A 30 YEAR PROGRESSION IN HMA ACCEPTANCE SPECIFICATIONS

MATT MUELLER

2021 U OF I BITUMINOUS CONFERENCE

or

FROM METHOD SPEC'S TO PERFORMANCE SPEC'S

or

FROM METHOD SPEC'S TO PERFORMANCE SPEC'S

1st - Why did IDOT get here

or

FROM METHOD SPEC'S TO PERFORMANCE SPEC'S

1st - Why did IDOT get here

2nd - Status

or

FROM METHOD SPEC'S TO PERFORMANCE SPEC'S

1st - Why did IDOT get here

IT’S BIGGER THAN US IN THIS ROOM

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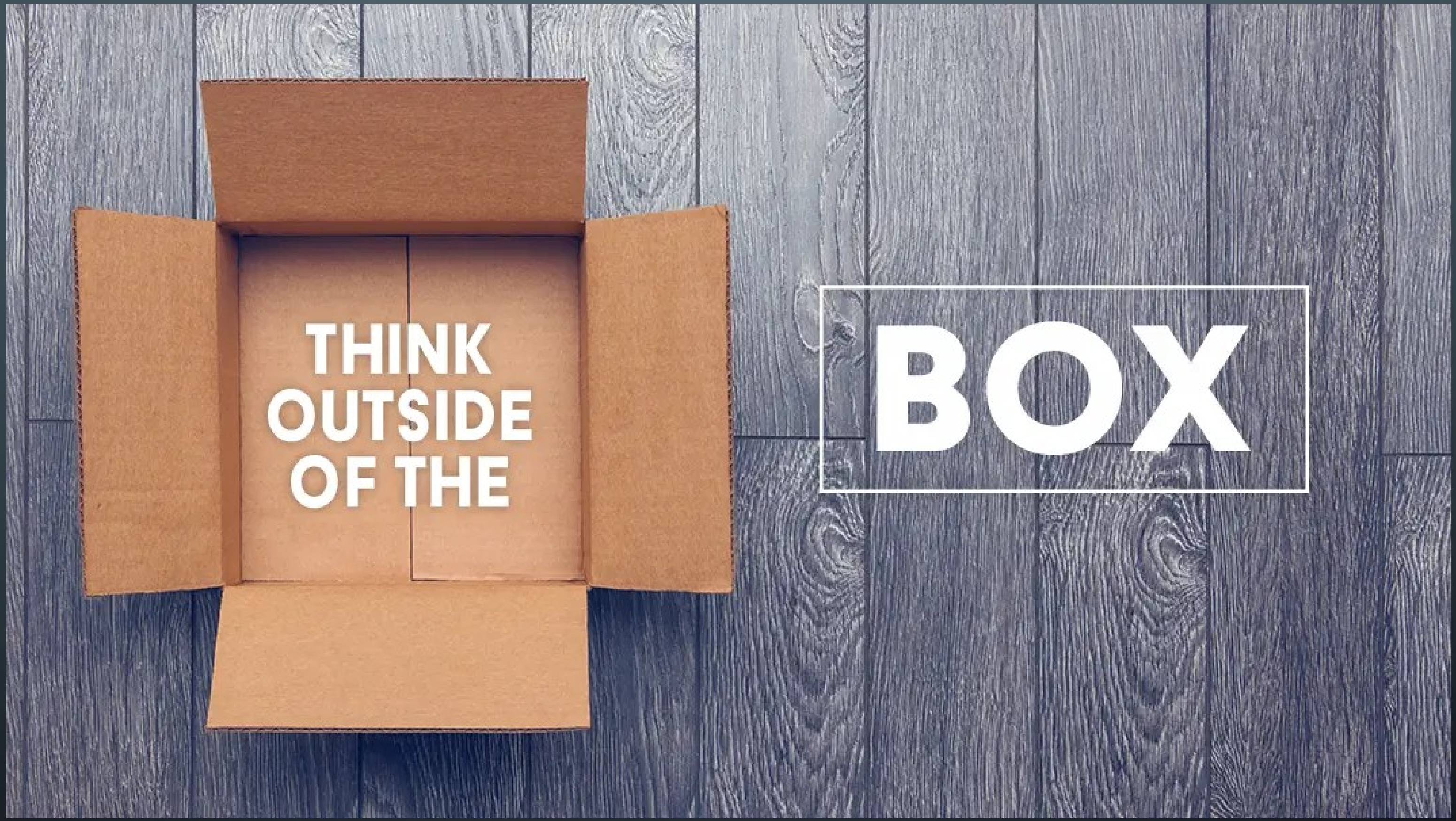

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When it doesn’t know the answer to any of these questions?

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- Pavement performance is variable (usually resulting in less and not more life) putting pressure on keeping the highway system in good condition (and there is no incentive for Industry to make improvements). (Industry is actually incentivized by the low bid process to cut quality.)
- The agency undertakes research to get answers to performance questions.

