3 OVERVIEW OF TRANSPORT DEVELOPMENT

3.1 Infrastructure Development

1) Road

Road Network: As of 1999, Vietnam had a total road network of about 257,254 km. Of this figure, national roads accounted for merely 15,250 km (7.5%), while provincial roads accounted for 17,449 km (8.5%), district roads 36,372 km (18.2%), and village roads 131,000 km (65.5%). District and village roads are considered rural roads. Since 1997, a number of roads have either been rehabilitated, upgraded or constructed with the use of domestic investments and, especially, ODA, of which JBIC's contribution accounted for a large share of this big portion. In the past five years, more than 3,000 km of national roads (i.e., NR 1, NR 5, NR 51, NR 18, NR 10, etc.) were rehabilitated and upgraded, while 12,500m of new, large bridges, such as My Thuan Bridge and those on NR 1, NR 10, etc., were constructed. Large bridges, such as Bai Chay Bridge, Can Tho Bridge, Thanh Tri Bridge, Binh Bridge, and etc., are also going to be constructed. The Hai Van Road Tunnel, Vietnam's largest, is likewise under construction.

The entire road network is relatively well developed but poor in quality. Only 60% of national roads and 27% of provincial roads are paved. The majority of rural roads are earth road, and the pavement proportion is not so high. There are many temporary and low-capacity bridges. The poor condition of rural roads makes access to many villages, especially in mountainous and remote areas, difficult. Many cannot be accessed all year round. At present, there remain more than 400 communes without roads to village centers. This is aggravated by the low-quality of rural transport infrastructure.

According to the Governmental Decree No 167/CP, Vietnam's roads are divided into six categories, namely: national, provincial, district, commune, urban, and special roads. National Road system: this is the main road system of the whole Vietnam Road Network. This system is directly managed by the VRA. However, Provincial Transport Authorities (PTAs) likewise manage some national roads and national road sections that are commissioned by MOT. PTAs manage provincial roads; Districts manage district roads; Communes manage commune roads; Cities manage urban roads; and other sectors such as industry, forestry etc. manage special roads.

Road Administration and Management: The VRA manages and sets up maintenance plans for approximately 8,000 km of national roads (about 52% of the total length of national roads) through four Regional Roads Management Units (RRMUs). RRMU II manages national roads from the north down to Thanh Hoa, RRMU IV from Nghe An to Binh Tri Thien, RRMU V from Da Nang to Khanh Hoa, and RRMU VII from Ninh Thuan to the Mekong Delta provinces. Each RRMU employs "Road Maintenance and Management companies" which are directly responsible for managing and maintaining national roads and road sections as commissioned by the RRMU.

Table 3.1.1
Road Condition by Category and Pavement Type[1]

No.	Road System[2]	Roads and Pavement type										
		Total Length	Concrete		Asphalt Concrete		Asphalt		Macadam		Earth	
		(km)	Km	%	Km	%	Km	%	Km	%	Km	%
1	National Road	15,258	73	0.50	3,938	26.36	4,976	33.32	4,233	28.34	1,715	11.48
2	Provincial Road	16,403,5	12	0.07	387	2.22	3,561	20.40	8,605	49.31	4,885	28.00
3	District Road	36,905	0	0	53	0.14	3,558	9.64	17,932	48.59	15,362	41.63
4	Urban Road	3,211	0	0	1,246	38.80	1,965	61.20	0	0	0	0
5	Commune Road	132,054	0	0	0	0	2,921	2.21	52,446	39.72	76,687	58.07
6	Total	207,254	85	0.04	5,624	2.75	16,981	8.30	83,216	40.68	98,649	48.23

Source: MOT and VRA
[1] 1999 data , [2] Excluding 5,451 km of special roads

2) Railway

Features: Vietnam's railway operates over 2,600 route kilometers, covering 31 of the country's 61 provinces and cities. It comprises seven main lines and several branch lines. The longest main line is the Hanoi-Sai Gon line (1,726 km or 66.30% of the total) and the second longest is the Yen Vien-Lao Cai line (285 km or 11% of the total). The entire network uses a single track with 1,000 mm gauge, 1,435 mm gauge and dual-gauge sections. The Railway system has not yet reached the Mekong River Delta.

Many railway sections, even on the Hanoi-Sai Gon line, have small radius bends. The gradient is generally <1.7% on the main line. Further, since most road and railway intersections are level crossings and there are also many illegal crossings, this situation has resulted in low train speeds and many accidents.

Administration: Vietnam's railway sub-sector has two divisions, namely: transport and infrastructure. The Government is responsible for the investment in and maintenance of infrastructure, and the Vietnam Railways pays the Government 10% of its revenue as rent for the infrastructure. Vietnam Railways, an independent state-owned enterprise (SOE) under the MOT, has about 42,000 employees including three transport unions (19,000 employees), 48 other SOEs (22,600 employees involved in track maintenance, construction, etc.), and a project management unit.

3) Inland Waterway

Network: The total length of Vietnam's rivers is about 42,000 km. About 8,000 km of rivers are used as inland waterway transport network, of which 6,230 km (about 78%) are managed by the VIWA, and the rest is either managed by local governments or not managed at all.

Waterways are categorized into six classes (classification of river based on criteria such as depth, width, clearance...see Table 3.1.2) with the following corresponding lengths.

Class I : 1,787 km
Class II : 1,206 km
Class III : 3,228 km
Class IV-VI : 1,782 km

Table 3.1.2
Classification of Inland waterways (TCVN 5664-1992)

Unit: metre

Class	Dimension of waterways					Dimension of works			
	River		Canal		Radius (R)	Bridge			Electric Wire
	Depth	Width	Depth	Width		Span		Clearance	Clearance
						River	Canal		
I	> 3.0	> 90	> 4.0	> 50	>700	80	50	10	12
II	2.0–3.0	70–90	3.0–4.0	40–50	500-700	60	40	9	11
III	1.5–2.0	50–70	2.5–3.0	30–40	300-500	50	30	7	9
IV	1.2–1.5	30–50	2.0–2.5	20–30	200-300	40	25	6 (5)	8
V	1.0–1.2	20–30	1.2–2.0	10–20	150-200	25	20	3.5	8
VI	< 1.0	10-20	< 1.2	10	60-150	15	10	2.5	8

Source: VIWA.

Transport: Although inland waterways play an important role in transporting passengers and cargo in the deltas, especially Red River Delta and Mekong River Delta, their navigability is not optimized due to a substantial need for dredging, a low annual investment and a lack of night time navigational aids.

Inland water transport services are mainly provided by state operators in the north and by private operators in the south.

Table 3.1.3
Main River Systems in Vietnam[1]

Region (Length)	River System	Length (km)	Basin Area (km^2)
North (18,000 km)	Bang Giang-Ky Cung	n.a.	n.a.
	Red River	1,161 km (total) 541 km (Vietnam portion)	61,400 km^2
	Thai Binh River	185 km	12,000 km^2
	Ma River	415 km (Vietnam portion)	17,600 km^2
Central (14,000 km)	Lam River	500 km	n.a.
	Thu Bon River	97 km	n.a.
	Ba River	317 km	n.a.
South (10,000 km)	Dong Nai River	n.a.	n.a.
	Mekong River	4500 km(Total)	810,000 km^2

Source: VITRANSS; [1] 1999 data,

4) Maritime

Ports: Most of Vietnam's ports are owned and operated by the State except for a few specialized and joint venture ones. The Vietnam National Maritime Bureau (VINAMARINE) manages the ports of Nghe Tinh, Quy Nhon and Nha Trang, while the Vietnam National Shipping Lines (VINALINES) manages the ports of Hai Phong, Saigon, Danang and Can Tho. Local governments and other ministries manage most of the small ports. Vietnam's ports are grouped into three: northern (Hai Phong), central (Danang) and southern (Sai Gon). They all suffer from shallow water depth and inadequate infrastructure and cargo-handling facilities. In spite of these constraints, cargo traffic in Hai Phong and Saigon has constantly increased. In 1999, Saigon and Hai Phong handled 8.3 million tons and 6.3 million tons, respectively. Another problem is the long entry to large ports (for example, Hai Phong and Sai Gon) which limits the port's capacity, especially in handling container cargoes. Hence, port expansion, especially in the north and south is being promoted including the development of new ports at Cai Lan and Vung Tau-Thi Vai.

Shipping: Some 10 Vietnamese shipping operators owned by the central and local governments, joint ventures, etc., and about 25 foreign shipping operators are engaged in the country's foreign trade. VINALINES, which holds 60% of the total national fleet, shares only 11% of the total foreign trade due to stiff competition from foreign operators. Domestic shipping consists of sea-cum-river shipping in the delta areas and coastal shipping carrying mainly agricultural, mining and industrial products. Container traffic for coastal shipping is gradually becoming significant. Generally though the small capacity and low efficiency of ports discourage foreign shipping operators from assigning modern vessels to Vietnam routes.

Table 3.1.4
Shipping Traffic Volumes, 1995-1998

Unit:1,000

Total Cargo Throughput		Unit	1995	1996	1997	1998
		Tons	34,000	36,656	45,760	56,899
Container		TEU	315	464	760	799
	Export	TEU	152	225	381	375
		Tons	1,200	n.a.	3,222	3,079
	Import	TEU	162	239	372	381
		Tons	1,463	n.a.	3,417	4,332
	Domestic	TEU	n.a.	n.a.	7	42
		ton	n.a.	n.a.	33	468
Liquid Cargo		Tons	13,180	15,510	18,126	21,889
Dry Cargo		Tons	14,470	17,522	20,927	23,123
Transit Cargo		Tons	n.a.	2,085	3,150	4,038
Passenger		Person	n.a.	55	64	47

Source: VINAMARINE

3.2 Freight and Passenger Transport Demand

1) Overall Transport Demand

Freight and passenger volume has increased over the past few years. Based on GDP growth from 1996 to 2000, a 1% increase in GDP resulted in a growth of from 1.05% (2000) to 1.52% (1996) in all forms of freight transport and from 0.54% (1998) to 0.66% (2000) in passenger transport.

Table 3.2.1
Freight and Passenger Volume, 1996-2001

Year	Freight Volume (million tons)					Passenger Volume (million pax)			
	Total	Road	Railway	Inland Waterway	Maritime	Total	Road	Railway	Inland Waterway
1996	100.14	63.81	4.04	23.40	8.84	639	509	8.5	118
1997	112.32	71.91	4.75	25.94	9.66	686	548	9.3	125
1998	118.93	76.58	4.98	26.70	10.61	726	585	9.7	128
1999	126.45	81.67	5.15	27.84	11.74	764	625	9.3	126
2000	135.44	85.62	6.23	29.76	12.58	799	656	9.7	130
2001	145.813	93.233	6.39	31.88	14.26	844	694	11.6	135

Source: Statistical Yearbook, 2001.

2) Road Transport

In the period 1996-2000, freight and passenger volume by motorized road vehicles increased, accounting for the highest transport share among all transport modes. Especially in short distances, road transport took more than 60% of freight and about 80% of passenger volume, showing that road transport played an important role in Vietnam's economic development and social life of its people. In the period 1991-1999, when GDP increased by 1%, freight and passenger volume increased by 1.50% and 1.11%, respectively.

3) Inland Waterway Transport

Inland waterway transport (IWT) ranked second in terms of transport share, following road transport. It is concentrated in the Red River Delta and Mekong River Delta, where the private sector plays an important role, especially in the Mekong River Delta. IWT shared 16-19% of passenger and 22-23.5% of freight volume.

4) Railway Transport

1999 statistics showed that Vietnam Railways operated 65 passenger trains and 91 freight trains daily. It has 339 diesel locomotives, 750 passenger cars and 4,338 freight wagons. Vietnam Railways transported 9.7 million passengers (2.5 billion passenger kilometers) in 1998 and 4.8 million tons (1.5 billion ton kilometers) in

1997. Tracks, tunnels, bridges, and signals are generally in poor condition but the railways are relatively well operated technically. In 1996-1998, the Transport Division generated a revenue of VND 900-950 billion, of which roughly a half came from passenger transport. Expenditure, however, exceeded revenue although only slightly.

Table 3.2.2
Overall Transport Volume of the Vietnam Railways, 1995-2001

Items	1995	1996	1997	1998	1999	2000	2001
Number of Passengers (million)	8.8	8.5	9.3	9.7	9.25	9.77	11.6
Passenger-km (million)	2133	2267	2444	2540	2721	3130	3607
Average Passenger Trip Distance (km)	242	267	263	262	294	320	311
Freight Transport Volume (million tons)	4.52	4.4	4.7	4.88	5.03	6.12	6.39
Freight Transport Volume (million ton-km)	1751	1684	1526	1323	1397	1820	1994
Average Freight Trip Distance (km)	388	383	325	271	279	297	312

Source: Vietnam Railways

3.3 Transport Means

1) Road

Number of Vehicles: From 1995 to September 2001, registered motorized vehicles increased quickly with an average growth rate of 13.59% per year. Motorcycles alone grew by 14.45%. In the first nine months of 2001, the growth rate soared to 20.28%. In 1995, the total number of registered vehicles was 340,779 for automobiles and 3,578,156 for motorcycles. By September 2001, this number became 520,243 for automobiles (increasing by 1.53 times from 1995) and 7,791,698 for motorcycles (increasing by 2.18 times from 1995).

Table 3.3.1
Number and Growth Rate of Vehicles, 1995-2001

Year	Automobiles			Motorcycles			Total of Motorized Road Vehicles		
	No.	Increase		No.	Increase		No.	Increase	
		No.	%		No.	%		No.	%
1995	340,779	33,701	10.97	3,578,156	525,309	17.21	3,918,935	496,010	14.49
1996	386,976	46,197	13.56	4,208,247	630,091	17.61	4,595,223	676,288	17.26
1997	417,768	30,792	7.96	4,827,219	618,972	14.71	5,244,986	649,763	14.14
1998	443,000	25,232	6.04	5,200,000	372,781	7.72	5,643,000	398,014	7.59
1999	465,000	22,000	4.97	5,600,000	400,000	7.69	6,065,000	422,000	7.48
2000	486,000	21,000	4.52	6,478,000	878,000	15.68	6,964,000	899,000	14.82
9 months, 2001	520,243	34,243	7.05	7,791,698	1,313,698	20.28	8,311,941	1347941	19.35

Source: Road - Railway Traffic Police Bureau.

Motorization: At present, the motorization level in Vietnam is still low compared with that of ASEAN countries. That is, for every 1000 persons, Thailand has 326 vehicles, Singapore 177 vehicles, Malaysia 456 vehicles, the Philippines 47 vehicles and Vietnam 98 vehicles . However, Vietnam's motorized vehicles are dominated by motorcycles which account for 93% of the total.

Characteristics of Vehicles: The characteristics of road vehicles are as follows:

(1) Load capacity: According to the survey data, the average load capacity is 5.74 tons per truck and 19.1 seats per bus.

(2) Vehicles' service life: There are more obsolete and unsafe vehicles on the road. These include buses and vehicles which are assembled at workshops in Vietnam such as tractors, congnongs (a type of motorized vehicle that is manufactured in Vietnam and usually used to transport goods in rural areas).

(3) According to the survey, the age of 70% of vehicles currently in use is 18-20 years. Many are even older, particularly in the south. Moreover, about 50% of vehicles have been repaired and converted to serve preferred uses, so they are not in their original state.

(4) The market economy mechanism also undermines vehicle safety, since most vehicle owners are only interested in getting the most out of their vehicles without properly maintaining them.

Transport Operators: The characteristics of transport operators are as follows:

(1) Ownership and transport organization: Statistics showed that 11% and 89% of vehicles used as commercial road transport belonged to the State and to the private sector, respectively.

(2) Types of collective and private enterprises:
- Cooperatives: 52.3%
- Business households and groups: 28.3%
- Limited companies: 5.8 %
- Public-private companies: 1.2 %
- Private enterprises: 0.7 %
- Equitized companies: 0.7 %

(3) Due to equitization, there was a gradual decrease in the number of state-owned vehicles and a corresponding increase in the number of vehicles in equitized enterprises. (By the end of 1999, 14 out of 85 SOEs were equitized).

2) Railway

Locomotives: The railway subsector manages 339 diesel locomotives (332 locomotives with a 1,000 mm width and seven locomotives with a 1,435 mm width).

Table 3.3.2
Number and Type of Diesel Locomotives, as of 2001

Technical Characteristic	D4H	D5H	D9E	D11H	D12E	D13E	D18E
Manufacturer	Russia	Australia	America	Rumania	Slovakia	India	Belgium
Year manufactured	1975/88	1966/70	1963/65	1980	1986/90	1984/85	1984/85
Horsepower (HP)	400	500	900	1.100	1.000	1.350	1.800
Designed speed (km/h)	50	65	114	100	80	96	105
Kind of driving force	H	H	E	H	E	E	E
Tare weight (ton)	24	41	52	54	56	72	84
Axle-load capacity (ton)	6	10/16	13	13.5	14	12	14
Owner number	199	13	32	18	40	14	16
Number of locomotives in use	183	13	32	18	40	14	16
Locomotive length (m)	9.59	11.10	11.64	14.00	13.20	14.32	15.23
Locomotive width (m)	2.55	2.82	2.74	2.78	2.74	2.73	n.a.
Locomotive height (m)	3.56	3.81	3.77	3.65	3.87	3.63	n.a.

Source: Vietnam Railways

Passenger Cars: There are 750 passenger cars, of which 741 have a 1,000 mm width and nine with a 1,435 mm width.

Table 3.3.3
Number and Type of Railway Cars as of 2001

Type	Sleeper Car		Passenger Car			Dining Car	Baggage Car	Mail Car
	Class I	Class II	Class I	Class II	Class III			
Weight (ton)	32/34	30/32	30/34	30/32	25/30	30/34	30	32
Loading capacity (ton)	10	10	10	10	10	10	10/15	10
Car length (m)	19	19/20	19	19/20	16/19	19	19	19
Total length (m)	19.7	20/21	19.7	20/21	19.7	19.7	19.7	19.7
Passenger capacity	24/28	42	64	80	64	0	0	0
Maximum speed (km/h)	100	100	100	80100	80	100	100	100
Quantity	71	116	105	243	164	42	14	30

Source: Vietnam Railways

Wagons: The railway subsector has 4,368 wagons, including 3,831 with a 1,000 mm width and 537 with a 1,435 mm width.

Table 3.3.4
Number and Type of Wagons

	Covered Wagon		Sided Wagon		Flat Wagon		Petroleum Wagon
Tare weight (ton)	15.7	19.8	15	17	15	17	15/18
Loading capacity (ton)	30	35	30	40	25	35	25/30
Freight wagon length (m)	12	13/14	12	14	11.5	12.8	10/11.5
Total length (m)	12.9	14.9	13	15	12.3	13.6	10.8/12.3
Maximum speed (km/h)	80	80	80	80	80	80	80
Quantity	1566		1672		404		189

Source: Vietnam Railways, as of 2001

3) Inland Waterway[1]

In the period 1996-2001, the number and type of inland waterway transport, such as ships and boats, increased rapidly. At present, Vietnam has many fleets of push boats and tugboats with a loading capacity of up to 2,000 tons and an engine power of 300 HP, a propelled boat fleet with a loading capacity of 650 tons, and tour boats transporting tourists along various routes.

By 2001, 73,862 inland water transport vessels were registered with a 2,329,795-ton loading capacity and 224,434 seats as well as an engine power of 1,539,956 HP. Out of these numbers, about 6.4% of total vessels and 22% of total engine power are under the management of SOEs. A VIWA report compared IWT capacity increase in December 2001 from 1995 levels, as follows:

- Number of inland waterway transport: (73,862/30,598) 2.41 times;
- DWT: (2,329,795/649,100) 3.6 times;
- Number of seats of passenger ships: (224,434/162,600)1.38 times;
- Total engine power (HP): (1,539,956 /448,900) 3.43 times.

However, unregistered boats/ships still account for about 20% of the total existing number. Such ships mainly have a small capacity of under 100 tons and under 50 tons.

The number of boats/ships for family use increased recently, especially in the Mekong River Delta. This type of inland waterway transport plays an important role in the life of people living near rivers and channels. Many are used to satisfy not only the family's needs but also to transport freight and passengers, as demand increases. According to VIWA's current estimation, there are about 200,000 family-use boats/ships, but only 30% of these are registered.

Table 3.3.5
Number and Type of Inland Waterway Transport

No.	Type	State-owned			Non-State-owned			Total		
		Number	Capacity (HP)	Average Service Life	Number	Capacity (HP)	Average Service Life	Number	Capacity (HP)	Average Service Life
1	Dry-cargo ship	786	54,612	9.66	49,924	251,607	9.00	50,710	306,219	9.01
2	Liquid-cargo ship	103	17,561	12.15	724	194,931	7.52	827	212,492	8.10
3	Dry-cargo barge	1,156	na	19.43	4,066	na	10.88	5,222	na	12.77
4	Liquid-cargo barge	64	na	15.88	320	na	10.04	384	na	11.01
5	Pushboat/Tugboat	733	118,977	20.06	2,213	294,156	10.62	2,946	413,133	12.97
6	Passenger ship	620	58,372	7.99	9,296	363,038	8.57	9,916	421,410	8.53
7	Crane ships	102	1,666	15.22	494	14,713	7.65	596	16,379	8.95
8	Dredge ship	97	18,342	38.96	114	12,963	10.06	211	31,305	23.35
9	Others	1,055	70,692	11.20	1,995	68,326	8.09	3,050	139,018	9.17
	Total	4,716	340,222	16.73	69,146	1,199,734	9.16	73,862	1,539,956	11.54

Source: Vietnam Register Bureau, as of 2001

[1] The information is as of 1/1/2000.

