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

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

North-South Expressway Master Plan

ITS Master Plan

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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ABBREVIATIONS

ADB	Asian Development Bank
ATM	Automatic Teller Machine
ATM	Asynchronous Transfer Mode
BOT	Build Operate Transfer
CBTA	Cross-Border Transport Agreement
CCD	Charge Coupled Device
CCTV	Closed-Circuit Tele-Vision
CDMA	Code Division Multiple Access
CMOS	Complementary Metal Oxide Semiconductor
C-to-C	Center-to-Center
DOT	Department of Transportation
DSRC	Dedicated Short-range Communications
DWDM	Dense Wave Division Multiplexing
EMV	Euro Master Visa
ERP	Electronic Road Pricing
ETC	Electronic Toll Collection
EVN	Electricity of Vietnam
EWEC	East-West Economic Corridor
GDP	Gross Domestic Products
GPS	Global Positioning System
GMS	Grater Mekong Sub-region
GSM	Global System for Mobile Communications
HMI	Human Machine Interface
IC	Interchange
IC-card	Integrated Circuit card
IEC	International Electro-technical Commission
IR	Infrared Ray
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
ITU	International Telecommunication Union
LED	Light Emitting Diode
LP	License Plate
MIC	Ministry of Information and Communication
MOT	Ministry of Transport
NSEC	North-South Economic Corridor
OBU	On-Board Unit
ODA	Official Development Assistance
PDOT	Provincial Department of Transport
PTQC	Posts and Telemetric Quality Control Directorate
RSA	Rivest, Shamir and Adleman
SDH	Synchronous Digital Hierarchy
SGM	Simple Graphical Message-sign
SMS	Systems Management Service
T-DES	Triple Data Encryption Standard
TDM	Time Division Multiplex
VATA	Vietnam Automobile Transportation Association
VMS	Variable Massage Signs

VNPT	Vietnam Posts and Telecommunications Group
VOV	Voice of Vietnam
VRA	Vietnam Road Administration
WB	World Bank
WIM	Weigh-in-Motion
WL	Wireless Communication
WTO	World Trade Organization

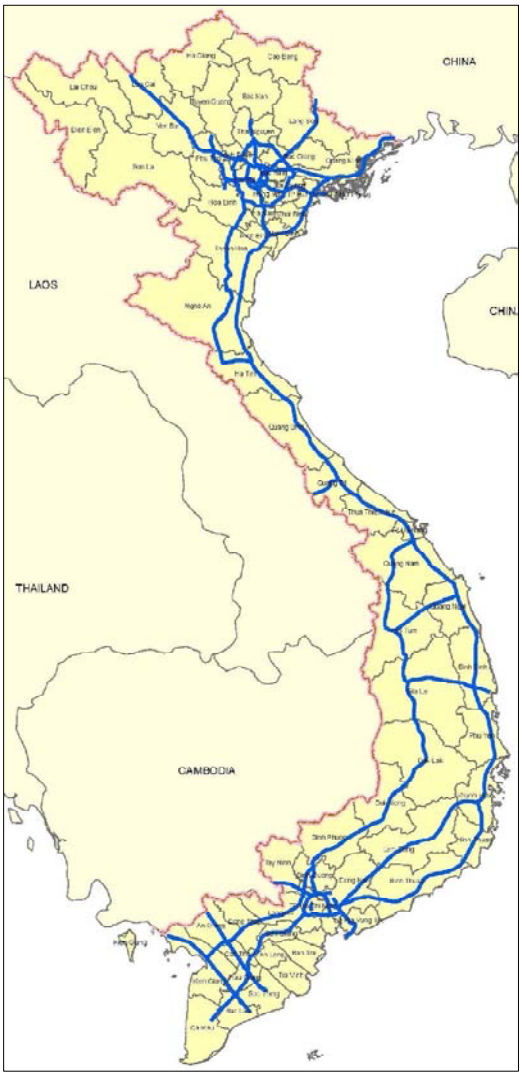
1 INTRODUCTION

1.1 Background of Developing the Master Plan

In Vietnam, expressway construction has begun to increase rapidly. Furthermore, the burden of the construction is shared by various organizations funded by the Official Development Assistance (ODA) of many different countries, the Asian Development Bank (ADB), the World Bank (WB), and the domestic banks and the private companies as the investors of the Build Operate Transfer (BOT). Consequently, it is conceivable that the constructed expressway network will be operated by many different organizations.

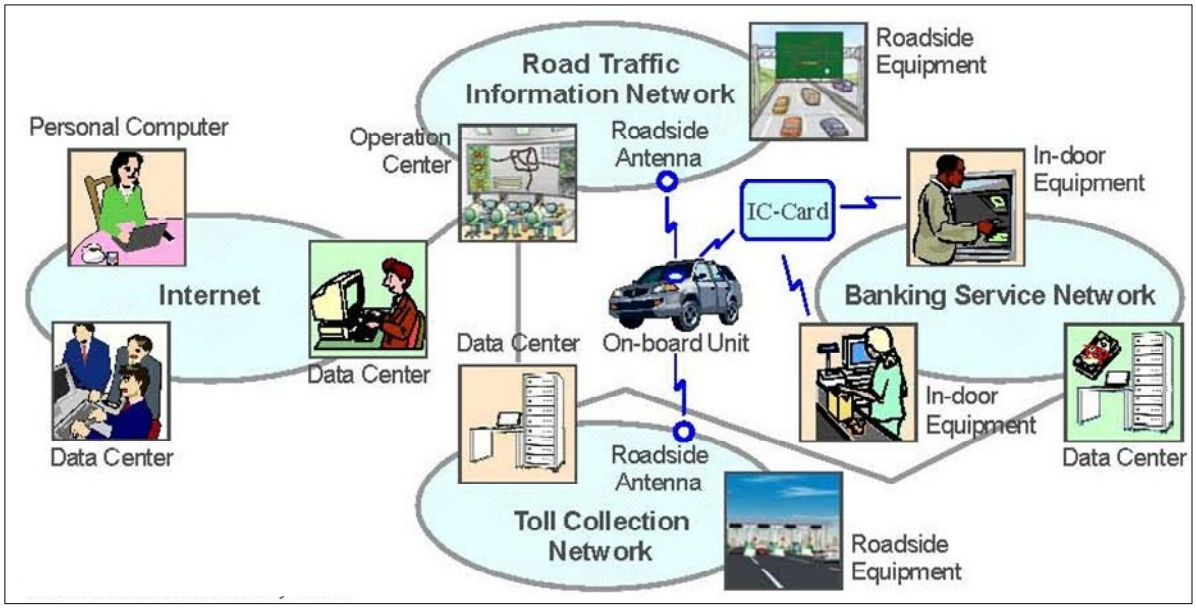
On the other hand, the communication network has been achieving a remarkable breakthrough in the world. As symbolized by the Internet, information/communication services are provided through a nationwide or worldwide network that includes a number of networks operated by different organizations. ITS (Intelligent Transport systems) also actualized by data exchange among various devices and centers on the communication network in many countries. Most of the devices are standardized and provided by many different suppliers. The standardization aims at cost reduction through market competition.

Figure 1.1.1 Expressway Network Plan in Vietnam



Source: VITRANSS 2 Study Team

Figure 1.1.2 Conceptual Illustration of ITS

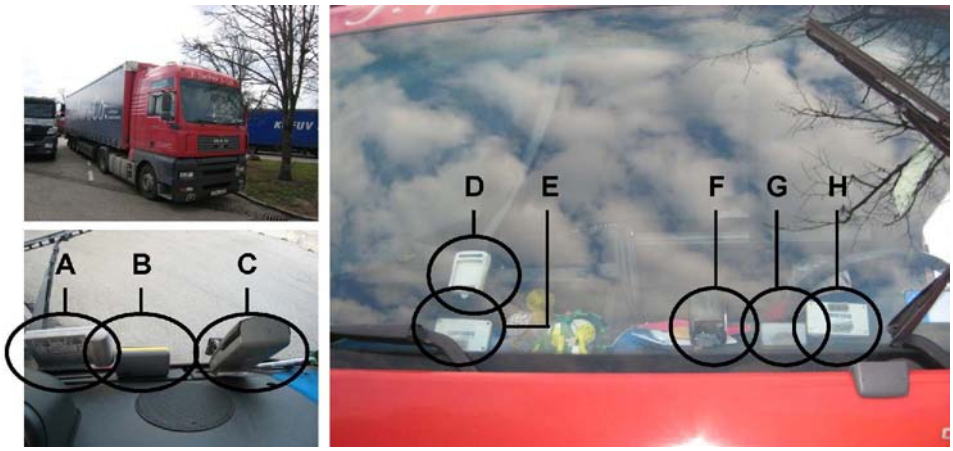


Source: VITRANSS 2 Study Team

However, the unified policy for ITS is not yet established in Vietnam, which may include toll collection, traffic information/control and communication network operation/management. If the expressway construction continues to go this way, unconformity and lack of coordination among different road sections will become apparent, and a waste of the system implementation/ operation cost and inconvenience in the expressway usage will come true.

For example, it is conceivable that incomplete standardization of the road-to-vehicle communication of ETC will bring an unhappy situation as shown in the pictures below. The drivers are required to prepare many OBUs (on-board units) for passing continuously through the different road sections.

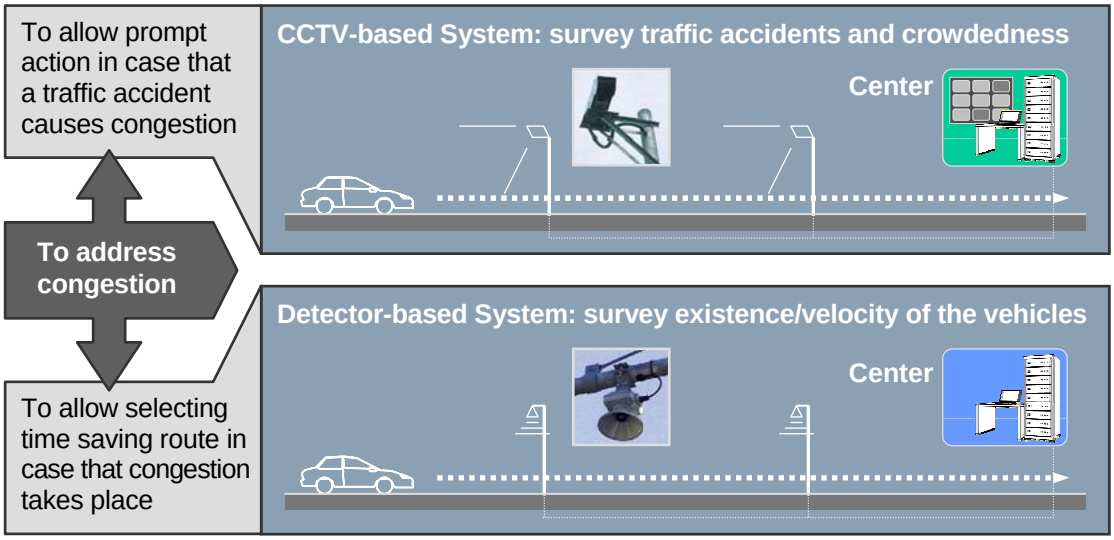
Figure 1.1.3 Unhappy Situation by Incomplete Standardization



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

The first step of standardization is to clarify the policy and requirements of ITS in Vietnam. Indistinct requirement often causes useless system installation and profitless costs. Even to address congestion, different systems can be developed as below.

