Rapid Lane Replacement
I-40 Concrete Rehab. Project, Forsyth Co, NC

The Lane Construction Corporation
James Seybert, Project Director,
David Chaparro, Area Project Engineer

we build value
Project Overview

- Express Design-Build Project
- 37,000 SY (5.25 Lane-Miles) of Concrete Pavement Replacement along I-40 in Forsyth Co – NC
- 94,500 SY of Concrete Diamond Grinding

Project Availability:

- Weeknights 7 pm to 5 am
- Weekends without local events (Football games, Bowman Gray Races, Fair, etc)
Project Overview

Restrictions:

• No permanent lane closures allowed. All lanes open by the end of the work shift, or by Monday at 5:00 am if working on weekend.

• Flexural strength of 400 psi prior to opening to traffic
Project Overview
Existing Road Conditions:
I-40 Concrete Rehab. Project, Forsyth Co, NC
Project Challenges:

- Reduced window for slab replacement
- Challenges with “Hot” concrete mixes
- Unforeseen site conditions (undercuts, existing concrete thickness)
- Limited work spaces
- Dynamic work schedules
- Local events restrictions and stakeholders
- Managing resources (availability of qualified personnel)
Project Challenges:

- High volume and high speed traffic both on I-40 and US 52
- Slurry Management
- Night work
Overall Construction Strategy:

Weekdays:

- 10 hour window for replacement
- Target replacement: 90 CY (1,080 SY)
- Target areas: Ramps and loops (minimum traffic control)
- Use of volumetric concrete
- Concrete mix: 400 psi flexural at 4 hours
Overall Construction Strategy:

Weekdays (sequence of work):

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<th>Task</th>
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I-40 Concrete Rehab. Project, Forsyth Co, NC
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Overall Construction Strategy:

Weekends:

- “Marathon weekend” approach
- Target replacement: 1,200 CY (or volume needed to complete a specific area)
- Target Areas: Thru lanes on I-40
- Use of ready mix concrete
- Concrete mixes:
  - 400 psi flexural at 4 hours
  - 400 psi flexural at 12 hours
  - 400 psi flexural at 24 hours
Overall Construction Strategy:

Weekends (sequence of work):

<table>
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<tr>
<th>Task</th>
<th>3 nights before</th>
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Mix Designs Highlights

Volumetric Concrete:

- Rapid Set Cement (Hydraulic cement similar to Portland cement)
- High early strength
- Difficult to control workability
- Batch only the concrete needed. Little waste
- Larger Equipment
Volumetric Concrete:

- Average 7 day compressive strength: 4,932 psi
- Average 28 day compressive strength: 5,825 psi
Mix Designs Highlights
Ready Mix Concrete:

- Portland Cement
- High Early strength (24 Hr, 12 Hr, and 4 Hr mix)
- Early strength controlled with additives
- Can batch large quantities
- Increased workability
Ready Mix Concrete:

- Average 7 day compressive strength: 6,044 psi
- Average 28 day compressive strength: N/A
Ready Mix Concrete:

- Average 7 day compressive strength: 5,870 psi
- Average 28 day compressive strength: 7,575 psi
Issues and Special Situations:

it happens…
Issues and Special Situations:
Differing site conditions
Issues and Special Situations:
Differing site conditions
I-40 Concrete Rehab. Project, Forsyth Co, NC

Issues and Special Situations:

Undercuts
Issues and Special Situations:
Undercuts
Issues and Special Situations:
Loop Detectors
Issues and Special Situations:

Loop Detectors
Issues and Special Situations:
Curb and gutter replacement
Best Practices:

• Concrete Test Panel
  • Become familiar with the mixes ahead of time
• Concrete Mix and Testing Strategy
• Prep work ahead of concrete replacement
  • Layout
  • Concrete saw cut
  • Staging of materials
• Explore site conditions
  • Determine extent of removals ahead of time
  • Test subgrade ahead of time (coring)
Best Practices:

- Material in stock
  - ABC stone
- Have a plan B for everything
  - Quarry on call on weekends
  - Volumetric mix supplier on call
- Manage your resources
  - Clearly establish crew shifts
- Communication
  - Dynamic schedule
  - Clear line of communication 24h/7d
- Partnering with NCDOT