

TOWARDS AN ASEAN ROAD NETWORKS: VIETNAM STUDY RESULTS

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abstract: The idea about an ASEAN highway network is so reasonable attractive that all ASEAN countries agree to develop it without any different opinion. But, for a lot of reasons from history, there are unfortunately various problems to be solved when integrating existing highways of each country in this network. On the way towards this integrated network, several tasks are assigned to the ASEAN highway experts. They are:

- Development of ASEAN highway network configuration,
- Proposal on a minimum set of ASEAN highway standards,
- Etc.

The paper presents study results of Vietnam to propose measures for these topics:

- Proposed ASEAN routes, its existing conditions and upgrading/improvement needs;
- Road design standard in relation with ASEAN standard minimum set.

1. INTRODUCTION

For the development of the region in both economy and society, an integrated road network for ASEAN countries have been urgently required. Paving the way for integration transport network, in each member country, a Highway Expert Study Team has been established. Such a team contributes on proposing a minimum set of ASEAN highway standards depending on its country specific conditions and considering the general conditions of the area. The ASEAN Highway Network will intentionally consist of 16 main routes running through all over region. Due to the fact that every country has its own design standards and transport conditions, the question is that the minimum set of ASEAN highway standards should be most applicable for all and easy for converting their road to adapt to. The method and time required for application of such a standards also are task of highway experts.

2. ASEAN ROUTES ON TERRITORY OF VIETNAM

2.1 Background for determining ASEAN routes.

On the way towards this integrated network, each Highway Expert Group has carried out surveys, review and analysis on not only their country road network but also road network of neighbor countries and region. Then in co-ordination, ASEAN highway experts would come to agreement of choosing roads or road sections to be ASEAN routes.

The selected routes should satisfy with following requirements:

- Contributing to the strengthening of economic communication between countries. Therefore, the routes should be links between economic, tourist centers, border-gates.
- Reducing cost by avoiding complicated terrain, making the most of existing roads and avoiding to construct new roads.

To do this, a evaluation criteria form should be made including:

- Traffic demand at present and in future
- Possibility of strengthening the exchanges between ASEAN countries though border-gates.
- Cost/benefit analysis for investigation in road improvement and upgrading.
- Consideration of proposals of other countries

2.2. Proposed ASEAN routes (refer attached map)

After surveying, considering and analyzing the results, the Highway Expert Group has proposed that following routes will run through Vietnam :

1. ASEAN 1. Continuing the highway from Phnompenh (Cambodia's capital) at MocBai border gate, following Highway No.22 through HoChiMinh city then Highway No.1 to Hanoi. From Hanoi the route will join Highway No.5 to HaiPhong. The length of the road runs in Vietnam is 1918.88 km. This route section also coincided with route A1 of ASIAN Highway Network.
2. ASEAN 5: This route passes the North of Laos, enters Vietnam at Tay Trang border gate and follows Highway No.16 to Hanoi. The length of the section is 512,87 km and also on the ASIAN Highway named A13.
3. ASEAN 6B: The Highway connects Dung Quat port, following Highway No.1 to Thach Tru, Highway No.24 to Kon Tum, No.14 to Dakto, No.40, with Laos.
4. ASEAN 7: From the middle of Laos, this route enters Vietnam at Keo border gate, follows Highway No.18 and joins Highway No.1 at Vot field. This section is 85 Km and coincides with ASIAN HIGHWAY A15.
5. ASEAN 7A: The Highway connects VungAng port (Vietnam), following Highway No.12, with Laos and then Northern part of Thailand.
6. ASEAN 7B: Quang Ngai – Kontum –Ban Het (Vietnam/Laos Border).
8. ASEAN 7C: Highway No.70 from Hanoi to Lao Cai to Northern Border.
9. ASEAN 8: Entering Vietnam at Lao Bao border gate with Laos, following Highway No.9, this route meets Highway No.1 at Dong Ha. The section's length is 83,4 Km.
10. ASEAN 11: From HaTien in border with Cambodia, this route follows Highway No.80, then Highway No.1 passing HoChiMinh city, Highway No.13 to Chon Thanh, Highway No.14 passing Tay Nguyen, Highway No.14b to HoiAn. The length of the route lying in Vietnam is 1330 Km. One section of this route is on ASIAN HIGHWAY A17.
11. ASEAN ?: Highway No. 51 from Ho Chi Minh City to Vung Tau seaport.

