Maryland's Experience with Modified Asphalts

7th Annual Meeting

Feb. 13-15,2006

Orlando, Fla.

Larry L Michael
Consultant

Maryland's Experience with Modified Asphalts

- **History**
- **Performance**
- **Performance Graded Specification**
- **PG plus Specification**
- **Pavements Rehabilitation Strategies**
- **Maryland's Reasons for Using Modified Asphalts**

LLM

Maryland's Experience
with
Modified Asphalts

- **History**

LLM

Maryland's Experience
with
Modified Asphalts

History

Started Using Modified Binders in the late 1980's

LLM

Maryland's Experience
with
Modified Asphalts

History

Started Using Modified Binders in the late 1980's

1991 First Open Graded Mix with Modified Binder

LLM

Maryland's Experience
with
Modified Asphalts

History

Started Using Modified Binders in the late 1980's

1991 First Open Graded Mix with Modified Binder

1992 First SMA with Modified Binder

LLM

Maryland's Experience
with
Modified Asphalts

History

Started Using Modified Binders in the late 1980's

1991 First Open Graded Mix with Modified Binder

1992 First SMA with Modified Binder

1994 Intersection Project – HMA versus PCC

LLM

Maryland's Experience with Modified Asphalts

Performance

OGFC

I 495

Constructed 1991

AC 20 Modified

LLM

Maryland's Experience
with
Modified Asphalts

Performance

Intersection

August 1994
19 mm Dense Graded Surface
25 mm Dense Graded Base
AC 20 Modified (PG76-22)

