in the planning and budgeting process, whereby GRA/MOT would formulate the road construction and maintenance programs jointly, based on the road network plan under an integrated road budget ceiling, and determine the most feasible mix of construction and maintenance projects that would give highest net economic returns in meeting the network needs. GRA would then prepare the capital and recurrent budgets accordingly within the total road budget ceiling from general revenues. This should be done within the context of the MTEF which gives first priority to existing programs, notably the maintenance of existing roads. Over time, as the road maintenance fund grows, the amount of road maintenance funds sourced from general revenues should gradually be reduced.

(2) Making the Road Maintenance Fund Operational

The government, through an inter-agency group chaired by MOT, should expedite the formulation of the guidelines and instructions that would define the fund sources, utilization, and other mechanisms and systems to make the road maintenance fund operational as soon as possible, noting that the road traffic law regulating the establishment of the road maintenance fund became effective in July 2009. Key points that need to be considered in drawing up these implementing instructions include the following:

(i) Specific Sources of the road maintenance fund. These could include fuel levies and vehicle registration fees and taxes, existing and/or new, which should be deposited in a special account separate from the general revenues.

(ii) Application of the road maintenance fund. The fund should be used mainly for road maintenance including minor rehabilitation or asset preservation of the national road network.

(iii) Amount of road maintenance fund and rates of road user charges. The fund should ultimately cover the cost of road maintenance needs – in terms of routine and preventive or periodic maintenance and minor rehabilitation. These needs could be systematically estimated on a network life cycle basis using tested planning tools such as HDM 4. The proper mix of vehicle and fuel charges should be determined, noting that the consumption of fuel is directly related to the use of the road by the vehicles. As pointed out by an MOT official, the government will have to determine the appropriate portion or percentage of the fuel levies that should go to the road maintenance fund, considering that, apart from road users, other sectors such as fishing and industries also consume fuel. Road user charges from vehicle registration fees should differentiate between types of vehicles and should be proportional to the cost of the road damage caused by each type of vehicle - e.g., heavy trucks would have to be charged more than automobiles or motorcycles as the former cause greater damages than the latter. The user charges could be introduced and increased gradually.

(iv) System and criteria for project selection and fund allocation. Modern road planning systems and tools using objective technical and economic criteria, e.g., HDM 4, could be employed to selection and prioritize feasible intervention works for funding within

the available budget based on the net present value of economic benefits per unit cost.

(v) Administration of road maintenance fund. Alternative schemes for administering the fund should be explored, and lessons from practices in other countries should be considered. These alternatives include, among others, fund administration by (a) MOT or GRA, or (b) a government board under MOT chaired by MOT and composed of other government agencies (e.g., MOF, MPI,) with some representation from road user groups, or (c) an independent board composed of road user groups, or (d) a combination or hybrid of these schemes. Alternative (b) has been adopted in the Philippines with mixed results because of political intrusion in the government-dominated board. Alternative (c) has proven to be successful in New Zealand, especially as it provides for a built-in motivation of the road users to closely administer and monitor the proper utilization of the fund to which they contribute. Regardless of the scheme adopted, what is essential is that the special fund be administered according to sound systems and processes which would include the allocation of funds to maintenance programs and projects based on needs using technical and economic efficiency criteria.

A flexible approach to the matter of road financing is suggested, focusing on ensuring that maintenance expenditures increase progressively in line with the maintenance requirements and budgets based on an agreed long-term strategy. This approach offers several advantages. First, implementing a road maintenance fund without first improving efficiency would mean essentially asking users to pay to support the existing maintenance system, which lacks transparency and accountability. Second, to be effective, a road maintenance fund would need to be transparently managed and take into account the views of stakeholders to gain their willingness to pay new user charges and place their trust in the management of such funds. Third, a limited number of users are willing and able to pay for road maintenance (trucking companies, exporters and importers, large industrial users). Preliminary surveys indicate that they feel that they are already too heavily charged under the current system of taxes and tolls, which therefore needs to be re-examined in the context of any new road user charges.

Hence, the road user charges could be gradually introduced and increased to reach the desired ultimate level over a reasonable period, say, 4-6 years. At the same time, maintenance funding from the budget from general revenues would continue as a supplementary source, but diminish correspondingly over the same period as the road maintenance fund increases. Ideally, as practiced in other countries and in line with basic economic principles, in the long run it would be desirable to finance road maintenance entirely from road user charges, as these are directly related to the cost of road utilization, instead of from general revenues which could then be concentrated on road construction.

Initially, the road user charges could be set at levels equivalent to the current maintenance funding so that the budget is not further burdened. The user charges would then be increased gradually, in accordance with the medium-term maintenance program based on needs, to raise the maintenance standards and quality of the road network.

This strategy will allow for transparency and prove a reasonable time to build up the users' trust in the effective use and management of the road maintenance fund.

Technical assistance may be secured from ODA sources to help the government in developing the detailed systems and mechanisms for the road maintenance fund, in order to benefit from best international practices (e.g., New Zealand).

(3) Strengthening GRAs Capacity to Manage Road Maintenance

GRA should enhance its institutional capacity to manage road maintenance. It should implement a planning and monitoring framework for road maintenance, and expand business practices in road management. GRA should intensify its efforts to establish the extensive database of road and traffic conditions and costs needed to fully use the HDM 4 system for programming preventive maintenance and rehabilitation works. It should train the RRMUs to regularly conduct field surveys needed to generate accurate and timely information for the database. Aside from HDM 4, GRA could explore the use of other modern programming tools such as the routine maintenance management system.

GRA should improve the existing maintenance manual, particularly on the aspects of road maintenance inspection, planning, and management to guide road maintenance engineers and supervisors on modern practices. It should undertake continuous and intensive training and accreditation of RRMU road maintenance inspectors and managers, including techniques for the supervision of maintenance contracts.

(4) Reforming SOEs

Maintenance SOEs should be redefined as business enterprises (similar to construction SOEs), instead of public interest SOEs, in order to increase their management autonomy and make them operate along business lines. As in the case of construction SOEs, the government should expedite its plan to equitize maintenance SOEs.

(5) Expanding Private Participation in Maintenance Services

GRA should expand the use of maintenance by contract (MBC) by private contractors for better control and management of works. This could follow a phased schedule which would attempt to implement at least 90% of maintenance works through MBC in about 6-8 years. Contract packages should be large enough to attract good maintenance contractors. GRA could also consider the adoption of long-term performance-based maintenance contracts (LTPBMCs) for long road links or sub-networks. Under this scheme, which has been successfully practiced in other countries, the contractor shall undertake the routine and preventive maintenance of the roads according to prescribed output and performance standards, and will be periodically paid fully if he meets the output/performance standards; otherwise, appropriate deductions will be imposed for failure to meet the standards.

(6) Strengthening Measures against Vehicle Overloading

To address the fast growth of truck traffic and the incidence of truck overloading, GRA should strengthen vehicle load regulations and their enforcement. These should include the installation and operation of weighing stations along heavily traveled truck routes.

(7) Redesigning Roads

The government could consider redesigning roads to carry heavier gross vehicle and axle loads. This, however, should be done in the broader context by looking at practical alternatives involving different combinations of road designs and vehicle configurations with the view of considering the alternative that would minimize the total transport cost to the economy – i.e., road user costs plus road construction and maintenance costs.

To reduce the need to rehabilitate road sections damaged by natural disasters, identified high-risk roads could be designed to higher standards, including appropriate slope protection and disaster mitigation measures.

4.4 Quality of Road Construction

1) Problems and Opportunities

The implementation of national road projects (as well as other transport construction works) is generally managed by Project Management Units (PMUs) attached to MOT and GRA. MOT and GRA have five PMUs each. PMUs are allocated work by MOT based on the nature and scale of the projects. MOT plans to eventually place all road PMUs under GRA. MOT usually assigns the large and most important projects directly to the PMUs under MOT, while the other projects are assigned to the PMUs under GRA. According to an MOT official, this arrangement may continue for some time because the GRA is not yet capable of managing the bigger projects and, thus, it would be risky to assign these projects to GRA. PMUs usually handle the design works, assign or tender out the construction works to SOEs/contractors, manage the project funds, supervise the construction works, and then turn over the completed works to GRA for maintenance.

In the first decentralization phase, MOT had hand over haft of their PMUs in charge of Road project development to GRA. From now then, GRA have the comprehensive management right to regulate and operate all strategy, master plan, development plan, project construction implementation, operation and maintenance of Road sub-sector. Some specialist says “in future MOT may transfer all PMUs of important Road projects to GRA”. In reality, long ago this issue has been in place at other sub-sector like Airway, Maritime, IWT, Rail, but Road. Thus, it takes time for GRA getting experiences.

Actual construction of national road projects is carried out mostly by SOEs under the Civil Engineering and Construction Corporations (CIENCO’s) attached to MOT; provincial governments and some private sector companies are also assigned or awarded projects. Interested companies are required to compete through bidding, but SOEs are awarded the majority of the contracts, which they often subcontract to private firms.

According to the Deputy Director General of PMU 85, the participation of private contractors under the PMU has been increasing steadily; the number of contracts awarded to private contractors was almost nil in the 1990s, rose to about 30% in 2000-2005, and further grew to about 40% after 2008, with the balance awarded to SOEs.

Under the current set-up, project management and implementation is generally inadequate, and accountability and oversight functions are weak. PMUs have not generally been consistently successful in managing projects (a notable exception could be PMU 85 which has reportedly completed 15 projects with no major construction defects, cost overruns, and delays). The criteria for choosing PMUs to handle specific projects are not clear. Being government entities, PMUs are not commercially oriented and have little incentive to be efficient in managing projects. Their performance is not systematically evaluated against targets. PMUs sometimes engage supervision consultants but the latter have limited powers over the performance of SOEs/contractors which often bypass the consultants and report directly to the PMUs or MOT. PMUs also tend to bypass the consultants in dealing with the contractors. The PMU 85 Deputy Director-General attributed this situation partly to the unclear laws and regulations governing the responsibilities of the owner/PMU, the contractor, and the consultant. All of these contribute to the low quality of construction.

In addition, delays in implementation are also caused by delays in acquiring land (right-of-way) and resettlement of families displaced by the projects. These are responsibilities of the PMU and other government agencies.

SOEs/ CIENCOs have not been efficient in implementing road construction projects. This is partly because of their basic structure as government-owned and capitalized entities which do not operate according to business principles. Many SOEs are heavily indebted; some have been bailed out by the government, and most urgently need financing. This situation induces them to submit low bids, which in turn usually result in low quality works and delayed implementation. Since the CIENCOs running the SOEs are attached to MOT, PMUs and consultants usually have little control over the SOEs. The government is implementing a program to corporatize or equitize SOEs, but progress on this has not been significant. According to MOT, particularly this year the equitization program is delayed because of the general economic downturn. Several SOEs, however, have partnered with private companies in forming joint stock corporations. According to the PMU 85 Deputy Director General, many private contractors, including the joint stock corporations, do not have enough money, equipment and staff, as well as experience, which give rise to delays in implementation and inferior work.

Governance on road projects is weak, which is vulnerable to corruption. As noted above, this is mainly due to inadequate project management and implementation, involving PMUs and SOEs, with unclear accountability and oversight responsibilities. Procurement and contracting processes are particularly weak. These are marked by lack of transparency, inconsistent rules, limited competition, signs of collusion among bidders, State control of prices, and lengthy approval of designs and estimates. There is also an inherent conflict of interest where the bidders are SOEs. SOEs/ CIENCOs are attached to MOT and, therefore, cannot be said to be truly independent of MOT besides, many SOEs are indebted to the government. MOT would then have an incongruous conflict between its interests as customer/client of the construction services and its interests in the ownership and operation of the service provider. Some CIENCOs are reportedly coordinating the operations of their member SOEs which would develop monopolies and discourage the entry of private contractors and other SOEs, thereby restricting competition and providing low quality construction at high costs. All of these eventually engender low quality of construction.

2) Agenda to Improve Road Construction

To address issues above to improve road construction, the proposed agenda include the following:

(i) Strengthening GRA capacity for project management
(ii) Expediting reforms on construction SOEs
(iii) Improving the quality of road designs and estimates
(iv) Strengthening the procurement process

(1) Strengthening GRA Capacity for Project Management

MOT should intensify its initiatives to strengthen the project management and supervision capacity of GRA so that the latter effectively performs its lead role in road administration. This would include the following measures

(i) Place all PMUs directly under GRA for better supervision and control and to ensure consistency with the approved road plans, programs and budgets. This could be done according to a phased program that would progressively build up the capability of GRA and its PMUs to manage the larger projects. GRA could streamline the PMUs by making them co-terminous with the projects that they handle, rightsizing their staff or merging them, or integrating them into the regular units of GRA.

(ii) Set up a strong performance-related incentive system for PMUs to enhance their efficiency and accountability. This will involve evaluating and measuring project management performance of PMUs against pre-set targets and norms, in terms of the quality of construction against plans and specifications, actual project expenses against approved contract/project budgets, and ability to meet schedules for the projects managed by them. Appropriate sanctions would be imposed for poor PMU performance, e.g., suspension from managing projects, while rewards would be given for good PMU performance, e.g., merit points to be considered in selecting PMUs for future larger projects.

(iii) Clearly define and enforce the roles and responsibilities of GRA/PMU, contractor and supervision consultant (engineer):

- GRA/PMU, as the project client/owner, would award the contract, engage the supervising engineer/consultant and empower him/her to supervise the works as their representative, provide the right-of-way to the contractor, approve variations, pay for work accomplished, secure adequate funding, and accept the completed works. GRA/PMUs should see to it that the supervising engineer/consultant have passed upon the technical aspects of the above before giving their approval thereon.
- The contractor would carry out the construction works, adhere to the approved plans, specifications, and timetable, provide the labor, materials and equipment, award sub-contracts, remedy defects, and present payment claims.
- The supervising engineer, as the client's (GRA/PMU's) representative, would check the contractor's performance against plans, specifications, and timetable, measure accomplished works, verify work quality, issue payment certificates, instruct contractors to remedy defects, and issue completion certificates.

As suggested by the PMU 85 Deputy Director-General, the standard contracts for civil works developed by the Federation Intenationale des Ingeniuers Conseils (FIDIC) could serve as a good template in defining the responsibilities and relationships of the contractor, the engineer (consultant), and the owner (PMU/GRA).

(i) Develop a comprehensive manual on project management, including quality assurance, to guide project managers and engineers. Undertake continuous and intensive training and accreditation of GRA project managers and engineers.

(ii) Simplify and shorten the review and approval processes for engineering designs, estimates, contracts, variation orders, and payment claims. Most of these processes can be devolved to GRA or PMUs. The simplified procedures, requirements, and timetable should be published and posted on the agency website.

(2) Expediting Reforms on Construction SOEs

The government should accelerate its program to equitize or corporatize construction SOEs under defined and transparent rules and a firm schedule. This should include the joint stock companies between SOEs and private companies. Equitizing the SOEs will immediately remove the conflict of interest of MOT as client of SOE services and as controlling owner of SOEs. The equitized SOEs are expected to operate along business lines, which will drive them to be financially self-sustaining and efficient in their construction operations. The equitized SOEs should compete with private companies on equal footing. In the meantime, MOT/GRA should raise the qualification standards for SOEs participating in the bidding and

increase their training incentives.

(3) Improving the Quality of Road Designs and Estimates

To improve the quality of road construction, GRA should strengthen the preparation of road designs and specifications. This should include a quality assurance system to check the integrity of engineering surveys, designs, and quantity and cost estimates. Value engineering should be introduced, especially for the larger road and bridge projects, to ensure that all practicable alternative designs to perform the function of the project are evaluated and compared, in order to arrive at the least cost scheme without impairing the structural integrity and basic function of the project. These measures will serve to minimize the possibility of overdesigning and overpricing before tendering the works, as well as reduce the likelihood of defects, variations and overruns during construction. GRA could mount a training program to improve skills and systems on the above aspects.

To mitigate disaster impacts on roads, GRA should conduct an audit of high-risk road segments, and enhance design specifications for slope protection and related disaster reduction works, especially for roads in high-risk areas. Alternative routes to bypass the high-risk road links should be identified and developed.

(4) Strengthening the Procurement Process

GRA should improve the procurement and contracting process through the following measures:

(i) The bidding procedures and tender documents should be streamlined and standardized. The government should formulate a single code of procurement for construction contracts. This code would prescribe a standard set of clear and simple rules and procedures for bidding based on the principles of competition, transparency, consistency, and accountability. This should include the use of standard criteria and requirements to determine the eligibility/qualification of contractors, and simple and non-discretionary rules to evaluate and compare bids to arrive at the winning bidder.

(ii) Standard bidding/tender documents should also be developed. These would cover clear and complete instructions to bidders including eligibility/qualification and bid requirements, project plans, specifications, bill of quantities, and pro-forma contract conditions. The standard bidding documents should preferably be harmonized with those used by major ODA agencies - ADB, JICA and WB – as has been done by other countries, e.g., the Philippines, in order to have a uniform set of documents applicable to both domestically-funded and foreign-assisted projects. A good model for a pro-forma contract, which is universally used, is the standard conditions of contract developed by FIDIC. Now being employed for ODA-funded projects in Vietnam, the FIDIC contract conditions could be adapted and used for domestically-funded projects as well.

(iii) To promote healthy competition among contractors and SOEs, a two-submission, two-envelope bidding system could be used. The contractors would submit their technical envelopes containing their technical qualifications to implement the contract being bid (including financial capability and work experience). The second envelope would be their financial envelopes containing their price proposals. Only bidders passing the technical evaluation will have their financial proposals evaluated.

(iv) Establish a computerized database or registry of contractors with up-to-date information on their qualifications - legal, technical and financial capability, and

performance records on previous projects. For a particular contract to be bid out, the database would automatically process and determine whether the contractor is eligible or not, by matching his qualifications, as stored in the database, against the requirements of the contract at hand. This automated system would greatly shorten the processing time and avoid human intervention which could undermine the integrity of the bidding process.

(v) Strengthen governance to prevent corruption and promote accountability and transparency by GRA and other entities involved in road construction. To widen the competition by interested bidders, all invitations for tenders should be published in major newspapers and posted through the internet on the agency website. Bidding documents should also be posted at, and be downloadable from the agency website, as should bid results and contract awards. To enhance transparency, the bidding panel should include representatives from the community/road users/non-government organizations concerned. There should be a mechanism to receive and respond to complaints on bidding irregularities and to impose sanctions on erring bidders and agency personnel.

(vi) To avoid any conflict of interest, a program should be undertaken that will eventually allow SOEs to participate in the bidding only if they are fully equitized and completely autonomous from MOT/government in terms of financial and technical support and control.

