

# Belgian experiences with rural and local concrete roads

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# Introduction

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## Belgian road network

|                              |   |            | Estimated<br><u>% concrete</u> |
|------------------------------|---|------------|--------------------------------|
| ■ Motorways                  | = | 1 726 km   | 35 to 40                       |
| ■ Regional roads             | = | 13899 km   | 14                             |
| ■ Municipal (local) roads    | = | 138.000 km | 15                             |
| — Rural (agricultural) roads | = | 6.500 km   | 50 to 60                       |



### Belgium

30 528 km<sup>2</sup> - 11,58 million inhabitants

Very high density of the road network:  
5km/ km<sup>2</sup>

# Introduction

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- “Rural and local” roads exist under several forms
  - Agricultural roads
  - Roads in environmentally protected and/or wooded areas
  - Country roads
  - Cities and municipalities
    - Rural connecting roads
    - Residential streets
    - Public spaces
  - Bicycle networks



# Design aspects

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- Always in JPCP
  - Slab length max. 5m
  - Joints by sawcutting (in the past with inserted plastic strips)
  - Mostly undowelled
- If possible mechanical construction with slipform pavers: daily production 400-600 m



# Design aspects

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- Some exceptional cases in CRCP!





# Design aspects

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- Surface finishing
  - transverse brushing
  - exceptionally exposed aggregate concrete
  - or imprinted concrete



# Design aspects

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- Concrete mix
  - The required quality has increased over time due to higher demands on road surface characteristics
  - $C \geq 350$  to  $375 \text{ kg/m}^3$
  - $w/c \leq 0,50$
  - $D_{\max}$  32 mm or 20 mm
  - Compressive strength of 50 to 60 MPa on drilled cores after 90 days



# Agricultural roads

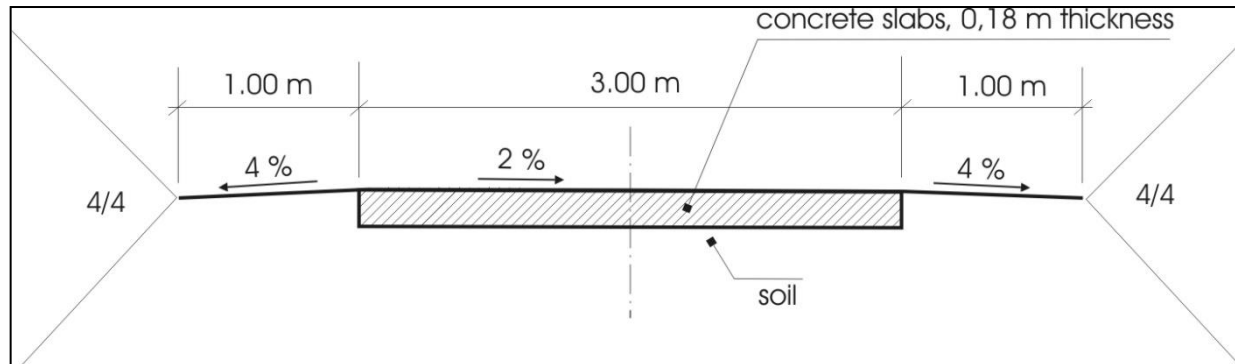
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- Around 6500 km of farm roads
- Paving of farm roads started in the 1950's and boomed in the '60s and '70s
- 50 to 60 % in concrete
- Most of them still in service



