CPTP

- Presentation is part of FHWA’s concrete Pavement Technology Program implementation efforts
  - Presenting Best Practices for Concrete Pavement Design, Construction & Repair/Rehabilitation
  - Goal – Safe, smooth and durable concrete pavements for the Federal-Aid highway system

Outline

- Precast Paving Concepts
- Current Precast Paving Activities
- Precast Pavement Systems (AASHTO TIG)
- Precast Prestressed Concrete Pavement (PPCP)
  - Concept
  - Demo Projects
  - Guidelines
- Future Directions

Precast Pavement Concepts

- Individual panel repairs – plain concrete panels
  - Full-depth full panel replacement
- Project level rehab (longer length/larger area) - for existing AC or PCC
  - Conventional panels
  - Prestressed panels – fewer active joints

Individual Panel Repair

Project Level Rehabilitation

- Highway sections
- High volume ramps
- Toll plazas
- Urban intersections
- Airport aprons/taxiways
Current Activities

- ACI 325 Task Force
  - Preparing a State of Practice document (Sam Tyson)
- PCI committee on Precast Pavement
  - Developing Guidelines (Dave Merritt)
- AASHTO TIG on Precast Pavement
  - Developing implementation package (Tim LaCoss, FHWA, Albany)

Current Activities

- CPTP demos (PPCP)
  - Iowa bridge approach slabs (2007?)
  - Indiana, Texas (possible demos)
  - Florida – possible intersection
- Ontario, MNDOT, Caltrans – continuing evaluation
- PANY&NJ – evaluating airport & highway applications
- Fort Miller – several active production projects

AASHTO TIG on Precast Pavement

- To promote use of Precast Concrete Pavements for new construction, rehabilitation, and repairs
- First TIG meeting in New York, Sept. 06
- TIG Products & Services
  - AASHTO TIG website
  - Generic precast pavement design & construction guidelines
  - Workshops
  - Lead states member presentations

Full-depth/Full slab repairs

- Single slab method (FHWA CPTP developed)
- Uretek USA method
- Super-Slab (Fort Miller)
- Kwik Slab

Rehabilitation/reconstruction

- Precast prestressed method (FHWA CPTP developed)
- Super-Slab (Fort Miller)
- Uretek USA method
- Kwik Slab

Precast Prestressed Pavement

(FHWA CPTP Task 58)

Developer/Project Manager:
David Merritt, The Transtec Group

Typical Design Details

- 2-lane wide plus shoulders
- Panel size: up to 36 ft wide, 10 ft long, t ~ 8 in.
- Panel types:
  - Base, joint & central stressing panels (original)
  - Base & joint stressing panels (Missouri)
- Tongue & groove transverse epoxied joint
- Expansion joints @ ~ 250 ft
- AC base
  - Poly sheet over AC base
- Prestress force – residual prestress at mid-point
**Overall Process**

- Fabricating precast panels at plant
  - Controlled process
  - Better quality control, better durability
- Transporting panels to the site
  - Need sufficient no. of trucks
- Removal of old pavement/preparing base
  - Or, place as an overlay
- Installing panels on finished base
  - Over a pre-placed poly sheet

<table>
<thead>
<tr>
<th>Overall Process</th>
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<tr>
<td>1. Interconnecting panels</td>
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<td>2. Post-tensioning panels</td>
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<td>3. Grouting post-tensioning ducts</td>
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<td>4. Injecting bedding grout to firmly seat panels</td>
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**Precast Panels**

- Ducts for Post-tensioning
- Continuous Shear Key
- Pretensioning Strands

**Panel Assembly**

- Joint Panel (Multiple)
- Base Panel (Multiple)
- C.S. Panel
- Base Panel (Multiple)
- Joint Panel

**Panel Assembly**

- Once post-tensioned, pavement behaves like a conventional prestressed pavement
**Benefits of Precast Prestressed Concrete Pavement**

- Speed
- Durability
- Thinner slabs (8 in. PPCP vs. 12 to 14 in. JPCP)
- Longer construction season
- Existing technology & established industry procedures

Get in, do it right, get out, and stay out

**Demo Projects**

- Pilot – Frontage Road, Austin, Texas – 2001
  - 2,300 ft, 2 lanes plus shoulders
- Demos
  - 2004 – California – I-10 (Night-time) - ~ 500 ft
  - 2005 – Missouri – I-57 (Rehab) – 1,000 ft
  - 2006 – Iowa – Bridge approach slab
  - 2007 – Florida – Intersection (proposed)

**Precast Prestressed Concrete Pavement Missouri I-57 Demonstration Near Sikeston - December 2005**

- **Project Length:** 1,000 ft (2 lanes plus shoulders)
- **Panel Dimensions:** 10 by 38 ft with t of 5.75 to 11 in.
- **No. of panels:** 100
- **No. of post-tensioned sections:** 4 @ 250'
- **Installation Rate:** 12 panels/6 hours
- **Features:**
  - Pavement crown cast into the panel surface.
  - Non-continuous keyways between panels

**Missouri I-57 Precast Panels – Fabrication in Memphis, TN**
Plant site storage

Installation & Prestressing

Delivery from Memphis to Sikeston site

I-57 Missouri Completed Section

Sheldon, Iowa

PPCP anchored to integral abutment of new bridge

Project Length: ~160 ft (2 approach slabs)
Panels: 14’ x 20’ x 12” (typical); No. of panels used: 16
No. of slabs: 2 @ ~ 80’ long x 24’ wide
Features: 2-way post-tensioned partial width panels

Summary of PPCP Activities

Fabricate – Stockpile – Deliver & Install

Fabricate

Stockpile

Deliver & Install

General Guidelines

- Candidate projects
  - Any new or rehabilitation project that cannot have extended lane closures
  - Initial cost is not a criterion
- Design
  - Thickness about 7 to 8 in.
  - Expansion joints at 250 to 300 ft
  - Needs a well-finished AC base or existing ACP or PCCP with AC interlayer

Candidate projects

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General Guidelines

- Construction
  - Conventional concrete mixtures
  - Nearby precast plant
  - Site access necessary – to accommodate large no. of delivery trucks
  - Site access for heavy-duty crane
  - Construction not affected by weather

Future Directions

- FHWA demo program will continue – several demo projects are under discussion for 2007 and 2008
- As there is more use and more experience and competition, construction costs are expected to be competitive compared to other alternatives

Summary

- Precast prestressed paving technology has improved
- Construction is feasible under traffic conditions
- Rapid re-opening to traffic is possible
  
  A technology whose time has come!!!

Questions??

For additional information, contact:
Dave Merritt (The Transtec Group)
Sam Tyson (FHWA)
Shiraz Tayabji (CTLGroup)