4) Maritime

Statistics showed that up to June 2001, Vietnam's maritime fleet had 600 vessels, with a total weight of approximately 1.6 million DWT, ranking Vietnam 60th out of 144 nations with a shipping fleet. If the count were limited only to vessels weighing at least 200 DWT, Vietnam would have 426 vessels with a total weight of nearly 1.4 million DWT.

Small vessels have an average weight of 3,200 DWT. That of seagoing and coastal vessels is 4,600 and 700 DWT, respectively. Vessels with a weight of 5,000 DWT and more accounted for 13%, while those under 1,000 DWT accounted for 58% of the total.

Table 3.3.6
Number and Type of Maritime Vessels/Ships

Type	No. of Vessels	Total Tonnage (DWT)	No. of Vessels by DWT					
			200-1,000	1,001-2,000	2,001-5,000	5,001-10,000	10,001-15,000	> 15,000
General cargo, bulk vessel	380	1.030.000	302	21	18	14	12	13
Tanker	35	215.000	10	13	6	2	o	4
Container vessel	11	122.064	0	0	0	3	7	1
Total	426	1.367.064	312	34	24	19	14	21

Source: VINAMARINE, as of 2001

In recent years, shipping companies focused on buying tankers and container vessels. However, the shipping fleet structure remained unbalanced: General cargo vessels accounted for 75%, tankers 16%, and container vessels 9% of the total DWT.

The technical condition of Vietnam's shipping fleet is medium level compared with that of other ASEAN countries (average vessel age is 14-15). Although Vietnam has imported new vessels, which are more modern and of a high technical standard, locally built ones still do not satisfy industry standards.

Nowadays, Vietnam's shipping fleet carries only 15-16% of the country's total imported and exported goods. It also focuses on short routes only.

4 INSTITUTIONAL FRAMEWORK FOR TRAFFIC SAFETY

4.1 Organizations Responsible for Traffic Safety

Relevant organizations and their major responsibilities for traffic safety are briefly as follows:

1) **Government**: is supreme power executive, answerable to the National Assembly;

2) **Ministry of Transport**

   (1) **Planning and Investment Department**: responsible for making investment plans to upgrade, rehabilitate and maintain transport infrastructure including improvement of accident black spots .

   (2) **Financial and Accounts Department**: responsible for monitoring and financing the upgrading, rehabilitation and maintenance of transport infrastructure.

   (3) **Transport Legislation Department**: responsible for formulating and monitoring legislation/regulations etc. relating to transport issues.

   (4) **Science and Technical Department**: responsible for establishing technical standards on transport infrastructure and means of transportation.

3) **National Transport Safety Committee (NTSC)**: responsible for monitoring and managing traffic safety in general.

4) **Sub sectors Agency under MOT** (Vietnam Road Administration, Vietnam Maritime Bureau, Vietnam Inland Waterway Administration, Vietnam Railway Unions, Vietnam Registration Administration): responsible for managing, monitoring and investing in transport infrastructure within the relevant sub sector.

5) **Ministry of Planning and Investment:** responsible for making investment plans to construct infrastructure, including transport infrastructure, and acquiring transportation vehicles.

6) **General Statistics Office:** responsible for collecting, managing and monitoring all statistical data.

7) **Ministry of Police**

   (1) **Road and Railway Traffic Police Bureau**: responsible for responding to and monitoring road and railway traffic accidents and enforcing road and railway traffic rules and regulations.

   (2) **Social Order and Administrative Management Police Bureau**: responsible for countering encroachment and illegal construction on pavement and roadway and preventing illegal motorcycle races.

(3) **Waterway Traffic Police Bureau**: responsible for responding to and monitoring inland waterway traffic accidents, and enforcing inland waterway traffic rules and regulations.

8) **Ministry of Finance**: responsible for financing, managing all taxes, charges and penalties (including those in the transport sector).

9) **Ministry of Education and Training**: responsible for educating and disseminating traffic laws and regulations in schools and universities.

10) **Ministry of Health Care**: responsible for giving emergency treatment to victims of traffic accidents.

11) **Vietnam Fatherland Front:** responsible for coordinating with other organizations in disseminating traffic safety laws and regulations to all citizens for their strict compliance.

12) **Central Youth Union**: responsible for mobilizing youths to participate in the campaign on traffic safety and order.

13) **Ministry of Justice**: is a State administrative body on laws, including those relating to/or affecting the transport sector.

14) **Ministry of National Defense**: responsible for ensuring the safety of transport systems managed by the military.

15) **People's Committees**: responsible for State administration of transport and traffic safety in their areas.

16) **Provincial and Municipal Traffic Safety Units:** responsible for giving advice on local traffic safety to provincial and city chairmen.

17) **Provincial Transport Authorities**: responsible for State administration of transport infrastructures, vehicles, drivers, traffic accidents, and transport inspectors.

18) **Local Traffic Police**: responsible for enforcing traffic rules and regulations, dealing with traffic accidents, collecting traffic accident data, and reporting them.

19) **Other Related Agencies** with specific responsibilities relating to traffic safety.

4.2 National Transport Safety Committee

1) Central Level

Acting on the request of the MOT and Ministry of Police, the Prime Minister signed Decision No 917/QD-TTg on 29 October 1997 establishing the National

Transport Safety Committee (NTSC) to coordinate the activities of ministries, government sectors and local government units (LGUs) to ensure traffic safety and order. The NTSC's responsibilities and authorities are as follows:

(1) Giving advice to the Prime Minister on guidelines, policies and legal documents on traffic safety submitted by ministries, government sectors and LGUs to the Government or to the Prime Minister;
(2) Proposing intersectoral measures on traffic safety to the Prime Minister and coordinating among government sectors and LGUs to execute approved measures;
(3) Coordinating central government agencies, relevant organization, and provincial and municipal People's Committees to execute legal documents on road, railway, maritime, inland waterway, and aviation traffic safety;
(4) Coordinating with relevant organizations to disseminate traffic safety laws and regulations to the populace and educating them in the benefits of compliance;
(5) Coordinating with relevant State agencies, provincial and municipal People's Committees to monitor the enforcement of regulations on traffic safety;
(6) Urging various sectors and LGUs to enforce traffic safety measures in accident-prone locations;
(7) Coordinating various sectors and government levels to immediately deal with serious traffic accidents;
(8) Coordinating activities of all traffic inspectors and police force that traffic safety laws and regulations are enforced throughout the country;
(9) Reporting regularly to the Prime Minister about the traffic safety situation in the whole country ; and
(10) Establishing relations and cooperating with international organizations in promoting traffic safety.

The members of the NTSC are the following:

(1) Chairman: Minister (or Vice Minister) of Transport;
(2) Vice Chairman: Vice Minister of Police
(3) Members: Vice minister of the ministries of national defense, finance, justice, and training and education; deputy director general of the People Policemen General Office, deputy director of the Civil Aviation Authority of Vietnam (CAAV), and a department director of the MOT. NTSC has its own staff and assistant cadres.

2) Sectoral and Local Levels

Each sub sector of road, railway, inland waterway, maritime, and aviation has a Safety Board, chaired by a deputy director of the sub-sector and assisted by officials. The board is responsible for managing, monitoring and implementing tasks to ensure traffic safety.

Each LGU likewise has a Traffic Safety Board. The vice chairman of the provincial or municipal People's Committee chairs the board with a PTA director as standing vice chairman. Its members are leaders of relevant agencies (i.e., provincial police department, military, finance, justice, and education and training).

4.3 Existing Policies and Regulations

The National Assembly, the Government of Vietnam, ministries, agencies, transport sub sectors, and concerned agencies have issued orders, decisions, decrees, circulars, and instructions ensuring traffic safety, strengthening the effectiveness of State administration, delineating the responsibilities of government agencies and private organizations, and ensuring a smooth and convenient passenger and freight transport so as to contribute to economic development and national security. The following are the major existing legal documents on traffic safety of each sub sector (see details in Appendix A).

1) Road

(1) Decree No. 07/2001/L/CTN, President, 12 July 2001, National Assembly 26/2001/QH10 on the issuance of the Road Act.

(2) Order No 26/2001/QH10, National Assembly, 10th Legislature of the Socialist Republic of Vietnam at 9th Session, Road Act.

(3) Decree 36/2001/ND-CP, Government, 10 July 2001, on the improvement of road and urban transport order and safety.

(4) Decree 39/2001/ND-CP, Government, 13 July 2001, on sanctions against administrative violations of road and urban transport order and safety laws and regulations.

(5) Circular No 16/2001/TT-BGTVT, MOT, 5 September 2001, on instructions to giving sanctions against administrative violation of road and urban transport order and safety.

(6) Directive No 23/2001/CT-BGTVT, MOT, 18 December 2001, on the improvement of driver training centers, driver training and examination, and issuance of driving license.

(7) Decision No 4170/2001/QD-BGTVT, MOT, 7 December 2001, on the improvement of the training program for drivers of motorized vehicles.

(8) Decision No 4232/QD-BYT, Ministry of Health Care, 4 October 2001, on health standards of drivers of motorized vehicles.

(9) Decision No 4352/2001/QD-BGTVT, MOT, 18 December 2001, on health standards for drivers of motorized vehicles.

(10) Decision No 4353/2001/QD-BGTVT, MOT, 18 December 2001, on the administration of driver training centers for drivers of motorized vehicles.

(11) Decision No 4135/2001/QD-BGTVT, MOT, 5 December 2001, on standards of motorized road vehicle registration station, Registration No:22TCN-226-91.

(12) Decision No 4105/2001/QD-BGTVT, MOT, 4 December 2001, on periodic inspection of the technical safety and environmental protection standards of motorized road vehicles.

(13) Decision No 4134/2001/QD-BGTVT, MOT, 5 December 2001, on standards of technical safety and environmental protection of motorized road vehicles. Registration No 22-TC-224-01.

(14) Decision No 1690/QD-VT, MOT, 15 September 1990, on the rules and regulations on freight transport by automobiles.

(15) Decision No 1691/QD-VT, MOT, 15 September 1990, on the rules and regulations on passenger transport by automobiles.

(16) Decision No 3385/QD/PC-VT, MOT, 23 December 1996, on temporary regulations on the management of city buses.

(17) Decision No 4126/2001/QD-GTVT, MOT, 5 December 2001, on regulations on taxi operation.

(18) Decision No 1748/QD-GTVT, MOT, 12 July 1997, on temporary regulations on the organization, management and issuance of road transport license.

(19) Decision No 2076/QD-GTVT, MOT, 18 August 1998, on regulations on the issuance and use of road transport license.

(20) Decision No 4128/2001/QD-BGTVT, MOT, 5 December 2001, on regulations on bus terminal operation.

(21) Decision No 890/1999/QD-BGTVT, MOT, 12 April 1999, on sectoral standards of interprovincial buses - General Requirements: Registration No 22-TCN 256-99.

(22) Decision No 1832/1999/QD-BGTVT, MOT, 26 July 1999, on organizational and managerial regulations on motorcycles used as passenger transport.

2) Railway

(1) Decree 120/CP, Government, 12 August 1963, on railway traffic order and safety.

(2) Decree 39/CP, Government, 5 July 1997, on railway traffic order and safety.

(3) Decision 737/2001QD BGTVT, Ministry of Transport, 19 March 2001, on road and railway crossings.

3) Inland Waterway

(1) Directive No 236 CT/GTVT, MOT, 21 July 1997, on reserved area of inland waterway facilities.

(2) Directive No 03/1999/CT-TTg, Prime Minister, 20 January 1999, on strengthening of State management of sand and gravel exploration and use and dredging of riverbed.

(3) Direction No 308/PC, MOT, 24 August 1996, on the implementation of the government decrees on railway and inland waterway traffic order and safety.

(4) Official document No 310-TC-LD, Inland Water Traffic Management Union, 5 May 1991, on inland water traffic inspection.

(5) Direction No 718/TTg, Prime Minister, 1 September 1997, on strengthening of the implementation of government decrees on traffic order and safety.

(6) Instruction No 454/TTg, Prime Minister, 5 July 1996, on the implementation of government decrees on railway and inland waterway traffic order and safety.

(7) Decree No 77/1998/ND-CP, Government, 26 September 1998, on amendments to Decree 40/CP, 5 July 1996, Government.

(8) Decree No 40/CP, Government, 5 July 1996, on inland waterway traffic order and safety.

(9) Decision No 2047 QD/PC, MOT, 6 August 1996, on the management and issuance of license to use inland waterway area.

(10) Decision No 2046 QD/PC, MOT, 6 August 1996, on the administration of river ports and inland waterway berths.

(11) Decision No 2050 QD/PC, MOT, 6 August 1996, on amendments to Vietnam's inland waterway signal rules.

(12) Decision No 2049/PC, MOT, 6 August 1996, on the carrying load of river vessels during flood season.

(13) Decision No 613/2000/QD-BGTVT, MOT, 16 March 2000, on inland waterway safety, particularly on navigation of bridges.

(14) Decision No 213-QD/LB, Interministeral Transport and Police, 27 January 1984, on traffic order and safety.

(15) Circular No 53 TC/TCT, Minister of Finance, 16 August 1997, on the collection, tranfer and management of fees for IWW order and safety.

(16) Circular 318 TT/PC, MOT, 6 September 1996, on the implementation of Article 19 Decree 40/CP, Government, 5 July 1996, on inland waterway traffic order and safety.

(17) Circular No 48/1999/TT-BTC, Ministry of Finance, 6 May 1999, on the use of the budget from penalties for traffic order and safety violations.

(18) Circular No 10/1998/TTLT-GTVT-BQP-BNV, Interministerial Transport, Defence and Police, 13 January 1998, on the implementation of some provisions of Decree 40/CP, Government, on the management and inspection of navy ships and other inland waterway vessels used for defense.

(19) Circular No 124-TT/PC, MOT, 25 May 1984, on the management and operation of passenger boats.

4) Maritime

(1) Maritime Law, National Assembly, 12 July 1990.

(2) Decree No 13/CP, Government, 25 August 1994, on the management and operation of Vietnam ports.

(3) Decree No 14/CP, Government, 25 February 1994, on the registration of seagoing vessels and crew.

(4) Decree No 203/TTg, Prime Minister, 28 December 1992, on the operation and organization of Vietnam vessels.

(5) Decree No 204/TTg, Prime Minister, 28 December 1992, on maritime safety in Vietnam.

(6) Decree No 269/TTg, Prime Minister, 26 April 1996, on the improvement of Vietnam's coastal beacon system up to 2010 and 2020.

(7) Directive No 33/1999/CT-TTg, Prime Minister, 27 December 1999, on the delineation of responsibilities of ministries on traffic order and safety.

(8) Decision 780/TTg, Prime Minister, 23 October 1996, on the establishment of a National Committee to rescue air and sea accident victims.

(9) Decision No2384/QD-PC,MOT, 17 November 1994, on the organization and examination of maritime pilots and issuance of a special certificate for them.

(10) Decision No 174/QD-PCVT, MOT, 5 December 1994, on the duties and functions of seamen.

(11) Decision No 49/QD-VT, MOT, 9 January 1993, on Vietnam maritime signal regulation.

(12) Decision No 1387/1998/QD-GTVT, MOT, 3 June 1998, on the training, examination and duties of seamen and the issuance of professional certificates to them.

(13) Decision No 2628/QD-TCCB, MOT, 2 October 1996, on the establishment of a Vietnam Maritime Search and Rescue Center.

(14) Decision No 2788/QD- PC, MOT, 17 May 1995, on the operation of foreign vessels at Vietnam ports.

4.4 Review of Previous Studies and Technical Assistance on Traffic Safety

Past and ongoing major studies and technical assistance on traffic safety were reviewed in this study. The main content of these studies is summarized in Table 4.1.1 below.

4.5 Systems on training and Driving License

1) Road vehicle driving license system

a. Type of driving license

In Vietnam, the Ministry of Transport (MOT) is responsible for issuing the driving licenses. There are six types of driving licenses for different vehicle types. Applicants must be at least 18 years old. However, many young people under 18 years old still drive motorcycles on the road without a license. The reason for this is that driving a motorcycle under 50cc engine does not require a license.

A1: Motorcycle (with 50-175cc engine)
A2: Motorcycle (with over 175cc engine)
B1: Car and small truck (including private, commercial car and small truck) with loading capacity under 9 seats and 3.5 tons.
C: Truck (Loading capacity more than 3.5 tons)
D: Bus (10-30 passenger seats)
E: Bus (more than 31 passenger seats)

Table 4.1.1
Past and Ongoing Studies and Technical Assistance on Traffic Safety

N°	Field	Project/Study title	Objectives	Funding Agency	implementing Agency	Duration	Activities	Budget	Location
1	Infrastructure	Study on Road Traffic Safety on National Road N°1	Research on road traffic safety Identification of traffic accident causes Identification of priority projects	WB	TRL (UK) VRA	1997-1999	Description of road traffic safety on two sections of NR 1	USD ~2.1 Mill.	Two sections of NR1, they are: HN- Vinh and, HCMC- Can Tho
2	Infrastructure	The Study on Traffic Safety Improvement in Vietnam	Research on traffic situation and urgent measures required to reduce road traffic accidents at black spots	GOV	NTSC VRA	1999	Identification of black spots. Development of measures to reduce road traffic accidents	n.a.	All national roads
3	Infrastructure	Assistance from the Republic of France	Construction of an operation center, and installation of traffic lights & cameras at some key traffic junctions	GOF GOV	Hanoi TUPWS and Traffic Police Dept.	1996-1999	Construction of an operation center; Installation of traffic lights at 35 traffic junctions and 6 cameras at 6 key junctions	France: FF 46,447,381 Vietnam: FF 21,747,681	Hanoi Capital
4	Education	"Childhood Injury Prevention Program" project	Reduction of 25% injuries leading to deaths & perpetual disability and injuries for Vietnamese children from 0 to 18 years old in project areas	UNICEF's assistance	UNICEF MOET	2001-2005	Enhancement of the awareness on child safety; Development & introduction of necessary safety devices in project area	USD 10,000,000	Some areas be selected
5	Education	-"Helmets for Kids" Program - "Helmets for Kids" Extension Program	Presentation of traffic accidents for children Presentation of traffic accidents for children	Stage 1: UNICEF, Embassy of America and AIPF Stage 2: AIPF AIPF	Stage 1: UNICEF, MOET Stage 2: MOET, NTSC MOET, NTSC	Stage 1: 2000-2005 Stage 2: 2002-2004 2002-2004	Stage 1: distribution of 15,000 helmets Stage 2: distribution of 15,000 helmets Distribution of 50,000 helmets	Providing of helmets only (USD ~800,000)	16 selected schools in Hanoi, Haiphong, Danang, HCMC 30 selected schools in Hanoi, Danang & HCMC
6	Education	Pilot project: "Active methods on Traffic Safety Education for Primary school children"	Education on traffic safety for Primary School Children.	AIPF	MOET	2001-2003	Introduction of traffic laws and transport system for primary school children	USD 220,600	Selected Schools in. Hanoi, Haiphong, Danang, HCNC.
7	Infrastructure Education	National Traffic Safety Program 2001-2005	Identification of priority projects to reduce traffic accidents	GOV	NTSC in coordination with relevant agencies	2001-2005	Draft of a national traffic safety program to be submitted to GOV	Expected budget VND 2,269 billion (USD ~150 Mill)	Whole country

b. Driver training and testing

Applicants must be registered in a driving school to take the necessary theory classes. The training period varies according to vehicle types. After completing the necessary training and passing the driving test, driving schools issue a provisional driving license. Applicants then go to the driving license center managed by VRA to take the final examination on driving theory and technique. At present, there are 28 VRA driving license centers in Vietnam.

Driving schools are managed and operated by various governmental agencies and private sector organizations. For example, in HCMC there are 29 driving schools, of which 2 are operated by MOT, 6 by other ministries, 17 by HCMC Government (TUPWS) and 4 by private sector. For example, to obtain a driving license for a car requires 20 hours of theory and 10 hours of practical experience. The total cost to obtain the license is approximately VND 2.5 million.

Driving licenses are to be renewed every three years. License holders go to the driving license center and pay the fee for renewal. There is no seminar or training for applicants to enhance their consciousness on traffic safety.

MOT is managing three transport technical & professional schools located in Ha Tay (near Hanoi), Hai Phong and HCMC, respectively. The main objectives of these schools are to train operators and mechanics of construction equipment for transport infrastructure. Schools No.1 and No.3 also have training courses for driving ordinary vehicles. For example, School No.3 in HCMC has 300 applicants in every month.

2) Training of Inland Waterway Crews

a. Training Organization

As of 2001, there were 19 training and supplementary/refresher training high schools for inland waterway crews. Out of they, 3 were under the management of the MOT (these schools soon to be handed over to the VIWA), 3 under VIWA, and the remaining 13 under PTAs and Labor and Social Welfare Services.

Schools under VIWA's management consist of Central Inland Waterway High School No I, Inland Waterway Professional & Technical School No II and High School for Inland Waterway Technicians. These schools implement the training for steersmen, river craft engine technicians and inland waterway engineering technicians, as well as supplementary training for inland waterway crews.

Schools under the MOT, PTAs and Labor, War Invalids and Social Affairs Services mainly perform supplementary/refresher training courses to upgrade degrees and professional certificates for crews in accordance with regulations on management classification of inland waterway vessels.

b. Training Duration

Training duration to finish school: 3 years.
Supplementary and refresher training to upgrade degrees: from 6 months to 1 year, based on requirements of each degree or certificate type.

c. Training Curriculum

Training documents are compiled by the MOT and the MOET but approved by the MOT.

d. Issuance of Professional Certificates

VIWA is responsible for organizing examinations and issuing professional certificates for successful inland waterway crews.

e. Evaluation of Training Performance

The performance of training and supplementary/refresher training for inland waterway crews has satisfied the development requirements of inland waterway transport in the whole country. A VIWA report shows that the number of qualified captains has increased by 50%, marking a remarkable effort.

