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Group of Experts on Benchmarking Transport Infrastructure Construction Costs

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Collection and analysis of benchmarking data

Benchmarking analysis of road transport infrastructure construction costs in the ECE region

Submitted by the Group of Experts on Transport Infrastructure Construction Costs

I. Introduction

1. An important part of the mandate of the Group of Experts on Transport Infrastructure Construction Costs (GE.4) was to collect and analyse data to prepare a benchmarking analysis of transport infrastructure construction costs in the United Nations Economic Commission for Europe (ECE) region for each inland transport mode – road, rail, inland waterways – including intermodal terminals, freight/logistics centres and ports. The current report provides an overview of the analysis of road infrastructure construction costs received from a group of twelve ECE member States. The Government of Turkey has taken the lead on the road sector data analysis.

II. Approach for Data Analysis

2. The results of the questionnaire turned out to be useful for gaining insights into the difference observed in construction costs per km. Since the focus of the study was on the construction costs of the projects, the data was verified, organized, transformed, and extracted in an appropriate output form for subsequent use.

A. Data Reverification

3. After ensuring the integrity of the data, a comprehensive data verification strategy was applied to ensure that the data is free from any human or logical errors. The project details shared in the questionnaires were reverified using desk research to remove any errors or any misrepresentations.

B. Removing the Blanks

4. As mentioned earlier, the data received was sparse and scattered. The first challenge was to bring the data to a readable format which could later be analysed. For that purpose, all the projects with missing construction costs and project lengths were removed from the final dataset, as they did not serve any purpose to the study.

C. Standardizing the Cost Unit

5. Different countries gave their costs in their National Currencies. Since all values were to be handled in USD, all construction costs were then converted to USD. This was carried out using the ECE "Market price exchange rate" tool.[1] For countries which were not reflected in the tool, foreign exchange rate at the end of fiscal year of 2016 was adopted.

D. Data Normalization

6. Once the errors were removed and the costs were standardized to 2016—all construction cost data was turned into 2016 USD prices using the GDP Deflators.[2] The GDP price deflator was used as it presents a more accurate portrait of an economy where currency values may be in flux.

GDP Price Deflator = (Nominal GDP ÷ Real GDP) × 100

7. Using the United Nations GDP Deflators, changes in prices over several periods were measured. The implicit price deflator value was divided by 100 and then to bring the prices to reflect those of the year 2016, the costs of the concerned projects with the result was divided. However, for the data reflecting 2019 and 2020 prices an average value from the previous two years were used for GDP Deflator.

E. Compilation of Data

8. Once the data was normalized to 2016 — it was combined into a single spreadsheet and analysis was carried out to determine differences between the construction costs per km across countries.

F. Delving into the Data

9. In order to better appreciate the meaning of the results obtained in the course of this study, data for the construction projects were compared with the different factors influencing the construction costs including the direct input costs of the construction in order to (a) Determine why some countries report more costs of constructions and (b) determining the factors that affect the construction costs to varying degrees.

G. Data Limitations

10. The data sample received from the countries was sparse and carried limitations that impacted or influenced the interpretation of the research in the following capacities:

1. Data Sparsity

11. The data received from most countries was not enough for an in-depth analysis — which was a major setback. Most questionnaires were left unanswered — like the ones for ports, intermodal terminals and inland waterways while the questionnaires that were submitted were partially filled. For example, most road questionnaires were partially filled

[1] w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT 20- ME 6-MEER/30_en_MECCExchPPPsNEWY_r.px/

[2] unstats.un.org/unsd/amaapi/api/file/15

and breakdown project costs like the costs of bridges and viaducts, tunnels, pedestrian crossings etc. were left out. Such cases left no room to analyse the data in any way.

2. Missing Links and Data Access

12. Interpretation of the received findings led to the discovery that that there were few missing details in the questionnaires that inhibited the potential of a thorough analysis of the results like lane width, international standards etc. This served as a challenge because there is limited data available on open sources for such aspects and even fewer research studies on construction costs' benchmarking that could help a thorough analysis.

III. Benchmarking socio-economic indicators

A. Socio-economic indicators

13. In the following tables, Table A-1 to Table A-5 socioeconomic indicators by countries are given. The following graphs have been produced based on data received from countries.

Table III.1
Socio-Economic Indicators by Countries

			Austria	*Bulgaria*	*Croatia*
GNP (US $) (End of 2016)			395 197 917 596.40	53 102 474 547.50	50 063 797 663.80
Population (End 0f 2016)			8 736 668.00	7 127 822.00	4 172 441.00
GNP Per Capita (US $) (End of 2016)			46 220.00	7 580.00	12 390.00
Surface Area (Km^2)			83 858.00	110 993.00	56 542.00
Density (End of 2016) Person/Km^2			104.00	64.00	74.00
Length of Roads (End Of 2016) (Km)	High Classified Roads (HCR)_Motorways		2 208.19	322.69	1 419.52
	Medium Classified Roads (MCR)_Primary Roads	Single Carriageway	10 006.86	757.77	7 032.50
		Double Carriageway	-	809.71	196.90
	Medium Classified Roads (MCR)-Secondary Roads	Single Carriageway	23 636.81	1 333.74	9 413.00
		Double Carriageway	-	1 048.00	-
	Other Roads	Single Carriageway	97 745.21	-	8 794.14
		Double Carriageway	-	-	-
Length of Bridges (End of 2016) (M)			352 581.00	19 330.06	104 290.00
Length of Tunnels (End of 2016) (M)			164 839.00	4 380.00	70 970.00
HCR_Motorways Per 1000 Km^2 (End of 2016)			26.32	-	-
MCR_Primary Roads Per 1000 Km^2 (End of 2016)			119.27	-	-
MCR_Secondary Roads Per 1000 Km^2 (End of 2016)			281.73	-	-
Annual Investment Budget of Roads (US $) (2016 Fiscal Year)			907 025 233.98	-	145 023 750.00
Annual Road Investment by PPP (US $) (Average of the Last Five Years 2012-2016)			-	-	-
Annual Investment Budget of Roads as Percentage of GNP (%) (Including Yearly PPP Investment)			2.57	-	-
Annual Constructed Roads in Length (Km) (End of 2016)			73.60	-	-
Annual Constructed Double Carriageway Roads in Length (Km) (Average of the Last Five Years 2012–2016)			4.66	-	5.00
Annual Constructed Single Carriageway Roads in Length (Km) (Average of the Last Five Years 2012–2016)			68.95	-	0.50
Annual Constructed Tunnels in length (M) (Average of the Last Five Years 2012–2016)			7.90	-	1 300.00

	Austria	*Bulgaria*	*Croatia*
Annual Constructed Bridges in Length (M) (Average of the Last Five Years 2012–2016)	-	-	500.00
Design Cost as Percentage of Construction Cost (%) (End of 2016)	10.00	-	2.50

Table III.2
Socio-Economic Indicators by Countries

			Cyprus	*Estonia*	*Finland*
GNP (US $) (End of 2016)			20 055 640 912.10	22 239 718 030.00	236 800 000 000.00
Population (End of 2016)			851 560.00	1 315 635.00	5 495 000.00
GNP Per Capita (US $) (End of 2016)			24 700.00	16 904.00	43 400.00
Surface Area (Km^2)			9 251.00	43 432.00	338 434.00
Density (End of 2016) Person/Km^2			92.00	30.00	17.40
Length of Roads (End of 2016) (Km)	High Classified Roads (HCR)_Motorways		-	0.00	992.00
	Medium Classified Roads (MCR)_Primary Roads	Single Carriageway	-	1 455.00	12 077.00
		Double Carriageway	-	154.00	485.00
	Medium Classified Roads (MCR)-Secondary Roads	Single Carriageway	-	2 405.00	13 382.00
		Double Carriageway	-	0.00	24 241.00
	Other Roads	Single Carriageway	-	12 592.00	26 802.00
		Double Carriageway	-	0.00	0.00
Length of Bridges (End of 2016) (M)			25 875	24 505.00	384 703.00
Length of Tunnels (End of 2016) (M)			2 000	0.00	-
HCR_Motorways Per 1000 Km^2 (End of 2016)			70	0.00	2.93
MCR_Primary Roads Per 1000 Km^2 (End of 2016)			52	37.05	37.11
MCR_Secondary Roads Per 1000 Km^2 (End of 2016)			248	55.37	111.17
Annual Investment Budget of Roads (US $) (2016 Fiscal Year)			-	168 576 942.50	373 200 000.00
Annual Road Investment by PPP (US $) (Average of the Last Five Years 2012-2016)			40 000 000.00	0.00	83,978,000.00
Annual Investment Budget of Roads as Percentage of GNP (%) (Including Yearly PPP Investment)			-	0.758	0.16
Annual Constructed Roads in Length (Km) (End of 2016)			8	2 485.00	42.46
Annual Constructed Double Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			6	84.00	28.86
Annual Constructed Single Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			2	2 401.00	13.60
Annual Constructed Tunnels in length (M) (Average of the Last Five Years 2012-2016)			-	0.00	-
Annual Constructed Bridges in Length (M) (Average of the Last Five Years 2012-2016)			-	6 102.00	-
Design Cost as Percentage of Construction Cost (%) (End of 2016)			1.5	3.00	3.50

Table III.3
Socio-Economic Indicators by Countries

			Germany	*Iceland*	*Italy*
GNP (US $) (End of 2016)			3 853 184 000 000.00	20 106 000 000.00	1 863 000 000 000.00
Population (End of 2016)			82 180 000.00	338 349.00	60 600 000.00
GNP Per Capita (US $) (End of 2016)			57 671.00	59 423.85	30 742.50
Surface Area (Km^2)			357 376.00	102 775.00	301 338.00
Density (End of 2016) Person/Km^2			230.00	3.29	200.80
Length of Roads (End Of 2016) (Km)	High Classified Roads (HCR)_Motorways		12 996.00	-	7 000.00
	Medium Classified Roads (MCR)_Primary Roads	Single Carriageway	34 465.00	3 111.00	20 000.00
		Double Carriageway	3 602.00	94	-
	Medium Classified Roads (MCR)-Secondary Roads	Single Carriageway	178 909.00	4 414.00	150 000.00
		Double Carriageway	-	-	-
	Other Roads	Single Carriageway	600 000.00	5 108.00	500 000.00
		Double Carriageway	-	-	-
Length of Bridges (End of 2016) (M)			2 131 877.00	31 111	-
Length of Tunnels (End of 2016) (M)			269 000.00	50 712	-
HCR_Motorways Per 1000 Km^2 (End of 2016)			36.37	-	23.00
MCR_Primary Roads Per 1000 Km^2 (End of 2016)			106.52	31	60.40
MCR_Secondary Roads Per 1000 Km^2 (End of 2016)			500.62	43	498.30
Annual Investment Budget of Roads (US $) (2016 Fiscal Year)			7 421 820 000.00	218 000 000.00	6 000 000 000.00
Annual Road Investment by PPP (US $) (Average of the Last Five Years 2012-2016)			362 850 000.00	-	-
Annual Investment Budget of Roads as Percentage of GNP (%) (Including Yearly PPP Investment)			0.20	1.09	0.30
Annual Constructed Roads in Length (Km) (End of 2016)			113.00	102	-
Annual Constructed Double Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			47.00	14	-
Annual Constructed Single Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			66.00	88	-
Annual Constructed Tunnels in length (M) (Average of the Last Five Years 2012-2016)			5 500.00	1 508	-
Annual Constructed Bridges in Length (M) (Average of the Last Five Years 2012-2016)			13 239.00	155	-
Design Cost as Percentage of Construction Cost (%) (End of 2016)			18.00	0.1	5,0–10,0

Table III.4
Socio-Economic Indicators by Countries

	Latvia	*Republic of Moldova*	*Russian Federation*
GNP (US $) (End of 2016)	27 663 388 541.90	8 526 490 539.00	1 247 227 421 134.20
Population (End 0f 2016)	1 959 536.00	3 551 954.00	144 342 396.00

			Latvia	*Republic of Moldova*	*Russian Federation*
GNP Per Capita (US $) (End of 2016)			14 600.00	3 180.00	9 750.00
Surface Area (Km^2)			64 589.00	33 845.00	17 098 250.00
Density (End of 2016) Person/Km^2			30.00	105.00	8.80
Length of Roads (End Of 2016) (Km)	High Classified Roads (HCR)_Motorways		-	0.00	5 298.55
	Medium Classified Roads (MCR)_Primary Roads	Single Carriageway	1 565.00	783.00	35 074.88
		Double Carriageway	107.00	59.00	4 149.08
	Medium Classified Roads (MCR)-Secondary Roads	Single Carriageway	5 466.00	2 525.80	400 415.72
		Double Carriageway	-	0.00	-
	Other Roads	Single Carriageway	12 984.00	6 017.90	1 049 230.06
		Double Carriageway	-	0.00	-
Length of Bridges (End of 2016) (M)			315.21	26 856.00	2 361 196.67
Length of Tunnels (End of 2016) (M)			-	0.00	58 752.36
HCR_Motorways Per 1000 Km^2 (End of 2016)			-	0.00	-
MCR_Primary Roads Per 1000 Km^2 (End of 2016)			25.89	24.90	-
MCR_Secondary Roads Per 1000 Km^2 (End of 2016)			84.65	74.60	-
Annual Investment Budget of Roads (US $) (2016 Fiscal Year)			316 609 200.00	81 236 913.00	4 794 254 077.51
Annual Road Investment by PPP (US $) (Average of the Last Five Years 2012-2016)			-	0.00	1 692 353 733.35
Annual Investment Budget of Roads as Percentage of GNP (%) (Including Yearly PPP Investment)			1.03	1.20	0.38
Annual Constructed Roads in Length (Km) (End of 2016)			440.00	9.80	2 736.62
Annual Constructed Double Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			-	0.00	-
Annual Constructed Single Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			440.00	9.80	-
Annual Constructed Tunnels in length (M) (Average of the Last Five Years 2012-2016)			-	0.00	2.74
Annual Constructed Bridges in Length (M) (Average of the Last Five Years 2012-2016)			242.00	0.00	50.49
Design Cost as Percentage of Construction Cost (%) (End of 2016)			-	1.07	12.00

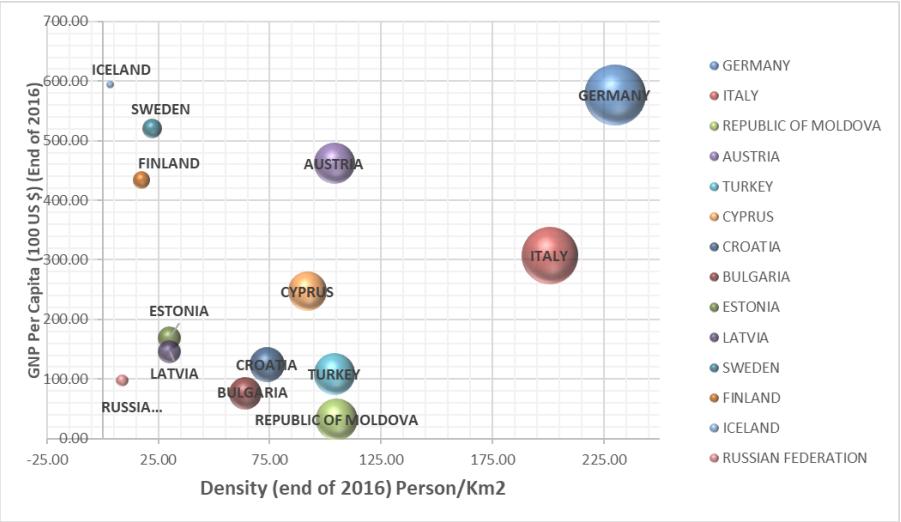
Table III.5
Socio-Economic Indicators by Countries

			Sweden	*Turkey*
GNP (US $) (End of 2016)			520 418 000 000.00	856 791 000 000.00
Population (End 0f 2016)			9 995 153.00	79 814 871.00
GNP Per Capita (US $) (End of 2016)			52 067.00	10 807.00
Surface Area (Km^2)			447 400.00	769 604.00
Density (End of 2016) Person/Km^2			22.30	104.00
Length of Roads (End of 2016) (Km)	High Classified Roads (HCR)_Motorways		2 078.00	2 542.00
		Single Carriageway	5 911.00	11 316.00

			Sweden	*Turkey*
	Medium Classified Roads (MCR)_Primary Roads	Double Carriageway	454.00	19 790.00
	Medium Classified Roads (MCR)-Secondary Roads	Single Carriageway	17 826.00	32 015.00
		Double Carriageway	115.00	1 498.00
	Other Roads	Single Carriageway	72 141.00	175 429.00
		Double Carriageway	15.00	-
Length of Bridges (End of 2016) (M)			418.00	520 934.00
Length of Tunnels (End of 2016) (M)			6.60	345 851.00
HCR_Motorways Per 1000 Km^2 (End of 2016)			4.60	3.30
MCR_Primary Roads Per 1000 Km^2 (End of 2016)			14.20	40.40
MCR_Secondary Roads Per 1000 Km^2 (End of 2016)			40.10	43.50
Annual Investment Budget of Roads (US $) (2016 Fiscal Year)			923 224 277.00	6 080 901 283.00
Annual Road Investment by PPP (US $) (Average of the Last Five Years 2012-2016)			0.00	1 657 913 741.00
Annual Investment Budget of Roads as Percentage of GNP (%) (Including Yearly PPP Investment)			0.20	0.90
Annual Constructed Roads in Length (Km) (End of 2016)			30.00	1 761.00
Annual Constructed Double Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			15.00	794.00
Annual Constructed Single Carriageway Roads in Length (Km) (Average of the Last Five Years 2012-2016)			15.00	967.00
Annual Constructed Tunnels in length (M) (Average of the Last Five Years 2012-2016)			5 900.00	39 339.00
Annual Constructed Bridges in Length (M) (Average of the Last Five Years 2012-2016)			5 000.00	26 395.00
Design Cost as Percentage of Construction Cost (%) (End of 2016)				3-5

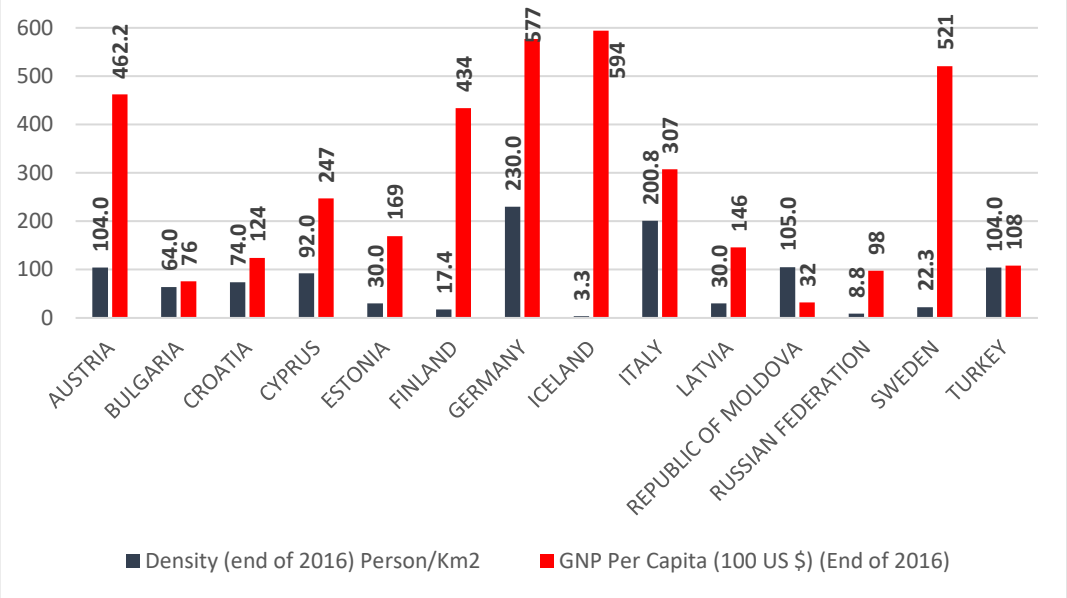
14. In the following bubble graph density versus GNP per capita of countries which answered the questionnaire are plotted. Dimensions of bubbles represent density. From the following graph it is seen that there is no relation between density and GNP per capita of the countries. On the other hand, for the countries Austria, Germany, Iceland, Finland and Sweden GNP per capita is pretty high compared with other countries.

Figure III.1
GNP Per Capita Versus Density (End of 2016)



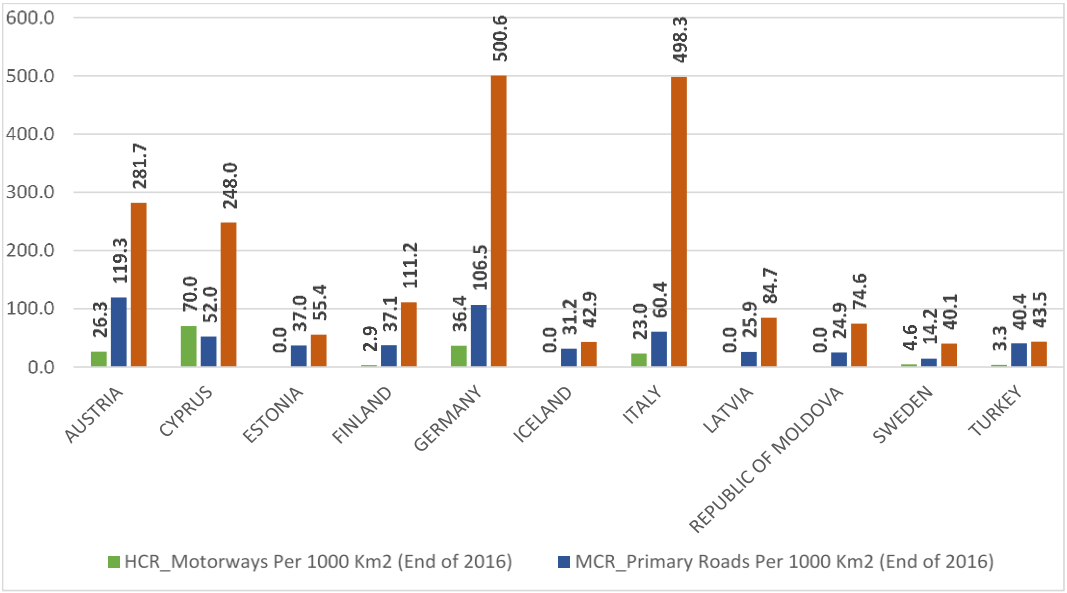
15. In addition to bubble graph the following bar chart is also plotted to illustrate density and GNP per capita indicators. Germany, Iceland and Sweden GNP per capita is almost higher than US $ 50,000. For Austria GNP per capita is also high but comparatively lower than these three countries. On the other hand, Germany, and Italy are more densely populated countries. Regarding all countries the size of the countries in terms of density and economy are not similar.

Figure III.3
Density and GNP Per Capita (End of 2016)



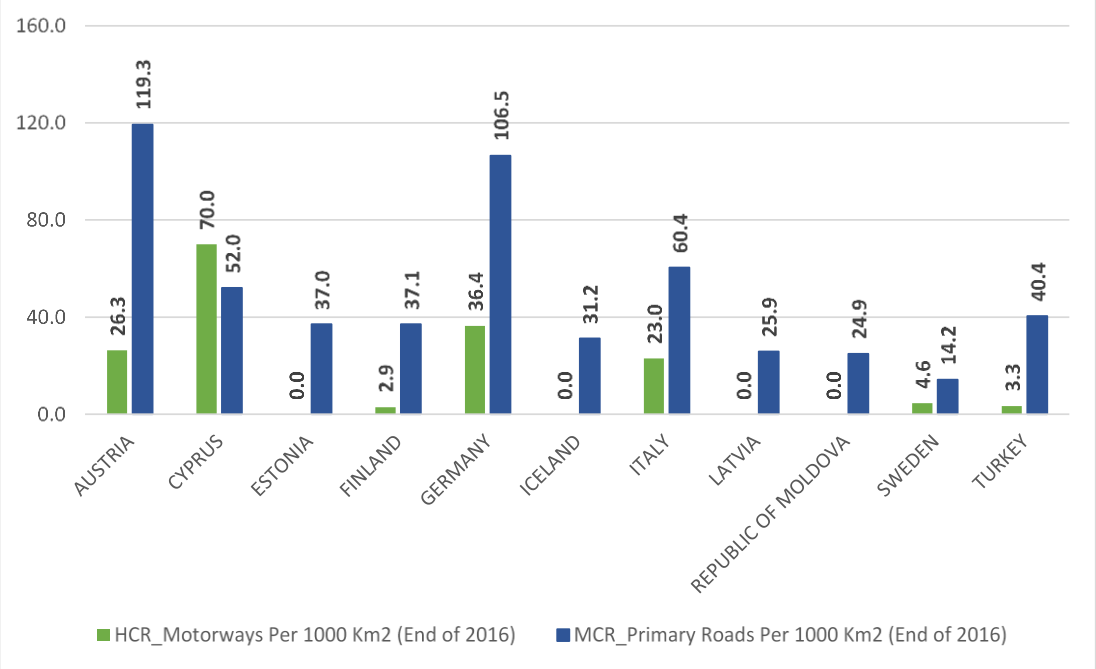
16. In the following bar charts road densities by their class are also given. Countries like Germany and Italy, secondary roads are very dense. On the other hand, there are not any motorways for countries namely Estonia, Iceland, Latvia and Republic of Moldova.

