

Benchmarking Transport Infrastructure Construction Costs WP.5/GE.4 – Road Specific

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Agenda item 4 (b)*



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MINISTRY OF TRANSPORT
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Outline of the Presentation

ROAD SPECIFIC

- Achievements of the Group of Experts (GE.4)
- Challenges
- Results of the analysis
- Suggestions for further studies



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Achievements of the Group of Experts

for Road Specific

- **Specific questionnaires for data collection about road infrastructures were prepared (Both for road infrastructures construction costs and maintenance & operation costs)**

Questionnaire covers

- Member countries national road projects realized costs
- Projects completed within 10 years before 2016
- Costs with US\$ 2016 prices
- Excluding right of way and design cost
- Excluding PPP projects, cover only government owned projects
- Road part cost unit (Excluding bridges and tunnels)
 - Cost unit US\$/Km for single carriageway roads
 - Cost unit US\$/LanexKm for double carriageway roads
- Bridges cost unit
 - US\$/m² by bridge structural types
- Tunnels cost unit
 - US\$/m for single tube tunnels, double tube tunnels and underwater tunnels separately



Achievements of the Group of Experts

for Road Specific

- **Road specific list of terminologies were prepared**
(Both for road infrastructure construction costs and maintenance-operation costs)
- **Data on road infrastructure construction costs by using prepared questionnaire were collected**
- **Analysis based on responses to questionnaires were done**
 - **Turkey**, benchmarking literature review, road transport terminology and analysis of data for the road sector
 - **Russian Federation**, inputs to road transport analysis and compilation of national benchmarking approaches and methodologies
 - All other **GE.4 members** contributed to proofreading and provision of national case studies and benchmarking data



ROAD MAIN PART

ROAD CLASS TYPE

Medium Capacity Roads Secondary Roads

2X1 Singe
Carraigeway Roads
US\$/Km

Double
Carraigeway Roads
US\$/lanexkm

Resurfacing

Resurfacing

Resurfacing by
Strengthening

Resurfacing by
Strengthening

Pavement
Replacement

Pavement
Replacement

Reconditioning

Reconditioning

Reconstruction

Reconstruction

Expansion
(Capacity
Improvement)

New Construction

New Construction

Medium Capacity Roads Primary Roads

2X1 Singe
Carraigeway Roads
US\$/Km

Double Carraigeway
Roads US\$/lanexkm

Resurfacing

Resurfacing

Resurfacing by
Strengthening

Resurfacing by
Strengthening

Pavement
Replacement

Pavement
Replacement

Reconditioning

Reconditioning

Reconstruction

Reconstruction

Expansion
(Capacity
Improvement)

New Construction

New Construction

High Capacity Roads Motorways-Expressway

Double Carraigeway
Roads US\$/lanexkm

Resurfacing

Resurfacing by
Strengthening

Pavement
Replacement

Reconditioning

Reconstruction

Expansion
(Capacity
Improvement)

New Construction

ROAD WORK TYPES



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ROAD INFRASTRUCTURES

Tunnels and Bridges



Tunnels

US\$/m

Single Tube Tunnels

Twin Tube Tunnels

Underwater Tunnels

Bridges

US\$/m²

Precasted and Pre-stressed
Simple Beam Bridges

Balanced Cantilever Bridge

Cable Stayed Bridge

Suspension Bridge

Pedestrian Bridge



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Challenges

for Road Specific

- **Cost itself inherently is difficult to benchmark. There are many factors that effect road infrastructure costs**
 - Material availability
 - Labour
 - Experience and capacity of contractors
 - Machine park
 - Availability of finance
 - Finacial conjuncture
 - Size and characteristics of projects
 - Geography
 - Others.



