I-385 Rehabilitation

Laurens, SC

Tomorrow's High Performance Concrete Pavements, Today
Charlotte, NC
February 28, 2012

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History

- US 276 was converted to Interstate 385 in 1981
- No major rehabilitation had been performed on the project section of I-385 since that time
- ADT in 1981 – 1,400 vehicles/day
- ADT in 2009 – 20,000 vehicles/day
  - Mainly truck traffic

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Project Concept

- To widen, smooth, and upgrade the safety features of the existing asphalt section of I-385 as quickly, cost effectively and safely as possible.
- Many options were considered
- SCDOT selected for the 1st time in South Carolina's history to completely close a section of interstate, the Northbound lanes of I-385, within the project limits for the entire project duration
  - Estimated cost savings of approximately 34 million dollars
  - Estimated construction time reduction of 2+ years
- Restrictions!!!

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Project Overview

- Interstate rehabilitation of I-385 from the I-26/I-385 interchange at mile point 0, 14.6 miles to the north
- Demolition and reconstruction of the flyover bridge that connects I-26 Westbound to I-385 Northbound
- Placement of a 10” high strength concrete layer on I-385 Northbound and Southbound mainline and 4 interchanges
- Construction of an 8’ wide Roller Compacted Concrete mainline shoulder
- Improved safety features: guardrail, median cable rail

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Project Schedule

- Letting Date - August 11, 2009
- Notice to Proceed – October 26, 2009
- I-385 Northbound Lanes Closed – January 4, 2010
- Scheduled completion – August 15, 2010
  - $25,000/day early completion incentive
  - $50,000/day penalty for late completion

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November/December 2009

- Clearing/Grubbing/Earthwork

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CATERPILLAR
A022


Clinton

November/December 2009

- Clearing/Grubbing/Earthwork
- Erection of 2 onsite concrete batch plants @ Mile Point 9
  - Rexcon Logo 12 Central Mix Plant
    - 12 cy mixer
    - 300 cy/hr capacity
  - Rexcon Logo 10 Central Mix Plant
    - 10 cy mixer
    - 240 cy/hr capacity

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- Concrete/RCC Mix Designs

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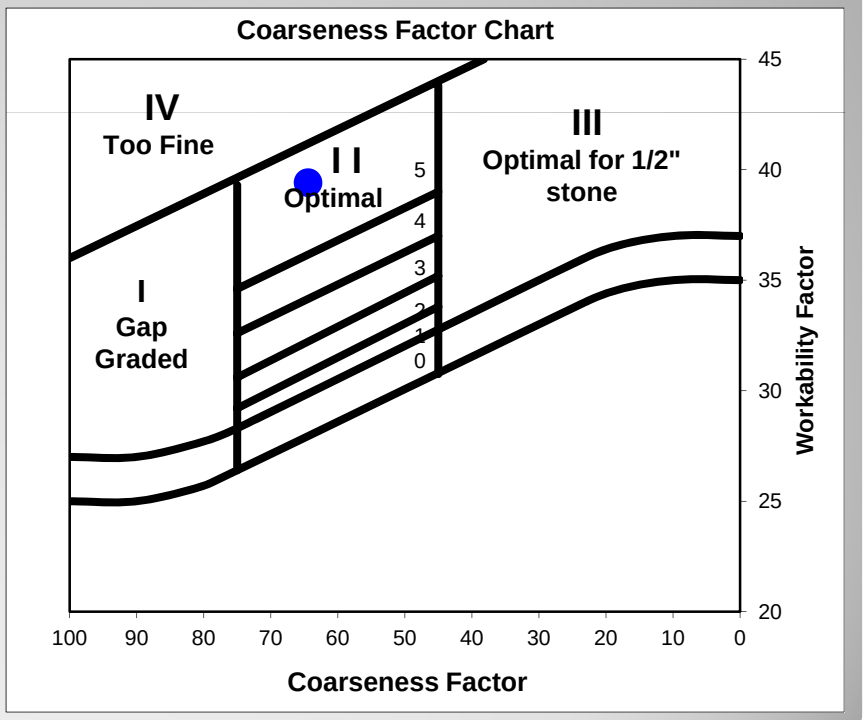
Concrete / RCC Mix Designs