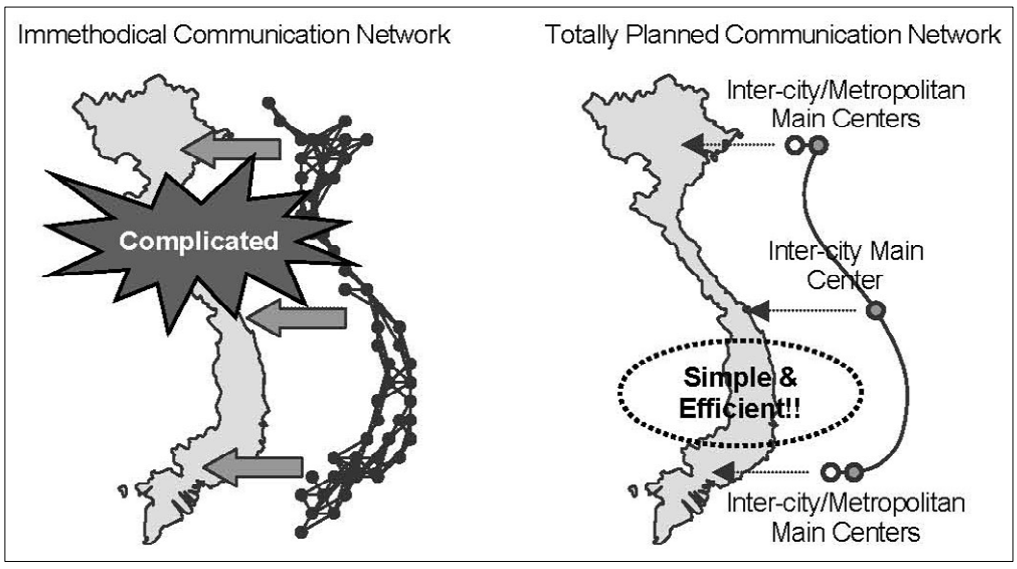
Figure 1.1.4 Necessity to Clarify the Policy and Requirements



Source: VITRANSS 2 Study Team

A totally planned communication network is necessary to provide ITS services all over the country; otherwise, a number of small-scale centers are likely to be built depending on the section-by-section road construction. Such an immethodical communication network and small centers will bring complicated data exchange and profitless costs.

Figure 1.1.5 Necessity of Total Plan of Communication Network



Source: VITRANSS 2 Study Team

For the reasons mentioned above, this Master Plan is needed as the preliminary stage of standardization of ITS for the inter-city road network.

1.2 Goals of ITS for Inter-city Road Network

Preparatory to the discussion in the Master Plan, seven goals below are proposed for ITS implementation of the inter-city road network in Vietnam.

(i) Increase operational efficiency of transportation system

(ii) Provide smooth and punctual transport

(iii) Improve safety and security of transport

(iv) Enhance convenience and comfort of transport

(v) Lower energy consumption and environmental costs

(vi) Activate industries by developing advanced technologies

(vii) Secure smooth access to the urban arteries.

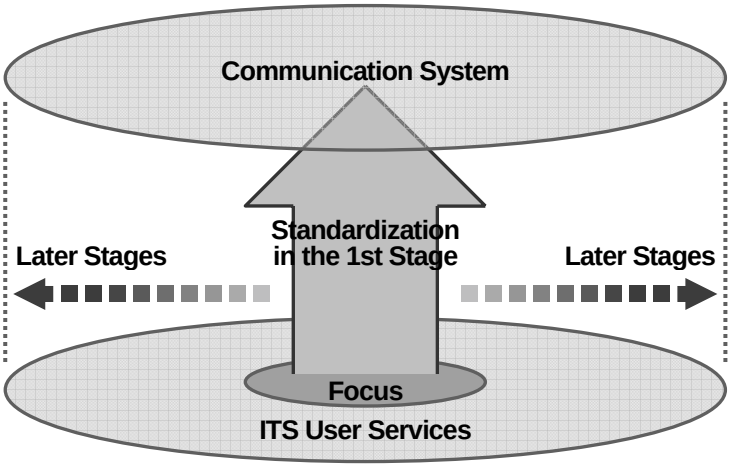
ITS serves the road users through required system operation. That is quite different from the road structures that serve road users only by construction.

Appropriateness of the goals is verified later referring to the background issues in Chapter 2.

1.3 Scope of the Master Plan

In the Master Plan, the scope of discussion shall focus to the priority ITS user services that provide clear assistance to the road operation. A required communication system for ITS can be reasoned out from the priority ITS services. The scope of discussion can be extended to further services in the later stages.

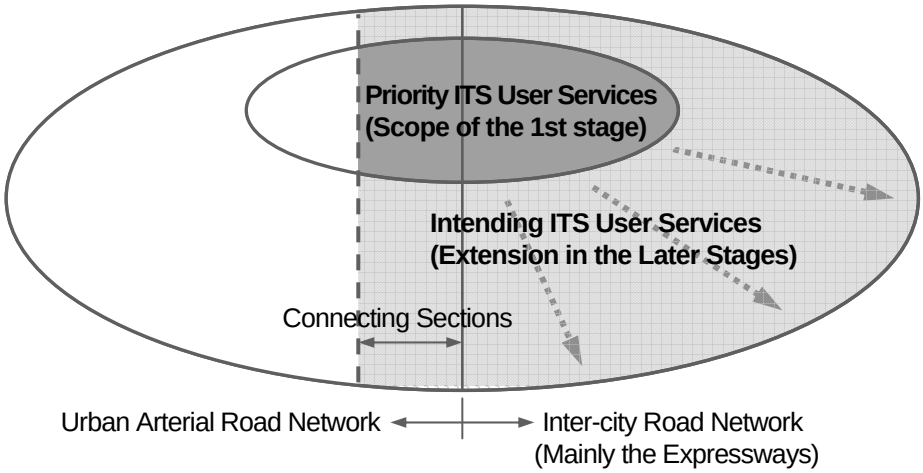
Figure 1.3.1 Focusing in the 1st Stage and Extension in Later Stages



Source: VITRANSS 2 Study Team

The Scope of the Master Plan is the inter-city road network, mainly the expressways, and connecting sections of the urban arterial road network. ITS services shall be provided continuously to road users en route; accordingly, it is not appropriate to limit the scope of the services to only within the inter-city road network. The Scope defines the location of roadside equipment; however, the location of the centers, in-door equipment and communication network are not to be limited in the scope.

Figure 1.3.2 Scope of the Master Plan



Source: VITRANSS 2 Study Team

1.4 Approach of the Master Plan

ITS will provide the road users with advanced services using the communication network. It will be achieved by various subsystems and by many operating bodies. Issues on ITS are to be discussed from the following three aspects in the Master Plan.

(1) Aspect of Traffic Service: "What services shall be provided?"

Various scenes of the usage of ITS are imaginable; however, ITS user services shall be prepared appropriately for the specific road network conditions and traffic characteristics in Vietnam. In the event of congestion, for example, it depends on the existing conditions of road network and traffic whether the most important thing is to remove the cause of congestion or to support appropriate route selection. ITS user services and their effects shall be discussed appropriately to the proposed goals.

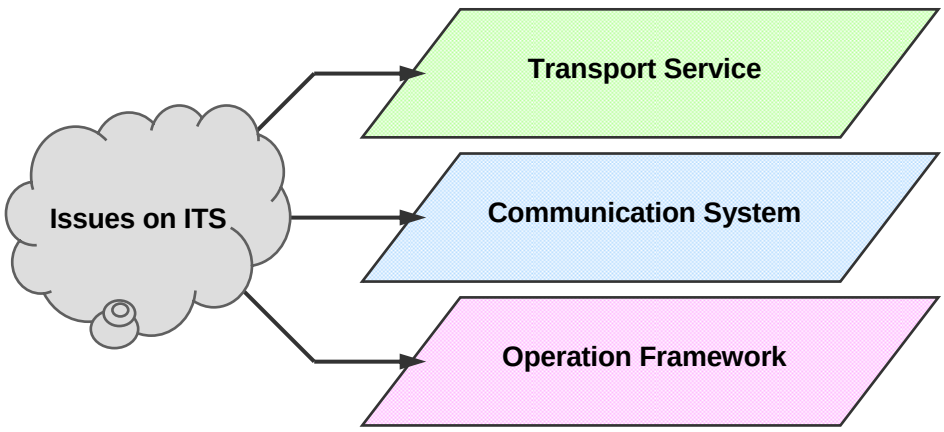
(2) Aspect of Communication System: "What methods shall be adopted for each service?"

Many different system architectures can be selected for realizing an ITS service, and the implementation cost depends on the system architecture. Hence, alternatives of system architecture shall be listed and appropriate one shall be selected for service requirements and budgetary constraints. Furthermore, it shall be considered that standardization of the system has particular importance for reducing its implementation cost.

(3) Aspect of Operation Framework: "What organizations shall be set for operation?"

For successful development of ITS, the system shall be managed by appropriate operating bodies. Accordingly, requirements for the operating bodies shall be brought into discussion. Setting up of the operating bodies appropriate for the requirements and cooperation among them shall be promoted.