Oct. 1998

LLM

Maryland's Experience with Modified Asphalts

Performance

LLM

LLM

Maryland's Experience with Modified Asphalts

Performance

LLM

Maryland's Experience with Modified Asphalts

Performance

SMA

I-695 SBL
Completed 09/1994
19.0 mm
AC-20 Modified

AADT – 170,000
Trucks – 19%

LLM

Maryland's Experience with Modified Asphalts

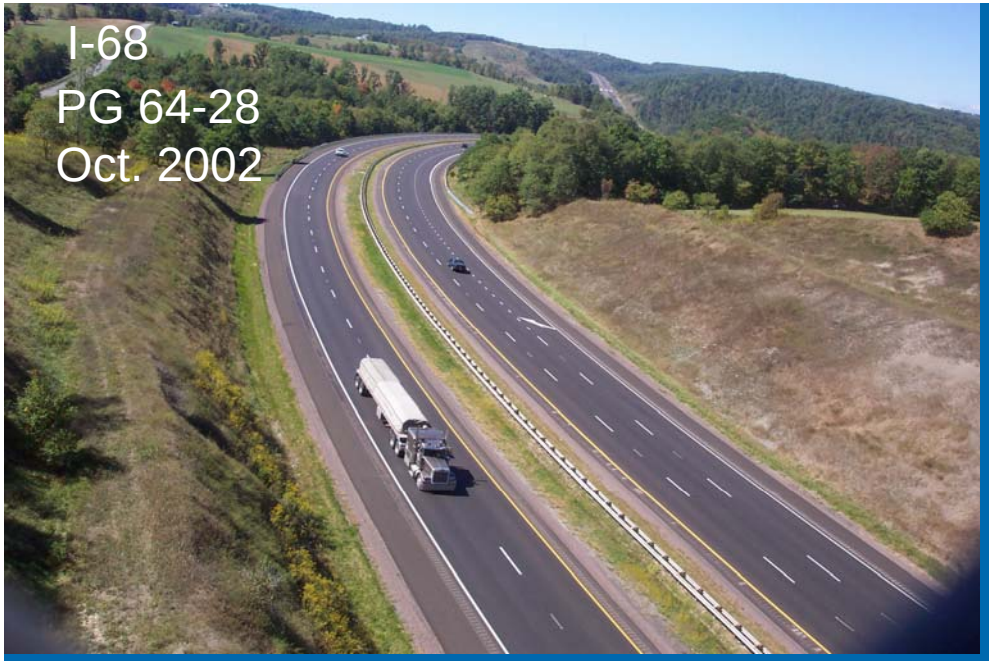
Performance

SMA

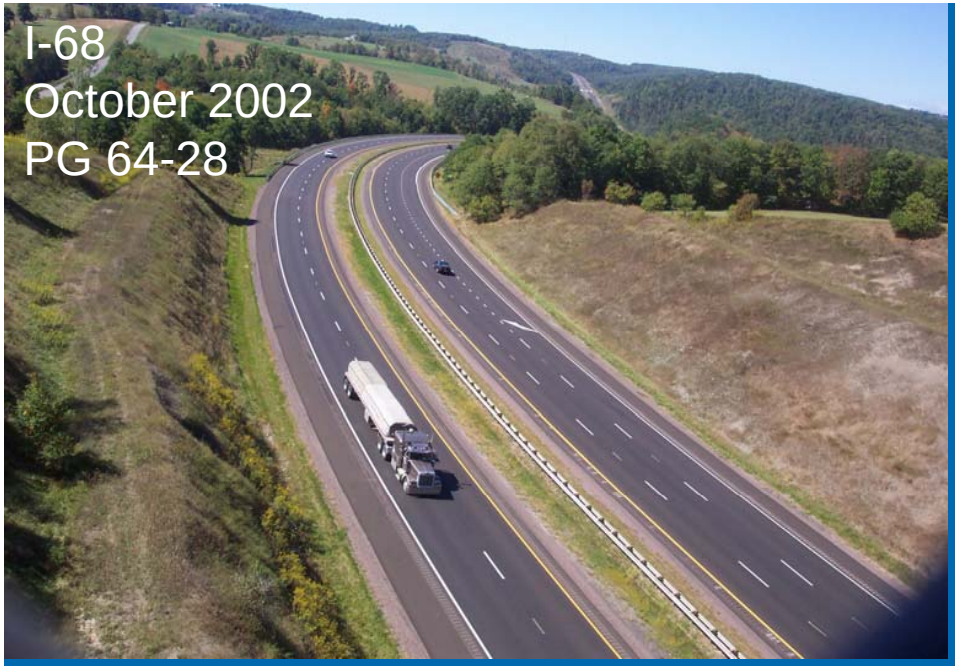
I-695 SBL
Completed 09/1994
19.0 mm
AC-20 Modified

