



**WE'VE COME A LONG WAY!**

**Fred Garrott, PE  
S.T.A.T.E.  
Testing, LLC**

# Objectives

- **Outline 20 Years of HMA Improvements.**
- **Increase Awareness of HMA Quality.**
- **Congratulate HMA Industry!**



# IMPROVED

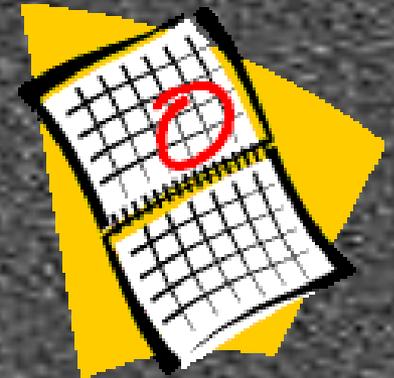


- **Specifications**
- **Material**
- **Equipment**
- **Support**
  - **Labs**
  - **Training**
- **New Mixtures.**

# Major Milestones

**1984** Task Force on Stability and Durability

**1990** QC/QA Introduced



**1995** Superpave Introduced

**RECENT** New Mixes & New Technology.

# Before 1984



- **All mix designs:**
  - **Central Springfield Lab**
  - **Chicago District Labs**
- **Design Voids: 2½%**
- **Natural Sand**
- **“Method” Specs**
- **Interstate Overlays were not working.**



STAY IN YOUR LANE

**U of I**

**IDOT**

**IAPA**

**AI**

**1984**

**Task Force on Stability and Durability**

**IAAP**

**NAPA**

**Consultants**

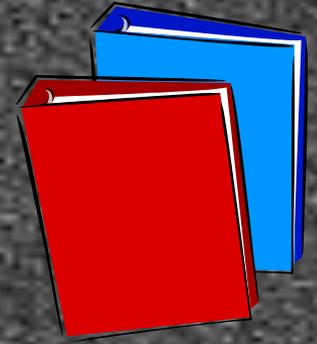
**FHWA**

# Task Force on Stability and Durability

## Assignment

- 1. Review** Interstate Overlay Policies, Procedures, and Operations.
- 2. Recommend** changes to address rutting of Interstate Overlays.

# **Task Force Recommendations**



- 1. Increase Design Air to 4%.**
- 2. Add VMA Spec.**
- 3. Introduce FA20 (Mfg'd. Sand).**
- 4. Decentralize Mix Design.**
- 5. Allow Contractor Mix Design.**
- 6. Implement Contractor Quality Control.**

# **Task Force Legacy**

## **Basic Task Force**

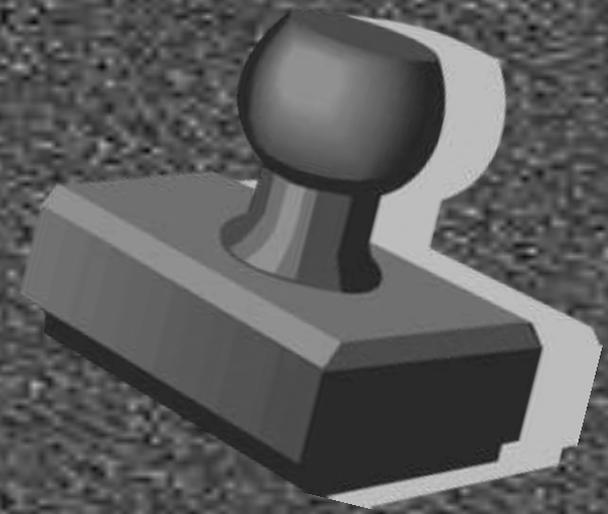
### **Recommendations:**

- **Emphasized Stability.**
- **Defined Class I Mixtures.**
- **Are still Valid for Superpave.**

# After 1984



- **Districts began to perform mix design and acceptance testing.**
- **Still, few contractor labs or mix designs.**



**QC/QA**

**1990**

**1991**

**1992**

1990	1991	1992	1993	1994	1995	1996
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

1990	1991	1992	1993	1994	1995	1996
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

1990	1991	1992	1993	1994	1995	1996
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