Figure 1.4.1 Three Aspects of Discussion in the Master Plan

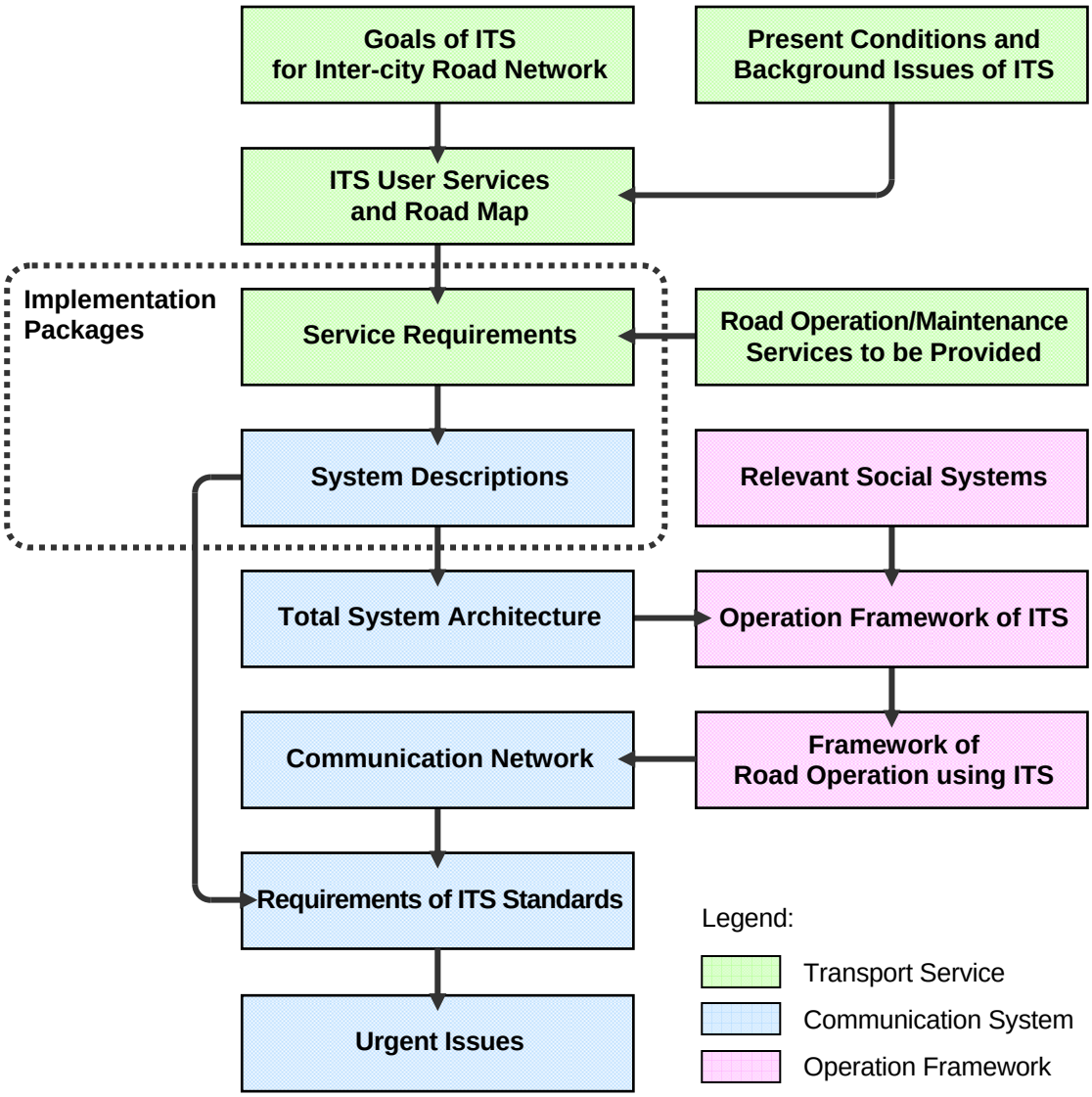


Source: VITRANSS 2 Study Team

1.5 Structure of the Master Plan

In the master plan, the form of ITS to be introduced to the inter-city road network in Vietnam is discussed from the three aspects aforementioned. The structure and procedure of the master plan is shown in the figure below.

Figure 1.5.1 Structure of the Master Plan



Source: VITRANSS 2 Study Team

Outlines of the discussion in each step are shown in followings.

(1) Goals of ITS for Inter-city Road Network

Preparatory to the discussion in the Master Plan, seven goals below are proposed for ITS implementation of the inter-city road network in Vietnam in the Chapter 1.

(2) Present Conditions and Background Issues of ITS

Chapter 2 aims to take a broad view of the current conditions below for discussions in the master plan, and based on the results, the background issues are summarized and correlated to the goals of ITS aforementioned.

(i) Inter-city road network
(ii) Car parking
(iii) Traffic accident
(iv) Inter-city bus
(v) Cargo transportation
(vi) Vehicle weight control systems
(vii) Toll collection systems
(viii) Road traffic information facilities
(ix) Roadside rest facilities
(x) Tourist information facilities.

(3) ITS User Services and Road Map

Priority/intending ITS user services are proposed in Chapter 3.

- Traffic information/control
- Non-stop toll collection
- Heavy truck control

} Priority ITS User Services

- Inter-city bus assistance
- Convenient parking assistance.

} Intending ITS User Services

The ITS user services to be cooperated in urban areas are subsequently proposed, such as road pricing. The effects provided by the services are assembled in a table related to the goals of ITS. The proposed services are finally organized in the road map of ITS with three stages of implementation and the main objectives of each stage are clarified.

(4) Road Operation/Maintenance Services to be Provided

Outlines of the road operation/maintenance are mentioned in Chapter 4. The policy of a combined toll rate system is proposed for the road network in the metropolitan area. The policies of toll revenue are mentioned and the policy of vehicle classification is assumed for the discussion in the following chapters.

Finally, the minimal service requirements for expressways are proposed for discussing the required service level of ITS quantitatively in the Master Plan.

(5) Implementation Packages

The concept of implementation packages is clarified first in Chapter 5. Subsequently, the specific implementation packages and their alternatives are defined responding to the priority ITS user services by using the following descriptions:

(i) Service requirements
(ii) Breakdown of implementation packages
(iii) System descriptions
(iv) Supplementary explanation.

(6) Total System Architecture

As the result of discussion on the implementation packages, the total system architecture is illustrated for ITS implementation on the inter-city road network. The details necessary for specifying the requirements of ITS standards are shown in ***Appendix 1***. Finally, the

recommendations on the alternatives of the following technologies are mentioned:

(i) CCTV camera
(ii) Vehicle detection
(iii) VMS (Variable Message Sign)
(iv) Road-to-vehicle communication for ETC
(v) Contact-less IC-card.

(Relevant international standards are shown in ***APPENDIX-2***.)

(7) Relevant Social Systems

Chapter 6 aims to clarify the current conditions of the following social systems relevant to the ITS user services discussed in Chapters 3 and 5.

(i) Vehicle registration and license plate system
(ii) Road rescue management
(iii) Traffic information through radio
(iv) Weather information
(v) Fee payment system (for telephone service and electric/water supply)
(vi) Legal regulations of penalties (for toll cheating and overloading)
(vii) Cross-border vehicle control
(viii) Telecommunication service
(ix) Legal regulations for radio waves.

(8) Operation Framework of ITS

In Chapter 7, the following frameworks for operating ITS are illustrated and institutional issues and its countermeasures are discussed in consideration of the system architecture shown in Chapter 5 and ***Appendix 1***.

(i) Framework for incident notification
(ii) Framework for DSRC probe
(iii) Framework for GPS/WL probe
(iv) Framework for traffic information
(v) Framework for OBU management
(vi) Framework for IC-card operation
(vii) Framework for toll clearance
(viii) Framework for toll enforcement
(ix) Framework for heavy truck control.

The results above are integrated conclusively into the total framework of ITS and the rolls of organizations in the framework are discussed and compiled in a table.

(9) Framework of Road Operation using ITS

Conceivable types of functional allocation for road operation are discussed first in Chapter 8, and the recommended type is indicated through the comparisons among them. The basic policies are subsequently mentioned on the following items of ITS implementation:

(i) Function allocation for road operation
(ii) Arrangement and cooperation of the centers

(iii) Stepwise implementation of ITS.

(10) Communication Network

Communication network is discussed from the following three aspects:

(i) Structure of backbone network

(ii) Transmission method

(iii) Installation of fiber optic cable.

(11) Requirements of ITS Standards

The concept of the following key-stones of standardization is shown at the outset of Chapter 9.

- Service requirements
- System architecture

} Shown in Chapter 5 and ***Appendix 1***

- Performance and installation of equipment
- Compatibility of equipment components
- Connectability of interfaces
- Inter-operability of data
- Communication network system.

} Specified in Chapter 9

The requirements of ITS standards are listed up for the priority ITS user services: traffic information/control, non-stop toll collection and heavy truck control. The items to be described as the requirements of ITS message/data are shown subsequently referring to ISO11179 and ISO/DIS14817. Finally, necessity and urgency of the requirements are shown in comparison with the implementation status of ITS in ongoing expressway projects.

(12) Urgent Issues

In Chapter 10, the following items are proposed as urgent issues for ITS implementation in Vietnam:

(i) Establishment of ITS standards

(ii) Pilot project for coordinated implementation

(iii) Other issues on operation framework of ITS.

2 PRESENT CONDITIONS AND BACKGROUND ISSUES OF ITS

2.1 General

This chapter aims to take a broad view of the current conditions below for discussions in the master plan, and based on the results, the background issues are summarized and correlated to the goals of ITS aforementioned.

(i) Inter-city road network
(ii) Car parking
(iii) Traffic accident
(iv) Inter-city bus
(v) Cargo transportation
(vi) Vehicle weight control systems
(vii) Toll collection systems
(viii) Road traffic information facilities
(ix) Roadside rest facilities
(x) Tourist information facilities

2.2 Inter-city Road Network

The national network for inter-city road has been started its implementation based on the expressway network plan (No.1734/QD-TTg) which was approved on December, 2008. The expressway is planed as 5,873 km length in total and located to be parallel to national highways. Figure 2.2.1 shows that red line is the planned expressway network and some sections with high priority are already started construction by the Japanese Loan, ADB and Domestic Funds.

