Cold recycling works and design of stabilised mixes for cold recycling of pavements in Estonia

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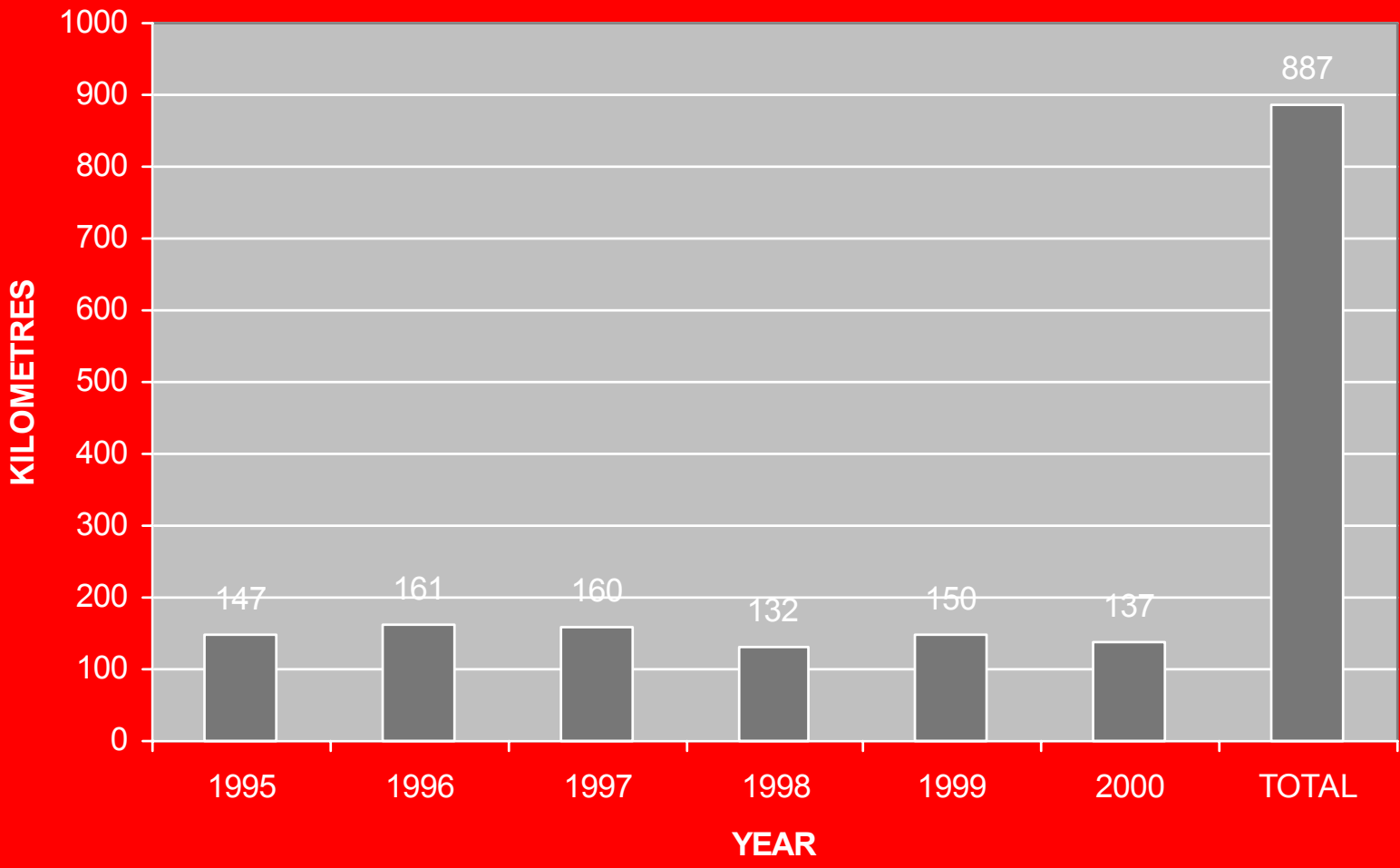
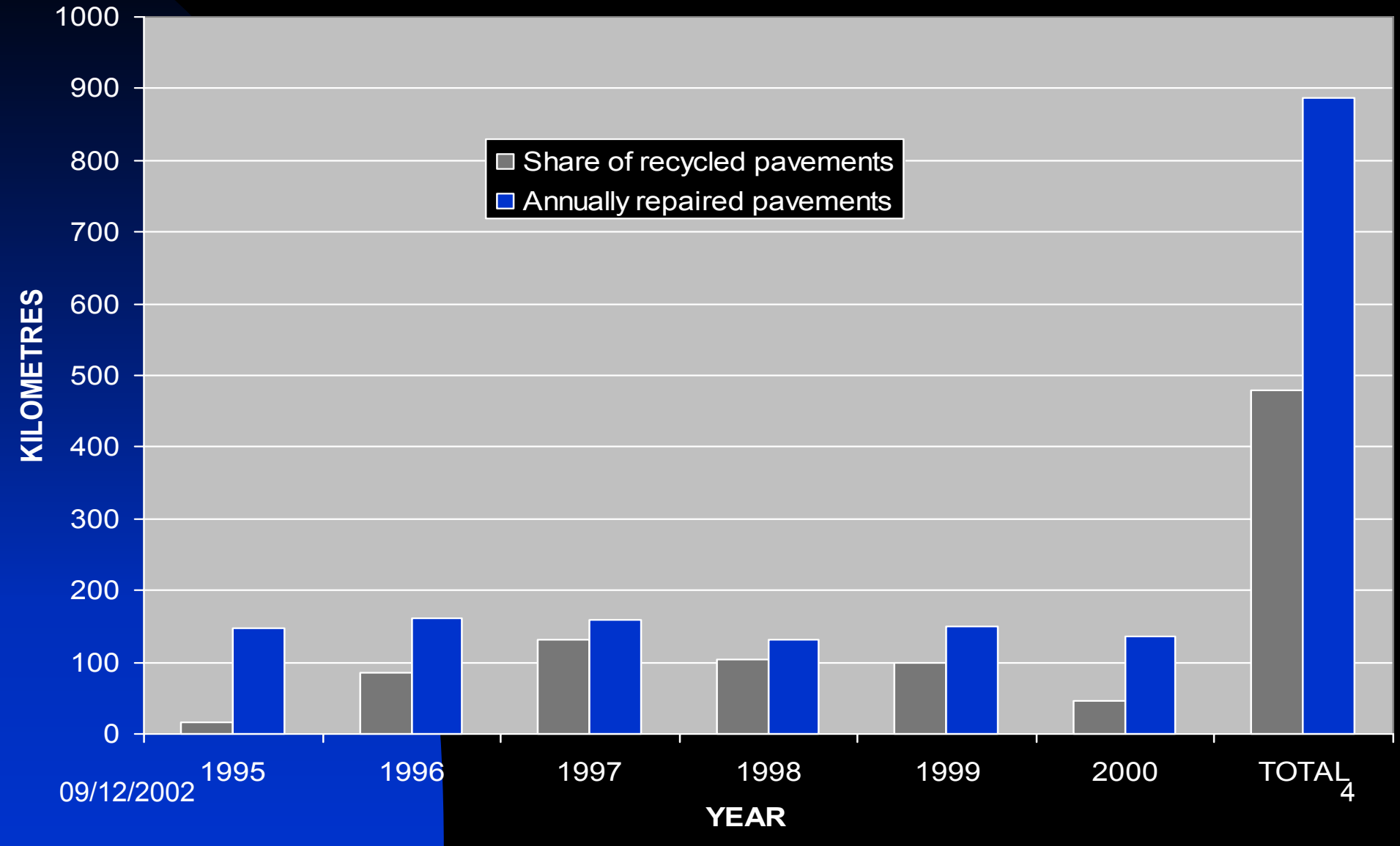
Background information