# 1990 Quality Initiative Program



## 3 QC/QA Programs:

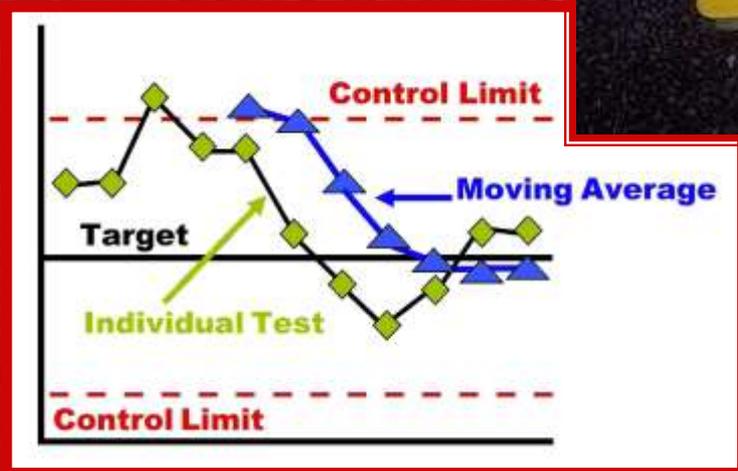
- Aggregate Gradation
- Portland Cement Concrete
- Hot Mix Asphalt.

# Aggregate QC/QA

## AGCS – Aggregate Gradation Control System

- **Real-Time Gradation (Quality Control) Tests**
- **Tighter Gradation Control – Improved consistency.**
- **Increased Quality Awareness**
  - **Aggregate Producer**
  - **HMA Mix Producer.**

# HMA QC/QA



# **QC/QA Infrastructure**

- 1. Trained Technicians**
- 2. Qualified QC and QA Labs**
- 3. Uniform Contract Requirements (Special Provisions)**
- 4. Uniform Test Procedures.**

# Technician Training

- **Required for everyone:**
  - **Contractor**
  - **IDOT**
  - **Local Government**
  - **Consultant**
- **Developed by IDOT**
- **Housed at Lake Land College**
- **Central IL and Chicago area classes.**

# HMA Trained Technicians

- **Aggregate Gradation & AGCS 4,000 graduates**
- **Level I - Lab and Field Tests 2,400 graduates**
- **Level II - QA Manager 1,400 graduates**
- **Level III - Mix Design 600 Graduates**

# Manual of Test Procedures for Materials

## Uniformity:

- Test Procedures
- QC Procedures
- Lab Operations
- Annual Updates.



# Qualified Labs

## Required for:

- **Districts**
- **Contractors**
- **Consultants**

- **Central Office Inspection**
- **District Re-approval**
- **Technical Manager**
- **Calibration Records**
- **IDOT Round-Robin.**

# **Contractor Quality Control**

- **Contractor Mix Design**
- **Lab and Field Control Tests**
- **Control Charts – Corrective Action**
- **Standard Procedures**
  - **Nuc-Core Correlations**
  - **Start-up, Test Strip.**

# Superpave



**1995**



**96**

**97**

# Superpave

- 1. Performance Graded Binders – “PG Binders”**
- 2. Polymer Modified Binders**
- 3. Gyratory Compaction**
- 4. Calculated Implementation.**

# PERFORMANCE Graded Binder



# Polymer Modified Binders

**Improve:**

**Stability and Durability:**

- **Stiffness Resists Rutting**
- **Elasticity Resists Fatigue Cracking**
- **Ductility Reduces Thermal Cracking**
- **Adhesion to Aggregate Improves Resistance to Moisture Damage.**

# IT'S MORE THAN MIX DESIGN

**Durability depends on proper  
placement and compaction!**



# Improved Density for Long Term Durability



# Permeability



# Lift Thickness



- **Compaction Potential is Related to Lift Thickness...**
- **And Long Term Performance.**
- **3 x NMAS Aggregate Size.**