2.3 Existing conditions of roads on the ASEAN routes

As mentioned above, there are 7 main routes of ASEAN HIGHWAY Network run in Vietnam territory with the total length is 3,930.15 Km. In general, the condition of the roads is relatively good, some roads have been upgrading with 2 or 3 traffic lanes. Axle loaded on these routes is 10 ton/axle, maximum speed is 80kmh in flat terrain and 40kmh in mountainous terrain. There are many roads run on long, high passes (slope of 9-10%, length of 15-20km) bending with small radius such as roads run through HaiVan, Ngang, Phadin passes. This makes traffic operation difficult, especially container trucks with ISO standard can not pass over. All of routes ever run through resident and urban area with high density of population so vehicle speed is reduced. In big cities like Hanoi and HoChiMinh City, ring roads have not been completed synchronously. Traffic volumes are quite high especially in section approaching Hanoi and HoChiMinh City of Highway No.1 and the traffic flows on the routes are mixed traffic without separation of non-motorized and motorized vehicles, carriageways are used thoughtlessly and occupied by markets at many places causing traffic congestion and accidents.

Many bridges on routes are low loaded, some have been constructing and will be put into operation in the year 2000-2001 such as My Thuan, Giang bridges. Some other rail-road bridges will be reconstructed to separate road and railway traffic.

Some sections are flooded in rainy or stormy reasons like sections in Highway No.1, No.6, No.80, No.14. There are many intersections with railway, especially Highway No.1 with 27 intersections are grade sections, some have been constructing to be at-grade intersections. For preventing vehicles from overloaded, there are 27 fixed and mobile scale stations of which 15 belong to Highway No.1. There are also 30 traffic toll booths operating and other 34 points will be put into operation.

2.4 Improvement of Vietnam roads on ASEAN routes to be adaptable to ASEAN highway network.

Up to now, there have not been any freeway and highways of the first class in Vietnam (ie, there have not been any road reaching the design speed of over 120 kmh). Vietnam has been constructing about 400 km of expressway and about 800 km of highways of class II and III (design speed is up to 100 kmh). The rest of national roads of about 11,000 km only reach the fourth class or lower than that (the design speed is up to 60 kmh). So, numerous projects on upgrading and improvement of roads are in preparation/implementation.

The following is the development strategy of Vietnam roads on ASEAN routes:

- Highway No.22:

It is intended that in the year 2005 the whole road will reach the standard of class III and in the year 2010 the HoChiMinh city - Cu Chi section will have class I with 4 lanes.

- Highway No.1:

Improvement and upgrading of the whole to reach the standard of class III. Sections approaching Hanoi and HoChiMinh city will consist of 4 or 6 lanes. The capacity of the road after improvement will be 17000 PCE/day. According to traffic forecast, the traffic demand will be higher than capacity. Two following solution are suggested:

- First solution: Constructing the second Trans-Vietnam highway to share traffic volume (20%) with Highway No.1 including traffic volume of Trans-Asian Highway. This new highway will have standard of class 3 and 4 with 3 lanes (except section Chon Thanh - HoChiMinh city will be 1 class with 4 lanes). However, by the year 2010 - 2020 with the present of this new highway the demand is still over the capacity in some sections of Highway No.1 needing improvement.

- Second solution: To meet the transport demand, the following section in Highway No.1 should be extended:

<u>Section</u>	<u>Year 2010</u>	<u>Year 2020</u>
Phu Ly - Vinh		Class I, 4 lanes
Dong Ha - Quang Ngai		Class I, 4 - 6 lanes
Phan Thiet - Xuan Loc		Class I, 4 lanes
Xuan Loc - HCM City	Class I, 6 lanes	Class I, 8 lanes
HCM City - Tan An	Class I, 4 lanes	Class I, 8 lanes
Tan An - Bac Lieu		Class I, 4 lanes

- Highway No.5: Has been constructing for the standard of class I with 4-6 traffic lanes. Of which:

- Section from Km 0 to Km 6: 6 lanes
- Section from Km 6 to Km 93: 4 lanes
- Section from Km 93 to Km 106: 6 lanes

The construction will be completed by the year 2001 expectedly

- Highway No.6: It is known that after finishing Son La Hydro-electrical plant, some sections of this road will be flooded so some flooding by-passes should be built. In the plan for Highway No.297, the section Pha Uon - Tuan Giao is also the by-pass of Highway No.6 to avoiding Phadin pass.

