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Inland Transport Committee

Working Party on Transport Trends and Economics**Group of Experts on Benchmarking Transport Infrastructure Construction Costs****Third session**

Geneva, 10 and 11 July 2017

Item 5 of the provisional agenda

Discussions on the structure of the final report of the Expert Group**Questionnaire on Benchmarking Road Transport
Infrastructure Construction Costs****Note by the secretariat and the road transport team of experts*****I. Mandate and main remarks****A. Mandate**

1. In accordance with its Terms of Reference, the Group of Experts is expected to complete its work within two years (2016-2018) and to submit a full report of its accomplishments (ECE/TRANS/WP.5/GE.4/2016/1). The Group of Experts shall assist in:

(a) Identify models, methodologies, tools and good practices for evaluating, calculating and analysing inland transport infrastructure construction costs;

(b) Identify and list terminologies used in the United Nations Economic Commission for Europe (UNECE) region for construction costs of inland transport infrastructure, if possible, create a glossary of agreed terminologies and related explanations;

(c) Collect and analyse data in order to prepare a benchmarking of transport infrastructure construction costs along the ECE region for each inland transport mode - road, rail, inland waterways - including intermodal terminals, freight/logistics centres and

* This document was submitted late due to delayed inputs from other sources.

ports. Analyse and describe the conditions / parameters under which these costs have been calculated on.

2. In carrying out its main tasks, the Group of Experts will, among others, also identify suitable methodological approaches, models and tools for gathering and disseminating information, i.e. conducting studies, distributing questionnaires, using existing studies and national strategies, existing best practices in calculating transport infrastructure construction costs, among others.

B. Main Remarks

3. The following remarks should be taken into consideration while considering the suggested questionnaire:

- (a) Currency is US\$;
- (b) Road related costs are preferably given excluding superstructures (tunnels, viaducts, bridges);
- (c) All costs and other data related with monetary units are as of 2016 prices;
- (d) All data are as of end of 2016;
- (e) If some data are not available, missing or not N/A (Not Applicable) should be noted;
- (f) The terminology used is based on the Glossary from the Texas Department of Transport (TxDOT). Experts should consider the terminology used and make relevant comments / amendments.

II. Questionnaire

4. Question 1: Provide the following social and economic indicators

GNP (US\$) (end of 2016)	
Population (end of 2016)	
GNP per capita (US\$) (end of 2016)	
Surface area (km ²)	
Density (end of 2016)	
Length of roads (end of 2016) (km)	High Classified Roads (HCR)-motorways
	Medium Classified Roads (MCR)-primary roads
	Single Carriageway
	Double Carriageway
	Medium Classified Roads (MCR)-secondary roads
	Single Carriageway
	Double Carriageway
	Low Volume Rural Roads

HCR_Motorways per 1000 km² (end of 2016)
MCR_Primary Roads per 1000 km² (end of 2016)
MCR_Secondary Roads per 1000 km² (end of 2016)
Paved roads in length (end of 2016) (km)
Unpaved roads in length (end of 2016) (km)
Percentages of paved roads (end of 2016) (%)
Annual total investment budget (US\$) (2016 Fiscal Year)
Annual investment budget of transportation (US\$) (2016 fiscal year)
Annual investment budget of road infrastructure (US\$) (2016 fiscal year)
Annual Investment Budget of Road Infrastructure as Percentage of GNP (%)
Annual constructed roads in length (km) (end of 2016)
Annual constructed double carriageway roads in length (km) (end of 2016)
Annual constructed single carriageway roads in length (km) (end of 2016)
Annual constructed tunnels in length (m) (end of 2016)
Annual constructed bridges in length (m) (end of 2016)

5. Question 2: Construction costs of bridges and tunnels

Unit Construction Cost Of Tunnels (2017 prices)

single tube tunnel (US\$/m)
twin tube tunnel (US\$/m)

Unit Construction Cost Of Bridges (2017 prices)

pre-stressed simple beam (US\$/m ²)
balanced cantiliver bridge (US\$/m ²)
cable stayed bridge (US\$/m ²)
suspension bridge (US\$/m ²)

6. Question 3: Construction costs of asphalt roads

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads)

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Pavement	HCR_Motorways-Expressways	N/A				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads)

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Replacement	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Reconditioning	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
MCR_Secondary Roads	Flat					
	Rolling					
	Mountainous					
Reconstruction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Expansion (capacity improvement)	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
New	HCR_Motorways-Expressways	Flat				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads)

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
construction	MCR_Primary Roads	Rolling				
		Mountainous				
		Flat				
	MCR_Secondary Roads	Rolling				
		Mountainous				
		Flat				

7. Question 4: Construction costs of asphalt roads (2 x 1 roads)

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 1 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Pavement replacement	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Reconditioning	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 1 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Reconstruction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Expansion (capacity improvement)	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
New construction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				

8. Question 5: Construction costs of asphalt roads (2 x 2 roads)

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 2 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Pavement replacement	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Reconditioning	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Reconstruction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Expansion (capacity)	HCR_Motorways-Expressways	Flat				
		Rolling				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 2 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
improvement)	MCR_Primary Roads	Mountainous				
		Flat				
		Rolling				
	MCR_Secondary Roads	mountainous				
		Flat				
		Rolling				
New construction	HCR_Motorways-Expressways	Mountainous				
		Flat				
		Rolling				
	MCR_Primary Roads	Mountainous				
		Flat				
		Rolling				
MCR_Secondary Roads	Mountainous					
	Flat					
	Rolling					
		Mountainous				

