Evaluation of materials for road upgrading

SPENS
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WP4 (Evaluation of materials for road upgrading)
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The objective of the SPENS research project is to develop appropriate tools and procedures for the rapid and cost-effective rehabilitation and maintenance of roads in the EU New Member States(NMS).

4.1 Investigation of the Performance of Conventional and Polymer Modified Bitumen

Björn Kalman

A performance based binder criterion (based on the correlation between binder tests and critical asphalt performance tests) has already been suggested, but more validation tests are needed.
Within this task not only the validation tests will be performed, but we will also try to find new or better criteria for those asphalt properties where good and solid correlation has not yet been found.

The binders (conventional and modified bitumen) used in the asphalt mixtures will be varied to accomplish a large variation in their characteristic properties. The binders will also be characterized with a range fundamental test methods as well as traditional test methods and these results will be compared and correlated to the results from the asphalt mixture testing program.

The task will accomplish

- **Recommendations for the choice of performance related binder tests**
- **Recommendations for selecting binder properties for different types of asphalt mixtures based on the performance related binder tests**

Bitumen are tested on RB (EN 1427), pen. (EN 1426), Fraass (EN 12593), RTFOT (EN 12607-1), RFT (EN 12607-3), kinematic viscosity (EN 12595), capillary viscosity (EN 12596), rotating spindle viscosity (EN 13302), cone-plate viscosity (EN 13702-1), coaxial cylinders viscosity (EN 13702-2), elastic recovery (EN 13398), storage stability (EN 13399), Force ductility (EN 13589), DSR zero shear viscosity and SHRP parameters.

Used bitumen- Paving grade bitumen

EN 12591	70/100	50/70	20/30
Penetration @25 °C	78	57	28
Softening Point, °C	50	55	62
Fraass Breaking Point, °C	- 22	- 19	- 11
Density @25°C, Mg/m^3	1,014	1,017	1,017
Kinematic viscosity @135°C, mm^2/s	372	579	1340
EVT (170), °C	153	160	178
EVT (280), °C	140	148	165

Used bitumen- Polymer modified bitumen

EN 14023	PmB 50-90S	PmB 25/55-55	Elvaloy	DE 30B
Penetration @ 25 °C	70	45	79	30
Softening Point, °C	72	73	48	67
Fraass Breaking Point, °C	- 18	- 16	- 16	- 13
Density @ 25°C (Mg/m^3)	1,014	1,017	1,017	1,016
EVT (170), °C	170	193	160	-
EVT (280), °C	155	176	148	-

Asphalt mix program

- 1-2 stone aggregates
  - Diabase (Croatia) – A1
  - Limestone (Croatia) – A2

- 4 gradings of mineral mixture
  - AC (asphalt concrete) – G1
  - SMA (stone mastix asphalt) – G3
  - PA (porous asphalt) – G4

Binder content Default C1
High (+0.5%) C2
Low (-0.5%) C3

The testing program will include wheel tracking tests (EN 12697-22), stiffness (EN 12697-26) performed in Bulgaria. Asphalt tests will be mainly performed in Croatia. Water sensitivity (EN 12697-12) will be preformed in Slovenia. TSRST tests will be performed in Poland.

4.2 Material Recommendations and Performance-based Requirements for High Modulus Asphalt Mixtures and Flexible Pavement Design

Wojciech Bańkowski, Dariusz Sybilski

High Modulus Asphalt Mixtures are not yet widely used in the Central and Eastern European countries. The technology transfer has to take into account local climatic conditions as well as the availability of raw materials (binders, low quality aggregates, additives) and existing equipment, both for the road construction and for laboratory testing. Within this task material recommendations will be prepared based on laboratory and field data from the NMS countries.

