

Chapter I.

Introduction

I.1. Background and project objective

Issue of dimensions and weights of freight road vehicles is closely linked to multiple aspects of road transport: road safety, road maintenance and its costs for national economy, economics of transport operations and domestic and international trade.

While setting the national limits on dimensions and weight of freight (commercial) road vehicles countries consider quality of roads, capacity to repair the damage from passage of the heavy vehicles, market needs for types and size of vehicles. Consequently, the national standards differ and these differences between the countries pose challenges to the international road transport.

Those challenges have various implications. On the one hand, facing lower limits on weights or dimensions of vehicles across the border, transport operators might either underload their trucks, trans-load goods at border or uncouple one of the trailers of a road train to attach it to other truck. Any of these steps would result in increase of number of trips and costs for operators and overall economy, as well as more adverse impact on environment. Such practices increase risks (for example, theft or damage due to accidents while handling) and cause delays in goods haulage, introducing additional inefficiencies to the supply chain. On the other hand, allowing on the roads, bridges and in the tunnels vehicles that surpass their carrying capacity could cause safety risks, damage to infrastructure and again economic and environmental losses.

In their turn, standards on emissions of pollutants by road vehicles are aimed at protecting and improving the quality of ambient air. Harmonization of requirements on emissions along Asian Highways would allow alleviating the air pollution and reducing related health impact and economic losses becoming one of the pillars of green and sustainable transport in the region

Regulations on freight road vehicles could be used as a non-tariff barrier to trade or reason to block cross-border or transit international road transport. Non-compliance with national standards or regulations on vehicles weight, dimensions or emission levels serves as a reason to deny access to the foreign vehicle and might either cause trans-loading in border area or might lead to informal arrangements to allow the passage. As a result, differences in road vehicle regulations, including the mismatching limits of dimensions, weights and different emission standards, contribute to the factors hindering or stopping the cross-border and transit freight road transport at multiple locations along the Asian Highway network.

Harmonization of said standards on regional level would improve efficiency of the international road transport and contribute to the goal of seamless transport along the Asian Highway network. While countries in Asia do make efforts to harmonize the vehicle standards at subregional level there is room for improvement in operational terms since national rules might take precedence over subregional or bilateral arrangements constraining international freight transport on roads. In combination with mutual recognition of emission related licenses and certificates, harmonization of emission standards would serve as powerful instrument to reduce barriers to international road transport and trade.

Harmonization of the vehicles standard in terms of dimensions, weight of commercial vehicles and their emissions of the pollutants would be crucial element to overall transport facilitation along the Asian Highways, together with harmonization and standardization of road signage and signals, doubling national language signs, markings ones along the Asian Highways in English language, streamlining switches between right-hand and left-hand driving sections, training for drivers and trainers, providing the information on legislation and rules for road transport in the countries along the Asian Highway network in both national languages and English language (languages of partner countries if it is more feasible or reasonable).

Agreement on Asian Highway network and the minimum road design standards it sets provide opportunity to initiate elimination of barriers caused by differences in the standards on vehicles dimensions, weight and emissions along the selected routes of international importance. The countries that joined the Agreement have already committed to the bringing the routes to the unified design standards. Roads built by the same design are the foundation allowing for the harmonization of vehicle standards that is one step away.

By limiting the application of the possible harmonized standards to the routes of the Asian Highways, ESCAP countries might avoid radical changes in domestic regulations and test the effects and impacts of the harmonization on a subset of their roads.

Efforts to harmonize the standards on freight road vehicles are part of the ESCAP work on promotion and development of regional transport and of the 2030 Agenda for Sustainable Development. The study and related discussions, their outcomes aimed at contributing to the following Sustainable Development Goals:

- Goal 3: Ensure healthy lives and promote well-being for all at all ages:
 - Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents;
- Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation:
 - Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.
 - Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

To provide the recommendations on the application of the harmonized standards on freight road vehicles along the Asian Highway network to be agreed upon by the ESCAP member countries, the current study assesses the existing standards and limits on vehicles dimensions, weight and emissions of gaseous and particulate pollutants in the countries which signed or ratified Intergovernmental Agreement on the Asian Highway network, elaborates on problems caused by from the variations in national standards and potential benefits of harmonization, showcases enforcement measures; proposes standards based on the road design criteria within the agreement and steps for introduction of harmonized standards.

It is a challenging task to develop an optimal solution from a theoretical standpoint due to the divergence and complexity of the national standards on weights, dimensions, and emissions, great difference in conditions of road infrastructures and climate change, and limited data availability. Even if such solution was developed, it may be difficult for every member country to practically accept the standard. Thus, the scope of this study is limited to recommending a reasonable level of standards through reviewing various aspects in technical perspectives.