Highway No.6 is divided into sections, each section has its own specifications according to future traffic demand:

- Section Hanoi - Hoa Binh: class I with 4 lanes
- Section Hoa Binh - Son La - Tuan Giao: class III, IV with 2 lanes
- Section Tuan Giao - Lai Chau: class I with 4 lanes

- Highway No.8:

At present this road belongs to class IV with 2 lanes and is in good surface condition.

Expectedly, by the year 2010, Bai Vot - Pho Chau section (crossing with North-South Highway will be class III with 2 lanes, the rest will keep to be class IV.

- Highway No.9: The whole highway has been upgrading to class III with 2 lanes.

- Highway No.13: At present, the road belongs to class III and IV. Ho Chi Minh City - Thu Dau Mot section will be upgraded to class I with 4 lanes by the year 2005, Thu Dau Mot - Chan Thanh section to class III with 2 lanes, the rest to class III with 2 lanes. By the year 2020, Ho Chi Minh City - Thu Dau Mot section will belong to class I with 6 lanes, Thu Dau Mot - Chan Thanh section to class I with 4 lanes.

- Highway No.80

The whole road will reach class III by the year 2010. The My Thuan - Sa Dec intersection will have class I with 4 lanes.

3. MINIMUM SET OF ASEAN HIGHWAY STANDARDS

3.1 The need of ASEAN Highway Standard

Simultaneousness with other aspects in the development of the region, transport plays a very important role. More than that transport, of which the dominant is road transport, contributes greatly to the development of other sectors. Thus, with some plans as Trans-Asian Railway, Inter-modal Transport, ASIAN Highway Network etc., the ASEAN Highway Network is the indispensable project.

The most difficult for the integration is the diversity in road standards of ASEAN countries. Each country has its own standards coming from different countries such as Russia, France, UK, USA etc. The legal level is also different, for example, Vietnam has not law on transport yet. What is more, the customs of transport operation are not similar, by example there five countries being left-handed the other five right-handed. The traffic flow characteristics are not the same. All these shows that it is necessary to work out a set of standards, firstly a minimum set, which will not create obstacles to each member to accept or recommend minor modifications to it.

3.2 ASEAN Highway Standard criteria (refer annex 1)

Consideration from varieties of the standards among member countries, it is revealed that the most appropriate standards should be based on the new ESCAP standards in 1995 because the standards were evaluated and approved by member countries of ESCAP for Asian Highway. However, some modification have been taken into account to reflect the ASEAN region condition, for example, design speeds in ESCAP standards are *certain values* according to road class and terrain while in proposed ASEAN standards are *interval values*.

1. Classification by function

- | | | |
|------------------|---------------|-------------|
| - Access control | - Non control | - Motorway |
| - Primary | - Secondary | - Collector |
| - Traffic Volume | - etc. | |

2. Geometric

2.1 Cross section: roadway, shoulder, R.O.W. median, bridge, cross section, etc.

2.2 Terrain: Mountainous, rolling, flat, urban, rural

2.3 Design speed

2.4 Horizontal curve radius

2.5 Sight distances: Stopping, passing

2.6 Cross slope : Surface, shoulder

2.7 Superelevation (max)

2.8 Vertical curve length

2.9 Vertical clearance

3. Structure loading

Design loading by AASHTO, British standards, International standards, regulation, etc.

4. Pavement structure: Surface type, design load, design life.

Because of the fact that each country has their own conditions and difficulties with the road network, the purposes of recommended ASEAN Highway Standards can be grouped in 2 stages as follows:

Stage 1: The standards can be used to identify the level of current highway standards in each member country as a specified ASEAN Standard. Hence, it is used to designate the ASEAN transport routes. All member countries simply compare their own highway standards to the standardized ASEAN Standards and make an identification.

Stage 2: The Standards can be used for future implementation of the ASEAN Highway intentionally targeting to be designated ASEAN transport route.

