

Perpetual Pavement Demonstration

September 12, 2007

Cedar Road
from Brainard Rd.
to Lander Rd.

Cuyahoga County Engineer's Presenters:

- ▶ Brian Driscoll, P.E. – Chief Highway Design Engineer
- ▶ Thomas Sotak, P.E. – Area Construction Engineer
- ▶ E. Todd Zima – Project Engineer

Project Overview

- ▶ Cedar Road Reconstruction and Widening
- ▶ From Brainard Rd. to Lander Rd.
- ▶ In the Cities of Lyndhurst, Mayfield Heights, and Pepper Pike

Project Overview

- ▶ Design and Construction Managed by the Cuyahoga County Engineer's Office
- ▶ Plans Prepared by DLZ
- ▶ Design Assistance Provided by Flexible Pavements of Ohio
- ▶ Contractor: Burton Scot Contractors, LLC
- ▶ Bid Amount: \$5,160,899.00

Project Overview

- ▶ Approximately 0.7 Miles of Full-Depth Full-Width “Perpetual Pavement” Between Brainard Rd. and Lander Rd.
- ▶ Some Composite Pavement West of Brainard
- ▶ Some Composite Pavement on Brainard
- ▶ Some Composite Pavement on Lander

Project Overview

- ▶ New Lane Configuration Varies and Isn't Really Important Here
- ▶ Project Also Includes:
 - Sanitary Sewer
 - Storm Sewers and Culverts
 - Sidewalk
 - Traffic Signals

Perpetual Pavement

- ▶ Let's Talk About How Perpetual Pavement Works!

Perpetual Pavement

► OK, Why Not Concrete Pavement?

Perpetual Pavement

- ▶ OK, Why Not Conventional Full-Depth Flexible Pavement?

Perpetual Pavement

- ▶ OK, We Decided to Use A Perpetual Pavement Design! What Next?

Perpetual Pavement

- ▶ DLZ Provided a Conventional Full-Depth Flexible Pavement Design
- ▶ Used All the Regular Parameters:
 - Current ADT (22676)
 - Design ADT (23421)
 - Trucks 5%
 - B:C Ratio 2:1
 - Directional Distribution (57% Eastbound)
 - Mr 7200 PSI (From Geotechnical Report)
 - CBR 6 (From Geotechnical Report)
 - G.I. 8 to 11 (From Geotechnical Report)

Perpetual Pavement

- ▶ Conventional Pavement Design (Cont.)
- ▶ Put all the Above in a Blender
- ▶ Or, Follow the Design Guidelines in Section 200 and 400 of the ODOT Pavement Design & Rehabilitation Manual

Perpetual Pavement

► Conventional Pavement Design (Cont.)

► The Result: Design Structural Number: 4.5

- 448 AC Surface $1.25'' \times 0.35 = 0.44$
- 448 AC Intermediate $1.75'' \times 0.35 = 0.61$
- 302 Bitum. Agg. Base $9'' \times 0.35 = 3.15$
- 304 Aggregate Base $6'' \times 0.14 = 0.84$
- Total Pavement Structure $18'' = 5.04$

Perpetual Pavement

- ▶ OK, Finally Let's Talk About Perpetual Pavement!
- ▶ We had DLZ Talk To Flexible Pavements of Ohio
- ▶ Flexible Pavements of Ohio Turned to Their Own Experts to Provide a Perpetual Pavement Design

Perpetual Pavement

- ▶ The Resulting Perpetual Pavement Design:
 - 1.5" 442 AC Surface Course, 12.5 mm Superpave Type A (446), PG 70-22M
 - 1.75" 442 AC Intermediate Course, 19mm Superpave Type A (446), PG 70-22M
 - 4.75" 302 Bit. Agg. Base, PG 64-22 Compacted to 93% Minimum Density
 - 4" 302 Bit. Agg. Base, PG 64-22 Designed at 3% Air Voids, Compacted to 94% Minimum Density
 - 6" 304 Aggregate Base
 - TOTAL PAVEMENT STRUCTURE = 18"