- The length of state road network in Estonia is 16 443 km
- 8477 km or 52 % of these roads are paved
- Approximately 100 km of asphalt-grouted pavements are repaired in Estonia annually.

Annually repaired pavements



Percentage of recycled pavements



Causes necessitating the report are:

- Faults of longitudinal and cross section
- Uneveness in surfacing
- Longitudinal or cross cracks
- Insufficient bearing capacity

Shale-oil bitumen:

- Has good elongation features
- High adhesion with stone materials

But due to rapid agening:

- the bitumen in old surfacings has become extremely hard
- surfacings need softening

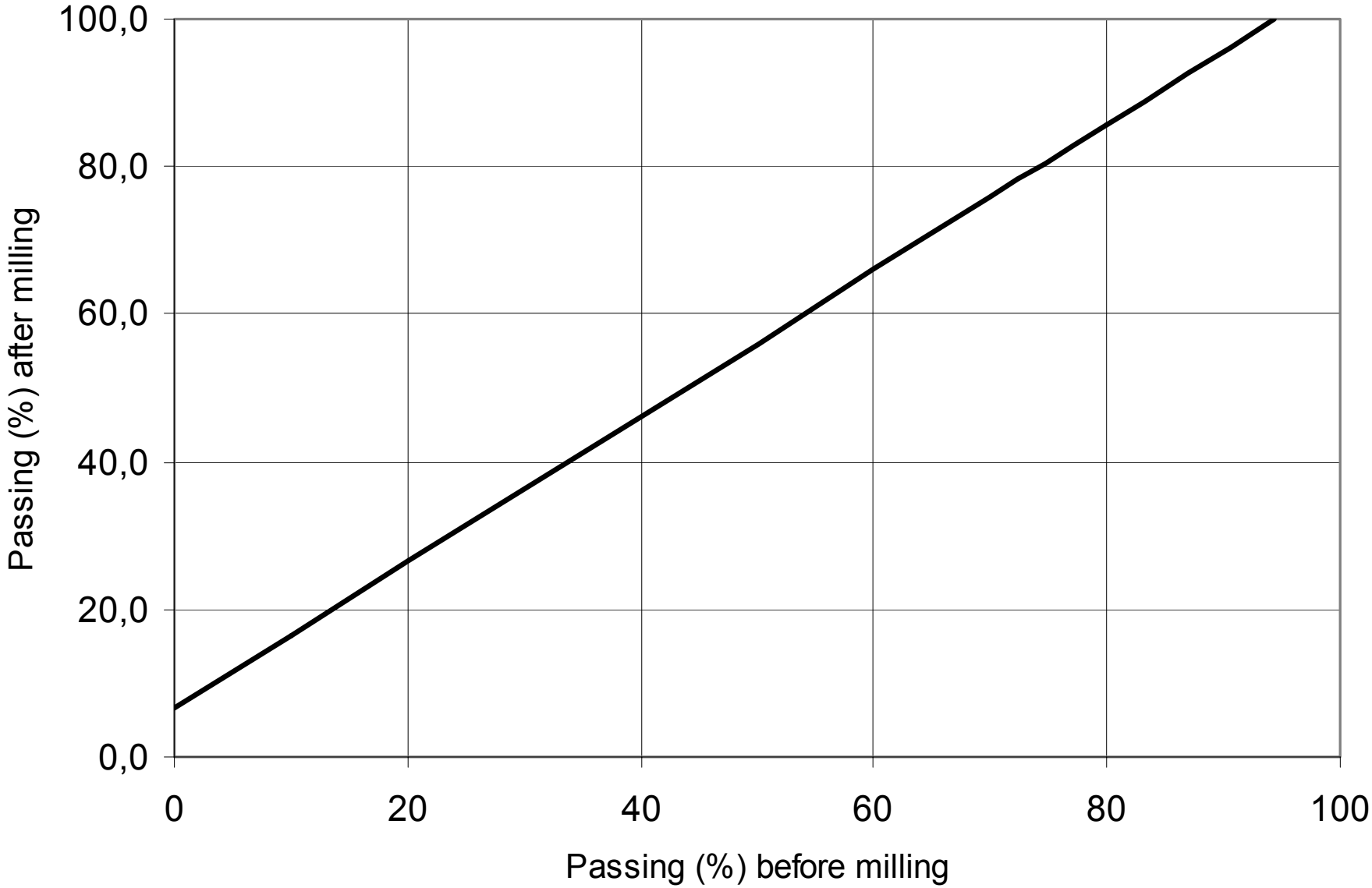
Important in designing the mix:

- The grain composition of the pavement being recycled
- The content and qualities of bitumen