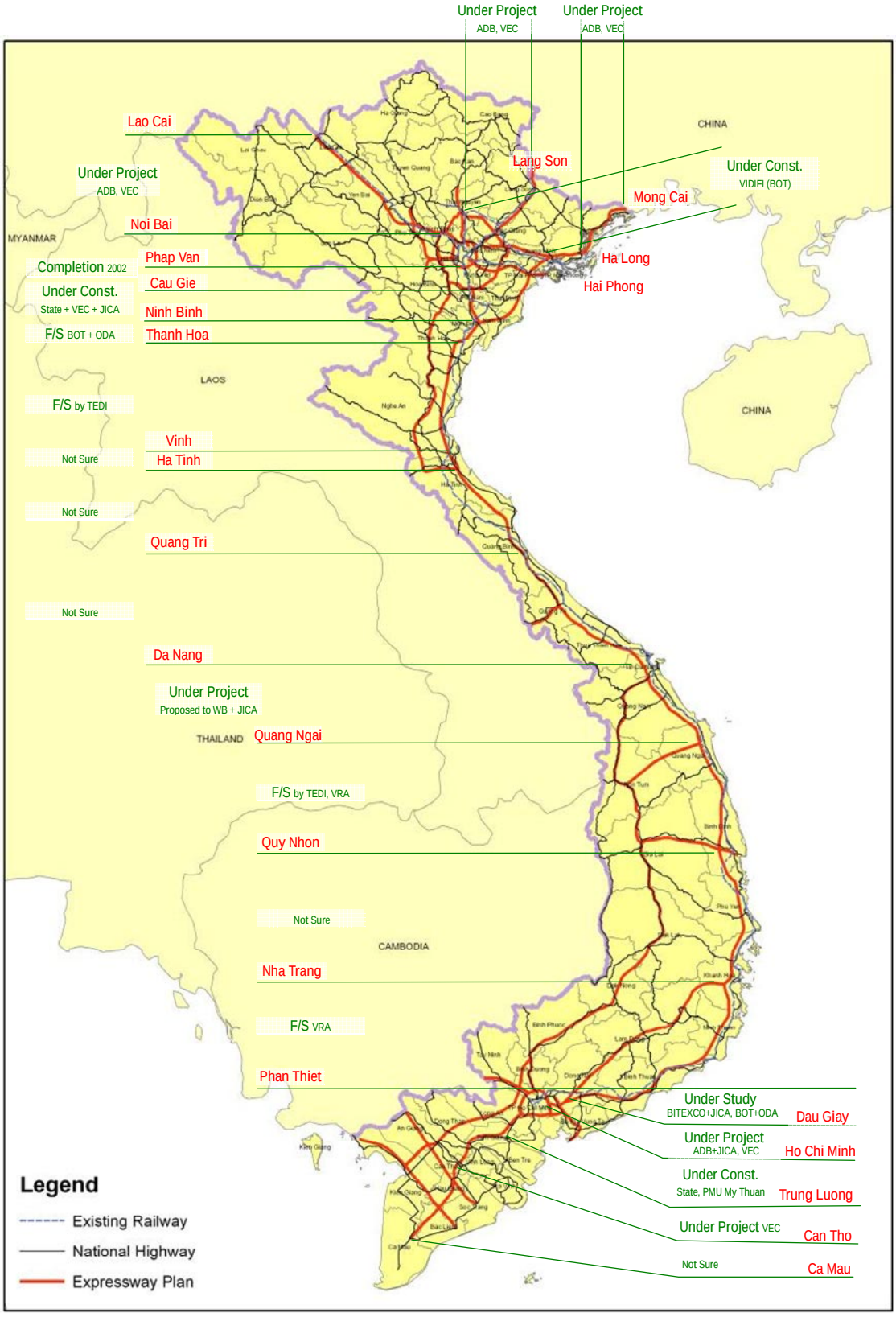
The details of expressway network plan and its implementation progress in northern and southern region are summarized in Figures 2.2.2 and 2.2.3.

Although the expressway network will be formed in accordance with this plan, each section is thought to be implemented by different financial resources. Therefore, it will be afraid if deferent expressway management for traffic control and maintenance as well as ITS solution will be installed at each section.

The design guideline of expressway is regulated under TCVN5729/97 established in 1997 which defined as Express-A and Express-B. It described that expressway should be designed by “Full access control” which means that vehicle can access to expressway at the only limited points at where the inter change was designed, and pedestrian and bicycles are not allowed to enter. However, it does not describe its definition that expressway must run with parallel national highway.

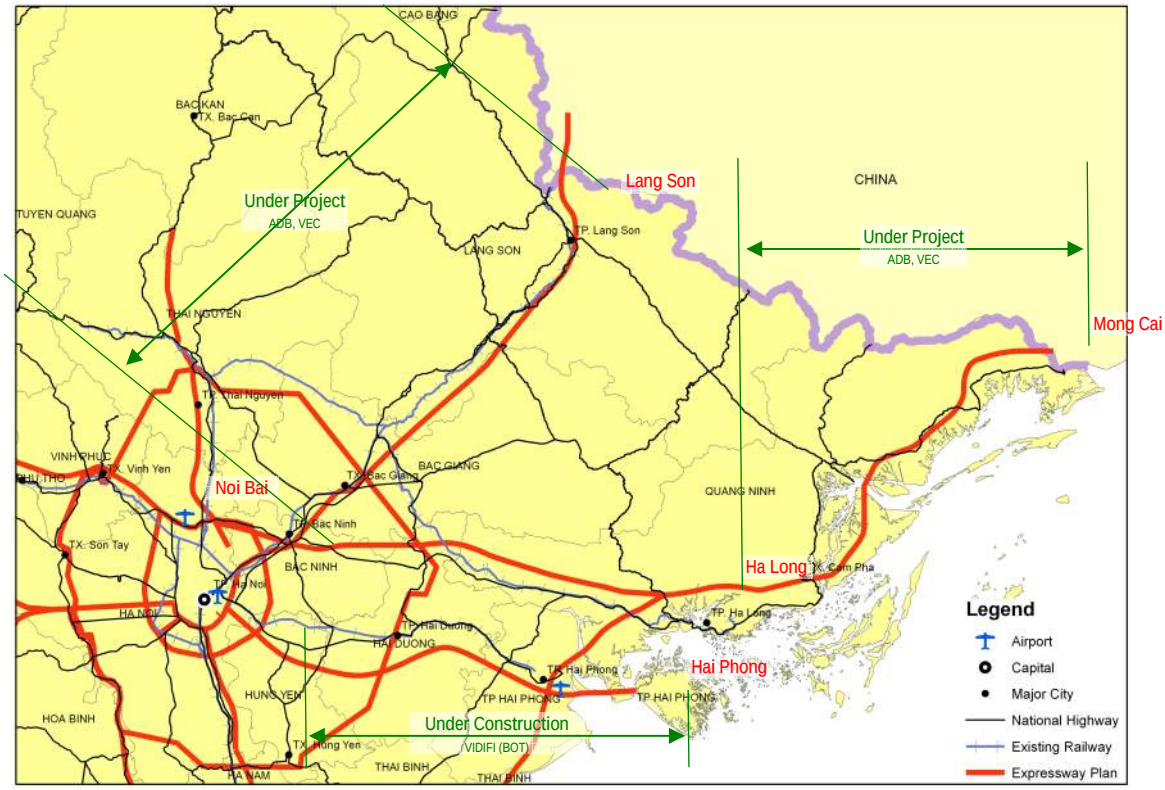
And more, there are nothing in regulation and guideline for expressway which type of toll gate system (e.g. Open System or Closed System) should be applied. It affects the selection of toll fare system and ITS solution for non-stop toll gate system. Table 2.2.1 shows the explanation of difference with toll gate systems.

Figure 2.2.1 Expressway Network Plan (No. 1734/QD-TTg) Approved on December 2008



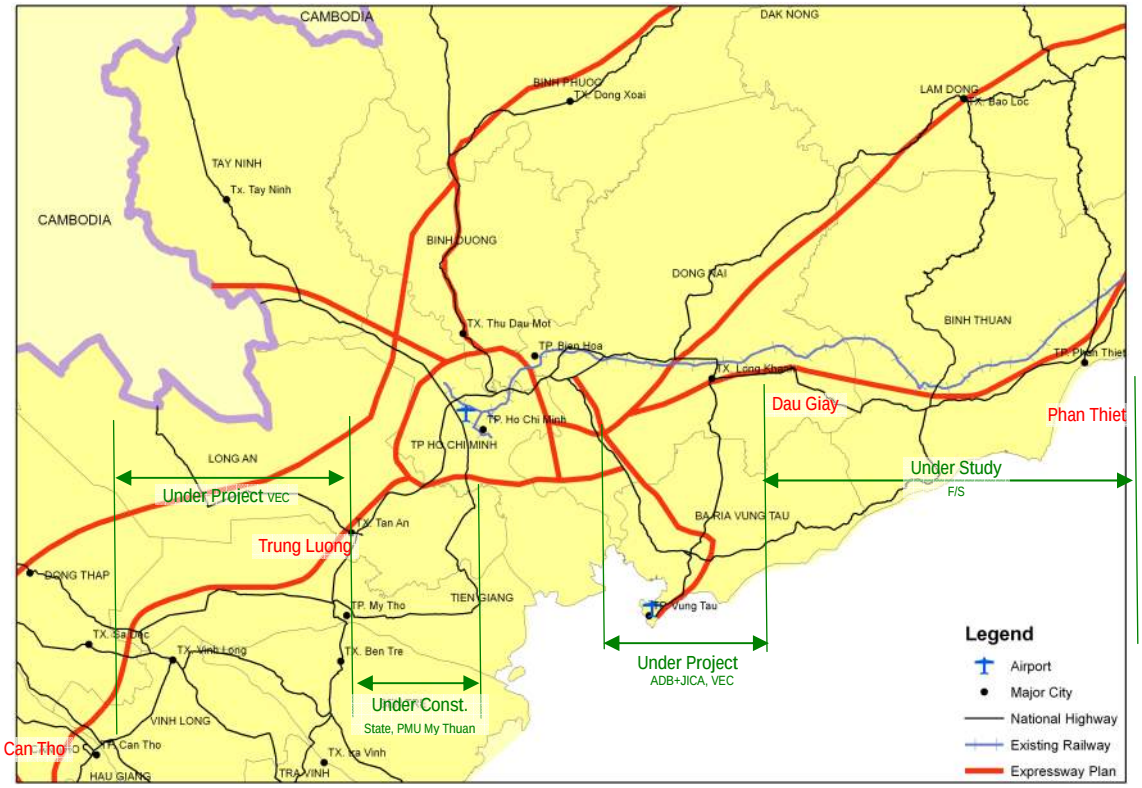
Source: VITRANSS Study Team based on No. 1344/QD-TTg

Figure 2.2.2 Expressway Network Plan in Northern Area



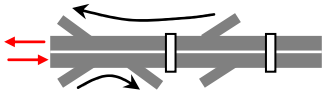
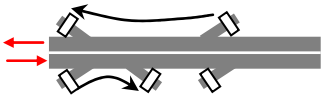
Source: VITRANSS Study Team based on No. 1344/QD-TTg

Figure 2.2.3 Expressway Network Plan in Southern Area



Source: VITRANSS Study Team based on No. 1344/QD-TTg

Table 2.2.1 Difference with Toll Gate System on Expressway

System	Open System	Closed System
Conceptual Diagram : Toll Gate		
Notes	• Even vehicle can access at limited interchange, Toll fee is collected at the barrier on expressway. • Some vehicles can run expressway without any toll fee if it does not pass barrier on its route. • If it is charged at each toll gate, it seems to be a distance based toll fee system. • This system is suitable for the section where there is no parallel national highway, because this section is necessary to be used for daily purpose for residential user.	• Toll fee is normally collected at the exit interchange, based on the record of entrance interchange information. • All vehicles should pay their expressway toll fee. • It is easy to apply distance based or proportional toll fee system. • This system is suitable for the section where there is some parallel national highways, because this section is used for their specific propose, not daily purpose for residential user.