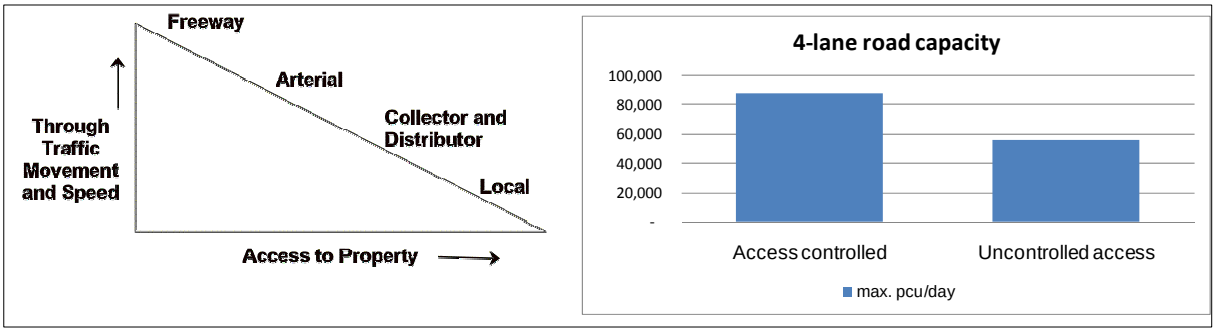
(vii) To improve the quality of construction work, GRA should upgrade the qualification requirements for contractors (private and SOEs). This should be done under a phased program to provide for the progressive build-up of contractors' capacity, while ensuring adequate participation of contractors to provide effective completion at all times.

4.5 Road Hierarchy

1) Problems and Opportunities

A road hierarchy creates a functional classification of the highways to allow the specific highway to concentrate on either facilitating high capacity or property access. Controlling access, for example, could increase the capacity of a 4-lane highway by nearly 60%, resulting in higher capacity per unit investment (see Figure 4.5.1).

Figure 4.5.1 Impact of Access Control and Function



Sources: Federal Highway Administration of the United States and VITRANSS 2 Study Team.

One key weakness of the Vietnamese road network is an unclear road hierarchy, and this has become increasingly more an issue as Vietnam progresses towards becoming a motorized country with high growth rates in motorcycle ownership, car ownership, and truck movements. These vehicles with differing operation characteristics cause friction on the roadway, leading to suboptimal operation. Worse, they create risky maneuvers and situations leading to a high rate of accidents on Vietnamese roads.

The definition of the national highway is stipulated in Decree No.186/2004/ND-CP, that is;

'National Highways are the main axial roads of the nationwide land road network, which are of particularly important effect in serving national or regional socio-economic development, defense and security, including:

(i) Roads linking Hanoi capital with the centrally-run cities; and with administrative centers of the provinces;
(ii) Roads linking administrative centers of three or more provinces or centrally-run cities (hereinafter called provinces); and
(iii) Roads linking international seaports with international border-gates and main land border-gates.'

However, even in the category of national highways, there is considerable difference on how the weights of traffic function and access function are placed by route. For example, Photo-1shows the condition of National Highway No. 21 which was just improved as a part of Ho Chi Minh Road, and Photo-2 shows National Highway No. 12B which crosses NH21 in the vicinity of Hang Tram (Figure 4.5.2).

Figure 4.5.2 National Highway Conditions

Photo-1 Condition of NH21

Photo-2 Condition of NH12B

Source: VITRANSS 2 Study Team

NH21 was improved with a high level of specification in structural aspects in order that it may perform the role of a trunk road which connects between cities, while NH12B which caters to pedestrians and bicycles has mainly provided access function. NH12B therefore could not function as a primary arterial effectively because it has to also function as an access road for properties and houses along it.

2) Agenda to Improve Road Hierarchy

The key objective of a road hierarchy is to ensure the orderly grouping of roads in a framework around which state and local governments can plan and implement various construction, maintenance, and management schemes. It should also assist local and state governments with the adoption of appropriate standards for roadway construction.

A well formed road hierarchy will reduce overall impact of traffic by:

(i) Concentrating long distance flow onto routes in less sensitive locations;
(ii) Preserving areas where through traffic is discouraged;
(iii) Ensuring that activities most closely related to frontage development can be given more space within precincts where environmental and access functions should predominate.

The road hierarchy principles will assist planning agencies with;

(i) Orderly planning of heavy vehicle routes;
(ii) Planning and provision of public transport routes;
(iii) Planning and provision of pedestrian and bicycle routes;
(iv) Identifying the effects of development decisions in and on surrounding areas and roadways within the hierarchy;
(v) Development design that facilitates urban design principles such as accessibility, connectivity, efficiency, amenity and safety;
(vi) Assigning control over access onto traffic carrying roads to ensure safe and efficient operation for traffic;

To orient road development towards a more defined hierarchical structure, key thrusts proposed include:

(i) Redefining the development criteria of national highways, by classifying the function of routes of the national highway based on a overall transport corridor development strategy.

(ii) Promoting the development of the secondary road network.

(iii) Introducing traffic segregation.

(1) Development Criteria for Classification of National Highways

The present National Highway network (17,400km covering 91 routes) contains routes whose expected roles differ greatly. In such a situation, to achieve a more efficient network development, it is necessary to clarify the road hierarchy and to improve the roads according to the standards corresponding to their functions.

Therefore, it is proposed to classify national highways into three classes - primary, secondary and tertiary - based on the concept of transport corridors which was introduced by VITRANSS 2 as one of the essential policies and strategies for transport development:

VITRANSS 2 defines a transport corridor as a set of parallel transport routes that form a gateway connecting one economic activity center with another. The entry point of a gateway is often an international seaport and/or border gate. The transport corridor is comprised of transport infrastructures, such as highway, railway and shipping lane.

Under this context, the classification of National Highways is defined in Table 4.5.1. The existing national highway network is then categorized into primary, secondary or tertiary in Table 4.5.2, and illustrated in Figure 4.5.3.

Table 4.5.1 Classification of NHs by the Transport Corridor Concept

Class of NH	Corridor NH belongs	Definition of Corridors
Primary	National Backbone Corridor	Serves as a major artery to connect NFEZ, CFEZ and SFEZ passing through the country from north to south as a backbone of country's economy and life.
	International Gateway Corridor	Serves as a major artery to FEZs for the growth of national economy, and functions as the gateway to and from the international market as well as sources.
	Land-bridge Corridor	Serves as a linkage between FEZs and neighbouring countries, i.e., China with NFEZ, Cambodia with SFEZ, and Thailand, Lao PDR, Myanmar with CFEZ.
	Metropolitan Ring Corridor	Serves as an arterial road to unite the provinces surrounding the growth pole in a shape of ring.
Secondary	Regional Corridor	Serves as a major link branching off from FEZs to connect major production / consumption areas along the corridor.
Tertiary	Out of Corridors	

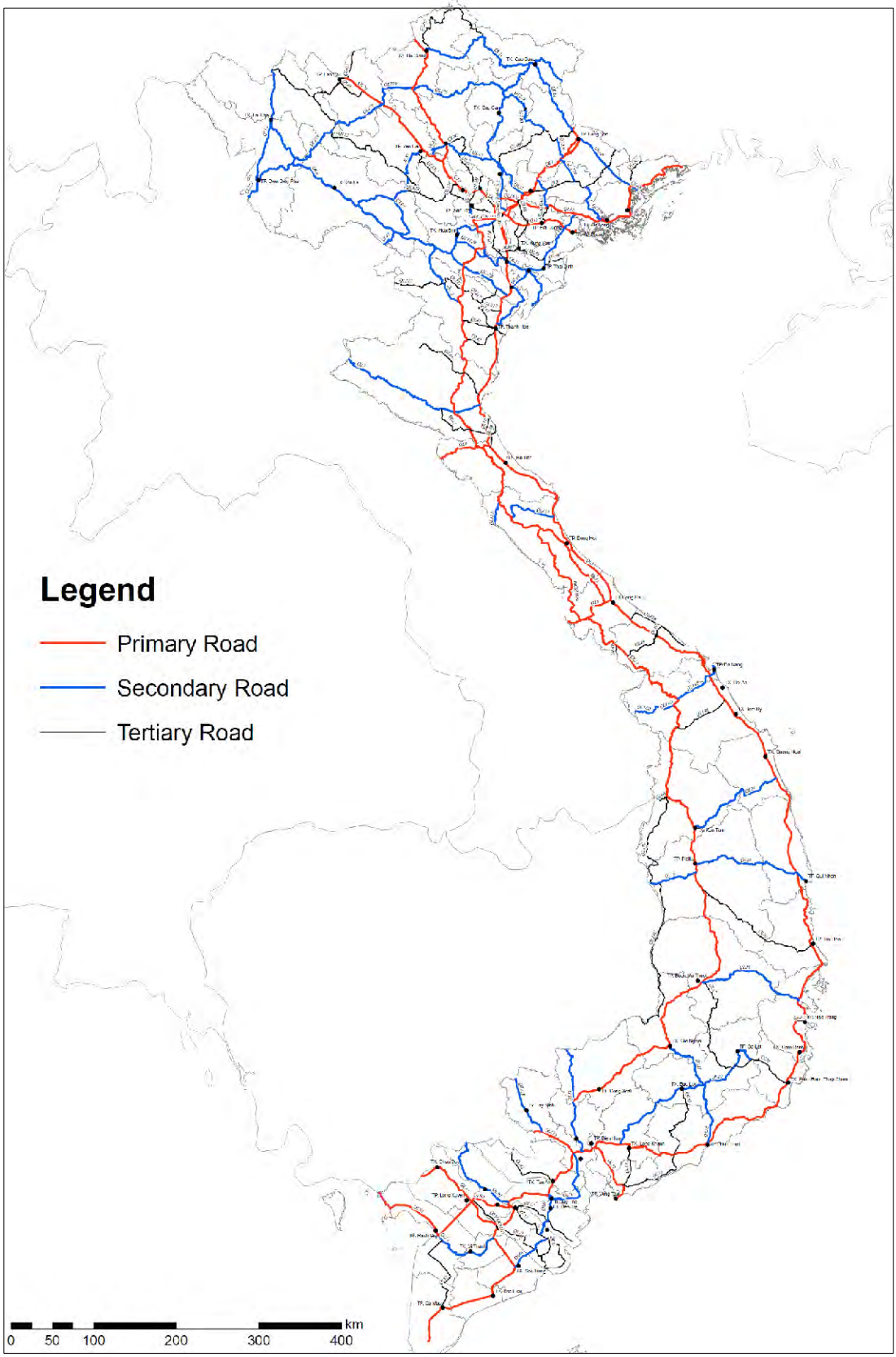
Source: VITRANSS 2 Study Team

Table 4.5.2 Classification of NHs with Route No.

Classification	Corridor		Route No.	Length (km)
Primary	National Backbone	North-South Coastal	NH1, HCM Road East (NH15)	7,519
		North-South Upland	HCM Road (NH21, 519, 15), HCM Road West, HCM Road (NH14), NH80	
	International Gateway	NFEZ Gateway	NH5, NH18	
		SFEZ Gateway	NH51	
		CFEZ Gateway	NH1	
	Land-bridge	Hanoi-Lao Cai	NH2, NH70	
		Hanoi-Lang Son	NH1	
		Vinh-NH8-Lao Border	NH1, NH8	
		Don Ha-Lao Bao	NH9	
		HCMC-NH22-Cambodia	NH22	
		Soc Trang-Can Tho-Cambodia	NH1, NH91	
	Others	-	Thang Long-Noi Bai, Lang-Hoa Lac, Noi Bai-Bac Ninh, D.ATK	
Secondary	Regional Transport	Regional Corridors	NH3, NH4A, NH4B, NH6, NH7, NH10, NH12, NH12A, NH13, NH12B, NH14B, NH14D, NH15, NH19, NH20, NH22B, NH24, NH26, NH28, NH30, NH34, NH37, NH43, NH50, NH60, NH61, NH279	5,310
Tertiary	Local Transport	-	NH1B, NH1C, NH1D, NH2B, NH2C, NH3B, NH4C, NH4D, NH4E, NH4G, NH8B, NH14C, NH14E, NH18C, NH21B, NH23, NH24B, NH25, NH27, NH27B, NH31, NH32, NH32B, NH32C, NH38, NH39, NH40, NH45, NH46, NH47, NH48, NH49, NH49B, NH53, NH54, NH55, NH56, NH57, NH62, NH63, NH91B, NH100, NH183, NH217	4,576
Total				17,404

Source: VITRANSS 2 Study Team

Figure 4.5.3 Distribution of NHs with Classification



Source: VITRANSS 2 Study Team

(2) Secondary Road Network Development

Eighty-five percent (85%) of the road network is composed of local roads including provincial roads, district roads, urban roads, and commune roads, which gives access to the less developed areas in the country. The quality of local road network is unsatisfactory. The road conditions are poor with a high proportion of roads remain unpaved. Road density is relatively high, but this is only because of the 151,000km of commune roads. The collector and intra-provincial road network which is the function of provincial roads is particularly limited in coverage. This affects the overall performance of the road network, as the weak secondary road network inevitably constrains the performance of the primary road network.

The PDOTs are responsible for the investment and maintenance of the secondary road network, thus their capability to handle the large investment and the complicated planning and engineering process needed is crucial for the successful alleviation of the poor secondary road network in the country.

Funding is obviously a key consideration, especially with the scale of investment needed, and therefore it is necessary to rationalize the investment in the secondary road network. In other words, the improvement of the road network needs to follow clear and efficient criteria to ensure that the resources are wisely spent in a stage-wised manner, and the continuous application of this strategy will slowly accumulate and gradually transform the secondary road network in line with growth of traffic requirements.

The capacity building of local government units therefore is identified as the key thrust to the accelerated development of the secondary network. Moreover the coordination of the secondary road network development and the national highway network needs to be enhanced. The role of local and national government agencies therefore need to be clarified.

(3) Introducing Traffic Segregation

Vietnam's unique traffic mix of motorcycle traffic travelling along high speed arterials together with cars and heavy vehicles is one of the factors of high road fatality rates in Vietnam. Traffic segregation, which is to physically separate the movement of motorcycles and four-wheeled vehicles, would be one of the key strategies to reduce road fatalities. It will also traffic operation efficiency, as fast moving cars and heavy vehicles would not be constrained by slower moving motorcycle traffic.

Strengthening the road hierarchy would create traffic segregation, to an extent. Inter-provincial through traffic is mostly composed of cars, trucks and busses, while local traffic is mostly motorcycles. With a more defined hierarchical road network some level of segregation will be realized. There are however will be segments in the national highway network wherein there will still be a mixture of motorcycles together four-wheeled vehicles. In this case road designs should feature facilities for motorcycle traffic. Standards and warrants for traffic segregation should be developed.

4.6 Traffic Management and Road Services

1) Problems and Opportunities

Traffic management and road services are critical to ensure that infrastructure development and improvements are optimally used and negative externalities are mitigated. Key areas include traffic safety, road transport industries, and ITS.

(1) Traffic Safety

The high rate of motorization has also produced a rate of accidents in Vietnam that is higher than other Asian countries. Most of these accidents have occurred on national roads (46%) and involved 68% by motorcycles. The estimated economic cost of these accidents amounted to VND3.2 trillion[2] in 2004. For the 2006 accident data, the economic cost is VND3.8 trillion, or about $230 million.

(2) Road Transport Industries

The privatization of the trucking industry has progressed that the role of state-owned enterprises (SOEs) has been reduced to negligible levels, creating a highly competitive trucking market. It is also notable that the role of the government in the provision of bus services has declined in favor of private sector operators, reflecting an increasingly more vibrant market-oriented industry. Similar to the trucking industry the bus industry is likewise very competitive. Most of road transport service provides are small to medium scale companies.

While competition is a key factor to enhance responsiveness to the market and to lower costs, there is a danger that over-competition will stifle the modernization of the truck and bus fleet. There is also a danger that operators would sacrifice safety, by overworking drivers, incentivizing reckless driving to keep up with schedules, and cost-cutting in vehicle maintenance. Mechanical failures could result in fatal accidents.

It is therefore timely for the government to strengthen safety and environmental standards to foster the modernization of the road transport industry.

(3) ITS

Intelligent Transport Systems (ITS) has potential to improve efficiency and to offer value-added road services in both the passenger market and logistics. Examples of ITS services that could be introduced in Vietnam include:

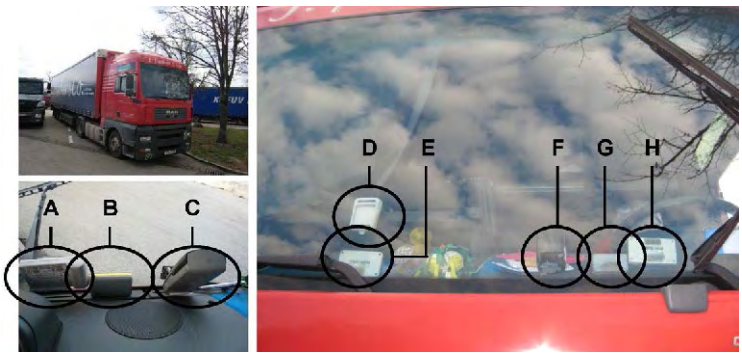
(i) Road traffic information – to improve route decisions of motorists, and for accident or vehicle breakdown response.
(ii) Non-stop toll collection – to totally remove the need for toll plazas and improve operation of expressways.
(iii) Heavy truck control – to facilitate value-added logistics, heavy vehicle monitoring (including overloading), and to improve the implementation of cross-border traffic (e.g. Goods in Transit).
(iv) Inter-city bus information – to improve bus operations.

ITS is still in its infancy in Vietnam, and early applications only include ETC applications. Promotion of ITS application is needed, particularly in the setting up of standards and the

[2] Trinh Thuy Anh, Nguyen Xuan Dao, and Trinh Tu Anh. “Cost of Road Traffic Accidents in Vietnam,” EASTS 2005.

institutional framework that would govern and guide the development of ITS in Vietnam. Standards in ITS will avoid problems in incompatibility of technology. For example, the lack of standards would require vehicles to carry numerous on-board units (OBU) for oftentimes the same type of application (Figure 4.6.1).

Figure 4.6.1 Necessity to Use Numerous OBU due to Lack of Standardization



Source: Offered by Mr. Noguchi
Note:
A–H: Many
OBUs in a Car

2) Agenda to Traffic Management and Road Services

(1) Traffic Safety

To reduce traffic accidents and improve traffic flow, there is need for traffic segregation on national roads, especially to deal with the very high number of motorcycles mixing with four-wheel vehicles. Design standards for Vietnam national roads should be developed to address this unique traffic characteristic.

