Virginia Concrete Conference
Lessons Learned

March 9-10, 2006

Coliseum Central Highway Improvement Project (CCHIP),
Interstate 64 @ Mercury Blvd.

by

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2.5 miles I-64 –
  avg 10 lanes wide,
  - 26.5 lane miles Mainline
  - 3.8 lane miles Ramps, Loops, Flyovers
  - 4.8 lane miles Mercury and Magruder Blvds.
  - 35.1 total lane miles

170,000 ADT on I-64
66,000 ADT on Mercury Blvd
I-64 Coliseum Central Challenges

ISSUE

1. Design Flaws

2. Contract Specification Omissions

3. Contractor Means and Method

4. No field decision-making authority for VDOT
One Lane @ 10’-0”

One Lane @ 10’-3”
<table>
<thead>
<tr>
<th>Material</th>
<th>Thickness</th>
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<tbody>
<tr>
<td>Concrete</td>
<td>11 inches (275mm)</td>
</tr>
<tr>
<td>OGDL</td>
<td>3 inches (75mm)</td>
</tr>
<tr>
<td>CTA</td>
<td>6 inches (150 mm)</td>
</tr>
<tr>
<td>Subgrade</td>
<td></td>
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</tbody>
</table>
Spec Book Tolerances

Concrete  Up to 1 inch short = $ penalty
OGDL     -0.6 in. < t filled w/ next layer; no $
CTA      -1 in < t < +1 in
Subgrade +/- 0.4 inches (10mm)
As Constructed

Concrete  Up to 1 inch short = $ penalty
OGDL  -0.6 in. < t filled w/ next; layer no $
CTA  -1 in < t < +1 in
Subgrade  +/- 0.4 inches (10mm)

Finish Grade = net but elev. of rebar = ?

Plan Dimensioned
5 ¼ +/− ½

4.5 in. chair
From Inspector’s View?

Everything Is Within Tolerance
Is Everything Okay?

From Designer’s View?

From Contractor’s View?
Once this happens, “how wide spread and how severe?” is the question.
Cores (initial depth checks)

Crack Behavior

– Pre-Traffic
  • Transverse Cracks 3 Feet to 8 Feet Apart
  • Very Tight

– After Traffic Loading
  • Additional Transverse Cracks
  • Still 3 Feet to 8 Feet Apart
  • Still Very Tight

How do you know before this?
Utilization of Available Technology

- Immediate Safety Concern
  - Under Traffic
  - Limited View from Two Lanes Away
- VDOT Video Logger
- Technician Review of “footage”
- Quick Review of Pavement w/o Interruption of Traffic
Non Destructive Testing

Falling Weight Deflectometer (FWD)
Non Destructive Testing

Falling Weight Deflectometer

Loading Wheel Contact Area

Sensor

12 in.

12 in.

12 in.

12 in.

12 in.

12 in.
Program of Testing

• FWD – Non-destructive Testing
• Testing Spacing Every 50 feet
  – Approximately 2 minutes per location
  – +/- 2 lane miles per night
• Coordinated with Inspector
  – Starting Location to Match a Station
  – Tracking/Mapping of Areas Tested
• FWD – Deflection Bowl Calculations
• Test Results Identify Potential Weaknesses
  – Measures Deflections and Can Calculate Deflections per Layer
  – Results Provide Limited Areas to Review
• Review Crack Pattern and Core
SAMPLE CORES

Some Good

Some Not

So Good
Designers, Material Engineers

Evaluation

– What Do Adjacent Crack Patterns Tell Us?
– Would The Cure Be Worse?
• Walked Approx. 6 lanes 2.5 mi
• FWD tested approx. 25 lane mi
• Identified 150 locations of Interest
• Cored Initial 100% (30 locations)
• Cored Approx. 40% (40+- Locs.)
• Contractor Replacing Approx. 20
some areas did not meet spec, but were not replaced because patched section would be weaker
<table>
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<tr>
<th>ISSUE</th>
<th>SOLUTION</th>
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<tbody>
<tr>
<td>1. Design Flaws</td>
<td>1. Hired District Preliminary Engineer for cradle-to-grave engineering; hired a QA/QC group; holding designers accountable</td>
</tr>
<tr>
<td>2. Contract Specification Omissions</td>
<td>2. Worked with contractor to define acceptable “industry standard” for concrete tolerance</td>
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<tr>
<td>3. Contractor Means and Method</td>
<td>3. Worked with contractor’s available equipment and construction methods</td>
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<td>4. No field decision-making authority for VDOT</td>
<td>4. Returned project management to project level (decentralized from Richmond); designated authority to on-site Professional Engineer</td>
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Future Considerations

- Performance Spec/Long Term Bond
- Test Strips (200-400 feet)
- Change in Drainage Layer OGDL to BM25 or Other Mat’l
- Change in Rebar Chairs
- Concrete Mix
- Survey Line Required For Drainage Layer