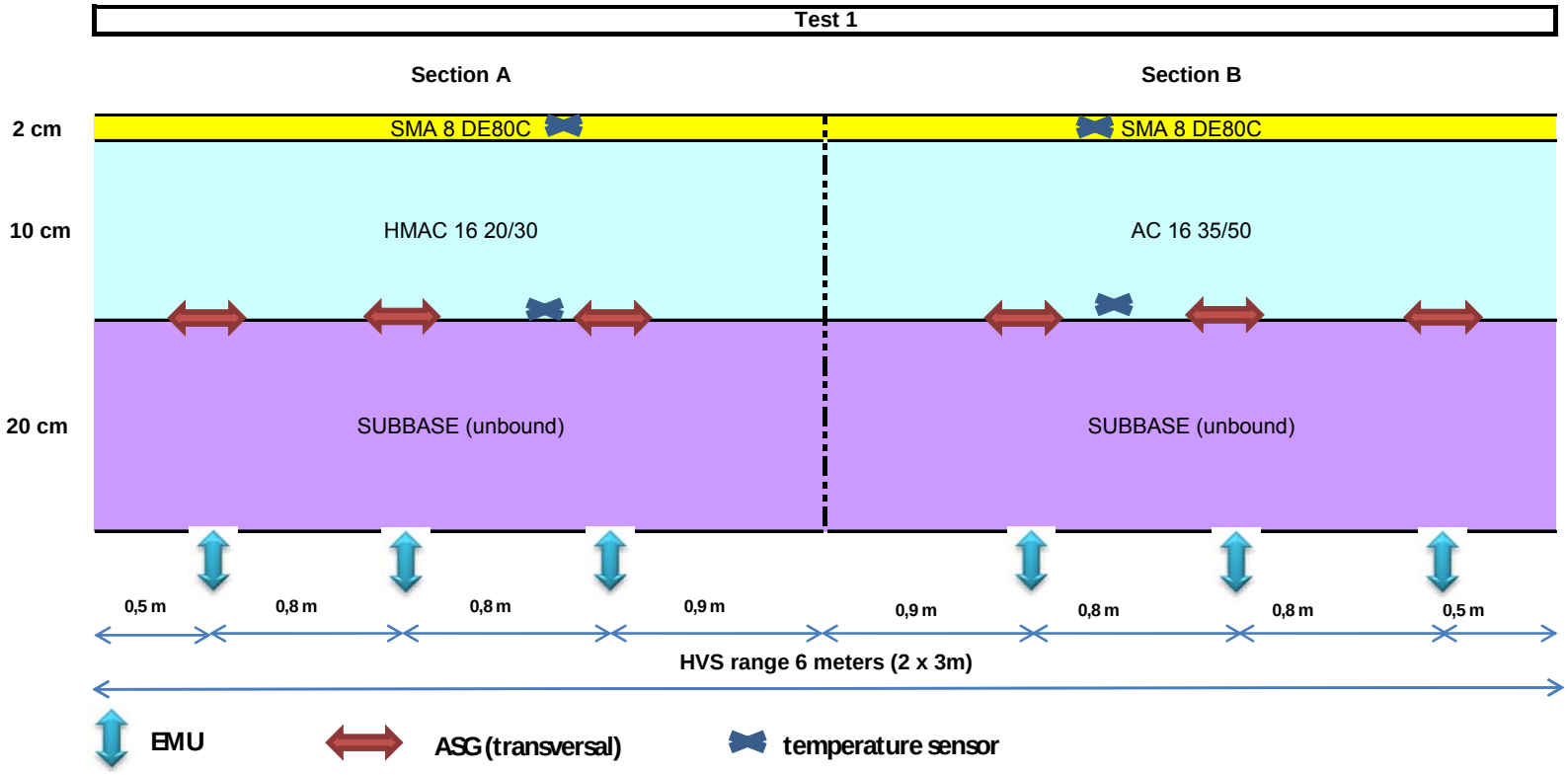
Two full-scale trial test sections were constructed in Poland with typical pavement design. They will be subjected to accelerated loading tests to validate the laboratory results.

Goal: to develop a concept of high modulus asphalt mixtures (HMAC) for the implementation in the Central and Eastern European countries

General plan:

Preparation of initial recommendations
Laboratory implementation and tests
Preparation of trial sections
HVS tests
Analysis and final report (recommendations)

The next step of the task was preparation to construction work of test sections that will be subjected to HVS loading. Test section was divided into two halves of the same layer thickness, but with two different mixes for base course: asphalt concrete (AC) and HMAC.



Construction and instrumentation works (22-26.10.2007)

IBDiM, VTI, STRABAG, TPA

4.3 Upgrading of asphalt macadam and light asphalt pavements to the bearing capacity level needed by EU-regulations

Leif G Wiman

Many regional and local roads have insufficient bearing capacity due to the increasing number of trucks and heavier axial loads. An instrumented full-scale trial section was designed and constructed. A new local road is upgraded with six different pavement structures. All six test sections are instrumented to monitor deformations during the full-scale accelerated loading tests. Laboratory and field tests of the materials (for unbound and asphalt layers) will be performed. Based on the data gathered from these tests and test sections constructed in the past years within some other projects, these upgrading techniques will be evaluated.

Type of road: local (in Dragučova)

Annual average daily traffic: very low

Date of construction: November 2007 (SCT, d.d.)