A database to systematically record and analyze traffic accidents on national roads should also be established to identify and prioritize road safety measures, especially to rectify accident black spots. This could be complemented by an intensive road safety audit on the national roads. These measures are in addition to intensifying traffic safety education and enforcement, including the current mandatory use of helmets for motorcycle riders.

(2) Road transport industries

Government regulations should focus on safety, environmental and quality safeguards since the road transportation industry is being substantially transferred to the private sector. Vehicle emission standards needs to be reviewed as more eco-friendly and fuel-efficient vehicles are introduced.

(3) ITS

To realize an efficient and sustainable ITS implementation and operation, it is necessary to establish an appropriate institutional framework for ITS standardization and promotion.

5 DEVELOPMENT STRATEGY

5.1 Strategic Priorities

Having received budget priority in the past decade, the focus has shifted away from rapid expansion of the network into network preservation and improvement of connectivity and quality. Compared to other countries, Vietnam's main deficiency is the low ratio of paved roads and the relative paucity of secondary roads. The road hierarchy is unbalanced and is being compounded by a lopsided program on expressway development (1,400km by 2010 and 5,753km by 2030).

Road maintenance is thought to be substantially underfunded, but little is known quantifying the scale and nature of the problem based on an assessment of road conditions, rate of deterioration, and appropriate remedial treatments. It was reported that maintenance of national roads alone will require USD195 million in 2005. Anecdotal evidence shows that many roads are relatively new and hence maintenance needs are relatively low. But in five to 10 years time, there will be a step-change in the scale of the problem. Already on older roads, problems are becoming obvious. Poor construction apparently has led to premature deterioration in some new roads. Similarly, truck overloading is exacting heavy damage on roads while enforcement and weighbridges are lacking.

A network strategy shall strengthen the road hierarchy, improve overall capacity, and avoid lopsided investments. This implies scaling down targets on expressways, scaling up primary and secondary roads to include ring roads around HCMC,Hanoi and other big cities such as Hai Phong, Danang and Can Tho, without sacrificing the rural roads program of the government. The latter has proven to be instrumental in the rapid reduction of poverty in Vietnam. Only about 2% of communes remain without road access, but nearly half of the rural roads are subject to weather disruption.

The first priority for investment should self-evidently be the maintenance of the existing assets. This would be followed by rehabilitation, then improvements (paving of about 2,700km of national roads and 7,900km of provincial roads) as funds allow. Apart from committed expressways, new roads should be last, with bottlenecks on main roads and rural roads receiving priority over other missing links in the main road network.

The creation of a road maintenance fund should be seen only as the first step of a long journey to road assets preservation. This should be followed by a systematic effort to curb truck overloading and the adoption of a performance-based maintenance-contracting regime.

Vietnam can lead the world in incorporating the special needs of motorcycles—and buses in urban roads—in new road construction as well as in road improvements. The reality is that two-wheel vehicles will continue to grow and is gaining acceptability as a sustainable mode of transportation in an increasingly carbon- and energy-constrained future. Traditionally, roads have been designed for four-wheel vehicles without regard to two-wheels and mass transit. This will have the collateral benefit of reducing road safety hazards.

To drive the foregoing strategies, there must also be a fundamental change in the way a road investment program is formulated. A five-year rolling program for the roads subsector should be made an intrinsic addendum to the five-year SEDP of Vietnam. This program should stipulate the estimated budget envelope, and projects costs prepared on the basis of engineering studies to provide confidence they are of the right order.

5.2 Five-Year Road Development Plan

The government, particularly through GRA, should strengthen its system for planning of national roads at the network level. Road network planning should:

(i) Be process-based and be driven by an intermodal transport strategy and policy framework to support national development goals

(ii) Needs-based, integrating road development and preservation requirements

(iii) Fiscally constrained, considering realistic funding levels from government and private sources,

(iv) Based on economic principles in selecting and prioritizing investment projects to meet the transport demand, and

(v) Provide for adequate participation of key stakeholders.

To improve the system of road planning along these lines, it is recommended to consolidate all proposed projects under a Five-Year Road Development Plan. The plan would be constrained by projected funds for the road sub-sector, thereby trade-offs between projects would be apparent because not all proposed projects could be accommodated in the budget. For example, overemphasis on certain projects such as the current overemphasis on expressway construction would be become evident because all of the funds would go to expressways leaving little for other projects.

As a result project proposal would have to undergo stringent analysis and the implementation of the projects would be clarified under a practical and systematic framework. The Five Year Development Program would foster a more balanced network development and would place maintenance and repairs and traffic safety program would more prominently in the road development agenda.

In order to establish a Five-Year Road Development Plan, the available budget should be estimated appropriately. Without a stable and institutionalized budgetary arrangement, it is not practical to establish any realistic development plan or program.

For example, based on recent trends approximately 600 million USD is available for road and road transport development in the state budget and revenue. With ODA funding resources, there would be 2 billion USD available by the country, annually.

The recent government strategy shows the establishment of “Road Maintenance Fund.” A road traffic law was passed last year and regulated to establish the road maintenance fund from user charges. The government should make this fund fully operational as a stable source of financing from road user charges. While the Road Maintenance Fund should mainly be dedicated to road maintenance works, expanding its coverage to include new construction of roads could be explored in the future.

The assumed budget would then be appropriated to different types of works and projects. The program would include appropriation for traffic management, maintenance, rehabilitations, improvement and new construction, as well as, studies and surveys. It should also appropriate for different classes of highways, including expressways, national roads, provincial roads, and local roads. The use of a Five Year Road Development Plan is an international best practice, and as example, Japan’s Five-Year Development Plan is shown in Box 5.2.1.

The Five-Year Road Development Plan would be updated every five years to reflect over-

all policy directions stated in the Five Year Socio-Economic Development Plan (SEDP) prepared by DPI.

Box 5.2.1 First Five - Year Road Development Plan in Japan

Objective: In order to improve poor road condition, of national and rural roads, the present time, it is needed a large amount of development cost. Considering the amount of volatile oil taxes available year after 1954, the first five year road development plan was prepared with the budget of 260 billion JPY (720 million USD in 1954).

Basic Criteria for Development: Basic criteria was prepared for the followings:

(i) Road extension
(ii) Grade separation of railways crossing
(iii) Bridge replacement
(iv) Pavement
(v) Repair works

1st Five-year Road Development Plan (260 billion JPY [720 million USD in 1954])

Item	NH (1st Class)	NH (2nd Class)	District Rd	Other Rd
Road	1,800km	1,400km	2,200km	4,63 km
Bridge	800 nos	700 nos	700 nos	1,200 nos
Pavement	2,110km	1,180km	910km	540km
Repair Works	24,400 MJPY (9.4%)			
Construction Equipment	5,700 MJPY (2.2%)			
Survey/Study/Design	400 MJPY (0.15%)			

Note: Japan's state budget in 1955 was approximately 10,000 MJPY, so the first five year development program was ambitious one.

In order to assure good progress in Five-Year Road Development Plan, annual reports should be prepared and issued to the public including a comparison between planned progress and actual progress. The reasons for the discrepancy between the planned and achieved progress should be studied and lessons derived from this should be used to improve the performance in the following years.

The operation and maintenance (O&M) of the road system should also be monitored as to its performance against set targets and standards under a monitoring system. A stable high-speed travel service can only be achieved when appropriate traffic operations are realized with sufficient road maintenance works.

5.3 Systematize Road Administration

1) Establishment of Integrated Road Sector Administration

In order to carry out the Five–Year Road Development Plan effectively, several institutional arrangements are necessary. Currently roads are planned by various agencies and levels of government, especially national highways and urban roads making the coordination of road investment, maintenance, and operation difficult.

Only one organization should manage and control the development or roads within the context of a long-term development strategy. Therefore to address the coordination issue, the establishment of an 'Integrated Road Sector Administration by expanding GRA functions or by creating such entity as a 'Vietnam Road Authority" under MOT is recommended to manage all classes of roads in a united and consistent manner. The proposed administration entity would manage the primary network including expressways, urban roads, national highways, provincial roads, district roads and commune roads, at least in terms of consolidated primary network planning in the beginning and ultimately in terms of consolidated development and recurrent budgetary systems.

2) Metropolitan Transport Development

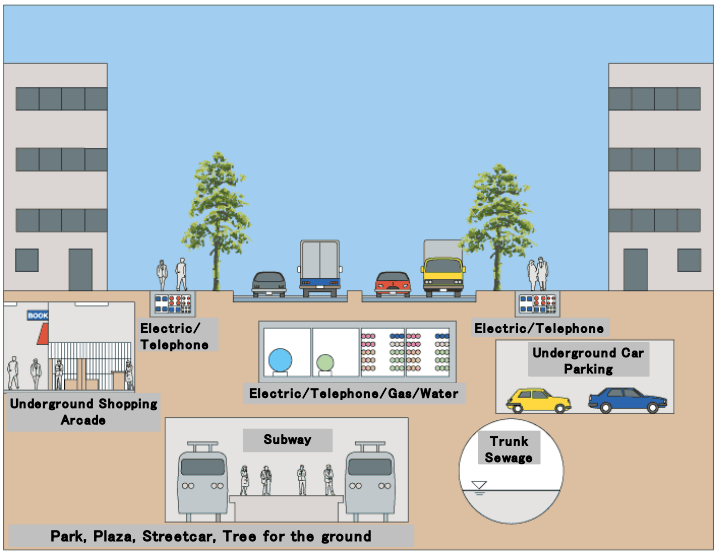
There are two (2) metropolitan areas in Vietnam, the capital Hanoi and Ho Chi Minh City (HCMC). Effective transport development in those metropolitan areas is essential in the national socio-economic development, and therefore, should be given special attention.

Hanoi and HCMC presents a different challenge compared to other cities, primarily because of its scale and density. Road transport development needs to be closely coordinated with land use, other modes of transport including public transport, and other lifelines, such as electricity, sewerage and water supply (see Figure 5.3.1).

In these two cities, an organization that covers only the road sub-sector will be ineffective. It is therefore recommended that the "Hanoi / HCMC Metropolitan Development Authority" be established. The Development Authority would have broader control and responsibility within their respective territories, allowing better management and development of roads integrated with other public transport modes as well as other infrastructures and services.

It will only be at the interface of the national road network and urban network of Hanoi and HCMC that inter-agency coordination will be required.

Figure 5.3.1 Concept of Integrated Transport and Lifeline Arrangement in Metropolitan



5.4 Delivery of Road Works

The delivery of road works including construction and operation and maintenance needs to be improved to ensure that funds for road works are used efficiently and that road works are of quality, to prevent early deterioration which could strain future funds and reduced economic impacts.

(1) Improvement of Road Construction

The government should strengthen its project management through an incentive system based on project performance as against targets in order to drive efficiency and accountability in project administration.

Road construction projects should increasingly be undertaken by the private sector, through open competition, in order to achieve greater efficiency, economy, and quality in project implementation. In the meantime, construction SOEs should be immediately equitized, made to operate along business lines, and compete on the same footing with private contractors.

(2) Improvement of Operation and Maintenance

The importance of operation and maintenance (O&M) will increase in the future. Road maintenance projects should increasingly be done by contract, after competitive bidding, for better control of the quality and cost of the work. Long-term output or performance-based maintenance contracts should be explored.

5.5 Establish Traffic Management Policy

Strategic traffic management initiatives in the road subsector include the strengthening of road safety programs and promotion of ITS.

(1) Strengthen Road Safety

Road safety strategies and programs have been prepared in several studies, most notable the Road Safety Master Plan which was recently developed through technical cooperation with JICA. The implementation of these programs needs to be improved through funding allocation. The road safety program should be discussed as part of the proposed Five-Year Road Development Plan. Targets should be set so that the progress towards better road safety could be monitored.

(2) Promotion of ITS

To realize an efficient and sustainable ITS implementation and operation, it is necessary to establish an appropriate framework for ITS standardization. The framework shown in Figure 5.5.1 is proposed as a long-term development strategy to promote ITS and its standardization in Vietnam.

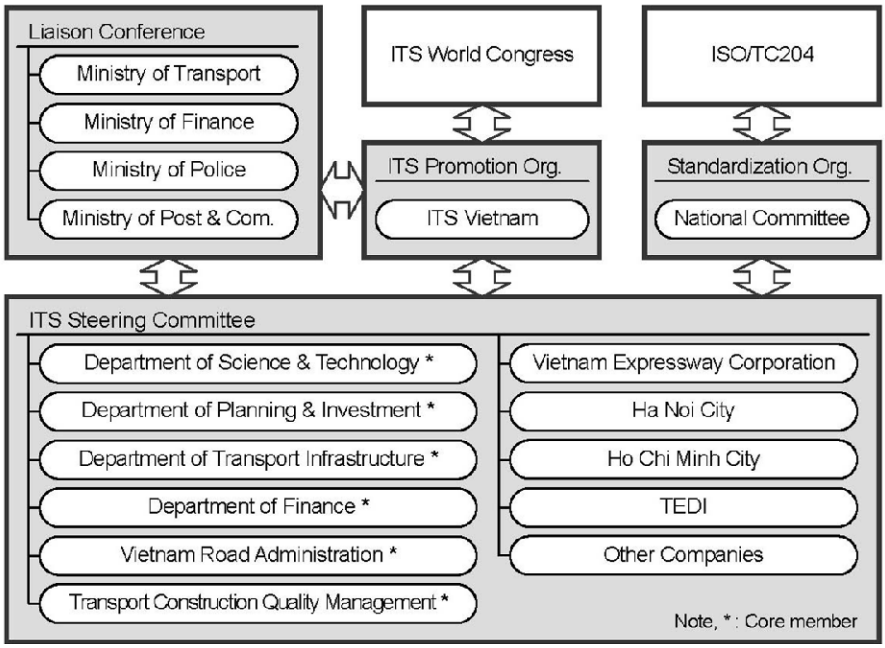
(a) **Liaison Conference:** This conference, which is to be chaired by MOT and MOP, MOF and MOCP as members, undertakes the primary role of promoting ITS and resolving inter-agency issues.

(b) **ITS Steering Committee:** This committee is responsible for addressing relevant technical/economical issues, and making proposals to the Liaison Conference for decisions on appropriate standards for ITS.

(c) **ITS Vietnam:** This organization serves as the front to the ITS World Congress and other international conventions and as a liaison among relevant public/private organizations and academia.

(d) **National Committee:** This organization promotes the international standardization of ITS as coordinator for ISO/TC204 and others.

Figure 5.5.1 Framework for Promoting ITS and Standardization in Vietnam



Source: VITRANSS 2 Study Team

5.6 Strengthen Road Technology Research and Development Plainning Activities

DST is responsible for development of technical standards in MOT. TCQM is responsible for the quality of construction after a project is commenced. Those units should be integrated in terms of coordinated activities toward better road technology research and development planning. Scope of activities to be strengtherned included:

(a) **Improve Standard Design System:** All technical standards, application guidelines, construction supervision, operation manual, maintenance manuals, etc should be issued and be updated from time to time by this R&D Institute.

(b) **Develop and Utilize New Technologies:** New technologies for survey, study design, construction, operation and maintenance should be continuously developed by this institute.

(c) **Improve Training System for Traffic Planners and Road Engineers:** Developments and updates should be disseminated widely all over the country through technical seminar and the issuance of technical textbooks. Through nationwide technical seminars, local characteristics should be feedback to this institute.

(d) **Cooperate with Academic Activities:** This institute should exchange information on road technologies with relevant academic organizations and international organizations. Where applicable, state-of-the-art technologies should be mobilized as early as possible for the benefit of the people of Vietnam after due evaluation and appropriate localization and/or customization of those technologies.

6 ROAD MASTER PLAN

6.1 Overview

The VITRANSS 2 road transport master plan was formulated to support the overall national physical development framework. Thirty-two transport corridors were identified and a long list of candidate projects (up to 2030) was drawn up. A multi-criteria analysis was then used to rank projects in the long list. A core program up to 2020 was then formulated as the master plan by selecting highly rated projects, as constrained by the available funding. In all an investment program of 23.3 billion USD is proposed.

6.2 Road Development Framework

1) Approach

To guide the road network development, VITRANSS 2 interpreted Vietnam's economic policy into a physical development framework (Figure 6.2.1). This physical framework identifies growth centers and development corridors. Transport development corridors were then identified to support development corridors. The role the road infrastructure are then clarified and used to identify potential projects.

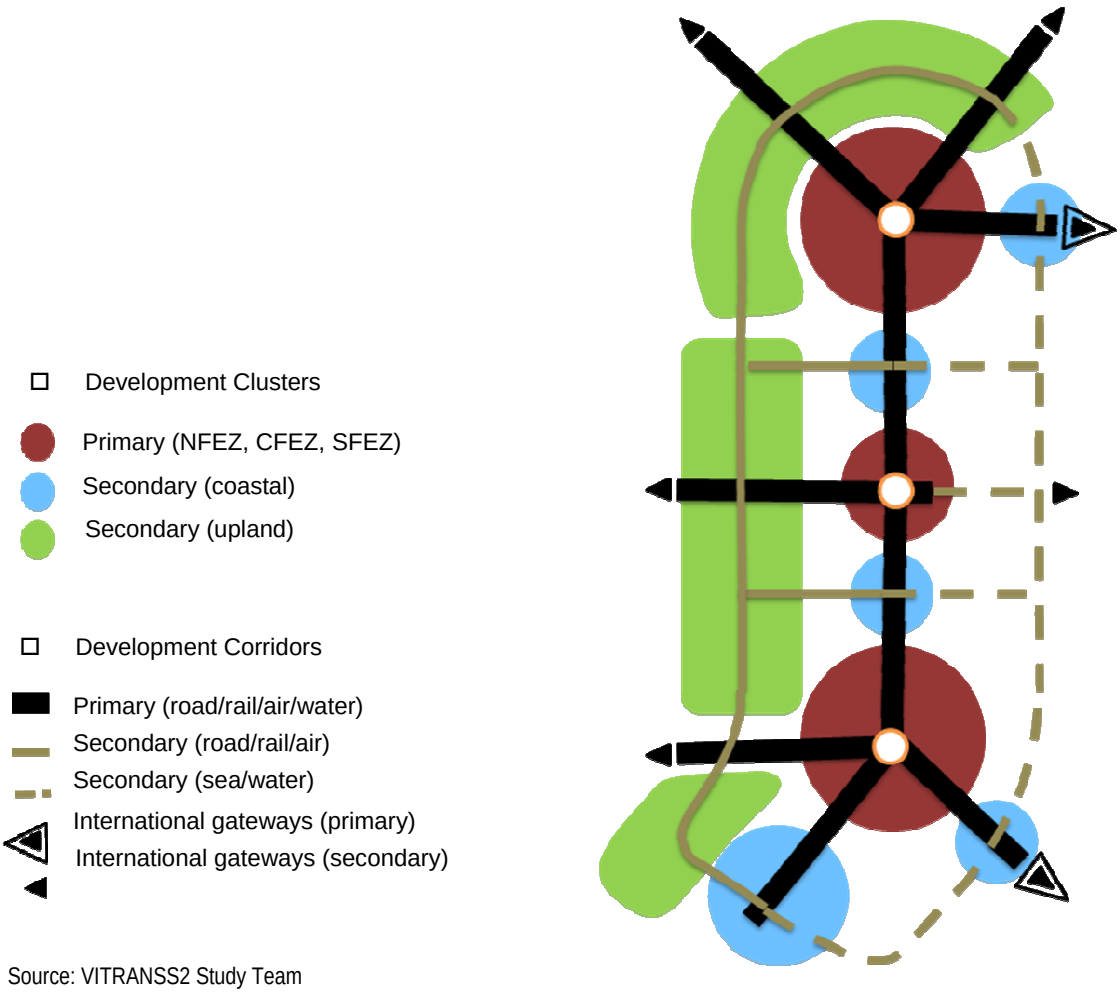
2) National Physical Framework

Vietnam's development is hinged three focal economic zones, namely Northern Focal Economic Zone (NFEZ), Central Focal Economic Zone (CFEZ), and Southern Focal Economic Zone (SFEZ). These three zones will be centers of industries and services. Key urban centers are also located in theses economic zones, including Hanoi, Ho Chi Minh City, Da Nang, as well as key cities in the hinterland of the economic zones.