Cost Factors

- ▶ OK, Got It So Far?
- ▶ But Can I Afford the "Good Stuff"?
- ▶ Flexible Pavements of Ohio Estimated Perpetual Pavement to Be 10% More Than Conventional Full-Depth Flexible Pavement

Cost Factors

► Cost of Perpetual Pavement

▪ Item 442 1-1/2" Surface	\$121,680
▪ Item 407 Tack for Int.	\$ 1,864
▪ Item 442 1-3/4" Intermediate	\$131,040
▪ Item 407 Tack for Int.	\$ 1,864
▪ Item 302 4-3/4" 93% Min. Density	\$275,652
▪ Item 407 Tack	\$ 3,792
▪ Item 302 4" 3% Air, 94% Den.	\$232,035
▪ Item 408 Prime Coat	\$ 23,667
▪ Item 304 6" Agg. Base	\$167,998
▪ Item Spl. Geotextile Fabric	\$ 33,078
▪ Item 204 Subgrade Compaction	\$ 43,264
▪ TOTAL	\$1,035,934

Cost Factors

- ▶ Total Bid Price = \$5,160,899.00
- ▶ Total Cost of Perpetual Pavement = \$1,036,000.00*
- ▶ So a 10% Premium for Perpetual Pavement Means We Paid About \$100,000 More.
- ▶ $\$5,160,899 / \$5,060,899 = 102\%$
- ▶ Therefore, We Can Assume That We Paid a 2% Premium Over Total Cost of Project.

Cost Factors

► Just For Fun, Compare to Conventional Full-Depth Flexible

■ Item 448 1-1/4" Surface	\$ 92,040
■ Item 407 Tack for Int.	\$ 1,864
■ Item 448 1-3/4" Intermediate	\$114,660
■ Item 407 Tack for Int.	\$ 1,864
■ Item 302 9" Bit. Agg. Base	\$561,700 ***
■ Item 408 Prime Coat	\$ 23,667
■ Item 304 Agg. Base	\$167,998
■ Item Spl. Geotextile Fabric	\$ 33,078
■ Item 204 Subgrade Compaction	\$ 43,264
■ TOTAL	\$1,040,135

Cost Factors

- ▶ What About --- Gulp! --- CONCRETE??
- ▶ Our Minimum Thickness Would Be 10"
- ▶ Burton Scot Bid \$42.50 / sy for 9" RCP
- ▶ On Crocker-Stearns (10" RCP), Low Bidder = \$39.50 / sy
- ▶ Average of All Crocker-Stearns Bidders = \$47.00 / sy

Cost Factors

► Cost of Concrete

■ Item 451 10" RCP	\$1,055,808
■ Item 304 6" Agg. Base	\$ 167,993
■ Item Spl. Geotextile Fabric	\$ 33,078
■ Item 204 Subgrade Compaction	\$ 43,264
■ TOTAL	\$1,300,143

► $\$1,300,143 / \$1,035,934 = 125\%$

Construction Administration Concerns

- ▶ Thomas P. Sotak, P.E.
- ▶ Area Construction Engineer

Construction Administration Concerns

► Testing

- Plans Called for Item 302 Base Course To Be Placed With a Density Requirement
- County Had No Experience Testing for Density Due to Use of Item 448 on County Jobs
- Flexible Pavements of Ohio Suggested Use of ODOT SS 1055 for Both Base Courses and Intermediate / Surface Courses

Construction Administration Concerns

► Other Considerations

- Both Surface and Intermediate Courses Utilize PG 70-22M Binder
- Normal ODOT Specification (442.04) Calls for PG 64-22 Intermediate Course

Construction Administration Concerns

► Other Considerations (Cont.)

- Subgrade Preparation
- Utility Issues
- Maintenance of Traffic – Elevated Pavement Placement Temperatures

END
ROAD WORK

HER
Ice
Cool
So