Challenges

for Road Specific

- **Mutual understanding**
- **Quality of the data**
- **Quantity of the data**
- **COVID-19 Pandemic**

The **quantity** and **quality** of data received and analyzed by GE.4
(sometimes sparse and scattered, misrepresentations or omissions, difficulties in normalization of data)



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Challenges for Road Specific

Road specific data received member countries;

Austria
Bulgaria
Croatia
Cyprus
Estonia
Finland
Germany
Iceland
Italy
Letonya
Moldova Cumhuriyeti
Sweden
Russian Federation
Türkiye

Data were not
available for all road
types and work
types in all countries



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Challenges for Road Specific

- Road transport infrastructure construction cost benchmarking analysis is more complex
- It is more complex undertaken at international level than national level
- Differences among countries turned this benchmarking analysis quite complicated
 - (Labor force, material availability, economic conditions, geographic conditions, bidding procedures, etc.)
- The comparability problems were technical in some cases but more fundamental in other cases



Challenges for Road Specific

- Specifically for road infrastructure, the needs, expectations and conditions of the countries tend to be quite variable.
 - While some countries do not need new infrastructure projects at all, as they have completed their highway infrastructure network, other countries require smaller scale projects or are building mega projects.
- Specifically for road infrastructure, the needs, expectations and conditions of the countries tend to be quite variable. While some countries do not need new infrastructure projects at all, as they have completed their highway infrastructure network, other countries require smaller scale projects or are building mega projects.
- The size of the road projects is a very important factor when conducting a cost benchmarking analysis.

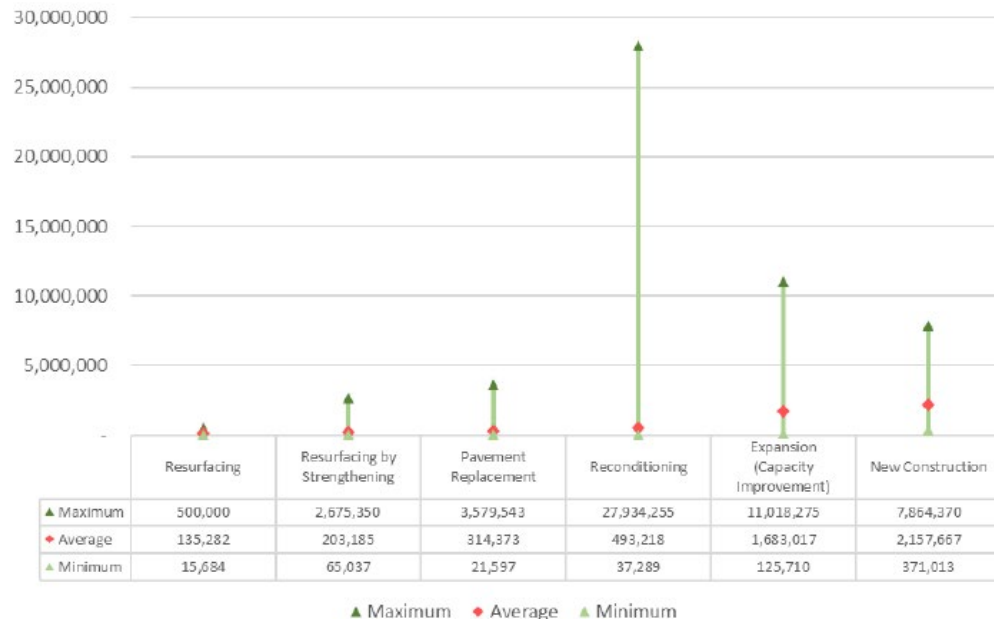


Results for Road Specific

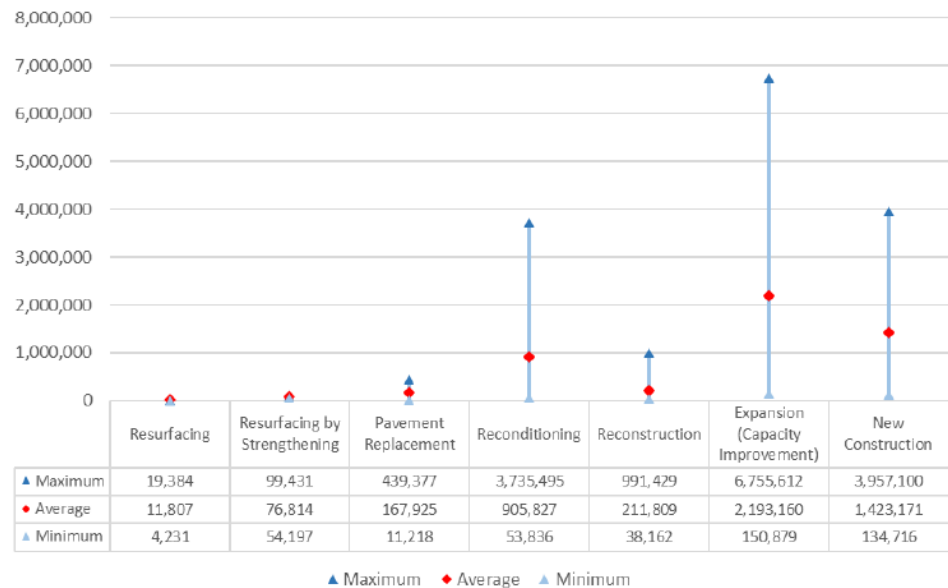
- Double Carriageway Highways
- Single Carriageway Highways
- Road Infrastructures Bridges
- Road Infrastructures Tunnels