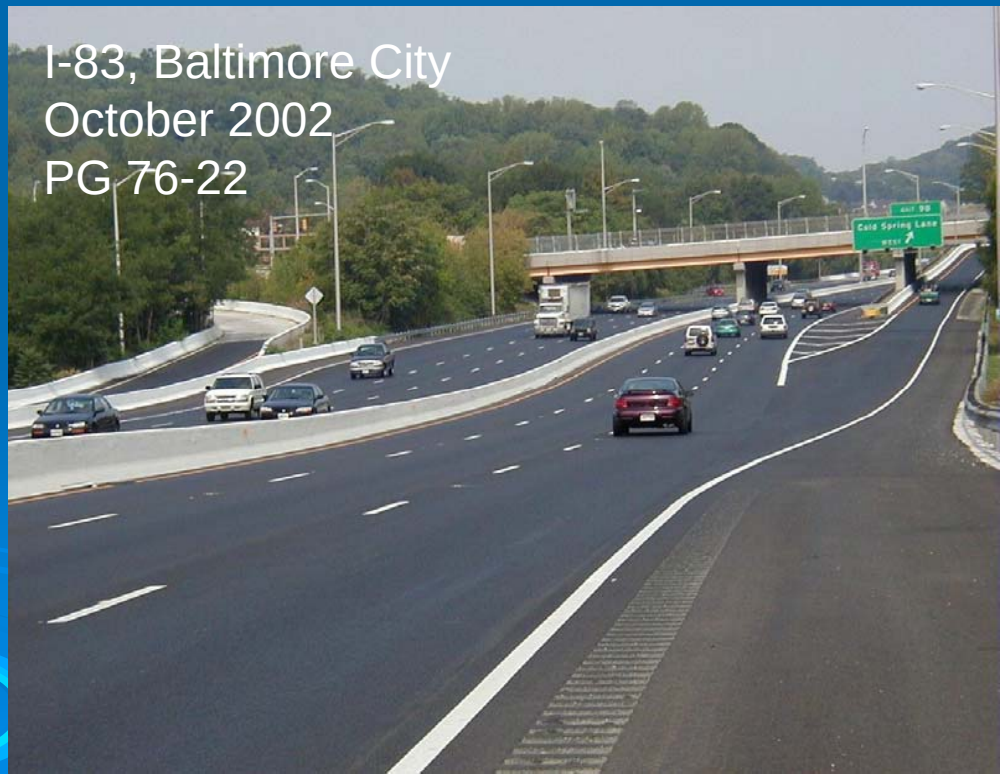
AADT – 170,000
Trucks – 19%

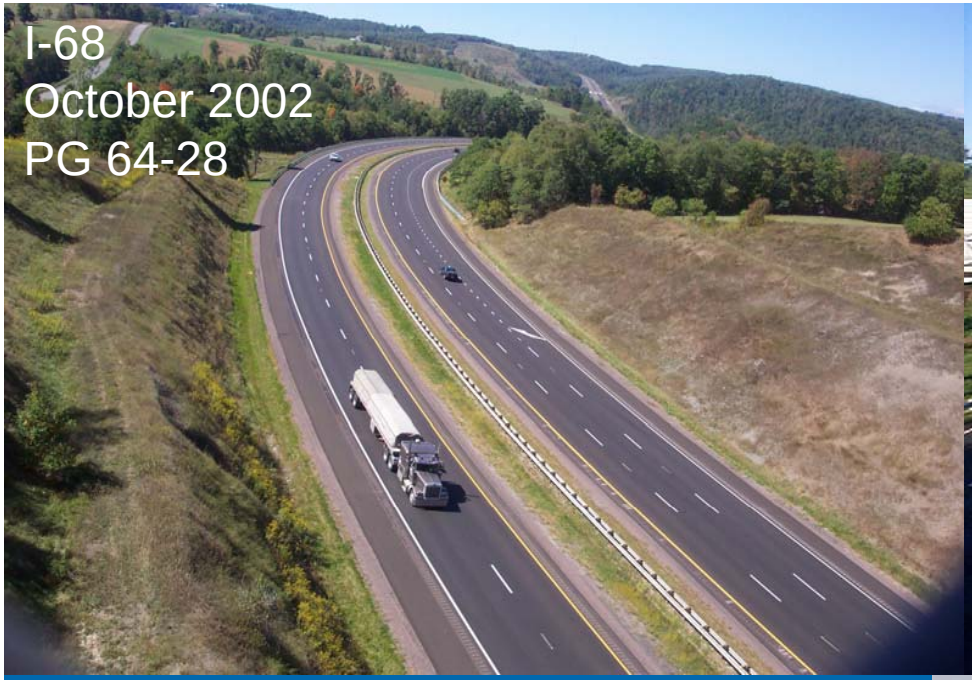
LLM



LLM


I-68
October 2002
PG 64-28


I-83, Baltimore City
October 2002
PG 76-22
Cold Spring Lane


I-68
October 2002
PG 64-28


I-695
2004
PG 76-22


I-83, Baltimore City
October 2002
PG 76-22
Cold Spring Lane


I-68
October 2002
PG 64-28


I-695
2004
PG 76-22


I-495
September 2005
PG 76-22


I-83, Baltimore City
October 2002
PG 76-22

Maryland's Experience
with
Modified Asphalts

- **1995 Performance Graded Specification**

  PG 76-22

  PG 64-28

LLM

Maryland's Experience with Modified Asphalts

- **1995 Performance Graded Specification**
  - **PG 76-22**
  - **PG 64-28**
- **1996 PG plus Specification**