RESEARCH

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- From the 1980’s through 2015, HMA was elevated from an “art” to a science.
- The following are just a few interesting snippets of that work.

State of Illinois
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
Division of Highways

AASHO ROAD TEST EQUATIONS APPLIED TO THE DESIGN OF BITUMINOUS PAVEMENTS IN ILLINOIS

BY

W. EMMITT CHASTAIN, SR.
AND
DONALD R. SCHWARTZ

#4 (HRB Pub.)

EVALUATION OF WELDED WIRE FABRIC IN BITUMINOUS CONCRETE RESURFACING

W. Emmitt Chastain, Sr., Engineer of Research and Development
R. H. Mitchell, Research Engineer

Illinois Division of Highways

This paper describes an experimental project undertaken in Illinois to determine the effectiveness of welded wire fabric in the prevention or retardation of reflection cracking in bituminous concrete resurfacing on an old portland cement concrete pavement. "Reflection" cracks are those cracks that commonly appear in bituminous resurfacing immediately over cracks and joints in the portland cement concrete serving as a base.

Various methods have been employed by highway agencies in attempts to prevent or minimize reflection cracking. Among these methods are the use of a granular cushion coarse, subsealing or mud-jacking of the concrete slabs, extra-thick overlays, welded wire fabric, and others.

This study is concerned with one type of welded wire fabric as the dependent variable in the experiment, as to its presence or absence and to its effective width, with all other factors considered to be essentially the same.

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CIVIL ENGINEERING STUDIES
Transportation Engineering Series No. 31
Illinois Cooperative Highway and Transportation
Series No. 188

NONDESTRUCTIVE TESTING OF FLEXIBLE PAVEMENTS FIELD TESTING PROGRAM SUMMARY

Field Data Collection
J. S. DHAMRAIT — K. W. WICKS
Illinois Department of Transportation

Report Preparation by
M. S. HOFFMAN — M. R. THOMPSON
University of Illinois

A Report of the Investigation of
Load Response Characteristics of Flexible Pavements
Project IHR-508
Illinois Cooperative Highway and Transportation Research Program

A Cooperative Investigation
conducted by the
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
BUREAU OF MATERIALS AND
PHYSICAL RESEARCH

TRANSPORTATION RESEARCH LABORATORY
DEPARTMENT OF CIVIL ENGINEERING
ENGINEERING EXPERIMENT STATION
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

in cooperation with the
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS
JUNE, 1981

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Illinois Cooperative Highway and Transportation
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ASPHALT Q.A. SPECIFICATIONS

INFLUENCE OF SIGNIFICANT MATERIAL FACTORS AND DEVELOPMENT OF A RATIONAL PAYMENT SCHEDULE

Report Preparation
by
R. P. ELLIOTT and M. HERRIN

An Interim Report on the Investigation of
Quality Assurance Specifications
IHR-411
Illinois Cooperative Highway and Transportation Program

A Cooperative Investigation conducted by the
DEPARTMENT OF CIVIL ENGINEERING
ENGINEERING EXPERIMENT STATION
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

in cooperation with the
STATE OF ILLINOIS
ILLINOIS DEPARTMENT OF TRANSPORTATION

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN
URBANA, ILLINOIS
JUNE, 1983

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MECHANISTIC DESIGN CONCEPTS FOR FULL-DEPTH ASPHALT CONCRETE PAVEMENTS

Report Preparation by
M. GOMEZ — M. R. THOMPSON
University of Illinois

A Report of the Investigation of
Mechanistic Evaluation of Illinois
Flexible Pavement Design Procedures
Project IHR-510
Illinois Cooperative Highway and Transportation Research Program

A Cooperative Investigation
conducted by the
TRANSPORTATION RESEARCH LABORATORY
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UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

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UNIVERSITY OF ILLINOIS
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A PROPOSED FULL-DEPTH ASPHALT CONCRETE THICKNESS DESIGN PROCEDURE

Report Preparation by
M.R. THOMPSON — K. CATION
University of Illinois

A Report of the Investigation of
Mechanistic Evaluation of Illinois
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Project IHR-510
Illinois Cooperative Highway and Transportation Research Program

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UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS
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PAVEMENT PERFORMANCE ANALYSIS OF THE ILLINOIS INTERSTATE HIGHWAY SYSTEM

By

Mark E. Dwiggins
Michael I. Darter
James P. Hall
Craig L. Flowers
James B. DuBose

Research Report 517-03

A Report of the Findings of:

Development and Field Testing of an Illinois Pavement Feedback System

Project IHR-517
Illinois Cooperative Highway Research Program

Conducted by the

DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

and the

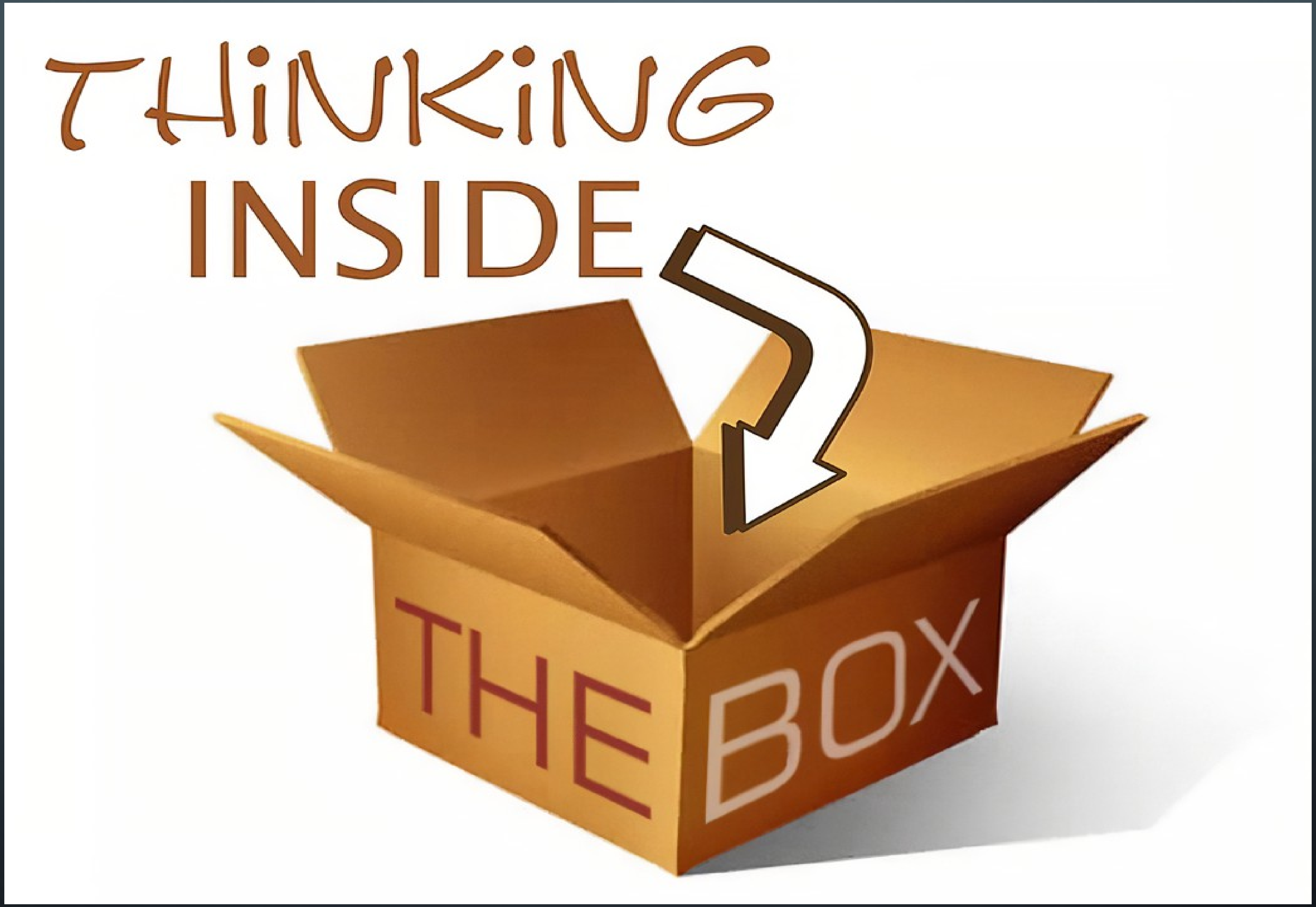
ILLINOIS DEPARTMENT OF TRANSPORTATION

In Cooperation with the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

JULY, 1989

AND THINK OF ALL THE RESEARCH YOU ARE AWARE OF THAT I DON'T HAVE TIME TO MENTION!


THINKING
INSIDE
THE BOX

DO ALL OF YOU KNOW THIS PERSON?

Jim Gehler

METHOD SPEC'S

PERFORMANCE SPEC'S

METHOD SPEC'S

QC/QA

PERFORMANCE SPEC'S

METHOD SPEC'S

QC/QA

PERFORMANCE SPEC'S

IN ORDER TO HAVE PERFORMANCE SPEC'S

- Need to determine what performance is desirable.
- Need to develop test methods that can measure this performance.
- More research!
- In the interim, implement QC/QA as a transition (educational) phase.