Investigation of the possibility of the harmonized standards on freight road vehicles is in line with the implementation of the Ministerial Declaration on Transport Development in Asia and Pacific, Regional Action Programme for Sustainable Transport Connectivity in Asia and Pacific – Phase I (2017-2020) and the Regional Strategic Framework for the Facilitation of International Road Transport. It is continuation and integral part of ESCAP-led efforts to create conditions for seamless connectivity in Asia and Pacific, including signing and enforcing Intergovernmental Agreement on the Asian Highway Network (2003), facilitating of the Intergovernmental Agreement on International Road Transport along the Asian Highway Network (2016), development of the Design Guidelines on Road Infrastructure Safety Facilities for Asian Highway, study on comprehensive planning on Eurasian Transport Corridors, development of the ESCAP facilitation tools and models (such as Secure Cross Border Transport Model, Model on Integrated Controls at the Border Crossing, Customs Transit Systems, Model Subregional Road Transport Agreement, Model Multilateral Permits for International Road Transport and others), etc.

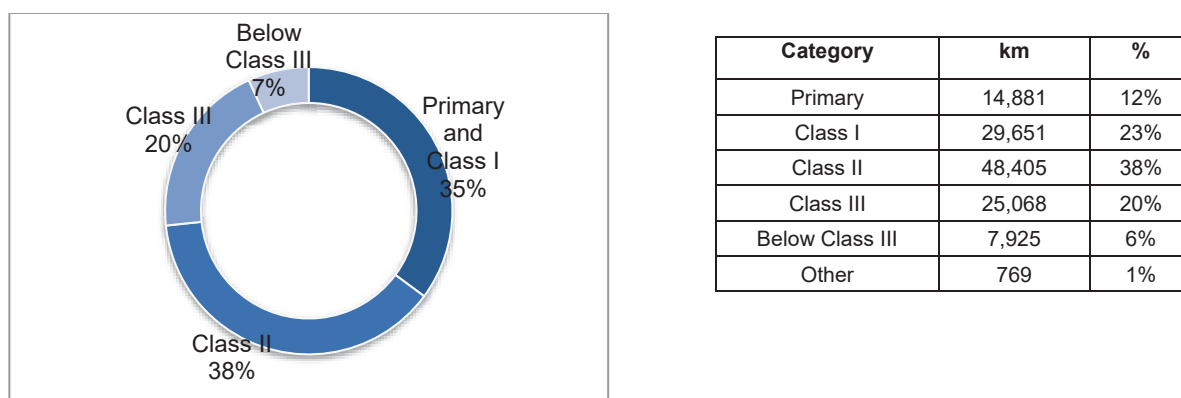
1.2. Asian Highway Network

Asian Highway (AH) network (Figure 2) was established by ESCAP member countries in 2003 via adoption of the Intergovernmental Agreement with the list of road routes of continental or subregional importance that the parties committed to bring to uniform technical standards, also set out by the Agreement. For the 30 Parties¹, the Agreement is the coordinated plan for the development of the roads to ensure connectivity both within Asia, especially for the landlocked countries, and between Asia and neighbouring regions. To achieve the objective of the smooth and interconnected regional road network, they agreed to put the selected roads into their national development programmes. The Intergovernmental Agreement on the Asian Highway Network came into force in 2005.

¹ Economic and Social Commission for Asia and the Pacific, 'E/ESCAP/AHWG(7)/1. Status of Signatories and Parties to the Intergovernmental Agreement on the Asian Highway Network. Note by the Secretariat.' (presented at the 7th meeting of the Working Group on the Asian Highway Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand, 2017), p. 1.

Totally, there are 32 AH member countries (Annex I), two of which, Singapore and Malaysia² are still not parties to the Agreement³. As of 25 September 2017, total length of the Asian Highways was 142.8 thousand km⁴, with about 70% of them of Class II and higher (Figure 1).

Figure 1 Status of the Asian Highway network



Source: ESCAP, 'Asian Highway Database: Status of the Asian Highway in Member Countries (2019)'.

ESCAP countries are set to improve the quality of roads along the Asian Highway network and in 2019 the share of Primary roads and Class I roads in total length of the network reached 35%, followed by Class II roads (38%). The shares of lower classes road, i.e. Class III and below Class III consisted of 27% of the Asian Highway network.

The classification and design standards for the AH are set in the Annex II to the Agreement. The roads are classified into four classes from Primary – access-controlled highways of 4 and more lanes to Class III two lanes roads with double bituminous treatment.