LLM

Maryland's Experience
with
Modified Asphalts

- **1995 Performance Graded Specification**

  PG 76-22

  PG 64-28

- **1996 PG plus Specification**

  Elastomer Polymer Modification

LLM

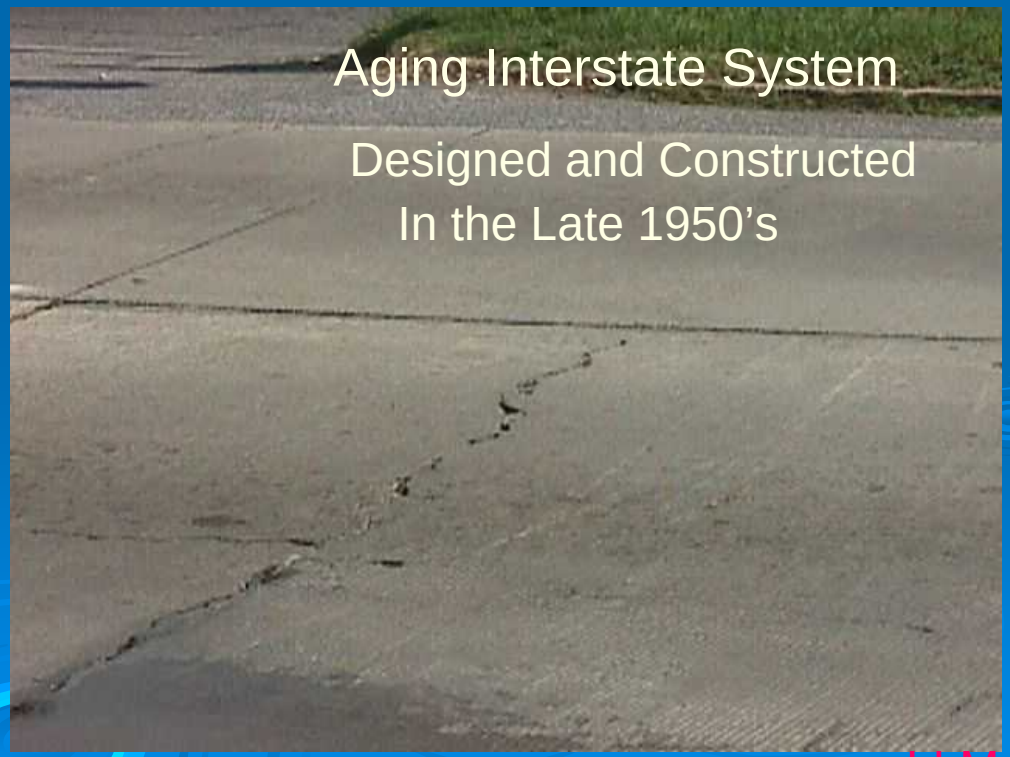
Maryland's Experience
with
Modified Asphalts

- **Pavements Rehabilitation Strategies**
  for
  High Traffic Areas

LLM

Maryland's Experience
with
Modified Asphalts

- **Pavements Rehabilitation Strategies for High Traffic Areas**



LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need
Money/budget

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need
Money/budget
Cost

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need
Money/budget
Cost
Life cycle cost of option

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need
Money/budget
Cost
Life cycle cost of option
Quality

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need
Money/budget
Cost
Life cycle cost of option
Quality

LLM

Pavements Rehabilitation Strategies

for

High Traffic Areas

Consider:

Least inconvenience to public
Safety
Condition of existing roadway
Structural need
Money/budget
Cost
Life cycle cost of option
Quality

All Strategies Require PG 76-22

LLM

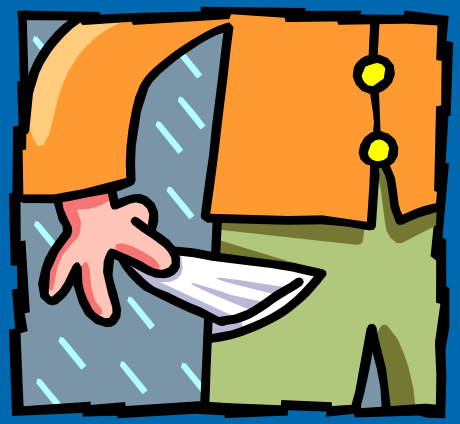
Project

- Resurfacing and safety improvements on Interstate 95/495 Inner and Outer Loops of the Washington D.C. beltway
- 3.43 miles of 4-6 lanes roadway
- Work consisted of patching, grinding and resurfacing
- Limited work hours

LLM

Outer Loop

- Mill 2 inches and replace with 2 inches
  of
  9.5 mm SMA,PG 76-22



LLM

Outer Loop

- Mill 2 inches and replace with 2 inches of 9.5 mm SMA,PG 76-22

Inner Loop (Experimental)

Mill to PCC and replace with
5 inches of SMA with PG 76-22.