Secondary economic zones will be interspersed in between and around the focal economic zones, as well as upland.

Development corridors are then identified, where primary corridors link the focal economic zones and connect the focal economic zones to international gateways both inland and sea. The secondary development corridors serve to connect secondary economic centers.

Figure 6.2.1 National Physical Framework



Source: VITRANSS2 Study Team

3) Transport Corridors

Based on the set development corridors, 32 transport corridors were identified. Two (2) long corridors,

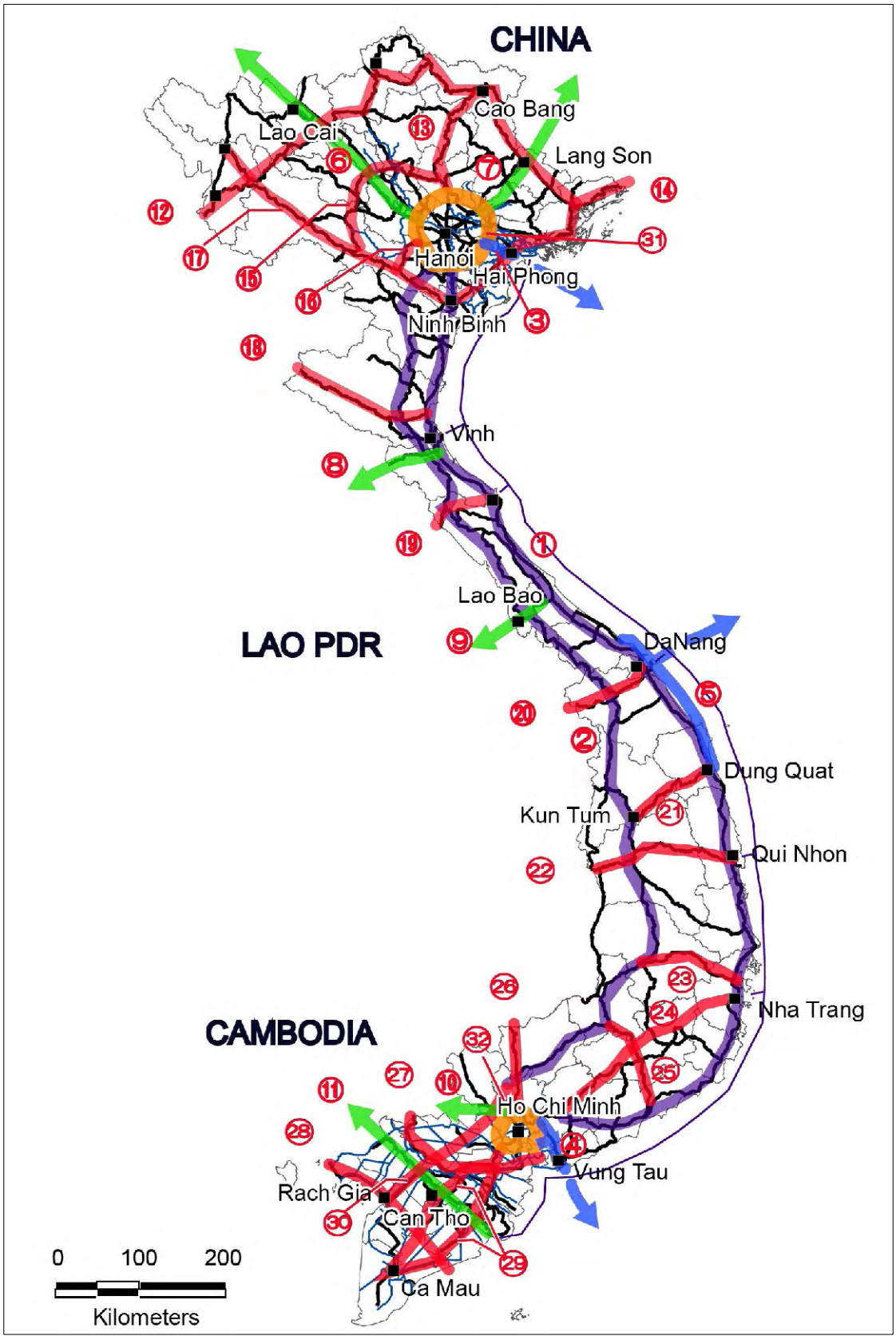
coastal and upland, are classified as National Backbone Corridors, and three (3) are International Gateway Corridors closely connected to the three (3) Focal Economic Zones (FEZs). Six (6) are Land-bridge Corridors that are internationally recognized as inland cross-border trade channels with China, Lao PDR, Cambodia, and Thailand. Nineteen (19) corridors are identified mainly to serve regional development. The remaining two (2) corridors are Outer Ring Corridors surrounding Hanoi and Ho Chi Minh City. These ring corridors function as the intersection of several radiating corridors separating inter-city and urban traffic, and as the physical boundary of urbanization.

Table 6.2.1 Transport Corridors

Type/Name of Corridor		Terminal Point		Length (km)
National Backbone Corridor				
1	North-South Coastal	Hanoi	HCMC	1,790
2	North-South Upland	Hanoi	HCMC	1,750
International Gateway Corridor				
3	NFEZ Gateway	Hanoi	Hai Phong	120
4	SFEZ Gateway	HCMC	Ba Ria - Vung Tau	110
5	CFEZ Gateway	Quang Ngai	Hue	190
Land-bridge Corridor				
6	Hanoi-Lao Cai (China Border) -Asian Highway, IICBTA Phase1	Hanoi	Lao Cai	260
7	Hanoi-Lang Son (China Border) - Asian Highway, IICBTA Phase1	Hanoi	Lang son	145
8	Vinh-NH8-Lao Border - Asian Highway, IICBTA Phase2	Vinh	Keo Nua	60
9	Don Ha-Lao Bao, - Asian Highway, IICBTA Phase1	Don Ha	Lao Bao	80
10	HCMC-NH22 - Cambodia Border, - Asian Highway, IICBTA Phase1	HCMC	Moc Bai	70
11	Soc Trang-Can Tho-Cambodia Border, - Main International Waterway	Soc Trang	Chau Doc	180
Regional Corridor				
12	North Frontier	Dien Bien Phu	Quang Ninh	500
13	Hanoi-Cao Bang (China Border)	Hanoi	Cao Bang	220
14	North Coastal (China Border)	Ninh Vinh	Mong Cai	260
15	North transversal	Thai Nguyen	Moc Chau	200
16	Hanoi-Hoa Binh	Hanoi	Muong Khen	60
17	Ninh Binh-Lai Chau	Ninh Binh	Lai Chau	360
18	Vinh-NH7-Lao Border	Dien Chau	Nam Can	180
19	Vung Ang-NH12-Lao Border	Vung Anh	Cha Lo	60
20	Da Nang-NH14B/14D-Lao Border	Da Nang	Ta Oc	110
21	Quang Ngai-Kon Tum	Quang Ngai	Kon Tum	120
22	Quy Nhon-NH19-Cambodia Border	Quy Nhon	Le Thanh	180
23	Nha Trang-Buon Ma Thuot	Nha Trang	Buon Ma Thuot	130
24	South Central Highland	Nha Trang	HCMC	300
25	Phan Thiet-Gia Nghia	Phan Thiet	Gia Nghia	140
26	HCMC-NH13-Cambodia Border	HCMC	Hoa Lu	120
27	HCMC-My Tho-Cambodia Border	HCMC	Tan Chau	220
28	Bac Lieu-Rach Gia-Cambodia Border	Bac Lieu	Ha Tien	200
29	South Delta Spine	HCMC	Ca Mau	250
30	Upper South Delta	HCMC	Rach Gia	180
Metropolitan Ring Corridor				
31	Hanoi Outer Ring			125
32	HCMC Outer Ring			83

Note: IICBTA – Initial Implementation of Cross-Border Transportation Agreement
Source: VITRANSS2 Study Team

Figure 6.2.2 Transport Corridors



Source: VITRANSS2 Study Team

4) Development Issues of Transport Corridors

(1) Corridor 1: North-South Coastal Corridor

The north-south coastal corridor is the most important national backbone of Vietnam, connecting the three focal economic zones, including a number of small and medium sized cities along the coast.

By 2030, transportation demand will increase remarkably along this corridor. Cross-sectional traffic could be projected to increase 5-8 times for passengers and 3-5 times for freight.

This corridor is served by NH1 which is mostly 2-lanes, and capacity would not be able to handle projected demands. Moreover, the structural strength of NH1 needs to be strengthened to accommodate projected heavy axle roads by trucks.

(2) Corridor 2: North-South Upland Corridor

The upland north-south corridor goes through mountainous terrain and presently carries a small volume of traffic. However it serves key agricultural lands producing cash crops. Over the years the average income of communities along this corridor has not increased, because of the high cost in transporting their goods to key markets in the coast and for export as a result of poor road conditions. Local roads also often become impassable due to during the rainy season.

Traffic volume was forecasted to grow only 1.5-3 times and 2-5 times for passenger and freight respectively. The current road capacity will not be exceeded by 2030. Road along these corridor however requires paving and some upgrading, including slope protection against landslides.

(3) Corridor 3: NFEZ Gateway Corridor

The NFEZ corridor connects Hanoi and the gateway city of Hai Phong. It caters to a significant volume of freight transport, particularly containerized traffic. Traffic volume is expected to grow 2-3 times and 2 times for passenger and freight respectively, by 2030. Future demand can be served by the existing roads and road projects already committed.

NH5, which serves this corridor, however has been deteriorating due to heavy axle loads. Moreover, there are points along the NH5 where through traffic and local traffic mix. Maintenance and repair works, as well as measures to address to segregate through traffic and local traffic is required.

(4) Corridor 4: SFEZ Gateway Corridor

The SFEZ corridor is served by NH51. New ports are now being constructed at Vung Tau, and once these ports goes to full operation NH51 will not be able to handle the expected traffic volume.

Roads have to be able to handle an additional 150,000 pcu/day by 2030, which is equivalent to an 8-10 lane road. An expressway has been committed for this corridor which should be able to help deal with the expected increase in traffic. In addition NH51 needs to be strengthened to deal with heavier truck loads and conflict points with local traffic needs to be addressed as well.

(5) Corridor 5: CFEZ Gateway Corridor

The CFEZ corridor is the key corridor serving and connecting key cities in the Central Region, particularly Da Nang and Hue, and is served by NH1. Traffic volume is expected to grow 5-8 times and 3-4 times for passenger and freight respectively by 2030. Additional road capacity is needed to handle future traffic volumes. NH1 also needs to be strengthened to handle heavy trucks. The CFEZ includes environmentally sensitive areas, which served as a draw for tourists. Moreover there are areas in the coast which are affected by tidal flooding. Transport development in this corridor needs to be sensitive to these environmental issues.

(6) Corridor 6: Hanoi – Lao Cai Corridor

The Hanoi – Lao Cai corridor connects to inland cross border post with China. It is served by NH2 and NH70. Traffic demand was forecasted to increase considerably by 2030, and will exceed road capacity in some segments. NH2 and NH70 are currently in poor conditions, and needs to be rehabilitated as well.

(7) Corridor 7: Hanoi – Lang Son Corridor

The Hanoi – Lang Son corridor connects to inland cross-border post with China. NH1 serves this corridor. Traffic demand is expected to increase considerably by 2030 but will still be below the current road capacity. Roads need to be maintained.

(8) Corridor 8: Vinh – NH8 – Lao Border Corridor

The Ving – NH8 – Lao Border Corridor is part of the Asian Highway network and is a gateway to Lao PDR, and is the shortest route going to Vientiane. Traffic was forecasted to grow 2 times and 10 times for passenger and freight by 2030. But because of the small current demand, existing road capacity would be able to handle future traffic volumes. Road conditions are however very poor, and requires upgrading and rehabilitation.

(9) Corridor 9: Dong Ha – Lao Bao Corridor

The Dong Ha – Lao Bao Corridor is part of the Asian Highway Network. Cross-border traffic is forecasted to increase. Traffic volumes however can be continued to be served by existing roads by 2030. Road structure however needs to be strengthened.

(10) Corridor 10: Ho Chi Minh City – NH22 – Cambodia Border Corridor

The HCMC – NH22 – Cambodia Border Corridor is served by NH22 and is part of the Asian Highway Network. Cross-border traffic will not be significant, but holds strong potential. Nonetheless local domestic traffic will increase considerably and road capacity will be reached by 2030. Road capacity expansion is required.

(11) Corridor 11: Soc Trang – Can Tho – Cambodia Border Corridor

The road capacity in Soc Trang – Can Tho – Cambodia Border Corridor would be able to sufficiently handle 2030 road traffic because of the new expressway to be constructed. Existing roads however are in bad condition. Reconstruction works are on-going which should improve the road conditions.

(12) Other Corridors

Other corridors cater to small traffic volumes, and traffic increase by 2030 can be handled by the exiting road capacity, except in a few sections. Road conditions are however bad, and requires improvement including upgrading of some sections from 1-lane to 2-lane. Some sections also require traffic segregation treatments.

6.3 Candidate Projects

To support the formulated physical framework development plan of Vietnam, transport corridors need to be strengthened by appropriate selection and implementation of road projects. A long list of candidate projects was compiled from various government plans and discussion with relevant agencies. The list includes committed/on-going projects and plans in various stages of planning, as well as, new proposals. The candidate projects are enumerated in Table 6.3.2 for committed/on-going projects and Table 6.3.3 for proposed projects. Figure 6.3.1 maps the location of projects. In total 243 projects were considered amounting to nearly 89 billion USD, as summarized in Table 6.3.1. Cost of proposed projects was estimated taking inflation of material prices represented by crude oil into account.

Table 6.3.1 Summary Candidate Projects

Project Type	Committed		Proposed		Total	
	No.	Mill. USD	No.	Mill. USD	No.	Mill. USD
1) Construction of new expressways	12	11,691	32	55,957	44	67,648
2) Construction of new roads	16	1,459	25	2,910	41	4,369
3) Construction of new bypasses	5	166	21	798	26	964
4) Improvement of roads/bridges	51	7,310	62	6,578	113	13,888
5) Securing all weather 2-lane roads on corridors	-	-	7	593	7	593
6) Improvement of traffic safety	3	136	9	1,800	12	1,936
Total	87	20,762	156	66,637	243	89,399

Source: VITRANSS2 Study Team

Table 6.3.2 Major Ongoing/Committed Transportation Projects

Project			Original Schedule	Implementing Agency	Total Project Cost (USD mil.)	Fund Source
Construction of new expressway	CH01	Cau Gie – Ninh Binh Expressway (50km)	06-10	• VEC	452.4	• SB • CB
	CH02	Da Nang – Quang Ngai Expressway (131km)	-20	• MOT	1048.2	• WB
	CH03	Phan Thiet – Dau Giay Expressway (100km)	-15	• BITEXCO	1003.8	• BOT[1)]
	CH04	HCMC – Long Thanh – Dau Giay Expressway (55km)	08-12	• VEC	1110.8	• ADB • JBIC
	CH05	HCMC- Trung Luong Expressway (40km)	04-09	• MOT	776.5	• GOV • SB
	CH06	Trung Luong – My Thuan – Can Tho Expressway (92km)	-10	• BIDV (BEDC)	1510.0	• BOT[1)]
	CH07	Lang Son – Bac Giang – Bac Ninh Expressway (130km)	11-14	• VEC	1176.3	• [1)]
	CH08	Ha Noi – Hai Phong Expressway (105km)	08-11	• BOT company	1441.2	• Local BOT
	CH09	Ha Noi – Lao Cai Expressway (264km)	09-12	• VEC	1218.7	• ADB • GOV
	CH10	Ha Noi – Thai Nguyen Expressway (62km)	05-10	• MOT	248.2	• JBIC
	CH11	Lang – Hoa Lac Expressway (30km)	06-09	• BT Company	450.0	• BT
	CH12	Ha Long – Mong Cai Expressway (128km)	12-15	• VEC	1254.7	• [1)]
Construction of new road	CH13	Can Tho Bridge Construction	02-09	• MOT	284.8	• JBIC
	CH14	Border Ring No1 Construction (Hai Giang - Lao Cai) (151km)	00-10	• MOT	300.4	• GOV
	CH15	Border Ring No2 Construction (Northern Part)	01-08	• MOT	17.2	• SC • GOV
	CH16	Border Ring No2 Construction (Northwest Part, Pho Rang - Minh Thang) (160km)	04-09	• MOT	140.9	• GOV
	CH17	Border Ring No3 Construction	02-07	• MOT	30.1	• GOV

