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**HARMONIZATION OF
REGIONAL LAND TRANSPORTATION STANDARDS**

Prepared by
Bassam Anani

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Introduction

It is well known that the growth of the transport sector in any country is a prerequisite for any economic growth and development and for meeting the ever-increasing socio-economic needs of the region. For this very reason the governments of the ESCWA region have embarked upon the development of transport infrastructures. Of prime concern was the development of the road networks throughout the region. It is therefore not surprising to find that most of the links, which constitute parts of the regional road network, have been constructed. The total length of the paved roads in the ESCWA region has expanded from a total of about 100,000-km in 1981 to approximately 240,000 km in 1995. Road transport has therefore expanded and a striking and momentous headway in its role and volume has been achieved in the region.

Despite the above mentioned progress achieved in the construction of the highways and road infrastructures, it is envisaged that further development is essential in order to cope with the expected growth in both the regional and international transport of both passengers and freight. Besides the physical structure of the highways, other major concerns exist that need to be addressed and considered in order to achieve the final objectives of these infrastructures. Among these are easing of the customs and administrative facilities at border crossing points.

Border crossing formalities and procedures can be classified as either required or supplementary procedures. Required procedures include those of security, passport and immigration, and customs procedures. Supplementary procedures, on the other hand, include those related to health, agricultural inspection, money exchange and insurance. Of these, customs procedures seem to take the longest time to complete. The number of documents to be filled and the lack of standard format are the main cause for such delays. Other factors that need to be considered also relate to the provision of standardized signs and signals and provision of uniform standards for the vehicles and the infrastructure components.

It is imperative that simplification and harmonization of formalities and procedures be introduced in order to facilitate international traffic and promote interregional and international trade and commerce. There is a need to facilitate the passage of road vehicles across the border points. With the new global changes and the introduction of the World Trade Organization (WTO) the need to provide the most convenient path for the transporting vehicles will imply that unless the border crossing formalities are eased then the region will lose its edge as a major provider for transit traffic.

The lack of harmonized standards for truck axle loads, gross weight, and truck dimensions, has been one factor resulting in delays at the border crossing points. Some countries in the ESCWA region will allow trucks with weights in excess of their national limits to pay a fine per extra ton and then to proceed with their journey. Other states will not allow such violating trucks to cross the borders unless they abide by the standard axle loads and dimensions of their national standards. This implies that the truck has to unload part of the excessive load in another transporting vehicle in order to meet the requirements. Otherwise they will be asked to return to their point of origin. The existence of different standards has, therefore, shown to be a cause of delays at border crossing points. Any effort towards standardizing truck loads and dimensions will support efforts aiming at facilitation of border crossing.

This paper intends basically to illustrate the existing regulations related to the truck fleets and the allowable limits that exist in the region and the need to set standards and regional specifications that ought to be implemented in the region. In addition, the application of standard paper documents will be demonstrated. It will be illustrated that the use of unified specifications for the vehicle, the road, and the documents, in harmony with the international conventions, could considerably reduce delays. Consequently, this would eliminate the unnecessary extra costs usually associated with the transport component thus rendering trade more attractive in the region.

I. CURRENT TRUCK SPECIFICATIONS

A. TRUCK AXLE LOADS

Truck axle loads play a major part in the structural design of pavements. It is well known that as the axle loads increase, the deterioration of the pavement accelerates at a geometric factor. Therefore each country, and depending on the method of structural design, has set a maximum axle load for single, tandem, and triple axles. This is important in order to save the huge amounts on investments that were allocated to construct the road network. However other factors play a role in determining the maximum allowable axle load. For instance, less strict axle loads can be enforced in order to control the cost of shipping freight from one fixed point to the other.

In the ESCWA region it is clear, as shown in Table 1, that the allowable axle loads vary appreciably from one country to the other.

Table 1. Allowable Single and Double axle loads in the ESCWA region

Country	Single axle (tons)		Double axle (tons)		
	Front	Rear	<1.2	1.2-2	>2
Jordan	7.5	13		18	18
UAE	6.75	13			20
Bahrain	6	8			
Saudi Arabia	6	13		20	26
Syria		13		14.7-21	
Iraq	6	12	18	18	18
Oman					
Qatar		10			
Kuwait	3	11	14.7		
Lebanon					
Egypt	6	10		16	20
Yemen	7	13		18	20