First lift is 3.5 inches of 19.0 mm SMA

Surface is 1.5 inches of 9.5 mm SMA

LLM

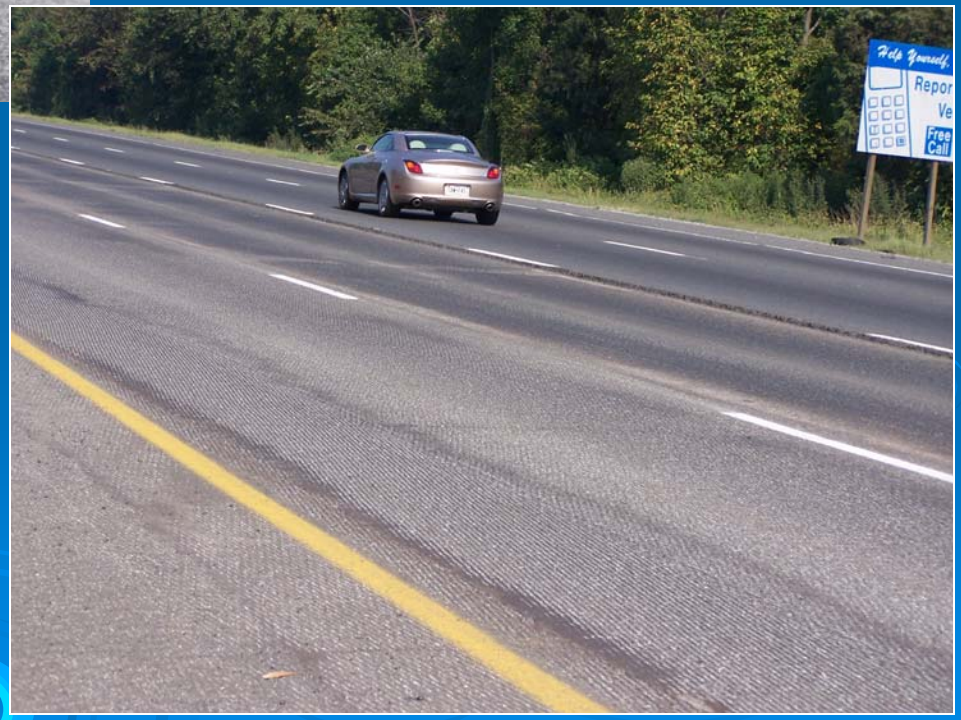
Outer Loop

Mill 2 inches and replace with 2 inches of
9.5 mm SMA,PG 76-22

LLM

Outer Loop

Mill 2 inches and replace with 2 inches of
9.5 mm SMA,PG 76-22



Inner Loop

Mill to PCC and replace with
5 inches of SMA with PG 76-22

LLM

Warm Mix Demo as part of this project

19 mm SMA

3.5 inches mill & fill
PG 76-22

LLM

Warm Mix Demo as part of this project

19 mm SMA

3.5 inches mill & fill
PG 76-22

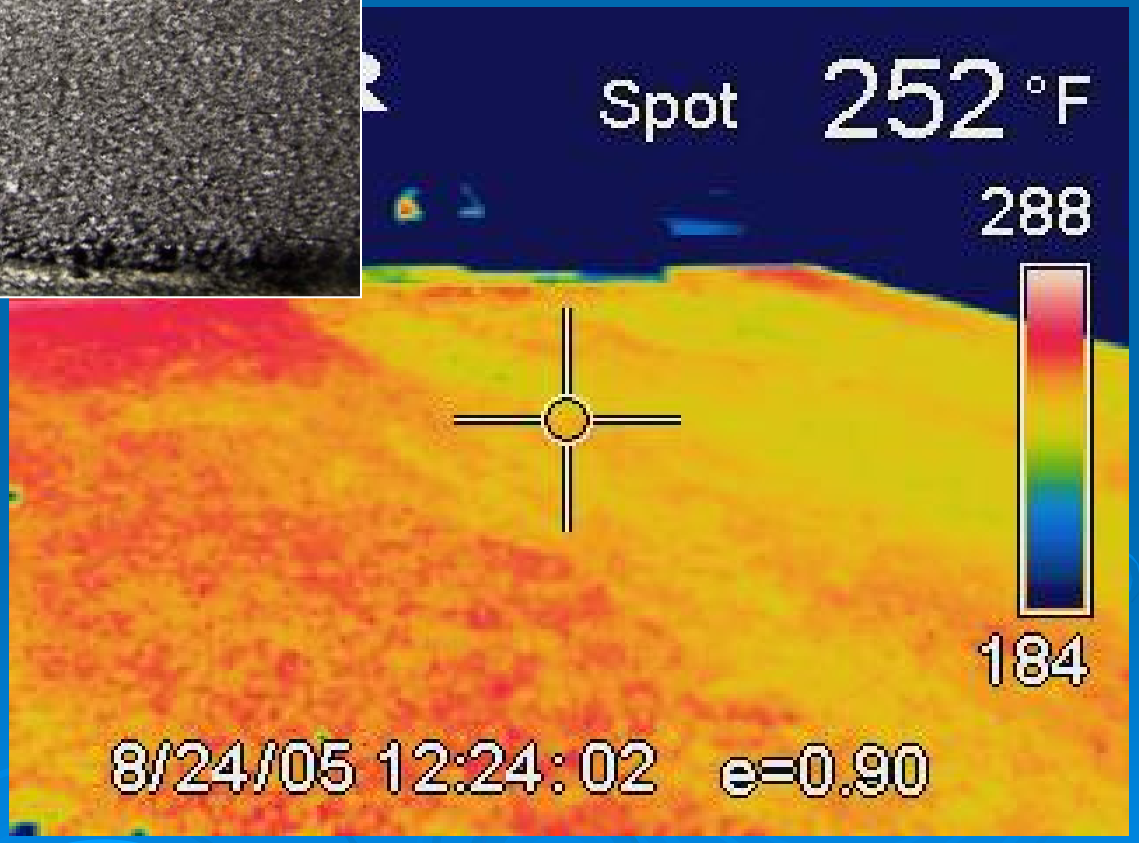
LLM

SMA

6.5 % AC
PG 76-22
1.5% Sasobit/Binder
Plus fiber

LLM

SMA
6.5 % AC
PG 76-22
1.5% Sasobit/Binder
Plus fiber



Sasobit: Mix temp 252ºF. Using tighter temp scale. Mat looks good.

LLM

ICC Draft Report

- Stiffness of Conventional Mix and

Sasobit were statistically the same with

Sasobit being placed 50°F cooler.

LLM

LLM

Maryland's Reasons For Using Modified Asphalts

LLM

Maryland's Reasons For Using Modified Asphalts

- **Decrease/Eliminate**
  - Rutting, Bleeding/Flushing

LLM

Maryland's Reasons For Using Modified Asphalts

- **Decrease/Eliminate**
  Rutting, Bleeding/Flushing
- **Reduce Thermal Cracking**

LLM

Maryland's Reasons For Using Modified Asphalts

- **Decrease/Eliminate**
  - **Rutting, Bleeding/Flushing**
- **Reduce Thermal Cracking**
- **Decrease/Eliminate**
  - **Raveling, Stripping**

LLM

Maryland's Reasons For Using Modified Asphalts

- **Decrease/Eliminate**