QC/QA TRAINING AHEAD

Objectives

OVERVIEW:

- QC/QA Implementation
- Superpave Implementation
- Trained Technician Program
- Approved Labs

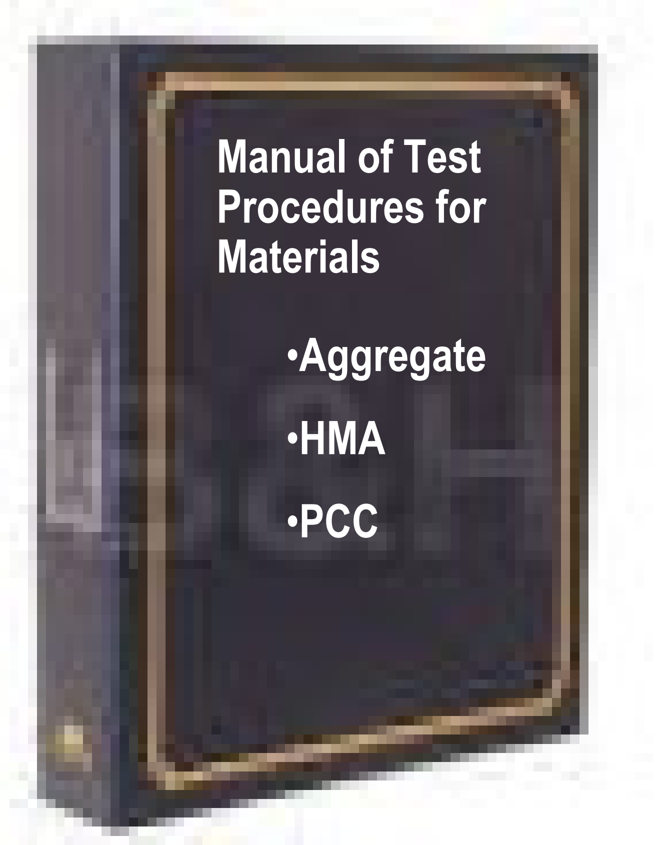
1990
Quality Initiative Program

Three QC/QA Programs:

1. Hot Mix Asphalt
2. Aggregate Gradation
3. Portland Cement Concrete

Manual of Test Procedures for Materials

- Test Procedures
- QC Procedures
  - Start-up
  - Nuc Correlation
  - Random Sampling
- Lab Operations



QC/QA OVERSTAYS ITS WELCOME

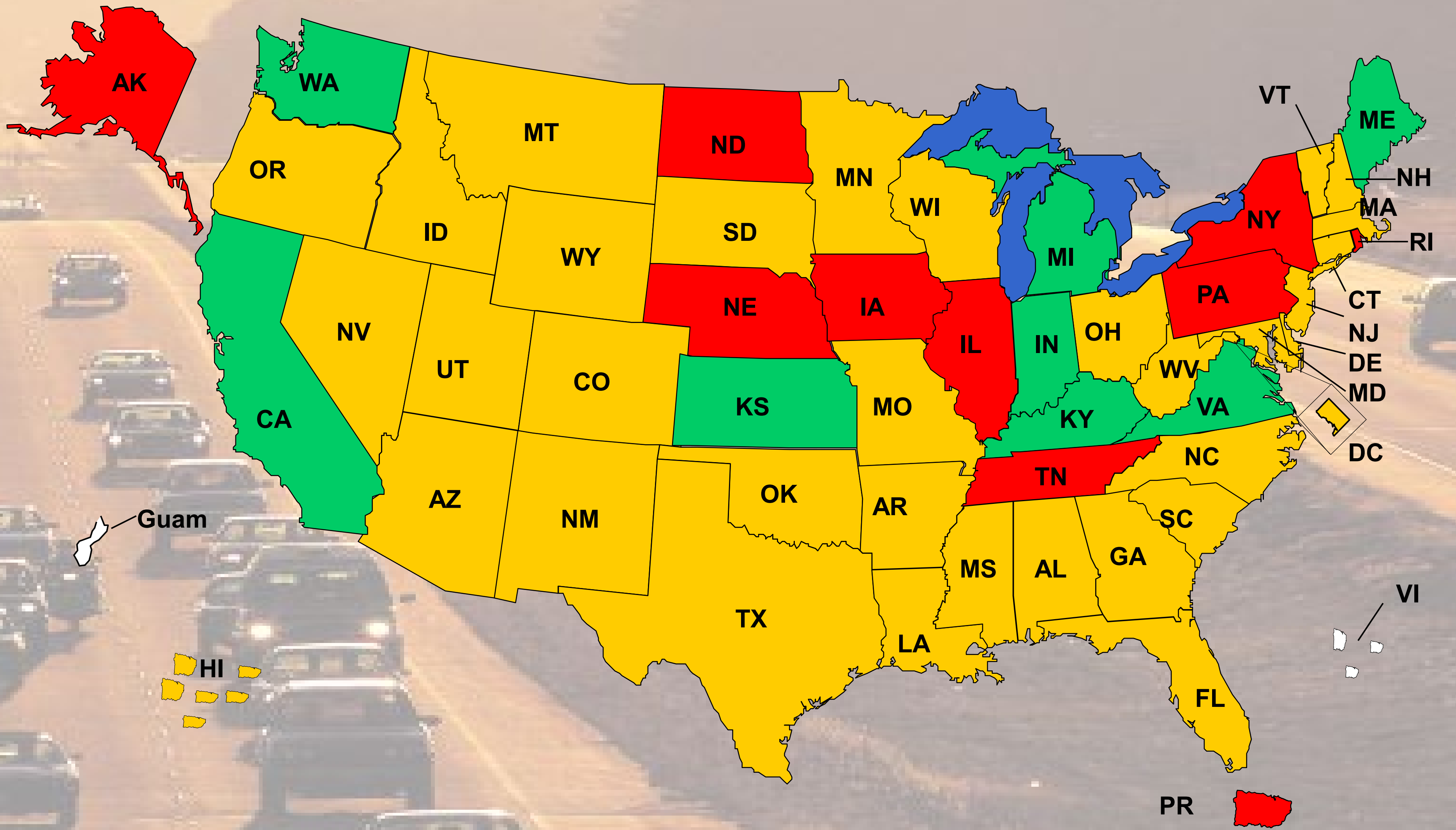
- Spec allowed test results out 50% of the time.
- Many contractors rode the edge of the spec limits.
- Department bears 100% of the Risk.
- No Acceptable Limits to define when R&R is necessary.
- No incentive/disincentive or R&R limits.
- Contractors rarely ceased production for failing results, bad weather or malfunctioning equipment.
- Biased test results – especially random density locations & nuclear gauge operation.
- Truck sampling bias.