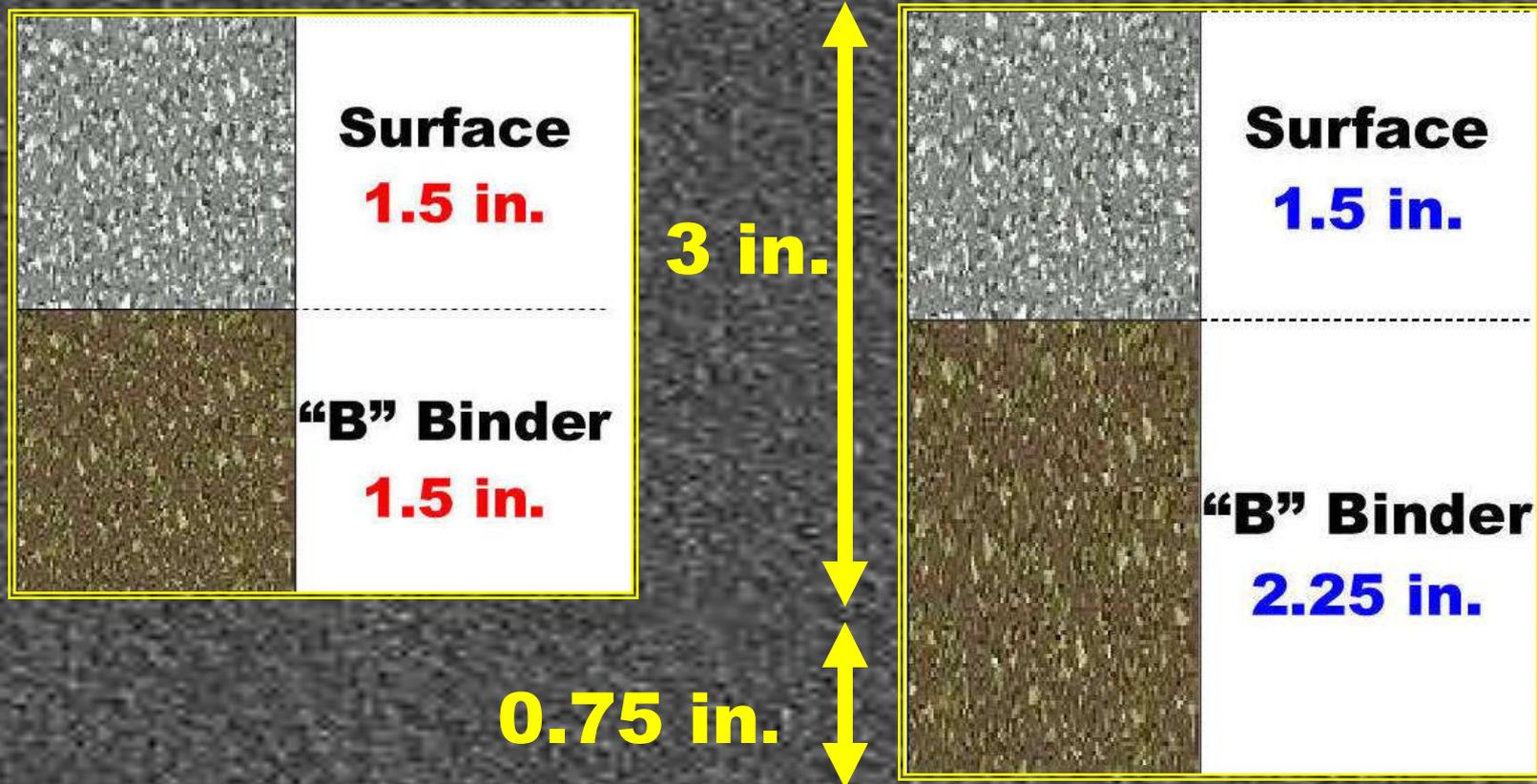
# Binder Thickness

## - Prior Policy

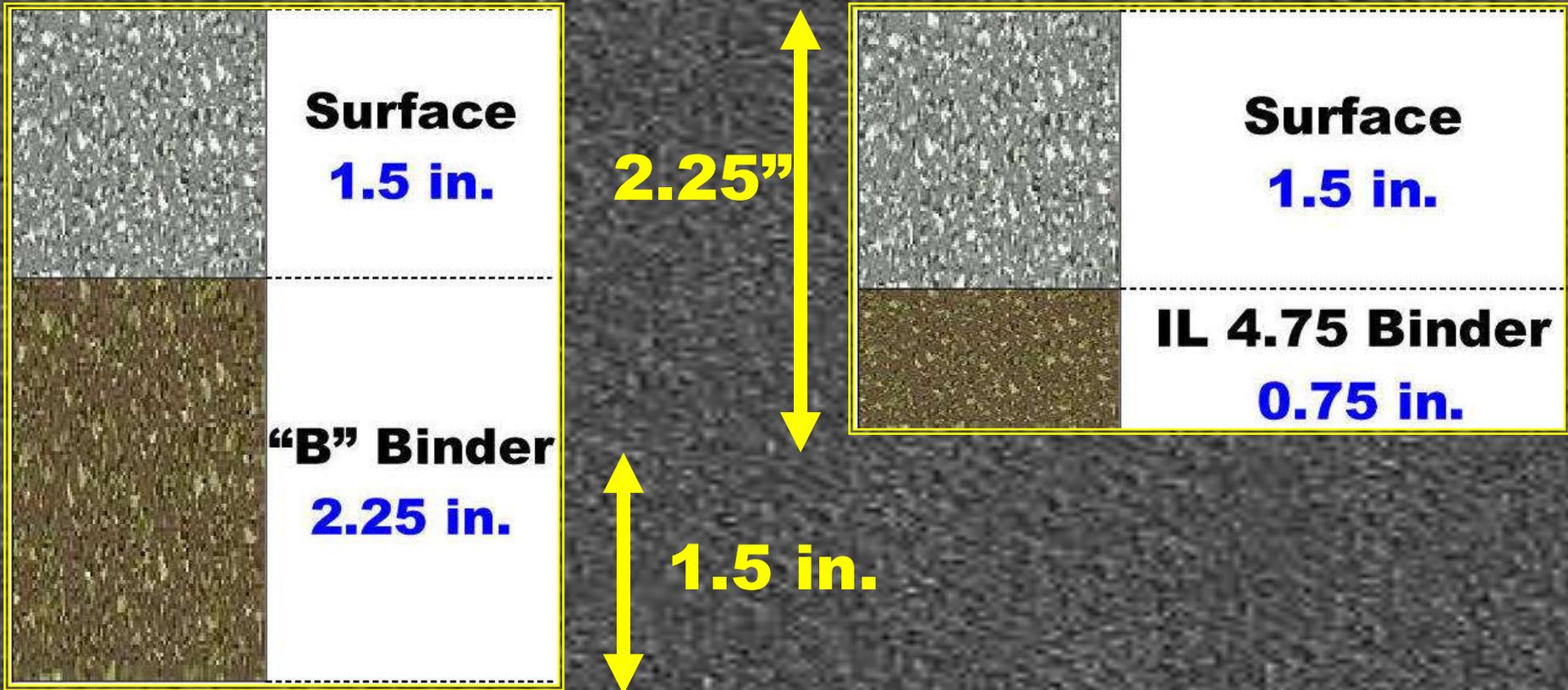


# Binder Thickness

## - 3x NMAS Policy



# “B” Binder / IL 4.75 Binder



# Perpetual Pavement

It will still be a good idea  
when your grandchildren  
get to be your age.

Designs for asphalt pavement have evolved so that you can expect to get a lifetime of smooth performance while reducing costs and improving safety. Here's how:

The Perpetual Pavement technology involves the use of multiple layers of durable, recyclable asphalt. When the surface layer needs maintenance, it can be quickly and easily milled off and replaced without disturbing the rest of the roadway's structure. And, many decades from now, the pavement structure will still be intact.

For more information, and for a free interactive CD discussing the Perpetual Pavement concept and research, visit [www.AsphaltAlliance.com](http://www.AsphaltAlliance.com) or call toll-free 877-272-0077.

THE NEW ASPHALT  
ABSOLUTELY!

877-272-0077

[www.AsphaltAlliance.com](http://www.AsphaltAlliance.com)



Illinois  
“Extended  
Life  
Pavement”