Source: VITRANSS 2 Study Team

2.3 Car Parking

The parking space on road side can be found at various places in town. It is called as “Car Keeping Space” in photo right.

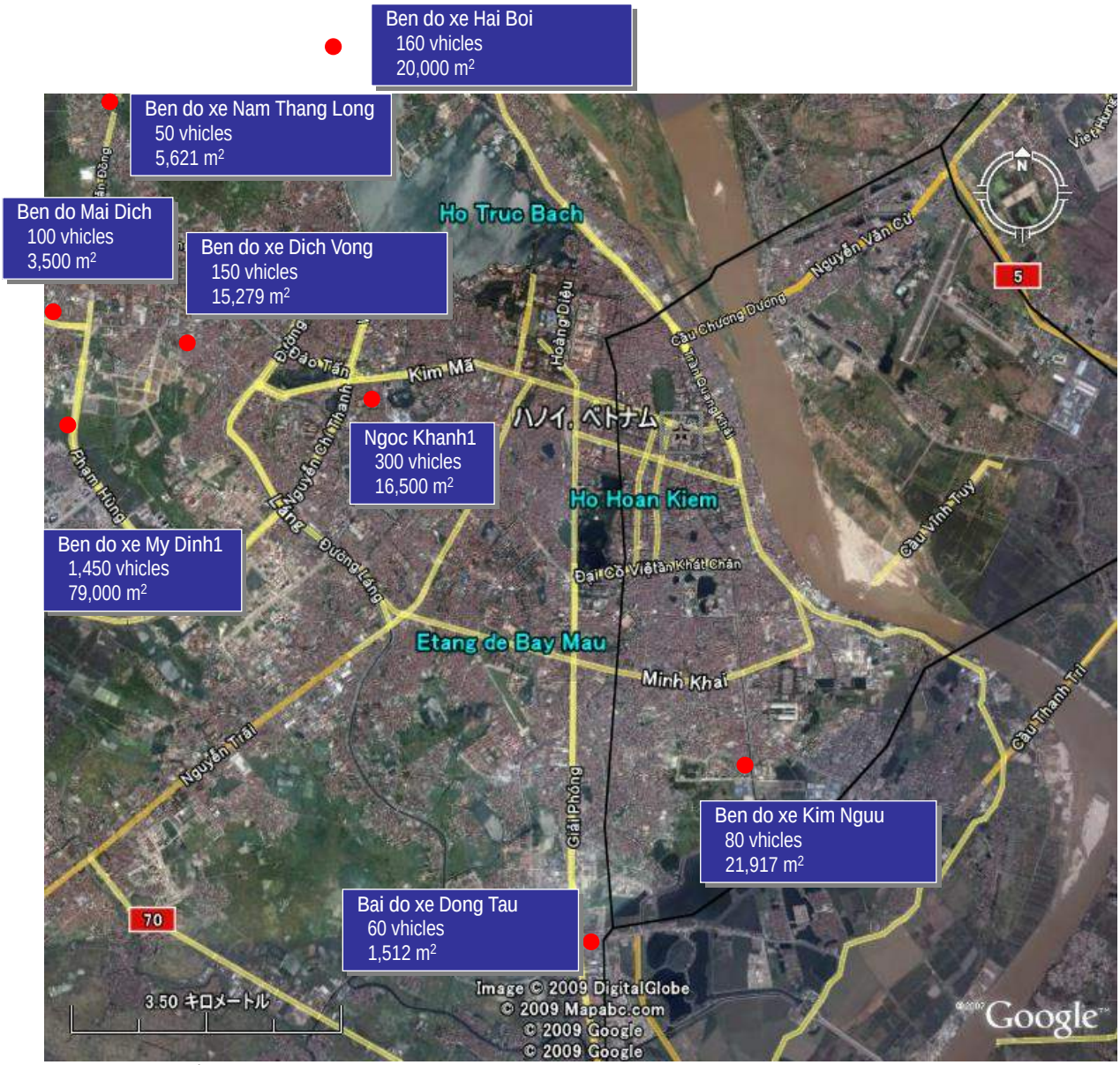
This planning of car keeping space should be approved by the provincial people committee, and its design and implementation plan should be approved by provincial DOT. This space can be invested by both public and private sectors. In the case of Hanoi, the Hanoi Transport Corporation is controlling 138 legal car keeping spaces, and 8 of which are located in central area as constructed parking facilities, remaining 130 of which are roadside spaces or temporally vacant spaces. However, even the biggest parking facility has only the small capacity of 1,450 vehicles and 79,000 m^2 located at beside of My Dinh Bus terminal, other facilities are only the capacity of 50–150 vehicles. Figure 2.3.2 shows the location of these public parking facilities.

As for private invested parking facilities, there are rare in Hanoi City, some facilities in HCMC.

Figure 2.3.1 Car Keeping Space

Source: VITRANSS 2 Study Team

Figure 2.3.2 Location of Public Car Parking Facilities



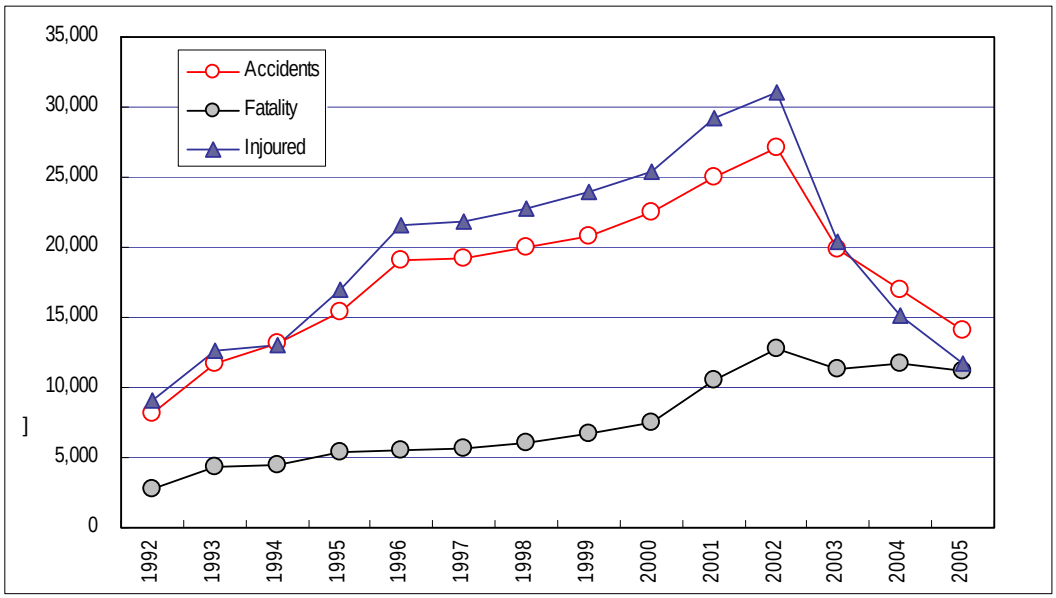
Source: Transerco Webpage

2.4 Traffic Accident

1) Occurrence of Traffic Accidents

In Vietnam, the number of accidents, fatality and injured in 2005 comparing in 1992 are, 8,165 to 12,732, 2,755 to 11,223 (12,406 in 2009) and 9,040 to 10,047, respectively. Although the number of accidents has started decreasing since 2002, number of fatality remains as stable. It means that rate of death has been increasing, for example, the average number of fatality per day reaches more than 30 people. Following figure shows the historical data of traffic accidents.

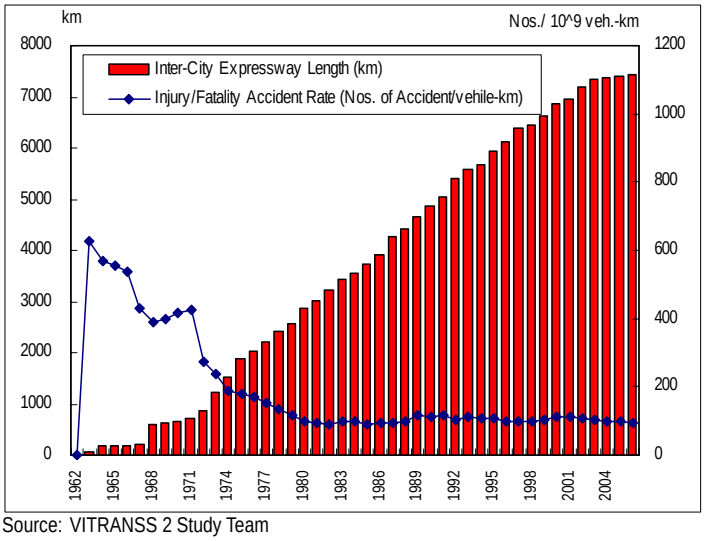
Figure 2.4.1 Historical Data for Traffic Accidents (1992–2005)



Source: UBATGTQG

According to the historical data for traffic accidents in Japan, it is obviously that at the early stage of expressway development had high possibility of traffic accidents occurred because of the poor experiences for driving on expressway and lack of incidents management system. This suggests that the countermeasure for traffic accident must be installed from the first stage of expressway network development.

Figure 2.4.2 Experience for Traffic Accidents in Japan



Source: VITRANSS 2 Study Team

2) Types of Traffic Accidents (some parts are same as VITRANSS 2 Main Report)

Herein below shows the characteristics of traffic accidents which are analyzed by traffic records in Vietnam. Note that this is the records on national highway, not on expressway.