DC, Motorways-Expressways (US \$/LanexKm)



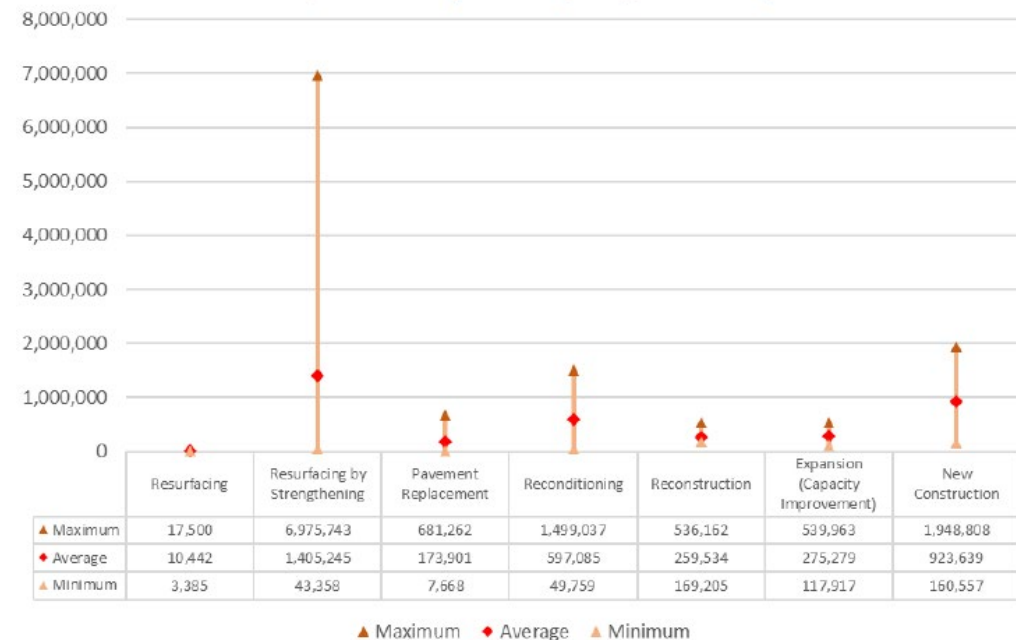
DC, Primary Roads (US \$/LanexKm)



US\$/Lanexkm 2016 year prices

	HCR Motorways	MCR Primary Roads	MCR Secondary Roads
Resurfacing	135.282	11.807	10.442
Resurfacing by Strengthening	203.185	76.814	1.405.245
Pavement Replacement	314.373	167.925	173.901
Reconditioning	493.218	905.827	597.085
Reconstruction		211.809	259.534
Expansion (Capacity Improvement)	1.683.017	2.193.160	275.279
New Construction	2.157.667	1.423.170	923.639

DC, Secondary Roads (US \$/LanexKm)