However, there have been some weaknesses, particularly:

- Insufficient material and technical facilities and lack of coordination of formal and practical training, together with outdated teaching and practical techniques of schools;
- Lack of experienced teachers, limitation of teaching skill development for teachers, unsatisfactory quality of training and supplementary training performance; and
- Dispersed distribution of training schools, inadequate training guidance and budget constraints for training delivery.

3) Training and Issuance of Certificates for Maritime Crews

a. Training Organization

Currently, there are 4 schools responsible for training maritime crews, consisting of Maritime University (in Hai Phong City); Transport University (in Ho Chi Minh City); Maritime High School No 1 (in Hai Phong City) and Maritime High School No 2 (in Ho Chi Minh City).

Universities are responsible for training of administration officers class 1 and 2, i.e. captains and mates for vessels with gross tonnage of 500 GT and upwards; engine chiefs class 1 and 2 for vessels with engine capacity of 750 KW and upwards; and operating officers class 1 and 2 for vessels with gross tonnage of 500 GT and upwards, and with engine capacity of 750 KW and upwards.

High schools perform training for administration officers class 3 and 4, i.e. captains and mates for vessels with gross tonnage of under 500 GT; engine

chiefs and engine chief-mates for vessels with engine capacity of under 750 KW; and operating officers class 3 and 4 for vessels with gross tonnage of under 500GT, and with engine capacity of under 750 KW.

b. Training Duration

Duration to undergraduate from university: 5 years.

Duration to finish high school: 2 years.

c. Training Curriculum

Training documents are compiled by the MOT and the MOET but approved by the MOT.

d. Issuance of Professional Certificates

Universities and high schools are responsible for issuing certificates for graduated crews in accordance to regulations of the MOET.

VINAMARINE is the only agency responsible for organizing examinations and issuing professional certificates for trained maritime crews. The professional certificate is a must for officers.

Certificate issuance is accorded with international conventions on training, certification and shift duty for maritime crews (i.e. STCW 1995).

e. Several Main Points in Current Training of Maritime Crews

Vietnam is a member of the International Convention STCW 1995 which has been valid since March 1995. The training, certificates issuance and shift duty for crews are therefore performed in conformity with regulations of this Convention (including training curriculum and practice conditions).

International Maritime Organization (IMO) inspected training curricula and practice equipment of Vietnam maritime universities and high schools and then added Vietnam to the "White List" which consists of countries having crews satisfying IMO standards.

4) Training in the Railway Sub-sector

Due to special characteristics of the Railway sub-sector, the training of railway technicians and train drivers is performed by Vietnam Railways only, not by PTAs or other economic sectors.

a. Training Organization

Vietnam Railways is managing two schools, i.e. Railway High School and Railway Technicians High School. These schools train drivers and technicians (in fields of mechanic, engineering, information facility and transport operation), and organize ordered supplementary training courses to enhance professional qualifications for the railway officials and workers.

b. Training Duration:

Duration to finish school: 3 years

c. Training Curriculum

Training documents are compiled by Vietnam Railways and the MOET, but approved by Vietnam Railways.

d. Issuance of Professional Certificates

Students get certificates after passing the required examinations in the training course. However, a student can not become a driver immediately after qualifying, but must undergo practical experience training as a drivers mate for some time first.

After this, Vietnam Railways will authorize Regional Railway Unions to establish exam commissions and issue driving certificates by each grade. Only with a driving certificate issued by a Regional Railway Union, can a driver carry out his tasks.

e. Evaluation of Training Performance

In general, the training is ensured in quality and satisfactory with requirements of the Railway Sub-sector

4.6 Systems on Vehicle Inspection

1) Road Vehicle Inspection

According to the Governmental Decree No.36/CP dated 29 May 1995 issued by the Prime Minister, the inspection of road motor vehicles was transferred to the Ministry of Transport in August 1995 (this work was done by the Ministry of Police before). The Vietnam Register (VR) under the MOT is responsible for organizing and managing all the technical safety inspection network for road motor vehicles in the whole country.

In order to meet the needs of technical safety inspection for road motor vehicles, as of May 2002, there are 78 inspection stations, of which 76 stations have mechanized their inspection work, only two stations remain semi-mechanized.

Thanks to the implementation of the Governmental Decree No.36/CP (before promulgation of the Road Act) by the Prime Minister and of the Road Act that has just been promulgated, the inspection work has contributed to the limitation of traffic accident growth, but the traffic accident situation is still very serious. Although traffic accidents caused by substandard vehicles account for a small rate (about 1.5%), the accurately defining of the actual technical conditions of vehicles involved in an accident is still one of the important measures.

In order to do the inspection work well, the Ministry of Transport has promulgated standards for motorized road vehicle registration stations: (No. 4135/QD-BGTVT) and the periodic inspection of the technical safety and environmental protection standards of motorized road vehicles (No. 4105/2001/QD-BGTVT). (See Appendix A)

With the operation of 78 Road Motor Vehicle Inspection Stations, more than 93% of motor vehicles in circulation in the whole country have been inspected by mechanized equipment. The inspected results given by the equipment reflect faithfully the actual technical conditions of the vehicles.

The mechanized inspection stations are equipped with the equipment of the BEISSBARTH firm (Germany), Japanese firms and Cantec firm (America).

The inspection management, at present, is implemented mainly in the form of reports which are sent to the Technical Safety Inspection Center for Road Motor Vehicles by e-mail, floppy disk and facsimile. Particularly, since April 2001 the inspection stations in Hanoi have sent their daily reports to the Center by computer using the Inspection Management Program.

Reporting the inspected results to the Center is mainly done using the abovementioned forms. A unified network to enable easy checking and follow up of the inspection work of all stations has not yet been set up.

Therefore, to enhance the quality of the inspection work, it is necessary to strengthen the supervision of stations' activities, improve the management work and apply science and technology, especially informatics technology. In addition, it requires to renovate, upgrade and equip the stations, in particular with inspection equipment and equipment for checking exhaust emissions and noise.

2) Register of inland waterway/sea going vessels

The technical register and supervision of inland waterway/sea facilities and vessels have generally been implemented in a methodical manner and following proper procedures.

According to the Decision No 75/TTg promulgated by the Prime Minister on 03/02/1997, Vietnam Register (VR) is the only agency responsible for managing the technical register and quality certification for road, inland waterway, maritime transport means and facilities; as well as for oil drilling rigs at sea, floating facilities, floating means and other kinds of facilities relating to the transport safety.

The inspection and supervision of inland waterway/sea going vessels are implemented under the forms of: initial survey; periodic survey; annual survey; docking survey; and occasional survey.

a. As for inland waterway going vessels

The VR and PTAs take charges of surveying/inspecting and supervising inland waterway going vessels, particularly:

The VR is responsible for surveys/inspections and supervisions for:

- Passenger ships of 50 seats, and upwards;
- Barges with tonnage of 200 DWT, and upwards;
- Ships with engine capacity of 135 HP, and upwards;
- Vessels of foreign or joint venture companies; and
- Coastal fishing ships.

PTAs are responsible for surveys/inspections and supervision for:

- Passenger ships of under 50 seats;
- Barges with tonnage of under 200 DWT;
- Ships with engine capacity of under 135 HP;
- Boats running along and cross rivers; and
- Special facilities such as floating posts, pontoons, floating workshops and so on.

However, the survey and supervision responsibility of these authorities will be able to be implemented by sub-agencies belonging to the VR, in case of agreements between VR and PTAs.

So far, inspections and supervisions for inland waterway going vessels and facilities nation- wide have been carried out by 59 sub-agencies, of which 25 and 34 are under the VR and Provincial Transport Authorities, respectively.

The inspection and supervision of inland waterway vessels conform to the issued technical rules, procedures and standards (in accordance to Vietnamese or sector standards).

According to a VR report in 2001, the VR carried out 28,538 technical surveys to inland waterway going vessels (of which, 876 new construction surveys; 2,446 initial surveys; 1,559 periodic surveys; 1,009 occasional surveys; and 22,648 annual surveys) and 30,385 docking surveys.

The inspection and supervision of inland waterway vessels have recently contributed to the assurance of inland waterway transport safety and order as well as to the prevention of accidents. However, there have been some remaining problems, such as:

- A large proportion of initial, but not periodic surveys for inland waterway vessels;
- Lack of inspection of many improved, upgraded, replaced and converted vessels;
- Various difficulties for accurately defining the weight of vessels;

- Disregard of issued technical rules/procedures and standards by some inspection sub-agencies, resulting in degradation of standards sometimes;
- Limit of information exchange among inspection stations, resulting in non-unification of the inspection and supervision performance, now and then; and
- Many difficulties for inspection/supervision and management performance to small and family-use boats, as well as to boats running along/cross the rivers.

b. As for sea going vessels

The VR is the only agency responsible for carrying out inspections, technical supervisions and quality certifications to all maritime facilities and vessels (including fishing ones).

Details relating to the inspection and supervision performance of maritime facilities and vessels are regulated by the Prime Minister's Decision No 203/TTg dated on 28th, December 1992.

VR has 13 branches performing its maritime surveys and supervisions throughout the country.

For domestic vessel fleet, VR carried out 1,537 technical surveys to seagoing ships (of which, 355 surveys for international voyage ships) in 2001.

Survey quality is more and more assured, and survey/testing documents issued were constantly controlled. This is due to the strict performance of ISO 9001 by inspection branches and sub-agencies.

Moreover, VR has recently co-operated with foreign classification societies to perform surveys and supervisions to foreign class vessels and facilities. For example, VR carried out 267 surveys for foreign class ships in 2001 (including ships at NK, LR, GL, DNV, ABS, BV and Cambodia class).

Since 2001, VR has applied the dual class vessel program for increasing its class tonnage within the Vietnamese flag fleet, including new construction and in-service ships.

In general, the inspection and supervision of maritime facilities and vessels are performed in a good manner. Furthermore, VR co-operates and signs agreements with foreign classification societies to carry out surveys for foreign class vessels.

However, there is a fact that VR's surveyors still have some limits in qualification and experience, together with inadequate and non-synchronous inspection and supervision performance, resulting in several technical incidents.

Due to some shortcomings in the management, many obsolete and substandard vessels are still operating, especially on international voyages, resulting in detentions at foreign ports. This causes significant economic losses.

3) Register Performance in the Railway Sub-Sector

According to the Prime Minister Decision No 75/TTg, the performance of register, inspection/supervision and technical acceptance of railway rolling stocks and facilities is also implemented by VR, but currently by Vietnam Railways, due to the special characteristics of the Railway sub-sector.

A Register and Acceptance Board is under Vietnam Railways with the functions of carrying out technical surveys and acceptances for all rolling-stocks and facilities operating on national railway lines. This Board directly registers brand new rolling-stocks and equipment which are imported from foreign countries or manufactured domestically.

The Register and Acceptance Board entrusts Regional Railway Unions to be responsible for making technical acceptances of operating rolling-stocks and facilities.

Each Regional Railway Union contains a Technical Acceptance Division which is in charge of making technical acceptances of railway rolling-stocks and facilities by different inspection and repair classes (in conformity with promulgated operating rules, procedures). For example, each class of inspection and repair is based on the number of operating kilometers of locomotives and wagons/cars, i.e. locomotives need daily survey, and repairing at classes of: after 30,000 km; after 100,000 km; after 200,000 km; after 600,000 km, and so on.

The inspection, supervision and acceptance are implemented by special equipment and by visual inspection . However, this special equipment is not sufficient and synchronous.

In general, the Railway technical inspection and supervision are performed in a good manner.

5 ANALYSIS OF TRAFFIC ACCIDENTS AND SAFETY

5.1 Overall Transport Sector

According to GRSP statistics, nearly 1 million persons are killed and over 10 million are injured in road traffic accidents every year worldwide. More than 75% of these occur in developing and transitional countries. Traffic safety, therefore, is currently one of the issues of immense importance.

In economic terms, traffic accidents can result in annual losses of between 1% and 3% of GDP. The estimated annual cost for developing countries exceeds US$ 100 billion or nearly double the total Official Development Assistance (ODA) they receive every year from bilateral and multilateral organizations. With the problems associated with traffic accident data collection, the actual scale and cost of traffic accidents may even be higher than reported.

In Vietnam, traffic accidents have also claimed thousands of lives, maimed many more, damaged many valuable properties and transport facilities, and scarred landscapes. Traffic accidents are even more dangerous than any epidemic, if one considers the number of fatalities and injuries.

In recent years, the GOV has recognized the economic and social costs of traffic accidents and has issued a number of traffic laws and regulations, as well as measures to improve traffic safety. However, improving the situation requires time, finance and close and synchronous coordination among all government sectors and levels, the private sector and citizens, as well as the financial and technical assistance of domestic and international organizations and individuals.

Over the past 11 years, from 1990 to 2000, the number of traffic accidents and fatalities increased annually (see Table 5.1.1, 5.1.2 & Appendix B from 5.1 to 5.2.2). From the table, it can be seen that the increase in traffic accidents and injuries in the years before 1996 was higher than that in the years after 1996 (~21.54% per year in comparison with ~4.45% per year). This achievement was attributed to the increasing effectiveness of State management of traffic safety since the issuance of Governmental Decree No 36, 39, 40, and 49/CP ensuring road, railway and inland waterway traffic safety and providing administrative sanctions against violations. Following these decrees, various decisions, directives, circulars, and other documents relating to traffic safety, education, and information dissemination were initiated by relevant ministries and sectors, resulting in better enforcement of and compliance with traffic laws.

The statistics for the traffic accidents, including the road, railway, inland waterway, and maritime during the period 1990- 2001 are as follow:

Table 5.1.1
Number of Traffic Accidents, 1990-2001

Year	Accidents		Fatalities		Injuries	
	Number	Compared to Previous Year (%)	Number	Compared to Previous Year (%)	Number	Compared to Previous Year (%)
1990	6,110		2,268		4,956	
1991	7,382	+20.82	2,602	+14.73	7,114	+43.54
1992	9,470	+28.29	3,077	+18.26	10,048	+41.24
1993	11,582	+22.3	4,140	+34.55	11,854	+17.97
1994	13,760	+18.81	5,897	+42.44	14,174	+19.57
1995	15,999	+16.27	5,728	+-2.87	17,167	+21.12
1996	19,678	+23.00	5,847	+2.08	21,764	+26.78
1997	19,702	+0.12	5,913	+1.13	22,091	+1.50
1998	20,752	+5.33	6,394	+8.13	22,989	+4.07
1999	21,538	+3.79	7,095	+10.96	24,178	+5.17
2000	23,327	+8.31	7,924	+11.68	25,693	+6.27
2001	25,831	+ 10.70	10,866	+ 37.10	29,449	+ 14.60

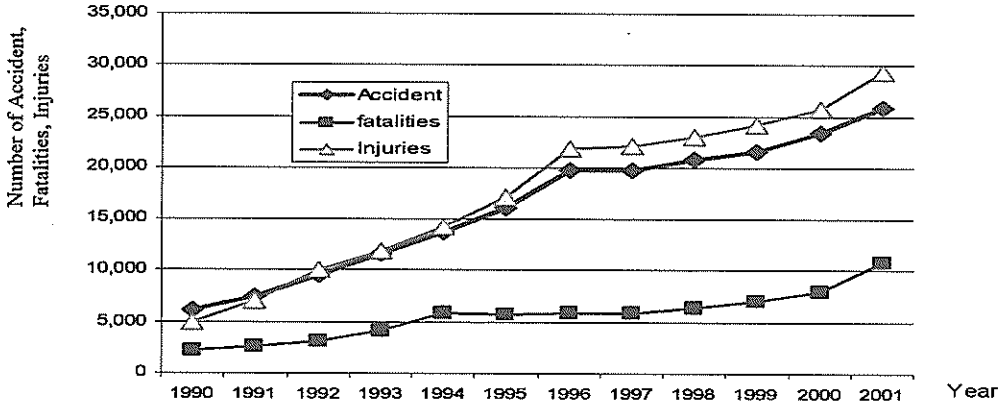
Source: NTSC

Table 5.1.2
Traffic Accident Statistics by Transport Sub-sector, 1996-2001

Sector	1996			1997			1998			1999			2000			2001		
	A	F	I	A	F	I	A	F	I	A	F	I	A	F	I	A	F	I
Road	19075	5581	21566	19159	5680	21905	19975	6067	22723	20733	6670	23911	22486	7500	25400	25040	10477	29188
%	96.94	95.45	99.09	97.24	96.06	99.16	96.26	94.89	98.84	96.26	94.01	98.89	96.39	94.65	98.86	96.94	96.42	99.11
IWW	193	109	13	188	95	13	422	184	93	316	250	60	385	261	67	358	214	64
%	0.98	1.86	0.06	0.95	1.61	0.06	2.03	2.88	0.40	1.47	3.52	0.25	1.65	3.29	0.26	1.39	1.97	0.22
Maritime	115	21		87	26		84	21	14	117	11	8	120	12	13	98	30	15
%	0.58	0.36	0.00	0.44	0.44	0.00	0.40	0.33	0.06	0.54	0.16	0.03	0.51	0.15	0.05	0.38	0.28	0.05
Railway	295	136	185	268	112	173	271	122	159	372	164	199	336	151	213	335	145	182
%	1.50	2.33	0.85	1.36	1.89	0.78	1.31	1.91	0.69	1.73	2.31	0.82	1.44	1.91	0.83	1.30	1.33	0.62
Total	19678	5847	21764	19702	5913	22091	20752	6394	22989	21538	7095	24179	23327	7924	25693	25831	10866	29449
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Note: A- accident; F-Fatalities; I-Injuries; IWW- Inland water way
Source: NTSC

Figure 5.1.1
Trend of Traffic Accidents, 1990-2001



5.2 Road Accidents and Safety

1) General Situation

As stated in Table 5.1.2 above, data from 1996 to 2001 shows that road traffic accidents accounted for a high proportion of the total number of transport accidents. Particularly, there were 126,468 road accidents causing 41,975 deaths and 144,693 injuries out of the total number of 130,828 traffic accidents; 44,039deaths; 146,165 injuries or 96.67%, 95.31% and 98.99%, respectively. Moreover, traffic accidents also resulted in damage to properties (such as traffic equipment, transport vehicles and transport facilities). Road accidents also impacted heavily on people's lives which cannot be measured in monetary terms.

Table 5.2.1
Number of Road Traffic Accidents, 1996-2001

Year	Number of Road Accidents			Fatalities			Injuries		
	Total Number	Increase		Total Number	Increase		Total Number	Increase	
		No.	%		No.	%		No.	%
1996	19,075	3,699	24.05	5,581	151	2.78	21,566	4,646	27.46
1997	19,159	84	0.44	5,680	99	1.77	21,905	339	1.57
1998	19,975	816	4.25	6,067	387	6.81	22,723	818	3.73
1999	20,733	758	3.79	6,670	603	9.93	23,911	1,188	5.23
2000	22,486	1,753	8.45	7,500	830	12.44	25,400	1489	6.23
2001	25,040	2,554	11.37	10,477	2,977	39.69	29,188	3788	14.91
1996-2001	126,468			41,975			144,693		

Source: NTSC

When Vietnam's road traffic accident rate is compared to that of other ASEAN countries, the number of accidents/1000 population and the number of accidents/1000 vehicles are lower. However, this is not a same-level comparison because motorcycles account for 94% of the total number of motorized road vehicles in Vietnam. Despite a lower accident rate, the comparison showed that the number of fatalities/1000 motorized vehicles in Vietnam is 0.6, higher than that of Thailand (0.27%), Singapore (0.28%) and Myanmar (0.57%).

Table 5.2.2
Road Accident Data[1] in Other ASEAN Countries

Country	Population (000 persons)	Motorized Vehicles (000 vehicles)	Number of Road Accidents	Accidents/ 000 Population	Accidents/ 000 Motorized Vehicles	Fatalities/ 000 Motorized Vehicles
Brunei	350	7	2,861	8.17	417.06	5.39
Cambodia	9,052	84	556	0.06	6.62	2.34
Laos	5,200	187	3,159	0.61	16.89	na
Malaysia	23,200	10,590	250,417	10.79	23.65	1.94
Myanmar	49,010	424	3,459	0.07	8.16	0.57
Philippines	75,000	3,506	na	na	na	2.41
Singapore	3,894	689	34,025	8.74	49.40	0.28
Thailand	61,662	20,097	67,800	1.10	3.37	0.27
Vietnam	77,686	6,964	22,486	0.29	3.23	0.60

Source: Seminar on Traffic Safety, Tokyo, 2001.
[1] Data in the year 2000

The number of accidents, fatalities and injuries sharply increased from 1995 to November 2001 at an average rate of 6.6% per year. The number of fatalities particularly increased by 9.40%. In comparison with the 2000 statistics, the 2001 ones showed a substantial jump of 11.37% in accidents, 39.69% in fatalities and 15% in injuries. Accidents caused by driving errors jumped from 75% to 82%. These included speeding, dangerous overtaking, drunk driving, and poor road observation. However, accidents caused by unsafe roads/bridges and facilities had a small percentage. In the aggregate, 20-27.5% of accidents were caused by automobiles, an alarmingly high 60-70% by motorcycles, and 6-10% by other causes.

Road accidents often occurred on national roads, high-volume roads and high-quality roads (which allow high-speed travel). According to the report of the Road - Railway Traffic Police Bureau, on average, 51.2% of traffic accidents happened on national roads, 23% on provincial roads, 17.2% on urban roads, and 8.5% on district/commune roads.