Type of road structures: aspahlt – 6 different pavement structures

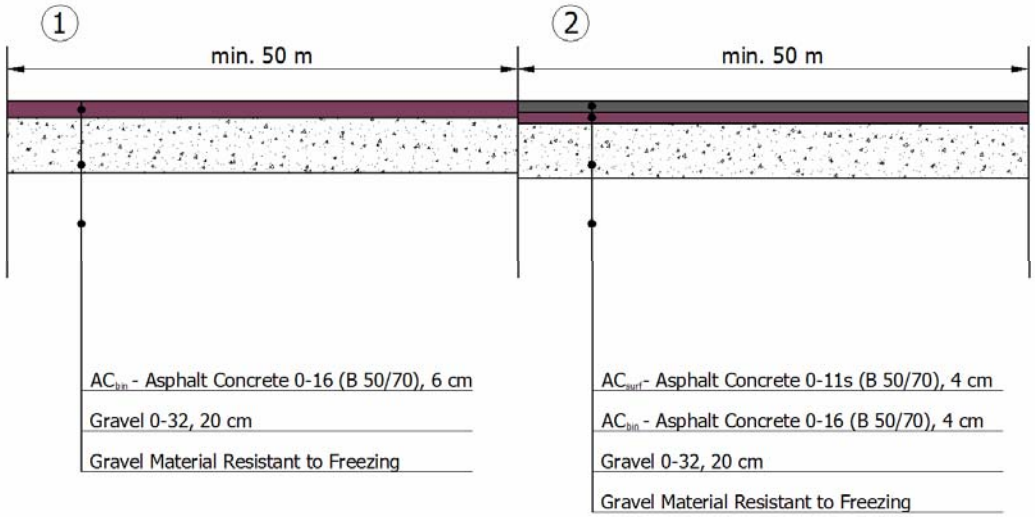
Width: 3,6 m

Length: 6x50m=300 m

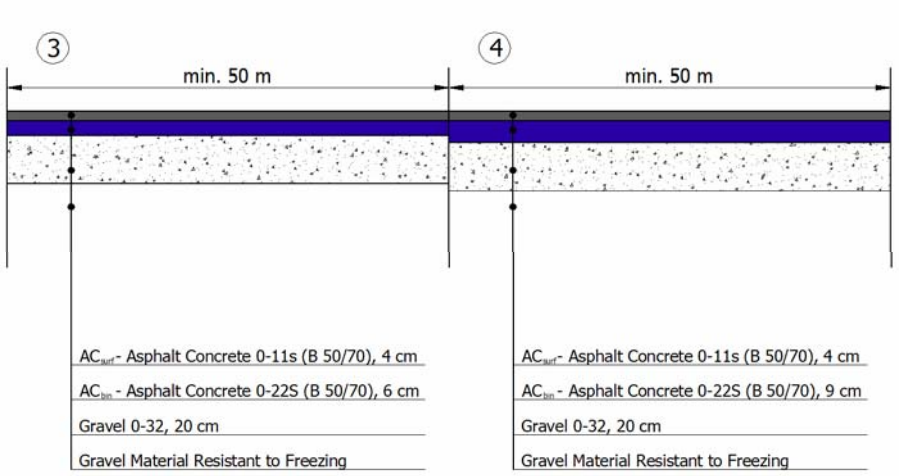
Thickness of unbound base layer:
20cm of gravel

Thickness of asphalt layer:
6 to 13cm

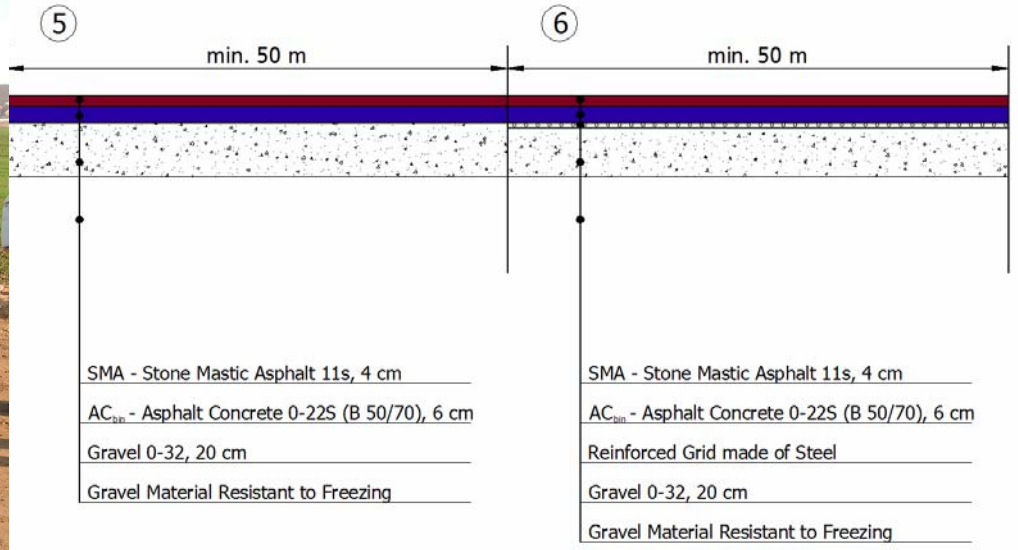
4.3 First test field



4.3 Second test field



4.3 Third test field




ZAG

WP4.3 – Upgrading of roads – test fields
paving over reinforcement

Thank you for attention!