



REPUBLIC OF TURKEY  
MINISTRY OF TRANSPORT  
AND INFRASTRUCTURE



*GE.4 - 11th Session of the  
Group of Experts on  
Benchmarking of  
Transport Infrastructure  
Construction Costs  
8-9 April 2021*

# Benchmarking Transport Infrastructure Construction Costs

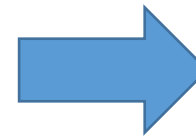
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# **ROAD ROUTINE MAINTENANCE COSTS AND EXPENDITURES**



## Components of Road Maintenance



If the roads are tolled  
toll collection costs  
should be added





In the following table distinction between investment (construction) and maintenance highway activities are given. Regarding this table surface replacement is light rehabilitation on the other hand pavement replacement and reconditioning is heavy rehabilitation. This table also brings to mind whether light rehabilitation is investment or maintenance.

From this point it is necessary to define routine and periodic maintenance.

All highway activities	Capital investment	New construction	Activities typical of "PM"
		Reconstruction	
		Heavy rehabilitation	
	Maintenance	Light rehabilitation	
		<b>Preservation</b>	
		Routine maintenance	
		Reactive maintenance (repair)	

FIGURE 1 Maintenance, preservation, and preventive maintenance (Source: J. Sorenson, personal communication, June 17, 2002).

1. Routine Maintenance
2. Preventive Maintenance
3. Deferred Maintenance
4. Rehabilitation
5. Reconstruction

KGM delegation proposal is focusing on investment projects



# TERMINOLOGY

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# Road Maintenance (WB)

The goal of maintenance is to preserve the asset, not to upgrade it.

Unlike major road works, maintenance must be done regularly.

Road maintenance comprises “activities to keep pavement, shoulders, slopes, drainage facilities and all other structures and property within the road margins as near as possible to their as-constructed or renewed condition” (PIARC 1994).

It includes minor repairs and improvements to eliminate the cause of defects and to avoid excessive repetition of maintenance efforts.

For management and operational convenience, road maintenance is categorized as:

- ✓ Routine,
- ✓ Periodic, and
- ✓ Urgent.

# Routine Maintenance (WB)

Routine Maintenance which comprises small-scale works conducted regularly, aims “to ensure the Daily passability and safety of existing roads in the short-run and to prevent premature deterioration of the roads” (PIARC 1994).

Frequency of activities varies but is generally once or more a week or month. Typical activities include roadside verge clearing and grass cutting, cleaning of silted ditches and culverts, patching, and pothole repair, etc.





# Periodic Maintenance (WB)

Periodic Maintenance which covers activities on a section of road at regular and relatively long intervals, aims “to preserve the structural integrity of the road” (WB Maintenance website).

These operations tend to be large scale, requiring specialized equipment and skilled personnel. They cost more than routine maintenance works and require specific identification and planning for implementation and often even design.

Activities can be classified as:

- Preventive,
- Resurfacing,
- Overlay,
- and Pavement Reconstruction.

Resealing and overlay Works are generally undertaken in response to measured deterioration in road conditions. For a paved road repaving is needed about every eight years; for a gravel road re-graveling is needed about every three years.

# Urgent Maintenance (WB)

Urgent Maintenance is undertaken for repairs that cannot be foreseen but require immediate attention, such as collapsed culverts or landslides that block a road.



# Terminology Used Under Benchmarking Transport Infrastructure Construction Costs

**89. Maintenance of roadway infrastructure:** The preservation through treatment activities of the entire roadway, including surface, shoulders, roadsides, structures, and such traffic control devices which are necessary for the road way to perform its function (5).

**90. Maintenance activities:** The combination of all technical and associated administrative actions during the service life to retain a civil engineering works or an assembled system (part of works) in a state in which it can perform its required functions. Note 1 to entry: Maintenance includes cleaning, servicing, repainting, repairing, replacing parts of the construction works where needed, or according to approved levels of service. (Construction Products Directive Guidance Paper F). Note 2 to entry: Adapted from the definition in ISO 15686-1, ISO 6707-1 and in Construction Products Directive Guidance Paper F (2).