Table 5.2.3
Major Road Accident Causes, 1998-June 2001

No	Causes	1998		1999		2000		2001	
		No.	%	No.	%	No.	%	No.	%
A	Major causes								
	Analyzed accidents	6,808	100	13,603	100	12,259	100	14,332	100
	Out of which:								
1	Road users error	5,518	81.1	10,040	73.8	9,163	74.7	10,896	76.0
	Speeding	2,373	34.9	4,761	35.0	4,633	37.8	4,686	32.7
	Dangerous overtaking	2,342	34.4	3,722	27.4	2,866	23.4	3,686	25.7
	Drunk driving	607	8.9	945	6.9	784	6.4	841	5.9
	Poor road observation	155	2.3	612	4.5	630	5.1	1,183	8.3
	Pedestrian	0	0.0	0	0.0	250	2.0	500	3.5
	Non driving license	41	0.6	0	0.0	0	0.0	0	0.0
2	Unsafe vehicles	155	2.3	185	1.4	215	1.8	191	1.3
3	Roads and bridges	0	0.0	12	0.1	14	0.1	33	0.2
4	Others	1,135	16.7	3,366	24.7	2,867	23.4	3,212	22.4
B	Objects causing accidents								
	Analyzed accidents	6,591	100	13,048	100	12,165	100	14,212	100
	Out of which:								
	Automobile drivers	1,786	27.10	3,425	26.2	3,307	27.2	3,199	22.5
	Motorcycle riders	4,111	62.37	8,130	62.3	7,851	64.5	10,142	71.4
	Others	694	10.53	1,493	11.4	1,007	8.3	871	6.1
C	Accident locations								
	Analyzed accidents	5,644	100	13,784	100.0	12,340	100.0	14,675	100.0
	Out of which:								
	National Roads	3,044	53.93	6,694	48.6	6,344	51.4	7,172	48.9
	Provincial Roads	895	15.86	2,784	20.2	2,853	23.1	3,842	26.2
	Inner city, inner urban roads	1,510	26.75	2,676	19.4	2,128	17.2	2,516	17.1
	Others	195	3.45	1,630	11.8	1,015	8.2	1,145	7.8

Source: NTSC

2) Several Major Causes of Road Traffic Accidents

Major causes of road accidents were as follows:

(1) Road Users' Lack of Discipline

- Most accidents were caused by road users who violated traffic rules and regulations.
- Statistics showed that 75-80% of road accidents were caused by road users who did not observe traffic rules and regulations; only 1% and 2% of accidents were caused by structurally poor roads/bridges and unsafe vehicles, respectively. The rest was by other causes, such as inclement weather, natural calamities, etc. Disregard of traffic rules and regulations included speeding, wrong overtaking, drunk driving, poor road observation, driver fatigue, and illegal motorcycle racing. These factors aggravated the road traffic accident situation.
- The above factors were gleaned from the collected data on NR 5 (Hanoi - Hai Phong) and NR 1 (section from HCMC to Can Tho). Data from 1999 to the present showed that out of 730 accidents on NR 5, 653 were due to traffic violations (occupying a high proportion of 89.5%). And out of 2,156 accidents on NR 1, 1,759 were due to a disregard of traffic rules (occupying 81.59%).
- The Vietnam Road Act requires motorcycle riders to have a driving license when they control motorcycles with a capacity of 50 cc and above. Despite this, Vietnam's roads are filled with a high percentage of riders driving motorcycles, especially those with a capacity of 50 cc upwards, without a license. This means that many riders are on the road without having learned the traffic laws and regulations and without passing a driving examination, as mandated by law.
- In recent years, road transport infrastructure has been improved and upgraded. Roads have smooth surfaces and many roads now enable high speed travel, greatly increasing the accident ratio, and associated fatalities and injuries.

(2) Weak Urban Development Control along Major Roads: Development of residential areas along roads, (including new roads and highways) has resulted in the proliferation of illegal crossings and encroachment on carriageways and sidewalks, adding to the danger factor.

(3) Rapid Growth in the Number of Unsafe Vehicles: The number of motorized vehicles, especially motorcycles, has rapidly increased in the last ten years. This development makes it difficult to control traffic accidents by proper regulatory mechanisms and policies. This is explained as follows:

- Automobiles are of different types and were manufactured in various countries. A large number of these automobiles have been on the street

for many years now. Survey data showed that the service life of 70% of current on-street vehicles is from 18-20 years. Many vehicles are even older, particularly in the south. About 50% of vehicles are repaired and converted to suit business or service purposes, meaning they are not in their original structure.

- The market mechanism is also a strong factor on safety and the mechanical integrity of vehicles used in business and industry. Owners are only interested in earning from their vehicles, and the safety of freight and passengers often becomes second priority. Overloaded transport vehicles, speeding, dangerous overtaking, and poor maintenance are additional causes of traffic accidents.
- Transport flow on roads is a mixture of motorized and non-motorized vehicles, which operate at different speeds, leading to driver frustration and risk-taking while overtaking.

(4) **Insufficient and Inadequate Road Infrastructure:** Road transport infrastructure does not meet transport demands, particularly transport demands for motorized vehicles.

- Road density per area and population is low, especially in large urban areas such as Hanoi and HCMC.
- Road quality and technical conditions are poor, unsatisfactory and cannot meet socio-economic development demands.
- Crossings between roads and between roads and railways are mainly level. Many newly constructed roads with four lanes (i.e., NR 5, NR 51, North Thang Long-Noi Bai) have no grade separation for pedestrian crossing or have inconvenient grade separations, for example those on NR 5 from Hanoi to Hai Phong.
- Roads are located on many passes and slopes (139 passes and slopes with a length of 1,153 km on national roads), on steep hills and mountains. Such roads are usually tortuous, with small radius bends and limited sight distances. Gradients of 10-15% are common. Protective barriers and warning facilities, such as safety fences, sign posts, road markings, and convex mirrors, are lacking.
- Land for transport is very limited, especially in large urban areas and in populated areas.

(5) **Inadequate Institutional Framework on Safety**: State management of relevant ministries, sectors and local governments on traffic safety is still lax. Tasks and functions on traffic safety assurance by these agencies are mandated in the Road Act and other government resolutions. However, their mandates are yet to be executed well by the agencies. The legal system on traffic safety is not synchronized and is ineffective. For example:

- Issued legal documents, regulations and rules are neither synchronized nor timely implemented.
- Enforcement and sanctions against violators are not decisive and thorough, therefore their use as an educational mechanism is limited and ineffective.
- In spite of advances, the application of technological and scientific means of traffic management is still limited and not synchronous. There is a lack of determination in the enforcement of measures.

3) Reporting System for Traffic Accidents

Current reporting procedures for road traffic accidents, which is managed by the Ministry of Police, is as follows:

(1) Accident information is relayed to the traffic police station (line 1) and district or town police (line 2). Severe accidents are also relayed to the investigating police (line 3). Then information is given to the provincial traffic police office and city or provincial police. The provincial traffic police office reports the accident to the Road - Railway Traffic Police Bureau. This Bureau collects accident data all over the country. Preliminary reports are archived by the district police or by the investigating police (see Figure 5.1.2).

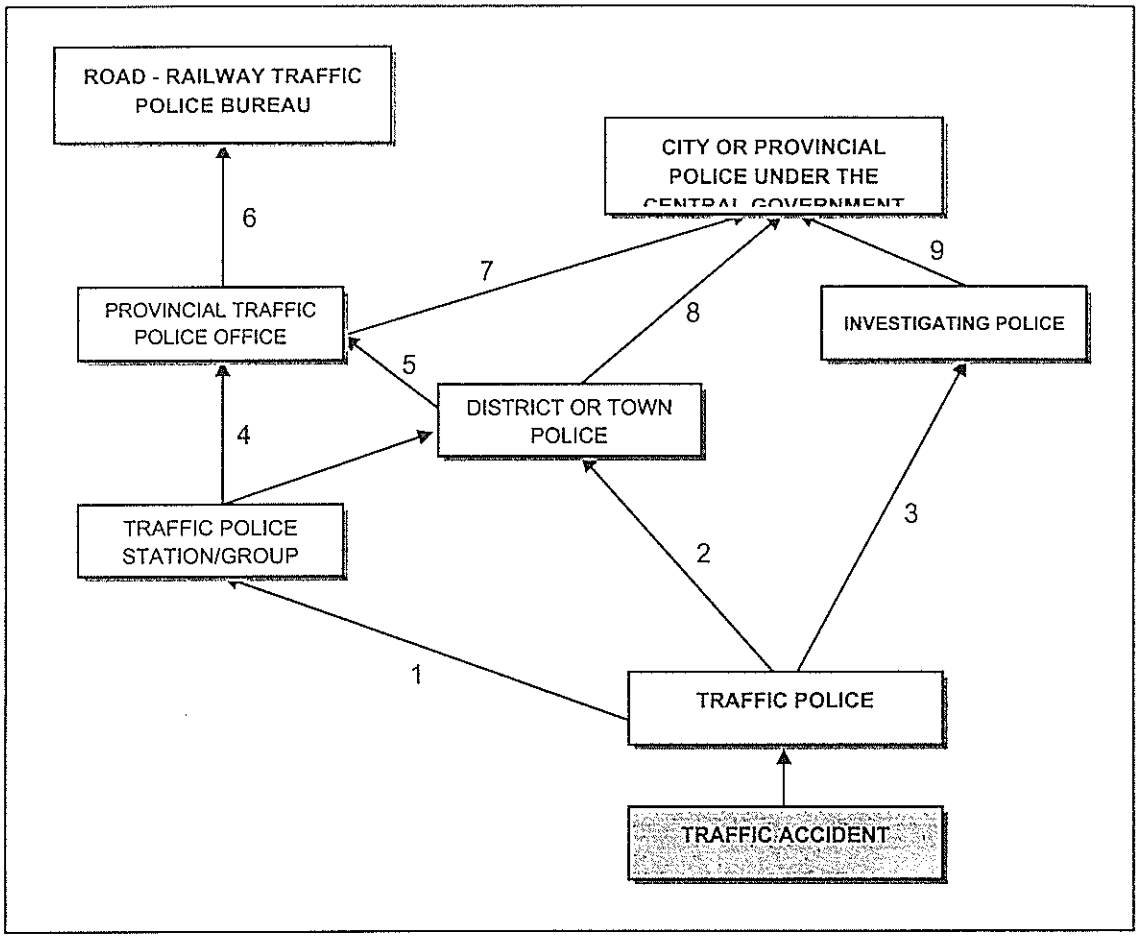
(2) At the accident scene, policemen who belong to the traffic police station are responsible for giving emergency aid to victims, securing the scene and easing traffic congestion.

(3) After being notified, the investigating police go to the scene to collect, investigate and complete the accident record (see Format of Accident Record and related information in Appendix B from 5.2-3 to 5.2-11). If the accident has no criminal undertones, the investigating police will send the records to the city or provincial traffic police office. If serious accidents have criminal undertones, the investigating police will send the completed record to the provincial or city police as mandated by law.

(4) The city or provincial traffic police office is responsible for dealing with accidents involving senior cadres and foreigners. The sheriff of the district police directly guides the emergency treatment of victims, secures the accident scene and other related work.

(5) Investigating police are responsible for relaying information on serious accidents with criminal evidence to the city or provincial traffic police.

Figure 5.2.1
Traffic Accident Reporting System



Box 5.2.1
Categories of Road Traffic Accidents

The classification of traffic accidents (Inter-sector Circular No 2 - People's Court - People's Supreme Organ of Control - Ministry of Police on 07/01/1995) is as follows:

- Minor traffic accident: injury to person and damage to property amounting to less than 45 tons of rice;
- Major traffic accident: 1-2 fatalities;
- Serious traffic accident: 3 or more fatalities, 2 fatalities and 1 serious injury; 1 fatality and 2 seriously injured; 1 fatality and 3 injured; damage to property amounting to 45 tons of rice and more.

5.3 Railway Accidents and Safety

1) General Situation

The railway sub-sector has its own safety/accident characteristics that are not similar to those of other sectors. This is because it operates on particular lines and follows a synchronous and unified operating procedure among locomotive drivers, infrastructure managers and trains. This organization must strictly follow laid down procedures. However, accidents still occur on railway lines, and in fact they have increased.

Compared to those of other transport sectors, the management of railway accident statistics is relatively sufficient. The data are classified and analyzed by related units; by systems of stations, locomotives, railway bridges, wagons/cars, communications and signaling, facilities, sub-sector; and by causes.

Out of the total traffic accidents in the whole transport sector, railway accidents accounted for 1.5-1.6% in terms of quantity, 1.8-2.35% in terms of fatalities and 0.7-0.8% in terms of injuries. Railway accidents are shown in the following table.

Table 5.3.1
Railway Accidents

Year	Accidents	Fatalities	Injuries
1996	295	136	185
1997	277	115	180
1998	342	129	226
1999	444	181	293
2000	561	187	446
2001	335	145	182
Total (1996-2001)	2254	891	1511

Source: Vietnam Railways

2) Characteristics of Railway Accidents

The number of railway accidents due to violations of procedures and train operating errors has increased. However, small technical errors have decreased. So far, most railway accidents are minor.

An analysis of data from January 1996 to October 2001 showed that the major cause of accidents were trains and rolling stocks. These were the main causes, accounting for 50% of accidents. The underlying reason was the age and condition of rolling stocks.

3) Major Causes[1] of Railway Accidents

Major causes of railway accidents are as follows:

(1) **Poor Condition of Rolling Stocks:** Most rolling stocks are obsolete. Moreover, the investment capital resource for repairing and rebuilding is still limited, resulting in unsafe operating rolling stocks.

(2) **Deficiency in Bridges and Tracks:** The railway infrastructure (including bridges, tracks, signaling, etc.) has been in existence for more than a century. Many facilities are not timely repaired; therefore, train operations cannot always operate safely. Furthermore, railway corridors are often encroached on, resulting in obstacles in train operation that can cause accidents.

(3) **Lack of Training and Management:** There is insufficient training and improvement of the management skills and professional enhancement of train operators (including skills training for dispatchers, captains, switchmen, drivers, service staff, etc.).

(4) **Problems in State Management:** The Railway Law has not yet been issued. Though the Government has issued Decree No 36/CP, which aims to ensure railway safety, its enforcement has not been thorough. This is shown by the fact that violations still continue, such as encroachment on railway corridors and arbitrary development of illegal level crossings. VR reports that there are about 2,000 level crossings, of which 50% are under its management and only 350 are controlled by rail guards. Moreover, many railway sections that are almost parallel to roads have no barrier, and most railway and road crossings are level, which is highly risky.

(5) **Lack of Enforcement:** Enforcement of railway traffic safety regulations has not been well executed. Besides, coordination among transport sub-sector agencies and local units is not synchronous and smooth.

(6) **Low Public Awareness:** Execution of traffic laws and the people's knowledge and awareness of railway laws and safety are weak.

(7) **Lack of Investment Budget:** Investment resources for the railway sub-sector is still insufficient. Moreover, the organization of railway operations does not satisfy the requirements of the new economic order.

[1] See Appendix B5.3 for the major causes of accidents.

Table 5.3.2
Railway Accidents due to Transport Facilities, 1996-10/2001

	Cause	Number of accidents	%	Total delay time (h)
1	Station	404	3.77	294.90
2	Locomotive	2,270	21.21	2718.50
3	Bridge/Track	337	3.15	624.00
4	Wagon/Car	3096	28.93	1748.00
5	Communications & Signaling	322	3.01	46.70
6	Equipment	77	0.72	220.00
7	Others[1]	4172	38.98	3033.60
8	Unknown	24	0.22	245.00
	Total accidents	10,702	100	8931.00

Source: Vietnam Railways.
[1] Causes not attributed to railway

Table 5.3.3
Number of Railway Accidents Involving Human Loss Causes

Year	Crash, Collision, Hit, Scrape	Falling from Train	Jumping from Train	Throwing Stones at Train	Other Causes	Total
1996	276	2	2	3	12	295
1997	258	1	5	4	9	277
1998	322	2	4	2	12	342
1999	429	3	1	1	10	444
2000	547	2	3	2	7	561
As of October 2001	467	4	1	3	10	485
Total (1996-2001)	2,296	14	16	15	60	2401

Source: Vietnam Railways

5.4 Inland Waterway Accidents and Safety

1) General Situation

Compared to road traffic mishaps, the number of inland waterway accidents is lower, taking only 1.5-2.0% of the total traffic accidents in the whole country. However, human loss and property damage are heavy. Average fatality is 0.65-0.8 person/accident. In general, inland waterway accidents are directly proportional to the density of inland water transport means, and this tends to increase.

Table 5.4.1
Inland Waterway Accidents, 1996-2001

Year	Accident	Fatality	Injury	Property Damage
1996	338	263	34	n.a.
1997	435	279	119	n.a.
1998	422	184	93	n.a.
1999	316	250	61	4,757
2000	379	248	63	4,403
2001	358	214	64	n.a.

Source: Inland Waterway Policemen Bureau

2) Accident-prone Areas

Inland waterway accidents have characteristics different from those of road accidents (usually occurring at a location or on a road section). After conducting surveys and investigations, VIWA put up a list of dangerous locations for inland waterway travel. They listed 43 bridges over rivers and 14 locations of sandbars where sand and pebbles are gathered as being dangerous. As of 2001, the list of dangerous locations decreased, 29 for roads and bridges over rivers and eight sandbars.

VIWA's data showed that on rivers managed by the central government, the number of accidents occurring in the north accounted for about 65% of the total inland waterway accidents, even though the quantity of inland waterway transport vessels in this area is only about 35% of the total. Two main causes are the fast current and complex channel conditions with the abundance of bridges. Another factor is the floods that occur in the north in the first and last quarters of the year. During these times, river currents are very strong, rendering control of vessels, especially those with unsafe conditions, difficult.
(Accident-prone areas on the main rivers managed by VIWA 2000-2001 see appendix 5.4.3)

3) Traffic Accident Causes[2]

Since, the Inland Waterway Law has not yet been issued, Government Decree No 40/CP on inland waterway transport safety, passed on May 7, 1996 has served as the legal basis for inland waterway transport and safety.
Although accidents occur in a variety of ways, the main causes can be identified as follows:

- Violation of rules on overtaking;
- Violation of channel rules;
- Lack of safety facilities for inland waterway transport vessels;
- Absence of driver's license;
- Overloading; and
- Others (i.e., bad weather, drunk pilots, etc.)

[2] See Appendix B5.4-2A, 5.4-2B for the main causes of accidents

Table 5.4.2
Inland Waterway Accidents by Cause

	Cause	Accidents	Rate (%)
	Total	286	100
1	Wrong overtaking	142	49.65
2	Navigation on wrong channel/route	18	6.30
3	Lack of safety facilities	11	3.84
4	No driving license	106	37.06
5	Overloading	15	5.24
6	Careless driving	78	27.17
7	Others, weather	9	3.15

Source: VIWA, based accidents on main rivers that managed by VIWA, 2000 and 2001

Further analysis of the main causes of inland waterway accidents resulted in the following:

(1) **Poor Management of Vessels and their Operation**

Poor Vessel Management: Inland waterway transport vessels rapidly increased from 1996-2001 both in number and type. However, the number of unregistered ships was around 20% of the total operating vessels.

In 2000, the Nam Dinh PTA estimated that there were about 300 unregistered inland waterway vessels with a tonnage of under 100 tons from a total of 987 units. The Quang Ninh PTA, on the other hand, estimated that they had about 200 unregistered vessels.

Current family-run inland waterway vessels number about 200,000 which is three times higher than the total number of registered inland waterway vessels. With different vessel types and weights operating all over the country, family-run vessels remain uncontrolled and not statistically assessed, a problem that needs to be solved in the coming time .

Lack of Control of Vessel Operators/Drivers: The MOT has regulations on getting a professional license or certificate and registering an inland waterway transport vessel. This task is assigned to the PTAs, which are responsible for checking and organizing the examinations for professional license or certificate at their localities. However, the fact remains that:

- The number of licensed captains of inland waterway vessels account for 49.5% compared to the registered number of inland waterway transport vessels (35,450/71,603). This means that more than 50% of captains/pilots do not have licenses.
- The ratio of ship captain (35,450) to chief of crew (8,162) is 4.3 to 1, while the ratio of sailor (4,624) to captain is 1 to 7.6. These figures,

however, do not correspond to the inland waterway fleet structure. Normally, each ship has one captain, one chief per crew and from 3 to 4 sailors, depending on the ship type.

Majority of captains and crew members learned to operate boats/ships through experience, meaning they are untrained and have no licenses. The number of such personnel has increased rapidly since the country's economy opened.

Overloading: Another cause of accidents is overloading. The need to make a profit often results in overloading. Vessels usually overload by 10-20% more than their loading capacity. They carry construction materials, gather sand and gravel in riverbeds and are not controllable at present. Overloaded vessels caused about 50% of the total traffic safety violations.

This is compounded by poorly skilled crew that cannot properly respond to emergency situations (i.e. engine stop, water overflows, strong waves, etc.), thereby resulting in mishaps. Irregular inspections and checks are insufficient to control the overloading problem. If inspectors are forced to conduct regular checks and inspections in ports, this situation will be limited.

Small boats running along rivers are usually overloaded, many boats transport 4-5 times heavier than the permitted loading capacity, resulting in sunk boats and many fatalities.

These are remaining problems for the management of controllers on inland waterway transport means, and also implicit of the inland waterway accidents that needs to be overcome in a short time.

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(2) Poor Management of Inland Waterway Channels

Channel Management Problems: As of September 2001, VIWA managed 6,314 km of rivers and channels, which accounted for about 60% of the total river length used for inland waterway transport. Most rivers and channels are operated under natural conditions and have not been improved or upgraded.

