PIARC

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SM Oberau

Winter maintenance in Bavaria
Quality, efficiency and sustainability

Angela Roßmann, MRin
Principal Building Authority in the Bavarian Ministry of the Interior
Administrative structure in Bavaria

Germany
16 Federal States

Bavaria
Bavaria: Statistical data

- Area: 70,500 km²
- Inhabitants: 12 m
- Density: 170 per km²
- Regional governments: 7

Length of road network
- Federal motorways (Autobahns): 2,500 km
- Federal highways: 6,700 km
- State highways: 14,000 km
- Country roads: 3,074 km*

* under administration of the Department of Highways
Bavarian road construction administration

Principal Building Authority in the Bavarian Ministry of the Interior
(Department IID)

7 Governments
(Road and bridge building departments)

2 Highway Agencies
with 6 departments

19 State building authorities
(responsible for road construction)

64 road maintenance units

30 motorway maintenance units
2 operations control centres

3,300 employees in the offices
2,850 employees in road maintenance units
Main Objective in Bavaria:
Road safety / mobility in the winter period
Winter Service Planning ("Traffic must flow.")

Times:
Motorways and highways with significant traffic function
(24 hours winter service)
Important highways for regional traffic
(6 am to 10 pm, daily)
Other roads for regional traffic
(according to local traffic requirements)

Periods:
Spreading 2 hours
Clearing 3 hours (2 hours federal motorways)

Average speeds:
<table>
<thead>
<tr>
<th></th>
<th>fed. motorways</th>
<th>2-lane roadways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreading</td>
<td>50 km/h</td>
<td>35 km/h</td>
</tr>
<tr>
<td>Clearing</td>
<td>40 km/h</td>
<td>30 km/h</td>
</tr>
<tr>
<td>Empty trip</td>
<td>60 km/h</td>
<td>40 km/h</td>
</tr>
</tbody>
</table>

Working widths in the road network:
Spreading width (entire roadway)
Clearing width (half of the roadway, if necessary staggered clearing for extra-wide lanes)

Ø spreading material quantities per m² 10 – 40 g

max. volume of spreading material container
according to the permissible axle loads of the carrier vehicles up to 6 m³
Optimisation of Clearing and Spreading Plans
Brine Spreading

Vehicle technology

Brine plants
Vehicle Design Motorways (Spreading)

1 vehicle per service loop
Clearing and spreading operations
Snow Blowers
Salt consumption  
Salt consumption (1000 t) per winter period on motorways, federal and state highways
Salt management in Bavaria

1. Storage at the maintenance depots (300,000 t)
2. Winter supply from salt suppliers with fixed quantities (100,000 t)
3. Provisional quantities for extreme winters in the regional distribution centres (280,000 t)

Including country roads serviced
Winter Service Management “WDK” (“WSC”)

- Display of Route network:
  - Clearing and spreading plans

- Ice warning devices

- Weather information (SWIS)

- Vehicle operations in real time

- Basic data:
  - Staff and vehicles (Standby schedules) including phone numbers

- Administration module for triggering of operations

- Control and documentation
Winter Service Management

Vehicle including direction of vehicle and filling level of spreading material container

Ice warning device

Clearing or spreading sections

Salt silo

Closed section
Ice-warning devices Network
(federal and state roads)
Automatic Winter Service Data Collection

No manual documentation required by the driver

In Bavaria, 100% of winter maintenance vehicles are equipped with data collection devices (even contractor vehicles)

Access to company portal
Display:
Brief operations report for the checking of data transmission from the operating staff.

Maintenanc depot

Maintenance depot - authority - OBB
Assessment and documentation of the data with a winter maintenance program of the Bavarian Road Administration (WD-Web).
Main contents of the program:
Operation reports, material consumption contractor billing, statistics
Universal Operating Panel with Dynamic Route Navigation

Temperature sensor at the spreader

Roadway widening
### Winter Service Costs 2011/12

<table>
<thead>
<tr>
<th></th>
<th>AM</th>
<th>SM</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt and brine</td>
<td>7,360,425</td>
<td>17,324,869</td>
<td>24,685,294</td>
<td>34%</td>
</tr>
<tr>
<td>Costs for contractor vehicles</td>
<td>1,011,724</td>
<td>12,830,367</td>
<td>13,842,091</td>
<td>19%</td>
</tr>
<tr>
<td>Wage and vehicle costs for maintenance depots</td>
<td>11,082,379</td>
<td>20,172,761</td>
<td>31,255,140</td>
<td>44%</td>
</tr>
<tr>
<td>Winter service preparations (snow signs, snow fences, compensation, salt storage etc.)</td>
<td>398,357</td>
<td>1,466,089</td>
<td>1,864,447</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total cost of winter service (€)</strong></td>
<td>19,852,885</td>
<td>51,794,087</td>
<td>71,646,972</td>
<td></td>
</tr>
</tbody>
</table>
Results of the operating cost calculation

<table>
<thead>
<tr>
<th>Costs:</th>
<th>Full costs of main groups; share of services</th>
</tr>
</thead>
<tbody>
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<td>State agency:</td>
<td>Federal-state, county and other; without motorways</td>
</tr>
<tr>
<td>Organizational unit:</td>
<td>all RMUs;</td>
</tr>
</tbody>
</table>

**JAN 2012..DEZ 2012**

- Emergency road measures: 7%
- Upkeep green areas: 20%
- Road equipment: 9%
- Winter road maintenance: 29%
- Other services: 10%
- Cleaning: 7%
- Structural maintenance and other services to third parties: 18%
Operating costs
Main groups – Annual overview

Costs:
State agency: Federal-state, county and other; without motorways
Organizational unit: all RMUs;

JAN 2012..DEZ 2012

Freising
Ingolstadt
Rosenheim
Traunstein
Weilheim
Landshut
Passau
Amberg-Sulzbach
Regensburg
Bamberg
Bayreuth
Ansbach
Nürnberg
Aschaffenburg
Schweinfurt
Würzburg
Augsburg
Kempten
Krumbach
Average for Bavaria

Emergency road measures  Upkeep green areas  Road equipment  Cleaning  Winter road maintenance  Other services  Structural maintenance and other services to third parties
Staff cuts at road and motorway maintenance depots

Staff at road and motorway maintenance units (excl. county employees)

- Road maintenance
- Motorway maintenance
- Concepts SM 2000
- Concepts SM 21
- Targets

Year:
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014

Employees:
- 3500
- 3000
- 2500
- 2000
- 1500
- 1000
- 500
Maintenance Depot

- Storage halls and garages (Vehicles and equipment)
- Office and workshop building
- Salt storage
  - Dry salt and brine
Bavaria in winter

The next winter is certain to come.
We should be prepared for it!
Bavaria in winter

Many thanks for your attention