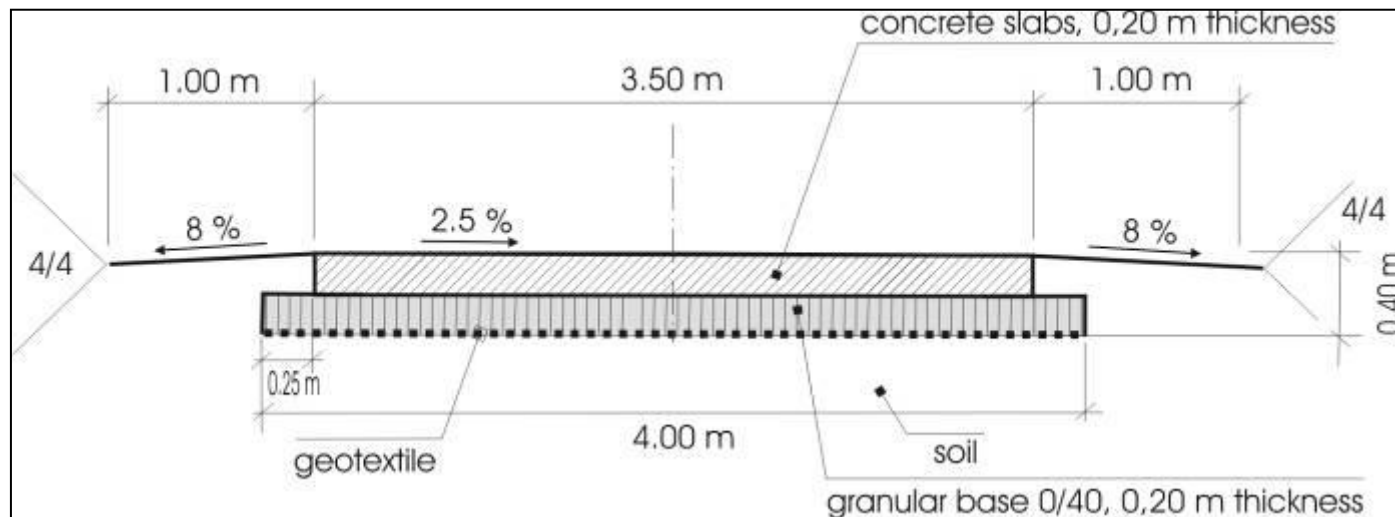
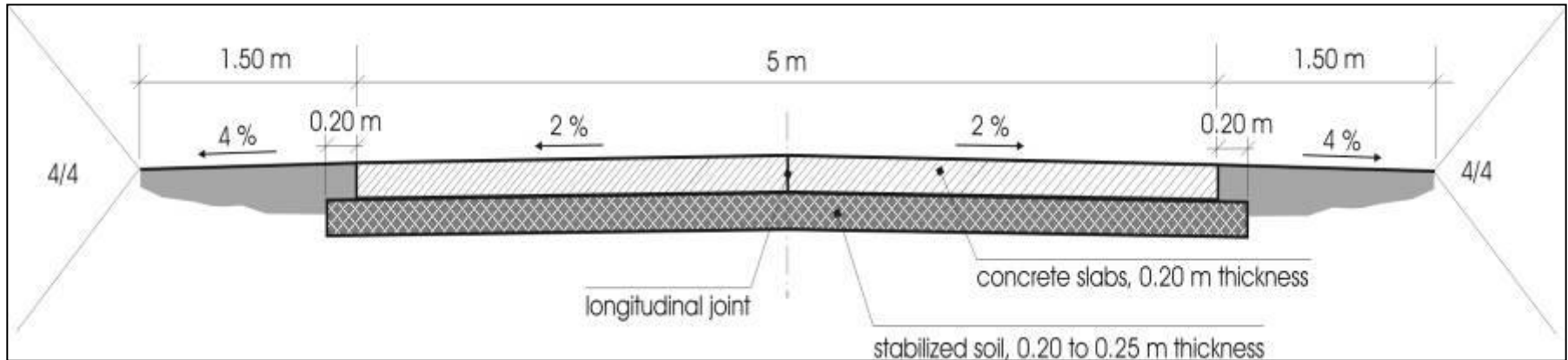