**91. Maintenance cost for road:** The total of labor, material and other related costs incurred to retain a road or its parts in a state in which it can perform its required functions. Note 1 to entry: Maintenance includes conducting corrective, responsive and preventative maintenance on constructed assets, or their parts, and includes all associated management, cleaning, servicing, repainting, repairing and replacing of parts where needed to allow the constructed asset to be used for its intended purposes (1).

**120. Periodic Maintenance:** The periodic activities on a section of road at regular and relatively long intervals aiming to preserve the structural integrity of the road. These operations tend to be large scale, requiring specialized equipment and skilled personnel. They cost more than routine maintenance works and require specific identification and planning for implementation and often even design. Activities can be classified as preventive, resurfacing, overlay and pavement reconstruction (19).

**125. Preventive Maintenance:** The planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without significantly increasing the structural capacity) (5).

**149. Routine Maintenance for highway systems:** The work that is planned and performed on a routine basis to maintain and preserve the condition of the highway system or to respond to specific conditions and events that restore the highway system to an adequate level of service (6).

# ROAD MAINTENANCE QUESTIONNAIRE

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# Questionnaire

## Annual Labor Cost

It contains all labor costs as salary, overtime, insurance, bonus and side rights.

## Annual Material Cost

It contains all materials costs such as fuel oil, bitumen, spare parts, stationery, fuel expense, salt, chemicals, construction products, etc. which expend on road maintenance services.

## Invoiced Expenses

It contains all utility invoices such as road lighting, phone, electricity, water, mobile phone, internet, natural gas and another invoices which is on road maintenance services.

## Operating expenses of machines and mechanism

It contains depreciation deductions for full restoration, costs of replacing wearing parts and attachments, the cost of relocating machines from one maintenance services to another one including the installation of machines with commissioning, dismantling, transportation with loading and unloading operations.

## Bided Expenditures

All biddings on road maintenance, safety and operation services such as traffic services, traffic lights, installing guardrails, snow and ice removal, ditch and road surface cleaning, road repairs etc.



# STATE AND PROVINCIAL ROADS

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PRICES YEAR:-----

<b>Routine Maintenance Expenditures of Primary and Secondary Roads</b>
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Unit: US\$

Total Annualy Maintained Road Length (Km)	Total Annualy Maintained Road Length (LanexKm)	Force Account Expenditures						Bidded Expenditures	Total
		Annual Labour Cost	Annual Material Cost	Invoiced Expences	Operating Expences of Machines and Mechanism	Other	Total	Total	

PRICES YEAR:-----

<b>Routine Maintenance Unit Costs of Primary and Secondary Roads</b>
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Unit: US\$/LaneXkm.

Traffic Safety Unit Cost	Road Maintenance Unit Cost	Winter Maintenance Unit Cost	Other (Management and Operation) Unit Cost	Total Unit Cost
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# MOTORWAYS – TOLL ROADS

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PRICES YEAR:-----

<b>Routine Maintenance Expenditures of Motorways</b>
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Unit: US\$

Total Annualy Maintained Road Length (Km)	Total Annualy Maintained Road Length (LanxKm)	Force Account Expenditures						Bidded Expenditures	Total
		Annual Labour Cost	Annual Material Cost	Invoiced Expences	Operating Expences of Machines and Mechanism	Other	Total	Total	