(i) Causes of Traffic Accidents

(ii) Collision Type

(iii) Occurrence Place

(1) Causes of Traffic Accidents

Table 2.4.1 shows the composition of traffic accidents by cause from 2002 to 2006. Most road traffic accidents in Vietnam are caused by road users' errors, among which, speeding is the primary cause accounting for 25%. Road infrastructure, especially national highways, has improved significantly in the last decade, but drivers' mindset has not changed accordingly.

As a result, road users tend to speed up in highways with relatively less traffic. Wrong overtaking by trucks, buses and passenger cars expose low-speed vehicle, such as M/Cs and bicycles, to great risk in a mixed traffic situation. Under these circumstances, strict enforcement of traffic rules and effective traffic education of road users are crucial in reducing traffic accidents. In addition, physical measures such as improvement of surface conditions, paving of shoulders, re-designing of roads, and installation of traffic signs and signals are also necessary.

Table 2.4.1 Traffic Accidents by Cause (2002–2006)

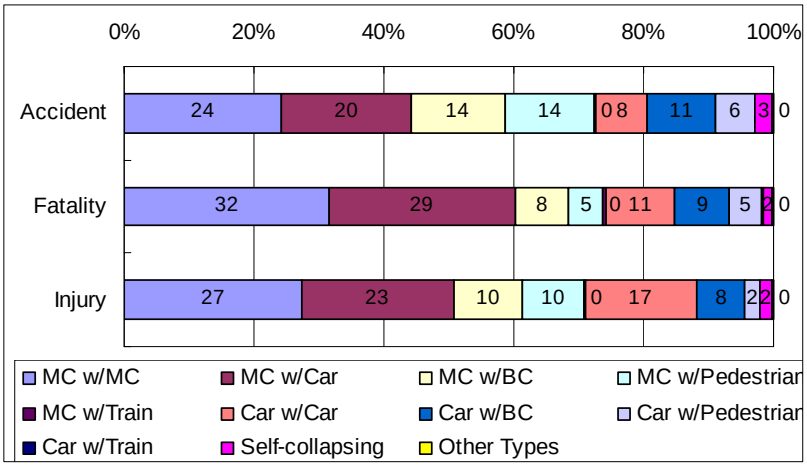
Causes	Proportion (%)				
	2002	2003	2004	2005	2006
1. Speeding	24.4	24.1	26.0	25.8	24.8
2. Wrong Overtaking	18.9	16.8	15.8	12.7	13.7
3. Wrong Lane Shifting	17.0	17.6	16.5	16.7	18.0
4. Turning Direction without Turning Signal	4.1	3.4	2.4	1.6	1.7
5. Passing Intersection with Red Signal	1.1	0.1	1.7	0.6	0.2
6. Not Keeping Safe Distance	6.9	0.9	2.4	1.8	0.4
7. Careless Driving	15.9	12.1	8.1	10.0	8.2
8. Careless Crossing of Pedestrians	0.7	2.3	2.9	3.2	2.6
9. Others	11.0	22.7	24.2	27.6	30.4

Source: Road and Rail Transport Division, MOPS

(2) Collision Type

Figure 2.4.2 shows the composition of traffic accidents by collision type in 2001. In the case of fatality, more than 60% of fatalities are caused by accident between M/Cs and M/C with automobile. In the case of injury, accident between automobiles has higher proportion of 17% compared to other accident indicators such as the number of accidents and fatalities.

Figure 2.4.3 Traffic Accidents by Collision Type (2001)

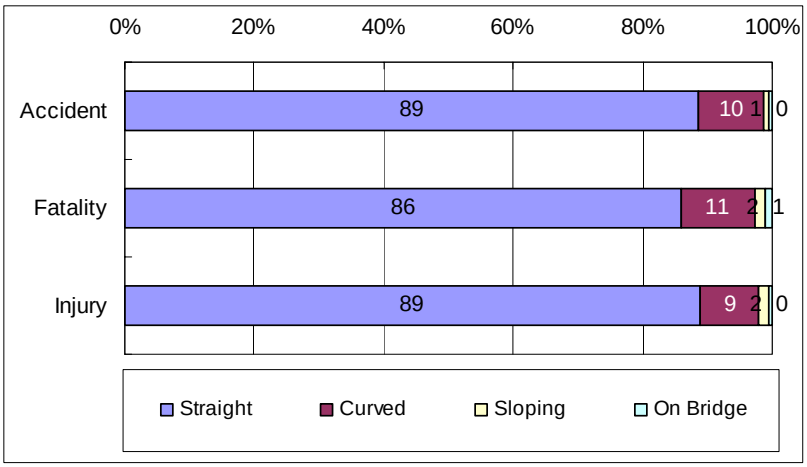


Source: People's Police Academy (Sampled Data Analysis)

(3) Occurrence Place

Figure 2.4.4 shows the composition of traffic accidents which occurred on mid-block road section in 2001. About 90% of accidents occurred on the straight section of the road. In the case of fatality, accidents occurred on the curve section has relatively higher proportion (about 11%) as compared to the number of accidents and injuries.

Figure 2.4.4 Traffic Accidents by Road Section (2001)



Source: People's Police Academy (Sampled Data Analysis)

For reference of understanding of road traffic situation in Vietnam, Figure 2.4.5 shows the typical situation of road traffic, such as large composition of traffic by motorcycle, flood condition in rainy season and uncontrolled at intersection.

Figure 2.4.5 Typical Situation of Road Traffic in Vietnam

Source: VITRANSS 2 Study Team

2.5 Inter-city Bus

1) Current Services

At the current inter-city bus service, there are 3,257 routes which are approved by VRA. There are 3 major private bus companies, which are Mai Linh Express, Hoang Long Transportation Co., Ltd. and Hanoi Transport Corporation (Transerco). Mai Linh Express operates in 96 routes with 436 buses (Mini-bus with 16 seats: 356, Bus with 30 seats or above: 80), and Haong Long Transportation Co., Ltd. has more than 300 buses for inter-city services. Hoang Long transports about 1,500 passengers for Hanoi–HCMC with 14 buses per day, and it takes about 38 hours.

Figure 2.5.1 Inter-city Bus (Hoang Long Transportation Co., Ltd.)

Source: VITRANSS 2 Study Team

2) Operation and Managements

(1) Policy and Guideline of Bus Operation

According to the policy of bus service industry and governmental regulation, it is not allowed to drive more than 10 hours per day and 4 consecutive hours. For example of Hoang Long Transportation Co., Ltd., the route between Hanoi to HCMC is divided into 5 sections and deferent driver is assigned at each section, who knows well at specific region, in order to keep driving safety.

(2) Operational Management: Black Box

For preventing over speed, over continuously driving of freight and bust operation, the installation of equipment for recoding driving logs are regulated by the revised road traffic law on July 2009. It is well known the name of “Black Box” in Vietnam. Even it has been already published, the decree which is enforcement regulations are not established yet.

The items of that law are described in below. Note that the Black Box is described as "itinerary trucking equipment".

(a) **Summary of Article 67:** Conditions for transportation business by cars

Enterprises, cooperatives, family businesses which join transportation business by cars should have followings conditions:

(i) Business registration as per regulation,

(ii) Be sure that number of cars, quality and lifetime of cars suitable to transportation; the cars should be equipped with driving itinerary trucking equipment as per Government regulation,

(iii) Ensuring that number of drivers and crew suitable with business plan, and writing

labor contracts should be concluded; crew should be trained with transport business practices including traffic safety; do not mobilize the driver who is prohibited from driving as regulation,

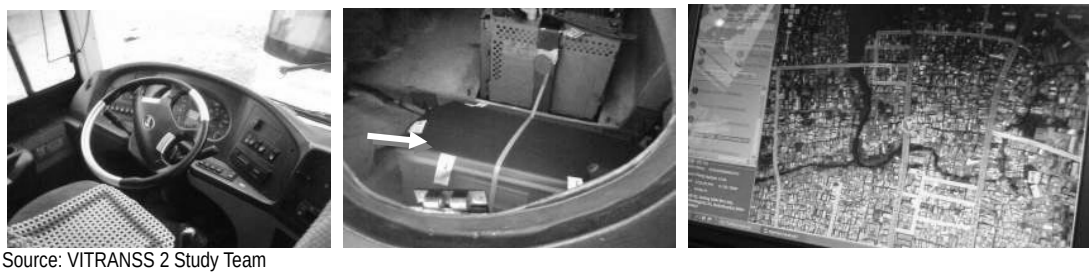
(iv) Transport operator, who is directly conducting operating transportation activities, should be specialized in transportation profession, and

(v) Having the car keeping space which is suitable with scope of enterprise, cooperative family business, meeting the requirements on order, safety, fire prevention and fighting, hygienic and environment.

For the advantaged 3 bus operator described above, this system has been already installed in their buses. However, it has not been installed in cargo transpiration yet. Mai Linh Express has started installing GPS equipment for first 18 buses with 45 seats since November, 2007, until now, 80 buses with 30 seats or above are equipped with GPS equipment. The company concluded the contract with suppliers for installing GPS equipment for all of company's buses in coming time.

The monitoring staffs sit at the Operation Center in order to monitor and control the travel itinerary, such as illegal stop/parking and over speeds, etc. If it is shown on monitoring screen the cases of sudden breaking, over speed or opened window, the Operation Center will have contact with drivers to treat his behaviors. Each behavior will appear with different color on monitoring screen.

Figure 2.5.2 Black Box installed in Inter-city Bus, Monitoring Screen (Sample)



Source: VITRANSS 2 Study Team

From the results of interview, there are several providers for this system, and some has applied just the foreign products, so that it is proposed that MOT-DOST should make a standard for Black Box from the voice of transport industry.

(3) Bus Terminals and Ticketing

The implementation of bus terminal is regulated under the Decision No.08/2005/QD-BGTVT, Article 5: Basic requirement of bus terminal location described below.

(i) The car terminal should be connected with public transport road, convenient for passengers, near to residence areas or economic/trade center. In case the terminal is not connected to the road, it should be located very far from the public road and should have link road to public road in accordance with regulation on transport safety.

(ii) Car terminal should be built at the transit places with other transport means or near to transit place with urban bus.

(iii) Car terminal should be facilitated with clear signing post.

The provincial department of transportation is the agency for approval for management of bus terminal operation, and VRA is responsible for the national registration.

The following show the example of Hanoi and HCMC bus terminals.

