**Introduction and Development of Performance-Based Road Maintenance on Serbian National Road Network**

# Contractor Briefing Meeting
# 02 February 2017

## Part 3: Extent of the Contract and its specificities (Services part)

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# Content

## This presentation:

- Traditional and modern road maintenance;
- What are Service Levels;
- This Contract Specificities;
- Content of the Contract (Services part of the Contract);
  - B. Administrative Requirements;
  - C. Road Operation Services;
  - D. Bridge and Tunnels Operation Services;
  - E. Winter Service.

# Traditional and contemporary road maintenance

**Traditional contracting for road maintenance :**

- Based on measured quantities of work and paid in line with contractual price. Such contracts are known as unit price contracts. Employer, i.e. Road Manager, has the responsibility to control both the quality and quantity of the works by engaging supervisors, and to make the payment for executed works, if approved by the Supervisor.

**Performance based maintenance contracts:**

- Precisely defines minimum requirements the Contractor needs to meet regarding condition of roads, structures and equipment, as well as other similar services, such as: road inventory data collection and management, control, inspections (internal control) and testing on the part of network that is subject of the Contract, communication and reaction to requests and complaints from the public, usage of weather data registered by road weather information system (RWIS), reporting etc.

# What is Service Level in contemporary maintenance?

**Definition: Service levels are minimum performance standards taking into account road condition and time for achieving of these performance standards (Contractor's response time), determined in Specifications.**

EXAMPLE 1:

- **Mowing of grass** is item of works on maintenance, measured and paid in m2.
- **Vegetation control** is item of services, assessed according to the height of grass after mowing, it is not measured and paid in lump sum.

Note: quality is not assessed for mowing works (there are no materials that are incorporated, i.e. the grass is either mowed or not). Therefore, mowing of grass is regarded as a service, not item of works, and it is nominated as **vegetation control.**

**Grass height** represents an indicator of service performance being evaluated. One or more performance indicators may be evaluated for a single Service in Specifications.

# What is Service Level in contemporary maintenance?

EXPAMPLE 2:

- During Winter Service, pavement is to be cleaned of snow and ice, and it needs to have required friction. These requirements are called **Performance Standards.**
- However, requiring the pavement to be clean of snow and ice, and to have required friction within, say 4 hours after snowfall events, **represent Service Level** (or **minimum performance standards**).
- Should this deadline (Contractor's response time) be 2 hours, the Contractor would bear higher costs for achieving of such service level (he would need to engage additional resources).
- If the Contractor achieves the required service level within 5 hours after snowfall events, it would mean the Contractor did not achieve the required service level in time – the Contractor is 1 hour late and he gets **demerit points**.

# Specificities of these Contracts

Therefore the Contractor is to **perform works and services** in accordance with the Contract

**Crucial differences in relation to traditional way of maintenance are:**

- Implementation of service items offered and paid in lump sum;
- Defining maintenance categories (class);
- Payment reductions by applying demerit points;
- RWIS application for monitoring of weather events during Winter Service and calculation of payment for a part of winter service;
- Internal control of the Contractor, by establishment of Performance Management Unit.

