Concrete Pavements in Virginia
Route 58 Open House
August 23, 2012
Mohamed Elfino, PE, PhD
Assistant Division Administrator
VDOT Materials Division
Overview

- Background
- Types of Concrete Pavements in Virginia
- How Route 58 Was Constructed?
- What Caused Distresses on Route 58?
- Virginia Experience with Bonded Concrete Overlay
- Current Dem for Unbonded Concrete Overlay
- Current CRCP Construction Features
- Lessons learned
Concrete Pavement Types in Virginia

- Jointed Plain, JPCP (15 - 20 ft Joint spacing, doweled or undoweled)
- Jointed Reinforced, JRCP (25 – 61.5 ft Joint Spacing, mostly doweled)
- Continuously Reinforced, CRCP (No working joints, no dowels)
What is CRCP?

Concrete pavement in which longitudinal reinforcing steel is continuous throughout the pavement length.
Transverse Reinforcement

Functions as:

- Tie bars across longitudinal joints
- Keeps potential longitudinal cracks held tight
- Supports longitudinal steel in place
CRCP Features

- Crack widths are controlled by continuous steel reinforcement
- Joint-related distresses are eliminated with absence of transverse contraction joints
- Provides smooth ride, long service-life
- Has become an optional pavement type for heavy traffic loads, high volume cases, with a low life cycle cost
CRCP Behavior - Crack Spacing

- Cracks begin to develop in the transverse direction
- Held tight by longitudinal reinforcing steel
- Cracks spacing 3.5-6 ft (Crack width < 0.040 in.)

Aerial View

Side View
How Route 58 was constructed?
Tying the longitudinal Steel in advance
Feeding the longitudinal Steel into the Tubes
Close up showing the Tubes
Delivering Concrete and Steel Depth check
Positioning the Longitudinal Steel
Positioning the Longitudinal Steel
Tube Feeding of Longitudinal Steel in CRCP
CRCP Paving I-64 in 1971
Placement of Tie-bars
Another System for Tube Feeding
Finished CRCP
What Distress May Result from the Tube Feeding System

- **High Steel** (spalling, rusting of steel due to inadequate cover)
- **Low Steel** (wider crack width, concrete acts as plain slab)
- **Inconsistent spacing** (erratic cracking)
Longitudinal Crack Due to High Steel
Close up High Steel On Route 58
Two Longitudinal Cracks and Punch out
High Steel as a Result of Tube Feeding System
High Steel Measurement
Drop Off at the Retrofitted Edgedarín Leading to Water Entry
CRCP in Good Condition On Route 58
Virginia Experience with Bonded Thin Concrete Overlay

- Route 13, Northampton County
  - 8 inches JPCP (20 joint spacing, undoweled) original construction 1965
  - 6 inches Select material as subbase
  - 3.5 inches bonded concrete overlay (1990)

- I 295, Henrico County
  - 8 inches CRCP, constructed 1979
  - 6 inches CTA subbase
  - 2 inches Bonded concrete overlay (1995)
Virginia Experience with Bonded Thin Concrete Overlay

I 85, Dinwiddie County

- 8 inches CRCP, constructed 1960’s
- 6 inches CTA subbase
- 4 inches bonded concrete overlay (1995)

Route 58, Southampton County

- 8 inches CRCP, constructed 1986-1988
- 6 inches CTA subbase
- 4 inches bonded Concrete overlay (2012)
Virginia Demo with Unbonded Concrete Overlay

- Today (2012)
- Route 58, Southampton County (first unbonded project in Virginia)
- Existing 8 inches CRCP, constructed 1986-1988
- 6 inches CTA subbase
- 7 inches unbonded jointed plain (6’x6’ panel), undoweled, concrete overlay
- One inches asphalt separation layer
Current CRCP Construction Features

- No Tube feeding is allowed
- Longitudinal steel on transverse steel and chairs
- Emphasis on consolidation
- Wider travel lane (14 ft)
- Use of OGDL
- Use edgedarins
Finishing CRCP
Open Graded Drainage Layer Balance Between Stability and Drainability
Working Edgedrain Outlet
Madison Heights By-pass
Madison Heights By-Pass
CRCP in Madison Heights, Virginia
Lessons Learned

- Familiarization with the unique CRCP aspects
- Refer to Project specifications, special provisions, Pavement Manual, standard drawings
- Most important: Steel placement & concrete consolidation
- Pay attention to construction joints & end anchorage details
- Recognition of effects of changes in ambient conditions
Thank You