  - **Rutting, Bleeding/Flushing**
- **Reduce Thermal Cracking**
- **Decrease/Eliminate**
  - **Raveling, Stripping**
- **Improve Durability**

LLM

Maryland's Reasons For Using Modified Asphalts

- **Decrease/Eliminate**
  - **Rutting, Bleeding/Flushing**
- **Reduce Thermal Cracking**
- **Decrease/Eliminate**
  - **Raveling, Stripping**
- **Improve Durability**
- **Improve Performance**
  - **Composite Pavement Rehabilitation**

LLM

Maryland's Reasons For Using Modified Asphalts

- **Decrease/Eliminate**
  - **Rutting, Bleeding/Flushing**
- **Reduce Thermal Cracking**
- **Decrease/Eliminate**
  - **Raveling, Stripping**
- **Improve Durability**
- **Improve Performance**
  - **Composite Pavement Rehabilitation**
- **Improve Overall Performance**

LLM

Maryland's Experience with Modified Asphalts

Summary

LLM

Maryland's Experience
with
Modified Asphalts

Summary

- **Performance to Date Excellent**

LLM

Maryland's Experience
with
Modified Asphalts

- **Summary**
  - **Performance to Date Excellent**
  - **Handwork Difficult**

LLM

Maryland's Experience
with
Modified Asphalts

- **Summary**
  - **Performance to Date Excellent**
  - **Handwork Difficult**
  - **Mixing and Compaction Temperatures Tend to be High**

LLM

Maryland's Experience
with
Modified Asphalts

Summary

- **Performance to Date Excellent**
- **Handwork Difficult**
- **Mixing and Compaction Temperatures Tend to be High**
- **With WMA Technologies Temperatures can be Reduced**

LLM


Questions?
Larry L Michael
Consultant