(a) **Bus Terminals in Hanoi**

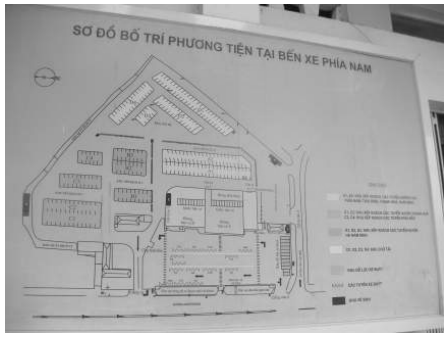
About five major bus terminals are located within 5–10 km from the center of Hanoi city. Each bus terminal has the routes of whole destination in Vietnam. The location of major bus terminals shows the figure below.

Figure 2.5.3 Bus Terminals in Hanoi City

Source: VITRANSS 2 Study Team

The one of the biggest bus terminal in Hanoi city is named as Giab Bat, Ben Xe Phai Nam, and its business records are 14,500 passenger/day, 900 buses/day and 120 bus routes. This bus terminal prohibits entering taxi, mainly provide connections to city buses, and a few space for motor cycle.

Figure 2.5.4 Ben Xe Nam Bus Terminals and its Layout (Hanoi) (1)



Source: VITRANSS 2 Study Team

At the ticketing counter, there are normal ticket (photo in left) and excursive express bus company ticket (photo in middle and right). Note that Hoang Long Transportation Co., Ltd. is thinking to start selling e-ticket on their web site and mobile phone through e-bank accounts.

Figure 2.5.5 Ben Xe Nam Bus Terminals and its Layout (Hanoi) (2)

Source: VITRANSS 2 Study Team

There is a TV installed for the private company's commercial. But, there is no information provision for bus passenger, which is operational status for bus schedule, timetable and so on.

(b) **Bus Terminals in HCMC**

There are two major bus terminals are located at more than 10 km far from the center of HCMC City. These are named as Mien Dong and Mien Tay bus terminals, respectively. Each bus terminal has different bus routes in accordance with their location. The location of these terminals is shown in Figure 2.5.7.

Table 2.5.1 Main Operation Route for each Bus Terminal

Bus Terminal	Main Operation Routes	
Mien Dong	Northern Route	Hanoi, Hue, Da Nang, Hoi An, Hai Phong, Qui Nhon, Nha Trang, Dalat
Mien Tay	Southern Route	Mỹ Tho, Can Mau, Binh Long, Long Xuyen, Chaudoc, Rạch Giá, Ha Tien

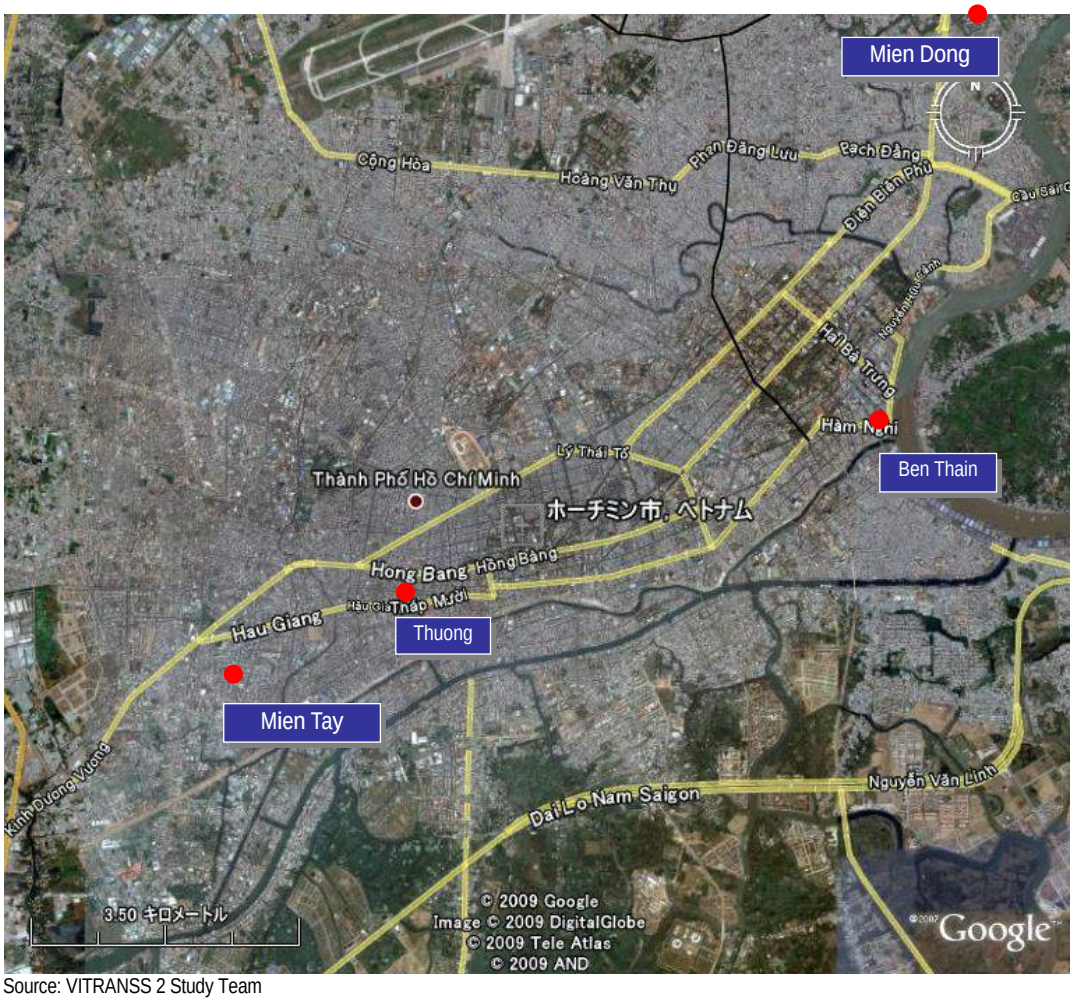
Source: VITRANSS 2 Study Team

These bus terminals are connected with city bus from Saigon Bus terminal, and also provide large sized parking for motor cycle. Photo below shows the parking space surveyed at previous study.

Figure 2.5.6 Parking for Motor Cycle (Mien Tay: left, Mien Dong: right)

Source: VITRANSS 2 Study Team

Figure 2.5.7 Bus Terminals in HCMC City



Source: VITRANSS 2 Study Team

3) International Operation within GMS Countries

At this moment, there is not any international bus services directly bound for neighbor countries. According to the interview, it is planed that the direct service to Thailand will be opened using the east-west route of GMS.

2.6 Cargo Transportation

1) Current Status of Cargo Industry

According to the statistical yearbook of Vietnam, 2007, the volume of freight traffic by the road in 2006 has been increased about 2.3 times in tonnage based and 2.6 times in ton-km based since the year in 2000. The averaged distance has been also increased as 60.8 km from 55.2 km.

There are major freight hauling companies in Hanoi, Hai Hong, Da Nang and HCMC, in other regions there are small sized companies which is blanched and cooperated of major companies.

Main issues for cargo transportation are pointed out, that is bad conditions of road surface and different and poor loading capacity for bridges.

Regarding to the restriction of truck for entering urban area, there are 3 decisions.

(a) **Decision No.12/2001/QD-UB (March 22, 2001):** Types of vehicles which are not allowed to enter the capital area of Hanoi are regulated by Hanoi peoples' committee.

(b) **Decision No.186/2006/QD-UBND (December 29, 2006):** Trucks are not allowed to drive in rush hours in the urban are of HCMC by HCMC peoples' committee.

(c) **Decision No.121/2007/QD-UBND (September 19, 2007):** Large vehicles are prohibited entering in urban area of HCMC peoples' committee.

The current status of operation for freight transport as follows.

(i) Container trailer is used for long distance transportation as Hanoi–HCMC

(ii) Speed is regulated under national standards as not more than 50 km/h and 30 km/h in town area and 80 km/h in rural area (Averaged speed is about 40 km/h)

(iii) For the transportation between Hanoi–HCMC in the length of 1,750 km, normally, it takes about 55–60 hours including the parking for driver's rest which spent about 15% of total. Some companies take safer operation so that it takes about 72 hours for this route.

(iv) According to the national regulation, drivers must not dive more than 4 continuously hours or 10 hours per day. Cargo transport industry efforts to allocate 2 drivers on the vehicle.

(v) The communication between driver and operator uses mobile phone, not by radio wave.

Regarding to the Black Box in freight transportation, it is already described in previous section that it is not started installing this equipment in trucks yet.

For ensuring safer driving, VATA conducts drivers training by guidelines supported by MOT.

2.7 Vehicle Weight Control Systems

1) Introduction

According to the Study on "Vietnam Road Safety Phase 2 and Load Control (CONSIA)" shows that all trucks tend to carry overload. The data shows that

(i) On National Highway Route 3, the rate of overloaded trucked varies from 28% to 90%.

(ii) On Notational Highway Route 5 (surveyed in May 2006), 30% overloaded trucks with overloaded rate of 200% in terms of weight.

2) Law and Regulation for Vehicle Weight Control

There are law and regulations for vehicle weight control as below.

(i) Decision of MOT, No 60/2007/QĐ-BGTVT, dated 07/12/2007 (replaced Decision, No 2074/2003/QĐ-BGTVT, dated 16/7/2003 & Decision No 09/2004/QĐ-BGTVT, dated 23/6/2004)

(ii) Decree, No 146/2007/NĐ-CP, dated 14/09/2007

(iii) Decision, No 20/2008/QĐ-BGTVT, dated 02/10/2008

(iv) Circular, No 21/2001/TT-BGTVT, dated 10/12/2001

(v) Decision, No 05/2007/QĐ-BGTVT, dated 02/02/2007 (replaced Decision, No 42/2005/QĐ- BGTVT, dated 16/9/2005)

The Decree No 146/2007/NĐ-CP specifies the types of violation, penalty and procedures against violators.

3) Historical and Current Enforcement Method

In 2003, Prime Minister gave the decision to establish 27 vehicle weight stations on national highways (according to decision No 455/TTg dated 04/09/2003), this is static weight stations and some portable weight equipments. At the each weight station included 3 forces, such as (i) Traffic Inspectors (staffs of Ministry of Transport), (ii) Traffic Polices and (iii) Military Inspectors. After some years, the traffic polices and military inspectors were no longer work in the weight stations. Then, all of 27 vehicle weight stations had been stopped their works since October, 2003. Table 2.7.1 shows the location of 27 weight stations.