After each flooding season, many river and channel routes in the north and the south become silted, adding to the difficulties in inland waterway navigation. Silted waterways also cause accidents and require large amounts of money for dredging .

There is a lack of coordination between the construction of transport facilities, especially bridges, and the operation of inland waterway transport, resulting in limited navigational clearance. Further, many obstacles, among them houses along riverbanks (mainly in the south), fish traps, stevedoring areas, sunk ships, bridge piers, etc. have not been removed, decreasing navigability and limiting ship movements. Accidents caused by these obstacles are rather few, however. On the other hand, accidents usually occur in areas where the

distance between two bridges is short (for example, the channel between Long Bien Bridge and Chuong Duong Bridge in Hanoi).

Lack of Traffic Safety Facilities: Although investments in signals and navigation lights in recent years have been sufficient for the sections improved, these facilities have been installed only on about 30% of the total river length managed by the central government. Remaining river routes have not had signal and navigation lights installed. This means that inland waterways cannot be operated 24 hours, and navigational safety is not guaranteed.

(3) **Poor Quality of Inland Waterway Transport Vessels:** This problem has persisted for a long time. There are a great number of accidents caused by poor quality of ships/boats. A number of shipyards lack sufficient technical capabilities, meaning new ships still do not meet quality and safety standards. The technical examination of ships, especially small ships, is also not well implemented. Even though lifeboats are a must, they remain lacking in ships and passenger boats, aggravating the number of fatalities and injuries when accidents do happen.

(4) **Natural Calamity and Similar Factors:** In comparison with other transport subsectors (i.e., road and railway), inland waterway transport is more influenced by weather and natural calamities. Storms, floods, heavy jungle rains, and monsoon rains have caused a relatively high number of accidents.

There are other causes of inland waterway accidents. One of those is the public's low awareness and knowledge of inland waterway transport safety, and another is the weak execution of safety regulations on passenger routes along rivers. Other critical concerns are insufficient regulations and mechanisms, low effectiveness of regulations and laws, and lack of personnel to ensure strict execution of regulations and laws. Another is the lack of safety or warning signs along rivers which have not been installed due to limited resources.

Analyzing the causes of inland waterway accidents in the past five years, from 1996 to 2001, showed that:

- No accidents occurred because of a lack of signal or giving of false signals.
- 82% of Inland waterway accidents happened due to human errors (violation of overtaking principles, entering wrong channels, overloading and lack of safety facilities, driving without license, or drunk driving, etc.)
- 18% of accidents were caused by other factors such as nature, operation in unmanaged areas, etc.

5.5 Maritime Accidents[3] and Safety

1) General Situation

The number of accidents in the maritime sub-sector is relatively modest with an average of 100 accidents per year. However, maritime accidents have increased by 10-15% per year in recent years.

(1) **Classification of Accidents by Severity:** An analysis of 600 accidents from 1996 to 2001 showed that major accidents accounted for 23.5%, serious accidents 32.8% and minor accidents 37%. Human losses were relatively negligible, but property damage was severe. In some collisions, both vessels sunk, thousands of tons of cargo were damaged or hundreds of tons of oil were spilled into the sea, resulting in losses of tens of billion VND, environmental consequences and associated clear up costs.

Table 5.5.1
Maritime Accidents by Severity

Year	Total accidents	Serious		Major		Minor		Number	
		Accs.	%	Accs.	%	Accs.	%	Fatalities	Injuries
1996	115	30	26.0	41	35.6	44	38.4	21	11
1997	87	16	18.3	36	41.3	35	40.3	26	11
1998	84	23	27.3	21	25.0	40	47.6	21	14
1999	117	22	18.8	37	31.6	58	49.6	11	8
2000	120	23	19.1	36	30.0	61	50.8	12	13
9/2001	77	27	35.0	26	33.7	24	31.2	30	14
Total	600	141	23.5	197	32.8	222	37.0	121	71

Source: VINAMARINE

(2) **Classification of Accidents by Causes:** Survey data from 1996 to the present shows that the main cause of maritime accidents is ship/vessel captain's mistakes (52%), followed by the poor conditions of vessels (28.4%), and then inclement weather (14.4%).

Table 5.5.2
Maritime Accidents by Cause

Year	Total Accidents	Drivers		Ships/Vessels		Channels		Weather		Others	
		Number	%	Number	%	Number	%	Number	%	Number	%
1996	115	58	50,4	33	28,7	0	0	11	9,6	13	11,3
1997	87	29	33,3	34	39,0	0	0	24	27,6	0	0
1998	84	38	45,2	24	28,6	6	7,1	16	19,0	0	0
1999	117	64	54,7	40	34,2	1	0,8	12	10,2	0	0
2000	120	73	60,8	33	27,5	0	0	14	11,7	0	0
9/2001	77	50	65,0	6	7,8	0	0	9	11,8	12	15,6
Total	600	312	52	170	28,4	7	1	86	14,4	25	4,2

Source: VINAMARINE

[3] See Appendix B5.5-1(A)-B5.5-1(C) for maritime accidents by year

(3) **Classification of Accidents by Ship owner:** Domestic vessels were involved in about 68% of maritime accidents, with the main cause being their poor technical condition. Most accidents involving foreign vessels are sea collisions with Vietnamese fishing ships.

Table 5.5.3
Maritime Accidents by Ship owner

Year	Total Accidents	Domestic Vessels		Foreign Vessels	
		Number	%	Number	%
1996	115	92	80	23	20
1997	87	47	54	40	46
1998	84	62	74	22	26
1999	117	79	67	38	33
2000	120	77	64	43	36
9/2001	77	51	66	26	44
Total	600	408	68	192	32

Source: VINAMARINE

(4) **Classification of Accidents by Incident:** Out of the total number of maritime incidents, collisions took a high proportion of 31.5%, crashes in narrow channels or into reefs or running aground 16%, and mechanical failure 20.2%. This means, technical conditions of vessels should be controlled.

Table 5.5.4
Maritime Accidents by Incidents

Year	Accidents	Collision	Crash	Running Aground	Holed Hull	Fire	Explosion	Oil Spill	Natural Calamity	Mechanical Failure
1997	87	11	17	16	5	1		1	8	28
1998	84	24	18	18	5				4	15
1999	117	35	19	17	6		1	2	9	28
2000	120	49	16	12	8	1			14	20
9/2001	77	33	10	15		1		4	7	7
Total	485	152	80	78	24	3	1	7	42	98
Rate	100%	31.5	16.5	16.1	5.1	0.6	0	1.4	8.6	20.2

Source: VINAMARINE

(5) **Accident-prone Areas:** By analyzing 68 typical accidents, it can be seen that most accidents occurred at sea (53%), on channels (32%) and at ports (15%). Unlike road accidents maritime accidents did not happen at the same locations. Therefore, black spots do not exist. However, accidents do happen more often on narrow channels and on sections with fish traps.

Table 5.5.5
Accident-prone Locations of Maritime (*)

Year	Total	At Sea		On Channels		At Ports	
		Number	%	Number	%	Number	%
1996	9	4	44	2	22	3	33
1997	11	4	36	6	55	1	9
1998	8	6	75	2	25	0	0
1999	12	5	42	4	33	3	25
2000	14	9	64	4	29	1	7
9/2001	14	8	57	4	29	2	14
Total (1996-9/2001)	68	36	53	22	32	10	15

Source: VINAMARINE; (*) Analysed based on too serious accidents.

2) **Major Causes of Maritime Accidents:** Major causes of maritime accidents are as follows:

(1) **Human Error (captains/crews)**

a) The main cause of maritime accidents and incidents is human error. This cause occupies more than 50% of the total.

b) In some accidents, the ship's captain and crew chief did not strictly follow regulations on maritime safety and procedures on cabin watch; they seemed complacent and lacked industry and experience. This is a direct cause of maritime accidents and incidents.

c) When at sea, crews of small ships such as fishing boats, river ships, etc. do not follow lighting and signaling regulations strictly, as well as maritime regulations for sea vessels. Therefore, they become potential risks to large sea vessels. Several collisions were caused by this noncompliance with maritime regulations. Recently, collisions between ocean-going vessels and off-shore fishing boats have increased.

d) Captains of some small ships (those with low engine power or with a gross weight of <1,000 GT) are allowed to pilot their ships to/from ports. However, if they are not quite knowledgeable with the waterway, this may cause collisions and crashes with large vessels availing themselves of pilotage.

(2) **Unsafe Technical Conditions of Vessels:** This factor takes 28% of the total. The condition of such vessels are as follows

a) Small ships owned by local shipping companies are obsolete and have not been adequately repaired nor maintained.

b) Tugboats with low capacity and in poor technical condition are being used to aid vessels to/from ports resulting in some berth collisions.

c) In general, Vietnam's vessel fleet is small and in poor technical condition with outdated equipment, except for those newly purchased in recent years. Many vessels considered technically fit to sail on international sea

routes are detained for repairs when being checked at foreign ports. About 70-80% of the checked vessels have defects, out of which 30-40% have serious defects. Vietnam is one of the countries with the highest ship detention rate.

d) Currently, fendering systems are not adequate and lighting systems are not satisfactory at some wharves. If the entire length of berths and wharves are fully used, the regulated distance between vessels cannot be guaranteed. As a result, ships may collide with berths, creating holes in the vessel's hull and spilling oil into the harbor.

Table 5.5.6
Number of Checked and Detained Vietnamese Vessels

Category	1995	1996	1997	1998	1999	2000
Checked vessels/ships	39	51	55	62	45	46
Defective vessels	35	43	46	50	34	43
No. of times vessels were detained	11	28	22	9	8	15
Rate of ship detention (%)	28	55	40	15	18	33
Average rate of ships detained in ASEAN countries (%)	6	5.6	6.4	7.3	7.2	7

Source: VINAMARINE

(3) Obstacles on Channels

a) At present, many obstacles, such as submerged reefs, sunk ships/vessels, etc., have not been removed from some waterways. Although these obstacles have warning signs, they still create navigational difficulties and cause accidents.

b) Another imperative issue is the encroachment on ship channels and safety corridors of ship channels by fish traps. Due to ignorance or for livelihood or business reasons, fishermen deliberately place fish traps on ship channels, particularly on Pha Rung, Hai Thinh, Diem Dien, Vung Tau Thi Vai, Dinh An and Can Tho channels.

(4) Weather

a) Weather is an objective cause and it ranks third among the causes of maritime accidents, taking 8.6% of the total.

b) Vietnam is located in a region constantly visited by typhoons and natural calamities. In past years, severe sea weather adversely affected vessel navigation.

c) Bad weather and thick fog usually occur in January, February and March every year in the northern coastal region. Storms often affect vast areas from June to October every year. Many whirlwinds occur in the northern provinces. The number of maritime accidents greatly increases in the rainy and stormy season.

(5) Others

a) At present, organizations responsible for maritime accident detection and rescue are not equipped with special facilities and communication equipment which satisfy standards required for rescue operations. Hence, accident detection and rescue are not timely.

b) There is a lack of special equipment and facilities to remove oil spills. As a consequence, damage to the marine environment and other effects have not been properly addressed.

6 CASE STUDIES OF SELECTED AREAS

6.1 Road Accident and Safety in Urban areas

6.1.1 Hanoi City

1) General Situation

Hanoi is the capital, cultural, political and economic center of the Socialist Republic of Vietnam. It covers an area of 921 km^2, including seven urban districts with an area of 84.3 km^2 (Ba Dinh, Hoan Kiem, Dong Da, Hai Ba Trung, Tay Ho, Cau Giay, and Thanh Xuan) and four suburban districts with an area of 836.7 km^2 (Gia Lam,Tu Liem, Thanh Tri, and Dong Anh).

By 2000, Hanoi had a population of 2,736,400 with 1,581,300 living in the urban area and 1,155,100 in its suburbs. The average population density in Hanoi is 2,976 persons/km^2. Dong Da district had the highest density with 34,365 persons/km^2. Besides its permanent residents, many people from other provinces and cities settle in Hanoi without registration.

Hanoi's GDP in 1999 and 2000 was 17,654 billion VND and 19,108 billion VND (1994 price), respectively. The growth rate was from 7.5 to 8.15% per year. Hanoi is one of the cities with high average incomes (i.e. Ho Chi Minh city, Ba Ria-Vung Tau, etc.) compared to other cities in Vietnam.

2) Road Transport Infrastructure

Hanoi has a total road length of more than 1,100 km, with 330 km in the urban area and 800 km in the suburbs, reaching 1.20 km per km^2. 100% of its roads are paved with bitumen. In addition, Hanoi is the hub of national railway lines (five railway lines) with a total length of 91 km passing Hanoi. There are four river ports belonging to the Hong river system and Duong river system. It also has the Noi Bai international airport.

The road network is composed of the following:

(1) **External Arterial Roads**: External roads: NR 5, 18, 3, 2, 32, 6, and the Lang-Hoa Lac Highway create radial roads linking Hanoi with neighboring cities and provinces. NR 5, 18, 1, and the Lang-Hoa Lac Highway have been widened or constructed with bypasses with 4-6 lanes. The other national roads are operated in their current conditions.

(2) **Ring Roads**: The important ring roads are:

Ring Road I: This road is 23 km long, starting from Tran Khat Chan – Dai Co Viet – La Thanh – De La Thanh – Buoi Road - Lac Long Quan – dyke on the

right of Hong River – Tran Khat Chan. The sections of Tran Khat Chan, Dai Co Viet, Kim Lien, and the dyke on the right of Hong River were upgraded into a 2-3-lane roads. The other sections are still very narrow, especially the Kim Lien and La Thanh sections.

Ring Road II: This road has a length of 38.4 km. It starts from Minh Khai slope to Truong Chinh – Nga Tu Vong (Vong crossroad) – Nga Tu So (So crossroad) – Lang road Cau Giay – Buoi - Lac Long Quan and ends at Nhat Tan dyke. At present, this ring road is still very narrow with only 1-2 lanes and has not been upgraded.

Ring Road III: This road has a length of 69 km, from North Thang Long to Noi Bai airport - Mai Dich – Thanh Xuan – Phap Van – Thanh Tri bridge – Sai Dong – New Duong bridge – Ninh Hiep – Dong Xuan junction (intersection with Noi Bai and Bac Ninh) – North Thang Long to Noi Bai. So far, only the Noi Bai – Mai Dich section (21 km) has been converted into a 4-lane road. The other sections are under construction pursuant to the 2001- 2005 plan.

(3) **Inner Urban Road Network:** Inner Urban roads have a total length of 340 km, with a pavement area of 5.25 km^2 The average road density is very low, reaching only 4.0 km road/km^2 and 0.19 km road/1000 residents in the inner city. The main arterial roads include:

(1) Giai Phong – Le Duan;

(2) Nguyen Trai – Nguyen Luong Bang – Ton Duc Thang;

(3) Cau Giay – Kim Ma – Nguyen Thai Hoc – Trang Thi;

(4) Doi Can – Le Hong Phong – Dien Bien Phu;

(5) Hoang Hoa Tham – Phan Dinh Phung;

(6) Truong Chinh – Bach Mai – Pho Hue;

(7) Nguyen Van Cu – Chuong Duong bridge.

Most of these roads have been upgraded to 2-3 lanes.

(4) **Intersections:** Hanoi has 580 intersections and junctions of which the majority are level crossings (except the south intersection of Chuong Duong Bridge), and they have not been upgraded nor widened. About 150 are equipped with traffic lights.

(5) **Bus Terminals:** The total area of bus terminals in Hanoi is 89,700 m^2, of which three inter-provincial and one adjacent terminals, i.e. Gia Lam, Kim Ma, Giap Bat, Long Bien, have an area of ~59,700 m^2.

3) Transport Vehicles

By the end of 2001, there were 103,748 automobiles of various models in Hanoi, with an annual increase rate of 7.29%. By the same period, there were 951,103 motorcycles, with an annual increase rate of 21.01%.

Table 6.1.1.1
Number of Motorized Vehicles in Hanoi

Year	Automobile	Increase from Previous Year (%)	Motorcycle	Increase from Previous Year (%)	Total	Increase from Previous Year (%)
1995	60,231	14.65	498,468	18.58	558,699	18.14
1996	70,880	17.68	570,544	14.46	641,424	14.81
1997	86,436	21.95	626,565	9.82	713,001	11.16
1998	89,513	3.56	602,615	-3.82	692,128	-2.93
1999	92,355	3.17	666,672	10.63	759,027	9.67
2000	96,697	4.70	785,969	17.89	882,666	16.29
2001	103,748	7.29	951,103	21.01	1,054651	19.48

Source: Transport Safety Board, Hanoi TUPWS.

4) Traffic Demand and Volume

The travel demand forecast for this year was estimated at 600 million passengers/year. This is comprised of 1.5% for pedestrians, 30% for bicycles, 61% for motorcycles, 2.8% for cars, 3% for buses and 1.2% for other travel modes in Hanoi.

Actual figures for travel in Hanoi showed that demand for public transport services was lower. Hanoi residents mainly use motorcycles as their daily transport vehicles (more than 95%). Traffic volume is very great at some cross-sections such as Giai Phong, Kham Thien, Hang Bot, Truong Chinh, Bach Mai, and etc. Many intersections, such as Nga Tu So (So crossroad), Nga Tu Vong (Vong crossroad), Cau Giay, and Kim Lien, have great traffic volume.

In 2000, transport volumes to/from Hanoi were 7.629 million tons, 802,000 tons, 3,093 tons and 15,000 tons by Road, Inland waterway, Railway and Aviation, respectively. And transport volume via Hanoi accounted for 1.53 million tons, 320,000 tons and 1.2 million tons by Road, Inland waterway and Railway, respectively.

5) Traffic Accident Situation

Statistics from 1995 to 1999 showed an average of seven accidents per day in Hanoi, resulting in one fatality and eight injuries. The number of traffic accidents in the capital did not increase compared to other provinces. Since 2000, although the number of accidents has decreased, fatalities have increased at a rate of 21-23% per annum. More serious accidents also occurred.

The number of accidents per 1000 persons (2001 data) was higher, while the number of accidents per 1000 motorized vehicles was lower than the average for the whole country.

- In Hanoi: 0.73 accident/1000 persons; 2.12 accidents/1000 motorized vehicles
- In the whole country: 0.32 accident/1000 persons; 3.01 accidents/1000 motorized vehicles

Table 6.1.1.2
Road Traffic Accidents in Hanoi

Year	Accidents		Fatalities		Injuries	
	Number	Increase/ Decrease from Previous Year (%)	Number	Increase/ Decrease from Previous Year (%)	Number	Increase/ Decrease from Previous Year (%)
1995	2,094	219.2	325	9.4	2,114	372.9
1996	3,517	68.0	353	8.6	3,727	76.3
1997	2,917	-17.1	284	- 19.5	3,201	- 14.1
1998	2,496	-14.4	283	- 0.4	2,976	- 7.0
1999	2,494	- 0.1	291	2.8	2,856	- 4.0
2000	2,054	- 17.6	351	20.6	2,687	- 6.0
11/2001	2,001	- 2.6	432	23.1	2,018	- 25.0

Source: Transport Safety Board, Hanoi TUPWS.

6) Accident-prone Locations

Statistics and observations by the Hanoi TUPWS and the Traffic Warden Office of the Hanoi Municipal Police, since 1998 showed that there were about 42 places where accidents often occurred (black spots), as shown in Table 6.1.1.3 and Figure 6.1.1.1

Most accidents occurred in Nguyen Van Cu and Dinh Tien Hoang, at Chuong Duong Bridge and Long Bien Bridge. These were attributed to the following reasons and causes:

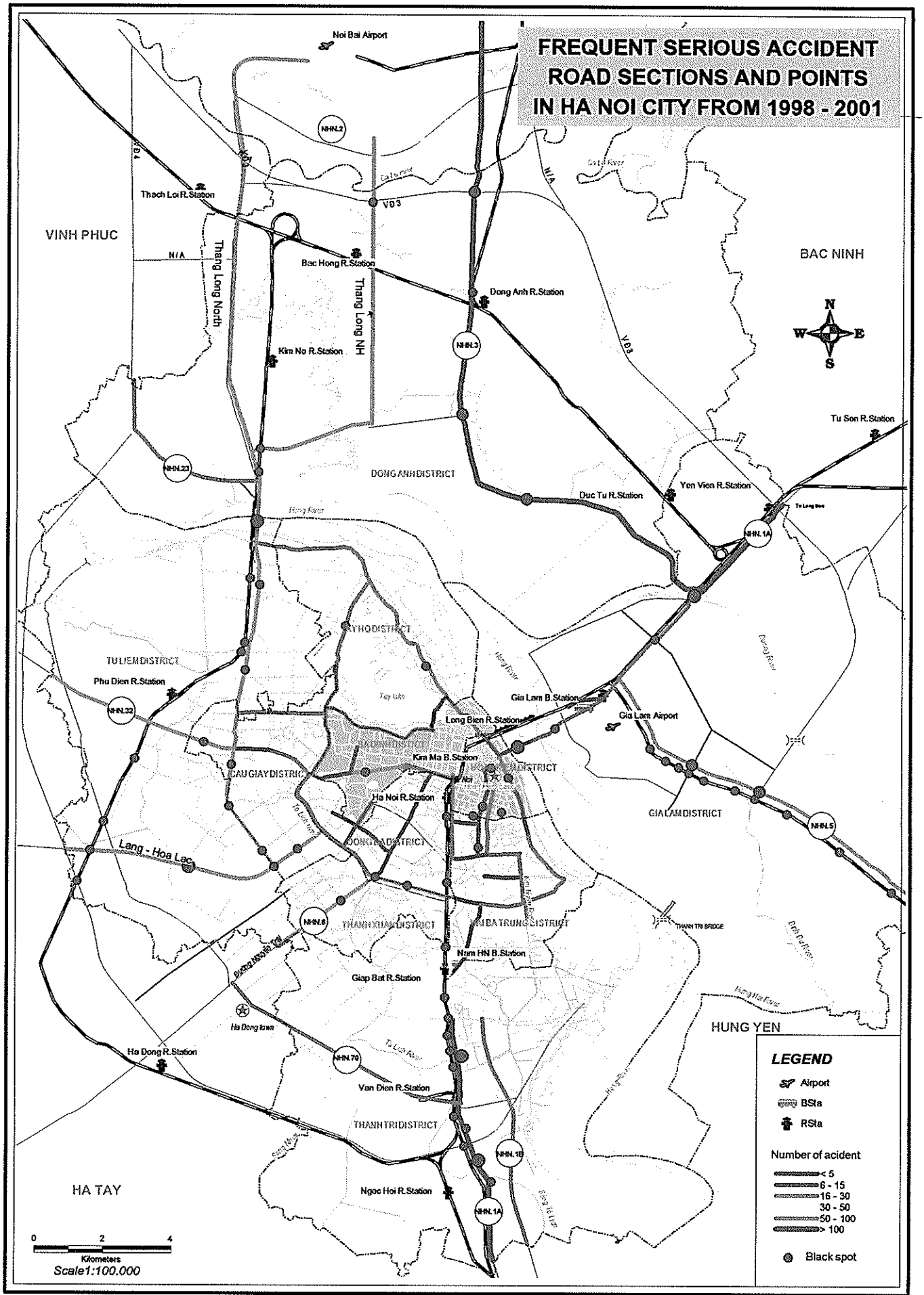
- Abundance of branch roads in densely areas, careless turning to main roads, speeding vehicles on axial roads;
- Vehicles moving on Chuong Duong Bridge usually did not follow required safety-distance intervals causing pile-ups;
- On Thang Long Bridge, most vehicles usually encroached on opposite lanes, did not follow traffic laws and drove in the wrong direction at high speed, causing serious accidents; and
- At T-junctions and crossroads, drivers drove carelessly and speedily, causing mishaps.