THE PROCESS BOGGED DOWN

- Research struggled to answer how changes to materials impacted performance due to so many variables. Fundamental tests could not be developed.
- Highway funding diminished.
- IDOT staffing was reduced through attrition.
- But finally, rutting and then cracking test methods were successfully developed.
- And then came the mandate from the FHWA.

Ratings of State QA Systems

Advanced
Intermediate
Opportunity



IDOT was found to not be in compliance with 23 CFR 637.

Illinois Department of Transportation

Memorandum

To:	Regional Engineers
From:	Christine M. Reed
Subject:	Needed Improvements to Quality Assurance Procedures
Date:	February 11, 2010

After thoroughly reviewing the department's Quality Control/Quality Assurance (QC/QA) program, the Federal Highway Administration (FHWA) is insisting changes be made in the Hot Mix Asphalt (HMA) and Portland Cement Concrete (PCC) Quality Assurance (QA) procedures to meet the intent of the Code of Federal Regulations and FHWA Technical Advisory recommendations. Shortcomings were identified in district sampling and sample security procedures, and in the use of contractor testing for acceptance and pay.

It is recognized that present department resources are not sufficient to fully comply with Federal Regulations in FY 2010. The following rational actions are proposed to bring the department into compliance as quickly as possible:

1) Adopt the Pay for Performance (PFP) specification for large hot mix asphalt projects. PFP is fully compliant with FHWA regulations and FHWA technical advisory recommendations.

   a. It is recognized that not all districts have experience with the specification at this time. The coming 2010 construction season is viewed as a transition period for each district to gain needed experience on at least one project.

   b. Transition to PFP with 50% of all projects over 8000 tons on Interstate and Supplemental Expressway projects in 2011.

   c. Use PFP on all Interstate and Supplemental Expressway hot mix asphalt HMA projects over 8000 tons in the 2012 construction season.

   d. Use of PFP will be expanded to include Interstate and non-Interstate projects above 4000 tons with 50% of these projects in 2013 and all of these projects in 2014.

   e. Mat sampling will be investigated. Acceptance sampling as close as possible to incorporation in the final product is less prone to bias or fraud.

IN THE ENSUING DECADE

- More materials were proposed for use in HMA.
- New equipment was trialed.
- Tools were showcased that could evaluate construction activities.
- Numerous research projects concluded with recommendations for implementation.
- Special provisions were developed and construction of HMA pavements using PFP and QCP specifications implemented.
- The Quality Management Program was finalized.

2ND - STATUS

QUALITY MANAGEMENT PROGRAM

QUALITY MANAGEMENT PROGRAM

QUALITY MANAGEMENT PROGRAM

PFP QCP QC/QA

Construction Inspection *and* Materials Testing

Pay for Performance (PFP)

PFP General Information

- Pay Specification Type
  - PWL
  - Incentive/Disincentive
- Acceptance Basis
  - Department Test Results
- Applications
  - ≥ 8,000 tons per mix
  - Resurfacing or Full Depth Projects
  - Interstates, Freeways, Expressways

Personnel & Laboratories

- Same as Original QC/QA
- Trained QC & QA Personnel
  - 3 Day Aggregate – Sampling & Gradations
  - Level I – HMA Testing (5 Day Course)
  - Level II – Plant Proportioning & Troubleshooting (5 Day)
  - Level III – HMA Mix Design (5 Day)
- Qualified Laboratories
  - Initial Inspection by CBM
  - Biennial District Inspections thereafter