Figure III.7
HCR_Motorways, MCR_Primary Roads, MCR_Secondary Roads Per 1000 Km^2 by Countries (End of 2016)



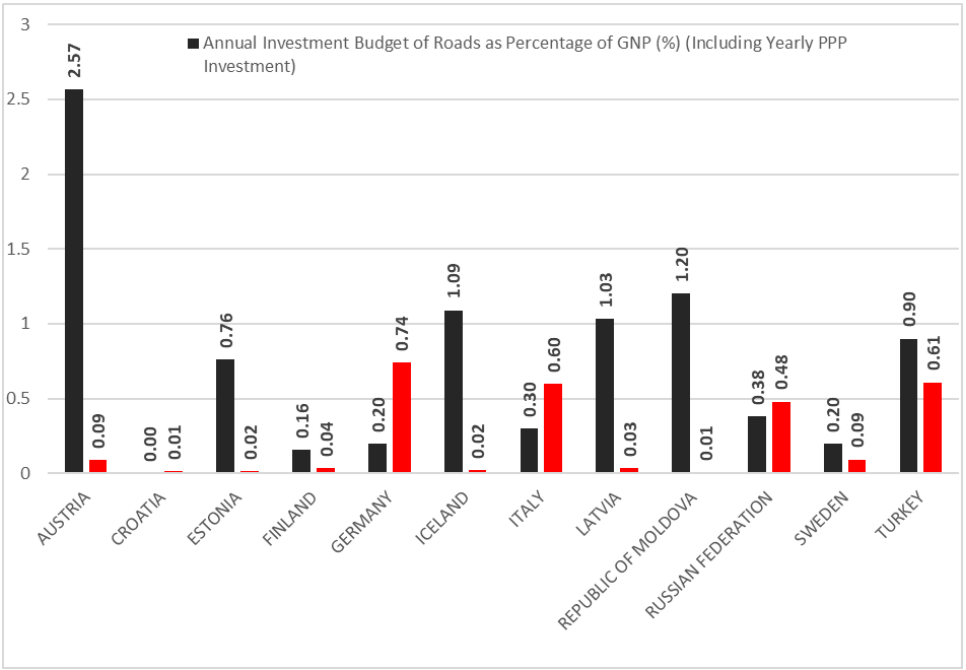
17. The following bar chart also shows for the countries Austria, Germany and Italy MCR_Primary Road are also dense.

Figure III.8
MCR_Primary Roads, MCR_Secondary Roads Per 1000 Km^2 by Countries (End of 2016)



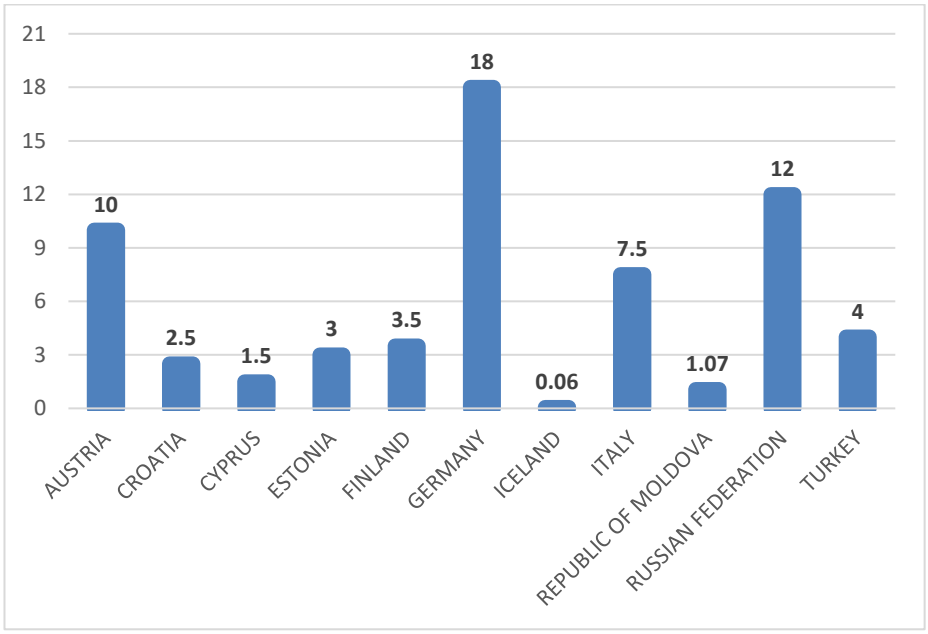
18. In the following bar chart, it is seen that annual investment budget of roads as percentage of GNP is pretty high in Austria as 2.57 per cent.

Figure III.10
Indicators on Annual Investment Budget of Roads by Countries (2016 Fiscal Year)



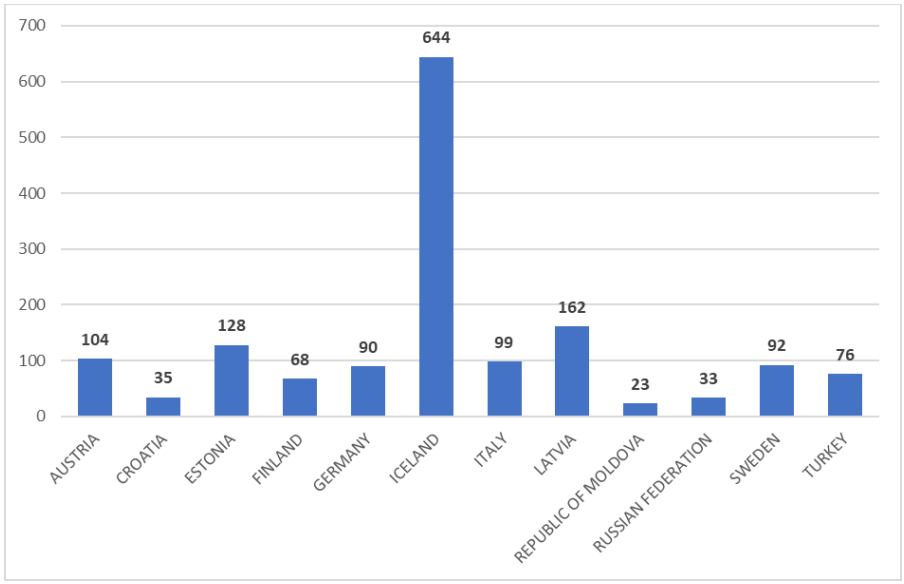
19. The following, bar chart shows design cost as percentage of construction cost. Germany' value is pretty high at 18 per cent, comparing with other countries. Additionally, the Russian Federation's, Austria's and Italy's values are also relatively high.

Figure III.14
Design Cost as Percentage of Construction Cost (per cent) by Countries (End of 2016)



20. The following, bar chart also shows annual investment budget of roads per population. Iceland's value is fairly high as 644 US $ per person compared with other countries.

Figure III.17
Annual Investment Budget of Roads Per Population (US $/Person) (2016 Fiscal Year)

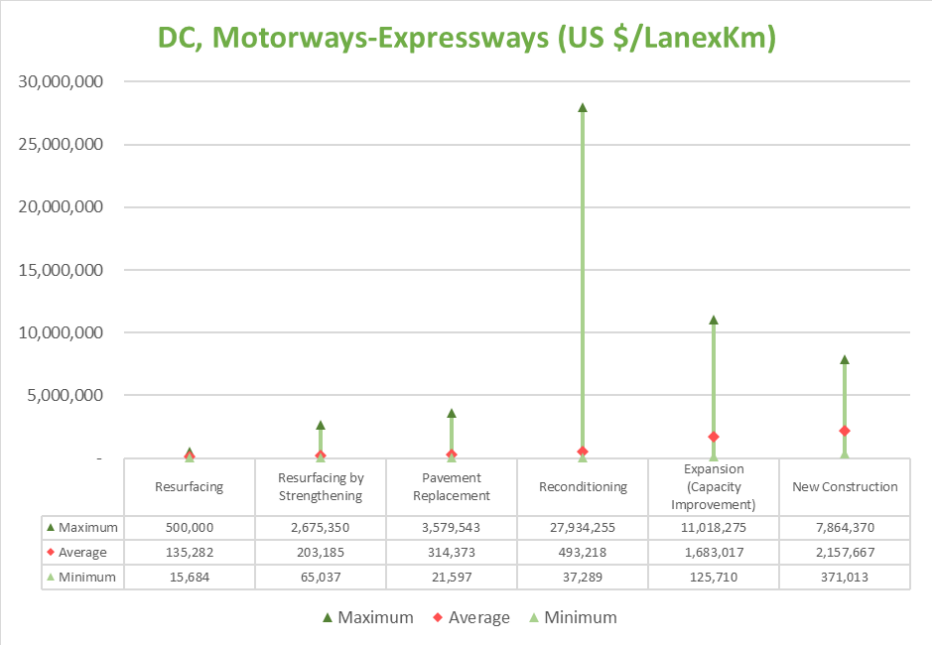


IV. Benchmarking double carriageway asphalt roads construction costs analysis for all work types

21. The following three graphs present a summary of double carriageway asphalt road unit costs analysis of all countries provided data. These graphs show unit cost of double carriageway asphalt roads as maximum, minimum and averages by work types as resurfacing, resurfacing by strengthening, pavement replacement, reconditioning, expansion and new construction.

Figure IV.1

Benchmarking of Double Carriageway Roads – Motorways and Expressways Construction Costs for all Member Countries Which Sent Data (US $/LanexKm) (2016 prices)



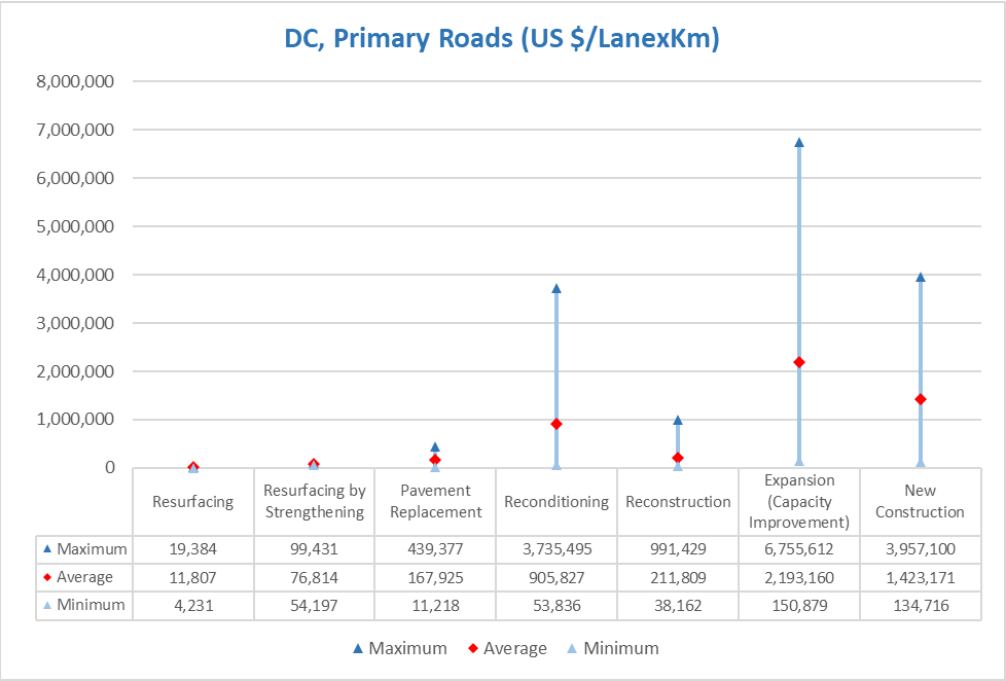
	Resurfacing	Resurfacing by Strengthening	Pavement Replacement	Reconditioning	Expansion (Capacity Improvement)	New Construction
▲ Maximum	500,000	2,675,350	3,579,543	27,934,255	11,018,275	7,864,370
◆ Average	135,282	203,185	314,373	493,218	1,683,017	2,157,667
▲ Minimum	15,684	65,037	21,597	37,289	125,710	371,013

22. The above graph shows average unit cost of motorways by road works types are between 135,282 US $ per lanexkm and 2,157,667 US $ per lanexkm. Average unit cost of motorways by work types gradually increases from resurfacing to new construction in order. The biggest gap is for reconditioning, the maximum value is 27,934,255 US $ per lanexkm on the other hand, minimum one is 37,289 US $ per lanexkm. The ratio between them is 749.

23. Comparing costs by work types the highest value is obtained for reconditioning road works and the lowest value for resurfacing.

Figure IV.2

Benchmarking of Double Carriageway-Primary Roads Construction Costs for All Member Countries Which Sent Data (US $/Lane x Km) (2016 prices)

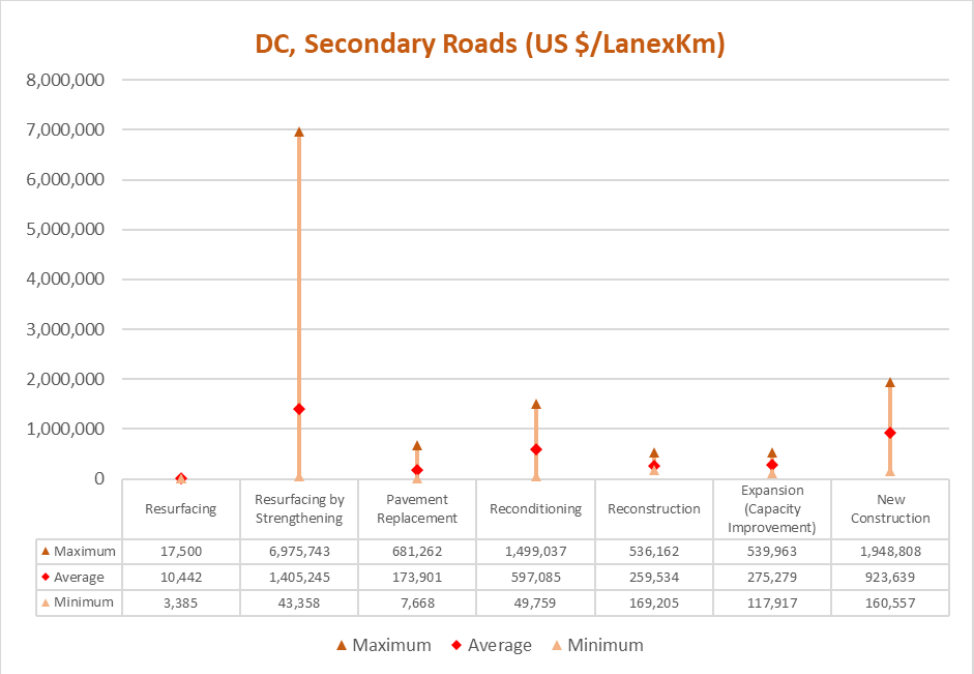


	Resurfacing	Resurfacing by Strengthening	Pavement Replacement	Reconditioning	Reconstruction	Expansion (Capacity Improvement)	New Construction
▲ Maximum	19,384	99,431	439,377	3,735,495	991,429	6,755,612	3,957,100
◆ Average	11,807	76,814	167,925	905,827	211,809	2,193,160	1,423,171
▲ Minimum	4,231	54,197	11,218	53,836	38,162	150,879	134,716

24. The above graph shows average unit cost of double carriageway primary asphalt roads by road works types are between 11,807 US $ per lanexkm and 2,193,160 US $ per lanexkm. Average unit cost of primary roads by work types gradually increases from resurfacing to new construction but not in order. Reconditioning and expansion unit costs are not fit well. The biggest gap is for expansion, the maximum value is 6,755,612 US $ per lanexkm, on the other hand minimum one is 150,879 US $ per lanexkm. The ratio between them is 44.78.

25. Comparing by work types the highest value is obtained for expansion road work type on the other hand the lowest one is for resurfacing as it is expected.

Figure IV.3
Benchmarking of Double Carriageway-Secondary Roads Construction Costs for All Member Countries Which Sent Data (US $/Lane x Km) (2016 prices)



	Resurfacing	Resurfacing by Strengthening	Pavement Replacement	Reconditioning	Reconstruction	Expansion (Capacity Improvement)	New Construction
▲ Maximum	17,500	6,975,743	681,262	1,499,037	536,162	539,963	1,948,808
◆ Average	10,442	1,405,245	173,901	597,085	259,534	275,279	923,639
▲ Minimum	3,385	43,358	7,668	49,759	169,205	117,917	160,557

26. The above graph shows average unit cost of double carriageway asphalt secondary roads by road works types are between 10,442 US $ per lanexkm and 1,405,245 US $ per lanexkm. Average unit cost of secondary roads by work types gradually increases from resurfacing to new construction but not in order. Resurfacing by strengthening unit cost is pretty much higher. Reconditioning unit cost is also high but lower than resurfacing by strengthening cost. The biggest gap is for resurfacing by strengthening, the maximum value is 6,975,743 US $ per lanexkm, on the other hand minimum one is 43,358 US $ per lanexkm. The ratio between them is 160.89.

27. Comparing by work types the highest value is obtained for resurfacing by strengthening road work type not as expected on the other hand, the lowest one is for resurfacing as it is expected.

V. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway medium and high classified roads resurfacing costs

Table V.1
Double Carriageway Medium and High Classified Roads Resurfacing Costs (US $/LanexKm) (2016 prices)

	Resurfacing														
	HCR_Motorways-Expressways					MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CROATIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CYPRUS	240,000	210,000	180,000	65	20	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FINLAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICELAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ITALY	-	7,400	-	-	-	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWEDEN	500,000	300,000	150,000	-	-	-	-	-	-	-	-	-	-	-	-
TURKEY	32,045	23,726	15,684	25	6	19,384	11,807	4,231	2,807	63	17,500	10,442	3,385	312	15

28. In the above table double carriageway medium and high classified asphalt roads which are motorways, primary roads and secondary roads resurfacing cost by countries are given. Only Cyprus, Italy, Sweden and Turkey provide data for motorways and only Turkey provided data for primary and secondary roads resurfacing cost.

29. The following map shows motorways resurfacing cost by colour.

Figure V.3
Double Carriageway High Classified Roads-Motorways Average Resurfacing Costs Map (US $/LanexKm) (2016 prices)

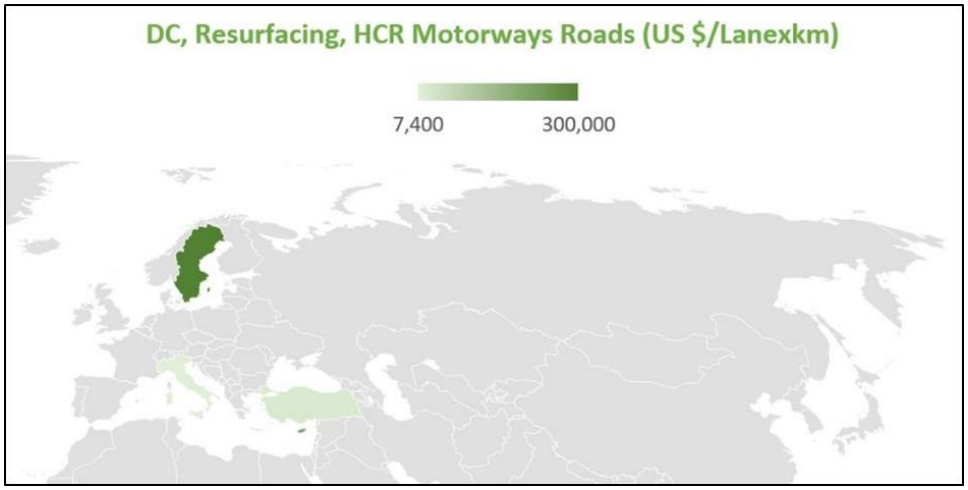
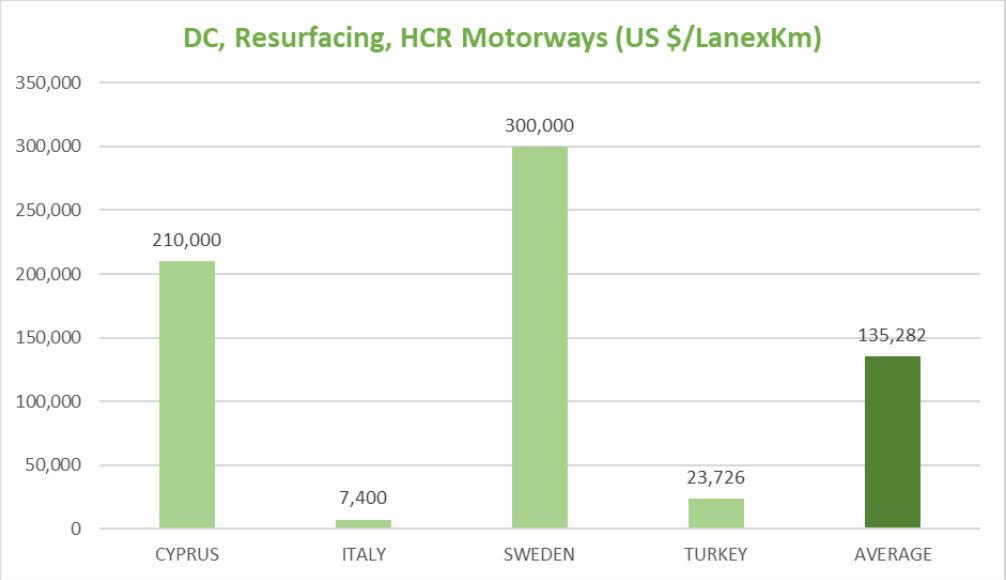
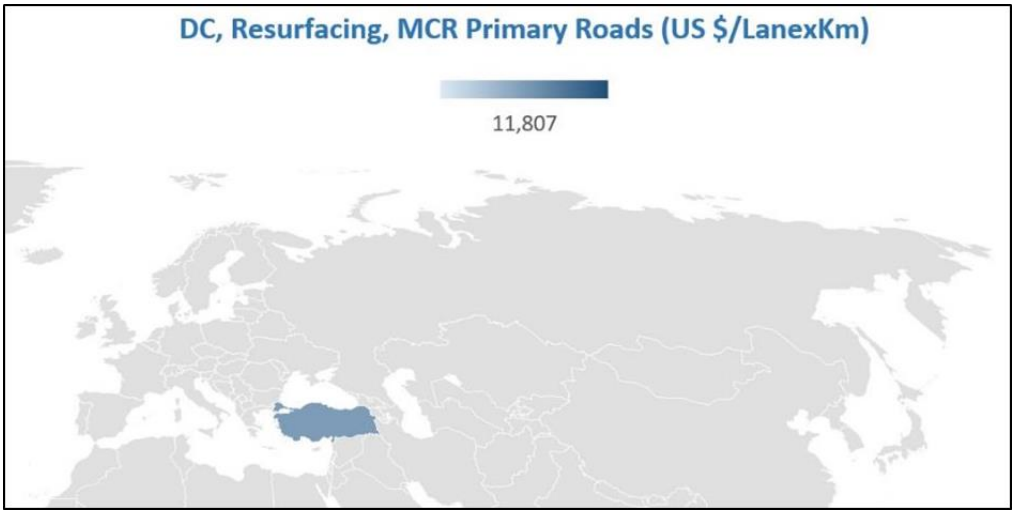


Figure V.4
Double Carriageway High Classified Roads-Motorways Average Resurfacing Costs by Countries (US $/LanexKm) (2016 prices)



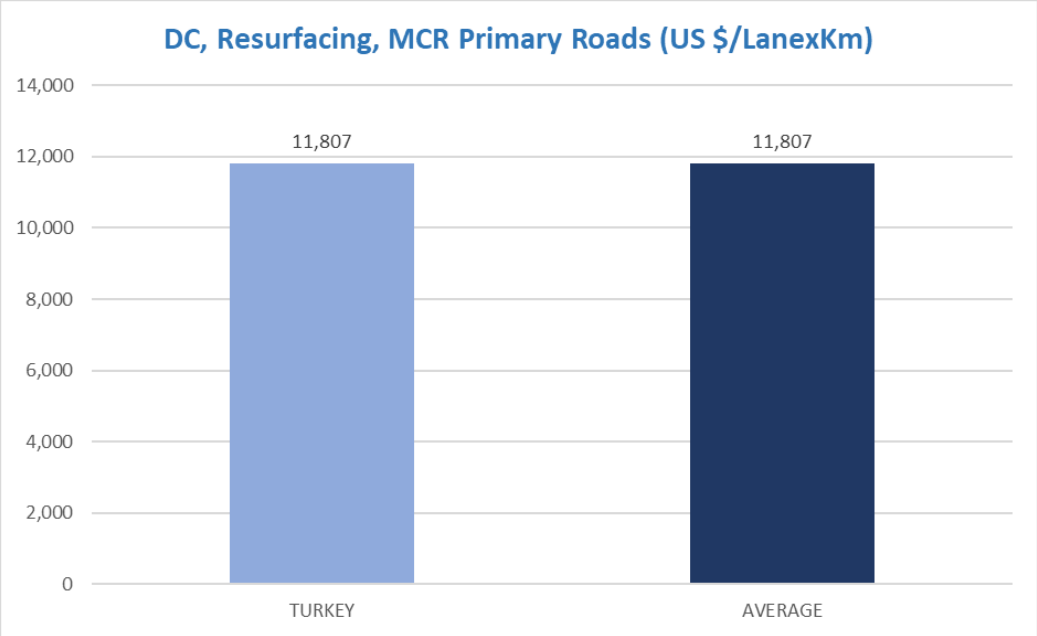
30. In the above graph double carriageway high classified roads which are motorways average resurfacing costs are plotted. The highest one is observed in Sweden and the lowest one is observed in Italy. The ratio between them is 40.54.

Figure V.6
Double Carriageway Medium Classified Primary Roads Average Resurfacing Costs Map (US $/LanexKm) (2016 prices)



31. In the above map resurfacing cost of medium classified primary double carriageway roads are shown. Only Turkey provided resurfacing cost data of primary roads as seen in the following bar charts.

Figure V.7
Double Carriageway Medium Classified Primary Roads Average Resurfacing Costs by Countries (US $/LanexKm) (2016 prices)



32. In the following map resurfacing cost of medium classified secondary double carriageway roads are shown. Only Turkey provided resurfacing cost of secondary roads data as seen in the following bar charts.