Table 6.1.1.3
Accident-prone Locations in Hanoi, 1998-1999

No	Locations	1998			1999		
		Major	Fatal	Minor	Major	Fatal	Minor
1	Au Co Road	1	1	15	2	2	12
2	Lac Long Quan Road	1	1	13	2	2	6
3	North Thang Long- Co Nhue	2	2	3	2	2	7
4	North Thang Long – Xuan Dinh	1	1	7	1	1	5
5	National Road No. 5 – Garment 10 Co.	3	3	1	1	1	9
6	National Road No. 5 – Sai Dong	2	3	3	2	2	11
7	National Road No. 5 – Chau Quy	2	2	0	1	1	12
8	National Road No. 1 – Cau Chui roundabout	2	2	0	1	1	4
9	Tran Khanh Du – Bac Co slope	1	1	0	1	1	6
10	South Thang Long – National Road No. 32	1	1	2	1	1	0
11	National Road No. 1- Doc La	0	0	1	2	2	2
12	North Thang Long – Nam Hong	1	1	9	1	1	4
13	North Thang Long ticket checking station	2	2	3	0	0	2
14	Cau Bay – Gia Lam railway section	1	2	0	2	2	0
15	Tran Hung Dao – Ba Trieu	0		7	2	2	5
16	South Duong Bridge	2	2	7	0	0	5
17	Vong crossroad	2	2	7	0	0	3
18	National Road No. 23 turning to Phu Thuong	2	2	2	0	0	1
19	National Road No. 5 - Gia Lam airport	0	0	0	2	2	5
20	Tran Quang Khai – Petrol Station	1	1	7	0	0	5
21	Dinh Tien Hoang – Tran Nguyen Han	0	0	8	1	1	5
22	Tran Quang Khai – Tran Nguyen Han	0	0	4	1	1	5
23	National Road No. 6 – Kim Giang	1	1	3	0	0	5
24	National Road No. 6 – Thang Long tobacco factory	0	0	2	1	1	3
25	Tran Hung Dao – Phan Chu Trinh	1	1	3	0	0	5
26	Tran Nhat Duat – O Quan Truong	1	1	2	0	0	4
27	Former rice warehouse – Truong Chinh	1	1	6		0	1
28	Ly Thai To (some spots)	1	1	5	1	1	0
29	Thang Long bridge	2	2	8	2	6	7
30	North Thang Long – National Road No. 2 (improved)	1	5	9	1	1	5
31	National Road No. 1, Km 8+400, 500; Km 7 + 800	2	3	0	2	2	1
32	National Road No. 32, Km 8+600, 700, 800, 900	1	1	1	2	2	0
33	Le Thai To (some spots) at houses no. 16, 2, 14, 34, 14, 46, 40, 14	1	1	9	1	1	5
34	Nguyen Van Cu (some spots) at alleys 1, 90, 98, 64,27, 105, 5, 27, 40, 143, 31	2	2	3	0	0	10
35	Dinh Tien Hoang (some spots) at Houses No 39, 33, 25, 75, 78, 5,65, 61, 79, 89	3	3	12	3	3	9
36	Ba Trieu (some spots) at House 43, 54, 62, 70, 45, 24, 27, 63, 62, 53, 60, 139, 48, 63	1	1	5	0	0	10
37	Dinh Tien Hoang – Hang Dau	0	0	6	0	0	9
38	Tran Hung Dao – Quang Trung	0	0	5	0	0	7
39	25 Phan Dinh Phung	0	0	6	0	0	4
40	Chuong Duong Bridge	0	0	31	1	1	24
41	National Road No. 3, Km 19+0, 600, 800	1	1	0	2	2	0
42	National Road No. 3, Km 1+800	0	0	1	2	2	1

Source: Transport Safety Department - Hanoi Transport Urban Public Works Service
Note: 2000 and 2001 data not available.

Figure 6.1.1.1
Accidents-prone locations in Hanoi, 1998 - 2001



7) Causes of Traffic Accidents

Overall Characteristics in Hanoi: Recent statistics in Hanoi have attributed the main causes of traffic accidents to the following:

- Weak execution of traffic laws by some people;
- Misuse of dedicated lanes by road users;
- Use of carriageways and sidewalks for public market use and business or for storing construction materials thus obstructing traffic and spoiling the city's beautiful street scenery;
- Poor transport system, land area for transport is less than 8% of city area;
- The road system is distributed unequally among urban districts, with those more than 15 m in width accounting for less than 45% and many road and railway crossings being mainly level crossings;
- High annual average growth rate of motorized vehicles, 12% for automobiles and 15% for motorcycles; and
- Irregular inspection and enforcement of traffic laws and regulations.

Causes of Traffic Accidents at 42 Black Spots in the City

Statistics on and investigation of 42 black spots by the TUPWS and the Hanoi Traffic Police show that the characteristics of these locations are as follows:

- In some locations, accidents happen at normal traffic density; time of accidents is changeable and do not follow a pattern;
- Speeding is the key cause of traffic accidents;
- Main causes of traffic accidents at these black spots are: speeding (54.76%), dangerous overtaking and lack of observation (28.57%), traveling in the wrong lane and encroaching on dedicated lanes (9.52%), wrong turning and poor road observation (7.14%);
- Accidents at traffic intersections account for more than 50% of total accident number; accident-causing objects are mainly motorcycles; driver's age – 18-34 years old (35%), 35-45 years old (21%), older than 45 years (14%).

The causes of serious traffic accidents are further analyzed as shown in Table 6.1.4. The number of serious traffic accidents in the period 1998-2001 was 1,292. Offenders were automobiles (37.5%), motorcycles (54.5%), other motorized vehicles (1%), non-motorized vehicles (1.93%), and pedestrians (5.1%). The details are in the table below.

Table 6.1.1.4
Causes of Serious Traffic Accidents, 1998-2001

Offender	Serious Traffic Accidents		%		
	Reason	Number			
Automobiles	Speeding	47	3.63	37.5	9.69
	Driving in wrong direction	99	7.65		20.42
	Overtaking	71	5.49		14.65
	Careless turning	30	2.32		6.19
	Others	237	18.30		48.84
	No safety equipment	1	0.08		0.21
	Subtotal	485			100.00
Motorcycles	Speeding	93	7.19	54.5	13.19
	Driving in wrong direction	114	8.81		16.17
	Overtaking	56	4.33		7.94
	Careless turning	41	3.17		5.82
	Others	401	31.00		56.88
	Subtotal	705			100.00
Other Motorized Vehicles	Speeding	0	0.00	1	0.00
	Driving in wrong direction	2	0.15		15.15
	Overtaking	2	0.15		15.15
	Careless turning	2	0.15		15.15
	Others	7	0.54		54.55
	Subtotal	13			100.00
Nonmotorized Vehicles	Driving in wrong direction	9	0.70	1.93	39.33
	Overtaking	3	0.23		12.92
	Crossing railway	6	0.46		25.84
	Careless turning	5	0.39		21.91
	Subtotal	23			100.00
Pedestrians	Crossing roads	45	3.48	5.1	68.10
	Jumping to get off bus	1	0.08		1.57
	Crossing railway	20	1.55		30.33
	Others	0	0.00		0.00
	Subtotal	66			100.00
Total		1,292		100	

Source: Transport Safety Board, Hanoi TUPWS.

6.1.2 Ho Chi Minh City

1) General Situation

HCMC covers a 2,095,01 km^2 area and consists of 17 prefectures, five districts and 303 quarters/villages. Its urban area is 440 km^2 while its rural area is 1,653.7 km^2. The city's population was 5.2 million at the end of 2000, with the urban

population at 4.25 million and the rural population at approximately 1 million. HCMC is one of the biggest cities in the ASEAN region.

HCMC's average population density is 2.467 persons/km^2. Urban prefectures (i.e. Phu Nhuan Prefecture, and Prefecture No. 3, 4, 5, 6, 10, 11) have a high population density of 30,000 to 40,000 persons/km^2. Its population growth is 1.31% per year. However, the growth of immigrants from other provinces is increasing rapidly.

The city's average GDP was VND 47,995 billion in 1999 and VND 52,860 billion in 2000 at 1994 prices. The economic structure is made up of construction/industry (1999: VND 20,313 billion, 42.32.%; 2000: VND 23,370 billion, 44.21%), agriculture/forestry/fishery (VND 1,125 billion, 2.34%; VND 1165 billion, 2.20%), and service sectors (VND 26,557 billion, 55.33%; VND 28,325 billion, 53.58%). Annual growth rate is 8.7%, making it one of the cities with a high average income in Vietnam. (*Source: HCM satistical yearbook 2000).*

2) Road Transport Infrastructure

The city's total road length is merely 2,221 km, with an average of 1.06 km of roads/km^2. The central areas have a high road density (i.e., Prefecture No. 1, 3, 5, and 6 have an average of about 9 km/km^2). Road density is low in the suburbs. The majority of city roads are paved.

HCMC has more than 1,200 km of rivers and channels, with 234 routes spread over 21 out of 22 prefectures and districts. However, its river and channel system is silted and encroached on. At present, it has two passenger ports but these are not adequately invested. Also, many bridges have insufficient vertical clearance.

HCMC is the end point of the North-South railway line, with Binh Trieu and Hoa Hung serving as the final stations. The length of the railway system going through the city is 14.55 km using a single track with a 1,000 mm gauge. There are 19 road and railway crossings, most of which are level crossings. Of these, 13 crossings have barriers, four have none and two are level-separated.

HCMC's road network is classified as follows:

(1) **External Arterial Roads:** Outer roads linking adjoining cities and towns are NR 1, 13, 22, 50, and Inter-provincial Road 25. Some of the national roads were already upgraded (i.e., NR 1 and 13) and others are being upgraded and widened (i.e., NR 22, NR 25, etc.)

(2) **Ring Roads:** There are two ring roads

Inner Ring Road: The inner ring roads have a length of about 41 km, starting from Binh Thai intersection – Kha Van Can road – Binh Loi bridge – Truong

Son Road – Hoang Van Thu Road – Vo Thanh Trang Road – Huong Lo 12 – Binh Thuan Road – Phu My bridge – Binh Thuan intersection (at present, 16 km of the East RR 1 are missing) and the Phu My bridge over Sai Gon River should be built.

Outer Ring Road: The outer ring road has a length of about 72km, starting from Thu Duc Junction – An Suong – An Lac – Binh Thuan road – Phu My bridge to Thu Duc Junction. At present, it has 58km of length under construction.

(3) **Inner-urban Road Network:** This includes two major radial axes (north-south axis, 28 km, and east-west axis, 22 km) and other main roads but excluding national roads. Its total length is about 544 km but is not equally distributed. The inner-urban area of the former Sai Gon City has a relatively high road density, at 9.86 km/km^2 and 2.98 m^2/person in Prefecture No. 1 and 12.9 km/km^2 and 2.17 m^2/person in Prefecture No. 5. On the other hand, the newly developed inner-urban area of Go Vap Prefecture has a low road density of 1.89 km/km^2 and 0.86 m^2/person.

(4) **Intersections:** Currently, Ho Chi Minh City has 1,350 intersections, ranging from T-junctions to seven-arm intersections. All intersections are level crossings, with low traffic circulation. Only 250 junctions in the center and 40 junctions in the suburbs are equipped with traffic lights. Junctions are still narrow at city gateways.

(5) **Bus Terminals:** The total area of the inner-urban and inter-provincial terminals is 250,000 m^2.

3) Transport Vehicles

By the end of 2001, the city had a total of 2,113,279 vehicles. Out of these were 144,407 automobiles, 1,968,872 motorcycles, and about 32,622 non-motorized and motorized pedicabs. Growth rate is high, especially of motorcycles.

Table 6.1.2.1
Number of Motorized Vehicles in Ho Chi Minh City

Year	Automobile	Increase from Previous Year (%)	Motorcycle	Increase from Previous Year (%)	Total	Increase from Previous Year (%)
1996	96,366	n.a.	1,055,910	n.a.	1,152,276	n.a.
1997	113,545	17.83	1,279,815	21.20	1,393,360	20.92
1998	118,369	4.25	1,333,836	4.22	1,452,205	4.22
1999	123,411	4.26	1,681,760	26.08	1,805,171	24.31
2000	131,182	6.30	1,899,861	12.97	2,031,043	12.51
2001	144,407	10.08	1,968,872	3.63	2,113,279	4.05

Source: Road and Railway traffic police Bureau.

4) Traffic Demand and Volume

Traffic demand is high, with an estimated 2.8-3.4 billion frequencies/annum. Traffic structure consists of public passenger transport (2-5%), motorcycles (50-60%) and bicycles (25-35%).

Although traffic demand is high in HCMC, public transport contributes only a low traffic volume. Residents usually use motorcycles in commuting. Traffic volume is very large in some T-junctions and crossroads, such as Cach Mang Thang 8 Road, Nguyen Van Troi Road and Xo Viet Nghe Tinh Road. The freight volume to and from the city is also very high because HCMC is a goods import-export hub.

In 2000, transport volumes to/from HCMC were 17.263 million tons, 192.173 million passengers by road; 2.695million tons, 5.438 million passengers by inland waterway; 5.907 million tons by sea; and 0.056 million tons, 1.792 million passengers by air. *(Source: HCM statistical yearbook 2000)*

5) Traffic Accident Situation

Statistics from 1996 to 2001 showed that an average of seven traffic accidents occurred daily, causing two fatalities and 7-8 injuries in HCMC. Based on 2001 data, the city had an accident rate of 0.48 accidents/1,000 persons and 0.6 accidents/1,000 motorized vehicles compared to the country's average of 0.32 accidents/1,000 persons and 3.01 accidents/1,000 motorized vehicles.

Table 6.1.2.2
Road Accidents in Ho Chi Minh City

Year	Accidents		Fatalities	Injuries (person)		
	Total No.	Major[1]	(person)	Total No.	Serious[1]	Minor[1]
1996	1,749	39	653	2,049	1,388	661
1997	1,765	34	871	2,080	1,460	620
1998	2,259	46	910	2,435	1,832	603
1999	2,418	45	912	2,657	2,026	631
2000	2,299	42	929	2,506	1,863	643
2001	2,519	68	1,224	2,738	1,941	797
1996-2001	13,009	274	5,499	14,465	10,510	3,955

Source: Road Traffic Police Office, HCMC. [1] Refer to Box 5.2.1 (page 32)

6) Accident-prone Locations (Black Spots)

Data from the TUPWS and the city's Traffic Police Office showed that:

- Accidents happened 85-95% on straight road sections and 4-16% on intersections;
- Accidents happened 60-65% on inner-urban roads, 6-10% on inter-provincial roads, 22-25% on national roads, and 1.5-2% on rural roads;
- Of the accidents at intersections, 70-90% happened at those with no form of traffic control;

Further details on black spots are shown in Table 6.1.2.3. and Figure 6.1.2.1.

7) Causes of Traffic Accidents

Local traffic accident statistic showed that the main cause of accidents was violation of traffic rules by drivers of motorized vehicles (92.8%), of which speeding accounted for 25%, dangerous overtaking 28%, using unsafe vehicles 1%, and disregarding traffic warnings by drivers of non-motorized transport 3.5%. Causes are shown in Table 6.1.2.4 and can be summarized as follows:

- Drivers' poor awareness of safety and bad driving attitude;
- Weak execution of traffic safety laws and regulations by road users;
- Misuse of dedicated lanes by road users;
- Illegal use of carriageways and sidewalks as public market and for business or storing construction materials thus obstructing traffic and spoiling the city's otherwise beautiful street scenery;
- Poor transport system.
- High average growth rate of motorized vehicles; and
- Inconsistent examination of vehicles and enforcement of traffic laws and regulations.

Table 6.1.2.3
Accident-prone Locations in Ho Chi Minh City

N°	Road Name	Accident		Fatality		Injury		Damage	
		2000	2001	2000	2001	2000	2001	2000	2001
	Urban Road :								
1	Nguyen Hue	3	1	0	0	4	1	4	2
2	Le Loi	0	3	0	1	0	2	0	4
3	Ham Nghi	1	2	1	0	0	2	1	4
4	Dong Khoi	2	1	0	0	5	1	3	1
5	Le Duan	3	1	0	0	3	2	1	2
6	Ton Duc Thang	12	13	6	6	15	14	15	20
7	Dinh Tien Hoang	7	8	0	3	12	10	6	12
8	Pasteur	1	0	0	0	2	0	2	0
9	Nam Ky Khoi Nghia	7	5	3	3	11	4	12	10
10	Nguyen Van Troi	12	8	1	1	14	11	18	16
11	Truong Son	0	8	0	2	0	10	0	9
12	Cong Hoa	16	13	9	10	17	9	24	17
13	Nguyen Thi Minh Khai	14	16	4	8	16	10	24	22
14	Xo Viet Nghe Tinh	30	15	8	7	26	12	31	20
15	Tran Hung Dao	20	24	9	10	29	31	30	36
16	An Duong Vuong	9	17	2	6	12	20	11	20
17	Hung Vuong	26	13	10	8	33	14	33	5
18	Dien Bien Phu	41	76	16	26	40	77	47	92
19	Vo Thi Sau	5	7	2	5	3	5	7	10
20	3 Thang 2	5	32	1	12	4	43	7	39
21	Bach Dang	9	16	3	7	11	21	13	22
22	Phan Dang Luu	16	11	5	2	13	12	19	16
23	Hoang Van Thu	22	19	10	9	21	14	34	28
24	Ly Thuong Kiet	26	25	7	8	24	34	31	36
25	Hai Ba Trung	9	9	4	5	12	7	14	14
26	Phan Dinh Phung	2	4	1	2	1	3	1	5
27	CMT8	17	16	6	5	15	17	17	20
	Truong Chinh		60		26		59		77
28	Nguyen Bieu	19	0	10	0	23	0	23	0
29	Tran Phu	5	0	2	0	6	0	6	0
30	Ly Thai To	1	7		2	1	7	2	8
31	Nguyen Van Cu	5	6	1	2	6	7	7	9
32	Truong Dinh	0	1	0	0	0	1	0	2
33	Nguyen Dinh Chieu	3	2	2	1	1	1	3	2
34	Tran Quoc Thao	2	2	1	1	2	2	2	2
35	Ly Chinh Thang	2	3	2	2	1	1	4	2
36	Nguyen Chi Thanh	4	6	2	3	4	13	7	11
37	Nguyen Tri Phuong	8	11	2	1	8	14	13	17
	Subtotal	364	461	130	184	395	491	472	612
	National Road:								
38	Hanoi road (NR52)	67	81	36	30	40	81	82	101
39	NH N°1	322	330	145	175	323	301	381	422
40	NH N°22	152	116	52	74	190	140	200	179
41	NH N°13	39	39	26	23	38	39	49	52
42	South of Saigon (Nguyen Van Linh)	13	9	9	10	10	9	16	12
	Subtotal	593	575	268	312	601	570	728	766
	Total	957	1036	398	496	996	1061	1200	1378