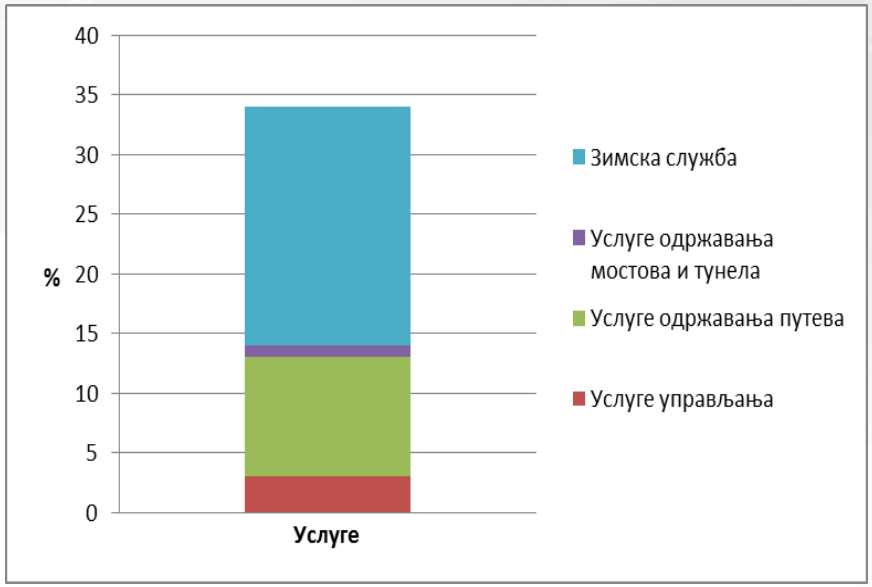
# Content of the Contract

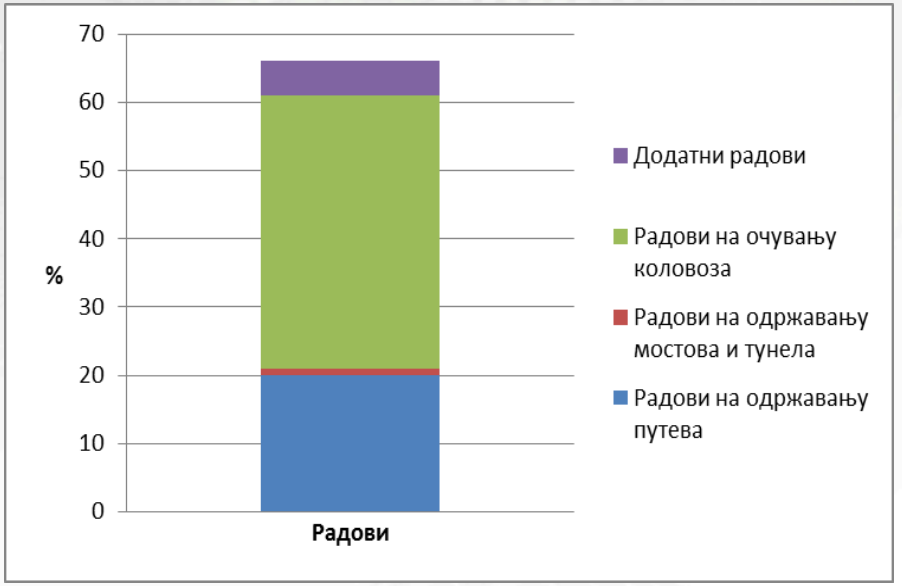
**Contract includes following works and services, which are listed in bill of quantities in the same order.**

| Group | Description of group of works or services | Part (%) |
|---|---|---|
| **B.** | Management Services | 3 |
| **C.** | Road Operation Services | 10 |
| **D.** | Bridge and Tunnel Operation Services | 1 |
| **E.** | Winter Service | 20 |
| **F.** | Road Maintenance Works | 20 |
| **G.** | Bridge and Tunnel Maintenance Works | 1 |
| **H.** | Pavement Preservation | 40 |
| **I.** | Dayworks | 5 |

# Content of the Contract

## Estimated portions for Works and Services in the Contract



# B. Management Services

## B.1 Administrative requirements

**1. Predict following key personnel:**

- Road Manager (BSc. Civil Engineer)
- Operations/Performance Manager (BSc. Civil Engineer)
- Traffic safety engineer (BSc. Traffic Engineer)

**2. Apart from the Performance Management Unit Manager, predict the following personnel:**

- Administrative Manager with personnel (at least 1+3 officers)
- Materials and Asphalt Control Manager
- Concrete Works Control Manager
- Survey Control Manager
- RWIS Control Manager with personnel (at least 1+3 officers)
- At least one driver and a field vehicle.

**3. Predict communication equipment**

**4. Establish maintenance depots**

# B. Management Services

## B.2 Programme of performance

Predict costs for preparation, submission and approval of the following site and technical documentation, as well as costs for taking measures on the field for the purpose of their implementation:

1. Work programmes (Initial and Annual) and Monthly Work Plan
2. Routine maintenance operational plan
3. Winter service operational plan
4. Quality assurance plan
5. Site organization, health and safety management
6. Environmental management plan
7. Emergency procedures and contingency plan **(include temporary vertical and horizontal signalization)**.
8. Temporary traffic signalization (working signalization) **(include working vertical and horizontal signalization and mobile complex sign for road works with protection from crashing by traffic users).**
9. Information Management Plan

# B. Management Services

## B.3 Inspections of roads and structures

- Routine road inspections
- Routine bridge inspections
- Seasonal inspections
- Additional inspections

Include the price for Performance Management Unit, Depot Managers and Administration Department.