Pay Parameters and Quality Levels

Pay Parameters, Parameter Weights "f" and Quality Levels				
Pay Parameter		Parameter Weight *"f"*	*UL*	*LL*
Air Voids		0.3	Design Voids + 1.35	Design Voids – 1.35
Field VMA		0.3	MDR[/1] + 3.0	MDR[/1] – 0.7
In-Place Density	IL-4.75	0.4	97.5	92.5
	IL-9.5, IL-9.5FG		97.5	91.5
	IL-19.0		97.5	92.2
	SMA		98.0	93.0

1. MDR = Minimum Design Requirement (VMA)

Mix Sampling & Security

- Random Jobsite Sampling
  - Behind Paver (4 samples across the mat blended & split)
  - Material Transfer Device (MTD)
- Frequency/Sublot Size
  - 1 set of volumetric tests per 1,000 tons
  - Randomly chosen by Department
    - Not disclosed until truck en route
  - Taken, Blended, and Split by Contractor and Witnessed by Department
  - Department secures using:
    - Locking ID Tag (Bag Sample)
    - Security ID Label (Box Sample)

PWL Density Coring

- Randomly chosen by Department (Longitudinal & Transverse Location)
  - Not disclosed until finish roller has passed
- Taken by Contractor and Witnessed by Department
- Longitudinal frequency dependent on paving width and lift thickness
  - 1 density interval per 0.1 mi. (< 20 ft. width & > 3 in. thickness)
  - 1 density interval per 0.2 mi. (< 20 ft. width & ≤ 3 in. thickness)
  - Longitudinal frequency divided by 2 if paving ≥ 20 ft. wide

Unconfined Edge Density Coring

- Outside of PWL Analysis
- Only used when LJS not present
- 1 density test per 0.5 mi.
- Randomly chosen by Department (Longitudinal)
- Cores Taken:
    - 4.0 in. from unconfined edge
    - By Contractor & witnessed by Department

Mix Testing

- Split samples tested by Contractor and Department
- Mixture Tests
  - G_{mm}
  - G_{mb}
  - Asphalt Content
  - Gradation
- Mixture Calculations
  - Air Voids
  - VMA
  - Dust/Asphalt Binder (AB) Ratio

Department Density Testing

- Density Tests
  - Core G_{mb}
  - Unconfined Edge Core G_{mb}
- Density Calculations
  - Core Density
  - Unconfined Edge Core Density

Composite Pay Factor

- Lot Size
  - 10 mixture sublots (Minimum of 8)
  - 30 density sublots (Minimum of 20)
- PWL

  $$PWL = (P_U + P_L) - 100$$
- Parameter Pay Factor (PF) Per Lot

  $$PF = 55 + 0.5\,(PWL)$$
- Composite Pay Factor (CPF)

  $$CPF = [0.3(TPF_{Voids}) + 0.3(TPF_{VMA}) + 0.4(TPF_{Density})] / 100$$

Dust/AB Ratio Monetary Deductions

Outside the PWL analysis

Dust/AB Ratio Deduction Table [1/]	
Range	Deduct / Sublot
$0.6 \leq X \leq 1.2$	\$0
$0.5 \leq X < 0.6$ or $1.2 < X \leq 1.4$	\$1,000
$0.4 \leq X < 0.5$ or $1.4 < X \leq 1.6$	\$3,000
$X < 0.4$ or $X > 1.6$	Shall be removed and replaced

1/ Does not apply to SMA.

Unconfined Edge Density Monetary Deductions

Outside the PWL analysis

Unconfined Edge Density Deduction Table	
Density	Deduction / Sublot
≥ 90 %	$0
89.0 - 89.9 %	$1,000
88.0 - 88.9 %	$3,000
< 88.0 %	Outer 1.0 ft (300 mm) will require remedial action acceptable to the Engineer

Acceptable Limits

Parameter		Acceptable Limits
Field VMA		-1.0 – +3.0 % [1/]
Air Voids		2.0 – 6.0 %
Density	IL-9.5, IL-19.0, IL-4.75, IL-9.5FG	90.0 – 98.0 %
	SMA 12.5, SMA 9.5	92.0 – 98.0 %
Dust / AB Ratio		0.4 – 1.6 [2/]

1/ Based on minimum required VMA as stated in the mix design volumetric requirements in Article 1030.05(b).

2/ Does not apply to SMA.