The front axle load has little impact on the design and the variations are always within allowable tolerances. As for the rear single axle load, it is shown that while some countries, like Egypt, allow a maximum 10 tons, others like Saudi Arabia, allows 13 tons. This represents a 30 percent variation. The specifications for the tandem axle are so different and show a more remarkable variation. For instance, when the distance between the two axles is more than 2 m the variation in the allowable axle load is between 18 and 26 tons. This represents a difference of more than 40 percent. In addition, the allowable maximum load here is a function of the distance between the axles. Whereas some countries specify one value regardless of the variation, others like Bahrain specifies variations as follows:

Table 2. Variations in the tandem axle load in Bahrain

Distance from (m)	Distance less than (m)	Maximum axle load (tons)
0.9	1.0	14.7
1.0	1.1	16.1
1.1	1.2	17.5
1.2	1.3	18.9
1.3	1.5	20.3
1.35	2.5	21

With regards to the triple axles, the variations in specifications in the ESCWA region can be considered as negligible and the differences are negligible.

B. TRUCK GROSS WEIGHTS



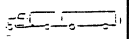
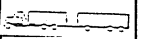
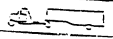
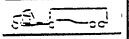
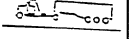


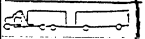
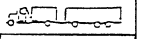
The gross weight of the truck is an important factor since it plays a major factor in the design of the structural components of the road, like bridges and box culverts. In addition the gross weight is considered as an easier factor to measure than those of the individual loads on the various axles of the truck. In fact most of the current weigh stations in the region measure the gross weight of the vehicles.

As is the case with the allowable loads on the axles, there are also wide variations in the gross truck weights, as shown in Table 3.

It is worth mentioning here that the specifications for the gross weight were not based on the allowable sum of the total allowable maximum axle loads. For instance, in Saudi Arabia the truck configuration No 7, which consists of a trailer and a semi trailer with triple axles, the maximum "theoretical" gross weight based on the allowable axle loads would be (6+45=51 tons). However, and as shown in table 3, the maximum allowable gross weight for this truck is 40 tons. This means that the allowable weight is only 78 percent of the "theoretical" weight. This explains why countries in the region would prefer to check the gross weight rather than the axle loads. Jordan, for example, is enforcing now a fine of about US\$ 15 per extra ton over the allowable weight.

One factor that is also related to the truck weights and may contribute largely to the delays is the method used to both measure and administer the weighing process. Trucks entering the borders should pass through weigh stations that are fixed weigh stations, random roving weigh stations, or high-speed screening sites. Static or fixed weigh stations have the advantage that they provide accurate results but have the disadvantage that they are slow and require large area. In order to minimize time and to speed up the operation it is recommended that the high-speed screening weigh stations be used.

Table 3. Allowable gross weights for the various truck configurations in the ESCWA region (in tons)

Type of truck and model #	Jordan	UAE	Bahrain	Saudi Arabia	Syria	Lebanon	Oman	Qatar	Kuwait	Iraq	Egypt	Yemen
	21	19	16.3	19	19				16		16	20
	27	25	22.4	26	26				24		22	28
	36				35				45		36	
	48	44									48	30
	30	30		32	26				29		26	22
	40	35	32.5	39	35				45		36	41
	46	44		40	38		45	32	45		38/46	45
	40			39					45		32	41
	46	44		40	45				45		38/46	45
10	50								45		44/52	45
											42	45
											42	45

Another factor that will require standardization is the amount of fine that should be collected and the method of arriving at the amount of fine to be collected per extra ton of weight of truck or axle load. Standards have to be established for the weigh-stations where a driver entering any new border will be familiar with the procedures to be followed with respect to enforcement of loads.

C. TRUCK DIMENSIONS

The various dimensions of trucks are important either for their safety upon maneuvering curves or are very important for the design of superstructures, such as bridges, or tunnels.

The specified widths that are presently allowed are within 2.5 and 2.6 meters. These are in conformity with international standards that in general call for a maximum width of 2.6 meters. This width was based on the standard width of containers i.e. 1.2 meters. A truck usually carries two containers in a trip. Thus a minimum width of $2 \times 1.2 = 2.4$ m plus 2×0.1 m (for clearance on each side) = 2.6 m.

The specified heights for trucks, however, pose some problems. As shown in Table 4 the allowable heights for vehicles range between 3.5 meters and 4.5 meters. The specified maximum height of the trucks has to meet two requirements: it has to provide a minimum clearance under the bottom of the superstructures and it has to handle loaded containers safely. The latter have standard dimensions of 8x8x20 feet or 8x8x40 feet. It is known that the height of the truck haulage area from the road surface ranges between 1.4 to 1.6 meters. This means that if we add the height of the container of 2.44-m (8 feet) then the total clearance required to accommodate a truck carrying containers shall be not less than 4 meters. This implies that the specified maximum height for the loaded truck as 3.5 m in some countries will not be practical and will stand as an obstacle for transit trucks. Not only this but also the recent discussions about using the non standardized containers (with a height of 8.5 and 9.0 feet) will make the problem even more serious, especially with the new worldwide trend to increase containerization traffic.