9. Question 6: Construction costs of asphalt roads (2 x 3 or more lanes roads)

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 3 or more lanes roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Pavement replacement	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Reconditioning	HCR_Motorways-Expressways	Flat				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 3 or more lanes roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Reconstruction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Expansion (capacity improvement)	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
New construction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for asphalt roads (2 x 3 or more lanes roads))

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				

10. Question 7: Construction costs of concrete roads

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads)

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Pavement replacement	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Reconditioning	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Reconstruction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads)

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Expansion (capacity improvement)	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
New construction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				

11. Question 8: Construction costs of concrete roads (2 x 1 roads)

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 1 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 1 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>	
	MCR_Secondary Roads	N/A					
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A					
	MCR_Primary Roads	N/A					
Pavement replacement	MCR_Secondary Roads	N/A					
	HCR_Motorways-Expressways	N/A					
	MCR_Primary Roads	N/A					
Reconditioning	HCR_Motorways-Expressways	N/A					
		Flat					
		Rolling					
			Mountainous				
	MCR_Primary Roads	Flat					
		Rolling					
		Mountainous					
	MCR_Secondary Roads	Flat					
		Rolling					
Mountainous							
Reconstruction	HCR_Motorways-Expressways	Flat					
		Rolling					
		Mountainous					
	MCR_Primary Roads	Flat					
		Rolling					
		Mountainous					
	MCR_Secondary Roads	Flat					
		Rolling					
		Mountainous					
Expansion (capacity improvement)	HCR_Motorways-Expressways	Flat					
		Rolling					
		Mountainous					
	MCR_Primary Roads	Flat					
		Rolling					

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 1 roads))

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median
New construction	MCR_Secondary Roads	mountainous				
		Flat				
		Rolling				
	HCR_Motorways-Expressways	Mountainous				
		Flat				
		Rolling				
	MCR_Primary Roads	Mountainous				
		Flat				
		Rolling				
	MCR_Secondary Roads	Mountainous				
		Flat				
		Rolling				
		Mountainous				

12. Question 9: Construction costs of concrete roads (2 x 2 roads)

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 2 roads))

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median
Resurfacing	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Pavement replacement	HCR_Motorways-Expressways	N/A				
	MCR_Primary Roads	N/A				
	MCR_Secondary Roads	N/A				
Reconditioning	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 2 roads))

Countries

<i>Work title</i>	<i>Road class</i>	<i>Terrain type</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>	<i>Median</i>
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Reconstruction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
Expansion (capacity improvement)	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
New construction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 2 roads))

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median
		Rolling				
		Mountainous				

13. Question 10: Construction costs of concrete roads (2 x 3 or more lanes roads)

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 3 or more lanes roads))

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median	
Resurfacing	HCR_Motorways-Expressways	N/A					
	MCR_Primary Roads	N/A					
	MCR_Secondary Roads	N/A					
Resurfacing by strengthening	HCR_Motorways-Expressways	N/A					
	MCR_Primary Roads	N/A					
	MCR_Secondary Roads	N/A					
Pavement replacement	HCR_Motorways-Expressways	N/A					
	MCR_Primary Roads	N/A					
	MCR_Secondary Roads	N/A					
Reconditioning	HCR_Motorways-Expressways	Flat					
		Rolling					
		Mountainous					
	MCR_Primary Roads	Flat					
		Rolling					
		Mountainous					
	MCR_Secondary Roads	Flat					
		Rolling					
		Mountainous					
	Reconstruction	HCR_Motorways-Expressways	Flat				
			Rolling				
			Mountainous				
MCR_Primary Roads		Flat					
		Rolling					
		Mountainous					

Road infrastructure construction costs (2017 prices) (US\$/lane x km) (for concrete roads (2 x 3 or more lanes roads))

Countries

Work title	Road class	Terrain type	Maximum	Average	Minimum	Median
Expansion (capacity improvement)	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				
	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		mountainous				
MCR_Secondary Roads	Flat					
	Rolling					
	Mountainous					
New construction	HCR_Motorways-Expressways	Flat				
		Rolling				
		Mountainous				
	MCR_Primary Roads	Flat				
		Rolling				
		Mountainous				
	MCR_Secondary Roads	Flat				
		Rolling				
		Mountainous				

14. Question 11: Superstructures

Average superstructures in length by terrain type (%)

Work title	Road class	Terrain type					
		Flat		Rolling		Mountainous	
		Bridges	Tunnels	Bridges	Tunnels	Bridges	Tunnels
Reconditioning	HCR_Motorways-Expressways						
	MCR_Primary Roads						

Average superstructures in length by terrain type (%)

Work title	Road class	Terrain type					
		Flat		Rolling		Mountainous	
		Bridges	Tunnels	Bridges	Tunnels	Bridges	Tunnels
	MCR_Secondary Roads						
Reconstruction	HCR_Motorways-Expressways						
	MCR_Primary Roads						
	MCR_Secondary Roads						
Expansion (capacity improvement)	HCR_Motorways-Expressways						
	MCR_Primary Roads						
	MCR_Secondary Roads						
New construction	HCR_Motorways-Expressways						
	MCR_Primary Roads						
	MCR_Secondary Roads						