# Agricultural roads – evolution in the design

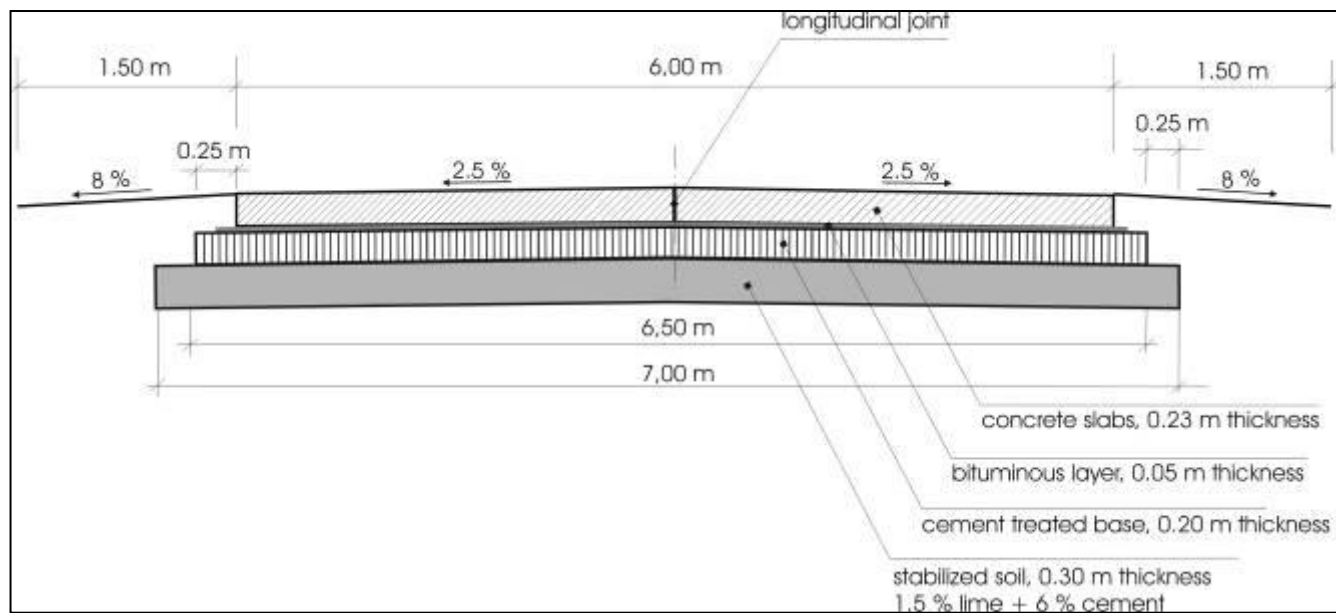


- Used to be typical 3 m wide
- Green verges on both sides
- If possible, directly on the subgrade, with no base layer
- Due to the increase of rat-run traffic :
  - Speed humps
  - Bendy roads
  - Less comfortable surfaces e.g. **roller compacted concrete (RCC)** and **wheel path pavements**

# Agricultural roads – evolution in the design



# Agricultural roads – evolution in the design



# RCC pavements

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- In Belgium, they have mainly been built as roads with a on purpose 'lower quality' surface to deter the traffic
- RCC techniques have been improved and higher quality surfaces can be obtained.
- Only few applications in Belgium due to high availability of slipform pavers



# RCC pavements

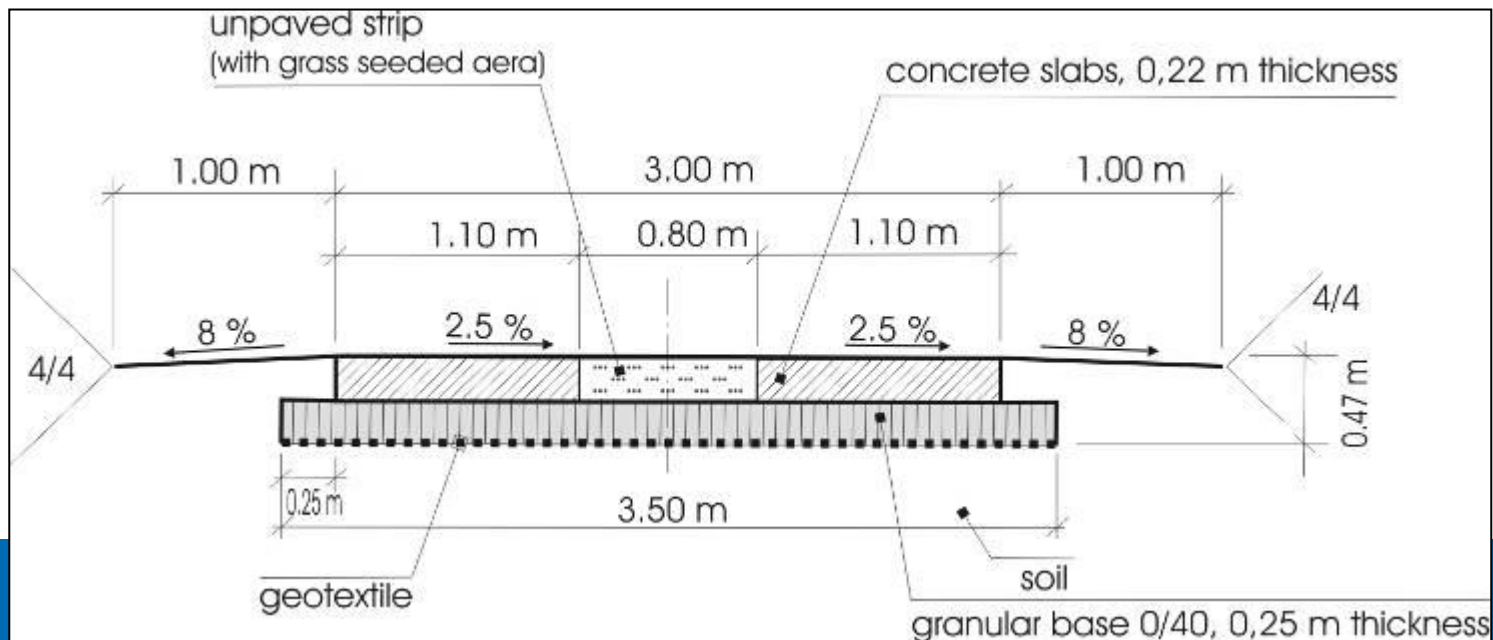
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- **Characteristics**
  - Maximum aggregate size 20 mm
  - Use of recycled crushed concrete
  - 200 – 300 kg cement per m<sup>3</sup>
  - Up to 5% fly ash
  - Average compressive strength of 20 MPa after 90 days
- **Execution**
  - Mixed in plant
  - Generally one layer 20 – 25 cm
  - Placed with finisher or grader
  - Compacted with vibrating rollers
  - Precracking or saw-cut, joint spacing max. 5 m