- Specified Concrete Strength – 5500 psi @ 28 days
  - Raised from current SCDOT specification of 4000psi due to project constraints placed on the design concrete thickness
- Specified RCC Strength – 4000 psi @ 28 days
- 40+ trial batches performed
- Special Considerations



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January 4, 2010

- I-385 Northbound lanes were CLOSED
- Including all Northbound entrance/exit ramps

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I-26 Flyover Bridge

- Existing Bridge built in 1959
  - Demo complete in 4 days
- New structure
  - Raised 3 feet for better clearance on I-26
  - Longer and wider to give full width shoulders
  - Completely concrete
- Beams set by March 25th
- Deck poured by May 5th
- Approach slabs/barrier walls by May 31st
- Slope Paving by July 11th

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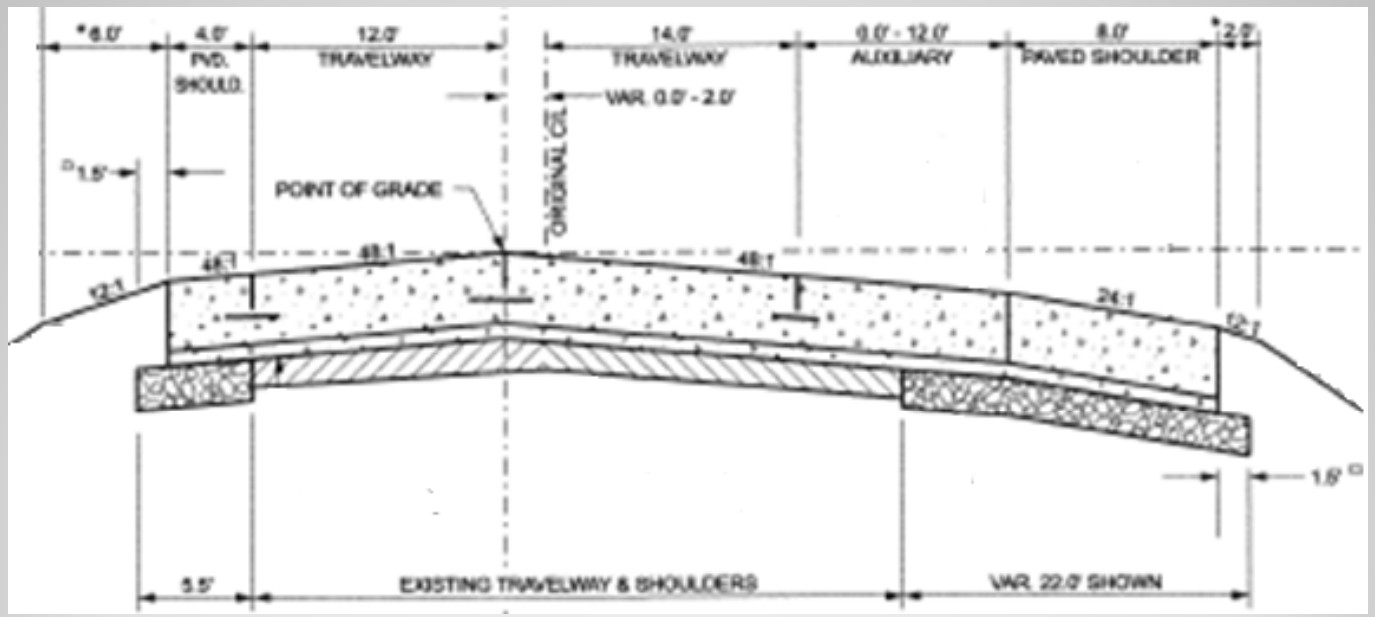
Roadway Typical Section

- Existing roadway –
  - 2, 12’ lanes, 8’ outside shoulder
- New roadway –
  - 4’ inside shoulder, 12’ lane, 14’ lane, 8’ outside shoulder