The Vietnam Government issued in the document No 1882/TTg-CN, dated 03/12/2007, that the pilot project will be conducted by modernize and restore of 2 weight stations in Dong Nai Province & Quang Ninh Province.

4) Pilot Project for Weight Control (Weigh-in-Motion) at Dau Giay

According to Invitation Letter of VRA, No 38/CĐBVN-KHCN & HTQT, the general requirements of pilot project for weight control at Dau Giay are as follows;

(i) Ability to control load on each lane separately

(ii) The vehicle must be tested at WIM System before the inspection at static weight system.

(iii) The system must have CCTV System to record images, number plate, time, images of staff in the operation static weight system.

(iv) The system must connect to the data system of VRA

(v) This pilot project has been started since March, 2009 at Dau Giay on national highway route No 1, and planning another implementation at national highway rout 13. The purpose of this project aims to find the suitable procedure and technical requirements for modern weigh control and to apply to develop 27 weigh station described above.

Table 2.7.1 List of 27 Weight Stations on National Highway

	Station Name	Location
1	Pho Huong Station	Km57, QL3, Thai Nguyen
2	Bac Ninh Station	Km138+70057, QL1, Bac Ninh Town
3	QUANG NINH Station	Km103+800, QL18, Hoanh Bo
4	Vinh Phuc Station	Km47, QL2, Vinh Phuc
5	Ky son station	Km63, QL6, Hoa Binh
6	Quan Toan Station	Km87, QL5, Hai Phong
7	Phu thuy Station	Km15, QL5, Gai Lam, Ha noi
8	Phu Ly Station	Km231, QL1, Ha Nam Town
9	Hong Linh Station	Km481, QL1, Ha Tinh
10	Nam Gianh Station	Km657, QL1, South of Pha Gianh (Quang Binh)
11	Cam lo Station	Km15, QL9, Quang Tri
12	Que Son Station	Km965+500, QL1, Quang Nam
13	Ba To Station	Km18+250, QL24, Quang Ngai
14	Tru A Station	Km159+750, QL19, Gia Lai
15	Ba Di Station	Km1214+500, QL1, Binh Dinh
16	Phu Yen Station	Km1537+500, QL1, TX Tuy Hoa
17	Madrak Station	Km62+900, QL26, Dac Lac
18	Kien Duc Station	Km871+089, QL14, Dac Nong
19	Ca Du Station	Km1551, QL1, Ninh Thuan
20	Chon Thanh Station	Km68+800, QL13, Binh Phuoc
21	Suoi Sau Station	Km31, QL22, Tay Ninh
22	Dau Giay Station	Km1846+700, QL1, Dong Nai
23	Binh Phuoc Station	Km1888+600, QL1, Tp.HCMC
24	Ben Luc Station	Km1934, QL1, Long an
25	My thuan Station	Km2028, QL1, Vinh Long
26	Hau Giang Station	Km2068, QL1, Can tho
27	My Tu Station	Km2126, QL1, Soc Trang

Source: VITRANSS 2 Study Team

It is operated by 4 officers who belong to different organization (i.e. VRA-RRMU, PDOT-Traffic Inspector, Military Control and Provincial Traffic Police) based on the agreement with MOT and People's Committee.

The technical requirements of this system which has "Static Weigh System" and "Weigh-in-Motion (WIM) System" are described in table below.

The procedure of this system which is installed in Gau Diay is following steps. The photo of WIM and static weigh system is shown below.

(i) A vehicles go to the WIM System, it will activity and measure parameters such as: weight, the distance of axle, Number plate, image of vehicle, parameters are calculated and transmitted to the control center at Static Weight System.

(ii) If the vehicle is overloaded, the system with lamps and will display alerts for the stations. Overloaded Vehicles need go to the Static Weight System to check again.

(iii) If the vehicle is not overloaded, passing to the system without stop.

(iv) When vehicle is overload for second check at Static Weight System: If overload, staff will penalty and require drivers remove of goods.

(v) All data, pictures, will be displayed on the monitor in Control center, restored, processed

Table 2.7.2 Technical Requirements of Static Weight System and WIM System

System	Static Weight System	Weigh-in-Motion (WIM) System
Technical Requirements	• Measure the load of each vehicle axles • Maximum load allowed: Not more than 30 tons • Accuracy: 3 tons • Software can record all information and calculate the weight of the vehicle. • Allows setting up and changing the threshold for the overloaded: axles, group of axles and vehicle. • Entry and store data of vehicle in the inspection processing. • Statistics and general data, data connection between WIM and static weight system • The system must register with the measurement quality of Vietnam	• Measure the load of each vehicle axles • Maximum load of axle allowed: Not more than 20 tons • Speed of vehicle through WIM System: Not more than 50 km/h • Determine the speed run, the distance of axles, No. axles and total weight of vehicle • Allows setting up and changing the threshold for the overloaded: axles, group of axles and vehicle. • Automatically detect overloaded by axle weight and the total weight of the vehicle • System controls traffic alerts overloaded vehicles go to the static weight system • System statistics the volume and classification of vehicles go through the station • Data connection between WIM and static weight system • Accuracy: Not more than 10% for the weight of axle, 3% for speed, 0.2m for the distance of axle

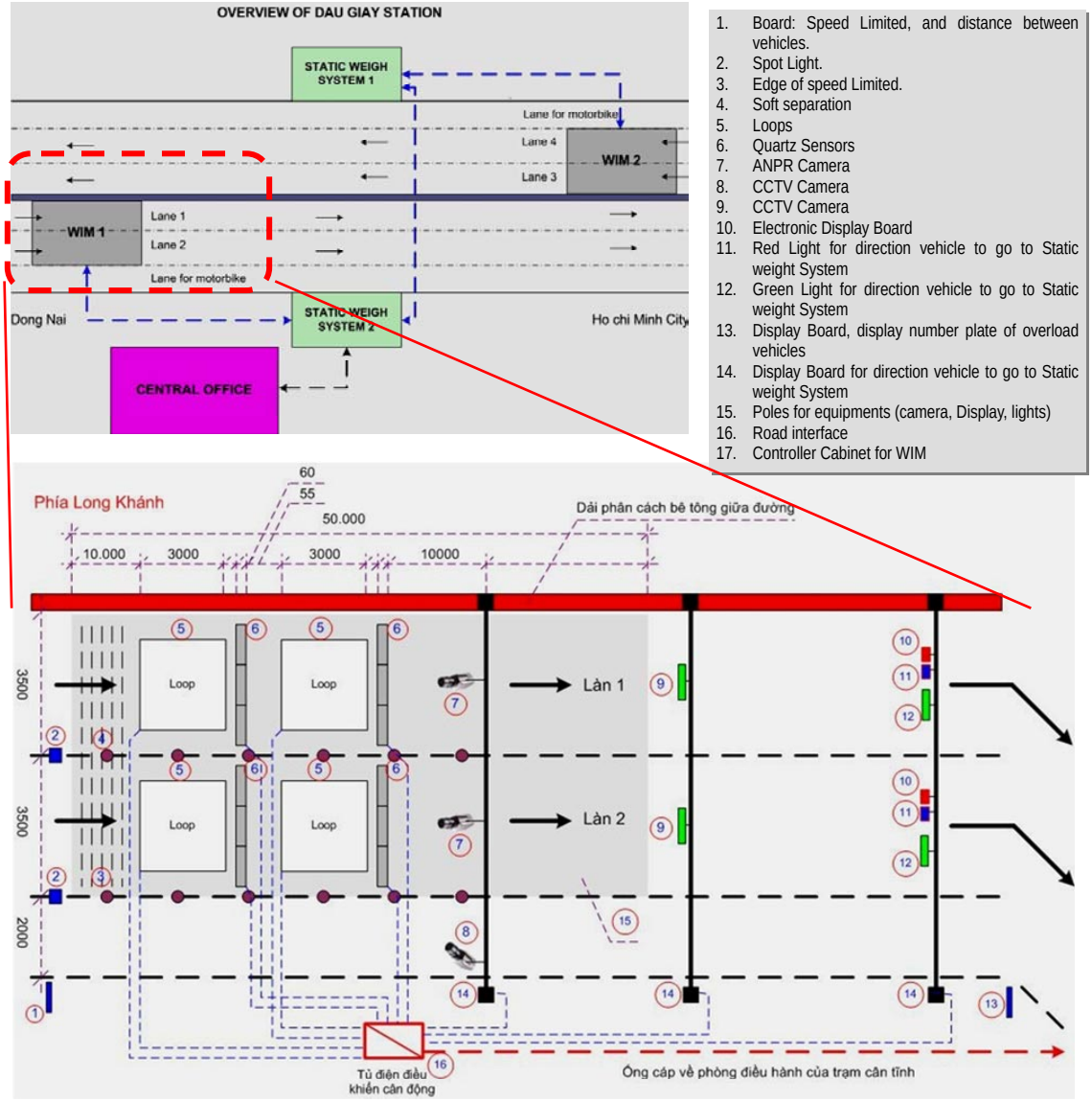
Source: VITRANSS 2 Study Team

Figure 2.7.1 WIM System (photo left) / Static Weigh System (photo right)

Source: VITRANSS 2 Study Team

Details and layout of this system are described in below.

Figure 2.7.2 System Layout for Pilot Project



Source: VITRANSS 2 Study Team

5) Issues for Overloading

Based on the results of interview survey to Vietnam Automobile Transportation Association (VATA), some issues are pointed out for current countermeasure for overloading.

(i) The opinions raised from hauling firms are that only gross net weight would be better to check not both gross net and axial weight.

(ii) Future weight control on expressway must be harmonized with the national highway one. (It is important of reloading excess weight for national highway, therefore, it is not considered the post charged and penalty for overloaded vehicles)

(iii) Reloading at the site is compulsion when it is overloaded. It is not allowed to pass through after it is found as overloaded.

(iv) The overloading is happened from driver's decision after contract with hauling firm and client. Therefore, it is natural for applying penalty to driver.

On the other hand, it is sounded that driver can not select what they bring, only obey

client's order, so that overloading must be caused by client.

In the current decision, it is written that the penalty will be charged to transport operator, not to driver. However, at the site, driver is charged on behalf of hauling firm, it is not in accordance with regulation.

For the special permission for extra-sized vehicles, VRA is a responsible organization for requesting of submission for route and vehicle details from operator.

Figure 2.7.3 Static Weighbridge

Source: VITRANSS 2 Study Team