Figure V.9
Double Carriageway Medium Classified Secondary Roads Average Resurfacing Costs Map (US $/LanexKm) (2016 prices)

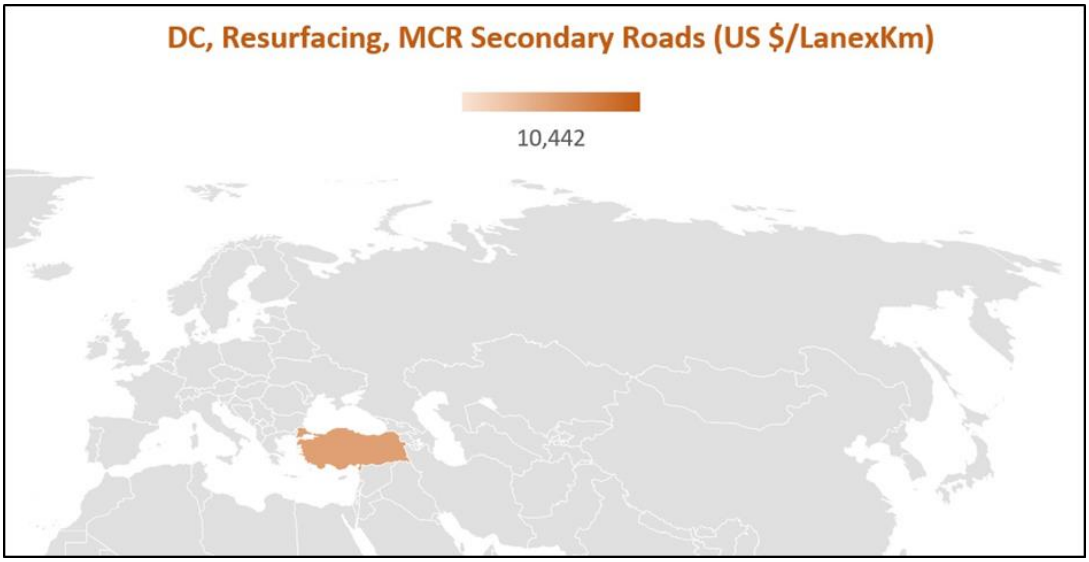
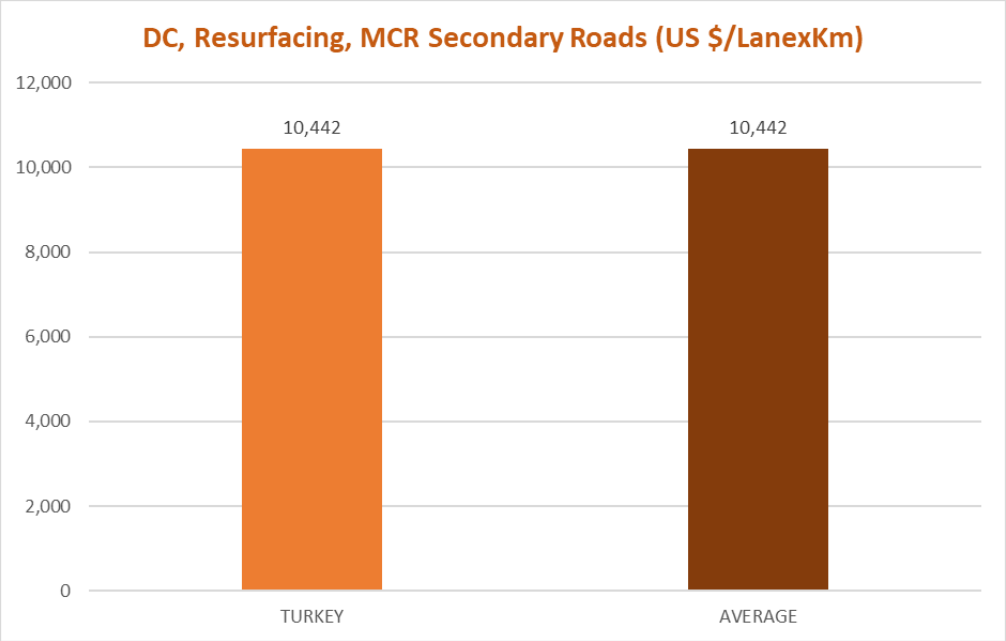


Figure V.10
Double Carriageway Medium Classified Secondary Roads Average Resurfacing Costs by Countries (US $/LanexKm) (2016 prices)



VI. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway medium and high classified roads resurfacing by strengthening costs

Table VI.1
Double Carriageway Medium and High Classified Roads Resurfacing by Strengthening Costs (US $/LanexKm) 2016 prices

	Resurfacing by Strengthening														
	HCR_Motorways-Expressways					MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	2,675,350	81,639	-	1,559	101	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	-	-	-	-	-	-	-	6,975,743	2,744,828	1,272,847	14	2
CROATIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FINLAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICELAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ITALY	-	46,000	-	-	-	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWEDEN	1,000,000	600,000	300,000	-	-	-	-	-	-	-	-	-	-	-	-
TURKEY	105,163	85,100	65,037	925	35	99,431	76,814	54,197	1,051	26	87,966	65,662	43,358	117	5

33. In the above table double carriageway medium and high classified roads which are motorways, primary roads and secondary roads resurfacing by strengthening costs by countries are given. As it is seen only Austria, Italy, Sweden and Turkey provide data for motorways and only Turkey provide data for primary and secondary roads resurfacing work type.

34. The following map shows motorways resurfacing by strengthening costs as colored.

Figure VI.2
Double Carriageway High Classified Roads-Motorways Average Resurfacing by Strengthening Costs Map (US $/LanexKm) (2016 prices)

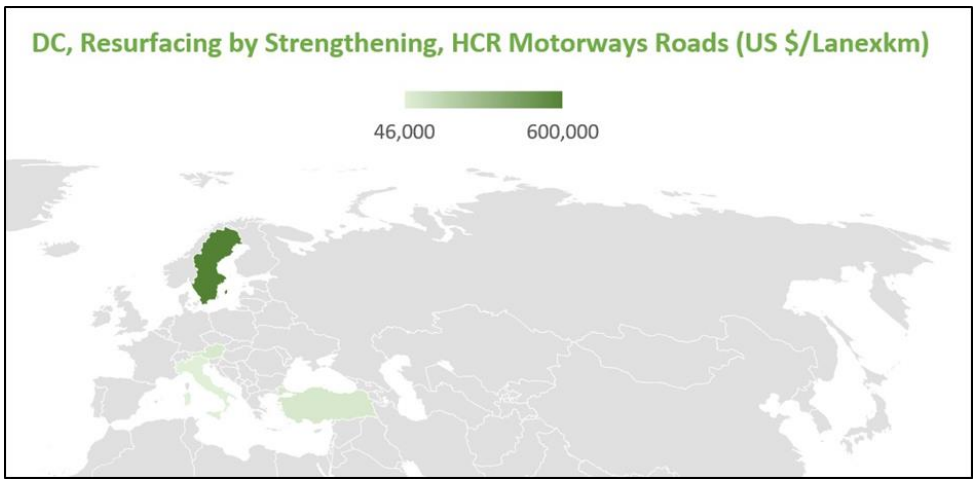
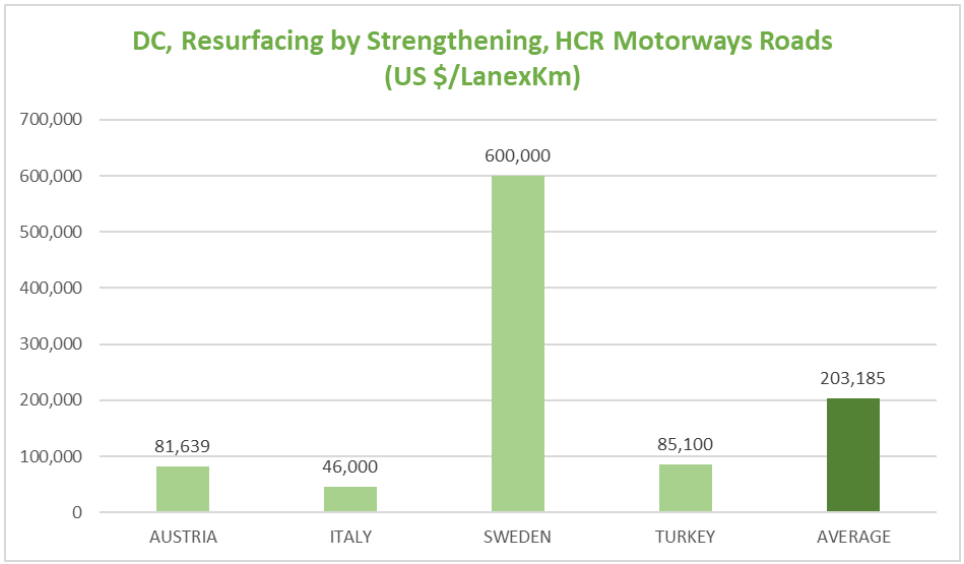
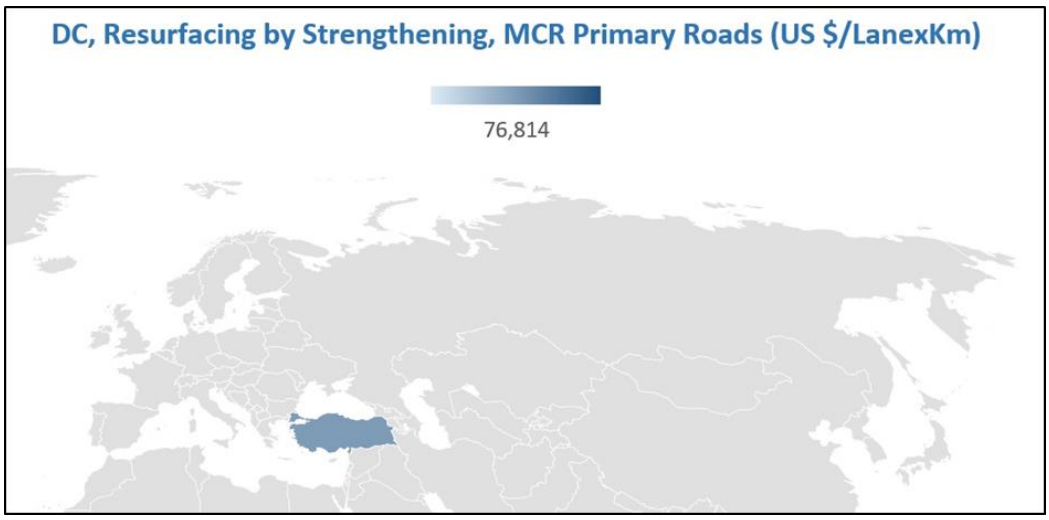


Figure VI.3
Double Carriageway High Classified Roads-Motorways Average Resurfacing by Strengthening Costs by Countries (US $/LanexKm) (2016 prices)



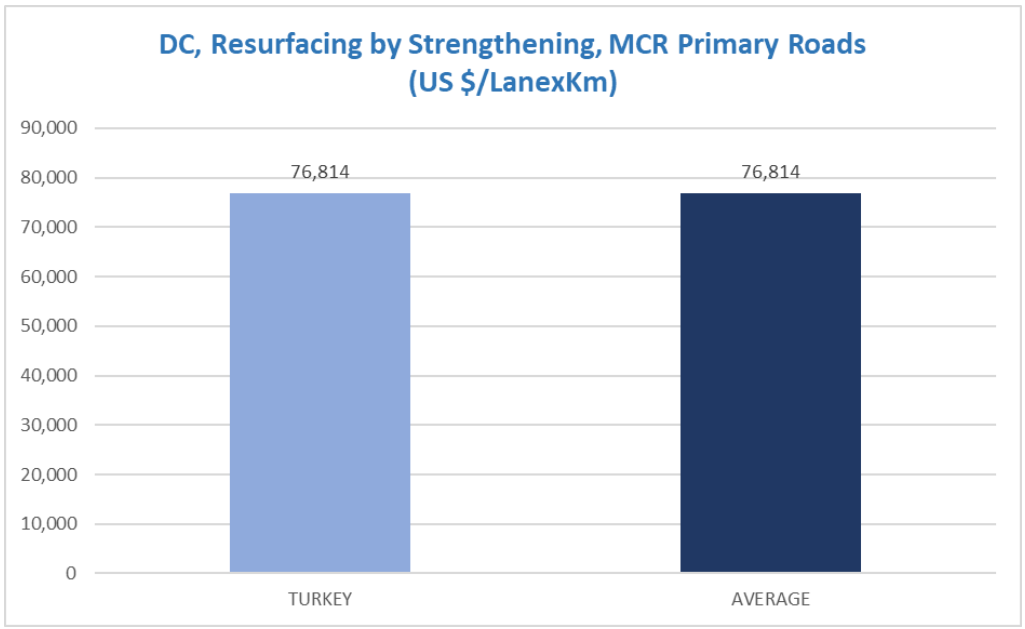
35. In the above graph double carriageway high classified asphalt roads which are motorways average resurfacing by strengthening costs are plotted. The highest one is observed in Sweden and the lowest one is observed in Italy. The ratio between them is 13. The average cost of Sweden is pretty much higher than other countries.

Figure VI.5
Double Carriageway Medium Classified Primary Roads Average Resurfacing by Strengthening Costs Map (US $/LanexKm) (2016 prices)



36. The above map shows primary double carriageway roads resurfacing by strengthening costs. Only Turkey provided resurfacing by strengthening cost of primary roads, data is seen in the following bar charts.

Figure VI.6
Double Carriageway Medium Classified Primary Roads Average Resurfacing by Strengthening Costs by Countries (US $/LanexKm) (2016 prices)



37. In the following map double carriageway secondary roads resurfacing by strengthening costs is colored. Only Turkey and Bulgaria provided resurfacing by strengthening costs data. Average cost data is plotted on the following bar charts. The ratio between them is 42.

Figure VI.8
Double Carriageway Medium Classified Secondary Roads Average Resurfacing by Strengthening Costs Map (US $/LanexKm) (2016 prices)

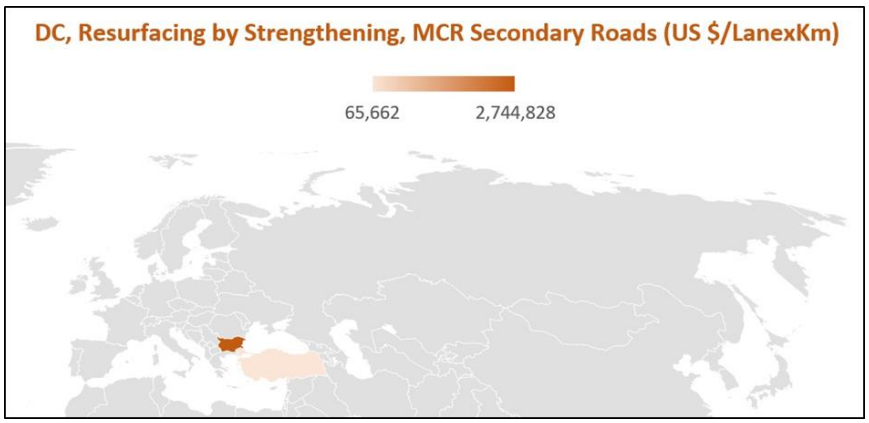
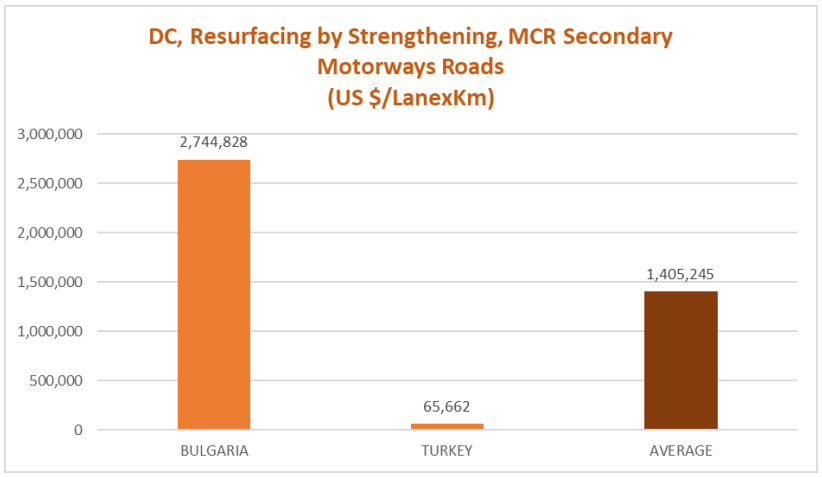


Figure VI.9
Double Carriageway Medium Classified Secondary Roads Average Resurfacing by Strengthening Costs by Countries (US $/LanexKm) (2016 prices)



VII. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway high and medium classified roads pavement replacement costs

Table VII.1
Double Carriageway High and Medium Classified Roads Pavement Replacement Costs (US $/LanexKm) (2016 prices)

	Pavement Replacement														
	HCR_Motorways-Expressways					MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	1,962,198	78,328	-	866	87	-	-	-	-	-	-	-	-	-	-
BULGARIA	3,579,543	1,101,581	37,066	46	4	439,377	199,052	11,218	167	7	681,262	237,971	7,668	290	6
CROATIA	176,400	141,100	114,200	114	9	-	-	-	-	-	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FINLAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICELAND	-	-	-	-	-	81,967	274,590	467,213	22	2	-	-	-	-	-
ITALY	-	190,000	-	-	-	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	143,012	43,340	21,597	194	14	73,133	68,581	54,256	13	2	-	-	-	-	-
SWEDEN	750,000	500,000	230,000	-	-	-	-	-	-	-	-	-	-	-	-
TURKEY	186,709	146,259	105,809	370	10	170,783	129,479	88,174	1,949	37	149,125	109,832	70,540	217	7

38. The above table provides country by country overview of double carriageway medium and high classified roads which are motorways, primary roads and secondary roads pavement replacement costs. Only Austria, Bulgaria, Croatia, Italy, the Russian Federation, Sweden and Turkey provided data for motorways and Bulgaria, Iceland, the Russian Federation and Turkey provided data for primary roads and Bulgaria and Turkey provided data for secondary roads.

39. The following map shows motorways pavement replacement costs of data provided countries by coloured.

Figure VII.1
Double Carriageway High Classified Roads-Motorways Average Pavement Replacement Costs Map (US $/LanexKm) (2016 prices)

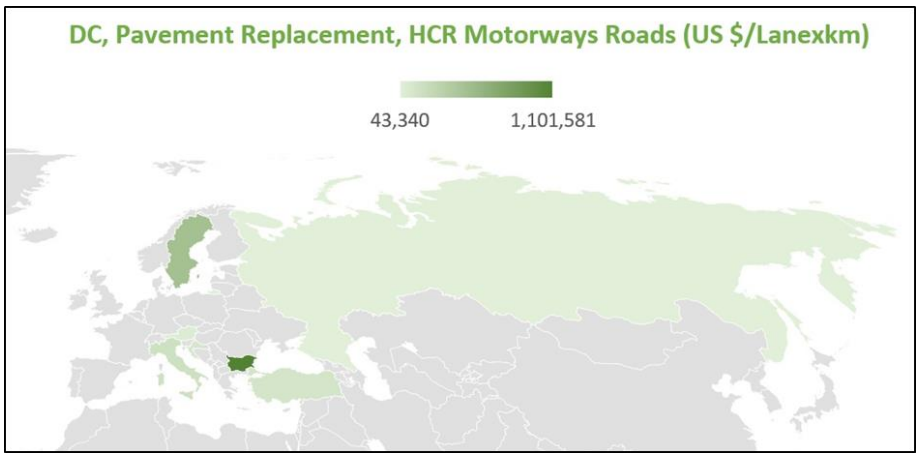
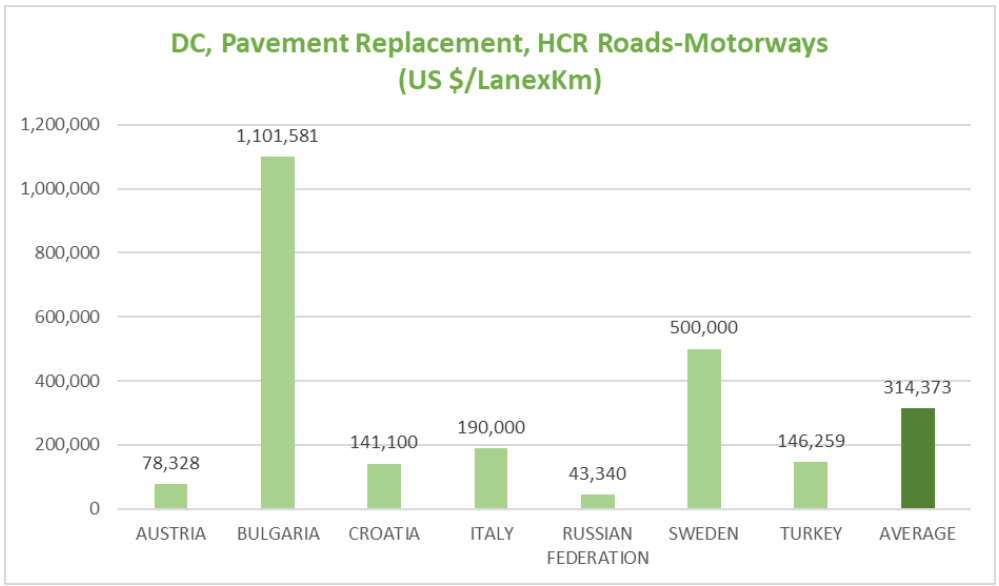
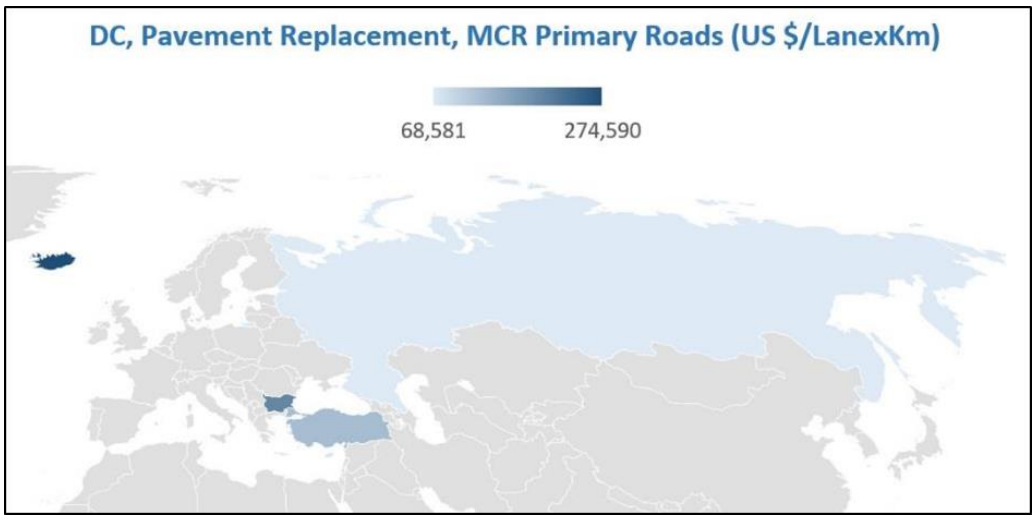


Figure VII.2
Double Carriageway High Classified Roads-Motorways Average Pavement Replacement Costs by Countries (US $/LanexKm) (2016 prices)



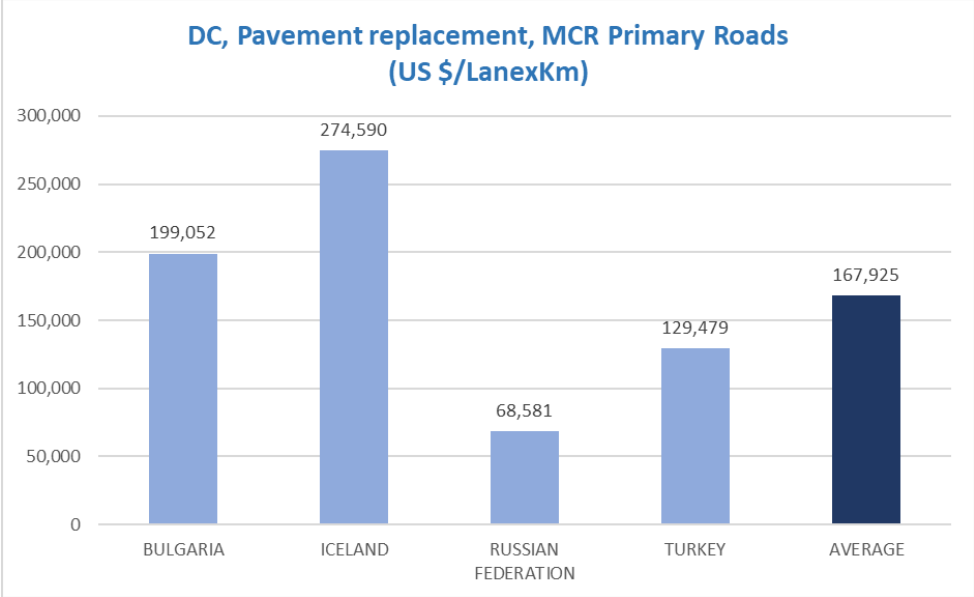
40. In the above graph, costs for double carriageway high classified roads which are motorways average pavement replacement costs are plotted. The highest average is observed in Bulgaria and the lowest average is observed in the Russian Federation. The ratio between them is 24.42.

Figure VII.4
Double Carriageway Medium Classified Primary Roads Average Pavement Replacement Costs Map (US $/LanexKm) (2016 prices)



41. The above map shows double carriageway primary roads pavement replacement costs of data provided countries by coloured. Bulgaria, Iceland, the Russian Federation and Turkey provided pavement replacement construction cost data. Average pavement replacement costs of countries are plotted on the following bar charts. Highest average cost is obtained in Iceland and lowest average one is in the Russian Federation.

Figure VII.5
Double Carriageway Medium Classified Primary Roads Average Pavement Replacement Costs by Countries (US $/LanexKm) (2016 prices)



42. From the above bar chart, it is seen that the highest average Pavement Replacement costs of Primary Roads are observed in Iceland. The lowest one however in the Russian Federation. In the following map secondary roads pavement replacement costs are coloured. Only Turkey and Bulgaria provided pavement replacement costs data. Data is also plotted on the following bar charts.