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Subbase Work

- Variable depth milling
  - 250,000 SY completed in 3 days
- Asphalt base widening
  - NB lanes completed in 8 days

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Concrete Pavement Requirements

- Thickness
  - 10”
  - -1/4” tolerance before penalty
- Joint spacing
  - Transverse Doweled Joint – 15’
  - Longitudinal Tied Joints – 15’
- Acceptance Strength
  - 5500 psi @ 28 days
  - 6 cylinders every 500cy for testing
- Early Opening Strength
  - 2500 psi – Field Cured
- Surface Texture
  - Full diamond grind
- Rideability
  - IRI < 70 for 100% pay

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Mainline Concrete Paving

- First day of placement on NB I-385 – January 19, 2010
- Equipment Used
  - Concrete Paver – Guntert & Zimmerman S850
    - Compact Dowel Bar Inserter
    - Leica Stringless Guidance System

  - Texture Cure Machine – Gomaco TC 600

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G&Z S850 w/CDBI & Stringless Guidance

- Increased efficiency
  - Project schedule didn't allow enough time
    - For manufacture or installation of conventional dowel basket assemblies
    - For survey and setting of a conventional stringline
- Job site conditions
  - Project footprint did not allow for construction of a haulroad for concrete trucks
  - Survey would be in the way
- Lower cost
- Excellent results

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MIT Scanner

- Magnetic Imaging Topography used to ensure dowel bar position accuracy
- 5,000+ joint scans performed

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MIT Scanner

- Magnetic Imaging Topography used to ensure dowel bar position accuracy by the dowel bar inserter
- 5,000+ joint scans preformed
- Dowel bars evaluated for side shift, depth, vertical and horizontal displacement
- Joint Scores
  - <10 OK
  - >10 Joint considered locked

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NB I-385 Concrete Paving

- Paved 30' wide - 26' Mainline and 4' inside shoulder together
- Mainline complete in 32 working days
  - Average 6,970 SY/day or 2,000 cy/day
- 8 ramps w/concrete shoulders and gores complete in 26 days
- Challenges!!!
  - Cold temperatures
  - 3 snowstorms
  - 2 – 25 yr rain events
  - Wettest winter in 26 years

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NB I-385 Roller Compacted Concrete

- Roller Compacted Concrete used on 8’ outside shoulder
- Equipment Used
  - Wirtgen Vogele Super 3000 paver w/ a high density screed
  - Terex MTP 4004 or Gomaco RTP 500 belt placer
- Placed in 2 lifts for a total thickness of 10”+
- RCC mixed in central mix batch plant
- Average production of 2200 LF/day
- Average IRI – 196 in/mile

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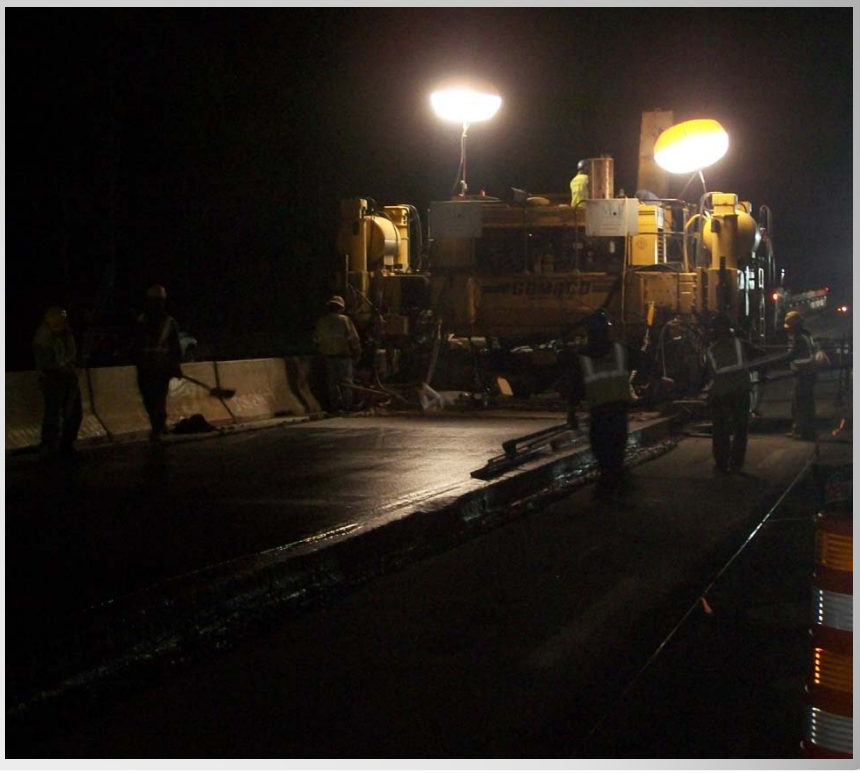
Project Staging