Table 4. The allowable dimensions for trucks in the ESCWA region

Country	Width (m)	Height (m)	Length (m)			
			2 Axles Vehicles	3 Axles Vehicles	Truck and semi trailer	Truck and trailer
Jordan	2.6	4.2	10	12	16.2	18
UAE	2.6	4.2	12		18	21
Bahrain	2.5	4	12	12	15	18
Saudi Arabia	2.5	4	11	12	18	
Syria	2.5		12		16	19
Iraq						
Oman	2.6	3.5				
Qatar	2.6	4	12		15	20
Kuwait	2.6	4.5	12		15	20
Lebanon						
Egypt	2.6	3.5	12	12	18	20
Yemen	2.6	4.2	12	18	18	18

The last parameter that needs to be standardized is the length of the truck. Table 5 shows that there is some variation in the specifications for the maximum allowable lengths of the various categories of the trucks.

The standards for the maximum lengths were established taking into considerations two factors: the psychology of the drivers and the safety of trucks at sharp curves. There are limits on both the front and rear overhang that a truck is allowed to have while maneuvering a curve.

Table 5. The Allowable limits for lengths of Trucks in the ESCWA region

Type of Vehicles	Permitted length (m)
2 -Axle Vehicles	10-12
3-Axle Vehicles	12
Truck and semi trailer	15-18
Truck and trailer	18-21

As was mentioned above, the newly proposed non- standard container has a total length of 14.9 m. When carried by a truck with a trailer, the total length of the vehicle will exceed 20 m. This is in excess of the maximum allowable length in many ESCWA countries.

II. STANDARD DOCUMENT FOR PASSAGE OF VEHICLES

One major cause of delays at border crossing points in the region is the lack of a standard document that allows a vehicle to cross the borders of a neighboring country. There has been worldwide concern regarding this issue since it requires a dainty balance between the requirements of the transport industry and the national economy on the one hand and the necessity to conform with the basic Governmental regulations relating to national health, security and customs duties. It was established through the study "Economic cost of Barriers to Road Transport" and completed in 1998 that the total losses due to congestion, borders, and traffic bans, etc vary between countries and are about 8% to 29% of the transport costs in the CEEC. These figures might be on the conservative side for the ESCWA region.

It is well known that border crossing formalities and procedures do involve two opposite border points and in some cases multiple points. It is important therefore that those bilateral or regional, and sometimes international, agreements be formulated to ease the flow of traffic.

More than fifty international agreements were developed for regulating transport operations. For land transport, the most prominent are the Customs Convention on the International Transport of Goods under the Cover of the TIR Carnets (TIR Convention, 1975), the International Convention on the Harmonization of Frontier Controls of Goods (1982), The Customs Convention on the International Transit of Goods (ITI Convention, 1971), and the International Convention on the Simplification and Harmonization of Customs Procedures (Kyoto Convention, 1973).

The TIR Convention is considered to be the most important international agreement that was concluded and has resulted in great facilitation at border points. In 1995 it had 62 contracting parties which included only two countries in the ESCWA: Jordan (1985) and Kuwait (1983). Recently both Lebanon and Syria have become additional members. For the transport operators this Convention has offered them with the possibility of preparing the placement under Customs control within the country of departure and enables them to cross the various border points with extremely rapid customs controls. The TIR Carnet is a document that is officially recognized by all the contracting parties. It has been recently used in a computerized form and this has resulted in further simplifications at border points. ESCWA members would benefit from adopting the TIR Convention, which could replace a large number of regional and bilateral agreements. An Arabic version of the Convention was developed and this could enhance its applicability in this region.

In the Arab region several attempts were made in order to facilitate the crossing of vehicles. Especially there are so many different procedures and regulations en force, which complicate the flow of traffic between borders. To show just one example, it was estimated that in the region there are at least 17 types of fees imposed on vehicles upon crossing other territories. Table 6 summarizes these fees which are implemented (one or more) at the various border. This has prompted several agencies to undertake efforts towards easing the procedures. Most prominent was the attempt to produce a Unified Arab Carnet to be recognized by all contracting parties. Long discussions took place under the umbrella of the League of Arab States in the 1990s but it finally encountered many deterrents for reaching a final agreement. Among those were the agreement on a chain of guarantees and the agreement on the agencies that will be authorized to issue the carnet.