Figure VII.7
Double Carriageway Medium Classified Secondary Roads Average Pavement Replacement Costs Map (US $/LanexKm) (2016 prices)

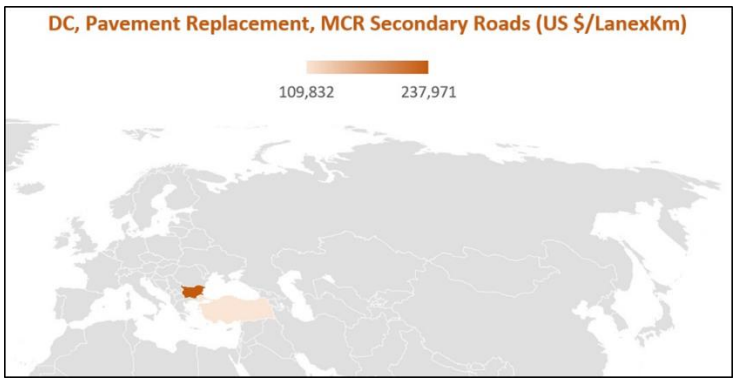
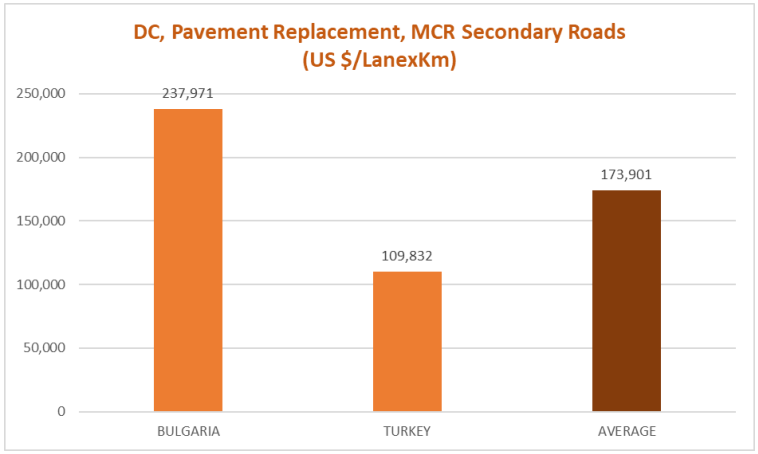


Figure VII.8
Double Carriageway Medium Classified Secondary Roads Average Pavement Replacement Costs by Countries (US $/LanexKm) (2016 prices)



VIII. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway high and medium classified roads reconditioning costs

Table VIII.1
Double Carriageway High and Medium Classified Roads Reconditioning Costs (US $/LanexKm) (2016 prices)

	Reconditioning															
	HCR_Motorways-Expressways					MCR_Primary Roads					MCR_Secondary Roads					
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	
AUSTRIA	27,934,255	1,134,251	-	326	77	-	-	-	-	-	-	-	-	-	-	
BULGARIA	-	240,165	-	2	2	-	-	-	-	-	-	-	-	-	-	
CROATIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CYPRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ESTONIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
FINLAND	-	-	-	-	-	3,735,495	2,443,188	1,656,371	11	3	1,499,037	1,499,037	1,499,037	28	1	
ICELAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ITALY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LATVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
RUSSIAN FEDERATION	1,174,983	105,238	37,289	1,320	109	196,153	105,017	53,836	384	59	203,856	126,382	49,759	20	158	
SWEDEN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TURKEY	-	-	-	-	-	196,907	169,275	141,643	2,214	53	190,528	165,836	141,143	246	8	

43. In the above table double carriageway medium and high classified roads which are motorways, primary roads and secondary roads reconditioning costs by countries are given. As it is seen only Austria, Bulgaria and the Russian Federation provided data for motorways and Finland, the Russian Federation and Turkey provide data for primary roads and Finland, the Russian Federation and Turkey provided data for secondary roads.

44. The following map shows motorways reconditioning costs of data provided countries by coloured.

Figure VIII.1
Double Carriageway High Classified Roads-Motorways Average Reconditioning Costs Map (US $/LanexKm) (2016 prices)

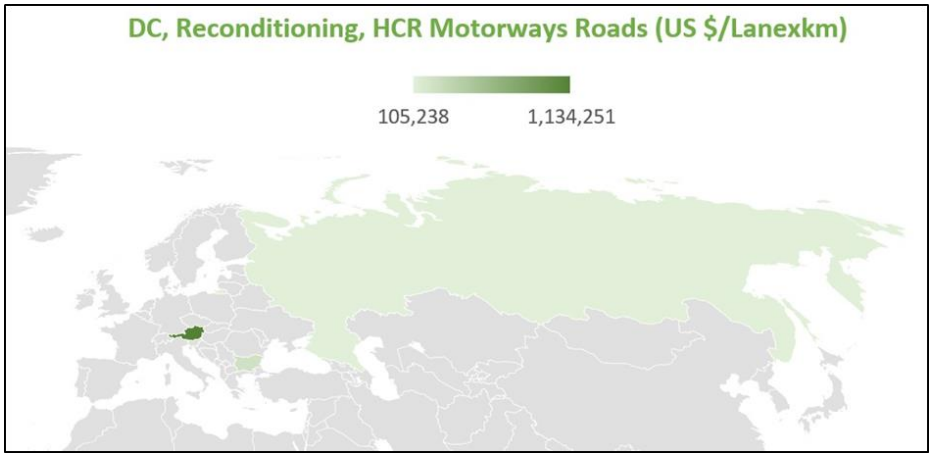
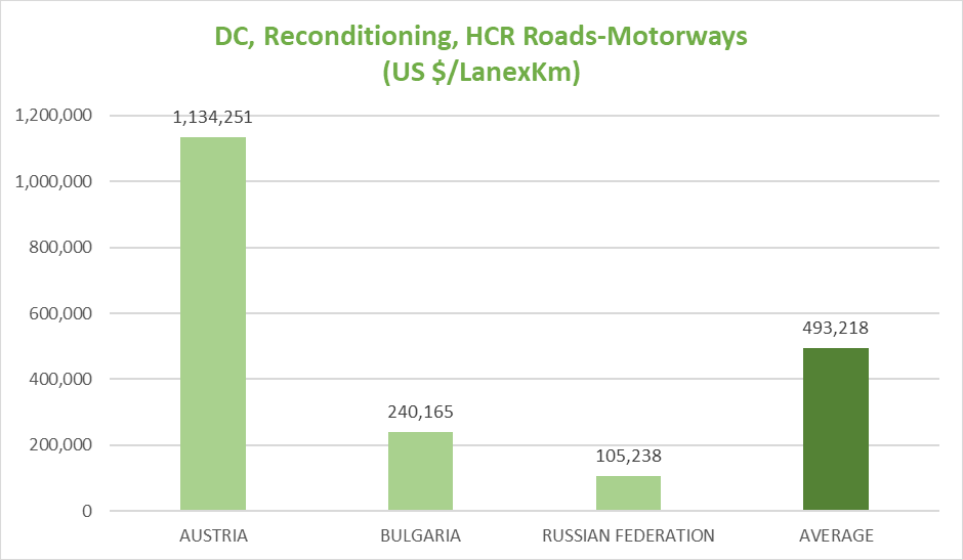
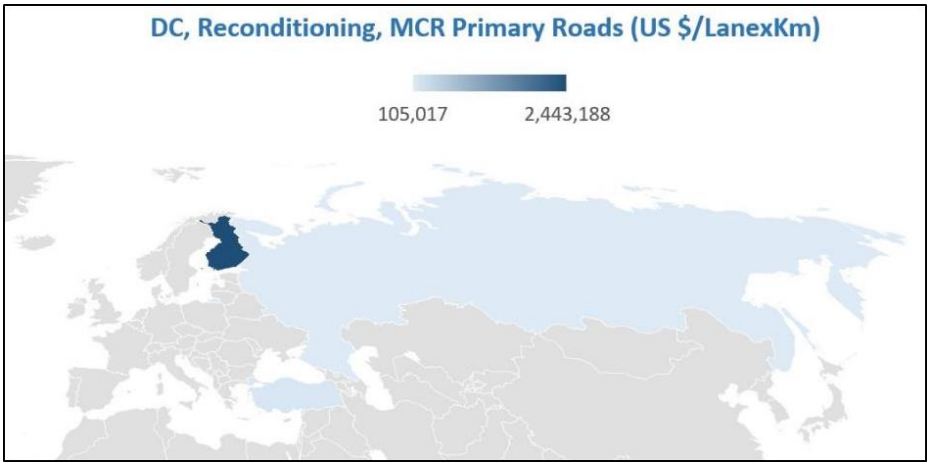


Figure VIII.2
Double Carriageway High Classified Roads-Motorways Average Reconditioning Costs by Countries (US $/LanexKm) (2016 prices)



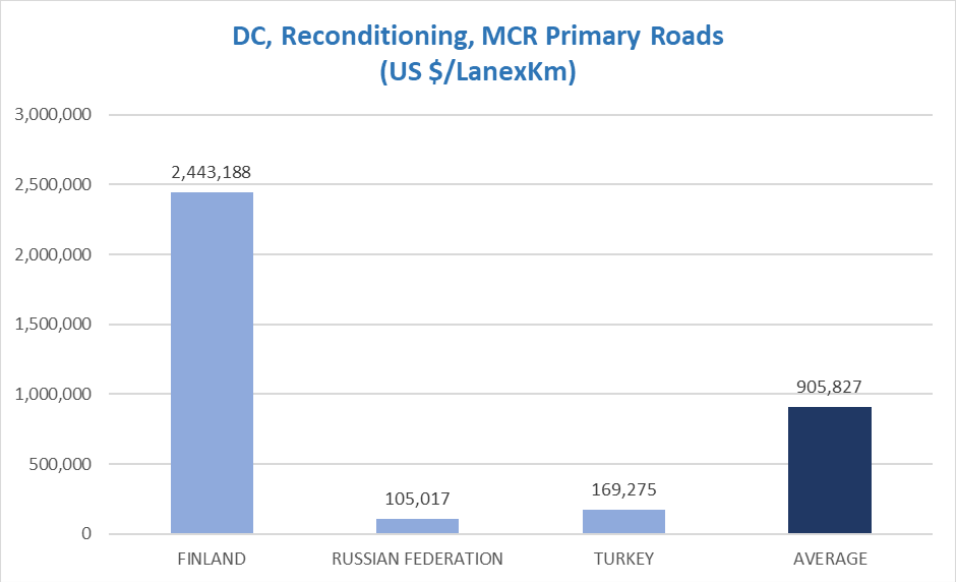
45. In the above graph double carriageway high classified roads which are motorways average reconditioning cost are plotted. The highest average is observed in Austria and the lowest one is observed in the Russian Federation. The ratio between them is 11.

Figure VIII.3
Double Carriageway Medium Classified Primary Roads Average Reconditioning Costs Map (US $/LanexKm) (2016 prices)



46. The above map shows double carriageway primary roads pavement reconditioning costs of data provided countries by colour. Finland, the Russian Federation and Turkey provided reconditioning cost. Average costs of reconditioning cost of countries data are plotted on the following bar charts. Highest average cost is observed in Finland and lowest average is observed in the Russian Federation. The ratio between them is 23.26

Figure VIII.5
Double Carriageway Medium Classified Primary Roads Average Reconditioning Costs by Countries (US $/LanexKm) (2016 prices)



47. In the following map secondary roads reconditioning costs are shown by colour. Only Finland, the Russian Federation and Turkey provided reconditioning costs data. Data is plotted on the following bar chart. The average reconditioning cost of secondary roads for Finland is higher than the other two countries, Russian Federation and Turkey.

Figure VIII.7
Double Carriageway Medium Classified Secondary Roads Average Reconditioning Costs Map (US $/LanexKm) (2016 prices)

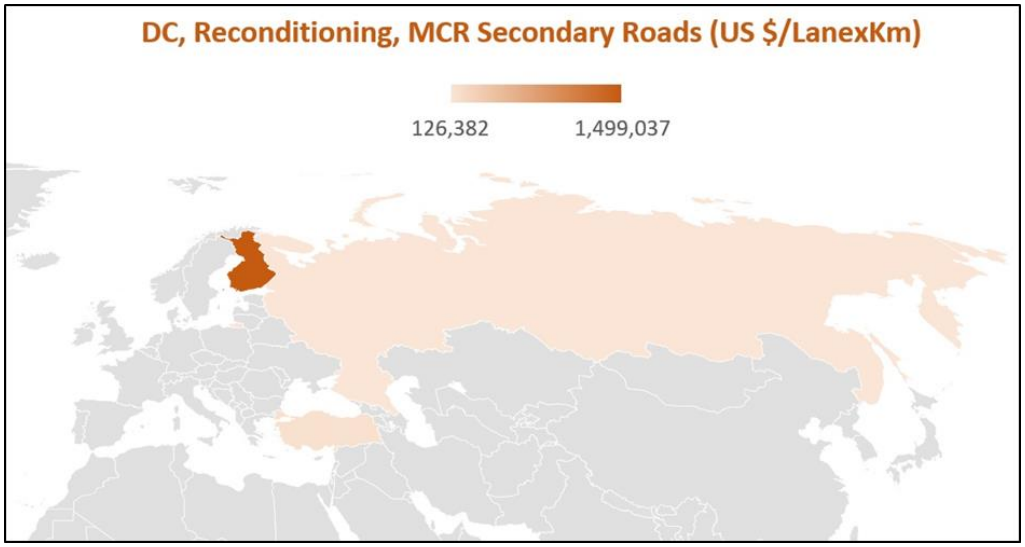
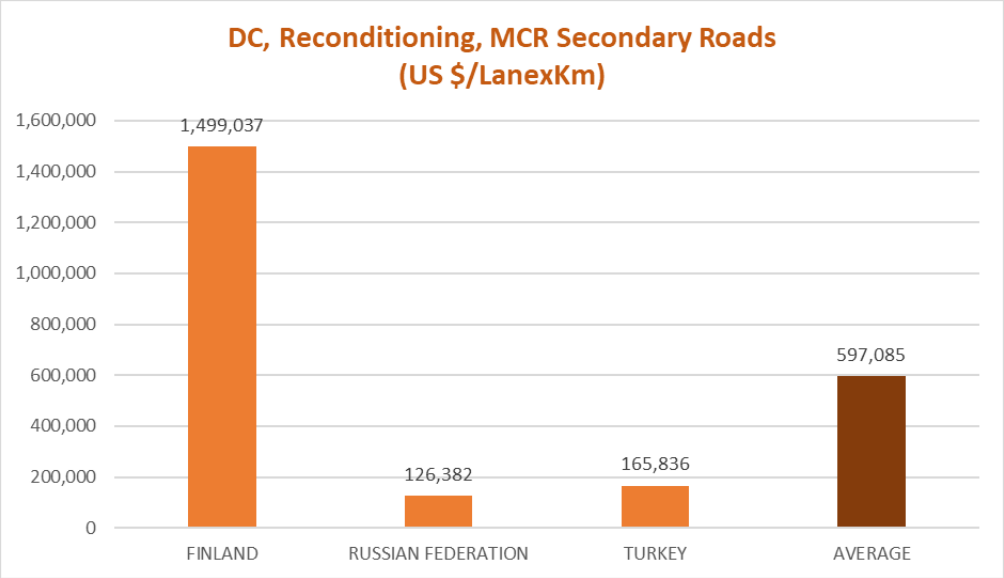


Figure VIII.8
Double Carriageway Medium Classified Secondary Roads Average Reconditioning Costs by Countries (US $/LanexKm) (2016 prices)



IX. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway medium classified roads reconstruction costs

Table IX.1
Double Carriageway Medium Classified Roads Reconstruction Costs (US $/LanexKm) (2016 prices)

	Reconstruction									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	241,680	111,333	38,162	643	35	536,162	357,059	177,956	741	54
CROATIA	-	-	-	-	-	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-
FINLAND	-	-	-	-	-	-	-	-	-	-
ICELAND	-	-	-	-	-	-	-	-	-	-
ITALY	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	991,429	300,455	102,330	699	28	215,902	201,346	195,966	2	2
SWEDEN	-	-	-	-	-	-	-	-	-	-
TURKEY	277,571	223,638	169,705	495	18	271,191	220,198	169,205	55	4

48. In the above table double carriageway medium classified roads which are primary and secondary roads reconstruction costs by countries are given. As it is seen only Bulgaria, the Russian Federation and Turkey provided data for primary and secondary roads. The following map shows primary roads reconstruction costs of data by colour.

Figure IX.1
Double Carriageway Medium Classified Primary Roads Average Reconstruction Costs Map (US $/LanexKm) (2016 prices)

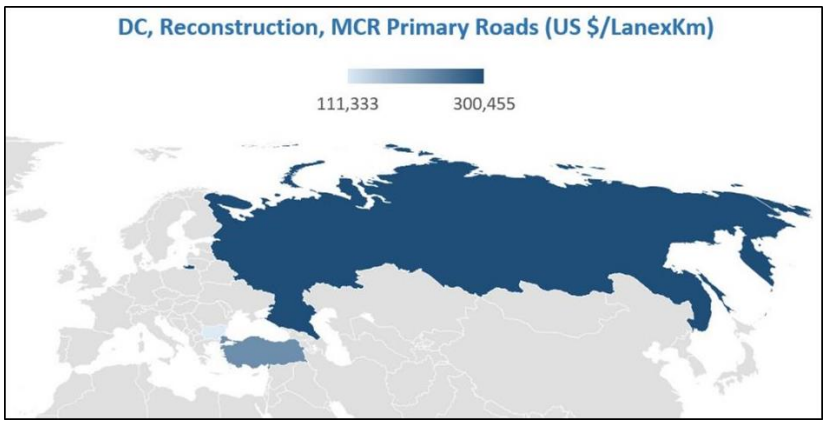
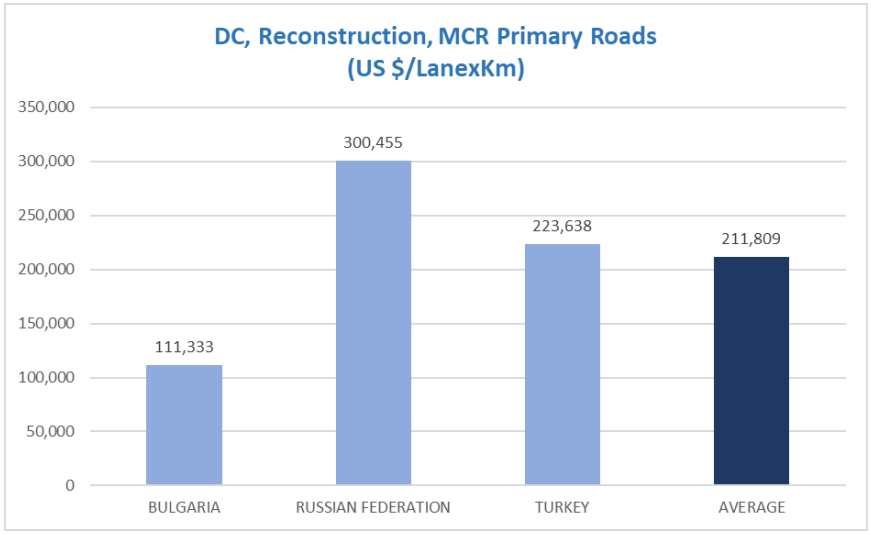
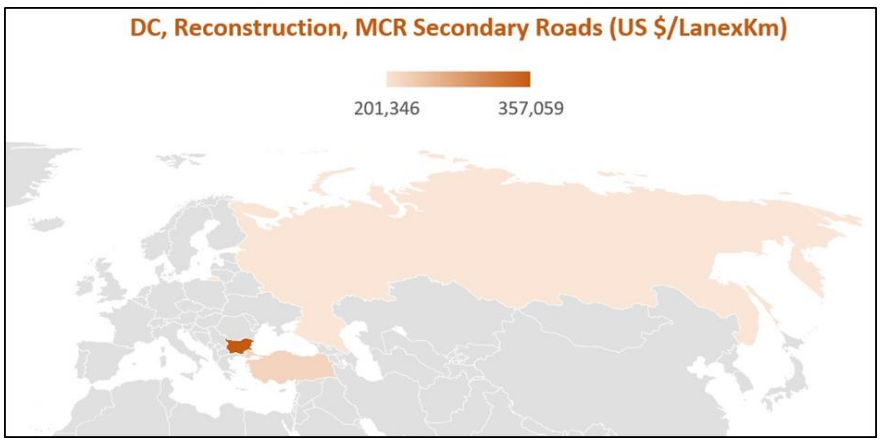


Figure IX.2
Double Carriageway Medium Classified Primary Roads Average Reconstruction Costs by Countries (US $/LanexKm) (2016 prices)



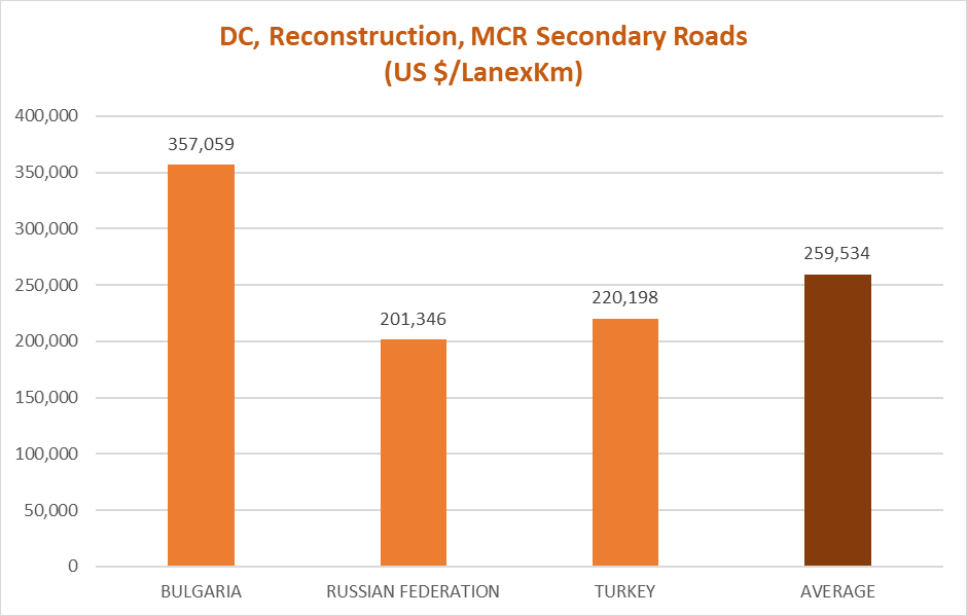
49. Average double carriageway primary roads reconstruction costs by countries are plotted on the above bar chart. Highest average cost is observed in the Russian Federation and lowest average is observed in Bulgaria. The ratio between them is 2.70.

Figure IX.4
Double Carriageway Medium Classified Secondary Roads Average Reconstruction Costs Map (US $/LanexKm) (2016 prices)



50. In the above map double carriageway secondary roads reconstruction costs are coloured. Only Bulgaria, the Russian Federation, Finland and Turkey provided reconstruction costs data for secondary roads reconstruction. Data is plotted on the following bar chart. Costs are fairly close to each other and the ratio between upper average cost and lower average cost is 1.62.

Figure IX.5
Double Carriageway Medium Classified Secondary Roads Average Reconstruction Costs by Countries (US $/LanexKm) (2016 prices)



X. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway medium and high classified roads expansion (capacity improvement) costs

Table X.1
Double Carriageway High and Medium Classified Roads Expansion (Capacity Improvement) Costs (US $/LanexKm) (2016 prices)

	Expansion (Capacity Improvement)														
	HCR_Motorways-Expressways					MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	2,163,152	789,768	-	70	17	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CROATIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	856,456	784,263	771,864	8	2	-	-	-	-	-
FINLAND	11,018,275	4,599,487	525,140	50	6	6,755,612	5,442,984	4,130,357	14	2	-	-	-	-	-
ICELAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ITALY	-	390,000	-	-	-	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	1,398,603	635,830	125,710	1,043	22	-	-	-	-	-	-	-	-	-	-
SWEDEN	3,500,000	2,000,000	1,000,000	-	-	-	-	-	-	-	-	-	-	-	-
TURKEY	-	-	-	-	-	690,907	352,232	150,879	1,091	48	539,963	275,279	117,917	109	7

51. In the above table double carriageway medium and high classified roads which are motorways, primary roads and secondary roads expansion (Capacity improvement) costs by countries are given. As it is seen Austria, Finland, Italy, the Russian Federation and Sweden provided data for motorways and Estonia, Finland, and Turkey provided data for primary roads and only Turkey provided data for secondary roads.