# Wheel path pavements

- Is less a barrier for certain animals
- Extra rural character
- Vegetation in the central strip
- Less water run-off —————→ Increasing interest
- Less attractive to rat-run traffic



# Wheel path pavements

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# Wheel path pavements

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Herne, Krommenstraat, BE



# Wheel path pavements

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# Overlay – often a good choice

- Unbonded overlay with asphalt interlayer
- Benefits of an overlay
  - Less transport
  - No demolition and disposal costs
  - Existing consolidated structure as a base layer
  - Shorter construction time



Lennik, Kerselarestraat, BE



# Agricultural roads

## Case Herne & Bever

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# Agricultural roads

## Case Herne & Bever

- Two sparsely populated municipalities with many agricultural activities
- 2015-2016: renovation of 6km of roads, of which 3,5 km in concrete
- 20 cm of cement treated base layer, laid with an asphalt finisher
- 20 cm of concrete pavement





# Agricultural roads

## Case Herne & Bever

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- Air entrained concrete mix



# Agricultural roads

## Case Herne & Bever

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- Slipform paving



# Agricultural roads

## Case Herne & Bever

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- Surface finishing by transverse brushing

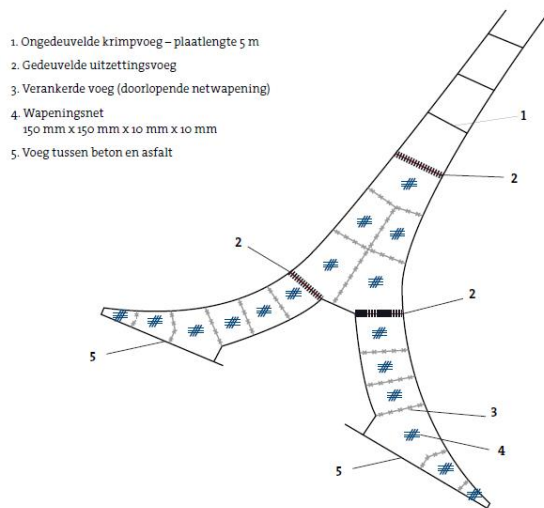




# Agricultural roads

## Case Herne & Bever

- Attention to the joint lay-out!
  - Steel reinforcement meshes in odd-shaped slabs
  - Avoid sharp angles
  - Position of expansion joints



# Agricultural roads

## Case Herne & Bever

- Concrete pavement : €25/m<sup>2</sup>



# Closing remarks

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- Local and rural roads are a huge potential market for concrete pavements
- Their main advantages:
  - A very long service life
  - Very little maintenance required
  - Easier to build
  - Easier to start with in countries with limited experience in concrete pavements







Thank you for your  
kind attention