3.3 Vietnam Road Design Standard (refer annex 2) in relation with ASEAN standard minimum set.

The road network in Vietnam is divided into two categories:

- Highways
- Major highways

Highways consist of 6 classes which depend principally on the vehicle density per day and the design speed.

Major highways consist of two kinds:

- Freeway: a road without grade intersections
- Expressway: a road with some minor roads intersecting on the same level.

In comparison with the standard of ASEAN member countries, road geometric design standards of Vietnam are not very different, what is more, they are similar to Indonesia and Malaysia road design standards.

The loading standard for bridge design in Vietnam is equally determined as the loading standard of BS 5400 and is higher than the loading standard of AASTO in some cases which have spans of over 40m.

The road vertical clearance in Vietnam is a minimum of 4.5 m for highway or 4.75 m for expressways. However, it is understood these provisions do not cause any difficulty for the harmonization of road transport laws, rules and regulations in ASEAN.

In summary, Vietnam road design standards correspond completely with ASEAN on design methodology and road geometry.

4. CONCLUSION AND RECOMMENDATION

Consideration from the fact that the ASEAN Highway network is a very wide range covering each member countries and Cambodia. Each country has its own standards, and it will take time to change the entire proposed ASEAN Highway into new standards. Therefore, at the early state, each country may still employ its own standards for highway improvement. However, when the implementation will be done on the designated route of transport, the new standard should be taken into account.

With the proposed ASEAN Design Standards mentioned above, it is expected that there is no obstacle for ASEAN members in general and Vietnam in particular to accept or recommend minor modification to proposed Highway Standard. The ASEAN Highway Network will be important mean for transport in the region.

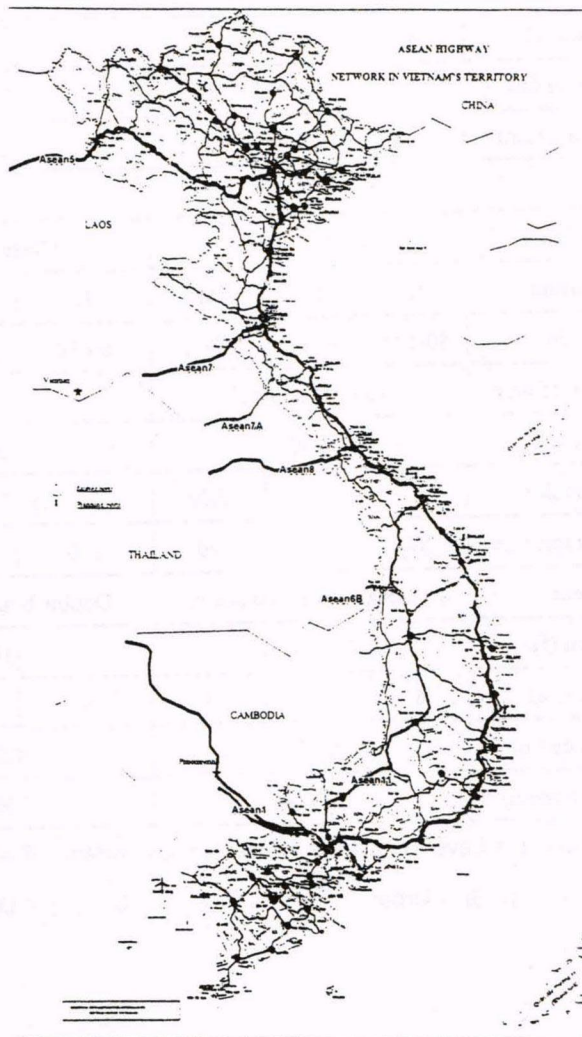
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Annex 1 : Proposed ASEAN Highway Standards

Highway classification		Primary (4 or more lanes) (control access)			Class I (4 or more lanes)		
Terrain classification		L	R	M	L	R	M
Design speed (km/h)		100-120	80-100	60-80	80-110	60-80	50-70
Width (m)	Right of way	(50-70) ((40-60))			(50-70) ((40-60))		
	Lane	3.75			3.50		
	Shoulder	3.00		2.50	3.00		2.50
Min. horizontal curve radius (m)		390	230	120	220	120	80
Type of pavement		Asphalt/cement concrete			Asphalt/cement concrete		
Max. superelevation (%)		(7) ((6))			(8) ((6))		
Max. vertical grade(%)		4	5	6	5	6	7
Min. vertical clearance (m)		4.50 [5.00]			4.50 [5.00]		
Structure loading (minimum)		HS20-44			HS20-44		

