Long life pavements
Long life pavements

[Image of pavement with a close-up highlighting 'Pumping' and 'Loss of integrity']
Long life pavements
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Loss of integrity - structural failure
Long life pavements

• when designing pavements, you have to decide upon
  
  – design strategy

  – design method
Long life pavements

design strategies

- long life design strategy
- long life design & maintenance strategy
- limited life design strategy
Long life pavements

**Long life design strategy**

- pavement is designed to be free from structural deterioration
- stresses & strains are kept below fatigue limits (which we do not know too well)
- materials must be insensitive for deterioration from climate, environment, endogenous processes etc.
- this approach is called the ‘long life pavement’ or the ‘perpetual pavement’ approach
Long life pavements

Long life design & maintenance strategy

• pavement is designed such that structural deterioration will end after one or more overlays

• initial stresses & strains are kept low so that distress is limited at overlaying

• overlaying will further reduce stresses and strains

• advantages is that overlay can be combined with profiling and can be optimised depending on the actual behaviour of the pavement

• disadvantage is that possibly no one ever puts on the overlay......
long life design & maintenance strategy

- Second intervention level: 20% fatigue damage (% of road length)
- First intervention level: 15% fatigue damage

85% reliable curve
Expected (50% reliable) curve
Residual “life”

First overlay
Second overlay

Age / former traffic
Years or traffic
long life design & maintenance strategy

- the choice of design period (period between overlays) is crucial

- this has to be harmonised with intervals for major maintenance of wearing courses

- in the Netherlands, prevalingly porous asphalt is used on the primary network

- this on average has a durability of 11 years for the right hand lane and 15 years for the total carriageway width

- so design period should at least be 15 years, but should incorporate some margin for longer wearing course life (NL uses 20 years)
long life design & maintenance strategy

• there is more to long life than design:
  • build quality
  • adequate maintenance
  • avoiding design solutions that cause a lot of maintenance
limited life design strategy

Limited life design strategy

- pavement is designed for limited life (which also needs to be tuned to wearing course maintenance)

- it will need full replacement once or more times

- this is initially cheaper but more expensive on the long term (strengthening is much cheaper than replacement)

- also traffic hindrance is of an other order

- sustainability issues can be more serious (use of raw materials and energy, emissions, ...
limited life design strategy

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Limited life design strategy