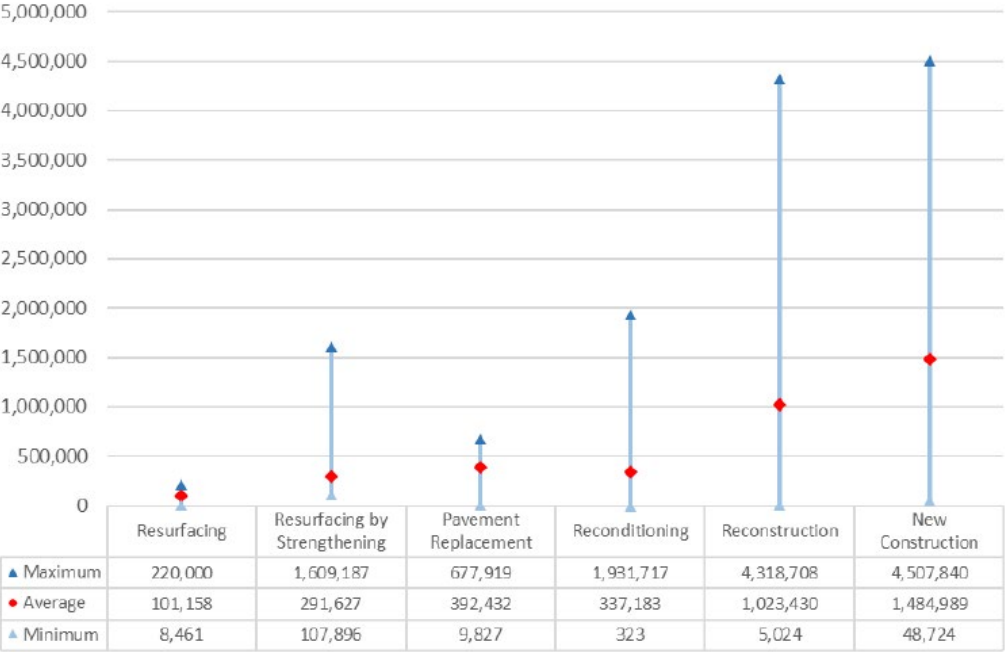
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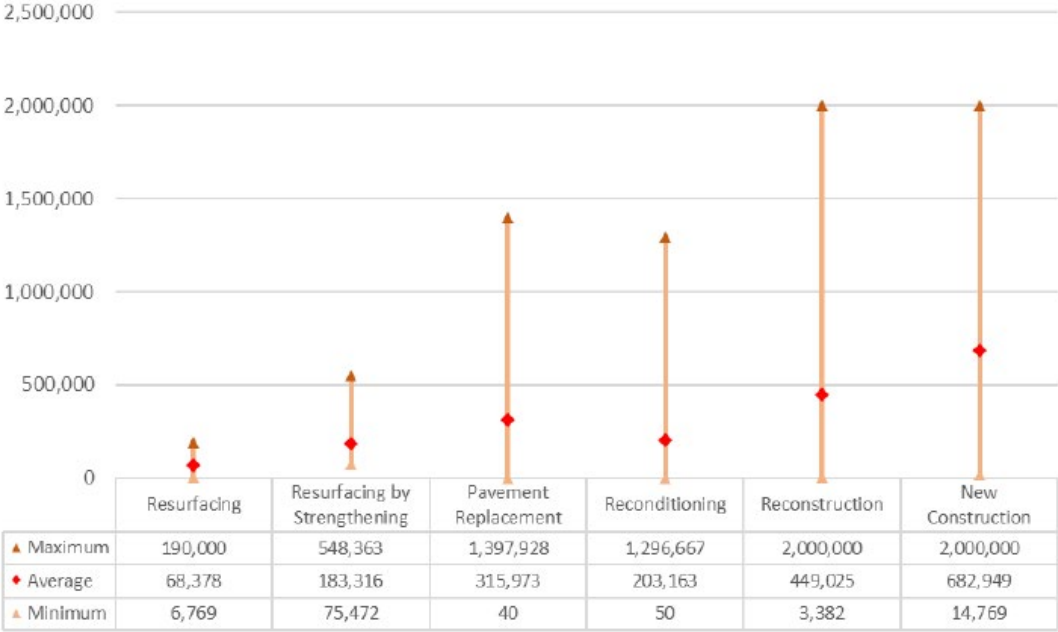
US\$/Km 2016 Year Prices

	MCR Primary Roads	MCR Secondary Roads
Resurfacing	101.158	68.378
Resurfacing by Strengthening	291.627	183.316
Pavement Replacement	392.432	315.973
Reconditioning	337.183	203.163
Reconstruction	1.023.430	449.025
New Construction	1.484.989	682.949

SC, Primary Roads (US \$/Km)



SC, Secondary Roads (US \$/Km)



▲ Maximum ◆ Average ▲ Minimum



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
Türkiye	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



Suggestions for further studies

- Data and results need to be further calibrated
- Try to get more data
- Try to ensure common language
- Do not benchmark apples and peaches by ensuring mutual understanding
- Size of the project is very important



Thank you for your attention



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all Andrius Maciejewski



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