Road pavements

Road pavements types
Themes of lecture

- Introduction
- Types of pavements
Introduction

• Various combinations of layers between surface and ground: structure, composed of one or more courses (layers), to assist the passage of traffic over terrain

• Many different materials can be used (bound or unbound)

• Primary function to carry traffic loading safely without damaging subgrade: spreading out the load below the tire, so the stress at the subgrade level is low enough not to cause damage
Types of pavements

- Pavements for roads:
  - Car traffic – low volume roads,
  - Heavy traffic volume roads: buses, trucks, trailers, semi-trailers
- Airport pavements: aprons, taxiways, runaways (resistance to fuel is important)
- Parking lots
- Loading/unloading areas in ports, rails, ships, trucks, logistic bases
Various pavement types: gravel roads

<table>
<thead>
<tr>
<th>Flexible</th>
<th>Sealed gravel road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel road</td>
<td>Bitumen seal</td>
</tr>
<tr>
<td>Granular</td>
<td>Granular</td>
</tr>
<tr>
<td>Soil</td>
<td>Soil</td>
</tr>
</tbody>
</table>

Road pavements
### Various pavement types: Asphalt pavements

<table>
<thead>
<tr>
<th>Flexible</th>
<th>Flexible, composite</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asphaltic</strong></td>
<td><strong>Asphaltic</strong></td>
</tr>
<tr>
<td><strong>Granular</strong></td>
<td>Cement treated base, CTB</td>
</tr>
<tr>
<td><strong>Soil</strong></td>
<td>Soil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flexible, full depth asphalt</th>
<th>Semi-rigid, composite</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asphaltic</strong></td>
<td><strong>Asphaltic</strong></td>
</tr>
<tr>
<td><strong>Asphaltic</strong></td>
<td><strong>Composite</strong></td>
</tr>
<tr>
<td><strong>Soil</strong></td>
<td><strong>Soil</strong></td>
</tr>
</tbody>
</table>

**Road pavements**

- Asphaltic Pavements
- Granular Pavements
- Soil Pavements
- Flexible Pavements
- Flexible, composite Pavements
- Semi-rigid Pavements
- Composite Pavements
- Full depth asphalt Pavements
- Cement treated base, CTB Pavements
Various pavement types: Asphalt pavements

- Inverted pavement, flexible, composite

<table>
<thead>
<tr>
<th>Material</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphaltic</td>
<td>Prevents reflection cracking</td>
</tr>
<tr>
<td>Granular</td>
<td>Sit the granular base on the stiff subbase Even though the granular base is not stiff itself, it cannot deflect much because of the stiff subbase</td>
</tr>
<tr>
<td>Cement treated base, CTB</td>
<td>If granular layer is too thick, benefit of stabilized subbase lost</td>
</tr>
<tr>
<td>Soil</td>
<td>If granular layer is too thin, cracks in subbase can still reflect</td>
</tr>
</tbody>
</table>
Various pavement types: Concrete pavements

- Rigid pavement

Jointed Plain Concrete Pavement (JPCP): dowels, tie bars

<table>
<thead>
<tr>
<th>Concrete (PCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granular/Cement treated base (CTB) / Asphaltic / Concrete</td>
</tr>
<tr>
<td>Soil</td>
</tr>
</tbody>
</table>
Various pavement types: Concrete pavements

- Rigid pavement

Continuously Reinforced Concrete Pavement (CRCP)

<table>
<thead>
<tr>
<th>Concrete (CRCP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement treated base (CTB)</td>
</tr>
<tr>
<td>Soil</td>
</tr>
</tbody>
</table>
**Various pavement types: Concrete pavements**

- **Rigid, composite pavement**

  Continuously Reinforced Concrete Pavement (CRCP) with thin asphalt surfacing

<table>
<thead>
<tr>
<th>Asphalt surface course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (CRCP)</td>
</tr>
<tr>
<td>Cement treated base (CTB)</td>
</tr>
<tr>
<td>Soil</td>
</tr>
</tbody>
</table>
Various pavement types: Concrete pavements

- **Rigid pavement**

  Jointed Reinforced Concrete Pavement (JRCP)

<table>
<thead>
<tr>
<th>Concrete (JRCP)</th>
<th>Cement treated base (CTB)</th>
<th>Granular</th>
<th>Soil</th>
</tr>
</thead>
</table>
### Various pavement types: Concrete pavements

#### Flexible pavement
- Concrete or brick blocks on sand
  - Granular
  - Soil

#### Semi-rigid / flexible pavement
- Concrete or brick blocks on sand
  - Concrete or cement treated
    - Granular
    - Soil
Rigid pavements

PORTLAND CEMENT CONCRETE PAVEMENTS

RIGID

- Jointed plain concrete pavement, JPCP
- Continuously reinforced concrete pavement, CRCP
- Jointed reinforced concrete pavement, JRCP

RIGID, COMPOSITE

- Continuously reinforced concrete pavement, CRCP
  + Thin asphalt surface layer
Pavements with asphalt surfacing

**SEMI-RIGID, COMPOSITE**
- Lean concrete base
- Old PCC pavement

**FLEXIBLE**
- Asphalt subbase (Full depth asphalt)
- Granular subbase
- Hydraulically stabilized subbase (composite)
- Inverted pavements (composite)
Block pavements

RIGID / SEMI-RIGID

- Concrete blocks
- Stone blocks
  - Pebblestones
- Natural stones
- Permeable concrete blocks
- Bricks
Unbound roads

Unbound pavements

- Gravel
- Gravel + bitumen seal
- Water bound macadam
Thank you for your attention!

Any questions?