52. The following map shows motorways expansion costs by colour.

Figure X.1
Double Carriageway High Classified Motorways Roads Average Expansion (Capacity Improvement) Costs Map (US $/LanexKm) (2016 prices)

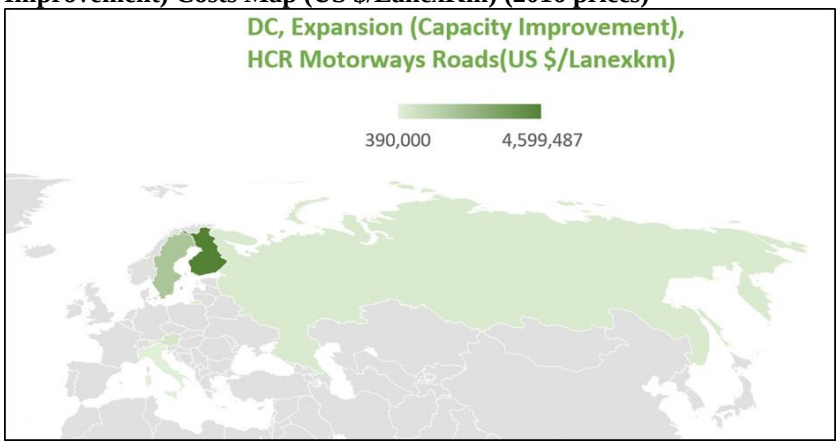
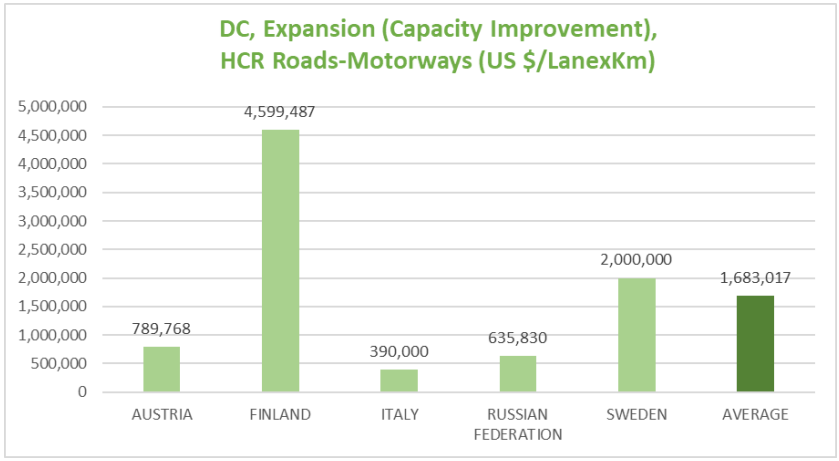
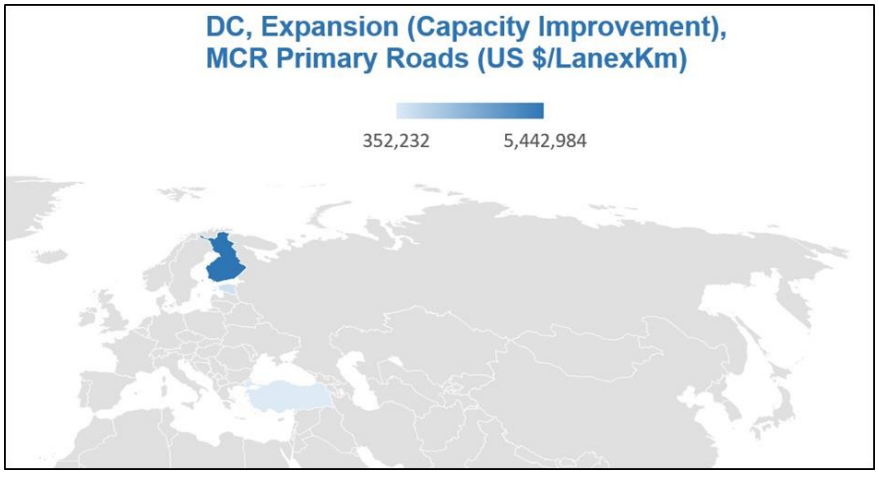


Figure X.2
Double Carriageway High Classified Roads-Motorways Average Expansion (Capacity Improvement) Costs by Countries (US $/LanexKm) (2016 prices)



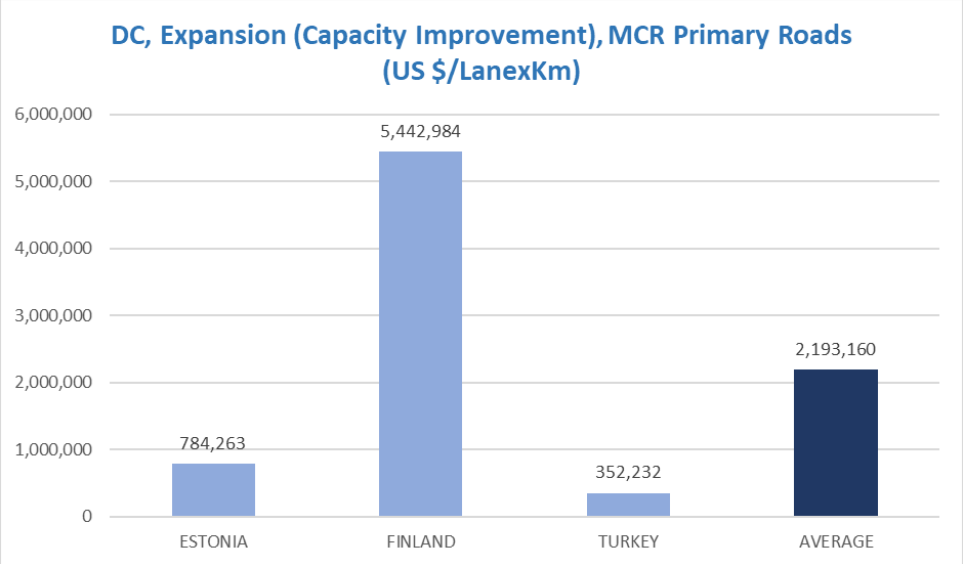
53. In the above graph double carriageway high classified roads which are motorways average expansion costs are plotted. The highest average is observed in Finland and the lowest one is observed in Italy. The ratio between them is 11.79.

Figure X.4
Double Carriageway Medium Classified Primary Roads Average Expansion (Capacity Improvement) Costs Map (US $/LanexKm) (2016 prices)



54. The above map shows double carriageway primary roads expansion costs of data provided countries are colored. Estonia, Finland and Turkey provided expansion costs.

Figure X.5
Double Carriageway Medium Classified Primary Roads Average Expansion (Capacity Improvement) Costs by Countries (US $/LanexKm) (2016 prices)



55. In the following map secondary roads expansion costs are shown by colour. Only Turkey provided expansion costs of double carriageway secondary roads data. Data is plotted on the following bar charts. The upper expansion cost of double carriageway primary roads is observed in Finland and the lowest one is in Turkey. The ratio between them is 15.45.

Figure X.7
Double Carriageway Medium Classified Secondary Roads Average Expansion (Capacity Improvement) Costs Map (US $/LanexKm) (2016 prices)

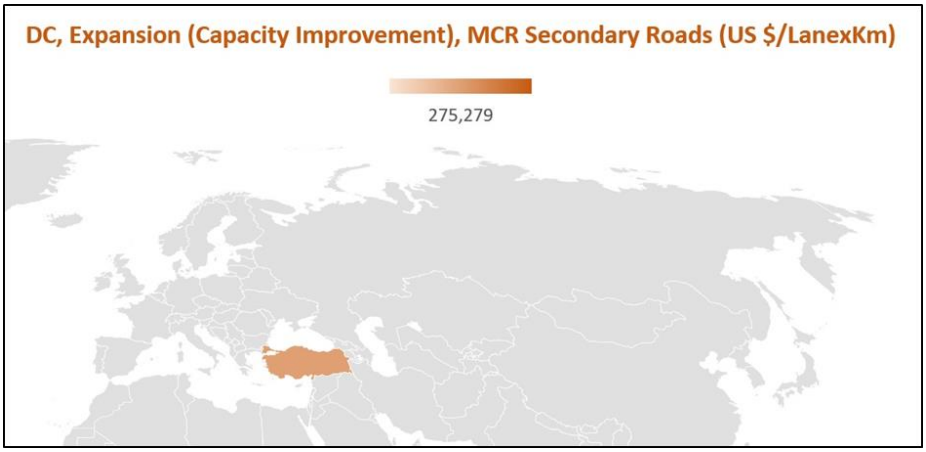
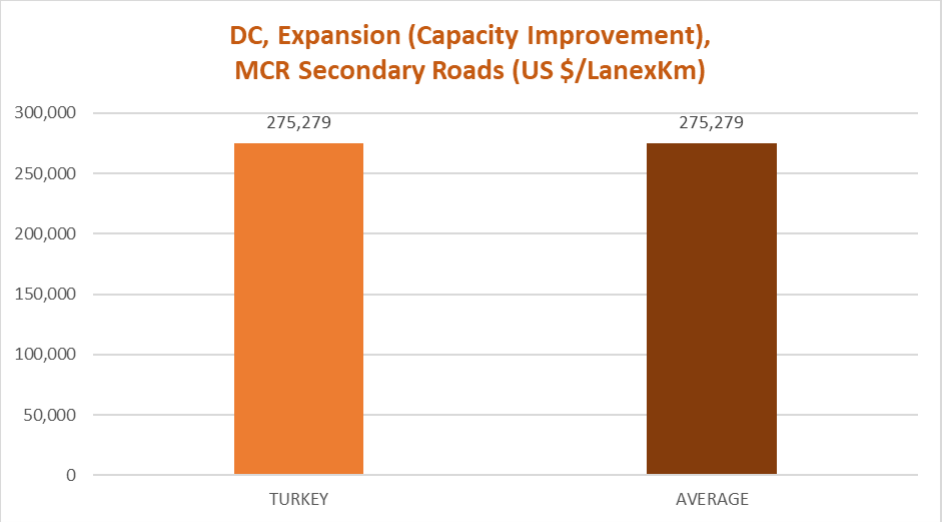


Figure X.8
Double Carriageway Medium Classified Secondary Roads Average Expansion (Capacity Improvement) Costs by Countries (US $/LanexKm) (2016 prices)



XI. Analysis about double carriageway asphalt roads construction costs by work types

Benchmarking double carriageway medium and high classified roads new construction costs

Table XI.1
Double Carriageway High and Medium Classified Roads New Construction Costs (US $/LanexKm) (2016 prices)

	New Construction														
	HCR_Motorways-Expressways					MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	7.864.370	2.683.414	-	112	16	-	-	-	-	-	-	-	-	-	-
BULGARIA	2.771.119	1.869.746	1.066.128	275	5	-	-	-	-	-	-	1.948.808	-	3	1
CROATIA	5.554.700	2.842.500	1.719.200	150	9	3.957.100	2.739.000	1.520.800	19	2	-	-	-	-	-
CYPRUS	-	3.750.000	-	20	2	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FINLAND	3.440.588	1.934.901	429.214	23	2	1.785.751	1.785.751	1.785.751	19	1	-	-	-	-	-
ICELAND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ITALY	-	650.000	-	-	-	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	2.225.891	846.862	701.277	74	6	991.429	523.355	134.716	37	8	530.187	530.187	530.187	0	1
SWEDEN	6.000.000	4.000.000	3.000.000	-	-	-	-	-	-	-	-	-	-	-	-
TURKEY	1.696.339	841.578	371.013	613	11	1.310.338	644.577	216.472	180	6	443.721	291.922	160.557	30	3

56. In the above table double carriageway medium and high classified roads which are motorways, primary roads and secondary roads new construction costs by countries are given. As is seen Austria, Bulgaria, Croatia, Cyprus, Finland, Italy, the Russian Federation, Sweden and Turkey provided data for motorways and Croatia, Finland, the Russian Federation and Turkey provided data for primary roads and Bulgaria, the Russian Federation and Turkey provided data for secondary roads.

57. The following map shows motorways new construction costs of data provided countries are shown with colour.

Figure XI.1
Double Carriageway High Classified Roads-Motorways Average New Construction Costs Map (US $/LanexKm) (2016 prices)

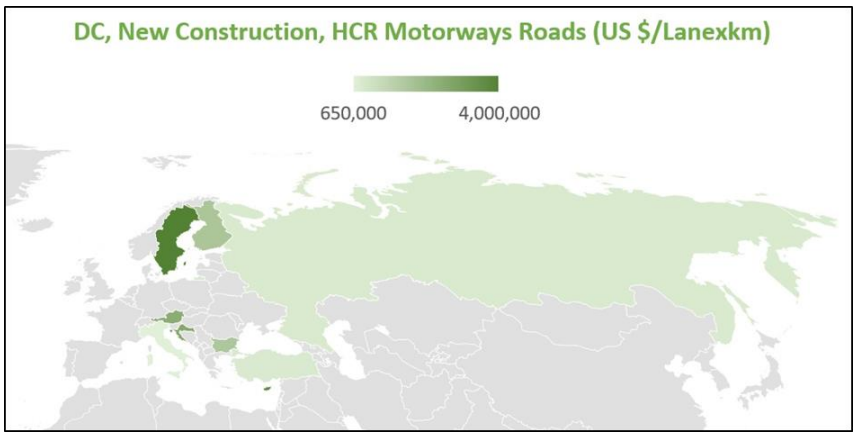
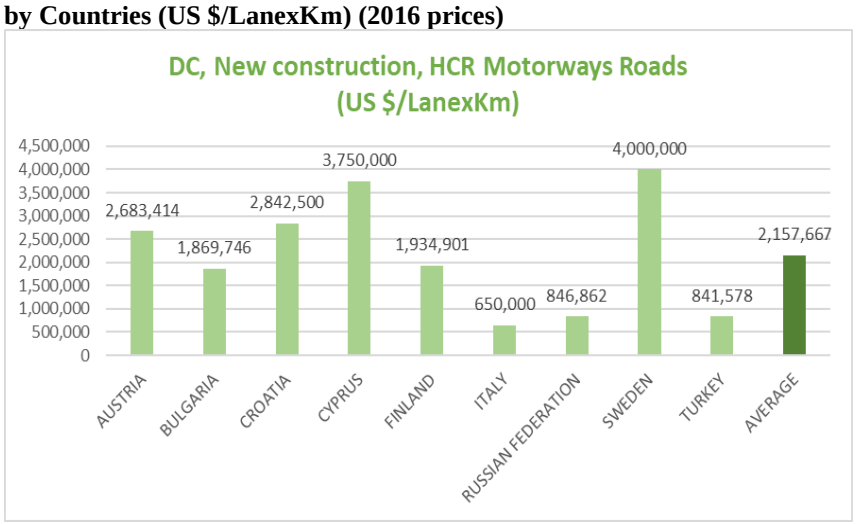
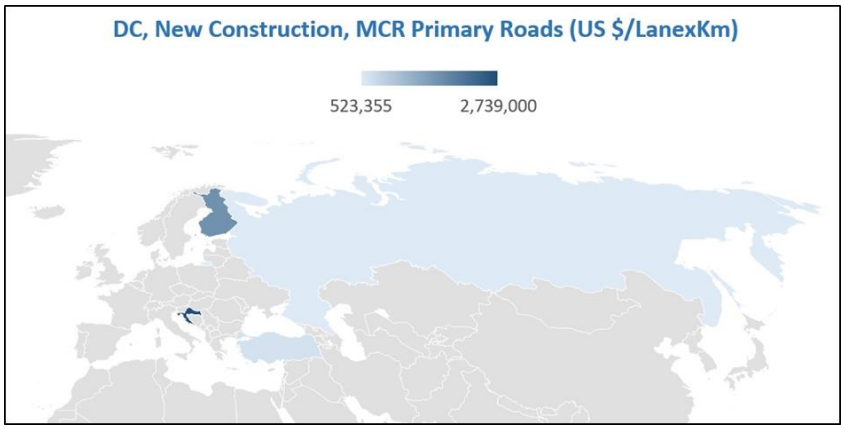


Figure XI.2
Double Carriageway High Classified Roads-Motorways Average New Construction Costs by Countries (US $/LanexKm) (2016 prices)



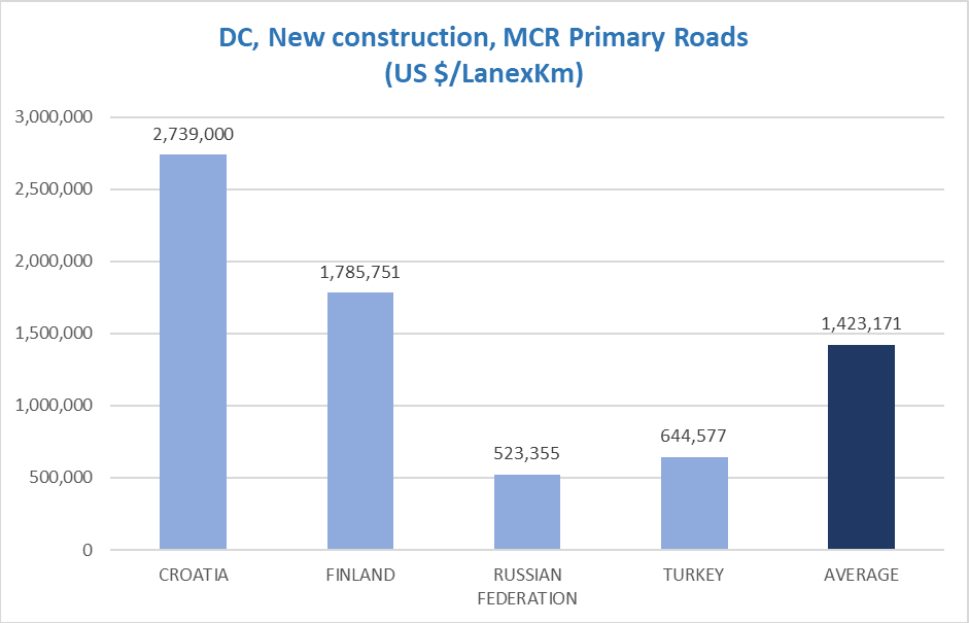
58. In the above graph double carriageway high classified roads which are motorways average new construction costs are plotted. The highest average is observed in Sweden and the lowest average is observed in Italy. The ratio between them is 6.15.

Figure XI.4
Double Carriageway Medium Classified Primary Roads Average New Construction Costs Map (US $/LanexKm) (2016 prices)



59. The above map shows double carriageway primary roads new construction costs of data provided countries by colour. Croatia, Finland, the Russian Federation and Turkey provided double carriageway primary roads new construction cost data. Average costs of new construction cost of countries are plotted on the following bar charts. Highest average cost is obtained in Croatia and lowest average one is in the Russian Federation.

Figure XI.5
Double Carriageway Medium Classified Primary Roads Average New Construction Costs by Countries (US $/LanexKm) (2016 prices)



60. In the following map double carriageway secondary roads new construction costs are colored. Only Bulgaria, the Russian Federation and Turkey provided cost data. Data is plotted on the following bar charts. The ratio between them is 5.24.

Figure XI.7
Double Carriageway Medium Classified Secondary Roads Average New Construction Costs Map (US $/LanexKm) (2016 prices)

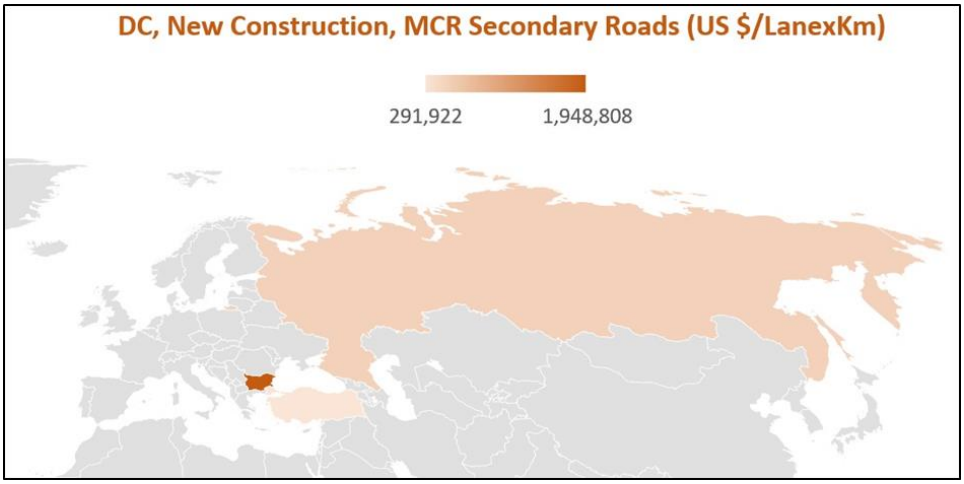
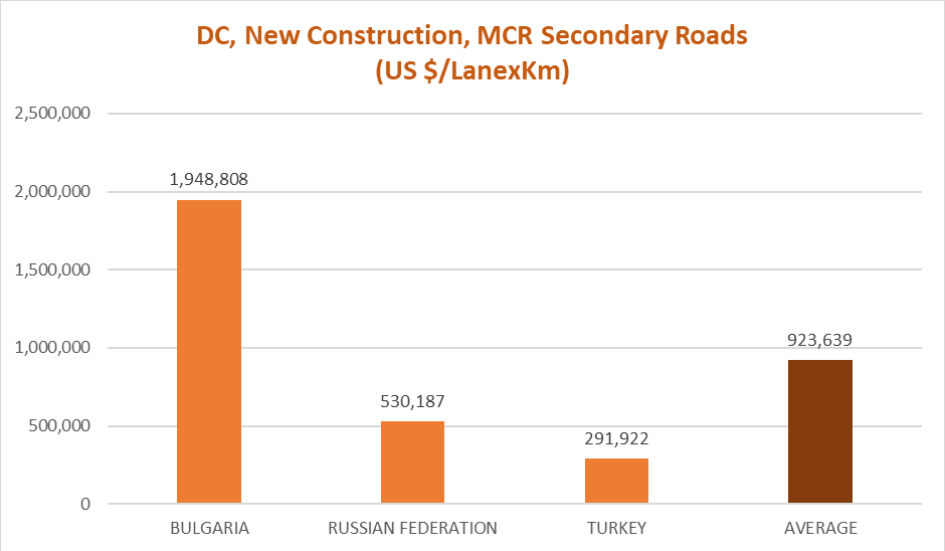


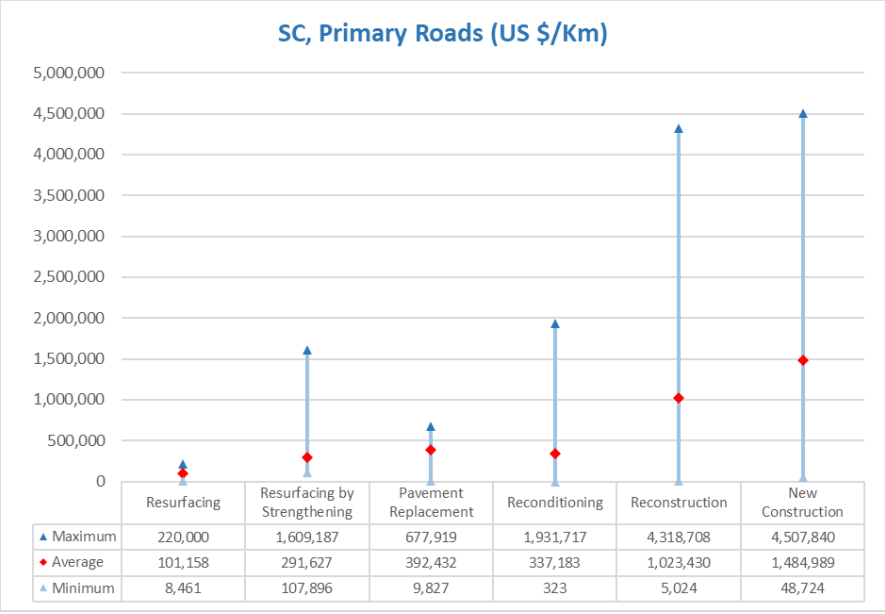
Figure XI.8
Double Carriageway Medium Classified Secondary Roads Average New Construction Costs by Countries (US $/LanexKm) (2016 prices)



61. The average new construction costs of double carriageway secondary roads for data provided countries are given in above bar chart. Upper average new construction cost of double carriageway secondary roads is observed in Bulgaria and the lowest one is in Turkey. The ratio between them is 6.68.

XII. Benchmarking Single Carriageway asphalt roads construction costs analysis for all work types

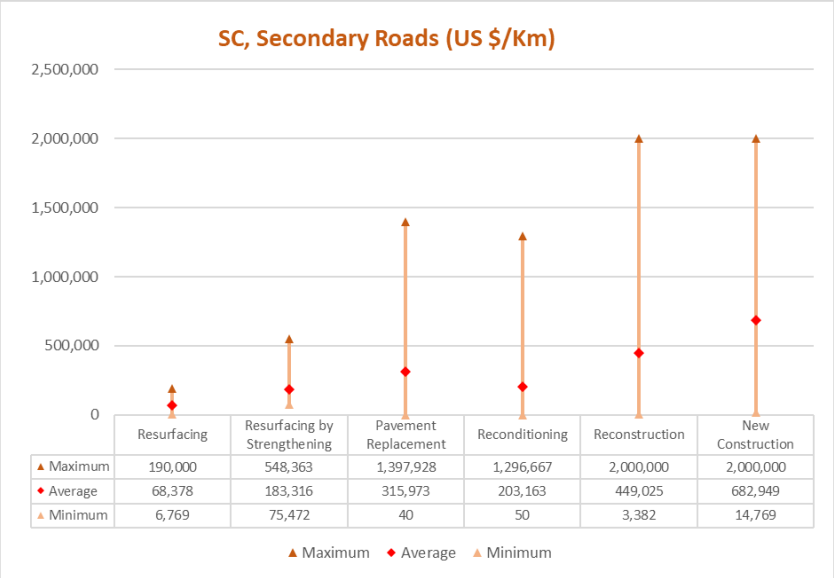
Figure XII.1
Benchmarking of Single Carriageway Roads – Primary Roads Construction Costs for All Member Countries Which Sent Data (US $/LanexKm) (2016 prices)



62. The above graph shows unit cost of single carriageway secondary roads by road works types are between 40 US $ per km and 2,000,000 US $ per km. Average unit cost of secondary roads by work types gradually increases from resurfacing to new construction but not in order. Reconditioning does not fit in order. Comparing by work types the highest value is

obtained for the reconstruction and the new construction road work types as while the lowest one is for pavement replacement.

Figure XII.2
Benchmarking of Single Carriageway Roads – Secondary Roads Construction Costs for All Member Countries Which Sent Data (US $/LanexKm)(2016 prices)



	Resurfacing	Resurfacing by Strengthening	Pavement Replacement	Reconditioning	Reconstruction	New Construction
▲ Maximum	190,000	548,363	1,397,928	1,296,667	2,000,000	2,000,000
◆ Average	68,378	183,316	315,973	203,163	449,025	682,949
▲ Minimum	6,769	75,472	40	50	3,382	14,769

63. The above graph shows unit cost of single carriageway primary roads by road works types are between 323 US $ per km and 4,507,840 US $ per km. Average unit cost of primary roads by work types gradually increases from resurfacing to new construction but not in order. Comparing by work types the highest value is obtained for new construction road work type as it is expected on the other hand the lowest one is for reconditioning not as it is expected.