Highway classification		Class II (2 lanes)			Class III (2 lanes)		
Terrain classification		L	R	M	L	R	M
Design speed (km/h)		80-100	60-80	40-60	60-80	50-70	40-60
Width (m)	Right of way	(40-60) ((30-40))			30-40		
	Lane	3.50			3.00[3.25]		
	Shoulder	2.50		2.00	1.50[2]		1.0[1.5]
Min. horizontal curve radius (m)		200	110	50	110	75	50
Type of pavement		Asphalt/cement concrete			Double bituminous treatment		
Max. superelevation (%)		(10) ((6))			(10) ((6))		
Max. vertical grade(%)		6	7	8	6	7	8
Min. vertical clearance (m)		4.50 [5.00]			4.50 [5.00]		
Structure loading (minimum)		HS20-44			HS20-44		

Note: 1. Abbreviation : L = Level Terrain M = Mountainous Terrain R = Rolling Terrain

2. () = Rural (()) = Urban

3. [] = Desirable Values

**Annex 2 : VIETNAM'S PROPOSAL ON
ASEAN HARMONIZATION OF ROAD, MOTOR VEHICLE
ROAD WORTHINESS AND TRAFFIC SAFETY STANDARDS**

I. ROAD DESIGN AND RELATED FACILITIES

SUBJECT	VIETNAM			
	N ^o	SUB SUBJECT	STANDARD	
ROAD DESIGN STANDARD	1	Design Speed Max (Krr/h)	Ord. area Dif. area	
		Freeway	120 80	
		Expressway	100 60	
		Class I (with ADT 6,000 vehs.)	120 -	
		Class II (with 3,000 to 6,000 vehs.)	100 80	
		Class III (with 1,000 to 3,000 vehs.)	80 60	
		Class IV (with 300 to 1,000 vehs.)	40 40	
		Class V (with 50* to 300 vehs.)	40 25	
	Class VI (with - less than 50 vehs.)	25 15		
	2	Single lane width, min (m)		
		Class I, Freeway, Expressway	3.75 3.75	
		Class II	3.75 3.50	
		Class III	3.50 3.00	
		Class IV	3.50 2.75	
		Class V	3.50 2.75	
		Class VI	3.50 2.75	
	3	Bridge width, min (m)		
		Class I		9
		Class II	9 8	
		Class III	8 7	
		Class IV	7 6	
		Class V	6 4.5	
		Class VI		4.5

SUBJECT	VIETNAM		
	N ^o	SUB SUBJECT	STANDARD
	4	Median, min (m)	
		Class I, II	3.0
		Other Class	0.5 to 3.0
	5	Super elevation, max (%)	
		Class I, II, III	3
		Class IV	4
		Class V	5
		Class IV	6
	6	Shoulder width, min (m)	
		Class I	3.0 3.0
		Class II	2.5 2.5
		Class III	2.5 1.5
		Class IV	1.5 1.0
		Class V	1.5 1.25
		Class VI	1.25 1.25
	7	Radius of Horizontal curvatures, min (m)	
		Class I	600
		Class II	400
		Class III	250
		Class IV	130
		Class V	60
		Class VI	15 to 25
	8	Gradient, max (%)	
		Class I	4
		Class II	5
		Class III	6
		Class IV	7
		Class V	8
		Class VI	9, 10

SUBJECT	VIETNAM		
	N ^o	SUB SUBJECT	STANDARD
	9	Critical Length, max (m)	
	10	Vertical Clearance, min (m)	
		Highway, National Road	4.5
		Secondary road, minor road	3.5
	11	Turning radius, min (m)	
		Class I, II	30
		Class III	25
		Class IV to VI	17
	12	Pavement design method	Based on Highway Design Standard TCVN 4054-85
	13	Loading Standard for bridge	Based on Highway Design Standard TCVN 4054-85
		Class I to IV	H-30
		Class IV to VI	H-1 3

The above standards are excerpts from the Vietnam State Standards and the Sector's Standards