## B.4 Reporting

- Construction diary and Measurement book (one technician for central diary and technicians in depots for depot diaries. Administrative department prepares Measurement book sheets).
- Incident reports, monthly reports, periodical statistical reports, Winter Service extreme weather events reports (include the price for depot managers, Performance Management Unit and Administrative department).

# B. Management Services

## B.5 Updating Road asset database

- Predict the costs for Contractor's obligation to compare road inventory data from Employer, with the actual conditions on the field, to update it and then to maintain the base and to amend it during the Contract period.
- Apart from depot managers, performance management unit and administrative department, include the price for a special team working on initial data update, collecting data from the road and their update during the Contract realization, and final update of data for submission of database at the end of the Contract.

# C. Road operation Services

## C Road Operation Service

Include maintenance services in roadway, drainage system, cobblestone roads, traffic signs and reflective equipment and guardrails.

These services relate to cleanliness of roadway in its full width, vegetation control, profile of shoulders, height and width clearances in the roadway, function of drainage system, cleanliness and integrity of traffic signs and guardrails, etc.

# C. Road Operation Services

EXAMPLE 3:
Determine monthly lump sum for Service Item C.2.4 „Function of pipe culverts, inlets and outlets“

Service description (written in Specifications):
The Item covers clearing of deposits and other waste materials from culverts and chambers; loading and transport out of road reserve to approved disposal sites. The item includes all pipes for discharge of water to outfalls or within drainage channels under side accesses and junctions. Any damage to culverts and chambers shall be repaired under Maintenance Works when approved by Project Manager.

Service level (written in Specifications):
Summer season, less than 20% of culvert diameter is silted.
Winter season, less than 30% of culvert diameter is silted.
Summer season, less than 20% of inlet diameter is silted.
Winter season, less than 30% of inlet diameter is silted.

Payment (written in Specifications)
Lump sum payment, in 12 equal monthly installments within a year **(meaning the Service is executed and assessed throughout the whole year, both in winter and in summer period)**.

# C. Road Operation Services

Traditional Road Maintenance:

This Service covers for the following traditional work items from PERS Pricelist:

4. Maintenance of drainage system

4.6 Manual cleaning of sediments in pipe and box culverts

4.7 Mechanical cleaning of culvert ends and manholes

Contractor should determine monthly lump sum for this item as follows:

1. By registering the number of pipe culverts on the maintenance territory (see from technical documentation number of culverts according to type, condition and maintenance category and/or site visit.....(N)
2. Adopt average length of pipe culvert (for ex. 7m).....(L)
3. Based on experience estimate average height of sediments in culvert (for ex. 20cm), and then calculate average surface of culvert opening cluttered by sediments.....F)
4. Assume annual number of cleaning for culverts (for ex. two times a year).....(T)
5. Annual value for culvert cleaning service is Vg = N x L x F x T
6. Monthly lump sum for this service is obtained by dividing annual service value by annual number of monthly installments, i.e. Vm=Vg/12

# D. Bridges and Tunnels Operation Services

Include services such as cleaning and vegetation and debris control in bridge area and area under bridges, and maintenance of drainage systems both from bridges and in tunnels .

Monthly lump sums for these items is determined the same way as for Road Operation Services.

# E. Winter Service

**Covers for establishment of Winter Service and preventive and combined treatments on different maintenance category roads.**

**Winter service establishment** covers for providing sufficient quantities of salt and aggregates per depot with an obligatory reserved quantity **(this is now Contractor's responsibility, no centralized procurement anymore),** mobilization of machines and work power for winter maintenance per depot in the required time period, procurement, installation, maintenance and removal of snow poles on critical sections, and procurement, installation, maintenance, renewal and removal of temporary traffic signalization for winter service in line with decision issued by the Ministry.

**Preventive treatments** (preventive spraying for impeding ice and snow on the pavement)

- Calculated per „weather event" not according to duration.
- Specifications define weather conditions determining „winter weather events" for which preventive treatment is applicable.
- A maximum of **TWO** weather events during a 24 h time, separated by a period of at least 8 h, can be accepted as events paid as preventive treatments.