XIII. Analysis about single carriageway asphalt roads construction costs by work types

Benchmarking single carriageway medium classified roads resurfacing costs

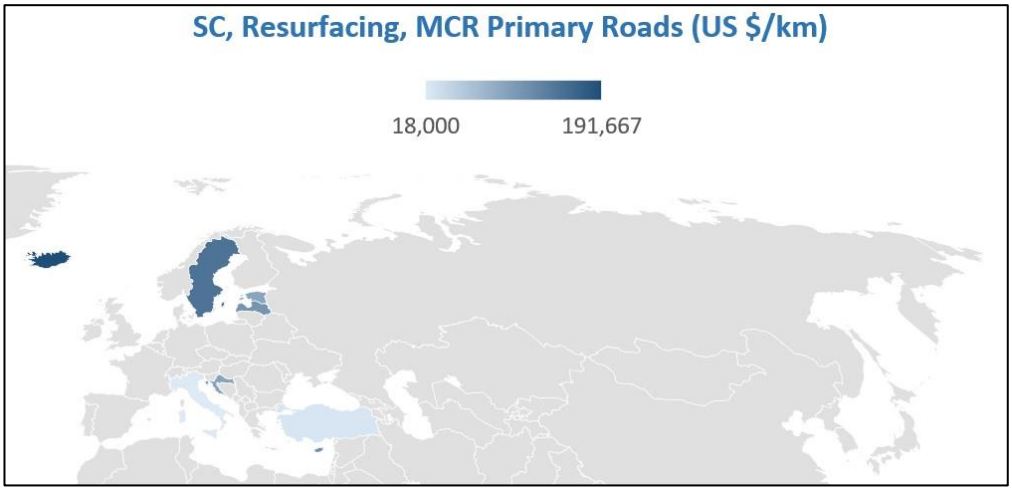
Table XIII.1
Single Carriageway Medium Classified Roads Resurfacing Costs (US $/Km) 2016 prices

	Resurfacing									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	-	-	-	-	-	-	-
CROATIA	128,615	97,035	55,417	20	4	-	-	-	-	-
CYPRUS	130,000	120,000	110,000	140	10	-	-	-	-	-
ESTONIA	184,468	95,426	63,246	232	38	148,628	100,192	55,867	-	23
FINLAND	-	-	-	-	-	-	-	-	-	-
ICELAND	-	191,667	-	59	-	-	41,667	-	318	-
ITALY	-	18,000	-	-	-	-	16,000	-	-	-
LATVIA	119,153	113,525	107,896	19	2	117,698	101,524	85,349	17	2
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	-	-	-	-	-	-	-	-	-	-
SWEDEN	220,000	150,000	100,000	-	-	190,000	130,000	70,000	-	-
TURKEY	38,768	23,615	8,461	3,476	83	35,000	20,885	6,769	2,317	56

64. The above table gives single carriageway medium classified roads which are primary roads and secondary roads resurfacing cost by countries. As it is seen only Croatia, Estonia, Finland, Latvia, Sweden and Turkey provided data for primary roads and Estonia, Iceland, Italy, Latvia, Sweden and Turkey provided data for secondary roads resurfacing cost.

65. The following map shows primary roads resurfacing costs by coloured.

Figure XIII.1
Single Carriageway Medium Classified Primary Roads Average Resurfacing Costs Map (US $/Km) (2016 prices)



66. It is seen from the following bar charts the highest average unit cost of resurfacing is 191,667 US $ per km observed in Iceland and the lowest one 18,000 US $ per km observed in Italy.

Figure XIII.2
Single Carriageway Medium Classified Primary Roads Average Resurfacing Costs by Countries (US $/Km) (2016 prices)

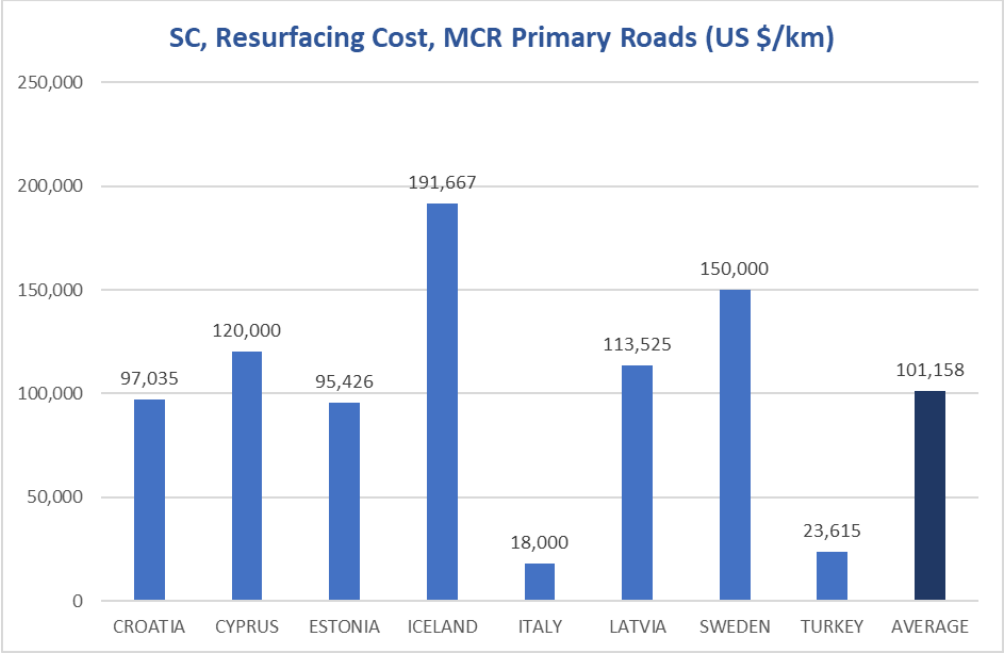
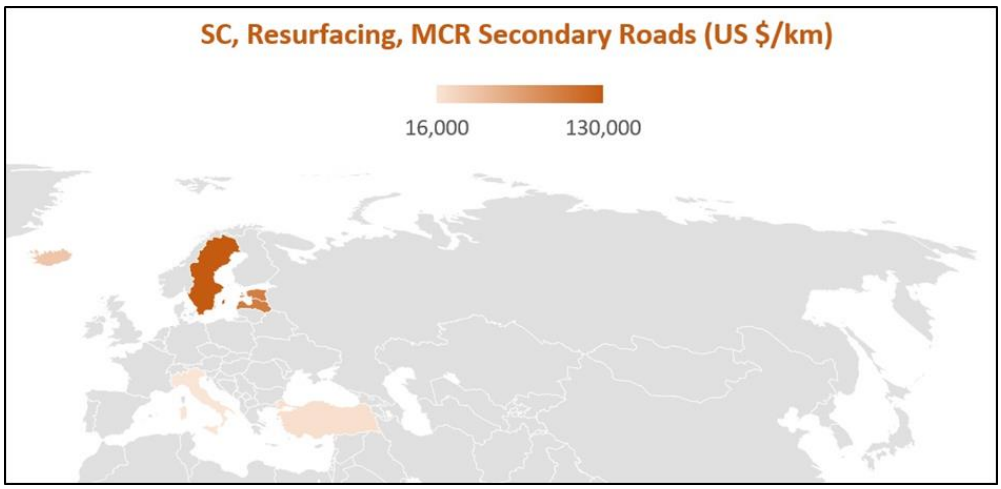


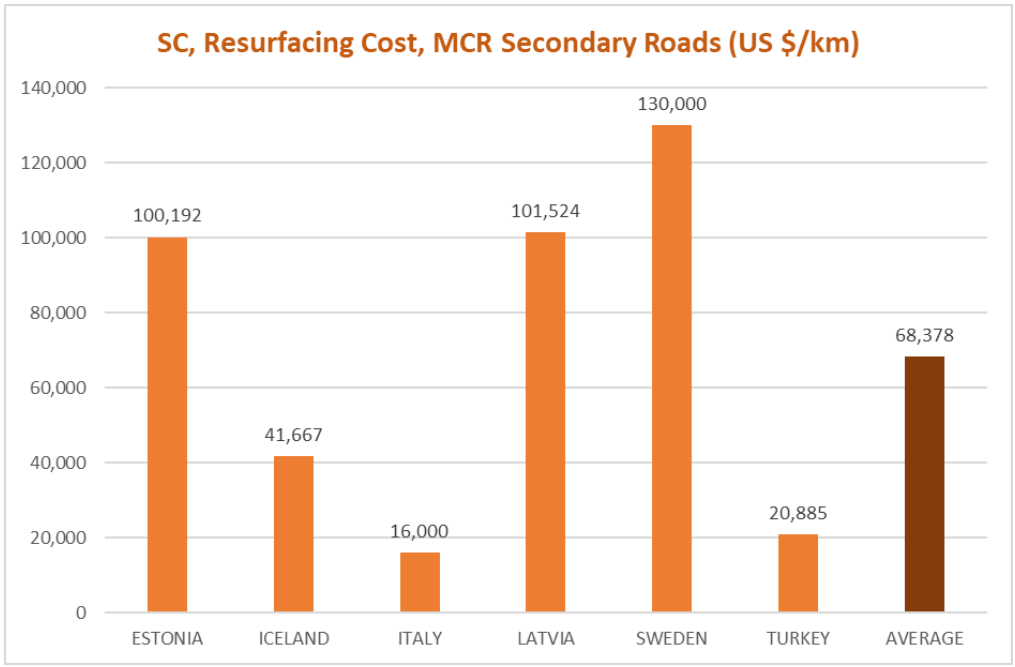
Figure XIII.4
Single Carriageway Medium Classified Secondary Roads Average Resurfacing Costs Map (US $/Km) (2016 prices)



67. In the above map resurfacing cost of single carriageway medium classified secondary roads are shown.

68. From the following bar charts, it is seen that the highest average unit cost is 130,000 US $ per km observed in Sweden and the lowest average unit cost for resurfacing of secondary roads is 16,000 US $ per km observed in Italy.

Figure XIII.5
Single Carriageway Medium Classified Secondary Roads Average Resurfacing Costs by Countries (US $/Km) (2016 prices)



XIV. Analysis about single carriageway asphalt roads construction costs by work types

Benchmarking single carriageway medium classified roads resurfacing by strengthening costs

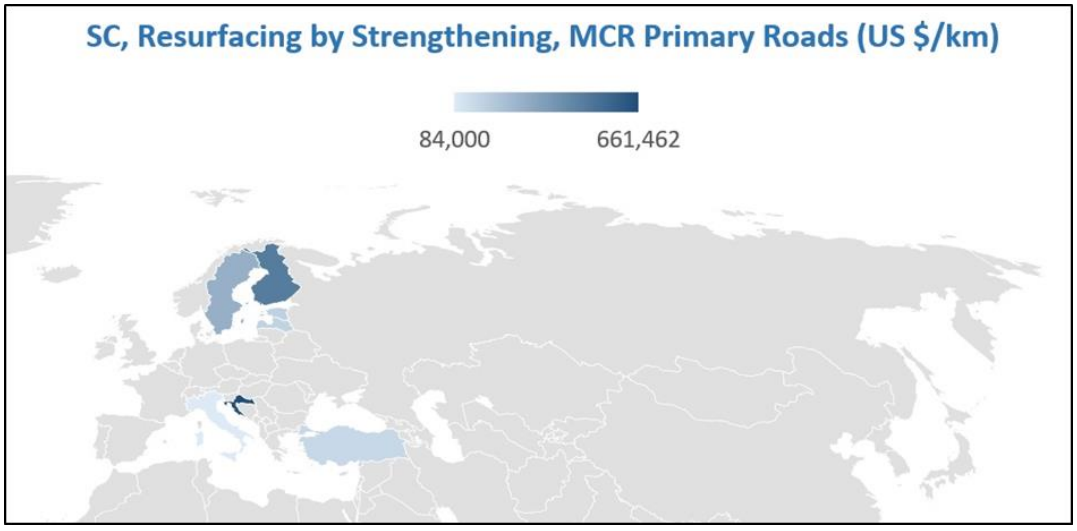
Table XVI.1
Single Carriageway Medium Classified Roads Resurfacing by Strengthening Costs (US $/Km) 2016 prices

	Resurfacing by Strengthening									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	-	-	548,363	321,127	123,223	593	38
CROATIA	1,609,187	661,462	178,310	12	4	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-
ESTONIA	182,359	178,901	164,440	30	3	388,963	194,311	166,548	19	3
FINLAND	493,873	493,873	493,873	25	1	-	-	-	-	-
ICELAND	-	-	-	-	-	202,381	138,369	75,472	8	3
ITALY		84,000	-	-	-	-	47,000	-	-	-
LATVIA	245,722	169,527	107,896	75	10	267,868	191,081	132,392	36	8
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	-	-	-	-	-	-	-	-	-	-
SWEDEN	440,000	300,000	200,000	-	-	380,000	260,000	140,000	-	-
TURKEY	198,862	153,628	108,394	1,302	35	175,932	131,324	86,716	868	21

69. In the above table single carriageway medium classified roads which are primary roads and secondary roads resurfacing by strengthening cost by countries are given. As it is seen Croatia, Estonia, Finland, Latvia, Sweden and Turkey provided data for primary roads and Bulgaria, Estonia, Iceland, Italy, Latvia, Sweden and Turkey provided data for single carriageway secondary roads resurfacing by strengthening.

70. The following map shows primary roads resurfacing by strengthening costs by colour.

Figure XVI.1
Single Carriageway Medium Classified Primary Roads Average Resurfacing by Strengthening Costs Map (US $/Km) (2016 prices)



71. It is seen from the following bar charts the highest average unit cost of resurfacing by strengthening costs is 661,462 US $ per km observed in Croatia and the lowest average 84,000 US $ per km observed in Italy.

Figure XVI.2
Single Carriageway Medium Classified Primary Roads Average Resurfacing by Strengthening Costs by Countries (US $/Km) (2016 prices)

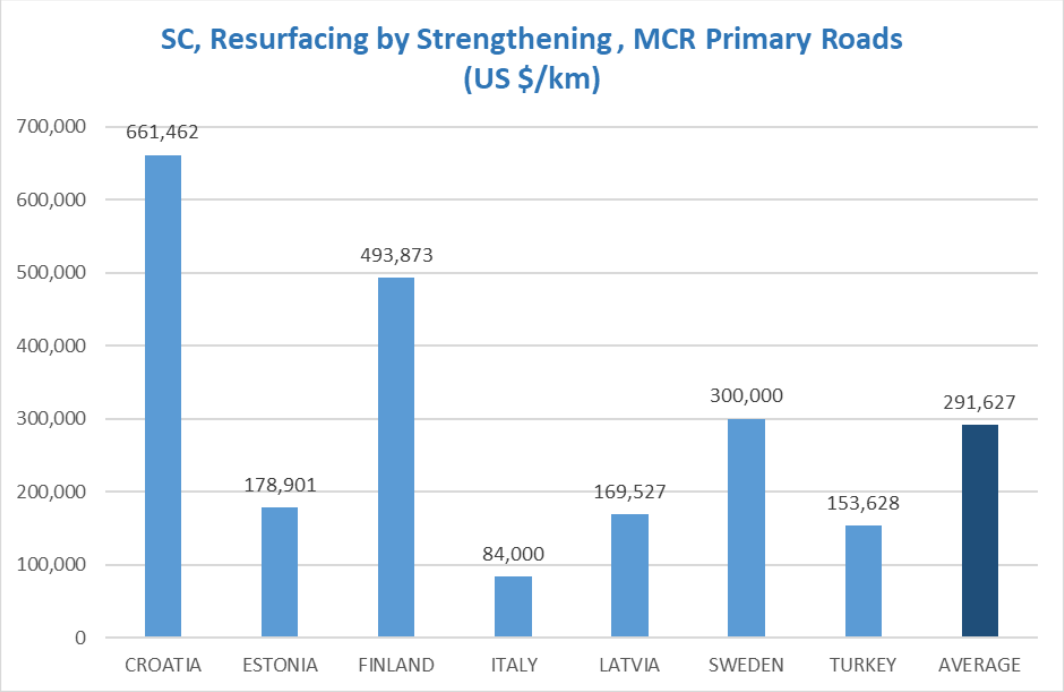
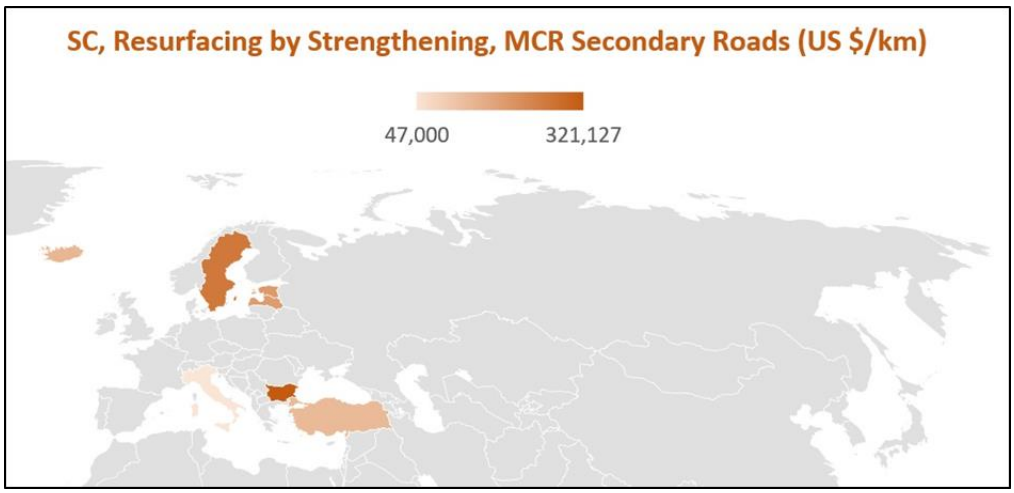
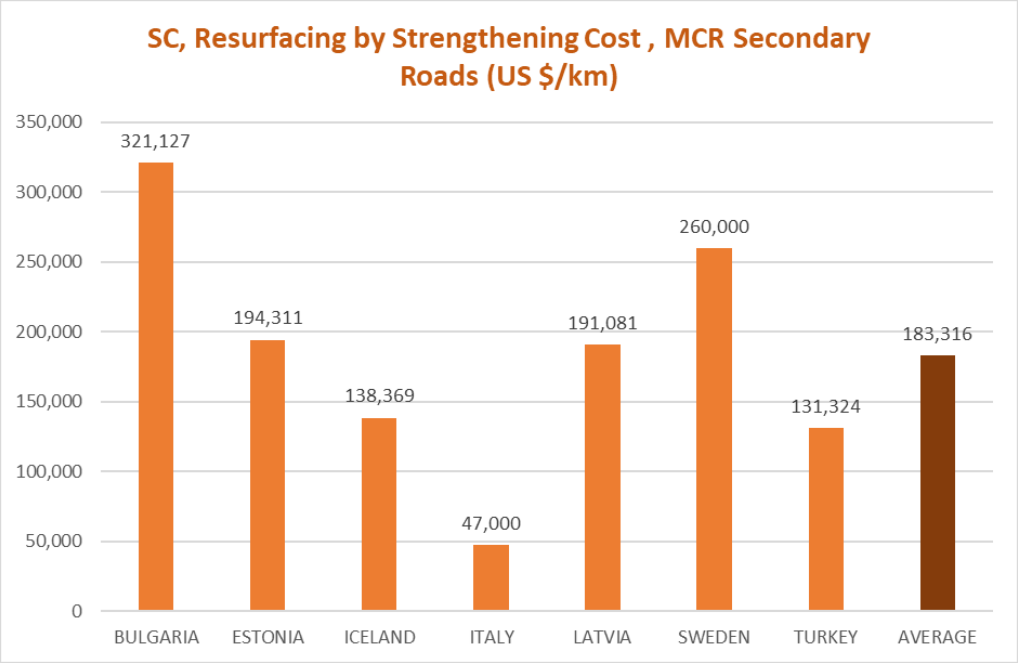


Figure XIV.4
Single Carriageway Medium Classified Secondary Roads Average Resurfacing by Strengthening Costs Map (US $/Km) (2016 prices)



72. In above map resurfacing by strengthening cost of single carriageway secondary roads are coloured. From the following chart, unit cost by countries as average are given. The highest average unit cost is 321,127 US $ per km observed in Bulgaria and the lowest average one is 47,000 US $ per km observed in Italy.

Figure XIV.5
Single Carriageway Medium Classified Secondary Roads Average Resurfacing by Strengthening Costs by Countries (US $/Km) (2016 prices)



XV. Analysis about single carriageway asphalt roads construction costs by work types

Benchmarking single carriageway medium classified roads pavement replacement costs

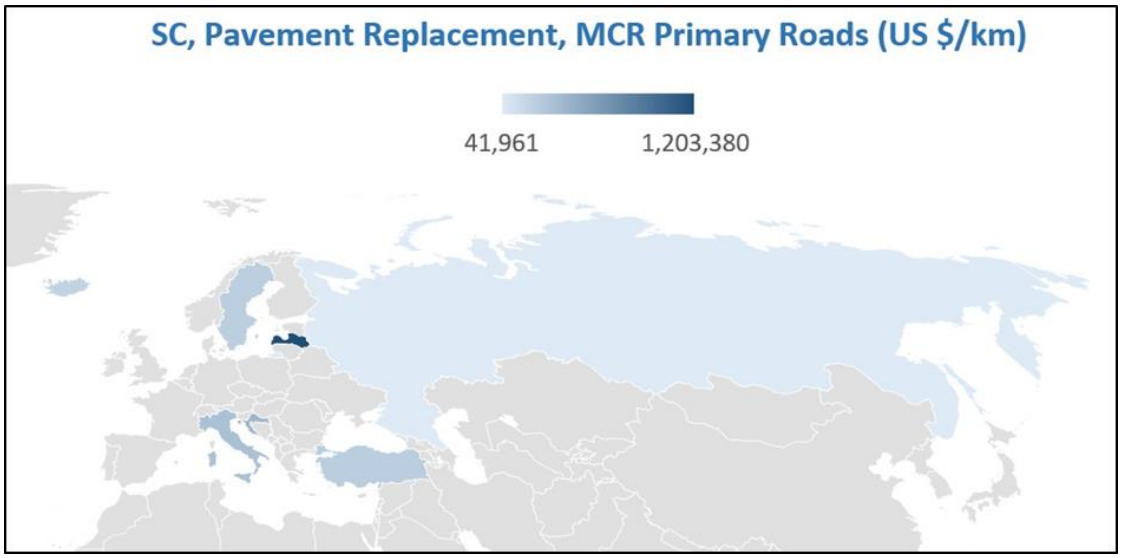
Table XV.1
Single Carriageway Medium Classified Roads Pavement Replacement Costs (US $/Km) 2016 prices

	Pavement Replacement									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	8	1	-	-	-	-	-
CROATIA	677,919	429,747	172,227	69	12	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-
FINLAND	-	-	-	-	-	-	-	-	-	-
ICELAND	344,262	212,980	81,697	18	4	278,986	262,599	246,212	5	2
ITALY	-	350,000	-	-	-	-	200,000	-	-	-
LATVIA	645,182	1,203,380	1,924,919	36	3	1,397,928	966,475	819,516	78	9
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	167,566	41,961	9,827	1,680	206	192,946	47,098	40	396	118
SWEDEN	320,000	250,000	140,000	-	-	280,000	200,000	100,000	-	-
TURKEY	341,566	258,958	176,349	650	15	298,250	219,665	141,079	350	18

73. In the above table single carriageway medium classified asphalt roads which are primary roads and secondary roads pavement replacement cost by countries are given. As it is seen Croatia, Iceland, Italy, Latvia, the Russian Federation, Sweden and Turkey provided data for primary roads and Iceland, Italy, Latvia, the Russian Federation, Sweden and Turkey provided data for secondary roads pavement replacement costs.

74. The following map shows primary single carriageway roads pavement replacement cost by colour.

Figure XV.2
Single Carriageway Medium Classified Primary Roads Average Pavement Replacement Costs Map (US $/Km) (2016 prices)



75. It is seen from the following bar charts the highest average unit cost of pavement replacement is 1,203,380 US $ per km observed in Latvia and the lowest one 41,961 US $ per km observed in the Russian Federation. The ratio between them is 28.68.