Project			Original Schedule	Implementing Agency	Total Project Cost (USD mil.)	Fund Source
	CH18	Linh Dam Bridge Construction (NH15, Ha Tinh)(2 lane)	08-10	• VRA	13.6	• GOV
	CH19	Ong Bo Bridge Construction (NH1A, Quang Nam)(2 lane,108m)	02-09	• VRA	1.4	• GOV
	CH20	Huong Anh bridge Construction (NH1A, Quang Nam)(4lane, 250m)	08-10	• VRA	8.4	• GOV
	CH21	Dinh Vu Bridge Construction (Hai Phong)	-	• N/A	200.0	• N/A
	CH22	Vinh Thinh Bridge Construction (Ha Tay)	-	• N/A	80.0	• N/A
	CH23	45 Rural Traffic Bridges in Central and Central Highland Provinces	01-10	• VRA	32.8	• ODA
	CH24	Ben Thuy II bridge Construction (NH1&NH8B, Nghe An-Ha Tinh) (2lane, 1km)	09-11	• VRA	74.1	• Gov(Bond)
	CH25	Dong Nai bridge Construction	08-09	• VRA	121.8	• BOT company
	CH26	Cau Phung Bridge Construction (NH32)	05-10	• VRA	18.6	• Gov(Bond)
	CH27	Border Ring Road No 1 Construction (Ha Giang – Lao Cai) (151km)	10-	• VRA	67.8	• Gov(Bond)
	CH28	NH279 Construction (Tuyen Quang – Bac Can) (94.5km)	07-10	• VRA	67.3	• Gov(Bond)
Construction of bypass	CH29	NH1A Bypass (Thanh Hoa) (10km)	-	• VRA	38.3	• BOT company
	CH30	NH1A Bypass (Dong Hoi, Quang Binh) (19.3km)	-	• VRA	38.6	• BOT company
	CH31	NH1A Bypass (Ha Tinh) (16.3km)	-	• VRA	20.8	• BOT company
	CH32	NH1A Bypass (Phan Rang, Ninh Thuan) (8.3km)	-	• VRA	32.2	• BOT company
	CH33	NH2 Bypass (Vinh Yen (Vinh Yen – Vinh Phuc)) (10.6km)	08-10	• VRA	36.2	• BOT company
Improvement of road/bridge	CH34	NH 25 Upgrading (Le Bac Bridge - To No pass) (11.5km)	07-09	• VRA	4.6	• GOV
	CH35	Mekong Delta River Infrastructure Development (NH53,N54,NH91 & PHs; WB5)	07-13	• VRA	119.5	• ODA
	CH36	NH 1 Widening (Dong Ha - Quang Tri)	-	• VRA	31.5	• BOT company
	CH37	Highway Rehabilitation Project III (NH1, Can Tho - Nam Can) (288km)	03-10	• MOT	186.0	• WB
	CH38	Bridge Rehabilitation Project - Phase III (NH1)	06-10	• MOT	84.9	• JBIC
	CH39	NH2 Upgrading (Noi Bai - Vinh Yen) (22km)	05-09	• Song Da BOT	66.8	• GOV • BOT
	CH40	NH10 Upgrading (Tan De bridge - La Uyen bridge) (5.5km)	08-10	• BOT	25.5	• BOT
	CH41	East-West Corridor Improvement (NH12A) (182.3km)	00-08	• MOT	98.9	• GOV
	CH42	NH 21B & NH21 Upgrading (Hanoi) (76km)	-	• MOT • BOT	44.2	• GOV • BOT
	CH43	Ho Chi Minh Highway Phase 2 Upgrading (Pac Bo - Dat Mui excluding Hoa Lac - Ngoc Hoi) (2,072km)	07-10	• MOT	1591.1	• GOV
	CH44	Rehabilitation Project (NH19, NH20, NH26, NH27, NH28)	03-08	• MOT	85.4	• GOV • SC

Project			Original Schedule	Implementing Agency	Total Project Cost (USD mil.)	Fund Source
	CH45	NH 2 Improvement (Hanoi - Ha Giang) (261km)	02-09	• MOT	107.2	• GOV
	CH46	NH 3 Improvement (Hanoi - Cao Bang) (310km)	03-10	• MOT	155.3	• GOV
	CH47	NH 6 Improvement Phase 2 (Son La - Dien Bien)	04-09	• MOT	68.9	• GOV
	CH48	NH 32 Improvement (Hanoi - Lai Chau) (358km)	02-09	• MOT	178.8	• GOV
	CH49	NH 50 Improvement (HCMC - My Tho) (88km)	06-10	• MOT	148.8	• GOV
	CH50	NH 80 Improvement (My Thuan - Vam Cong) (50km)	03-09	• MOT	35.2	• GOV
	CH51	NH 60 road and bridges Improvement	00-05	• MOT	168.5	• GOV • BOT • SC
	CH52	NH 61 Improvement (Can Tho - Kien Giang)	03-06	• MOT	23.8	• GOV
	CH53	NH22B Improvement (Go Dau - Xa Ma) (73km)	03-08	• MOT	23.9	• GOV
	CH54	Secondary Road Network rehabilitation Program	02-07	• MOT	664.4	• JBIC • WB • ADB • SC
	CH55	Tertiary Road Improvement Project	02-08	• MOT	201.9	• ADB • WB
	CH56	Rural Road Projects improvement III (2,500km)	07-12	• MOT	155.6	• WB
	CH57	Improvement of Rural Bridges in Central Coast & Central Highland Provinces	01-08	• MOT	32.3	• JBIC
	CH58	Other Roads and Bridges Improvement	-	• MOT	202.0	• GOV
	CH59	NH1 Upgrading (My Thuan - Can Tho) (38.4km)	07-09	• VRA	108.4	• Gov
	CH60	Thang Long Bridge Surface Repair	08-09	• VRA	3.5	• Gov
	CH61	Road Network Improvement and Upgrading of (WB4) (Improvement component) (629km)	04-09	• VRA	310.5	• WB
	CH62	Road Network Improvement and Upgrading (WB4) (maintenance and institutional improvement component)	05-09	• VRA	112.5	• WB
	CH63	NH 1 Rehabilitation (Phase 3)	07-09	• VRA	87.4	• JICA
	CH64	Rural Traffic Project No.3 (3150km)	07-12	• VRA	155.6	• WB, UK
	CH65	Rehabilitation of Weak bridges (140 bridges) ((Phase 1)	05-09	• VRA	98.1	• JICA
	CH66	Southern Coastal Corridor Upgrading (NH80 & NH63) (225km)	09-14	• VRA	290.9	• EDCF
	CH67	NH6 Upgrading (Tuan Giao – Lai Chau) (96km)	10-	• VRA	138.8	• Gov(Bond)
	CH68	NH 27 Upgrading (98km)	05-11	• VRA	56.9	• Gov(Bond)
	CH69	NH 32 Upgrading (Vach Kim – Binh Luu) (72km)	04-08	• VRA	33.8	• Gov(Bond)
	CH70	NH 32 Upgrading (Dien – Nhon) (7km)	05-08	• VRA	57.7	• Gov(Bond)
	CH71	NH 91 Upgrading (Chau Doc-Tinh Bien) (27.3km)	09-after 10	• VRA	55.7	• Gov(Bond)
	CH72	Storm No.5 Recovery Projects on NH6 (Hoa Binh – Son La)	-09	• VRA	4.6	• Gov(Bond)

Project			Original Schedule	Implementing Agency	Total Project Cost (USD mil.)	Fund Source
	CH73	NH 279 Upgrading (Ttan Son – Than Muoi, Dong Mo – Tu Don) (43km)	05-10	• VRA	14.8	• Gov(Bond)
	CH74	NH3B Upgrading (Xuat Hoa-Po Ma) (60km)	09-12	• VRA	79.8	• Gov(Bond)
	CH75	Weak Bridge Rehabilitation Project (Stage 2: 83 bridges)	10-	• VRA	207.5	• Gov(Bond)
	CH76	NH 31 Upgrading (Huu San – ban Chat) (61km)	-09	• VRA	59.4	• Gov(Bond)
	CH77	NH53 (not including Km56-Km60 and Km130-Km139 in WBS project) (121km)	09-11	• VRA	81.1	• Gov(Bond)
	CH78	NH8A Upgrading (Ha Tinh) (37km)	09-11	• VRA	69.2	• Gov(Bond)
	CH79	NH24 Upgrading (Pho Phong – Quang Ngai) (8km)	10-	• VRA	23.3	• Gov(Bond)
	CH80	NH24 Upgrading (Pho Phong – Kon Tum) (160km)	10-	• VRA	294.1	• Gov(Bond)
	CH81	NH25 Upgrading (Phu Yen – Gia Lai)(160km)	10-	• VRA	294.1	• Gov(Bond)
	CH82	NH15 Upgrading (Mai Chau - Hoi Xuan) (109km)	10-	• VRA	117.6	• Gov(Bond)
	CH83	NH1A Upgrading (Hoa Cam – Hoa Phuoc, Danang) (8.4km)	07-09	• VRA	32.8	• BOT company
	CH84	NH20 and Other Sections Re-pairment and Upgrading (268km)	10-	• VRA	16.6	• BOT company
Improvement of Traffic Safety	CH85	Road Safety Improvement Program	06-09	• NRSC	33.4	• WB
	CH86	Northern Vietnam National Roads Traffic Safety Improvement Project (NH 3, NH 5, NH 10, NH 18)	09-13	• VRA	60.7	• JICA
	CH87	Railway and Road Safety Traffic System Building	09-12	• VRA	41.7	• Gov(Bond)
				Subtotal	20,762	

Note: 1) Through the discussion with MOT, it was decided to add the following 4 projects to the list because of the maturity for implementation: CH03 Phan Thiet - Gia Ray, which WB selected as one of the priority projects, CH06 Trun Luong – My Thuan – Can Tho, for which BOT by VIDB is expected for Trung Luong – My Thuan section and FS review is requested to JICA for My Thuan – Can Tho section, and CH 07 Lang Son – Bac Giang – Bac Ninh & CH12 Ha Long – Mong Cai, for which TAs for reviewing F/S and D/D are committed by ADB.
2) Compiled by the VITRANSS 2 Study Team.

Table 6.3.3 Proposed Transportation Projects

Project Title			Project Description	Proj.Cost (USD mil.)
Construction of new expressway	H01	Ninh Binh – Thanh Hoa Expressway (75km)	A part of North-South expressway in the East. (75km, 6 lane)	827.6
	H02	Thanh Hoa – Vinh Expressway (140km)	A part of North-South expressway in the East. (140km, 6 lane)	2,128.0
	H03	Vinh – Ha Tinh Expressway (20km)	A part of North-South expressway in the East. (20 km, 4-6 lane)	201.5
	H04	Ha Tinh – Quang Tri Expressway (277km)	A part of North-South expressway in the East. (277km, 4 lane)	2,641.2
	H05	Quang Tri – Hue Expressway (73km)	A part of North-South expressway in the East, also a part of East-West corrider of GMS corrider network.(73km, 4 lane)	711.9
	H06	Hue – Da Nang Expressway (105km)	A part of North-South expressway in the East, also a part of East-West corrider of GMS corrider network. (105km, 4 lane)	1,778.0
	H07	Quang Ngai – Quy Nhon Expressway (150km)	A part of North-South expressway in the East. (150km, 4 lane)	1,787.8
	H08	Quy Nhon – Nha Trang Ex-	A part of North-South expressway in the East. (240km, 4 lane)	3,390.1

Project Title			Project Description	Proj.Cost (USD mil.)
		pressway (240km)		
	H09	Nha Trang – Phan Thiet Expressway (280km)	A part of North-South expressway in the East. (280km, 4-6 lane)	2,890.3
	H10	Long Thanh – Nhon Trach – Ben Luc Expressway (45km)	A part of North-South expressway in the East. (45km, 6-8 lane)	738.6
	H11	Doan Hung – Hoa Lac – Pho Chau Expressway (457km)	A part of North-South expressway in the West. (457km, 4-6 lane)	4,813.1
	H12	Ngoc Hoi – Chon Thanh – Rach Gia Expressway (864km)	A part of North-South expressway in the West. (864km, 4-6 lane)	7,974.4
	H13	Thai Nguyen – Cho Moi Expressway (28km)	Expressway in Northern Region. (28km, 4-6 lane)	256.9
	H14	Hoa Lac – Hoa Binh Expressway (26km)	Expressway in Northern Region. (26km, 4-6 lane)	214.0
	H15	Bac Ninh – Ha Long Expressway (136km)	Expressway in Northern Region connecting with Ha Noi City and World Heritage. (136km, 6 lane)	1,618.8
	H16	Ninh Binh – Hai Phong – Quang Ninh Expressway (160km)	Expressway in Northern Region connecting with Hai Phong Port. (160km, 4 lane)	1,189.4
	H17	Hong Linh – Huong Son Expressway (34km)	Expressway in Central Region connecting with coastal area and mountain area. (34km, 4 lane)	302.0
	H18	Cam Lo – Lao Bao Expressway (70km)	Eexpressway in Central Region, also a part of East-West corrider of GMS corrider network. (70km, 4 lane)	699.1
	H19	Quy Nhon – Pleiku Expressway (160km)	Expressway in Central Region connecting with North-South expressways. (160km, 4 lane)	1,615.1
	H20	Dau Giay – Da Lat Expressway (189km)	Expressway in Southern Region. (189km, 4 lane)	1,871.0
	H21	Bien Hoa – Vung Tau Expressway (76km)	Expressway in Southern Region connecting with Vung Tau Port. (76km, 6 lane)	696.5
	H22	HCMC – Thu Dau Mot – Chon Thanh Expressway (69km)	Expressway in Southern Region. (69km, 6-8 lane)	996.3
	H23	HCMC – Moc Bai Expressway (55km)	Expressway in Southern Region. (55km, 4-6 lane)	410.5
	H24	Soc Trang – Can Tho – Chau Doc Expressway (200km)	Expressway in Southern Region. (200km, 4 lane)	1,439.6
	H25	Ha Tien – Rach Gia – Bac Lieu Expressway (225km)	Expressway in Southern Region. (225km, 4 lane)	1,619.5
	H26	Can Tho – Ca Mau Expressway (150km)	Expressway in Southern Region. Lenth is (150km, 4 lane)	1,755.7
	H27	Quang Ngai – Dak To Expressway (170km)	Expressway in Central Region. (170km, 4 lane)	2,073.6
	H28	Nha Trang – Da Lat Expressway (80km)	Expressway in Southern Region. (80km, 4 lane)	1,062.5
	H29	Da Nang – Ngoc Hoi Expressway (250km)	Expressway in Central Region. (250km, 4 lane)	3,094.2
	H30	Ring Road No.4 in Ha Noi (90km)	Ring road system in Hanoi. (90km, 4-6 lane)	1,350.5
	H31	Ring Road No.5 in Ha Noi (320km)	Ring road system in Hanoi. (320km, 6 lane)	2,583.2
	H32	Ring Road No.3 in HCMC (83km)	Ring road system in HCMC. (83km, 6-8 lane)	1,226.9
Construction of new road	H33	Economic axle-road Construction (24km)	New road in Dan Phuong - Phuc Tho - Son Tay section in Ha Tay Province. (24km).	82.8
	H34	Do Xa - Quan Son Highway Construction (30km)	New road in Do Xa - Quan Son section in Ha Tay Province. (30km, 4lane)	103.5
	H35	NH1A (Chi Lang - Bac Giang) Construction (Pho Gio)) (40km)	New road in Chi Lang - Bac Giang (Pho Gio) section. (40km, 4lane)	182.1
	H36	NH21 Construction (Phu Ly – Nam Dinh) (25km)	New Class-I road from Liem Tuyen intersection. (25kmm 4lane).	86.2
	H37	Vam Cong Bridge Construction (An Giang&Can Tho)	New bridge on HCM Highway.	316.0

Project Title			Project Description	Proj.Cost (USD mil.)
	H38	Cao Lanh Bridge Construction (Dong Thap)	New bridge on HCM Highway.	236.0
	H39	New Coastal Road Construction (100km)	Roads along coastal area in Northern Vietnam, mainly in Thanh Hoa Province. (100km)	344.8
	H40	NH20 Extension(Da Lat – Nha Trang) (85km)	New road in NH20 (85km, 4 lane)	476.6
	H41	Hau River Bridge Construction (NH60, Soc Trang) (4lane)	New bridge on NH60 (4 lane).	500.0
	H42	Van Tien Bridge Construction (Quang Ninh)(1341m)	New bridge in Van Don, Quang Ninh Province. (Cable stayed, 1341m in length and 18m in width.)	200.0
	H43	NH47 Construction (Sam Son – Thanh Hoa City) (5km)	New road in NH47, Sam Son- Thanh Hoa city section. (5km, 4 lane)	17.2
	H44	NH14E Extension(Ha Lam along PR 613 – Binh Duong) (21.2km)	New road for the extension of NH14E. (21.2km)	47.0
	H45	Road Access to Cam Pha Port	To develop an access road connecting Cam Pha and expressway network	20.0
	H46	Road Access to Hon Gai Port	To develop an access road connecting Hon Gai and expressway network	20.0
	H47	Road Access to Hai Phong Port	To develop an access road connecting Hai Phong and expressway network	20.0
	H48	Road Access to Nghi Son Port	To develop an access road connecting Nghi Son and expressway network	30.0
	H49	Road Access to Cua Lo Port	To develop an access road connecting Cua Lo and expressway network	24.0
	H50	Road Access to Vung Ang Port	To develop an access road connecting Vung Ang and expressway network	30.0
	H51	Road Access to Quy Nhon Port	To develop an access road connecting Quy Nhon and expressway network	32.0
	H52	Road Access to Van Phong Port	To develop an access road connecting Van Phong and expressway network	26.0
	H53	Road Access to Nha Trang Port	To develop an access road connecting Nha Trang and expressway network	36.0
	H54	Road Access to Vung Tau Port	To develop an access road connecting Vung Tau and expressway network	20.0
	H55	Road Access to Sai Gon Port	To develop an access road connecting Sai Gon and expressway network	20.0
	H56	Road Access to Dong Nai Port	To develop an access road connecting Dong Nai and expressway network	20.0
	H57	Road Access to Can Tho Port	To develop an access road connecting Can Tho and expressway network	20.0
Construction of bypass	H58	NH1 Bypass (La Ha, Quang Ngai) (15km)	Bypass road on NH1 in Quang Ngai Province. (15km, 4 lane).	68.3
	H59	NH1A Bypass (Van Gia, Khanh Hoa) (10km)	Bypass road for diversion of thru traffic from urban area.(10km,4lane)	46.3
	H60	NH1A Bypass (Ninh Hoa, Khanh Hoa) (10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H61	NH1A Bypass (Cam Ranh, Khanh Hoa) (10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	44.6
	H62	NH1A Bypass (Cho Lau, Binh Thuan) (10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	39.8
	H63	NH1A Bypass (Phan Thiet, Binh Thuan) (10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H64	NH1A Bypass (Duc Pho, Quang Ngai) (9.7km)	Bypass road for diversion of thru traffic from urban area. (9,7km,4lane)	36.4
	H65	NH1A Bypass (Vinh Long) (7.5km)	Bypass road for diversion of thru traffic from urban area. (7.5km,4lane)	25.9
	H66	NH14 Bypass (Ea Drang, Dak Lak)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	44.4
	H67	NH14 Bypass (Buo Ho, Dak Lak)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	44.4
	H68	NH91 Bypass (Thot Not, Can Tho)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H69	NH91 Bypass (An Chau, An Giang)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H70	NH91 Bypass (Cai Dau, An Giang)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H71	NH10 Bypass (Nga Son, Thanh Hoa)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H72	NH60 Bypass (Mo Cay, Ben	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5