- Concrete work occurred on NB and SB I-385 simultaneously in order to facilitate building of asphalt crossovers for the major project traffic switch and to keep traffic flowing to Wal-Mart Distribution Center
- SB staged work done under traffic with permanent one lane closures
- Lanes were poured individually
- Tight quarters and minimal trackline



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May 5, 2010

- Southbound I-385 traffic was diverted through the median at the north end of the project from the Southbound lanes to the Northbound lanes where they continued to travel south
- All exits within the project limits were closed with the exception of exit 9, Hwy 221
- Traffic diverted back to SB lanes one mile north of I-385/I-26 intersection

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SB I-385 Concrete Paving

- Mainline complete in 21 working days
  - Average 10,400 SY/day or 2900 cy/day
  - May 22, 2010 – paved 5,376 ft
- SB ramps w/concrete shoulders and gores completed with crews working day and night
- Last day of concrete – July 7, 2010

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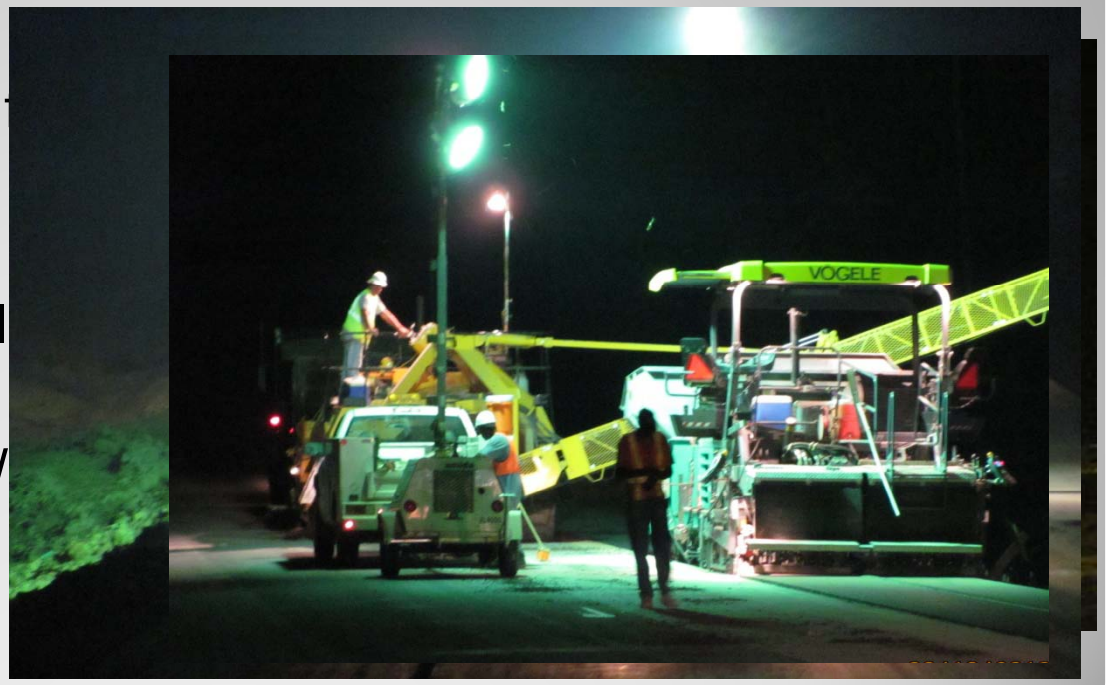
SB I-385 Roller Compacted Concrete

