TWO LIFT PCC PAVEMENTS TO MEET PUBLIC NEEDS

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RESEARCH GOALS

• IDENTIFICATION OF:
  • Construction - strengths and limitations
  • Development constraints – cost, mix design, constr.
  • Research needs – material/ equipment knowledge
  • Goals – improved surface durability, reduced noise, and improved safety
**RESEARCH OBJECTIVES**

- US and European Synthesis of Practice
  - Location, design, construction details, condition
  - Need for quality and durability
  - Identification of design/construction research gaps

**EUROPEAN EXPERIENCE**

- Countries employing two lift paving
  - France, Germany and Austria
  - Lessons learned
    - 2-5.5 inch high quality surface courses
    - 8.5-9.5 inch low cost base courses
    - Use of local aggregates in base and imported in the surface
    - Problem with stress intensity noted
    - Two lift paving equipment built
US EXPERIENCE IN TWO LIFT PAVEMENT CONSTRUCTION

- 1906 – Granitoid concrete patent
- 1950-1990 – Interstate mesh pavement

US CONSTRUCTION EXPERIENCE

  - Iowa, North Dakota, Florida, Kansas, Michigan
  - Wet on wet construction
  - Use of recycled materials in base layer
  - Capping of base layer
  - Use of econocrete in base layer
  - Use of durable aggregates in surface or employment of exposed aggregate surfaces for noise/durability
  - All in service yet today.
**US PROJECT CHARACTERISTICS**

- Facility – street, road, interstate
- Lower lift – gravel or poor limestone
- Width – 24 to 36 feet
- Load transfer – some
- Panel size – 15 or 20 feet
- ADT > 4,800
- Paving method – slipform and/or forms
- Time between lifts – 30-60 minutes minimum

**CONSTRUCTION INDUSTRY CONCERNS**

- Extra equipment – plants, placers, pavers
- Definition of low quality layer – strength, durability, cost, etc.?
- Construction - site management, trucks
- Thermo coefficient differences between lift materials
**BENEFITS IDENTIFIED**

- Construction material conservation/recycling
- Materials cost savings?
- Improved surfaces
- Recyclable surface layers

**RESEARCH NEEDS IDENTIFIED**

**BASE LIFT**

- Material specifications
  - Lower (base) lift – durability, strength, gradations, recycled material limits, admixture requirements, design depths
- Base Lift Construction guidelines
  - Placement methods and equipment
  - Compaction methods and equipment
**RESEARCH NEEDS IDENTIFIED**

**SURFACE LIFT**

- **Material specifications**
  - Surface lift – strength, durability, friction, noise and splash characteristics, admixture requirements
  - Design depths and cap or no cap

**Surface Lift Construction guidelines**

- Time between lift placement (min and max)
- Need for jointing details and placement
- Bonding need, amount and method of inducing
- Concrete placement methods and equipment

**DEMONSTRATION PROJECTS**

- Think life cycle in this process
  - How will you rehabilitate this surface in the future?
  - Balance cost of imported surface materials against the savings in local cost for the base layer

Involve the construction industry in the decisions

- Aggregate /material suppliers - material availability, compatibility and goal characteristics
- Contractors/equipment suppliers – set the goal and let them give you ideas on the methods
- Learn from partnering
**TWO LIFT OPPORTUNITIES IN IOWA**

- Pav’t type  PCI<50
  - ACC  252
  - PCC  866
  - Composite  845
  - Total  1963 miles

* Realistic goal – 5% or 500 miles