Case Study
1994 CIR Project
Newport, Delaware
Topics to be Covered

- Project Introduction
- Why was CIR selected?
- Project Evaluation
- 15 Years Later
- Comparison with Mill/Patch/Overlay Project
- Ensuring Quality
Project Location

- An industrial Park in Newport, DE
- Serves more than 40 Businesses including
  - Trash Transfer Station
    - 300+ trash Trucks/per day/6 days a week
    - 30+ Trucks to the landfill
  - Concrete Plant
  - Warehouses
  - Manufacturing Plants
  - Crane Rental
Project Background

- In Spring 1994, the municipality rehabilitated one of the side streets
  - 4-inch Mill, Patch and Fill
  - Extensive base patching
  - Expensive

- In Summer 1994, the municipality was planning to do the same type of project to the main road into the industrial park in the Fall.
Project Background

- Pavement Distresses
  - Extensive Fatigue Cracking (HS - HE)
  - Significant Transverse Cracking (HS – ME)
  - Significant Raveling (MS/HS)
- Poor Cross-Slope
- Poor Drainage
- Curb repairs
Existing X-Section

Slope varied – 3 to 10%

4-6 inch of HMA
6+ inch of GABC

10 foot Widening

Original 22 foot Width

6-8 inch HMA
8+ inch GABC

Rutting and Depressions

Original Cross-Section
Project Background

- Concerned about the long-term performance of a “Patch/Mill/Fill” approach
  - There had been many repairs on the entrance road over the years
- However, a consultant was in the process of designing a patch/mill/fill project (June 1994)
Project Background

- Late Summer 1994 (August 1994), the Town Manager read an LTAP (T2 Center) Newsletter article about CIR and then attended CIR/FDR training course.
- Meeting to discuss the possibility of CIR.
- Steps to determine if it is a good candidate:
  - Test Pits
  - Utilities/Drainage/Curbs/Driveway Entrances
  - Geometry (Cross-slope and profile) issues
  - Construction Time – Concerned about interference with traffic
  - Costs
Prior to Overlay

Section View

Plan View

Area to be Patched
After Overlay

Section View

Plan View

More on this later
Results of Investigation

Test Pits

- Confirmed that adequate material existed for CIR

Other Identified Benefits

- Reshape the roadway easily with the CIR process
  - Time/Cost savings
- Greatly reduce the amount of patching
- Quick in-out – minimal disruption to businesses
- Utilize existing in-place materials
Existing and Proposed X-Section

- **Slope varied** - 3 to 10%
- 4-6 inch of HMA
- 6+ inch of GABC
- 10 foot Widening
- Original 22 foot Width
- Rutting and Depressions
- 6-8 inch HMA
- 8+ inch GABC

**Original Cross-Section**

- **Slope - 2%**
- 2 inches HMA
- 5 inches CIR
- 32 foot Width
Existing and Proposed X-Section

- **Fill**
- **Cut**

**Existing Cross-Section**

**Proposed Cross-Section**
Performance Specification

- Warranty Clause
  - 5 years “free of defects”
    - Minimal amount of low severity distresses allowed
  - Repairable Defects were defined
  - Required Repairs were defined

- Problems not covered by the warranty
  - Weak Subbase/Mositure/Overlay Issues
Why not 15 Year Warranty

Desired Performance

Threshold Level

Condition

5 Years

15 Years

20
Cost Comparison

Bid Prices (1994):

- **Traditional Thick Overlay**: $375,000
  - Deep Patching, Milling & 4 inch Overlay
  - Minimal Slope/Grade Correction

- **CIR/2” Overlay**: $230,000
  - 5 inch CIR Base & 2 inch Overlay
  - Significant Correction of Slope/Grade

Note: Does not include the cost of drainage and curb work
Current Condition

16 Years Later
The Good!!

For a 16-year old Road – Pretty darn Good
It’s Not all Perfect

A Few Spots with Distress
One Significant Issue

Serious Rutting Occurred Early On in Two Locations

A Subgrade Moisture Problem
Comparison

1994 Patch and Overlay

Side Street
Patch and Overlay Street

- Side Road in the Industrial Park
- Receives approximately 1/3 the traffic loading as the Main Road

- Pavement Structure
  - Slightly less asphalt
  - Similar aggregate base
  - Similar subgrade
Quality Control
Quality Product

- To attain Quality/Long-Term Performance
  - Field Testing
  - Geometric/Drainage Design
  - Pavement Design
  - Mix Design
  - In-depth Contract Documents
  - Thorough Inspection
    - Verifying Application Rates, Gradation, Depth, Density, Moisture, Weather, etc.
Specifications

- In-depth Specifications are Imperative

- Required for:
  - Competitive Bidding
    - Level playing field
  - Inspection
  - Enforcement
  - Conflict resolution
  - Legal document
Specifications

Different Approaches:

- Recipe/Method Specifications
- Performance Specifications
- Combination Specifications

Must be enforced !!!!!!
Remaining Streets in the Ind. Park

- The remaining streets did not have adequate HMA thickness for CIR

- Significant Aggregate Base
  - Granular material with minimal fines
  - Asphalt Emulsion Binder

- Rehabilitated in 2001 using FDR
After Construction
Last Week
9 Years Later
Thank You

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