- Roller Compacted Concrete used on 8’ outside shoulder
- All work completed at night
- Average production o
  3900 LF/day
- Produced in a Pugmill
- Average IRI – 132 in/



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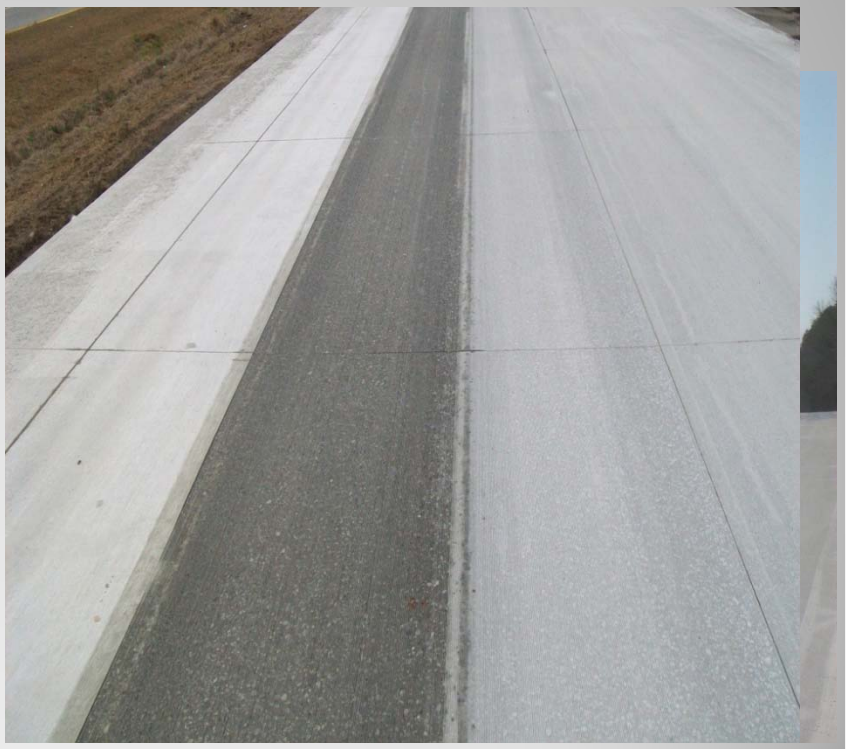
Diamond Grinding

- Specified Final surface texture for increased skid resistance and maximum smoothness
- Performed on all travel lanes and ramps
- All slurry collected in tankers
- 6 grinders on site at once
- Very fast and efficient
- Aided in lower rideability numbers as much as 30 points



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July 23, 2010

- I-385 NB reopened to traffic for first time in 8 months
- Ribbon Cutting Ceremony to honor the participants
- Project considered substantially complete
- 24 days ahead of schedule

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Project Statistics

- 180 acres of clearing/grubbing
- 300,000 CY of earth excavation
- 1- 330’ long flyover bridge
- 680,000 SY of asphalt milling
- 75,000 tons of asphalt
- 600,000 SY of concrete pavement
- 120,000 SY of roller compacted concrete pavement
- 525,000 SY of diamond grinding
- 900,000+ LF of joint sawing and sealing
- 55,000 LF of new guardrail
- 70,000 LF of new median cable barrier rail
- 400 acres of permanent grassing

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Project Accomplishments

- #5 – Top 10 Roads in 2010, Roads and Bridges Magazine
- 2010 ACPA National Paving Award, Silver Category
- AASTHO – American Transportation Award
- 2010 Erosion Control Project of the Year, Stormwater Solutions
- Nominated for 2011 National Partnership for Highway Quality (NPHQ) National Achievement Award.

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NOW
OPEN

QUESTIONS????

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