# Three Layer Design



**SMA, OGFC or Superpave**

**Intermediate Layer**

**Fatigue Layer**

**Aggregate, Lime Modified, or..**

# Rubblization Option



# Hydrated Lime Anti-strip

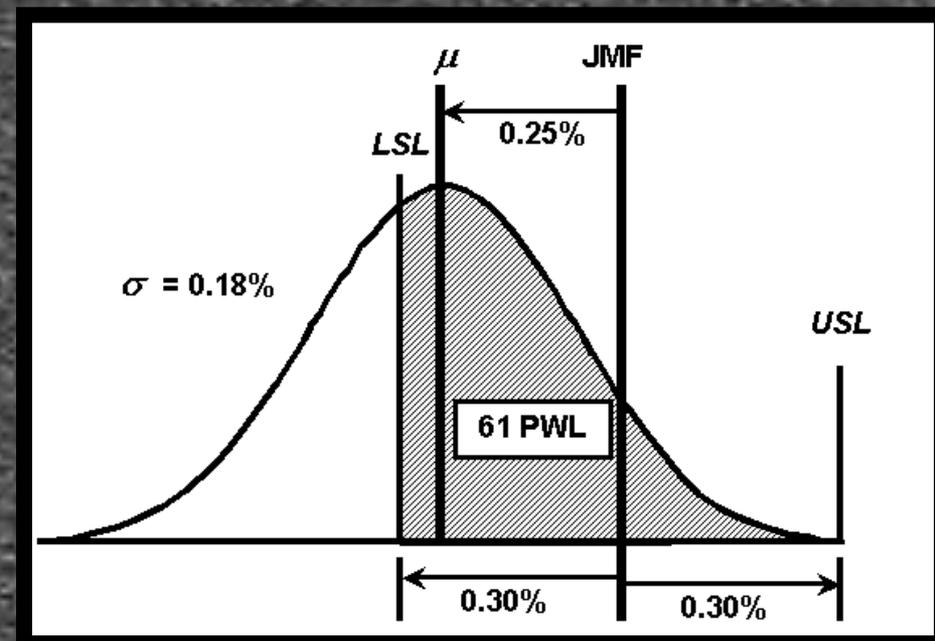


# Smoothness



# End Result Specifications

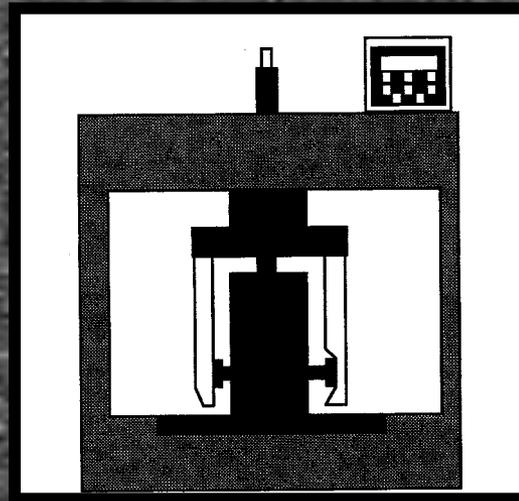
- Since 2000
- 34 Projects
- 14 Contractors
- Pay Factors
  - AC %
  - Density
  - Voids



# Lab Equipment



# Superpave Gyrotory Compactor



# Binder Ignition Oven

- **Fast Test Results**
- **Gradation**
- **AC %**
- **Safe**
- **Accurate.**



# Improved RAP Quality

## QC Program

- Gradation
- AC Content
- Source i.d.
- Sort by “Quality”