# E. Winter Service

EXAMPLE 4:

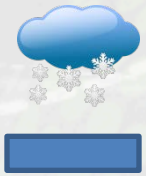
- During a time interval of 24 h, a weather event for preventive treatment was registered at 4 o'clock in the morning (morning frost) and in the evening at 22 h (snowfall event that lasted less than 2 h).
- Time period between two repeated weather events is 22h-4h=18h, which is longer than 8 hours.
- The Contractor is paid for two preventive treatments.

**Combined treatments** are performed during and after snowfall events, so the pavement surface is cleaned from snow and slush and ice formation is prevented.

- Specifications define weather conditions determining "winter weather events" requiring a preventive treatment.
- Preventive treatment is always executed prior to combined treatment.
- Number of combined interventions is calculated depending on the number and length of successive snowfall events, intervals without snowfall events and maximum and minimum duration of weather event paid to the contractor.
- Minimum duration of weather event is 2 hours, and maximum depends on the maintenance category (5 hours for A and B roads and 8 h for C roads).

# E. Winter Service

## Determining number of preventive treatments to be paid to the Contractor



18 hours

1 hour

1 hour

Time interval between two events > 8 hours

Weather event no.1 for payment

Weather event no.2 for payment

# E. Winter Service

EXAMPLE 5:

A maintenance category road.

- Period between commencement and end of first snowfall event ($TS_1$): 4 hours
- Period without snowfall ($TD_1$): 3 hours
- Period between commencement and end of second snowfall event ($TS_2$): 2 hours
- Maximum acceptable period between snowfall events ($TD_{MAX}$): 4 hours
- It is clear that $TD_1 < TD_{MAX}$
- Total duration of weather event (TW): $TS_1 + TD_1 + TS_2 = 4 + 3 + 2 = 9$ hours
- Maximum duration of one weather event for payment ($TW_{MAX}$): 5 hours
- Number of interventions paid to the Contractor:
  (W) = WHOLE NUMBER of quotient ($TW \div TW_{MAX}$) = Whole number $(9 \div 5) = 2$

If the second snowfall commences after maximum accepted period between two snowfall events (i.e. TD1> TDMAX), than this is regarded as commencement of a new weather event for payment.

# E. Winter Service

## Determining number of preventive treatments to be paid to the Contractor

4 hours | 3 hours | 2 hours

Time periof between two events < 4 hours, therefore it is regarded as one event

Total duration of weather event : 9 hours

Maximum durartion of a weather event : 5 hours

| Weather event no.1 for payment | Weather event no.2 for payment |
|---|---|

# Winter Service

**Lump sums for preventive and combined treatments are determined as follows:**

- Sections and their locations are registered per maintenance categories, with weather conditions registered by RWIS and sections with weather conditions similar to the ones covered by RWIS
- Number of weather events for certain type of treatment on certain road category is assumed in BoQ.
- The Bidder writes lump sum per kilometer per weather event for the assumed number of weather events and determined road length of certain category where combined or preventive treatments are required.
- Sections are registered according to data from technical documentation on road network (TD.1) and Winter Service (TD.4)
- Weather events requiring preventive or combined treatments and the procedure for their calculation are described in Specifications, and shown in Examples 4 and 5.

# E. Winter Service

- Truck paths on a territory are determined bearing in mind the assumed number and locations of depots on the maintenance territory (under the assumption that one depot needs to cover for 100 to 130km of road network) and the assumed territory division into depots.
- Lump sum needs to cover for the following:
    - Engagement and amortization of equipment and machines
    - Machines duty hours
    - Engagement of men power
    - Men power duty hours
    - Procurement, transport to deport and storage of salt (based on requirements from tender documentation, ratio between preventive and combined treatments, section surface)
    - Procurement, transport to deport and storage of grit(based on requirements from tender documentation, ratio between preventive and combined treatments, section surface)

    Number of trucks per depot is determined by setting out truck paths on a territory, calculating their performance and passing time. Material quantities are to be determined for a single treatment.

# F. Road Maintenance Works

Cover the works in roadway, on slopes, asphalt pavements, crushed stone and gravel pavements, traffic signs, horizontal markings and road furniture, guardrails and other.

The majority of items corresponds to routine maintenance works, but there is a small number of added items implemented on the request from the Employer, considering the road network and necessary works (cobblestone road works, for example).