Source: HCM City Road Traffic Police

Figure 6.1.2-1
Accidents-prone locations in Ho Chi Minh City, 2000 - 2001

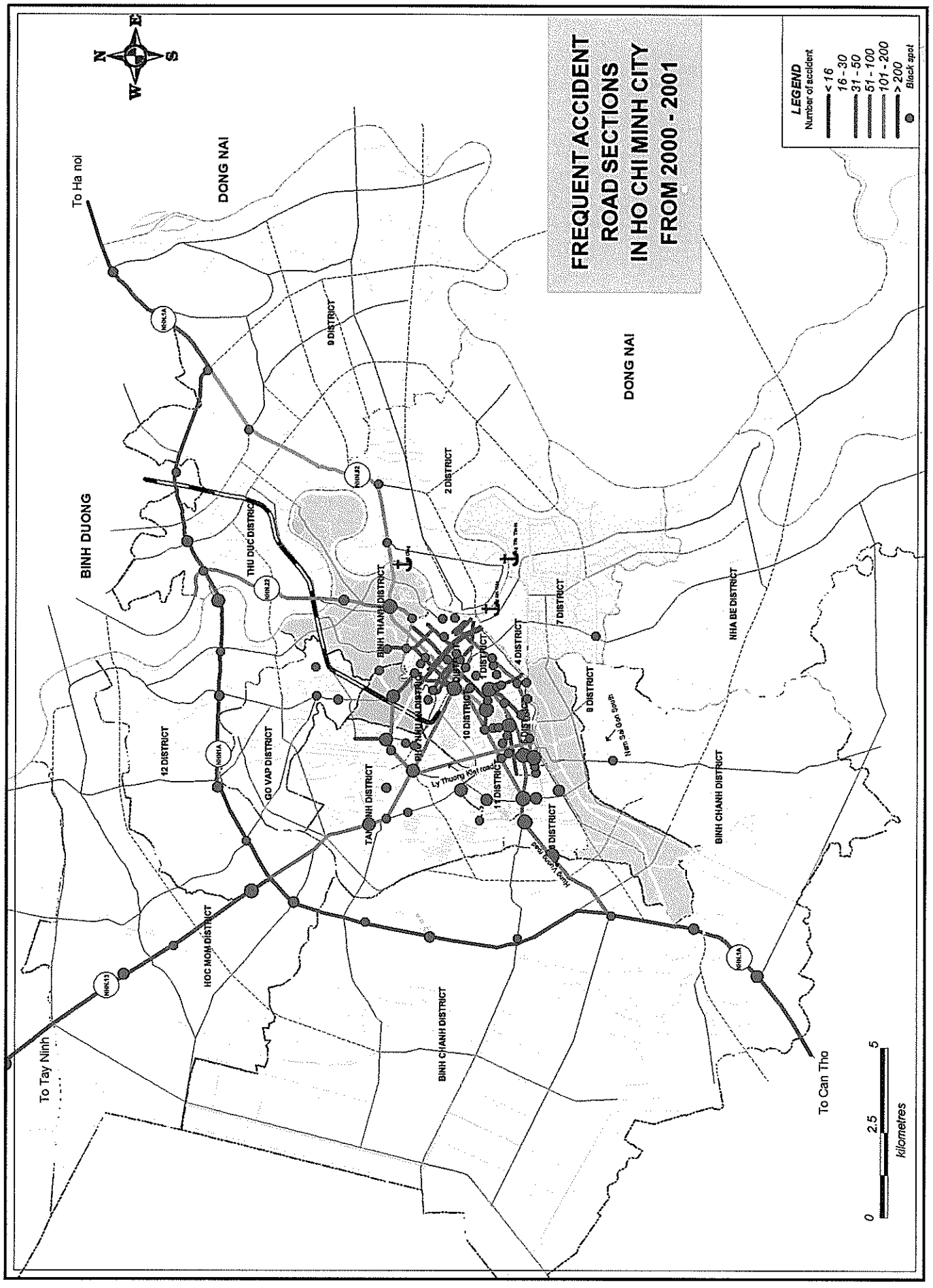


Table 6.1.2.4
Causes of Serious Road Accidents in Ho Chi Minh City

No.	Causes[1]	Rate (%)
1	Motorized vehicle drivers	92.88
1.1	No control of speed	25.06
1.2	Not giving way	5.11
1.3	Driving on wrong lane	1.50
1.4	Encroachment on lanes	27.87
1.5	Not keeping a safety distance	9.44
1.6	Careless turning	9.12
1.7	Entering prohibited roads, driving in wrong direction	1.41
1.8	Drunk driving	3.54
1.9	No driving license	0.87
1.10	Self-inflicted accident	4.25
1.11	Others	4.71
2	Unsafe vehicles	0.71
3	Non-motorized vehicle drivers	3.36
4	Pedestrians	2.99
5	Roads	0.05
6	Others	0.02
	Total	100.00

Source: Road Traffic Police Office, HCMC.
[1] 10,488 cases of accidents were analyzed.

6.1.3 Solutions to Reduce Traffic Accidents in Hanoi and Hochiminh City

Some solutions to reduce traffic accidents are as follows:

(1) **Education and Information Dissemination of Traffic Laws and Regulations**

a) Effecting an information campaign on traffic laws and regulations through mass media such as newspapers, Central and local Government radio stations and television networks;

b) Cooperating with the Department of Education and Training in organizing extra information dissemination of traffic laws and rules in schools, colleges and universities in the city;

c) Using mobile vehicles in broadcasting traffic laws and regulations;

d) Cooperating with related agencies in holding "safe driver" training courses and driving skills tests so as to screen and improve driver's competency at local and city levels;

e) Placing warning signs at black spots; and

f) Setting up volunteer youth teams, using students as core force to control traffic in the city.

(2) **Promotion of Traffic Safety**

a) Encouraging households along roads not to violate rules of the traffic corridor;

b) Fining persons violating safety rules of the traffic corridor; and

c) Relocating businesses and households along streets and roads

(3) **Management of Vehicles and Drivers**

a) Facilitating learning and examinations for driver's licenses; and

b) Strengthening the supervision and control of driver training schools.

(4) **Control, Patrol of and Sanction against Traffic Safety Violators**

a) Strengthening patrols and traffic control, especially during festivals and holidays; and

b) Strengthening inspections of vehicle weight at examination stations and police stations.

(5) **Reasonable Traffic Management on Axial Roads and at Traffic Junctions**

a) Placing signals and signs;

b) Installing traffic lights at junctions and a camera system to monitor traffic situations at high-density traffic junctions, and constructing a Traffic Operation Center;

c) Separating traffic flows and lanes and increasing the number of one-way roads on narrow roads;

d) Installing rumble strips;

e) Organizing inner-urban traffic by installing central reservations and strips on wider roads; and

f) Strengthening traffic police capacity (in terms of manpower, equipment, facilities, etc.) so as to ensure traffic safety and order.

(6) **Construction and Improvement of Road Infrastructure**

a) Removing black spots (by improving sight distance, installing traffic signs and signals, clearing carriageway and sidewalk obstacles, and painting road markings);

b) Widening traffic junctions, constructing and completing the improvements of roads such as ring road No.1, 2 and 3, radial roads to the city center, inner-city roads etc. Footbridges should be constructed across busy roads for pedestrians. The total estimated capital for the construction of

transport infrastructure to provide these improvements in Hanoi and Hochiminh city is VND 53,653 billion for the period 2001-2005.

c) Reorganizing and strengthening traffic management to assure traffic safety and order; educating people; ensuring the optimal operation of the existing transport network

6.2 Road Accident and Safety in Vinh Phuc Province

1) General Situation

Vinh Phuc province is located to the northwest of Hanoi. Vinh Yen town, which is 64 km from Hanoi, is the province's cultural and political center. Apart from Vinh Yen town, the province has six districts (Lap Thach, Tam Duong, Binh Xuyen, Vinh Tuong, Yen Lac, and Me Linh). It has a total area of 1,371 km^2, a population of 1,103,000 and an average population density of 804 persons/km^2 (see Figure 6.3.1).

In 2000, Vinh Phuc's GDP reached VND 4,183 billion (at current price). Revenues from the construction/industry sector was VND 1,690 billion which accounted for the highest portion of 40.40%. Meanwhile, the agriculture, forestry and fishery sector earned VND 1,045 billion, representing 24.98% and the service sector made VND 1,448 billion, for 34.61%. Its 1997-2000 growth rate was remarkably high, amounting to 17.3%.

2) Road Conditions

The total road length in Vinh Phuc province is 3,404 km. The length of national roads is 109 km (3.2%), provincial roads 245.2 km (7.2%), district roads 288.9 km (8.5%), and village/commune roads 2761 km (81.1%).

Regarding road quality, 82% of national roads, 60% of provincial roads and 25% of rural roads (including district, village and commune roads) have been paved with bitumen or cement concrete. Vinh Phuc province has a good rural transport road development. In fact, it received the Emulation Flag on Rural Transport Concrete and Development Movement from Vietnam's President in 2000.

Starting at Phu Lo in Hanoi, NR 2 – the transport route of Viet Bac – goes through the provinces of Vinh Phuc, Phu Tho, Tuyen Quang, Ha Giang, Yen Bai, and Lao Cai. Its length in Vinh Phuc is 39 km and goes through the districts of Vinh Tuong, Binh Xuyen and Me Linh, and Vinh Yen town.

A 1999 survey showed that traffic density on NR 2 at Phu Lo-Vinh Yen section was 7,705 PCU/24 hours and at Vinh Yen-Viet Tri section it was 9,086 PCU/24 hours. Vehicle volume was forecast to increase by 50% on NR 2 up to 2005. Traffic density in the province was highest on this road, while that on other national roads, such as NR 2B, NR 2C and NR 23, and 15 other provincial and rural roads was not so high.

Figure 6.2.1
Accidents-prone locations in Vinh Phuc Province

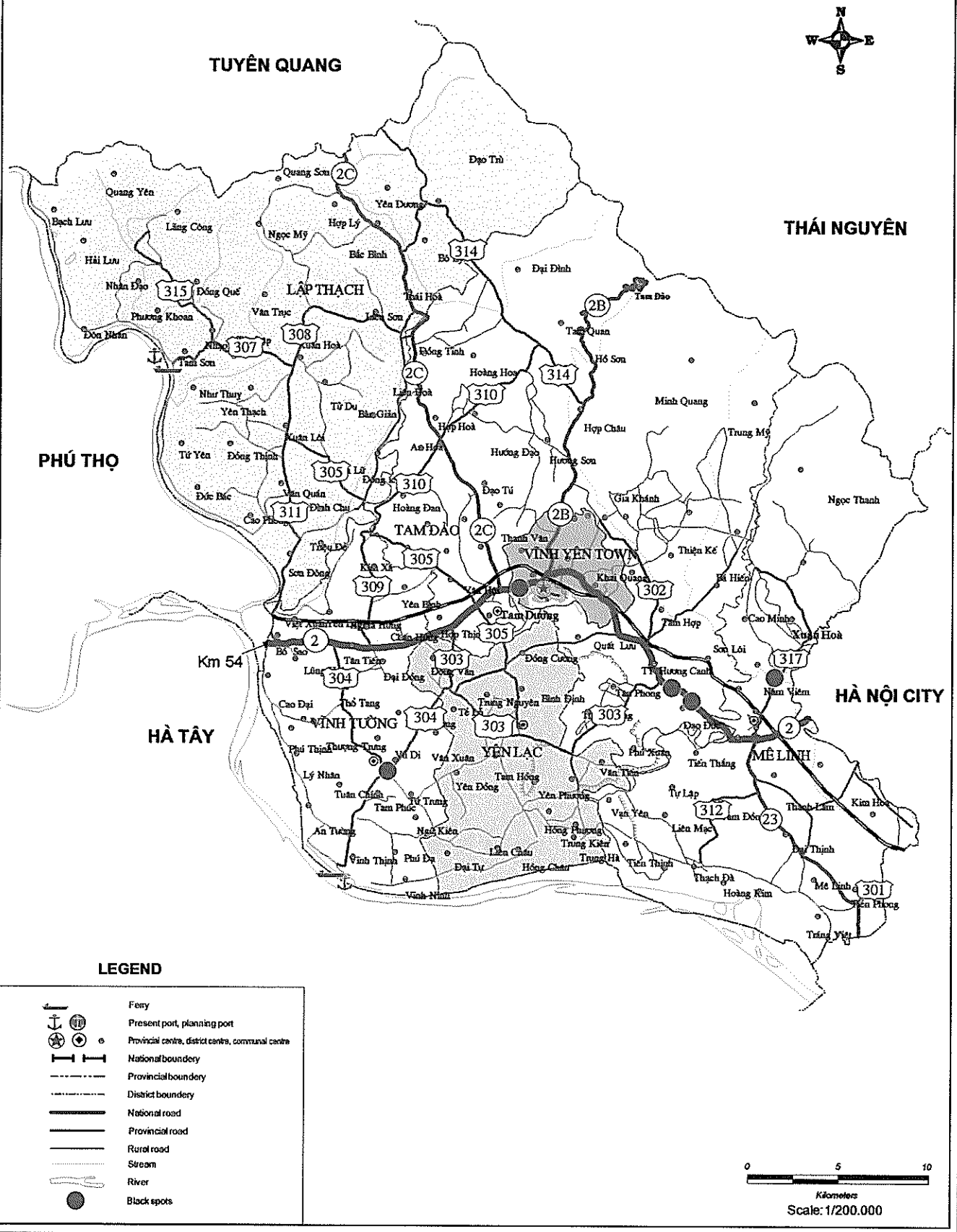


Table 6.2.1
Road Quality in Vinh Phuc Province, as of December 2001

No	Roads	Length	Pavement Quality (Km)				%	Remarks
			Bitumin	Concrete	Brick	Total		
1	National Road	109	89	n.a.	n.a.	89	81.6	
	NR 2	39	39	0	0	39	100	managed by central GOV.
	NR 2B, NR 2C, NR 23	79	50	n.a.	n.a.	50	71.4	managed by local GOV.
2	Provincial Road	245.2	139.8	7		146.8	59.8	
3	Rural Road	3050	131.1	196	444	771.1	25	

Source: Vinh Phuc PTA

3) Transport Vehicles

As of December 2001, Vinh Phuc province had 52,895 registered motorized vehicles. Out of this total, motorcycles accounted for 49,559 (94%), while automobiles and *cong nong* (a motorized vehicle manufactured locally in Vietnamese workshops and usually used to transport goods in rural areas), accounted for 3,336 (7%). The province had an average of 45 motorcycles/1,000 persons which was lower than the national average of 100 motorcycles/1,000 persons. However, growth rate was high, especially in 2001, when the registered number of motorcycles increased by 4.5 times compared to 2000. The increase accounted for 51% of the total number of motorcycles.

Only 18% of drivers of automobiles and motorcycles with a capacity of 50 cc upwards have a driver's license, meaning a majority of drivers are without licenses.

Table 6.2.2
Number of Motorized Vehicles and Issued Licenses

No		1997	1998	1999	2000	2001	Total
I	Newly Registered Vehicles						
	Motorcycles	1,477	2,687	2,606	5,597	25,063	49,559
	Automobiles + Cong Nong	139	158	104	162	405	3,336
II	Training for licensing						
	Automobiles	690	901	1,786	1,677	594	5,648
	Motorcycles	974	1,217	1,409	1,201	4,377	9,173

Source: Vinh Phuc PTA

4) Traffic Volume

Transport volume is not so high; it is concentrated mainly on short distances and on inner-province routes. This has not changed much throughout the years: Passenger

transport is mainly concentrated on inter-provincial and trunk routes and from the provincial center to districts and villages.

Table 6.2.3
Road Transport Volume, 1997-2001

No	Items	1997	1998	1999	2000	2001
1	Freight transport volume (1,000 tons)	1,155	1,265	1,553	2,043	2,305
2	Freight transport movement (mil. ton km)	53	59	68	102	115
3	Passenger transport volume (1,000 pax)	620	653	736	882	954
4	Passenger transport movement (mil. pax km)	60	62	74	53	86

Source: Vinh Phuc PTA

5) Traffic Accident Situation

Since 1997 up to now, traffic accidents annually increased in Vinh Phuc province (the details are in Table 6.2.4 below). The number of accidents increased by an average of 12.8% per year. Correspondingly, fatalities and injuries increased by 16.4% and 11.67% per year, respectively. Losses reached an estimated VND 2,231 million (equivalent to USD 150,000).

Based on 2001 data, Vinh Phuc's accident rate was 0.16 accident/1,000 persons and 3.45 accidents/1,000 motorized vehicles compared the national average of 0.32 accident/1,000 persons and 3.01 accidents/1,000 motorized vehicles.

Most of the traffic accidents occurred on national roads (50-55%), especially on NR 2 (402 accidents, or 52%, on this road from 1997 to 2001), and on the inner-town roads of Vinh Yen. Further,

- Traffic accidents on provincial roads was 11% (low proportion);
- Traffic accidents on district roads was 18%;
- Traffic accidents on village/commune roads was 13%.
- Traffic accidents occurred most frequently in districts where NR 2 passes through.

In period 1997 – 2001, there were 136 accidents in Vinh Yen, 192 in Vinh Tuong, 147 in Binh Xuyen, and 117 in Me Linh district.

6) Causes of Traffic Accidents

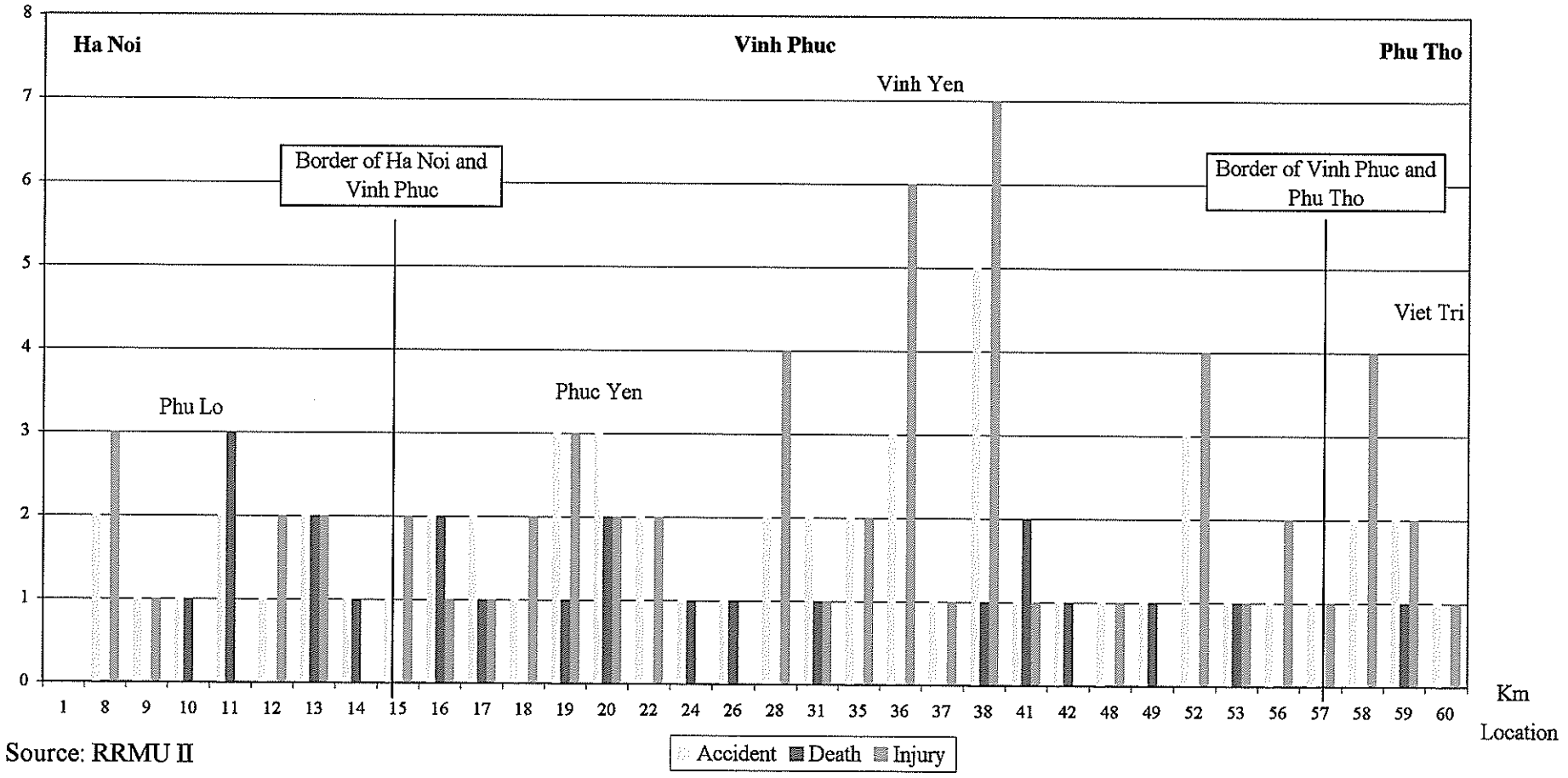
Statistics from 1999 to 2001 showed that 365 (85%) accidents out of a total of 427 were caused by drivers violating traffic laws and regulations and five (1.2%) by unsafe vehicles. Accidents caused by poor road transport infrastructure was low.

