Motorway and expressway network - 1989

Dálniční síť

stav k 31.12.1989

www.rsd.cz
Motorway and expressway network - 2010

Stav k 31.12.2009
Motorway and expressway network - 2014

Dálniční sít’

stav k 1. 1. 2014

www.rsd.cz
Current situation of the motorways and expressways in Czech Rep.

- **period 1990 – 2010:**
  - Funding of the new motorway and expressway network sections – new constructions

- **period 2010 - 2014:**
  - New constructions stopped
  - Almost all funding goes to maintenance and repairs of the existing motorways
  - Main topic: I) REPAIRS
    II) MAINTENANCE
### ISPROFOND – RECONSTRUCTION OF MOTORWAY (LONGER THAN 2 KM)

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Length (km)</th>
</tr>
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<tbody>
<tr>
<td><strong>2009</strong></td>
<td>D1 Rekonstrukce CB vozovky km 134,29 - 136,8 L</td>
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<td>D1 Oprava AB voz. km 61,951 - 59,038 L</td>
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<td>D1 Oprava AB voz. km 59,105 - 62,043 P</td>
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<td>D1 Oprava AB voz. km 89,806 - 91,044 L</td>
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<td>D5 Oprava AB voz. km 57,5 - 60,5 L</td>
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<tr>
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<td>D2 Oprava AB vozovky km 48,25 - 50,25 L</td>
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<td><strong>2010</strong></td>
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<td>4,3 km</td>
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<tr>
<td><strong>2011</strong></td>
<td>D8-806 rekonstrukce</td>
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<td>D5 Oprava AB vozovky v km 22,42 - 18,00 L</td>
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<td>D5 Oprava AB vozovky km 31,630 - 34,055 P</td>
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<td>D11 Přetah CB vozovky v km 19,811 - 22,004 P</td>
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<td><strong>2012</strong></td>
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<td>9,0 km</td>
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<td>D11 Přetah CB voz. km 18,0 - 13,7 L</td>
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<td>D1 Rekonstrukce CB vozovky D1 km 211,0-214,6 P</td>
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<td>D5 Oprava AB voz. D5 km 34,000 - 31,300 L</td>
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<td>D5 Oprava AB vozovky v km 14,5 - 11,0 L</td>
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<td>D2 Oprava AB vozovky D2 km 53,3-56,2 P</td>
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<td>D1 Oprava AB vozovky km 87,1 - 90,3 P</td>
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<td><strong>2013</strong></td>
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<td>20,2 km</td>
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<td>D5 Oprava AB vozovky km 40,7 - 34,0 L</td>
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<td>D5 Oprava AB vozovky km 61,15 - 66,6 P</td>
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<td>D8 Oprava AB vozovky km 17,7 - 11,2 L</td>
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<td>D11 Přetah CB vozovky km 13,7 - 7,8 L</td>
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<td>D11 Přetah CB vozovky km 23,250 - 25,550 P</td>
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<td>D1 Rekonstrukce CB vozovky km 214,6 - 220,2 P</td>
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<td>D2 Oprava AB vozovky km 55,3 - 50,3 L</td>
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I) Roadway repair technologies

A) Road surface - Asphalt roadways – asphalt layers

1) - Emulsion microcarpet
2) - Surface layers recycling - remix plus
3) - Asphalt layers replacement (surface, intermediate, base)
4) - Aggregate base layer recycling (cold way) – cement, asphalt emulsion, or both (+ upper layers replacement)
I-A-1) ASPHALT ROADWAY– EMULSION MICROCARPET

- VARIATIONS:
  - two microlayers 16 mm (mixture 0/8 – 0/8)
  - one layer 8 mm (mixture 0/8)

- REQUIREMENTS:
  - focus on implementing the technology during the right weather conditions (essential for durability)
  - before laying of the microcarpet must all the ruptures and local damages be fixed (using modified asphalt filler)

LIFE SPAN OF THE TECHNOLOGY:
- approx. 3-5 years

- COST OF THE TECHNOLOGY (Kč/m2):
  - approx. 150 - 250 (6-9 EUR/m2)
I-A-2) ASPHALT ROADWAY– SURFACE LAYERS RECYCLING

- VARIATIONS:
  - REMIX (surface layer recycling + binding material + gravel aggregate) – thickness 35-50 mm
  - REMIX PLUS (surface layer removal, intermediate layer recycling and immediate afterwards is the new surface layer added) thickness 55 mm intermediate + 35 mm new surface layer

- REQUIREMENTS:
  - surface layer must be cleared of other materials (from previous local repairs, etc.

- LIFE SPAN:
  - approx. 4-7 years

- COST (Kč/m2):
  - approx. 1500 (50 EUR/m2)
I-A-3) ASPHALT ROADWAY– ASPHALT LAYERS REPLACEMENT

- VARIATIONS:
  - surface layer replacement
  - cover layers replacement – surface+intermediate
  - all layers replacement surface+intermediate+base

- REQUIREMENTS:
  - thorough diagnostics to decide necessary depth of the repairs

- LIFE SPAN:
  - approx. 10-18 years

- COST (Kč/m2):
  - surface = 310 - 400 (12-15 EUR/m2)
  - cover = 750 - 1000 (25-35 EUR/m2)
  - all = 1400 - 1800 (50-65 EUR/m2)
I-A-4) ASPHALT ROADWAY– AGGREGATE BASE RECYCLING (cold way)