# New Technology New Mixtures

**4.75 mm  
Binder**

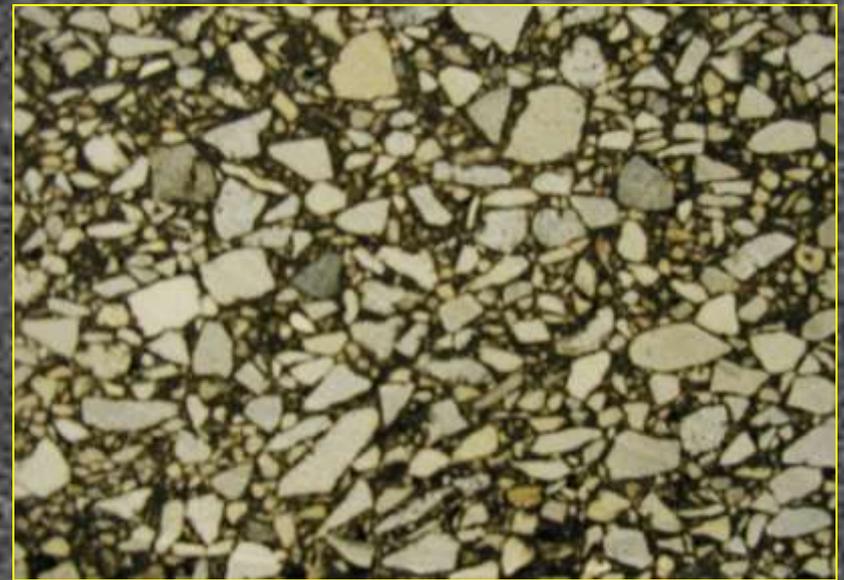
**SMA  
Binder**



# SMA – Stone Matrix Asphalt



**SMA**



**N<sub>50</sub> Surface**

# IL Low ESAL Superpave Mixes

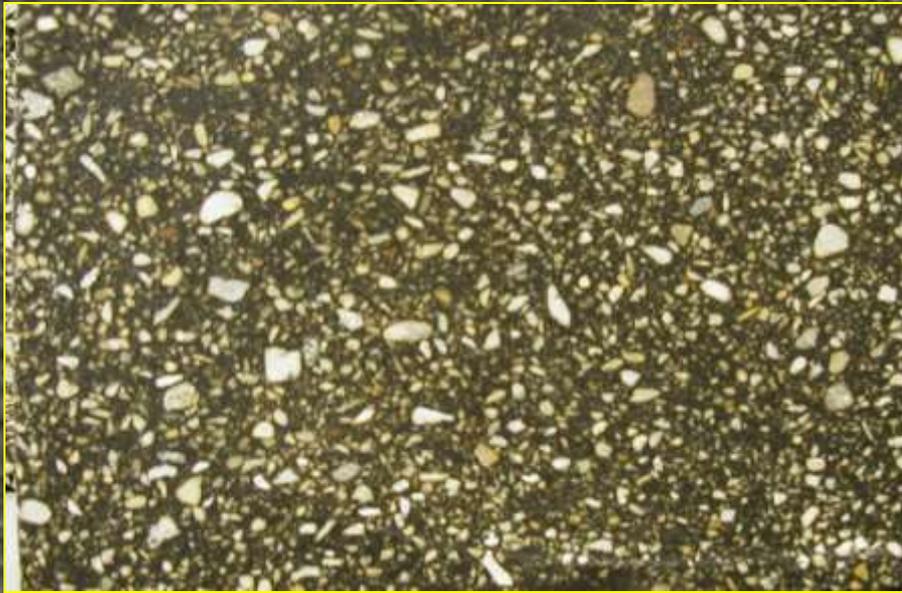


**9.5 Low ESAL**

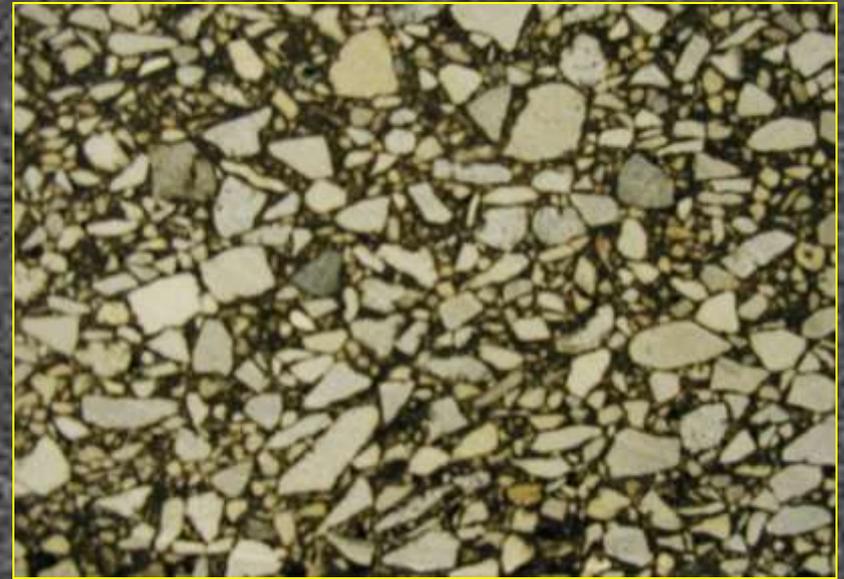


**N<sub>50</sub> Surface**

# IL 4.75 Binder/Level Binder



**IL 4.75 mm**



**N<sub>50</sub> Surface**

# **for Local Agencies**

- **Low Volume Mix Specifications**
- **State support for QC/QA program**
- **Special QC/QA Training Classes**
- **Special Superpave Training Classes.**

# Summary

## ☑ Better Material

- ✓ Aggregate

- ✓ PG Binder

## ☑ Better Equipment and Plants

## ☑ Smarter Personnel

## ☑ More Dependable Test Results

## ☑ More Mix Options

## ☑ Commitment to Quality

**= Better HMA Mixes**

# Thank You!