Project Title			Project Description	Proj.Cost (USD mil.)
		Tre)(10km)		
	H73	NH60 Bypass (Ham Luong (Ben Tre – Mo Cay))(10km)	Bypass road for diversion of thru traffic from urban area.. (10km,4lane)	34.5
	H74	NH38 Bypass (Hoa Mac, An Giang)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H75	NH21B Bypass (Binh Da, Ha-noi)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H76	NH21B Bypass (Kim Bai, Ha-noi)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H77	NH21B Bypass (Van Dinh, Ben Tre)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	H78	NH21B Bypass (Que, Ha Nam)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
Improve-ment of road/ bridge	H79	NH 14 Widening (Dong Xoai - Chon Thanh)(34km)	To widen 2-lane section to 4-lane.(34km)	115.4
	H80	NH 14 Widening (Gia Lai - Kon Tum)(50km)	To widen 2-lane section to 4-lane.(50km)	184.0
	H81	NH 18A Upgrading (Mong Duong - Mong Cai)(122km)	To upgrade to required standard.(122km)	150.8
	H82	NH 51 Widening(Dong Nai - Vung Tau)(73.6km)	To widen 4-lane section to 6-lane.(73.6km)	184.1
	H83	NH8 Upgrading (Hong Linh - Cau Treo Border) (77km)	To upgrade to required standard.(77km)	164.6
	H84	NH9 Upgrading (Pho Lai (Song) - Cua Viet) (14km)	To upgrade to required standard.(14km)	21.7
	H85	NH5 Upgrading (106km)	To upgrade to required standard.(106km)	155.8
	H86	NH21 Upgrading(Son Tay - Xuan Mai) (32km)	To upgrade to required standard.(32km)	31.1
	H87	NH21 Upgrading (Nam Dinh - Thinh Long) (61km)	To upgrade to required standard.(61km)	59.4
	H88	NH22 Upgrading (HCMC - Moc Bai) (82km)	To upgrade to required standard.(82km)	82.1
	H89	NH80 Upgrading (Cau My Thuan - Xa Xia) (213km)	To upgrade to required standard.(213km)	207.3
	H90	NH 6 Widening (Ba La - Xuan Mai) (20km)	To widen 2-lane section to 4-lane.(20km)	52.7
	H91	NH6 Extension (PR 127 Lai Chau – border corridor line in Muong Te, through Pac Ma – Nam La border) (120km)	To upgrade to required standard.(120km)	180.2
	H92	NH 20 Improvement(Dau Giay - Lien Khuong)(250km)	To improve to minimum requirement.(250km)	201.8
	H93	NH12B Upgrading (Tam Diep - Hang Tram) (46km)	To upgrade to required standard.(46km)	85.3
	H94	NH7 Upgrading (Do Luong - Con Cuong) (54km)	To upgrade to required standard.(54km)	100.1
	H95	NH19 Upgrading(Quy Nhon - NH14) (169km)	To upgrade to required standard.(169km)	357.8
	H96	NH10 Improvement (Lai Thanh - Tao Xuyen) (50km)	To improve to minimum requirement.(50km)	24.3
	H97	NH3 Improvement (Thai Nguyen - Ta Lung) (274km)	To improve to minimum requirement.(274km)	161.3
	H98	NH4A, 4B Improvement (Cao Bang - Tien Yen) (225km)	To improve to minimum requirement.(225km)	132.8
	H99	NH37 Improvement (Sao Do - Co Noi) (533km)	To improve to minimum requirement.(533km)	316.7
	H100	NH34 Improvement (Ha Giang -	To improve to minimum requirement.(260km)	168.8

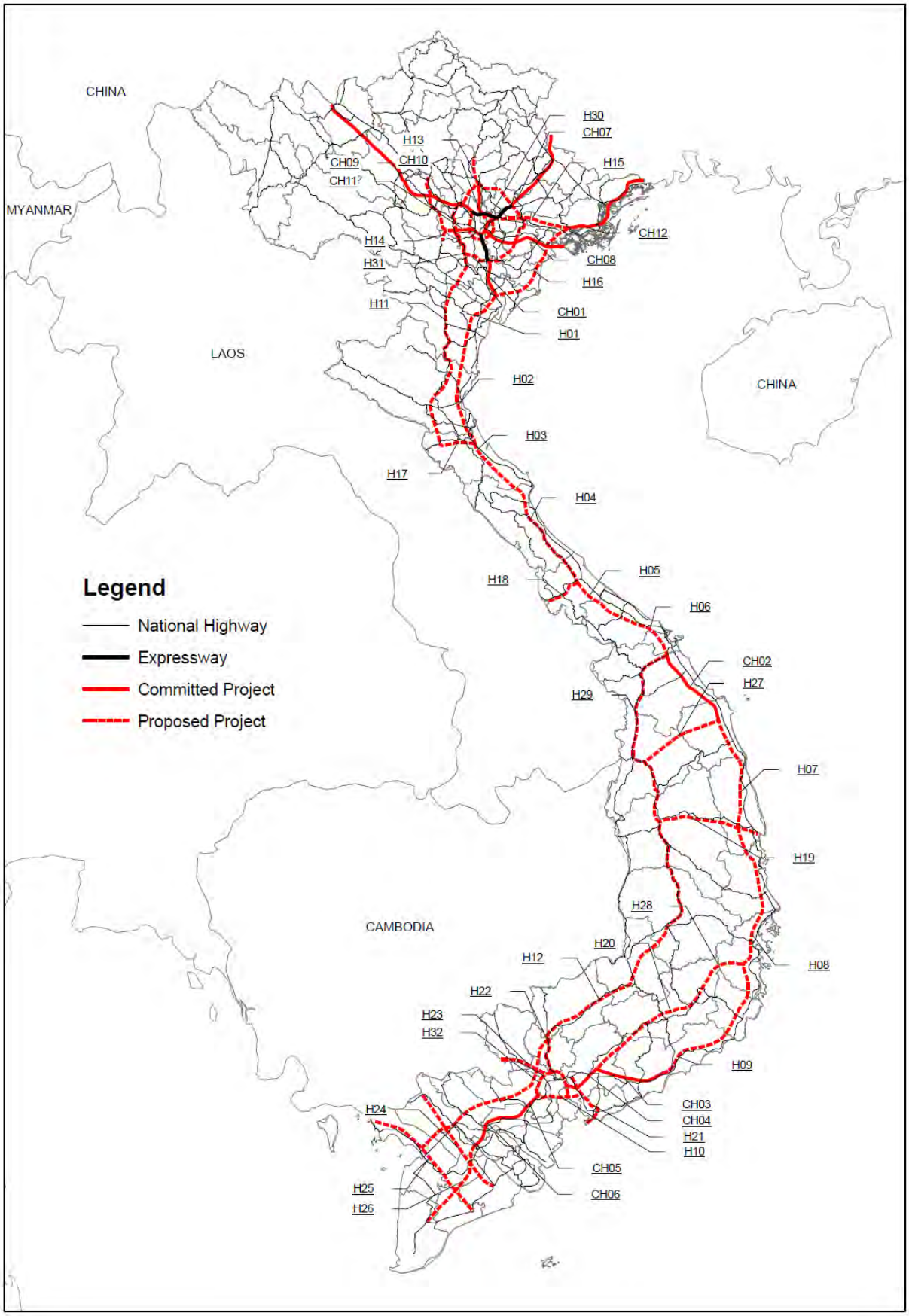
Project Title			Project Description	Proj.Cost (USD mil.)
		Cao Bang) (260km)		
	H101	NH43 Improvement (Gia Phu - Pa Hang) (113km)	To improve to minimum requirement.(113km)	72.5
	H102	NH7 Improvement (Dien Chau - Do Luong) (36km)	To improve to minimum requirement.(36km)	17.5
	H103	NH12A Improvement (Vung Ang - NH1(connection to Vung Ang port), Ha Tinh) (10km)	To improve NH12A connecting to Vung Ang Port to minimum require-ment.(10km)	4.9
	H104	NH14B Improvement (Da Nang - Thanh My) (78km)	To improve to minimum requirement.(78km)	41.9
	H105	NH14D Improvement (HCM Road - Lao Border) (75km)	To improve to minimum requirement.(75km)	48.3
	H106	NH13 Improvement (Chon Thanh - Hoa Lu Border) (142km)	To improve to minimum requirement.(142km)	92.9
	H107	NH30 Improvement (An Huu - Dinh Ba Border) (121km)	To improve to minimum requirement.(121km)	58.9
	H108	NH61 Improvement(Tan Phu - Vinh Loi) (96km)	To improve to minimum requirement.(96km)	46.7
	H109	NH 40 Rehabilitation (24km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (24km)	9.8
	H110	NH217 Wideining (NH217 – NH1, Thanh Hoa) (30km)	To widen 2-lane section to 4-lane.(30km)	87.1
	H111	NH31 Rehabilitation (An Chau - Dinh Lap) (48km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (48km)	23.7
	H112	NH3B Rehabilitation (Yen Lac - That Khe) (44km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (44km)	21.7
	H113	PR507(NH47) Rehabilitation (Thuong Xuan - Kheo Border) (60km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (60km)	32.9
	H114	NH48 Rehabilitation (Thai Hoa - Kim Son) (74km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (74km)	40.6
	H115	NH32 Widening (Hanoi - Son Tay) (32km)	To widen 2-lane section to 4-lane. (32km)	84.3
	H116	NH32B Rehabilitation (Xom Giac - Muong Coi) (21km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (21km)	8.4
	H117	NH2B Rehabilitation (Vinh Yen - Tam Dao) (25km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (25km)	10.6
	H118	NH2C Rehabilitation (Vinh Yen - Son Duong) (60km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (60km)	23.7
	H119	NH23 Rehabilitation (NH2 - Phuc Yen) (27km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (27km)	10.0
	H120	NH47 Rehabilitation(NH1 - NH15) (61km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (61km)	21.8
	H121	NH45 Rehabilitation(Pho Ria - Thanh Hoa - Yen Cat) (136km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (136km)	49.3
	H122	NH49 Rehabilitation(Cang Thuan An - HCM Road) (75km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (75km)	28.0
	H123	NH25 Rehabilitation (Tuy Hoa - HCM Road) (180km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (180km)	72.9
	H124	NH27 Rehabilitation(Phan Rang Thap Cham - Buon Ma Thuot) (276km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (276km)	113.1
	H125	NH49B Rehabilitation (Cau My Chanh - Vinh Hien, Thu Thien Hue) (89km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (89km)	31.1
	H126	NH24B Rehabilitation (NH1 - An Hai, Quang Ngai) (18km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (18km)	6.3

Project Title			Project Description	Proj.Cost (USD mil.)
	H127	NH27B Rehabilitation(Tan Son - NH1) (48km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (48km)	17.3
	H128	NH1D Rehabilitation(Quy Nhon - Song Cau, Binh Dinh & Phu Yen) (33km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (33km)	11.5
	H129	NH1C Rehabilitation (Dien Khanh - Nha Trang) (17km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (17km)	5.9
	H130	NH56 Rehabilitation (Xuan Thanh - Ba Ria) (50km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (50km)	17.5
	H131	NH62 Rehabilitation (Tan An - Binh Hiep) (77km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (77km)	26.9
	H132	NH54Rehabilitation (Cai Von - Tieu Can) (167km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (167km)	58.3
	H133	NH53Rehabilitation (Vinh Long - Duyen Hai - NH54) (132km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (132km)	46.1
	H134	NH63 Rehabilitation(Minh Luong - Ca Mau) (109km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (109km)	38.1
	H135	NH1 Widening (to 4 lane,Lang Son - Hanoi) (185km)	To widen 2-lane section to 4-lane.(185km)	150.0
	H136	NH1 Widening (to 4 lane, Hanoi - Vinh) (365km)	To widen 2-lane section to 4-lane.(365km)	365.0
	H137	NH1 Widening (to 4 lane, Vinh - Danang) (650km)	To widen 2-lane section to 4-lane.(650km)	570.0
	H138	NH1 Widening (to 4 lane, Da-nang - Nha Trang) (510km)	To widen 2-lane section to 4-lane.(510km)	485.0
	H139	NH1 Widening (to 4 lane, Nha Trang - HCMC) (350km)	To widen 2-lane section to 4-lane.(350km)	280.0
	H140	NH1 Widening (to 4 lane, HCMC - Ca Mau) (385km)	To widen 2-lane section to 4-lane.(385km)	310.0
Securing All-weather 2-lane roads on corri-dors	H141	NH279 Improvement(Tay Trang - Viet Quang) (242km)	To improve and widen 1-lane section to 2-lane. (242km)	151.2
	H142	NH6 Improvement (Moung Khen - Lai Chau) (19km)	To improve and widen 1-lane section to 2-lane. (19km)	9.8
	H143	New Road Construction(Ky Anh - Tan Son) (45km)	To construct new road (45km, 2 lane)	100.7
	H144	NH15Improvement (Tan Son - Thanh Lan) (20km)	To improve 1 lane section to 2-lane. (20km)	10.8
	H145	NH12AImprovement (Thanh Lan - Cha Lo) (7km)	To improve 1-lane section to 2-lane. (7km)	3.4
	H146	New RoadConstruction (Ngan Dua - Vi Thanh) (25km)	To construct new road (25km, 2 lane)	53.1
	H147	New RoadConstruction (HCMC - Long Xuyen) (140km)	To construct new road (140km, 2 lane)	264.4
Improve-ment of traffic safety	H148	Black Spot Improvement Plan	To review the black spot improvement guideline, implement the black spot improvement pilot project including training for engineers and capacity development, develop an exchage system for human resources and tech-niques/expertise related to black spot improvement system, promote un-derstanding of black spot improvement system to the road management authorities and promote black spot improvement implementation to local governments	95.0
	H149	Traffic Safety Audit Development Plan	To revise RSA guideline, RSA pilot project, and promote RSA system to the road management authorities	40.0
	H150	Traffic Safety Corridor Develop-ment Plan	To develop the database for inventory of encroachment and road condi-tions, set land value based on market price and apply to land land acqui-tion, improve the compensation system for affected people, improve the public consultation system and mandatory requirement of resettlement plan in road projects, strengthen and enforce sanctions against returning illegal dwellers, development planning focusing on heavy access sections, strengthen regulation for access from heavy traffic generating road side	40.0

Project Title			Project Description	Proj.Cost (USD mil.)
			facilities, and legal system improvement for encroachment	
	H151	Highway Traffic Safety Facility Enhancement Plan	To improve design standards and guideline basing on Vietnam's unique traffic, improve design standards and guideline basing on regional characteristics and budgetary situations, integrate design standards and development of design standard instruction, develop standard design drawing, improve traffic regulations and operation in accordance with local conditions, improve traffic regulation for arterial road, improve railway crossing, develop service roads on residential areas and urban sections, develop traffic control and information system for inter-city road, develop traffic signal and control system, improve intersections, develp passing lanes and road stations for inter-city road, improve traffic safety facilities, improve safety facilities for roads along residential areas, and improve systematic road network in residential improvement in residential and commercial zones	1,110.0
	H152	Vulnerable Road User Accident Prevention Plan	To improve pedestrian facilities along school routes and for high-risk accident areas and develop exclusive bicycle lane facilities	75.0
	H153	Expressway Safety Development Plan	To establish an efficient cooperation body between VEC and traffic police for expressway traffic control and develop traffic regulation for expressways, traffic safety measures guidelines for expressways, and advanced traffic control system (ETC) for expressways	112.5
	H154	Road Work Traffic Safety Development Plan	To develop road maintenance database, a comprehensive management system for national highways, regulations, and guidelines for safety measures during road construction and maintenance	20.0
	H155	Traffic Safety Monitoring and Maintenance Plan	To establish a monitoring and evaluation unit of road safety plan, and develop monitoring and evaluation system for local planning	35.0
	H156	Urban Road Traffic Safety Development Plan	To improve traffic regulations for urban road, develop coordinated traffic signal systems, wide area and flexible signal control systems , illegal parking prevention facilities, and an efficient parking regulation system, formulate regulations making parking facilities compulsory in every building, develop comprehensive parking system plan, public transport prioritizing facilities, promote public transport usage facilitation, and develop measures promoting traffic dispersion during peak hour and park and ride systems	272.5
Subtotal				68,637.4

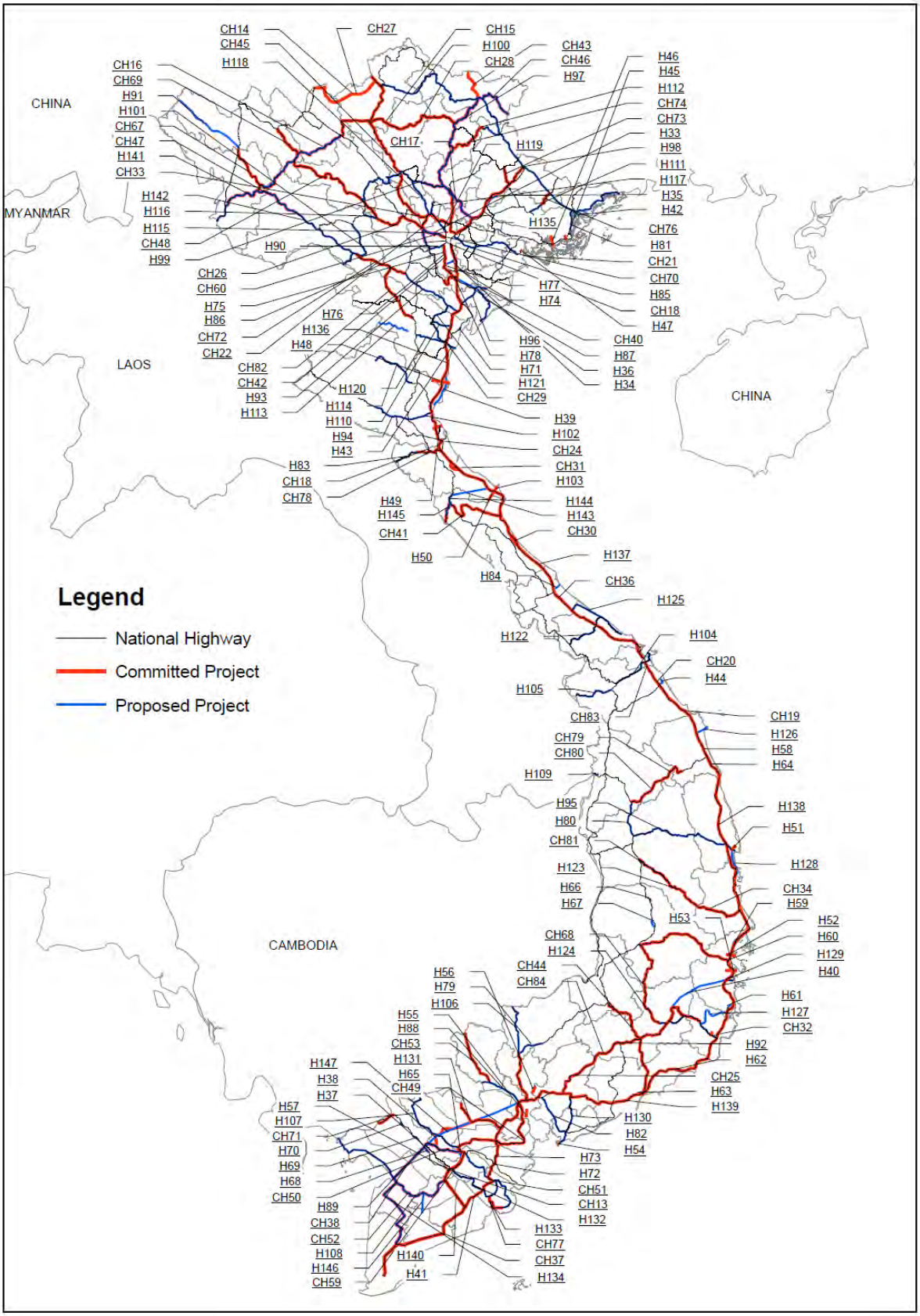
Note: Compiled by the VITRANSS 2 Study Team.
1. Expressway numbers H27 to H29 are supplementary proposals to the MOT expressway plan. Details are in Annex 3A.