Table 6. types of fees corrected from vehicles at various crossing points

Serial #	Type of fees
1	Stamps
2	Fuel Subsidy
3	Overtime Charges
4	Fees for Support of Public Agencies
5	Maintenance Subsidy
6	Fuel Tax
7	Security and Convoy Tax
8	Transit Tax
9	Fiche Tax
10	Fine for Unloading within 48 Hrs
11	Trip Ticket for Trucks
12	Insurance for Trip Ticket
13	Printing Fees

III. STANDARDS FOR THE REGIONAL ROAD NETWORK

The road construction in the ESCWA region has witnessed significant development in the last decades. For instance, in Jordan the length of paved roads has increased from a total of 2884 km in 1986 to 5037 km in 1997. Egypt, on the other hand, has seen a similar rapid growth in the construction of paved roads where the total length of paved roads increased from 15298 km in 1981 to more than 40000 km in 1996. It can be safely assumed that the major links have already been constructed and that there remain few links that need to be constructed in order to secure a complete road network. However it is important to mention here that there is a need in this region to specify a well-defined regional network with agreed upon standards and technical specifications.

There are few characteristics that describe the current road networks in the region. The most important is that the various road networks were constructed to serve as national roads and not as regional connections. For this reason different specifications were applied. The signing and the numbering systems do not follow any special standard. The elements of the cross section and the roadside elements are varied. It is important that a regional network with unified standards be developed in order to increase the regional cooperation and to facilitate the flow of both regional and international traffic.

The United Nations Economic Commission for Europe (ECE) has long time ago recognized the importance of defining a regional road network. The European Agreement on Main International Traffic Arteries (AGR Agreement) of 1975 aims at developing a coherent and comprehensive road network for international road traffic in Europe. It defines major European roads (E Road Network) and established uniform technical characteristics according to traffic volumes. This multilateral adoption of a unified system for the identification and numbering of E roads and of internationally recognized technical and operational standards has resulted in a more safe and effective operation of road transport.

ESCWA has started serious efforts in order to follow the steps undertaken by ECE in order that movement of people and goods between neighboring countries can be facilitated. As a first step a proposal for the major road corridors to be adopted has been prepared. Figure 1 shows the proposed regional network. The proposed numbering system is based on that of the AGR Agreement where the north-south oriented reference roads have two-digit numbers terminating in the figure 5 and increasing from west to east. East-west oriented reference roads have two-digit even numbers terminating in the digit 0 and increasing from north to south.

The proposed regional corridors will have to meet certain standards and specifications in order that they serve the purpose for which they were established. The following standards should be established:

- (a) Standards for the geometric design of roads including: the design speed, number of lanes, width of the lanes, shoulders, the median, right-of-way, roadside slopes, etc.
- (b) Standards for both the horizontal and vertical alignment of the road, including maximum vertical slopes, minimum-turning radii, super-elevations, minimum sight distances, etc.
- (c) Standards for axle loads and truck dimensions.
- (d) Standards for the design of intersections (grade and grade separated intersections).
- (e) Standards for the marking and signage of regional corridors.
- (IV) Standards for the structural design of the pavement.

It is important here to mention that in order for the proposal to meet success, maximum utilization and minimum changes should be introduced to the existing roads. It is expected, however, that new segments to be constructed along any of the proposed regional links should conform to the standards and technical specifications that will be finally agreed upon.

IV. CONCLUSIONS

This paper has presented some of the most important aspects related to the need to establish standards in the land transport sector. There are many areas in the land transport sector where standards and technical specifications have to be established in the region in order to facilitate border crossing formalities and assist in promoting trade among the countries of the region.

(a) In the area of documentation there is an urgent need to agree on standard documents for passage of vehicles and goods. Transport obstacles facing the issuance of a standard Arab Transit Carnet should be cleared.

(b) In the area of vehicles it is important that countries in the region reach an agreement on the maximum limits to be enforced on axle and gross weights of vehicles and also on the maximum dimensions to be allowed. These should be applied mainly for all vehicles crossing borders in order to lessen any delays related to inconsistencies in allowable loads or dimensions between neighboring countries.

(c) In the area of regional road network it is very important, after reaching an agreement on the regional road network, that standards be agreed upon and implemented in order to facilitate the flow of regional and international traffic. It is recommended that such standards be in harmony with international standards in order to better serve the international traffic.