Concrete Pavement:

What Are the Basics of a Good Road?

Purdue Road School

March 10, 2004

Concrete Pavement Types

• Jointed Plain
  – Undoweled
  – Doweled

• Jointed Reinforced

• Continuously Reinforced

Jointed Plain

Plan

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3.5-6.0 m

Profile

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or

Jointed Plain

Basic Components of a Concrete Pavement
Jointed Plain

How Pavements Carry Loads

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
  - Performed
- Surface Texture
  - Transverse tine
  - Burlap drag
- Shoulder
  - Asphalt
  - Concrete

Optimize

Cost

Performance

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

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
**Dowels or NO Dowels**

- The slab's ability to share its load with its neighboring slab
- **Dowels**
  - High Traffic Volumes (Pavements > 8 in.)
  - Low Traffic Volumes (Pavements < 7 in.)
- **Aggregate Interlock**

**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?