

Concrete Pavement:

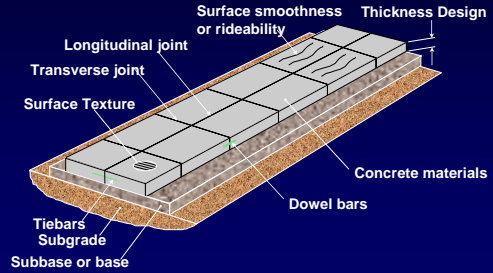
What Are the Basics of a Good Road?

Purdue Road School

March 10, 2004



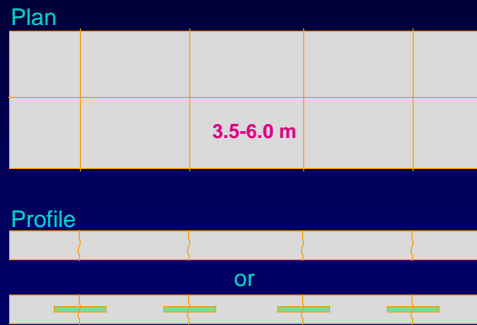
Basic Components of a Concrete Pavement



Concrete Pavement Types

- Jointed Plain
 - Undoweled
 - Doweled
- Jointed Reinforced
- Continuously Reinforced

Jointed Plain



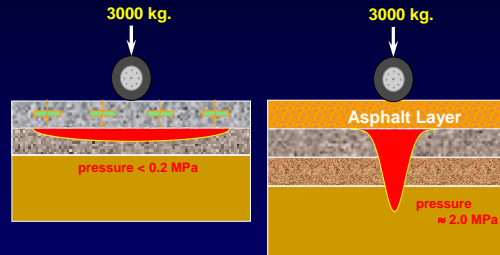
Jointed Plain



Jointed Plain



How Pavements Carry Loads

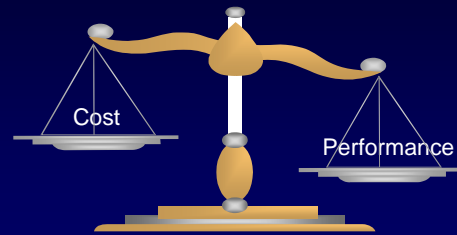


Concrete's Rigidity spreads the load over a large area and keeps pressures on the subgrade low.

Concrete Pavement Design Requires Selecting Appropriate Features

- | | |
|---|---|
| <input checked="" type="checkbox"/> Subgrade modification | <input type="checkbox"/> Reinforcement |
| <input type="checkbox"/> Drainage system | <input checked="" type="checkbox"/> Joint Sealant |
| <input checked="" type="checkbox"/> Subbase | <input type="checkbox"/> None |
| <input checked="" type="checkbox"/> Joint Spacing | <input type="checkbox"/> Hot pour |
| <input type="checkbox"/> 18 ft | <input checked="" type="checkbox"/> Silicone |
| <input checked="" type="checkbox"/> 15 ft | <input type="checkbox"/> Preformed |
| <input checked="" type="checkbox"/> Dowels | <input checked="" type="checkbox"/> Surface Texture |
| <input checked="" type="checkbox"/> Thickness | <input type="checkbox"/> Transverse tine |
| <input type="checkbox"/> 8 in | <input checked="" type="checkbox"/> Burlap drag |
| <input type="checkbox"/> 10 in | <input checked="" type="checkbox"/> Shoulder |
| <input checked="" type="checkbox"/> 12 in | <input checked="" type="checkbox"/> Asphalt |
| | <input type="checkbox"/> Concrete |

Optimize



Durability = Performance

- Quality Materials
 - Aggregate – AP Approved, uniform gradation
 - Minimum Cement Content
 - Approved Admixtures
- Proper Mix Design – Control to Design
- Moisture/Water Control
- Air Entrainment – $6\% \pm 1.5\%$
- Proper Curing – Liquid membrane applied @ manufacturer's suggested rate

Subbase vs. NO Subbase

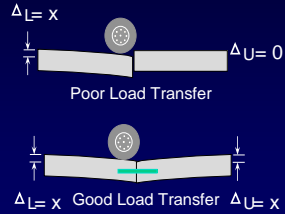
- Heavy Traffic?? > 120 Trucks/day = subbase
- Fine grain soils prone to erosion
- Presence of moisture/water
 - Potential pumping

Presence of all above conditions suggests need for subbase

Dowels or NO Dowels

- The slabs ability to share its load with its neighboring slab

- Dowels
 - High Traffic Volumes
(Pavements > 8 in.)
- Aggregate Interlock
 - Low Traffic Volumes
(Pavements < 7 in.)



Jointing

- Spacing based on thickness
 - 6" thick - 12' joint spacing
 - > 12" thick - 18' joint spacing
- > 12" thick - saw 1/3 the depth
- If not specifying dowels - can skew joints 1' in 12' across pavement
- High volume traffic - seal joints with silicone or neoprene
- Low volume traffic - seal joints with hot pour rubberized asphalt

Overlay vs. Reconstruct

- Expected Performance
 - UTW (3" - 5") - 10 to 15 years
 - Thicker overlays (6" - 12") 15 to 25 years
 - Reconstruction - 25 to 30 years
- Condition of existing pavement
- Clearance issues - if none can build on top of old PCCP or HMA pavement

I-69 UNBONDED PCC OVERLAY

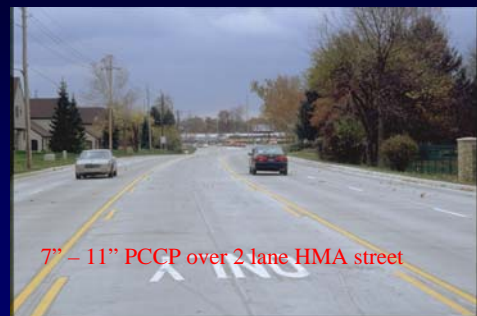


11" PCCP over old Concrete Pavement



9" PCCP over old Chip & seal road

Allisonville Road



7" - 11" PCCP over 2 lane HMA street

56th Street Brownsburg



6" PCCP over HMA street

Market & Columbia Streets - Warsaw



3.5" PCCP over HMA & brick

Summary

YOU HAVE OPTIONS

Select appropriate design features that optimize cost to achieve desired performance

Questions?