For these four highway classes and four classes of terrain (also defined by the Annex), the following design parameters are set: speed, dimensions of road elements (widths of right-of-way, lane, shoulder, pavement slope), minimum radii of horizontal curve, minimum length of transition curves, maximum vertical grades, critical length of gradient section of a climbing lane, pavement types, structure loading, vertical clearance. Agreement requires parties to carry out environment impact assessment and give full consideration to the road safety while designing new roads. Main parameters are summarized in Table 1.

Table 1 Asian Highway design standards

Highway classification	Primary (4 or more lanes)				Class I (4 or more lanes)				Class II (2 lanes)				Class III (2 lanes)			
Terrain classification	Level (L)	Rolling (R)	Mountainous (M)	Steep (S)	L	R	M	S	L	R	M	S	L	R	M	S
Design speed (km/h)	120	100	80	60	100	80	50		80	60	50	40	60	50	40	30
Width (m)	(50)				(40)				(40)				(30)			
	Lane				3.50				3.50				3.00 (3.25)			
	Shoulder				3.00		2.50		2.50		2.00		1.5 (2.0)		0.75 (1.5)	
	Median strip				4.00		3.00		3.00		2.50		N/A		N/A	
Minimum radii of horizontal curve (m)	520	350	210	115	350	210	80		210	115	80	50	115	80	50	30
Pavement slope (%)	2				2				2				2 - 5			
Shoulder slope (%)	3 - 6				3 - 6				3 - 6				3 - 6			
Type of pavement	Asphalt/cement concrete				Asphalt/cement concrete				Asphalt/cement concrete				Double bituminous treatment			
Maximum superelevation (%)	10				10				10				10			
Maximum vertical grade (%)	4	5	6	7	4	5	6	7	4	5	6	7	4	5	6	7
Structure loading (minimum)	HS20-44				HS20-44				HS20-44				HS20-44			

² Malaysia signed the Agreement in 2004 but has not ratified it yet.

³ The 30 Parties to the Agreement are: Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Cambodia, China, Democratic People's Republic of Korea, Georgia, India, Indonesia, Islamic Republic of Iran, Japan, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Republic of Korea, Russian Federation, Sri Lanka, Tajikistan, Thailand, Turkey, Turkmenistan, Uzbekistan, Viet Nam.

⁴ ESCAP, 'Asian Highway Database: Status of the Asian Highway in Member Countries (25 September 2017)' <<http://www.unescap.org/sites/default/files/Asian%20Highway%20Database-%2025%20September%202017.xls>> [accessed 31 January 2017].

Highway classification	Primary (4 or more lanes)	Class I (4 or more lanes)	Class II (2 lanes)	Class III (2 lanes)
------------------------	------------------------------	------------------------------	-----------------------	------------------------

Notes:

Figures in parentheses are desirable values.

Minimum radii of horizontal curve should be determined in conjunction with superelevation.

The recommended width of the median can be reduced with the proper type of guard fence.

The Parties should apply their national standards when constructing structures such as bridges, culverts and tunnels along the Asian Highway.

Source: Intergovernmental Agreement on the Asian Highway Network' (Bangkok, 2003)

For the "primary" class the Annex stresses that these highways are strictly for the use by automobiles only. Access to these roads should be provided only via grade separated interchanges. Though the Class III is the minimum desirable standard, the development goal for the AH is to bring the Network to Class II and above. Pedestrians, bicycles and animal-drawn carts should be separated from the through traffic at AH.

The Annex also sets the following considerations for the design standards:

- The minimum curves radii are recommended to be used only when it is unavoidable. For the rest of cases, it is suggested to increase the minimum values by 50%-100%.
- Annex defines the radii that require connection via transitional curves.
- Careful determination of the load capacity of the roads in order to choose appropriate pavement and reduce damage to the road surface and hence maintenance costs.
- Minimum design loading HS20-44 is the load of a full-size trailer.
- Minimum vertical clearance was chosen to allow safe passage of ISO containers.

