Recent Innovations in Jointed Precast Concrete Pavement Systems

ACI Spring Convention, Milwaukee, WI
April 17, 2016

The Fort Miller Co., Inc.

Peter J. Smith, P.E.

VP Market Development and Product Engineering
Minimize Structural Effect of Slots – Make them Smaller!

- Reduces potential for cracking along slots
- Minimizes Grout
- Leaves more concrete over the slots
- More room for reinforcement over slots (and dowels)
Lowered Dowels – Smaller Slots

Old Standard
Slot Height = “T”/2 + 1.25”

New Standard
5 – ½” High Slots
(All Panel Thicknesses)

More Concrete and Steel Over Slots
Shorter Dowels – Shorter Slots

Old Standard – 18” Long Dowels

New “Trend” – 14” Long Dowels
Shorter (Headed) Tie Bars – Smaller Slots

Old Standard – 18” Long (19” Long Slots)

New “Trend” (Standard) 7” Long Headed Tie Bars (8” Long Slots)
Complex Bridge Approach Slabs

Skewed and Warped Panels

Haunched & Notched on Top for Bridge Joint

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New Products – Removable Dowels and Tie Bars

Super-Dowels

Removable-Replaceable Tie Bars
Removable Super-Dowels and Tie Bars Enables:

- Removable/Replaceable Urban Pavement (RUP)
  - For utility-intensive arterials and city streets
- Smart Patching
  - Incremental addition to precast pavement
Conventional Repair Over Utility Cuts
– Cut Anywhere – Repair with Anything!

First Avenue, NY City, (Manhattan) NY

Cross Bronx Off-Ramp, NY City, (Bronx) NY

Non-durable materials – no load transfer – poor workmanship
New Method – Use RUP – Cut Dowels and Remove Panels As Needed

Remove As Needed

Clean Up Removed Panels
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Restore Remaining Half Dowels and Tie Bars and Replace Cleaned-Up Panel

Extracting Half Dowel

Replacing Cleaned-Up Panels

Restores Esthetics and Functionality of Original Pavement

Restoring Tie Bars
Van Sinderen Avenue Preliminary Slab Layout Drawing

167 Slabs, 75 flat, 76 non-planar (1 – ¾” max.)
Van Sinderen Avenue Street View

Looking North (Subway Station on Right)

Looking South (Bus Pad on Left)
“Smart Patching”
Adding to Previously-Placed Precast Panels – As Needed
(that will last another 35 years)
Smart Patching Schematic

Makes The Most of Original Concrete Pavement
– Restores it as Needed

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Precast Placed in 2015
Precast Placed in 2007
Super-Dowels Placed in 2015

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Present vs. New Method of Addition

Present Method

New Method

Saving per Eight Dowel Joint - $ 788.96 (New Method)
## I-95 Savings (in 2021) Using Smart Method

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>“Q”</th>
<th>UNIT</th>
<th>COST/SAVINGS</th>
<th>TOTAL COST/SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESTIMATED POTENTIAL COST OF DOWELS IN 2015 (3125 JOINTS)</td>
<td>25,000</td>
<td>EA</td>
<td>$ 10.30 (UP-CHARGE PER DOWEL)</td>
<td>$ 257,500 (C)</td>
</tr>
<tr>
<td>ASSUME 13.8% OF 3125 JOINTS = 462 JOINTS in seven years (2021)</td>
<td>431</td>
<td>EA</td>
<td>$ 788.96 (SAVINGS PER JOINT)</td>
<td>$ 340,042 (S)</td>
</tr>
<tr>
<td>ASSUME 25% OF 3125 JOINTS = 462 JOINTS in seven years (2021)</td>
<td>781</td>
<td>EA</td>
<td>$ 788.96 (SAVINGS PER JOINT)</td>
<td>$ 616,178 (S)</td>
</tr>
<tr>
<td>100% OF JOINTS OVER TIME = 3125 JOINTS (OVER TIME)</td>
<td>3125</td>
<td>EA</td>
<td>$ 788.96 (SAVINGS PER JOINT)</td>
<td>$ 2,465,500 (S)</td>
</tr>
</tbody>
</table>

PROPOSED THRUWAY EXTRA EXPENDITURE IN 2015 = $ 257,500
TOTAL POTENTIAL SAVINGS = $ 2,465,500 = 9,664 Lane Ft.
Full-Depth Replacement Asphalt Intersections

Farmers Blvd

Guy R. Brewer Blvd.

Rockaway Blvd., Queens, NY 2010
Hardening-Up Asphalt Pavement In Toronto – Pilot Project 2016

341,000 ADT
Highway 427

374,000 ADT
Highway 401

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Pilot Project – Un-bonded Precast In-Lays

Cross Section for Consideration

(For Rut Remediation and “Hardening-up” Asphalt Pavement)
Acid-Resistant Polymer Concrete Slabs

Mixing Polymer Concrete

Finished Slabs
(stainless steel dowels and rebar)
Weigh-In-Motion Panels – I-95
Manhattan, NY

Fabrication
Stainless Steel Reinforcing and Dowels

Installation (Overnight)

Plug and Play (Overnight)
Instrumented Precast Panels – Spring Valley, NY

Open Road Tolling

Shop-Installed Treadles

Future Applications
- Charging Panels
- Heated Panels
- Solar Generating Panels
Keys to Success
(Still More to Learn)

Good engineering
Open minds
Real partnering