Figure 6.3.1 Identified Road and Road Transportation Projects up to 2030 (Expressway)



Source: VITRANSS 2 Study Team.

Figure 6.3.2 Identified Road and Road Transportation Projects up to 2030 (National Highway)



Source: VITRANSS 2 Study Team.

6.4 Evaluation of Candidate Projects

The project long list for the road subsector includes 243 projects with a combined project cost of 89 billion USD. The projects were evaluated using a multi-criteria analysis (MCA). The use of MCA allows projects to be evaluated holistically, and seven items were considered as shown in Table 6.4.1.

Table 6.4.1 MCA for Project Evaluation

Criteria		Indicator	No. of Categories
1	Demand	(ton-km + pax-km)/km	5
2	Economic feasibility	EIRR	5
3	Financial feasibility	FIRR or Demand/Cost	5
4	Network Composition	5: North-South National Highway	5
		4: National Highway (excluding above)	
		3: Main Provincial Road	
		2-1: Minor Roads	
5	Natural Environmental Impact	% of Length passing Restricted Area	5
6	Maturity/Progress	9: DD (completed)	9
		8: DD (ongoing)	
		7: FS (completed)	
		6: FS(ongoing	
		5: Pre-FS (completed)	
		4: Pre-FS (ongoing)	
		3: MP	
		2: Idea	
		1: No Progress	
7	Consistency with Upper Plan or National Development Policy	3: Listed in Formal Plan	3
		2: Seemingly Consistent	
		1: Unknown/ Inconsistent	

Source: VITRANSS 2 Study Team

The methodology of evaluation scoring is as follows:

(i) Demand: By comparing demand volume (i.e. ton-km/km and pcu-km/km), the projects with top 10% demand are given 5 points, 4 points to next the 20%, 3 points to the next 40%, 2 points to the next 20% and 1 point to the last 10%.

(ii) Economic Feasibility: In the same way as demand, each project is given point corresponding to the economic IRR.

(iii) Financial Feasibility: In the same way as economic feasibility, a point is given according to the financial IRR, or demand divided by cost as a substitute of F-IRR. Point zero was given to non-income generating project.

(iv) Network Composition: Points are based on importance to the network structure. 5 points was given to projects that compose the N-S national highway, 4 points to other national highways, 3 points to main provincial roads, and 2 or 1 to other minor roads.

(v) Natural Environmental Impact: Restricted development areas were identified for the whole of Vietnam, considering topography, land cover, hazards, and protection areas. In all 34.8% of Vietnam was categorized as restricted area. Based on the % of length of the project, a score is assigned with a maximum score of 5.

(vi) Maturity/ Progress: In the order of (9) DD completed, (8) DD in Process, (7) FS completed, (6) FS in process, (5) Pre-FS completed, (4)Pre-FS in process, (3) Listed in Master Plan, (2) Still in concept stage, (1) No progress, each point was given.

(vii) Consistency Upper Plan or National Development Policy: (Refer to Table 6.4.1)

(viii) An overall score is then assessed by integrating all scores calculated. 20% of total score is based on Demand, 30% on Economic Feasibility and 10% on each of Network Composition, Natural Environmental Impact and Maturity/Progress. A score of 5 is attached projects with the highest rating, and 1 for projects with the lowest rating.

MCA was used only on the non-committed projects, while committed projects are assumed to be part of the Master Plan already. For details of the evaluation methodology, including key assumptions on the calculation of economic benefits, the reader is referred to Chapter 5 of the Main Text of VITRANSS 2.

The results of the MCA are shown in the following tables, described as follows:

(i) Expressway construction projects (Table 6.4.4)

(ii) National highway projects (Table 6.4.5)

The summary of project ratings is shown in Table 6.4.2 and Table 6.4.3

Table 6.4.2 Project by Rank and Project Type (Project Cost)

Type of Project	Committed	MCA Score					Total
		5 (high)	4	3	2	1 (low)	
Construction of new expressway	11,690.8	7,169.5	3,896.6	28,172.8	10,488.4	6,230.2	67,648.3
Construction of new road	1,459.1	351.1	741.0	797.3	468.8	552.0	4,369.3
Construction of bypass	166.2	246.4	211.5	226.9	113.4		964.4
Improvement of road/bridge	7,310.1	1,459.3	645.0	2,961.8	1,512.0		13,888.2
Securing All-weather 2-Lane Roads on Corridors	0.0	0.0	0.0	492.6	0.0	100.7	593.3
Improvement of Traffic Safety	135.9	690.0	1,110.0	0.0	0.0		1,935.9
Total	20,762.0	9,916.3	6,604.2	32,651.4	12,582.6	6,883.0	89,399.4

Source: VITRANSS 2 Study Team.

Table 6.4.3 Project by Rank and Project Type (Number of Projects)

Type of Project	Committed	MCA Score					Total
		5 (high)	4	3	2	1 (low)	
Construction of new expressway	12	7	4	12	6	3	44
Construction of new road	16	3	11	4	5	2	41
Construction of bypass	5	7	5	6	3	0	26
Improvement of road/bridge	51	30	2	18	12	0	113
Securing All-weather 2-Lane Roads on Corridors	0	0	0	6	0	1	7
Improvement of Traffic Safety	3	8	1	0	0	0	12
Total	87	55	23	46	26	6	243

Source: VITRANSS 2 Study Team.

Table 6.4.4 Comprehensive Evaluation of Expressway Construction Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Construction of new expressway											
H01	Ninh Binh – Thanh Hoa Express-way (75km)	827.6	15.3	5	5	4	5	5	6	3	5
H02	Thanh Hoa – Vinh Expressway (140km)	2128.0	12.1	5	4	3	5	5	6	3	5
H03	Vinh – Ha Tinh Expressway (20km)	201.5	17.0	5	5	5	5	5	6	3	5
H04	Ha Tinh – Quang Tri Expressway (277km)	2641.2	9.9	4	3	3	5	5	3	2	3
H05	Quang Tri – Hue Expressway (73km)	711.9	12.5	5	4	3	5	5	3	3	4
H06	Hue – Da Nang Expressway (105km)	1778.0	10.3	4	3	2	5	5	7	3	4
H07	Quang Ngai – Quy Nhon Express-way (150km)	1787.8	10.3	4	3	3	5	5	6	2	3
H08	Quy Nhon – Nha Trang Expressway (240km)	3390.1	8.9	4	3	2	5	5	3	2	3
H09	Nha Trang – Phan Thiet Express-way (280km)	2890.2	8.0	3	3	2	5	5	5	3	3
H10	Long Thanh – Nhon Trach – Ben Luc Expressway (45km)	738.6	15.9	4	5	3	5	5	8	3	5
H11	Doan Hung – Hoa Lac – Pho Chau Expressway (457km)	4813.1	6.3	1	3	1	4	5	3	2	2
H13	Thai Nguyen – Cho Moi Express-way (28km)	256.9	5.8	3	3	2	4	5	3	2	3
H14	Hoa Lac – Hoa Binh Expressway (26km)	214.0	7.3	2	3	1	4	5	6	2	3
H16	Ninh Binh – Hai Phong – Quang Ninh Expressway (160km)	1189.4	13.5	3	4	2	4	5	3	2	3
H17	Hong Linh – Huong Son Express-way (34km)	302.0	7.4	1	3	1	4	5	3	2	2
H18	Cam Lo – Lao Bao Expressway (70km)	699.1	4.9	1	3	1	4	5	3	2	2
H20	Dau Giay – Da Lat Expressway (189km)	1871.0	5.2	3	3	2	4	5	6	3	3
H21	Bien Hoa – Vung Tau Expressway (76km)	696.5	24.4	5	5	5	5	5	7	3	5
H22	HCMC – Thu Dau Mot – Chon Thanh Expressway (69km)	996.3	12.2	5	4	3	4	5	3	2	4
H23	HCMC – Moc Bai Expressway (55km)	410.5	16.4	4	5	4	4	5	3	2	4
H24	Soc Trang – Can Tho – Chau Doc Expressway (200km)	1439.6	9.7	2	3	1	4	5	3	2	2
H25	Ha Tien – Rach Gia – Bac Lieu Expressway (225km)	1619.5	10.9	1	3	1	4	5	3	2	2
H26	Can Tho – Ca Mau Expressway (150km)	1755.7	9.3	3	3	2	5	5	3	2	3
H27	Quang Ngai – Dak To Expressway (170km)	2073.6	8.3	1	3	1	4	5	1	1	1
H28	Nha Trang – Da Lat Expressway (80km)	1062.5	7.8	2	3	2	4	1	1	1	1
H29	Da Nang – Ngoc Hoi Expressway (250km)	3094.2	1.8	1	2	1	4	3	1	1	1
H30	Ring Road No.4 in Ha Noi (90km)	1350.5	14.5	4	4	4	5	5	6	3	5
H31	Ring Road No.5 in Ha Noi (320km)	2583.2	7.9	2	3	3	5	5	6	1	3
H32	Ring Road No.3 in HCMC (83km)	1226.9	13.7	5	4	4	5	5	6	3	5

Source: VITRANSS 2 Study Team.

Table 6.4.5 Comprehensive Evaluation of National Highway Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Construction of New Road											
H33	Economic axle-road Construc-tion (24km)	82.8	13.3	2	4	1	4	5	7	2	5
H34	Do Xa - Quan Son Highway Construction (30km)	103.4	2.9	1	2	1	4	5	7	2	3
H35	NH1A (Chi Lang - Bac Giang) Construction (Pho Gio)) (40km)	182.1	6.7	2	3	1	4	5	7	2	5
H36	NH21 Construction (Phu Ly – Nam Dinh) (25km)	86.2	18.2	4	4	4	3	5	7	2	5
H37	Vam Cong Bridge Construction (An Giang&Can Tho)	316.0	-	-	-	-	-	-	-	-	1*
H38	Cao Lanh Bridge Construction (Dong Thap)	236.0	-	-	-	-	-	-	-	-	1*
H39	New Coastal Road Construction (100km)	344.8	-	-	-	-	-	-	-	-	2*
H40	NH20 Extension(Da Lat – Nha Trang) (85km)	476.6	5.1	1	2	2	3	3	7	2	3
H41	Hau River Bridge Construction (NH60, Soc Trang) (4lane)	500.0	-	-	-	-	-	-	-	-	4*
H42	Van Tien Bridge Construction (Quang Ninh)(1341m)	200.0	-	-	-	-	-	-	-	-	3*
H43	NH47 Construction (Sam Son – Thanh Hoa City) (5km)	17.2	20.0	1	5	2	3	5	7	2	3
H44	NH14E Extension(Ha Lam along PR 613 – Binh Duong) (21.2km)	47.0	4.3	1	2	4	3	5	7	2	4
H45	Road Access between Cam Pha Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H46	Road Access between Hon Gai Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H47	Road Access between Hai Phong Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H48	Road Access between Nghi Son Port and Expressway	30.0	-	-	-	-	-	-	-	-	4*
H49	Road Access between Cua Lo Port and Expressway	24.0	-	-	-	-	-	-	-	-	4*
H50	Road Access between Vung Ang Port and Expressway	30.0	-	-	-	-	-	-	-	-	2*
H51	Road Access between Quy Nhon Port and Expressway	32.0	-	-	-	-	-	-	-	-	2*
H52	Road Access between Van Phong Port and Expressway	26.0	-	-	-	-	-	-	-	-	2*
H53	Road Access between Nha Trang Port and Expressway	36.0	-	-	-	-	-	-	-	-	2*
H54	Road Access between Vung Tau Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H55	Road Access between Sai Gon Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H56	Road Access between Dong Nai Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H57	Road Access between Can Tho Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
Construction of Bypass											
H58	NH1 Bypass (La Ha, Quang	68.3	-	-	-	-	-	-	-	-	4*

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
	Ngai) (15km)										
H59	NH1A Bypass (Van Gia, Khanh Hoa) (10km)	46.3	12.2	5	4	2	4	5	3	2	5
H60	NH1A Bypass (Ninh Hoa, Khanh Hoa) (10km)	34.5	-	1	1	3	4	5	3	2	2
H61	NH1A Bypass (Cam Ranh, Khanh Hoa) (10km)	44.6	5.5	2	2	3	4	4	6	2	3
H62	NH1A Bypass (Cho Lau, Binh Thuan) (10km)	39.8	5.8	4	2	2	4	5	3	2	4
H63	NH1A Bypass (Phan Thiet, Binh Thuan) (10km)	34.5	12.9	5	4	3	4	5	3	2	5
H64	NH1A Bypass (Duc Pho, Quang Ngai) (9.7km)	36.3	10.7	5	3	3	4	5	6	2	5
H65	NH1A Bypass (Vinh Long) (7.5km)	25.9	24.5	3	5	3	4	5	7	2	5
H66	NH14 Bypass (Ea Drang, Dak Lak)(10km)	44.4	-	1	1	2	3	5	3	2	2
H67	NH14 Bypass (Buo Ho, Dak Lak)(10km)	44.4	3.7	1	2	2	3	4	3	2	3
H68	NH91 Bypass (Thot Not, Can Tho)(10km)	34.5	18.8	5	4	3	3	5	3	2	5
H69	NH91 Bypass (An Chau, An Giang)(10km)	34.5	14.8	1	4	2	3	5	3	2	3
H70	NH91 Bypass (Cai Dau, An Giang)(10km)	34.5	6.1	1	3	4	3	5	3	2	3
H71	NH10 Bypass (Nga Son, Thanh Hoa)(10km)	34.5	-	1	1	3	3	5	3	2	2
H72	NH60 Bypass (Mo Cay, Ben Tre)(10km)	34.5	6.3	3	3	4	3	5	3	2	4
H73	NH60 Bypass (Ham Luong (Ben Tre – Mo Cay))(10km)	34.5	24.7	5	5	4	3	5	3	2	5
H74	NH38 Bypass (Hoa Mac, An Giang)(10km)	34.5	9.3	5	3	3	3	5	3	2	5
H75	NH21B Bypass (Binh Da, Ha-noi)(10km)	34.5	8.9	2	3	3	4	5	3	2	4
H76	NH21B Bypass (Kim Bai, Ha-noi)(10km)	34.5	11.8	2	3	3	4	5	3	2	4
H77	NH21B Bypass (Van Dinh, Ben Tre)(10km)	34.5	-	2	1	3	4	5	3	2	3
H78	NH21B Bypass (Que, Ha Nam)(10km)	34.5	2.8	3	2	3	4	5	3	2	3
Improvement of Roads and Bridges											
H79	NH 14 Widening (Dong Xoai - Chon Thanh)(34km)	115.4	12.4	4	4	1	3	4	3	2	5
H80	NH 14 Widening (Gia Lai - Kon Tum)(50km)	184.0	4.4	2	2	1	3	5	3	2	3
H81	NH 18A Upgrading (Mong Duong - Mong Cai)(122km)	150.8	2.8	1	2	1	3	5	3	2	3
H82	NH 51 Widening(Dong Nai - Vung Tau)(73.6km)	184.1	25.3	5	5	1	3	5	7	2	5
H83	NH8 Upgrading (Hong Linh - Cau Treo Border) (77km)	164.6	0.3	1	2	1	3	5	3	2	3
H84	NH9 Upgrading (Pho Lai (Song) - Cua Viet) (14km)	21.7	5.9	1	2	1	3	5	3	2	3
H85	NH5 Upgrading (106km)	155.8	15.6	2	4	1	4	5	3	2	5