- VARIATIONS:
  - cement (+ asphalt layers replacement)
  - asphalt emulsion (+ asphalt layers replacement)
  - cement and asphalt emulsion (+ asphalt layers replacement)
- REQUIREMENTS:
  - thorough diagnostics to decide necessary depth of the repairs
- LIFE SPAN:
  - approx. 15-20 years
- COST:
  - depends on the diagnostics
I) Roadway repair technologies

B) Road surface - Concrete roadways

1) - two layer emulsion microcarpet (with gaps)
2) - asphalt covering (strengthening the roadway with asphalt layers)
3) - replacement of the unanchored concrete roadway for the new concrete roadway
4) - replacement of the unanchored concrete roadway with the asphalt layers
5) - replacement of the unanchored concrete roadway and aggregate layers (partially recycled) for the new concrete roadway – modernization of the D1 motorway
I-B-1) CONCRETE ROADWAY – TWO LAYER EMULSION MICROCARPET

- TECHNOLOGY:
  - two microlayers 16 mm (mixture 0/8 – 0/8)

- REQUIREMENTS:
  - focus on implementing the technology during the right weather conditions (essential for durability)
  - before laying of the microcarpet must all the ruptures and local damages be fixed (using modified asphalt filler)

LIFE SPAN OF THE TECHNOLOGY:
- approx. 4-7 years

COST OF THE TECHNOLOGY (Kč/m2):
- approx. 150 - 250 (6-9 EUR/m2)
I-B-2) CONCRETE ROADWAY – asphalt covering (strengthening the roadway with asphalt layers)

- TECHNOLOGY:
  - segmentation of the existing concrete roadway
  - laying the asphalt layer SAL (stress absorbing layer) 30 mm
  - laying the intermediate asphalt layer 60-100 mm
  - laying the surface asphalt layer 40 mm

- REQUIREMENTS:
  - right weather conditions are essential, especially for the SAL asphalt layer

- LIFE SPAN:
  - approx. 12 years

- COST (Kč/m²)
  - approx. 2000 (75 EUR/m²)
I-B-3) CONCRETE ROADWAY – replacement of the unanchored concrete roadway for the new concrete roadway

- TECHNOLOGY:
  - after old concrete pavement is removed, base layer is reprofiled (shaped)
  - laying the new concrete roadway 270mm (two layers 220+50mm), with pikes and clamps on longitudinal gaps
  - upper cement surface is brushed to get the rough structure

- REQUIREMENTS:
  - quality requirements for following the proper procedure and proper brushing the surface of the concrete pavement

- LIFE SPAN:
  - cca 25 - 30 years

- COST (Kč/m2):
  - cca 2500,- Kč/m2 (90 EUR/m2)
I-B-4) CONCRETE ROADWAY – replacement of the unanchored concrete roadway with the asphalt layers

- TECHNOLOGY:
  - after old concrete pavement is removed, base layer is reprofiled (shaped)
    - laying the base asphalt layer 120-140 mm
    - laying the intermediate modified asphalt layer 80 mm
    - laying the surface asphalt layer 40 mm
    - layers are connected with mastic spray

- REQUIREMENTS:
  - carrying capacity check for the base layers and shaping
  - right weather conditions during the asphalt layers laying
    - suitable for the inter city sections and heavy traffic parts of the network (over 80000/24h) traffic is present at the site – only the half of the roadway is replaced, either longitudinal joint)

- LIFE SPAN:
  - cca 20 – 25 years

- COST (Kč/m²):
  - cca 2000 – 2500 (80-90 EUR/m²)
I-B-5) CONCRETE ROADWAY — replacement of the unanchored concrete roadway and aggregate layers (partially recycled) for the new concrete roadway – modernization of the D1 motorway

- TECHNOLOGY:
  - after old concrete pavement is removed, base layer is reprofiled (shaped)
  - laying the new concrete roadway 270mm (two layers 220+50mm), with pikes and clamps on longitudinal gaps
  - upper cement surface is brushed to get the rough structure

- REQUIREMENTS:
  - carrying capacity check for the base layers and shaping (recycled lower part and also new 120 mm upper part of the base layer)
  - quality requirements for following the proper procedure and proper brushing the surface of the concrete pavement

- LIFE SPAN:
  - cca 25 - 30 years

- COST (Kč/m2):
  - 7000 (250 EUR)

- D1 motorway modernization consists the widening of the roadside, the complete draining renewal, safety fences, optic and metallic cable lines, etc
MODERNIZATION D1
II) MAINTENANCE TECHNOLOGIES

- **A) RIGID PAVEMENT - CONTINUOUS MAINTENANCE**
  - RENEWAL OF THE SKID RESISTANCE – unsuitable friction characteristics:
    - PEEL JET (using high pressure water beam up to 2500 bar)
    - PELLET JET (using pellets)
  - CONCRETE PANEL DEPRESSION (STAIRS ON GAPS):
    - TSM (TECHNOLOGY OF SHEER MILLING)
    - MILLING USING DIAMOND DISC
  - SURFACE GROOVING (for the parts with unsuitable draining – to prevent the aquaplaning)
  - SEALING THE LONGITUNDIAL AND LATERAL GAPS, RENEWAL OF THE ASPHALT JOINTS OF THE CONCRETE PANELS ON THE ROADWAY
  - APPEARANCE ASR (alkaline-silicious reaction): TECHNOLOGY FOR DRAWING OUT THE CONCRETE PAVEMENT DECAY
    - laying the emulsion microcarpet
    - local repairs on the edges of concrete panels (on the lateral gaps)
    - separate concrete panel replacement
PEEL-JET, MILLING TECHNOLOGY AND TSM
Thank you for your attention

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