PRICES YEAR:-----

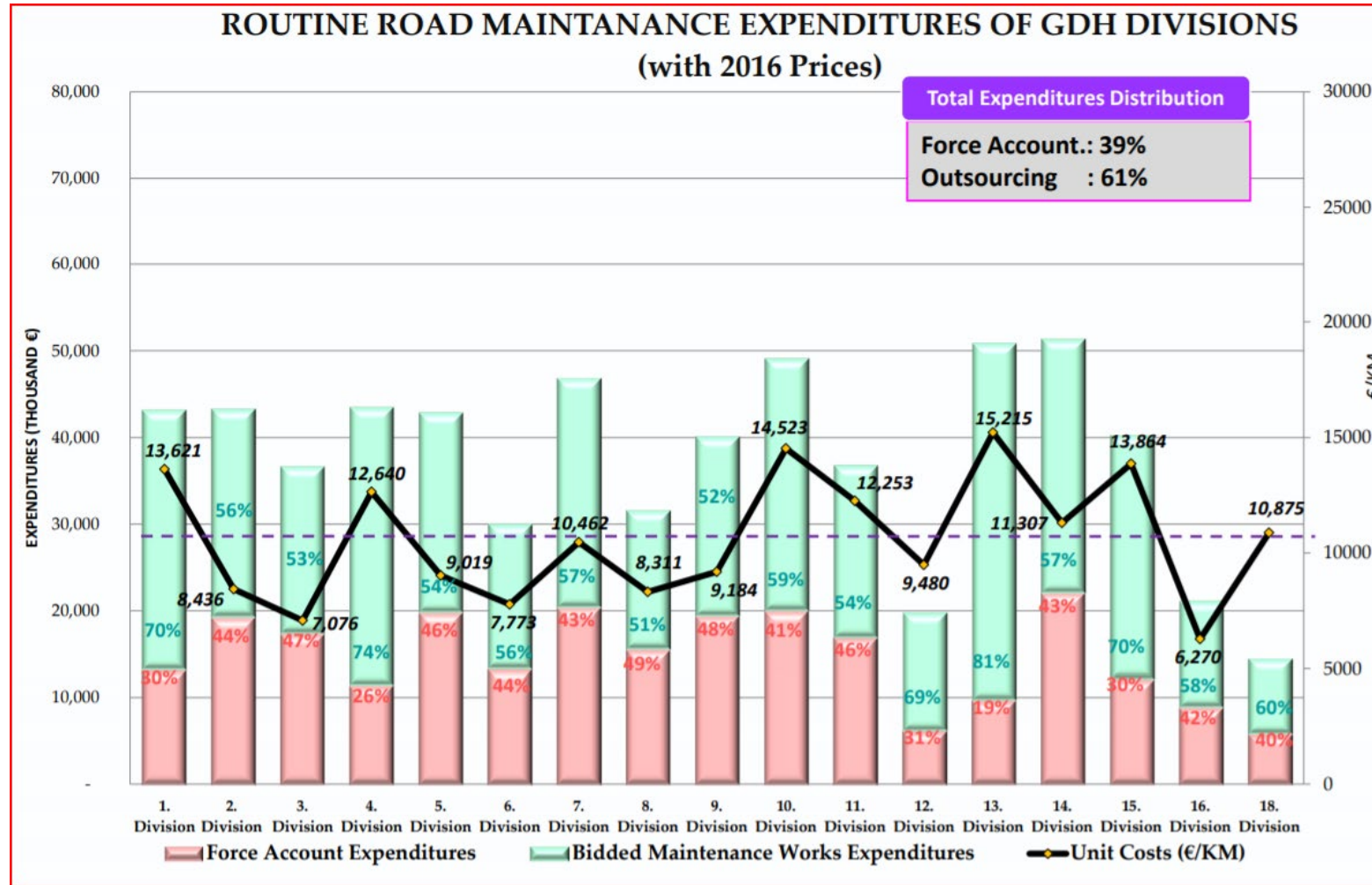
<b>Routine Maintenance Unit Costs of Motorways</b>
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Unit: US\$/LaneXkm.

Traffic Safety Unit Cost	Road Maintenance Unit Cost	Winter Maintenance Unit Cost	Total Maintenance Unit Cost	Other (Management and Operation) Unit Cost	Toll Collection Unit Cost*	Total Unit Cost
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\* If the motorway is tolled

## Sample Analysis



# Challenges

1. Different contract may be used in member countries. i.e. Some countries may do maintenance on performance-based road management and maintenance contracts
2. Problems on mutual understanding of questionnaire
3. Data may not collected on similar basis so it may be difficult to bring to same base in order to compare
4. Cost units may be different and it may be difficult to bring to the same unit

Thank you for your attention

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