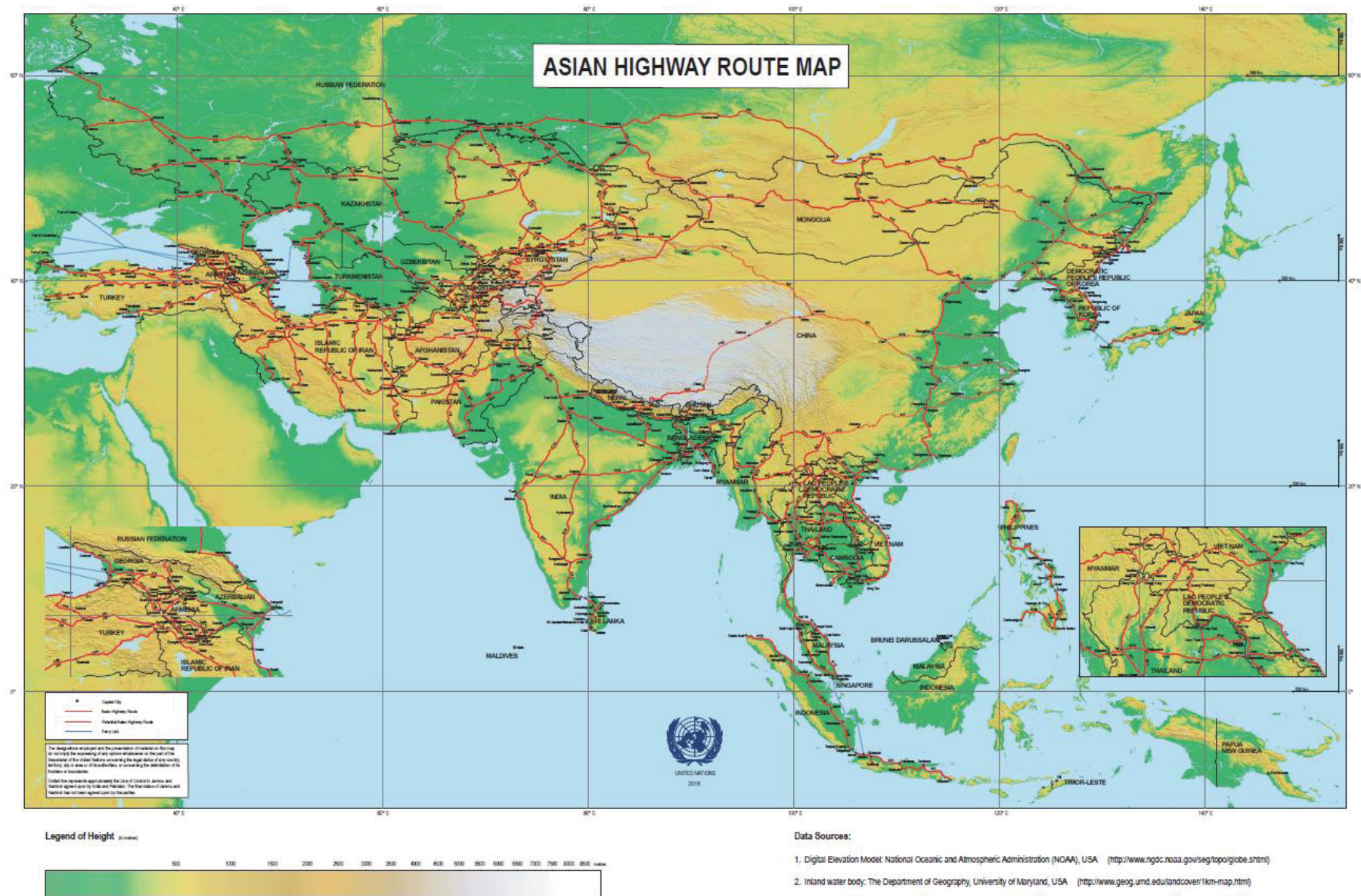
In the end of 2017, the AH Agreement was supplemented with the design standards for road safety (new Annex II bis)⁵. While not yet in force, the Annex II Bis offers a basis for harmonizing road safety facilities across the AH network.

The design standards for road safety first dictate that road safety infrastructure facilities shall be provided at the network consistently. They recommend that in future the network consists of highways of Classes Primary to II, desirably, with controlled access and access controlled bypasses (or bypasses with limited accesses) are built around major settlements. It is recommended that speed limits are applied consistently to the roads with similar characteristics across the network. The standards call to clearly visible, obvious signage for all of the changes that are present on the road, for all structures that influence driving.

The standards set the mitigation measures and safety structures/treatment per Class of the AH. In addition, they also set the requirements for shoulders and connected safety structures (such as barriers), for changes at the cross-sections and transition zones towards them, overtaking opportunities, pavement drainage, sharp curves, measures to mitigate the steep downward gradients, needs for climbing lines, consideration for locations and planning of the parking, service and rest areas, bus stops.

5 'C.N.53.2018.TREATIES-XI.B.34.a (Depositary Notification): Amendments to the Main Text of the International Agreement on the Asian Highway Network. Bangkok, 15 December 2017' (United Nations Treaty Collection, 2018) <<https://treaties.un.org/doc/Publication/CN/2018/CN.53.2018-Eng.pdf>> [accessed 11 April 2018].

Figure 2 Asian Highway network



Source: ESCAP, 2016