An important conclusion

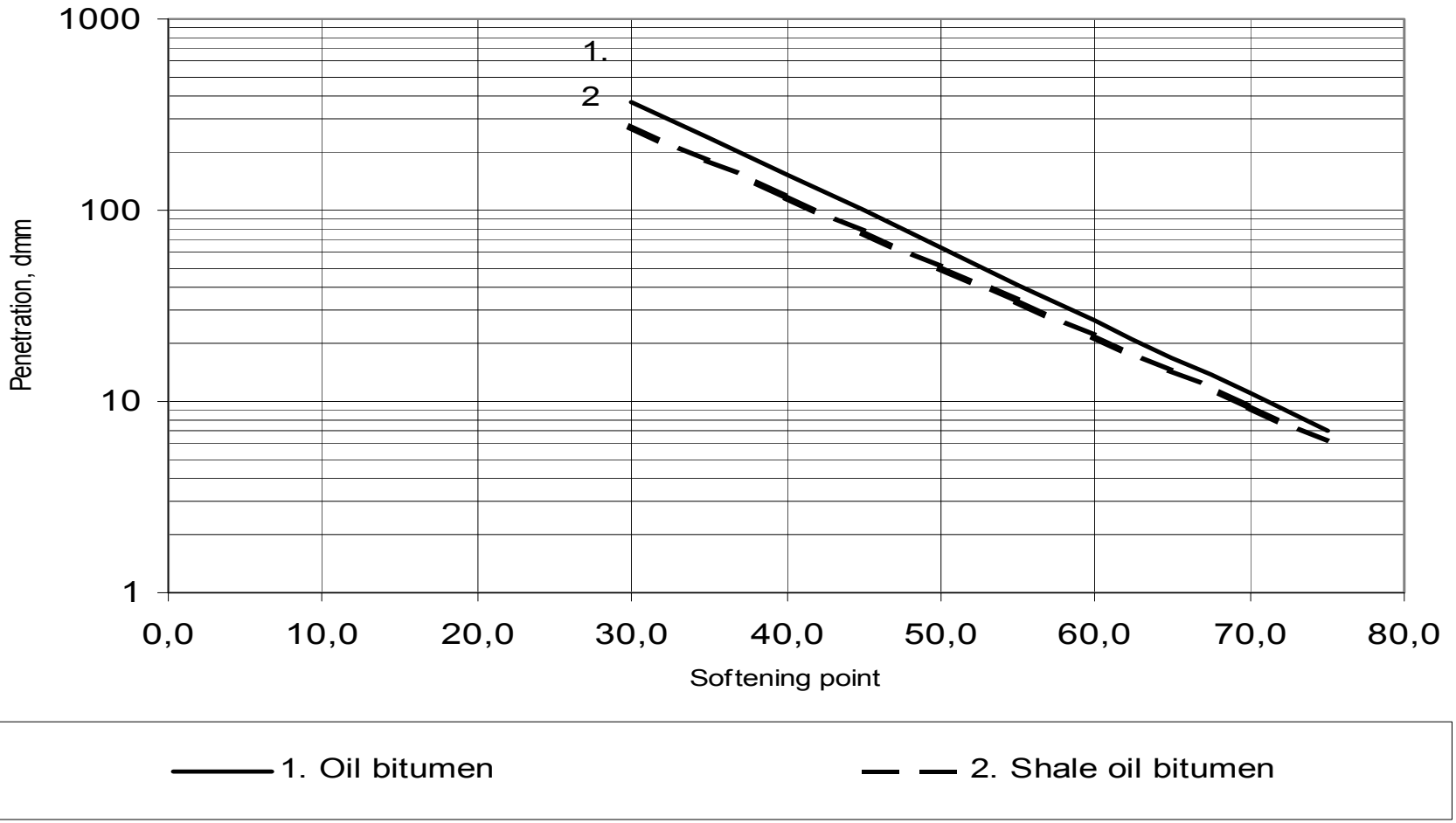
- The percentage of increase of amount of mineral aggregate (after milling) passing all openings of the mesh screen can be determined

Figure 1 The change of the aggregate`s gradation due to the milling the pavement



Regression analyses has derived ties between softening point and penetration of bitumen

Figure 2 Relationship between the penetration and the softening point



Two different principles in the design of stabilised mixes.

- 1. Crushed asphalt is considered an independent grain material.
- 2. Crushed old asphalt is seen as composite material consisting of mineral aggregate and bitumen.

The amount of bitumen to be added depends on:

- The share of milled asphalt of the mixture, %
- Penetration of bitumenin the milled asphalt
- Bitumen content of the milled asphalt, % of weight of milled asphalt
- The proportion of material passing through the 0,063 mech screen opening of the designed rock material

Viscosity of new and old bitumen

- It is easy task when the new and old bitumen are viscous and their softening poin can be determined
- But in most cases the added bitumen is liquid shale oil bitumen

The bitumen stabilised mixes in Estonia have norms:

- For permanent void content
- And moisture sensibility

All above factors are used in Estonia in the design of bitumen stabilised mixes. The correlations shown here consider the materials used in Estonia: therefore they can be different elsewhere. It is important, however, that there exists some mathematically expressed regularities, which enable to ease and speed up the design work.