Concrete Pavement: What Are the Basics of a Good Road?

Purdue Road School
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Concrete Pavement Types
- Jointed Plain
  - Undoweled
  - Doweled
- Jointed Reinforced
- Continuously Reinforced

Basic Components of a Concrete Pavement

Jointed Plain

Plan

Profile

3.5-6.0 m

Jointed Plain
Jointed Plain

How Pavements Carry Loads
3000 kg. 3000 kg.

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

Concrete Pavement Design Requires Selecting Appropriate Features

- Subgrade modification
- Drainage system
- Subbase
- Joint Spacing: 18 ft, 15 ft
- Dowels
- Thickness: 8 in, 10 in, 12 in
- Reinforcement
- Joint Sealant: None, Hot pour, Silicone, Preformed
- Surface Texture: Transverse tine, Burlap drag
- Shoulder: Asphalt, Concrete

Optimize

Cost  Performance

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% ± 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 slab's 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

**Allisonville Road**

9” PCCP over old Chip & seal 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?