Dispute Resolution Method 1

- Eligibility
  - Department test results outside Acceptable Limits (or)
  - Contractor & Department split sample calculation results outside precision limits

Test Parameter	Limits of Precision
Voids	1.0 %
Field VMA	1.0 %
Ratio - Dust / Asphalt Binder	0.2
Core Density	1.0 %

- Central Bureau of Materials (CBM) test results for G_{mb}, G_{mm}, Asphalt Binder Content, & Gradation replace Department (District) test results

Dispute Resolution Method 2

- Eligibility
  - Contractor participates and complies with AASHTO PSP testing protocol (and)
  - Contractor and Department split sample test results outside precision limits for one (or more) of the following:

Test Parameter	Limits of Precision
G_{mm}	0.008
G_{mb} 1/	0.012
Asphalt Binder	0.2

- CBM test results for G_{mb}, &/or G_{mm}, &/or Asphalt Binder Content replace Department (District) test results

Unacceptable Material

- Centralized Process
  - Initiated by IDOT Chief Engineer
  - Maintains equity across state
  - District informs Central Bureaus of Construction and Materials of each occurrence and provides relevant information
  - Information reviewed in Central Bureaus
  - Central Bureau of Construction makes final contract administration recommendation

Quality Control for Performance (QCP)

QCP General Information

- Pay Specification Type
  - Step Based System
  - Disincentive Only
- Acceptance Basis
  - Department Test Results
- Applications
  - Mainline quantity between 1,200-8,000 tons per mix
  - Shoulder applications > 8 ft. wide with minimum 1,200 tons per mix
- Pay Parameters
  - Air Voids, VMA, Core Density

Personnel & Laboratories

- Same as Original QC/QA
- Trained QC & QA Personnel
  - 3 Day Aggregate – Sampling & Gradations
  - Level I – HMA testing (5 Day Course)
  - Level II – Plant Proportioning & Troubleshooting (5 Day)
  - Level III – HMA Mix Design (5 Day)
- Qualified Laboratories
  - Initial Inspection by CBM
  - Biennial District Inspections thereafter

Pay Factors

Pay Parameter		Pay Factor[1/]			
		105%	100%	95%	90%
Air Voids		± 0.5%	± 1.2%	± 1.6%	± 2.0%
Field VMA		0% to +1.0% above minimum specified	-0.5% to +2.0%	-0.7% to +2.5%	-1.0% to +3.0%
In-Place Density	SMA	94.0% to 95.0%	93.5% to 96.5%	92.5% to 97.0%	92.0% to 98.0%
	HMA	93.5% to 94.5%	92.5% to 96.5%	91.5% to 97.0%	90.0% to 98.0%

1/ Capped at 100.0% prior to calculating Composite Pay Factor

Mix Sampling & Security

- Random Jobsite Sampling
  - Behind Paver (4 samples across the mat blended & split)
  - Material Transfer Device (MTD)
- Frequency/Sublot Size
  - 1 set of volumetric tests per 1,000 tons maximum
    - Not disclosed until truck en route
  - Randomly chosen by Department
    - Blended & Split by Contractor
  - Taken by Contractor and Witnessed by Department
  - Department secures using:
    - Locking ID Tag (Bag Sample)
    - Security ID Label (Box Sample)

Density Coring

- Randomly chosen by Department (Longitudinal & Transverse Location)
  - Not disclosed until finish roller has passed
- Taken by Contractor and Witnessed by Department
- Longitudinal frequency dependent on paving width and lift thickness
  - 1 density interval per 0.1 mi. (< 20 ft. width & > 3 in. thickness)
  - 1 density interval per 0.2 mi. (< 20 ft. width & ≤ 3 in. thickness)
  - Longitudinal frequency divided by 2 if paving ≥ 20 ft. wide

General Testing Overview

- Mixture Tests
  - G_{mm}
  - G_{mb}
  - Asphalt Content
  - Gradation
- Mixture Calculations
  - Air Voids
  - VMA
  - Dust/Asphalt Binder (AB) Ratio
- Core Density Tests

Department & Contractor Testing Per Lot

- Mixture Testing
  - Mixture Lots
    - 4 consecutive mixture sublots (minimum of 1)
  - Contractor tests all 4 sublots per lot
  - Department tests 1 random sublot per lot
    - If random sublot test results meet 100% criteria, no additional mixture sublots tested
    - If random sublot test results do not meet 100% criteria, all 4 mixture sublots tested
    - If Contractor results don’t compare to Department results, all 4 mixture sublots tested

Department & Contractor Testing Per Sublot

- Density Testing
  - Sublot = Avg. of 5 consecutive core densities
  - Department tests all cores
    - 2.0% density added to cores within 1 ft. of unconfined edge
  - Sublot Avg. is req’d to meet min. density specified for full pay

QCP Quasi-Dispute Resolution

- Eligibility
  - Contractor and Department split sample test results outside precision limits

Test Parameter	Limits of Precision
G_{mb}	0.030
G_{mm}	0.026
Field VMA	1.0 %

  - Department (District) tests extra retained sublot split sample to replace original test results

Composite Pay Factor (CPF)

$$CPF = 0.30(PF_{Voids}) + 0.30(PF_{VMA}) + 0.40(PF_{Density})$$

Where:

PF_{Voids}, PF_{VMA}, and $PF_{Density}$ = Avg. sublot pay factors

Dust/AB Ratio Monetary Deductions

Dust/AB Ratio Deduction Table [1/]	
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1/ Does not apply to SMA.