Table 6.2.4
Number and Causes of Road Accidents in Vinh Phuc, 1997-2001

No.	Analysis	1997	1998	1999	2000	2001	Total
1	**Number of Road accidents**	**124**	**118**	**184**	**163**	**182**	771
	Number of Fatalities	50	48	59	79	89	325
	Number of Injuries	124	108	179	188	167	766
	Estimated loss (VND mill.)	325	300	606	500	500	2231; 16 automobiles, 41 motorcycles, 22 bicycles + Cong Nongs
2	**Accident analysis**						
2.1	**By Road**						771
	NR 2	53	59	99	91	101	403
	NR 2B	4	4	2	4	4	18
	NR 2C	5	0	2	1	3	11
	NR 23	0	0	3	0	2	5
	Provincial roads	0	4	19	27	35	85
	District roads	41	31	42	14	18	146
	Commune + Inner-town roads	21	20	17	26	19	103
2.2	**By location**						771
	Vinh Yen	33	17	23	30	34	137
	Vinh Tuong	36	32	45	41	38	192
	Yen Lac	12	12	11	9	12	56
	Tam Duong	12	17	16	13	12	70
	Binh Xuyen	14	20	45	25	43	147
	Me Linh	7	11	31	34	34	117
	Lap Thach	10	9	13	11	9	52
2.3	**By objects**						771
	Automobile drivers	35	34	56	41	62	228
	Motorcycle riders	76	53	88	83	103	403
	Cong nong	2	9	23	13	8	55
	Bicycle riders	11	16	9	15	5	56
	Pedestrians	0	6	7	9	4	26
	Animal carts	0	0	0	2	0	2
3	**Causes**						427
	No control of speed	n.a.	n.a.	78	51	38	167
	Poor traffic observation	n.a.	n.a.	2	9	12	23
	Violation of traffic regulations	n.a.	n.a.	0	0	1	1
	Unsafe vehicles	n.a.	n.a.	0	1	4	5
	Dangerous overtaking	n.a.	n.a.	17	22	38	77
	Lane encroachment	n.a.	n.a.	43	22	32	97
	Self-inflicted	n.a.	n.a.	0	2	2	4
	Mixed-use road	n.a.	n.a.	3	3	1	7
	Being investigated	n.a.	n.a.	0	0	46	46

Source: Transport Safety Board, Vinh Phuc province

Figure 6.2.2
Road Traffic Accidents on the Section of Natonal Highway N°2
in Vinh Phuc Province
(1999-2001)



Source: RRMU II

7) Accident-prone Locations

National Road: There are three black spots (BS) on NR 2. These are:
(a) From Km 17 to Km 18 in Me Linh district (BS-1);
(b) From Km 23 to Km 24 in Binh Xuyen district (BS-2);
(c) From Km 34 to Km 35 in Vinh Yen town (BS-3).

Major causes of traffic accidents at these locations are violations of traffic laws and regulations by drivers, e.g., speeding, poor traffic observation, losing control of vehicle. These subjective causes, however, have objective factors, which are as follows:

- At BS-1 and BS-2: The roads are narrow with a surface width of 9m and a foundation width of 12m. They are well paved with bitumen and are relatively satisfactory at high speeds. However, the earth shoulders are rain-eroded, and as a result are 15cm lower than the road surface. Accidents are usually caused by motorcycle drivers going at high speed, especially those who are not used to driving on these sections;
- At BS-3: The location is a curve and the view is limited, making it difficult for drivers to see oncoming vehicles from both directions. Vehicles passing through this location are usually moving at a high speed, resulting in mishaps.

Provincial Road: There are two black spots on the provincial road network, as follows:
- Kha Do Bridge on PR 317 approaching Xuan Hoa town (about 500 m from NR 2): This location is a curve with a limited view (due to houses along roadsides) and there is a T-junction before the bridge;
- Quan Bridge on PR 304: This location is a curve on a slope. The bridge is relatively narrow compared with the approach road.

8) Solutions to Reduce Traffic Accidents

Solutions to reduce traffic accidents in the province include the following:

(1) **Education and Information Dissemination of Traffic Laws and Regulations**
   a) Effecting an information campaign on traffic laws and regulations and road safety through the media, such as Vinh Phuc Newspaper (e.g. an average of 8-10 news reports and photos per month) and provincial radio stations and television networks, and including road safety issues in the party's information drive and party branch activities;
   b) Coordinating with the provincial Education and Training Department in organizing part-time training courses on traffic laws in schools, colleges and universities in the province;
   c) Coordinating with the Fatherland Front and Provincial Youth Union to train youth cadres, commune cadres and etc.;

d) Using mobile vehicles to educate the people on traffic safety rules and regulations;
e) Coordinating with the Honda Motorcycle Company and the provincial National Front in organizing training courses and examinations on safe motorcycle driving at local and provincial levels;
f) Placing warning signs on accident-prone road sections;
g) Establishing volunteer youth teams to participate in ensuring traffic safety in the province.

(2) **Promotion of Traffic Safety**
a) Mobilizing households along roadsides not to encroach on traffic corridors;
b) Enforcing acquisition of road reserves;
c) Regulating business structures and activities along the roads.

(3) **Construction and Improvement of Road Infrastructure**
a) Provincial roads;
b) District and rural roads;
c) National roads, especially NR 2: removing black spots on national roads in Vinh Phuc;
d) Placing signs and signals.

(4) **Management of Vehicles and Drivers**
a) Organizing practical training courses and motorcycle driving license examinations;
b) Checking automobile driver training schools.

(5) **Control, Patrol of and Sanctions against Traffic Violators**
a) Strengthening patrols and control of traffic safety and order, especially during festivals and ceremonies;
b) Inspecting transport vehicles at weight examination stations and police stations.

6.3 Road Accidents and Safety on National Road No. 1: Ho Chi Minh City - Can Tho

1) Topography

The NR 1 section from HCMC to Can Tho goes through the Mekong River Delta and other rivers, which are populated areas. This section has been improved, upgraded and paved with asphalt concrete. In particular, the section through HCMC, which is part of the trans-Asian highway network and the outer ring road of HCMC, is under construction and being upgraded. This NR 1 section goes through HCMC, Long An, Tien Giang, Vinh Long, Can Tho, Soc Trang, Bac Lieu, and Ca Mau provinces. NR 1 ends at Km 2300+450 in Nam Can (see Figure 6.3.1). The technical features of the road section are shown in Table 6.3.1

Table 6.3.1
Technical Features of the Road Section

1)	From Km 1770+734 to Km 1873+00 in Dong Nai province
	(1) From Km 1770+734 to Km 1805+00: road surface width: 12m; foundation: 12.5m (2) From Km 1805+00 to Km 1811+500, road surface width: 14m, foundation: 14.5m (3) From Km 1811+500 to Km 1864+000, road surface width: 16m, foundation: 16.5m (4) From Km 1864+000 to Km 1873+000, road surface width: 23m, foundation: 23.5m
2)	From Km of 1873+000 to Km of 1924+815 in HCMC
	(1) From Km 1873+000 to Km 1879+680: road surface width: 23m; foundation: 23.5m (2) From Km 1879+680 to Km 1900+750: foundation: 33m; (a) Four lanes for motorized vehicles: 4 x 3.75m = 15m; (b) Two lanes for non-motorized vehicles: 2 x 6m = 12m; (c) Central median: 3m; (d) Safety strips: 2 x 0.5m = 1m; Reinforced shoulders (Hard shoulders): 2 x 1m = 2m. (3) From Km 1900+750 to Km 1924+815: road surface width: 10m; foundation: 10.5m
3)	From Km 1924+815 to Km 1954+790 in Long An province: road surface width: 10m; foundation: 10.5m
4)	From Km 1954+790 to Km 2027+966 in Tien Giang province: road surface width: 10m; foundation: 10.5m
5)	From Km 2027+966 to Km 2065+790 in Vinh Long province: road surface width: 10m; foundation: 10.5m
6)	From Km 2065+966 to Km 2107+742 in Can Tho province: road surface width: 10m; foundation: 10.5m

2) Traffic Volume

NR 1 is currently the only road connecting HCMC to the 12 provinces of the Mekong River Delta, which has an area of 39,555 km^2 (11% of the whole country) and a population of 165 million (22% of the country's population). Economic development demand and traffic density are very high on this road. NR 1 has one of the highest traffic densities among national roads, especially the section from HCMC to Tan An, which has 25,000 vehicles/24 hours (according to 1999 data). Traffic growth rate is rapid and expected to more than double by 2010. High traffic density is one of the factors causing accidents on this national road.

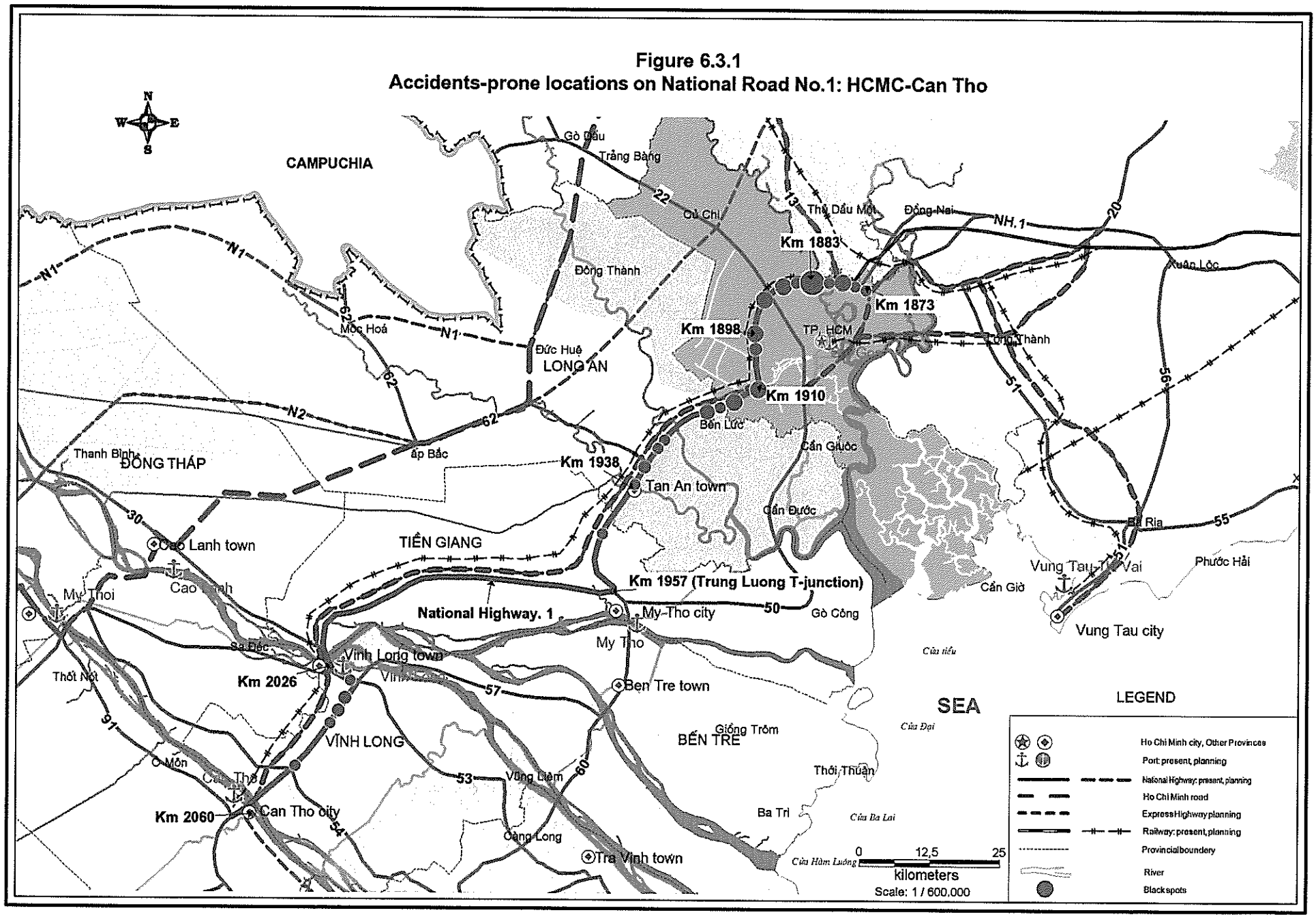
Table 6.3.2
Traffic Volume on NR 1

Unit: PCU/day

No.	Section	1999 survey	2005		2010		2020	
			Opt.1	Opt.2	Opt.1	Opt.2	Opt.1	Opt.2
1	Xuan Loc – Bien Hoa	8623	12590	13880	15755	17237	28096	32386
2	HCMC. – Tan An	25551	37509	41414	53656	58165	80988	92183
3	Tan An – My Thuan	6133	8929	9836	12707	13757	22477	25562
4	My Thuan – Can Tho	5797	8461	9328	12067	13070	21400	24348
5	Can Tho – Bac Lieu	4231	6228	6878	8964	9724	16163	18442

Source: TDSI
Note: Opt. 1: low assumption option; Opt. 2: high assumption option.

Figure 6.3.1
Accidents-prone locations on National Road No.1: HCMC-Can Tho



3) Traffic Accidents

Traffic accidents occurred most frequently on NR 1 from the boundary of Khanh Hoa and Ninh Thuan provinces to Km 2300+450 in Nam Can province, in comparison with other national roads under the management of the RRMU VII. This RRMU manages 2,805 km of national roads from Khanh Hoa to the Mekong River Delta provinces. Accidents on this section shared 40-45% of the total traffic accidents on all roads managed by RRMU VII. The number of fatalities was about 50% (see Table 6.3.3 below).

Table 6.3.3
Traffic Accidents on NR No.1

Year	Accidents	Fatalities	Injuries
1996	952/2280[1]	319/707	1089/2597
1997	1847/4249	521/1024	2128/5113
1998	1404/3128	361/758	1656/3905
1999	1816/3741	513/992	2318/4889
2000	1700/3661	510/1091	2143/4765
2001	1206/2653	408/833	1380/3230

[1] 952/2280: Traffic accidents on NR 1 section/total traffic accidents occurred on national roads under the management of RRMU VII.

4) Accident-prone Locations

Statistical data on this NR1 section from HCMC to Can Tho showed that traffic accidents occurred most frequently in the following sections:

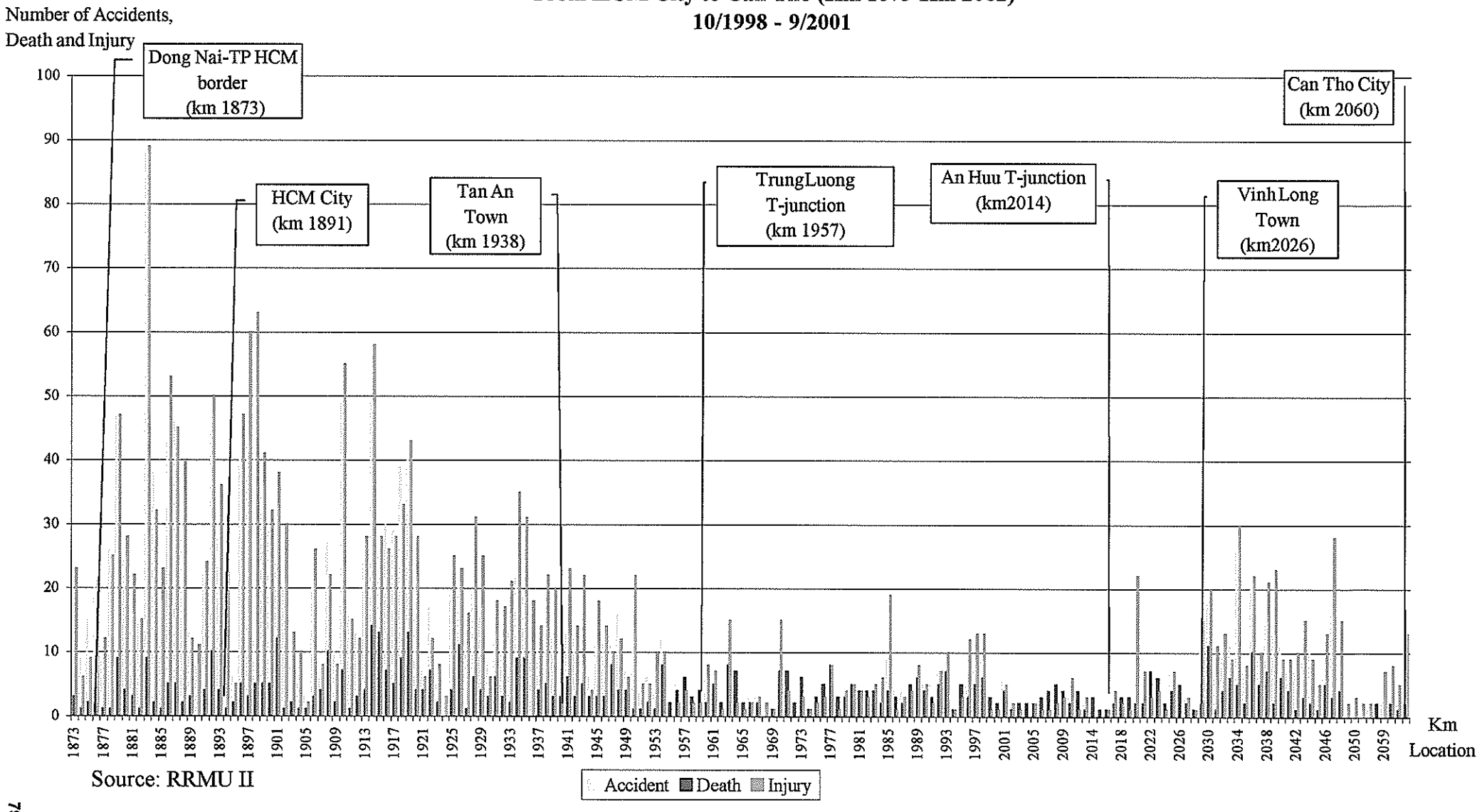
- Section from HCMC to the end of Long An province, from Km 1875 to Km 1956;
- Section through Vinh Long town, from Km 2029 to Km 2046.

Accidents were fewer on other sections. VRA places the black spots at the following locations:

(1) Binh Thang T-junction, from Km 1875 to Km 1878;
(2) An Lac, from Km 1916 to Km 1925;
(3) From Km 1925 to Km 1930, link from An Lac to Ben Luc;
(4) Ben Luc Town, from Km 1930 to Km 1935;
(5) From Km 1940 to Km 1945, two-way road section through Voi bridge;
(6) From Km 1945 to Km 1950, Tan An town (Long An province);
(7) From Km 1950 to Km 1956, Tan Thanh Town;
(8) From Km 2040 to Km 2045, Vinh Long Town.

Figure 6.3.2

Road Traffic Accidents on the Section of National Highway N°1
From HCM City to Can Tho (Km 1873-Km 2062)
10/1998 - 9/2001



Source: RRMU II

5) Causes of Traffic Accident

An analysis of 2,278 accidents which occurred from October 1998 to September 2000 (from Km 1873 to Km 2062) showed that the causes were seen as:

- Road users: 84.90%;
- Unsafe vehicles: about 0.53%;
- Roads and bridges: 0.13% (this cause took a low share because this section was upgraded, paved with asphalt concrete, and in good condition);
- Others: 12.69%.
- Objects causing traffic accidents: mainly motorcycles.

Table 6.3.4
Causes of Traffic Accidents[1]

	Causes	Traffic accidents	%
1	Road users	1,934	84.90
	Out of which:		
	- Speeding	1,189	52.19
	- Dangerous overtaking	202	8.87
	- Drunk driving	115	5.05
	- Lane encroaching	161	7.07
	- Not keeping safe distance	56	2.46
	- Careless pedestrians	211	9.26
2	Unsafe vehicles, facilities	12	0.53
3	Roads and bridges	3	0.13
4	Others	289	12.69
5	Unknown causes	40	1.76
	Total	2,278	100.00

Source: RRMU VII
[1] Based on accidents 10/1998 – 9/2000

Table 6.3.5
Accident Pattern Along National Road No.1

Unit: %

Victim \ Offender		Automobile	Motorcycle	Bicycle/NMV	Pedestrians	Others	Total
Automobile	Accident	9.39	18.37	5.97	4.88	0.91	39.52
	Death	7.18	23.02	6.74	9.09	1.61	47.65
Motorcycle	Accident	10.44	18.78	12.99	10.26	2.42	54.88
	Death	13.34	14.22	8.21	9.97	2.49	48.24
Bicycle/NMV	Accident	0.82	1.60	0.18	0.09	0.00	2.69
	Death	0.59	0.59	0.00	0.00	0.00	1.17
Pedestrians	Accident	0.96	1.14	0.09	0.00	0.00	2.19
	Death	1.47	0.44	0.00	0.00	0.00	1.91
Others	Accident	0.09	0.27	0.18	0.18	0.00	0.73
	Death	0.15	0.44	0.29	0.15	0.00	1.03
Total	Accident	21.70	40.15	19.42	15.41	3.33	100.00
	Death	22.73	38.71	15.25	19.21	4.11	100.00

Source: RRMU VII; Analysis based on accidents from 1999 to 2001

Table 6.3.5 shows the results of an analysis of accident causes on the most prone section, from Km 1873 to Km 1957 (from HCMC to Trung Luong).

Table 6.3.6
Road Users as Offenders and Victims of Accidents

Road Users	Offenders (%)	Victims (%)
1. Automobiles	38.60	22.57
2. Motorcycles	51.12	40.49
3. Bicycles	2.18	15.80
4. Non-motorized vehicles	0.75	1.55
5. Pedestrians	2.64	12.69
6. Others	0.63	0.86
7. Unknown objects	4.08	6.03

Source: RRMU VII; Analysis based on accidents from 1999 to 2001.

6) Infrastructure solution to reduce traffic accidents

Improved black spots

Two improved locations under the experimental project of the *Study on Road Traffic Safety Improvement* (implemented by the VRA), are the following:

- Location (5), two-way road section on Voi Bridge (from Km 1942+200 to Km 1942+500): placing concrete central median; widening foundation and road surface; placing rumble strips, road markings and signals. The cost was VND 350 million;
- Location (6), the section through Tan An town (from Km 1947+500 to Km 1949+350): widening road surface; developing sidewalks; placing rumble strips, road markings, signals; and installing traffic lights at junctions. The cost was VND 1,400 million.

Improved black spots by the Road Repair Fund in 2000 are:

- From Km 1957+500 to Km 1961+400: placing rumble strips, road markings, additional signals and signs;
- From Km 2037+400 to Km 2039: placing rumble strips, road markings, additional signals and signs.

On - going upgrading of the road section

- Widening road section of 3m on each road side from Ho Chi Minh city to Trung Luong junction (about 70km)
- High way from Ho Chi Minh to Can Tho should be built as soon as possible to reduce traffic volume on the NR1's section