Figure XV.3
Single Carriageway Medium Classified Primary Roads Average Pavement Replacement Costs by Countries (US $/Km) (2016 prices)

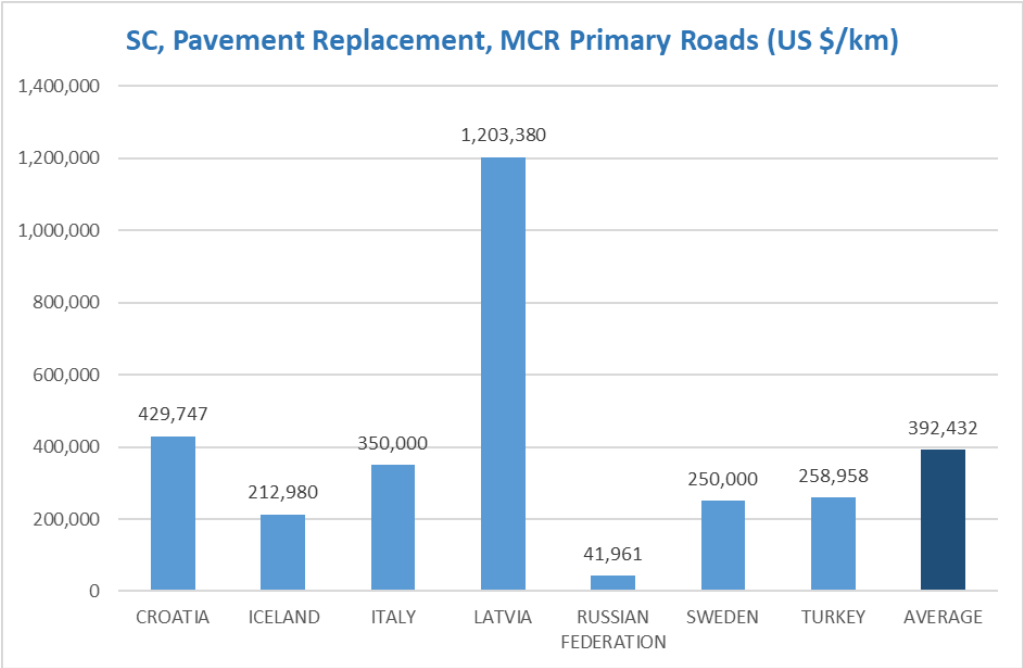
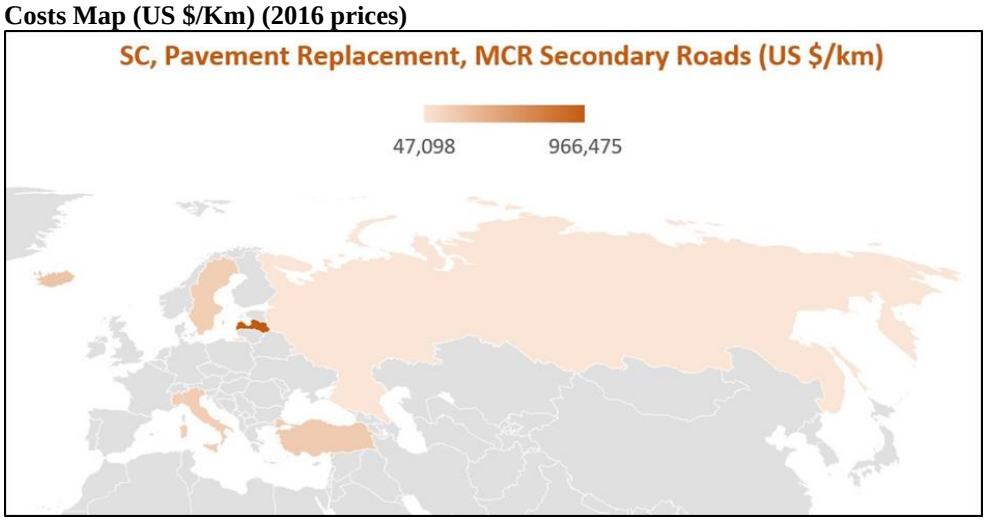


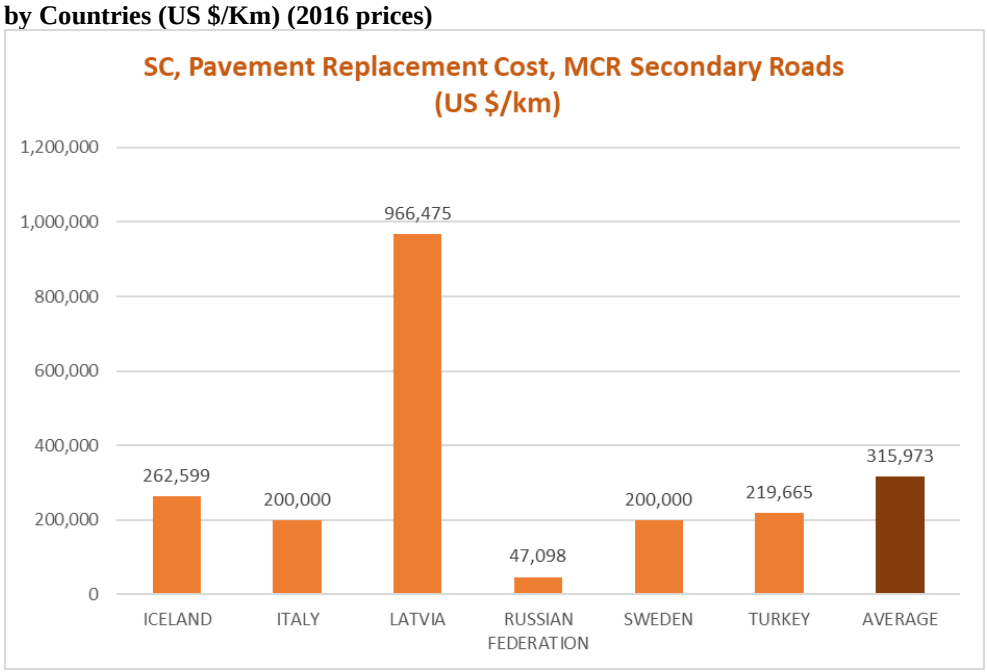
Figure XV.5
Single Carriageway Medium Classified Secondary Roads Average Pavement Replacement Costs Map (US $/Km) (2016 prices)



76. In above map pavement replacement cost of single carriageway asphalt secondary roads are shown by colour.

77. From the following bar charts average unit costs and unit cost by countries as average, maximum and minimum are given. The highest average unit cost is 966,475 US $ per km observed in Latvia and the lowest one 47,098 US $ per km observed in the Russian Federation. On the other hand, the ratio between them is 20.52.

Figure XV.5
Single Carriageway Medium Classified Secondary Roads Average Pavement Replacement Costs by Countries (US $/Km) (2016 prices)



XVI. Analysis about single carriageway asphalt roads construction costs by work types

Benchmarking single carriageway medium classified roads reconditioning costs

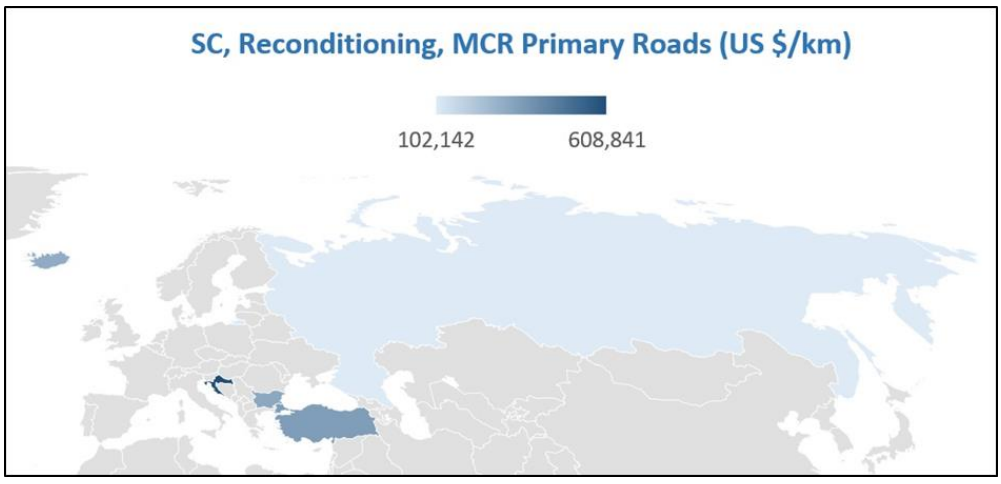
Table XVI.1
Single Carriageway Medium Classified Roads Reconditioning Costs (US $/Km) 2016 prices

	Reconditioning									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	1,931,717	317,366	121,765	742	10	312,741	200,000	130,631	741	12
CROATIA	1,204,634	608,841	291,466	186	16	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-
ESTONIA	-	-	-	-	-	-	-	-	-	-
FINLAND	-	-	-	-	-	-	-	-	-	-
ICELAND	359,195	306,717	225,575	30	7	-	-	-	-	-
ITALY	-	-	-	-	-	-	-	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	1,298,268	102,142	323	7,547	1,212	1,296,667	91,412	50	5,702	2,637
SWEDEN	-	-	-	-	-	-	-	-	-	-
TURKEY	437,571	350,850	264,130	1,820	41	423,395	318,076	212,757	980	23

78. In the above table single carriageway medium classified asphalt roads which are primary roads and secondary roads reconditioning costs by countries are given. As it is seen from above table Bulgaria, Croatia, Iceland, the Russian Federation and Turkey provided data for primary roads and Bulgaria, the Russian Federation and Turkey provided data for secondary roads reconditioning costs.

79. The following map shows primary single carriageway roads reconditioning costs by colour.

Figure XVI.1
Single Carriageway Medium Classified Primary Roads Average Reconditioning Costs Map (US $/Km) (2016 prices)



80. It is seen in the following bar charts the highest average unit cost of reconditioning cost is 608,841 US $ per km observed in Croatia and the lowest one 102,142 US $ per km observed in the Russian Federation. The ratio between them is 5.96.

Figure XVI.3
Single Carriageway Medium Classified Primary Roads Average Reconditioning Costs by Countries (US $/Km) (2016 prices)

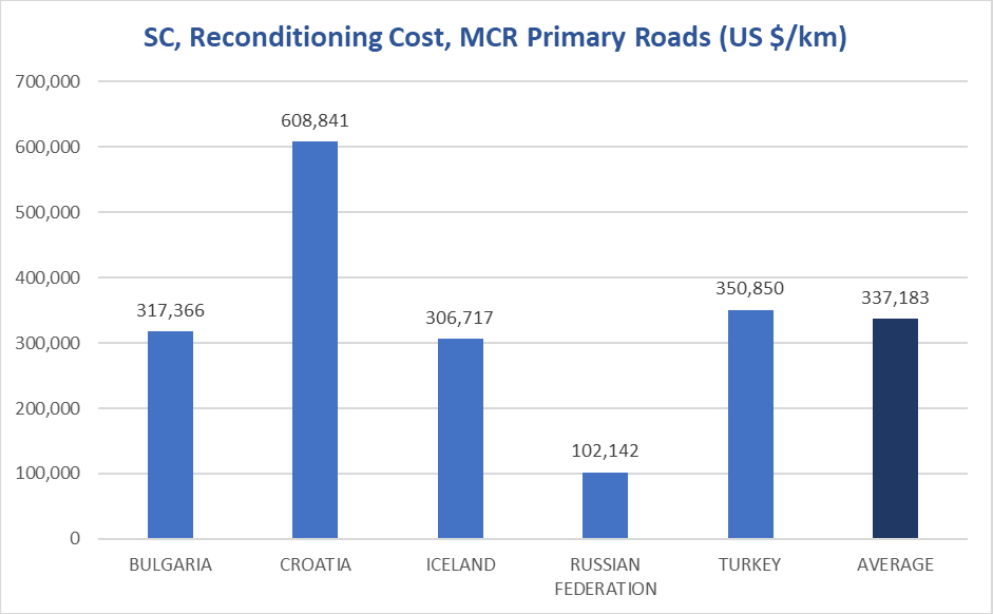
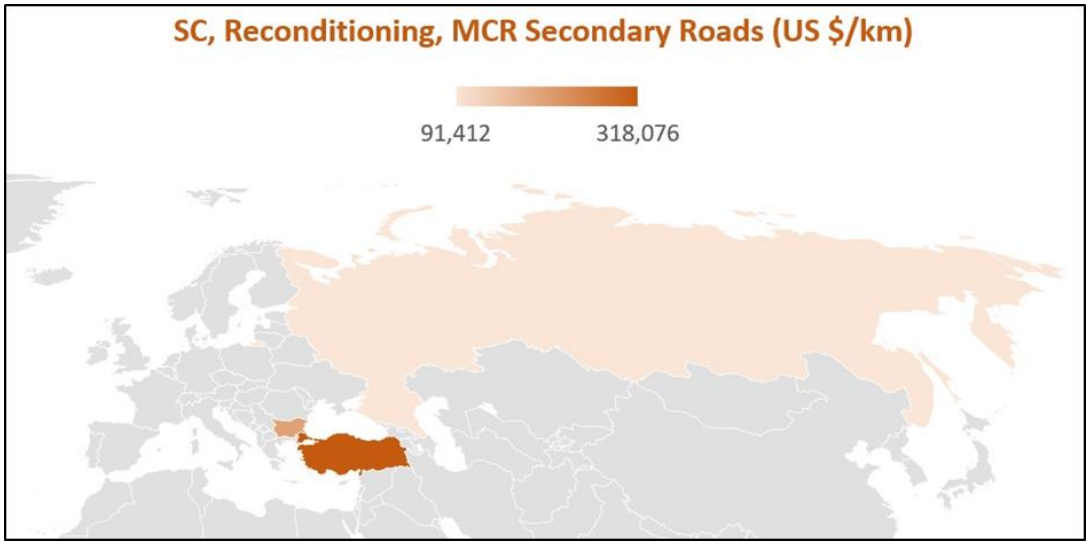
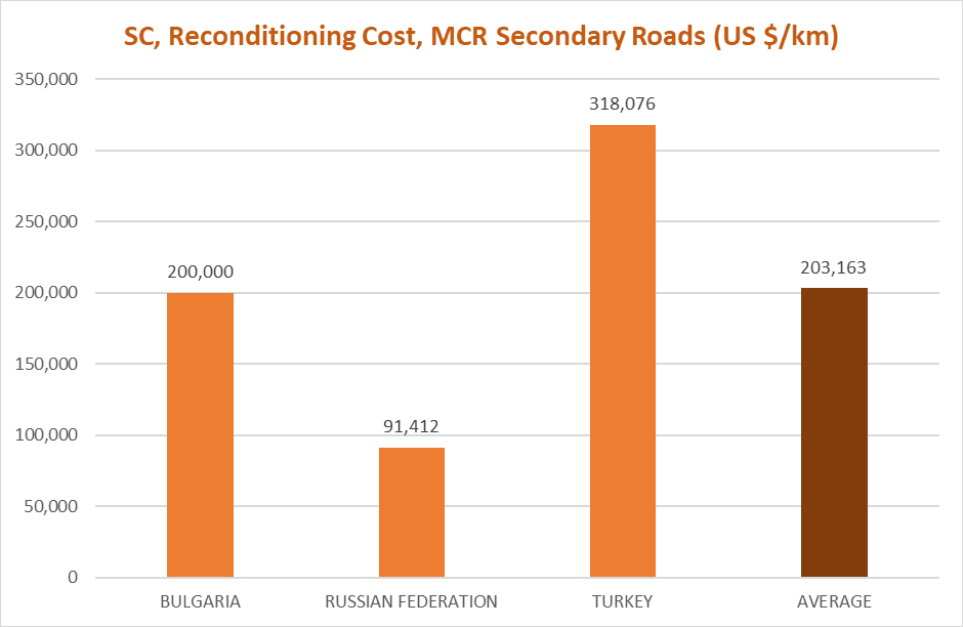


Figure XVI.4
Single Carriageway Medium Classified Secondary Roads Average Reconditioning Costs Map (US $/Km) (2016 prices)



81. In above map reconditioning cost of single carriageway asphalt secondary roads are shown by colour. From the following bar charts unit cost by countries as average, maximum and minimum are given. The average unit costs are not so different from each other. The ratio between highest average unit cost and lowest average unit costs is 3.5.

Figure XVI.5
Single Carriageway Medium Classified Secondary Roads Average Reconditioning Costs by Countries (US $/Km) (2016 prices)



XVII. Analysis about single carriageway asphalt roads construction costs by work types

Benchmarking single carriageway medium classified roads reconstruction costs

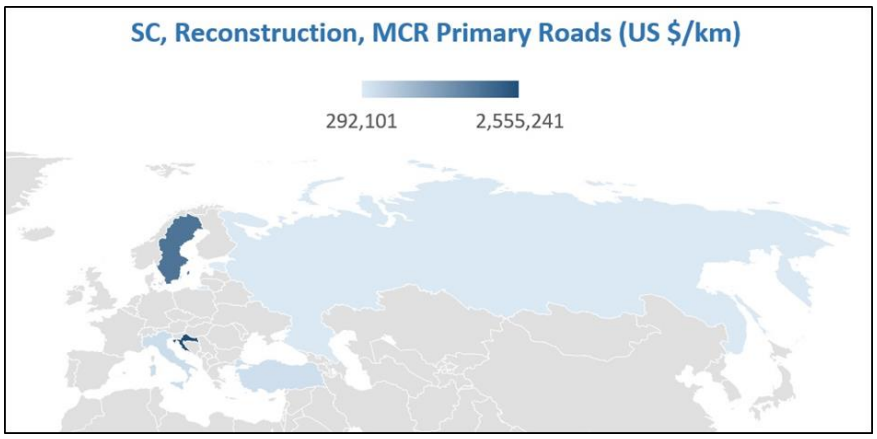
Table XVII.1
Single Carriageway Medium Classified Roads Reconstruction Costs (US $/Km) 2016 prices

	Reconstruction									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	-	-	1	1	-	-	-	-	-
CROATIA	4,318,708	2,555,241	1,055,027	36	12	-	-	-	-	-
CYPRUS	-	-	-	-	-	-	-	-	-	-
ESTONIA	635,622	292,101	230,848	125	19	368,935	246,462	169,710	98	20
FINLAND	-	-	-	-	-	-	-	-	-	-
ICELAND	-	-	-	-	-	471,393	308,882	225,694	14	3
ITALY	-	500,000	-	-	-	-	230,000	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	2,130,193	325,561	5,024	1,962	267	889,366	177,877	3,382	1,191	284
SWEDEN	3,000,000	2,000,000	1,000,000	-	-	2,000,000	1,300,000	1,000,000	-	-
TURKEY	616,823	467,679	318,534	949	37	602,647	430,926	259,204	1,762	58

82. In the above table single carriageway medium classified asphalt roads which are primary roads and secondary roads reconstruction cost by countries are given. As it is seen Croatia, Estonia, Italy, the Russian Federation, Sweden and Turkey provided data for primary roads and Estonia, Iceland, Italy, the Russian Federation, Sweden and Turkey provided data for secondary roads reconstruction costs.

83. The following map shows primary single carriageway roads reconstruction costs coloured.

Figure XVII.1
Single Carriageway Medium Classified Primary Roads Average Reconstruction Costs Map (US $/Km) (2016 prices)



84. It is seen in the following bar charts the highest average unit cost of single carriageway primary roads reconstruction cost is 2,555,241 US $ per km observed in Croatia and the lowest average one 292,101 US $ per km observed in Estonia. The ratio between them is 8.45.

Figure XVII.2
Single Carriageway Medium Classified Primary Roads Average Reconstruction Costs by Countries (US $/Km) (2016 prices)

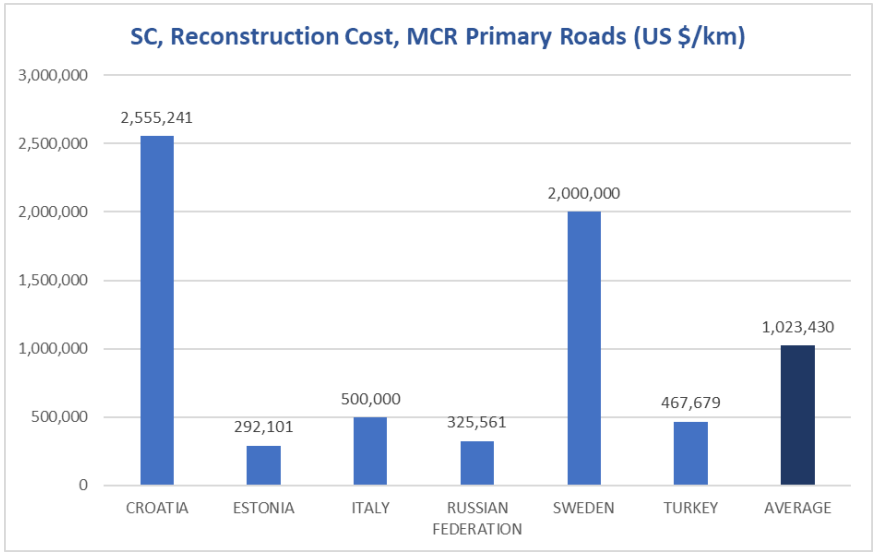
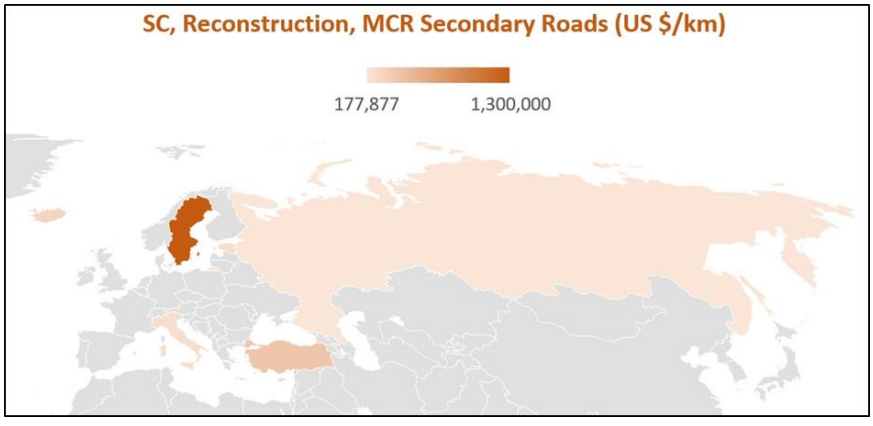
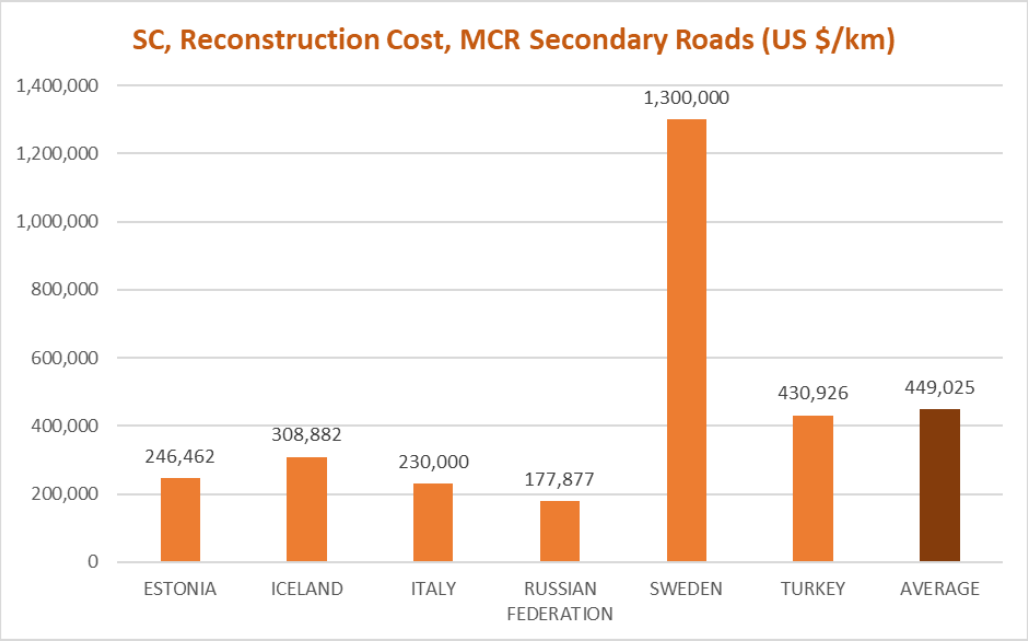


Figure XVII.4
Single Carriageway Medium Classified Secondary Roads Average Reconstruction Costs Map (US $/Km) (2016 prices)



85. In above map reconstruction cost of single carriageway secondary roads are shown by colour. From the following bar charts unit cost by countries as average, maximum and minimum are given. The highest average unit cost is 1,300,000 US $ per km observed in Sweden and the lowest one 177,877 US $ per km observed in the Russian Federation. The ratio between them is 7.3.

Figure XVII.5
Single Carriageway Medium Classified Secondary Roads Average Reconstruction Costs by Countries (US $/Km) (2016 prices)



XVIII. Analysis about single carriageway asphalt roads construction costs by work types

Benchmarking single carriageway medium classified roads new construction costs

Table XVIII.1
Single Carriageway Medium Classified Roads New Construction Costs (US $/Km) 2016 prices

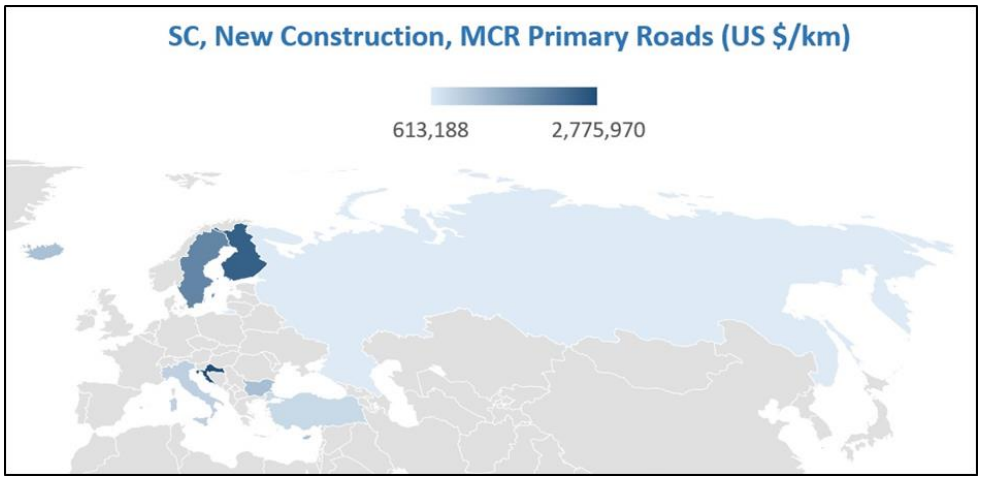
	New Construction									
	MCR_Primary Roads					MCR_Secondary Roads				
	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects	Maximum	Average	Minimum	Length of Regarded Projects (Km)	Number of Projects
AUSTRIA	-	-	-	-	-	-	-	-	-	-
BULGARIA	-	1,211,225	-	7	1	-	-	-	-	-
CROATIA	4,507,840	2,775,970	994,903	12	8	-	-	-	-	-
CYPRUS	-	1,200,000	-	20	4	-	1,000,000	-	3	1
ESTONIA	-	-	-	-	-	-	-	-	-	-
FINLAND	3,760,569	2,525,615	1,290,661	21	2	821,552	821,552	821,552	3	1
ICELAND	2,250,000	1,194,000	893,000	14	3	-	-	-	-	-
ITALY	-	980,000	-	-	-	-	268,000	-	-	-
LATVIA	-	-	-	-	-	-	-	-	-	-
REPUBLIC OF MOLDOVA	-	-	-	-	-	-	-	-	-	-
RUSSIAN FEDERATION	1,144,512	613,188	48,724	157	20	855,919	192,578	14,769	818	214
SWEDEN	3,000,000	2,000,000	1,000,000	-	-	2,000,000	1,300,000	1,000,000	-	-
TURKEY	1,314,653	864,903	475,697	40	6	737,087	515,563	294,040	45	5

86. In the above table single carriageway medium classified roads which are primary roads and secondary roads new construction cost by countries are given. As it is seen

Bulgaria, Croatia, Cyprus, Finland, Iceland, Italy, the Russian Federation, Sweden and Turkey provided data for primary roads and Cyprus, Finland, Italy, the Russian Federation, Sweden and Turkey provided data for secondary roads new construction costs.

