Overnight Reconstruction of Concrete Pavements

Presented by
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ACPA- Southeast Chapter
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Why Overnight?
- Expedite construction
- Ease work zone congestion
- Speed final opening to public traffic

GEORGIA CASE STUDIES
- I-75 LANE REPLACEMENT
- SR 316 LANE REPLACEMENT

Interstate Reconstruction
I-75 Lane Replacement (2003)

Scope of Project
- Removal and Replacement of outside lane with Concrete Pavement.
- Full Depth and Partial Depth Patching on the middle lane
- Diamond Grinding of all 3 lanes
- Reconstruction of outside shoulder
**Existing Slabs**

- No Dowels
- 10 inch thick
- Joint spacing 30 feet
- Base: Soil Aggregate (Sand-Clay) with top three inches bituminous stabilized.

**New Slabs**

- Thickness 10 ½ - 11 inches (Payment by CY as measured in place)
- Maximum Joint Spacing 15 feet
- Dowel Bars
- Structural Welded Wire Reinforcing Grade 80 equivalent to #5 Rebar @ 12” centers
- Strength of concrete 2500 psi in 24 hours
- 3500 psi in three days.

**Traffic**

- I - 75
  - From SR-49 to Hartley Bridge Road
    - ADT is 73,000 and 19% trucks (7000 trucks one way)
    - From SR-96 To SR-49
      - ADT is 53,800 and 24% Trucks (6500 trucks one way)
  - ESAL’s ----------- 5.0 million/year +/-

**Nightly Schedule**

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**I-75 Outside Lane Replacement**
8:30 pm Remove Existing Slabs

Remove Existing Slabs

Dowel Bars & Chairs for Steel Mat

Steel Mat in Place

Slip-Forming Concrete

Finishing Concrete
10 am Next Day Open to Traffic

Large Construction Force

- APAC-Ballenger had 75 people on the project
- Costello did the sawing, removal and spot patching and they had 25 personnel
- Lots of equipment and people in a small area (400 feet long); with a large amount of activity going on in a short time.

Recycled Slabs

Crushed & to be Reused in Shoulder Base

Production Rates

- Achieved up to ½ mile per night (1,000 to 1,200 CY)
- Averaged about 1,500 LF per night (600 CY)

Unit Prices

- New PCC Pvmnt------$188.00/CY* ($55 SY)
- Removal of Conc. Pvmnt------$13.22/SY
- Diamond Grinding----------$1.95/SY

* Field Measured  Reduces risk and therefore gets lower price to state.
Summary
Replaced PCCP with PCCP

- I-75 Peach, Crawford, & Bibb Co.’s, GA
  - Replacement of 20.1 Lane Miles in 11 Paving Weeks
  - Limited Nighttime Work Hours, Open to Traffic Each Day
  - Six Hours Cure Time on Last Concrete Placed each Night

Urban Concrete Pavement Rehabilitation

PROJECT DETAILS

- PROJECT LENGTH:
  - 5.7 miles
- PAVEMENT:
  - 9 INCH PCC+6 INCH LCB
- TRAFFIC:
  - ADT 68,000, 30% TRUCKS
- PCC LANE REMOVAL AND REPLACEMENT:
  - 33,000 SY, (PROJECT TOTAL 56,000 SY)
  - 3.55 MILES ONE LANE, ONE DIRECTION

PROJECT DETAILS

- LANE CLOSURE TIME:
  - SU-THU 9:00PM TO 5:00AM
    - PENALTY $1000/HR
- CONSTRUCTION TIME:
  - 22 NIGHTS OVER A 6 WEEK PERIOD
  - AVG. 1000FT/NIGHT - HIGH 1400FT
- COST:
  - REMOVE $35 SQ.YD
  - REPLACE $68 SQ.YD (9 INCH)

PROJECT DETAILS

CONSTRUCTION SEQUENCE
- PLACE LANE CLOSURE STARTING AT 9:00PM
- REMOVE OLD PCC
- PLACE DOWEL BASKETS
- PLACE AND FINISH NEW PCC
- GREEN SAW JOINTS
- FINISH PLACING CONCRETE BY 1:00AM
- PRE-SAW AHEAD IN OLD PCC FOR REMOVAL
- OPEN TO TRAFFIC BY 5:00AM
Concrete Mix

- Cement content: 752 lbs per CY
- No. 57 stone CA/FA 64%/36%
- Non-Chloride Accelerator
- Compressive Strength: 2500 psi in 24 hours
- Air: Target of 5%
- Slump: Target of 1.5 inches
- Max. W/C ratio: 0.45

Opening to Traffic Specification Language

- Schedule slab replacements so that the concrete will have a curing time of at least four hours.
- The Engineer may require a longer curing period, mix design adjustments, or other corrective action to ensure sufficient concrete strength development before opening to traffic.

Opening to Traffic Specification Language

- Until final acceptance of this work, replace damaged or broken slabs ---
  - Improper or Unsatisfactory methods, equipment, or materials
  - Construction or Public Traffic
- Replace slabs at NO additional cost to the Department

Strength at Opening to Traffic

- About 1200 to 1500 psi based on limited maturity testing
Summary of Findings from FL Study

Based on the limited test results from this study, it appears that for a 9 inch slab placed on a strong foundation (asphalt base used in this study) and a maximum temperature differential of +10°F in the concrete slab, a minimum required compressive strength of 1100 psi to 1600 psi for the concrete at the time of applications of traffic loads may be adequate.

Summary of Benefits for Fast-Track

- Concrete pavement is feasible for all types of projects
- Expedite construction operations
- Reduce work zone congestion
- Allow residents and business people access to pavement quicker than normal
- Useful for all traffic conditions

QUESTIONS OR COMMENTS