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H86	NH21 Upgrading(Son Tay - Xuan Mai) (32km)	31.1	-	1	1	1	3	5	3	2	2
H87	NH21 Upgrading (Nam Dinh - Thinh Long) (61km)	59.4	15.0	1	4	1	4	5	3	2	3
H88	NH22 Upgrading (HCMC - Moc Bai) (82km)	82.1	7.0	1	3	1	3	5	3	2	3
H89	NH80 Upgrading (Cau My Thuan - Xa Xia) (213km)	207.3	1.9	1	2	1	3	5	3	2	3
H90	NH 6 Widening (Ba La - Xuan Mai) (20km)	52.7	14.5	3	4	1	3	5	3	2	5
H91	NH6 Extension (PR 127 Lai Chau – border corridor line in Muong Te, through Pac Ma – Nam La border) (120km)	180.1	6.9	1	3	1	3	1	3	2	3
H92	NH 20 Improvement(Dau Giay - Lien Khuong)(250km)	201.8	15.1	3	4	1	3	5	3	2	5
H93	NH12B Upgrading (Tam Diep - Hang Tram) (46km)	85.3	9.7	1	3	1	3	5	3	2	3
H94	NH7 Upgrading (Do Luong - Con Cuong) (54km)	100.1	4.2	1	2	1	3	5	3	2	3
H95	NH19 Upgrading(Quy Nhon - NH14) (169km)	357.8	9.1	1	3	1	3	5	3	2	3
H96	NH10 Improvement (Lai Thanh - Tao Xuyen) (50km)	24.3	32.7	2	5	1	3	5	3	2	5
H97	NH3 Improvement (Thai Nguyen - Ta Lung) (274km)	161.3	7.5	1	3	1	4	5	3	2	3
H98	NH4A, 4B Improvement (Cao Bang - Tien Yen) (225km)	132.8	-	1	1	1	3	5	3	2	2
H99	NH37 Improvement (Sao Do - Co Noi) (533km)	316.7	-	1	1	1	3	5	3	2	2
H100	NH34 Improvement (Ha Giang - Cao Bang) (260km)	168.8	-	1	1	1	3	5	3	2	2
H101	NH43 Improvement (Gia Phu - Pa Hang) (113km)	72.5	-	1	1	1	3	5	3	2	2
H102	NH7 Improvement (Dien Chau - Do Luong) (36km)	17.5	0.0	1	1	1	3	5	3	2	2
H103	NH12A Improvement (Vung Ang - NH1(connection to Vung Ang port), Ha Tinh) (10km)	4.9	4.1	1	2	1	3	5	3	2	3
H104	NH14B Improvement (Da Nang - Thanh My) (78km)	41.9	18.6	1	4	1	3	4	3	2	3
H105	NH14D Improvement (HCM Road - Lao Border) (75km)	48.3	-	1	1	1	3	5	3	2	2
H106	NH13 Improvement (Chon Thanh - Hoa Lu Border) (142km)	92.9	-	1	1	1	3	5	3	2	2
H107	NH30 Improvement (An Huu - Dinh Ba Border) (121km)	58.9	12.3	1	4	1	3	5	3	2	3
H108	NH61 Improvement(Tan Phu - Vinh Loi) (96km)	46.7	12.4	1	4	1	3	5	3	2	3
H109	NH 40 Rehabilitation (24km)	9.8	3.8	1	2	1	3	3	3	2	5**
H110	NH217 Wideining (NH217 – NH1, Thanh Hoa) (30km)	87.1	-	1	1	1	3	5	3	2	2
H111	NH31 Rehabilitation (An Chau - Dinh Lap) (48km)	23.7	15.0	1	4	1	3	5	3	2	5**

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H112	NH3B Rehabilitation (Yen Lac - That Khe) (44km)	21.7	18.8	1	4	1	3	5	3	2	5**
H113	PR507(NH47) Rehabilitation (Thuong Xuan - Kheo Border) (60km)	32.9	13.2	1	4	1	3	1	3	2	5**
H114	NH48 Rehabilitation (Thai Hoa - Kim Son) (74km)	40.6	12.7	1	4	1	3	5	3	2	5**
H115	NH32 Widening (Hanoi - Son Tay) (32km)	84.3	-	1	1	1	3	5	3	2	2
H116	NH32B Rehabilitation (Xom Giac - Muong Coi) (21km)	8.4	10.6	1	3	1	3	5	3	2	5**
H117	NH2B Rehabilitation (Vinh Yen - Tam Dao) (25km)	10.6	4.0	1	2	1	4	1	3	2	5**
H118	NH2C Rehabilitation (Vinh Yen - Son Duong) (60km)	23.7	6.5	1	3	1	4	5	3	2	5**
H119	NH23 Rehabilitation (NH2 - Phuc Yen) (27km)	10.0	16.1	1	4	1	3	5	3	2	5**
H120	NH47 Rehabilitation(NH1 - NH15) (61km)	21.8	10.8	1	3	1	3	5	3	2	5**
H121	NH45 Rehabilitation(Pho Ria - Thanh Hoa - Yen Cat) (136km)	49.3	1.5	1	2	1	3	5	3	2	5**
H122	NH49 Rehabilitation(Cang Thuan An - HCM Road) (75km)	28.0	6.7	1	3	1	3	5	3	2	5**
H123	NH25 Rehabilitation (Tuy Hoa - HCM Road) (180km)	72.9	14.3	1	4	1	3	5	3	2	5**
H124	NH27 Rehabilitation(Phan Rang Thap Cham - Buon Ma Thuot) (276km)	113.1	8.2	1	3	1	3	5	3	2	5**
H125	NH49B Rehabilitation (Cau My Chanh - Vinh Hien, Thu Thien Hue) (89km)	31.1	6.8	1	3	1	3	5	3	2	5**
H126	NH24B Rehabilitation (NH1 - An Hai, Quang Ngai) (18km)	6.3	21.8	1	5	1	3	5	3	2	5**
H127	NH27B Rehabilitation(Tan Son - NH1) (48km)	17.3	-	1	1	1	3	5	3	2	5**
H128	NH1D Rehabilitation(Quy Nhon - Song Cau, Binh Dinh & Phu Yen) (33km)	11.5	15.0	1	4	1	4	5	3	2	5**
H129	NH1C Rehabilitation (Dien Khanh - Nha Trang) (17km)	5.9	25.0	2	5	1	4	5	3	2	5**
H130	NH56 Rehabilitation (Xuan Thanh - Ba Ria) (50km)	17.5	7.4	1	3	1	3	5	3	2	5**
H131	NH62 Rehabilitation (Tan An - Binh Hiep) (77km)	26.9	14.5	1	4	1	3	5	3	2	5**
H132	NH54Rehabilitation (Cai Von - Tieu Can) (167km)	58.3	-	1	1	1	3	5	3	2	5**
H133	NH53Rehabilitation (Vinh Long - Duyen Hai - NH54) (132km)	46.1	11.4	1	3	1	3	5	3	2	5**
H134	NH63 Rehabilitation(Minh Luong - Ca Mau) (109km)	38.1	14.7	1	4	1	3	5	3	2	5**
H135	NH1 Widening (to 4 lane,Lang Son - Hanoi) (185km)	150.0	-	-	-	-	-	-	-	-	2*
H136	NH1 Widening (to 4 lane, Hanoi - Vinh) (365km)	365.0	-	-	-	-	-	-	-	-	4*
H137	NH1 Widening (to 4 lane, Vinh - Danang) (650km)	570.0	-	-	-	-	-	-	-	-	3*

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H138	NH1 Widening (to 4 lane, Da-nang - Nha Trang) (510km)	485.0	-	-	-	-	-	-	-	-	3*
H139	NH1 Widening (to 4 lane, Nha Trang - HCMC) (350km)	280.0	-	-	-	-	-	-	-	-	4*
H140	NH1 Widening (to 4 lane, HCMC - Ca Mau) (385km)	310.0	-	-	-	-	-	-	-	-	2*
Securing All-weather 2 Lane Roads on Corridors											
H141	NH279 Improvement(Tay Trang - Viet Quang) (242km)	151.2	9.1	1	3	1	5	5	1	1	3
H142	NH6 Improvement (Moung Khen - Lai Chau) (19km)	9.8	22.6	1	5	1	5	5	1	1	3
H143	New Road Construction(Ky Anh - Tan Son) (45km)	100.7	-	2	1	1	5	1	1	1	1
H144	NH15Improvement (Tan Son - Thanh Lan) (20km)	10.8	12.1	2	4	1	5	5	1	1	3
H145	NH12AImprovement (Thanh Lan - Cha Lo) (7km)	3.4	6.1	1	3	1	5	5	1	1	3
H146	New RoadConstruction (Ngan Dua - Vi Thanh) (25km)	53.1	0.5	2	2	1	5	5	1	1	3
H147	New RoadConstruction (HCMC - Long Xuyen) (140km)	264.4	10.2	3	3	1	5	5	1	1	3
Improvement of Traffic Safety											
H148	Black Spot Improvement Plan	95.0	-	-	-	-	-	-	-	-	5*
H149	Traffic Safety Audit Develop-ment Plan	40.0	-	-	-	-	-	-	-	-	5*
H150	Traffic Safety Corridor Devel-opment Plan	40.0	-	-	-	-	-	-	-	-	5*
H151	Highway Traffic Safety Facility Enhancement Plan	1110.0	-	-	-	-	-	-	-	-	4*
H152	Vulnerable Road User Accident Prevention Plan	75.0	-	-	-	-	-	-	-	-	5*
H153	Expressway Safety Develop-ment Plan	112.5	-	-	-	-	-	-	-	-	5*
H154	Road Work Traffic Safety De-velopment Plan	20.0	-	-	-	-	-	-	-	-	5*
H155	Traffic Safety Monitoring and Maintenance Plan	35.0	-	-	-	-	-	-	-	-	5*
H156	Urban Road Traffic Safety De-velopment Plan	272.5	-	-	-	-	-	-	-	-	5*

Source: VITRANSS 2 Study Team.
Note: * For projects not suitable for quantitative evaluation due to the nature of the project or the lack of sufficient information, overall evaluation was done based on expert's judgment. ** Based on the basic strategy of VITRANSS2 which promotes the maximum use of existing transport properties, road rehabilitation projects should be lank 5 although some projects may have low evaluation on criteria partly because of the evaluation of EIRR and traffic demand based on inter-provincial traffic. (excluding intra-provincial traffic due to the lack of information)

6.5 Road Transport Master Plan

1) Development Program

The implementation of road projects needs to consider the budget envelope as well as prioritization among projects in other sub-sectors, including railway, maritime, IWT, aviation, and logistics. For details the reader is referred to Chapter 6 of the main text of VITRANSS 2. The selection of priority projects could not be made without referencing the competing needs of other sub-sectors.

The budget envelope for overall transport development was assumed to range from 3% to 7% of GDP, assuming that the economy will grow as follows:

(i) Annual GDP growth rate for 2011–2020: 5.5% (Low), 6.5% (Medium), 7.5% (High)

(ii) Annual GDP growth rate for 2021–2030: 4.5% (Low), 5.5% (Medium), 6.5% (High)

It is therefore estimated that funds for transport development a low of 37 to 96 billion USD for the period of 2009 to 2020, with a median estimate of 66.5 billion USD.

If all candidate road projects are to be implemented, the available funds would not be enough even assuming the share of private sector investment (Table 6.5.1). And this does not yet include funding requirements for urban transport projects, rural transportation, and maintenance works. It is estimated that these projects, which were not covered in VITRANSS 2 would account for about 40% of the overall transport funds. Moreover, there will no longer be money left for other priority projects in other sub-sectors.

A review of all sub-sectors and other funding needs, it was determined that for the period 2009-2020, only committed road projects and roads projects that scored the highest in the MCA can be accommodated. Therefore the recommended road development program for the period 2009-2020 would require a funding of 25.0 billion USD covering 142 projects (Table 6.5.1). Maintenance works is roughly estimated to require 20% of the road development investment program or 5.0 billion USD for the same period. Projects not included in the core program are to be implemented for the period 2021-2030.

Table 6.5.1 Road Development Core Program

	0. Candidate Projects (2009–2030)			1. Committed Projects			2. MCA Score 5 Proposed Projects (2009 2020)			1+2. Core Program (2009–2020)		
	No.	Cost (USD million)		No.	Cost (USD million)		No.	Cost (USD million)		No.	Cost (USD million)	
		Total	To Gov't		Total	To Gov't		Total	To Gov't		Total	To Gov't
Expressway	44	67,648	47,354	12	11,691	8,184	7	7,169	5,019	19	18,860	13,202
Nat'l Highway	187	19,815	19,815	72	8,935	8,935	40	2,057	2,057	112	10,992	10,992
Others	12	1,936	1,936	3	136	136	8	690	690	11	826	826
Total	243	89,399	69,105	87	20,762	17,255	55	9,916	7,765	142	30,678	25,020

Source: VITRANSS 2 Study Team.
Notes: % of cost to government for expressway - 70%

2) Road Projects by Transport Corridors

Based on corridor needs and the MCA results, projects for each of the 32 corridors were identified. The candidate projects were categorized by corridor and the implementation strategy of projects were determined as follows:

Table 6.5.2 Road Development Strategy by Corridor

Corridor	Short to Medium Term (2010-2020)	Long Term (2021-2030)
1) North-South Coastal Corridor	• (H1) CH01, CH02, CH03 CH04,H01, H02, H03 • (H2) CH19, CH20, CH24,H36 • (H3) CH29, CH30, CH31, CH32, H59, H63, H64 • (H4) CH36, CH38, CH42, CH83, H121, H125, H126, H128, H129	• (H1) H04, H05, H06, , H07, H08, H09 • (H2) H39, H43, H44, H45, H46, H47, H48, H49, H50, H51, H52, H53, H54, H55, H56 • (H3) H58, H60, H61,H62, H75,H76, H78 • (H4) H103, H110, H136 H137, H138, H139
2) North-South Upland Corridor	• (H4) H79, H109, H113, H114, H120, H122, H124	• (H1) H11, H12, H17, H29 • (H3) H56, H67 • (H4) H80
3) NFEZ Gateway Corridor	• (H1) CH08 • (H2) CH21	• (H1) H15 • (H2) H46, H47 • (H4 H85
4) SFEZ Gateway Corridor	• (H1) H21 • (H4) H82, H130	• (H2) H55, H56, H57
5) CFEZ Gateway Corridor	• (H1) CH02 • (H2) CH19, CH20 • (H4) CH83, H125	• (H1) H06 • (H2) H44
6) Hanoi–Lao Cai Corridor	• (H1) CH9 • (H4) CH39, CH45, CH48, CH26, CH33, H116, H118, H119	• (H4) H115
7) Hanoi–Lang Son Corridor	• (H1) CH07 • (H2) CH73, H35	• (H2) H135
8) Vinh–NH8–Lao Border Corridor	• (H4) CH78	• (H1) H17 • (H4) H83
9) Dong Ha–Lao Bao Corridor		• (H1) H18 • (H4) H84
10) HCMC–NH22–Cambodia Border Corridor	• (H4) CH53	• (H1) H23 • (H4) H88
11) Soc Trang–Can Tho–Cambodia Border Corridor	• (H3) H68 • (H4) CH71, CH77, H132, H133	• (H1) H24 • (H2) H37, H57 • (H3) H69, H60
12) North Frontier Corridor	• (H2) CH14, CH15, CH16, CH27, CH28 • (H4) CH47,CH69,CH76, H111, H112	• (H4) H98, H100 • (H5) H141
13) Hanoi–Cao Bang Corridor	• (H1) CH10 • (H4) CH43, CH46, CH74	• (H1) H13 • (H4) H97
14) North Coastal (China Border) Corridor	• (H1) CH12 • (H4) CH40, H96	• (H1) H16 • (H2) H42, H45, H46, H47 • (H3) H71 • (H4) H81, H87
15) North Transversal Corridor	• (H2) CH17	• (H4) H99, H91
16) Hanoi–Hoa Binh Corridor		• (H1) H14
17) Ninh Binh–Lai Chau	• (H4) CH47, CH67, CH72, CH82,	• (H4) H91, H93 • (H5) H142
18) Vinh–NH7–Lao Border Corridor		• (H2) H49

Corridor	Short to Medium Term (2010-2020)	Long Term (2021-2030)
		• (H4) H94, H102
19) Vung Ang–NH12–Lao Border Corridor	• (H4) CH41	• (H2) H50 • (H5) H143, H144, H145
20) Da Nang–NH14B/14D–Lao Border Corridor		• (H4) H104, H105
21) Quang Ngai–Kon Tum Corridor	• (H4) CH79, CH80	• (H1) H27
22) Quy Nhon–NH19–Cambodia Border Corridor	• (H2)CH34 • (H4) CH81, H123	• (H1) H19 • (H2) H51 • (H4) H95
23) Nha Trang–Buon Ma Thuot Corridor	• (H4) CH44	• (H2) H52, H53
24) South Central Highland Corridor	• (H1) CH04 • (H2) CH25 • (H4) CH68, CH84, H92, H127	• (H1) H20, H28 • (H2) H40, H53
25) Phan Thiet–Gia Nghia Corridor	• (H4) CH44	
26) HCMC–NH13–Cambodia Border Corridor		• (H1) H22 • (H) H106
27) HCMC–My Tho–Cambodia Border Corridor	• (H4) CH50	• (H2) H54 • (H4) H107
28) Bac Lieu–Rach Gia–Cambodia Border Corridor	• (H4) CH52, H134	• (H1) H25 • (H4) H108 • (H5) H146
29) South Delta Spine Corridor	• (H1) CH05, CH06 • (H2) CH13 • (H3) H65, H73 • (H4) CH37, CH49, CH51, CH52, CH59	• (H1) H26 • (H2) H41, H57 • (H3) H72 • (H4) H140
30) Upper South Delta Corridor	• (H4) H131	• (H1) H12 • (H2) H38 • (H4) H89 • (H5) H147
31) Hanoi Outer Ring Corridor	• (H1) CH11 • (H2) CH18, CH22, H33 • (H3) H74 • (H4) CH60, H90, H117	• (H1) H30, H31 • (H2) H34 • (H3) H77 • (H4) H86
32) HCMC Outer Ring Corridor	• (H1) H10, H32	

Note:(H1), (H2), (H3), (H4), (H5) indicate the type of project
H1: Construction of new expressway
H2: Construction of new road
H3: Construction of bypass
H4: Improvement of road/bridge
H5: Securing All-weather 2-Lane Roads on Corridors

6.6 Conclusion and Recommendation

The road sub-sector has been improved the last ten years, the condition of roads in Vietnam however continue to struggle to meet the requirements of its fast growing economy. Road conditions are deteriorating, traffic accidents remain high, and road capacity and could not keep up with the ever growing road traffic volumes. As Vietnam grows and its society and industries become more integrated with the rest of the world and within its borders road infrastructure and services are required to provide higher quality services, including high speed, intelligent, high load capacity, safe, and environmental friendly services.

To support the vision of an integrated and economically vibrant Vietnam, the road subsector needs to be modernized. The VITRANSS 2 road master plan proposed a road development program amounting to 22.3 billion USD. The maintenance program also needs to be strengthened in line with expansion of the road network to about 20% of the total road investment budget.

The GRA should be made to grow into its intended role of becoming the road authority in Vietnam—by resolving its conflicts with VEC (with regard to overall network planning and determination of the scale of expressways) and MOC (with regard to inter-urban transportation development).

The potential conflict of administrative function over toll roads such as over all network planning should be taken out of VEC, so that the latter can focus on its main role as developer and partner of private investors in expressways. Functions of VEC as a leading expressway developer and operator should be strengthened by coupling with PPP financing framework currently under development.

Other key recommendations for the road subsector are the following:

(i) Institutionalize a Five-year Road Development Plan;

(ii) Create a project management bureau to formalize the status of PMUs and leverage the accumulated experiences of the staff;

(iii) Spin off the CIENCOs into joint-stock companies, one at a time, so that they can evolve into competitive civil works contractors, on arms-length relationship with the MOT and its associated agencies;

(iv) Study the possibility of merging the unit responsible for developing technical standards and that responsible for keeping the quality of construction into a “Road Technology Research and Development Institute”; and

(v) Formalize the system of using the road maintenance fund.