87. The following map shows primary single carriageway roads new construction costs by colour.

Figure XVIII.2
Single Carriageway Medium Classified Primary Roads Average New Construction Costs Map (US $/Km) (2016 prices)



88. The following bar charts show Croatia's, Finland's and Sweden's average unit cost of single carriageway primary road new construction costs are higher comparing with other countries. The average of averages is 1,484,989 US $ per km and 1.87 times lower than the highest one and 2.42 times higher than the lowest one. The highest average is observed in Croatia and the lowest average is observed in the Russian Federation.

Figure XVIII.3
Single Carriageway Medium Classified Primary Roads Average New Construction Costs Map (US $/Km) (2016 prices)

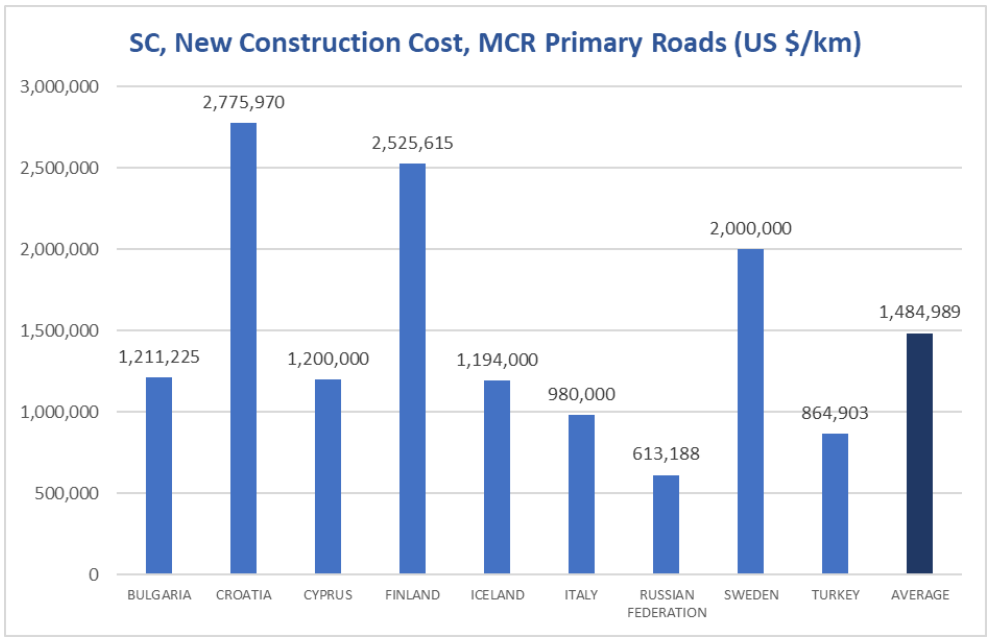
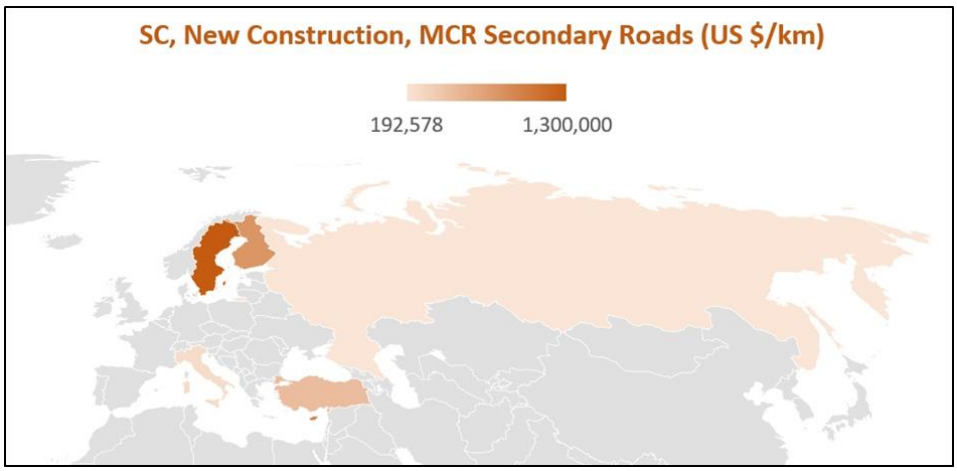
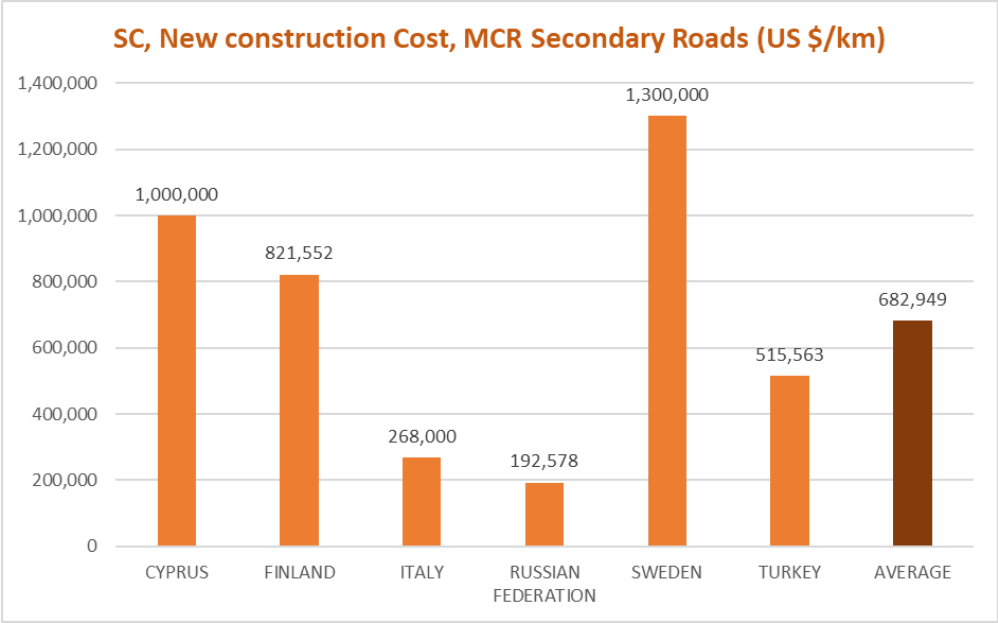


Figure XVIII.5
Single Carriageway Medium Classified Secondary Roads Average New Construction Costs Map (US $/Km) (2016 prices)



89. In above map new construction cost of single carriageway asphalt secondary roads are shown by colour. From the following bar chart unit cost by countries as average, maximum and minimum are given. The highest average unit cost is 1,300,000 US $ per km observed in Sweden and the lowest average 192,578 US $ per km observed in the Russian Federation. The ratio between them is 6.75.

Figure XVIII.6
Single Carriageway Medium Classified Secondary Roads Average New Construction Costs by Countries (US $/Km) (2016 prices)



XIX. Analysis about road superstructures construction costs by infrastructure type.

Benchmarking road infrastructures, tunnels and bridges unit construction cost

90. In the following paragraphs construction cost benchmarking analysis are presented for tunnels and bridges by table and bar charts. In following table unit construction costs of

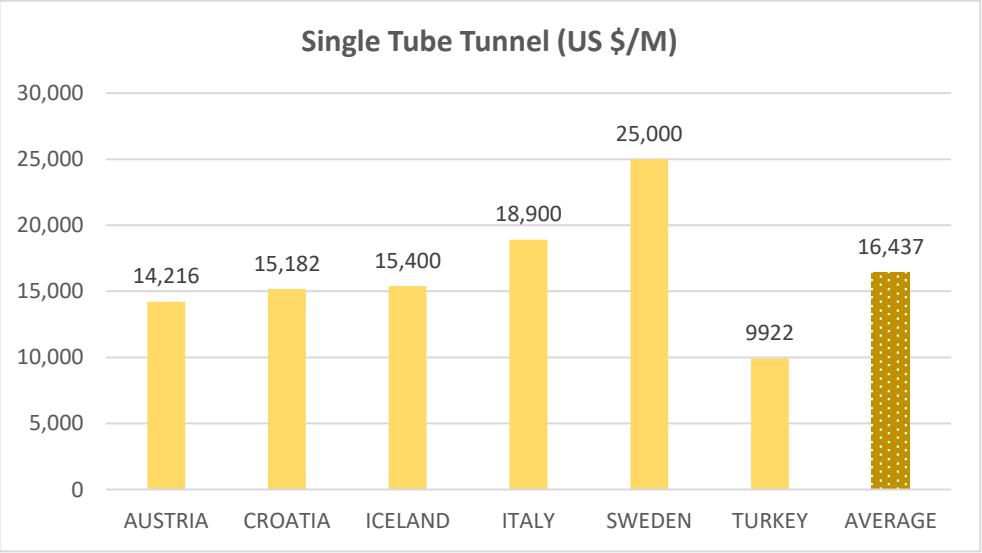
tunnels and bridges by countries are given in terms of $ per m for tunnels and $ per m2 for bridges. This table is produced based on data received from countries.

Table XIX.1
Unit Construction Costs of Tunnels and Bridges by Countries

	Unit construction cost of tunnels (us $/m)			*Unit construction cost of bridges (us $/m2)*				
	Single tube tunnel	*Twin tube tunnel*	*Under water tunnel*	*Precasted and pre-stressed simple beam bridge*	*Balanced cantiliver bridge*	*Cable stayed bridge*	*Suspension bridge*	*Pedestrian bridge*
Austria	14 216	-	0	-	-	-	-	-
Bulgaria	-	-	-	-	-	-	-	-
Croatia	15 182	24 045	-	958	-	-	-	-
Cyprus	-	20 000	-	2 119	2 400	-	-	-
Estonia	-	-	-	1 309	1 416	-	-	-
Finland	-	-	-	-	-	-	-	-
Germany	-	-	-	-	2 583	9 650	-	-
Iceland	15 400	-	-	3 690	-	-	-	4 098
Italy	18 900	31 500	-	1 100	-	-	-	-
Latvia	-	-	-	-	-	-	-	1 050
Republic of Moldova	-	-	-	1 534	-	-	-	16 542
Russian federation	-	-	-	-	-	-	-	-
Sweden	25 000	40 000	-	3 000	-	-	-	3 000
Turkey	9 922	19 827	86 562	698	2 303	3 006	9 644	1 128
Average	16 437	27 074	86 562	1 801	2 176	6 328	9 644	5 164

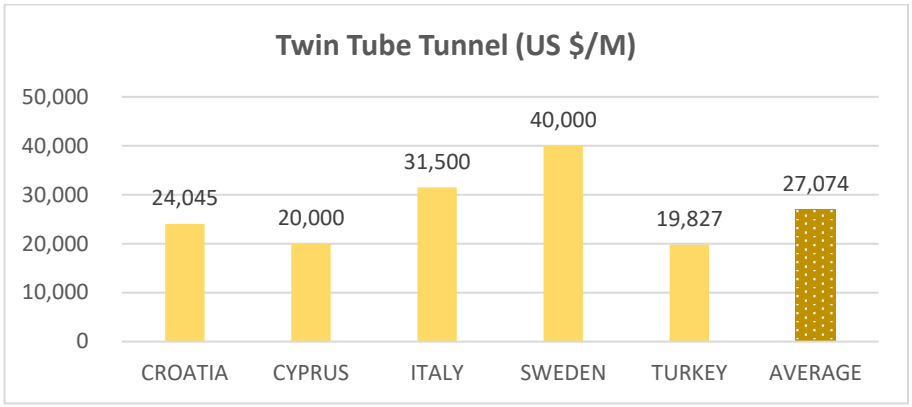
A. Tunnels unit construction costs benchmarking

Figure XIX.1
Single Tube Tunnels Unit Construction Costs by Countries (US $/M) (2016 prices)



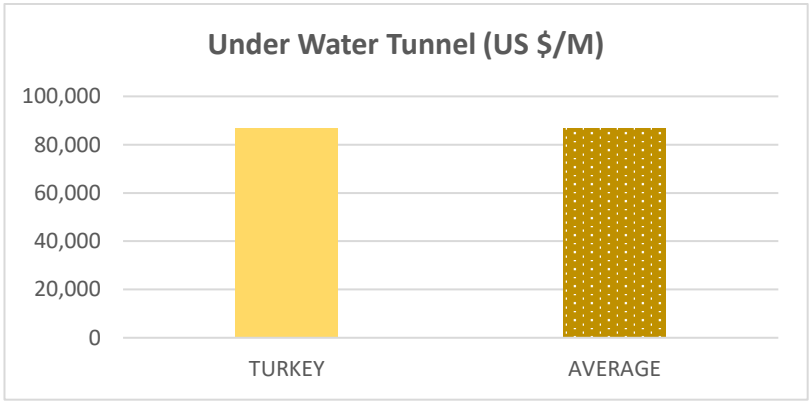
91. In the above bar chart single tube tunnel unit cost by countries are given. The average unit costs are pretty much similar. The overall one is 16,437 US$ per m. The highest one is observed in Sweden as 25,000 US $ per m and the lowest one observed in Turkey as 9,922 US $ per m. The ratio between them is 2.5.

Figure XIX.2
Twin Tube Tunnels Unit Construction Costs by Countries (US $/M) (2016 prices)



92. In the above bar chart however twin tube tunnel unit cost by countries are given. The overall average unit cost is 27,074 US $ per m. The highest one is observed in Sweden as 40,000 US $ per m and the lowest one observed in Turkey as 19,827 US $ per m. The ratio between them is 2.

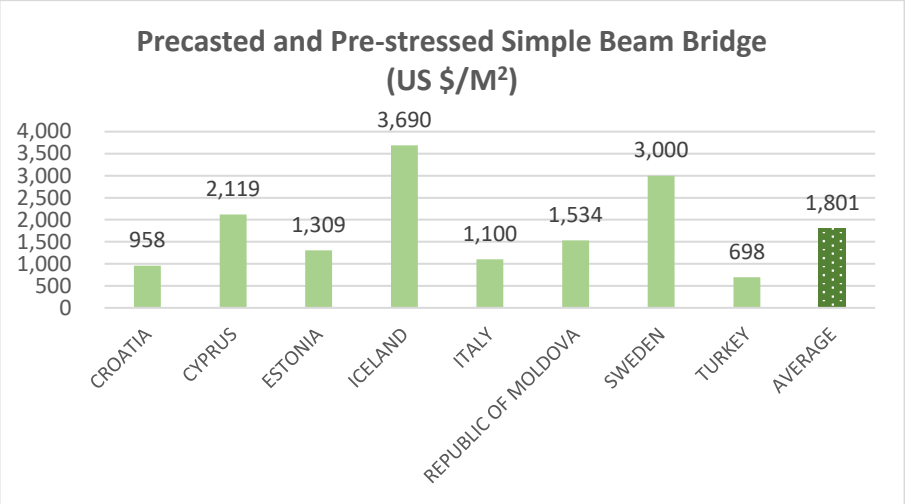
Figure XIX.3
Under Water Tunnels Unit Construction Costs by Countries (US $/M)



93. Unit cost of underwater tunnel is given in above bar chart. Only Turkey provided data. The average cost is 86,562 US $ per m.

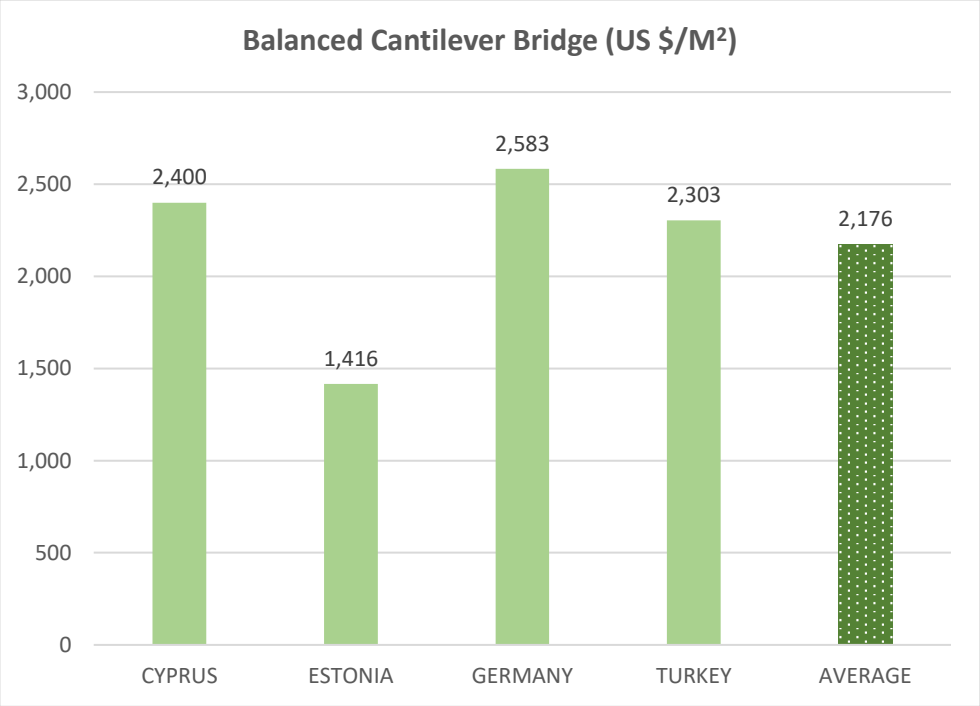
B. Bridges construction costs benchmarking

Figure XIX.4
Precasted and Pre-stressed Simple Beam Bridges Unit Construction Costs by Countries (US $/M2) (2016 prices)



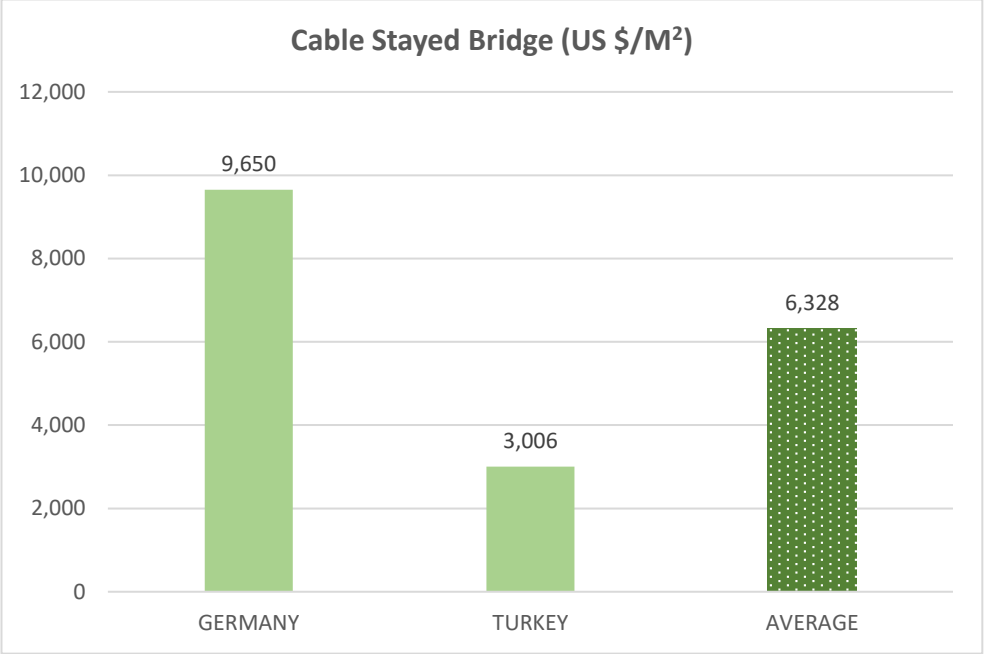
94. In the above bar chart, precasted and pre-stressed simple beam unit costs by countries are given. The overall average unit cost is 1,801 US $ per m2. The highest one is observed in Iceland as 3,690 US $ per m2 and the lowest one observed in Turkey as 698 US $ per m2. The ratio between them is 5.3.

Figure XIX.5
Balanced Cantilever Bridges Unit Construction Costs by Countries (US $/M2) (2016 prices)



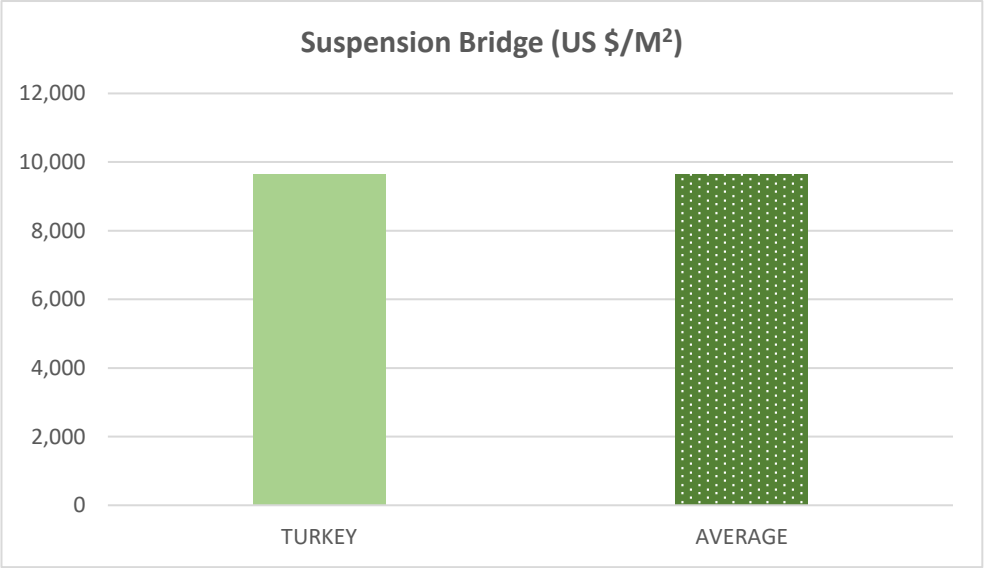
95. In the above bar chart however balanced cantilever bridge unit costs by countries are given. The overall average unit cost is 2,176 US $ per m2. The highest one is observed in Germany as 2,583 US $ per m2 and the lowest one observed in Estonia as 1,416 US $ per m2. The ratio between them is 1.8.

Figure XIX.6
Cable Stayed Bridges Unit Construction Costs by Countries (US $/M2) (2016 prices)



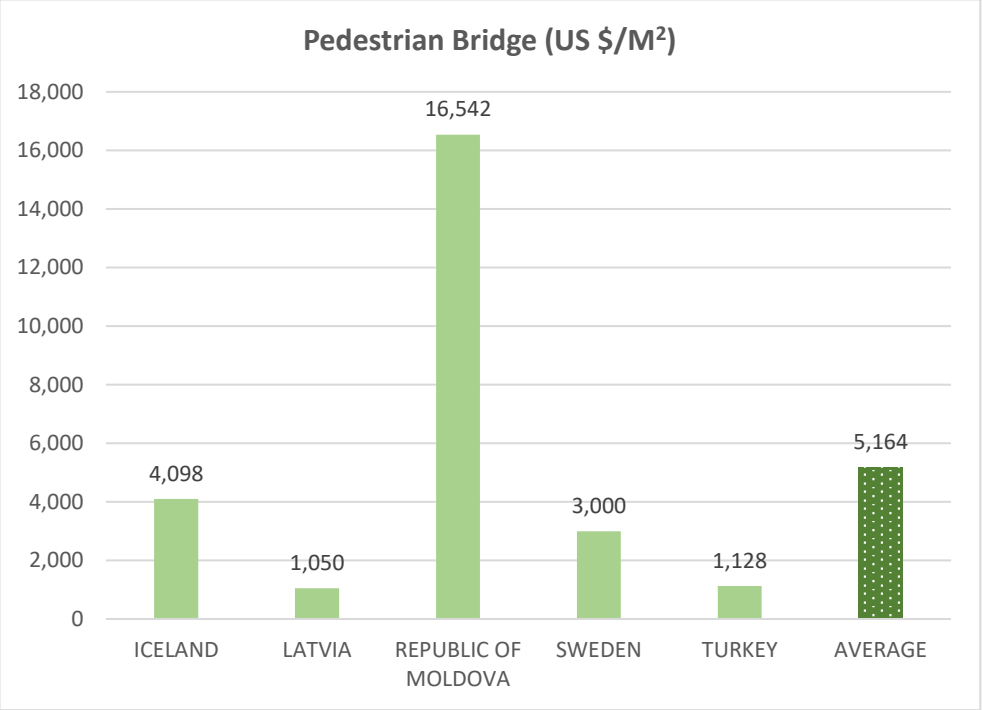
96. Unit construction cost of cable stayed bridge data is provided by Germany and Turkey only. The overall average is 6,328 US $ per m2. The ratio between these two countries is m is 3.21.

Figure XIX.7
Suspension Bridges Unit Construction Costs by Countries (US $/M2) (2016 prices)



97. As it is seen in above bar chart only Turkey provided suspension bridge construction cost which is 9,644 US $ per m2.

Figure XIX.8
Pedestrian Bridges Construction Costs by Countries (US $/M2) (2016 prices)



98. In the above bar chart however pedestrian bridge unit costs by countries are given. The overall average unit cost is 5,164 US $ per m2. The highest one is observed in Republic of Moldova as 16,542 US $ per m2 and the lowest one observed in Latvia as 1,050 US $ per m2.