Acceptable Limits

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Field VMA		-1.0 – +3.0 % [1/]
Air Voids		2.0 – 6.0 %
Density	IL-9.5, IL-19.0, IL-4.75, IL-9.5FG	90.0 – 98.0 %
	SMA 12.5, SMA 9.5	92.0 – 98.0 %
Dust / AB Ratio		0.4 – 1.6 [2/]

1/ Based on minimum required VMA as stated in the mix design volumetric requirements in Article 1030.05(b).

2/ Does not apply to SMA.

Same Unacceptable Materials Approach as PFP

Modified QC/QA

Applications

- Mixtures < 1,200 tons
- Shoulder applications ≤ 8 ft. wide or variable width
- Patching
- Turn lanes less than 500 ft. long
- Temporary pavement
- Other small/misc. projects

Mixture Tests

- Quality Control
    - Sample times & locations remain same
    - No longer sample for & split QC samples with District
- Department Verification
    - Jobsite sample location selected randomly by Department 1/3000 tons or min 1/project for mainline and wide shoulders
        - Not disclosed until truck en route
    - Sample Taken, Blended, and Split by Contractor and Witnessed by Department

Density Tests

- Quality Control
  - Frequency & locations remain same
  - Nuclear density & correlations remain same
- Department Verification
  - Location selected randomly by Department
    - Not disclosed until finish roller has passed
  - One verification core per 0.5 mi. for mainline & wide shoulders (≥ 3 ft.)
  - Nuclear Density Gauge for Patches, Paving < 3 ft. wide and < 300 ft. long

Verification Test Acceptable Limits

(Same as PFP/QCP)

Parameter		Acceptable Limits
Field VMA		-1.0 – +3.0 % [1/]
Air Voids		2.0 – 6.0 %
Density	IL-9.5, IL-19.0, IL-4.75, IL-9.5FG	90.0 – 98.0 %
	SMA 12.5, SMA 9.5	92.0 – 98.0 %
Dust / AB Ratio		0.4 – 1.6 [2/]

1/ Based on minimum required VMA as stated in the mix design volumetric requirements in Article 1030.05(b).

2/ Does not apply to SMA.

Acceptance

- Contractor’s Process Control and Actions
- Department Verification Tests for Air Voids, Field VMA & Density
    - Verification Tests only need to be within Acceptable Limits

HMA Mix Design Verification

Perpetual Mix Designs (2019-Present)

- IDOT & HMA Industry agreed to unlimited mix design length
- District verifies initial mix design (including perf. tests)
- Individual aggregate G_{sb} values updated annually according to IDOT G_{sb} List
- Annually updated combined aggregate G_{sb} values required to be ≤ 0.020
    - If > 0.020, mix design must be re-submitted or re-designed
- Updated combined aggregate G_{sb} values used in volumetric calculations

HMA Performance Testing

HMA Performance Testing Overview

- Tests
  - Hamburg Wheel
  - I-FIT
- Frequency
  - Mix Design
  - Construction - Start of Production for each mixture
- Test Specimen Preparation
  - Contractor compacts gyratory cylinders & submits to District
  - District randomly chooses gyratory cylinders to cut & prepare I-FIT and Hamburg test specimens

Hamburg (IL Modified AASHTO T 324)

- Conditioning
  - Short Term Aged
- Specification Limits (to 12.5 mm rut depth)

Illinois Modified AASHTO T 324 Requirements [1/]	
PG Grade	Minimum Number of Wheel Passes
PG 58-xx (or lower)	5,000
PG 64-xx	7,500
PG 70-xx	15,000 [2/]
PG 76-xx (or higher)	20,000 [2/]

1/ When WMA is produced at temperatures of 275 ± 5 °F (135 ± 3 °C) or less, loose mix shall be oven aged at 270 ± 5 °F (132 ± 3 °C) for two hours prior to gyratory compaction of Hamburg Wheel specimens.

2/ For IL-4.75 binder course, the minimum number of wheel passes shall be reduced by 5,000.

I-FIT (IL Modified AASHTO T 393)

- Conditioning
  - Short Term Aged
  - Long Term Aged - Surface Mixtures Only
- Specification Limits

Illinois Modified AASHTO T 393		
Mixture	Short Term Aging, Minimum FI	Long Term Aging, Minimum FI 2/
HMA 1/	8.0	5.0 3/
SMA	16.0	10.0
IL-4.75	12.0	-

1/ All mix designs, except for SMA and IL-4.75 mixtures.

2/ Required for surface courses only.

3/ Production long term aging FI for HMA shall be a minimum of 4.0.

THE SHIP HAS SAILED


NTPEP