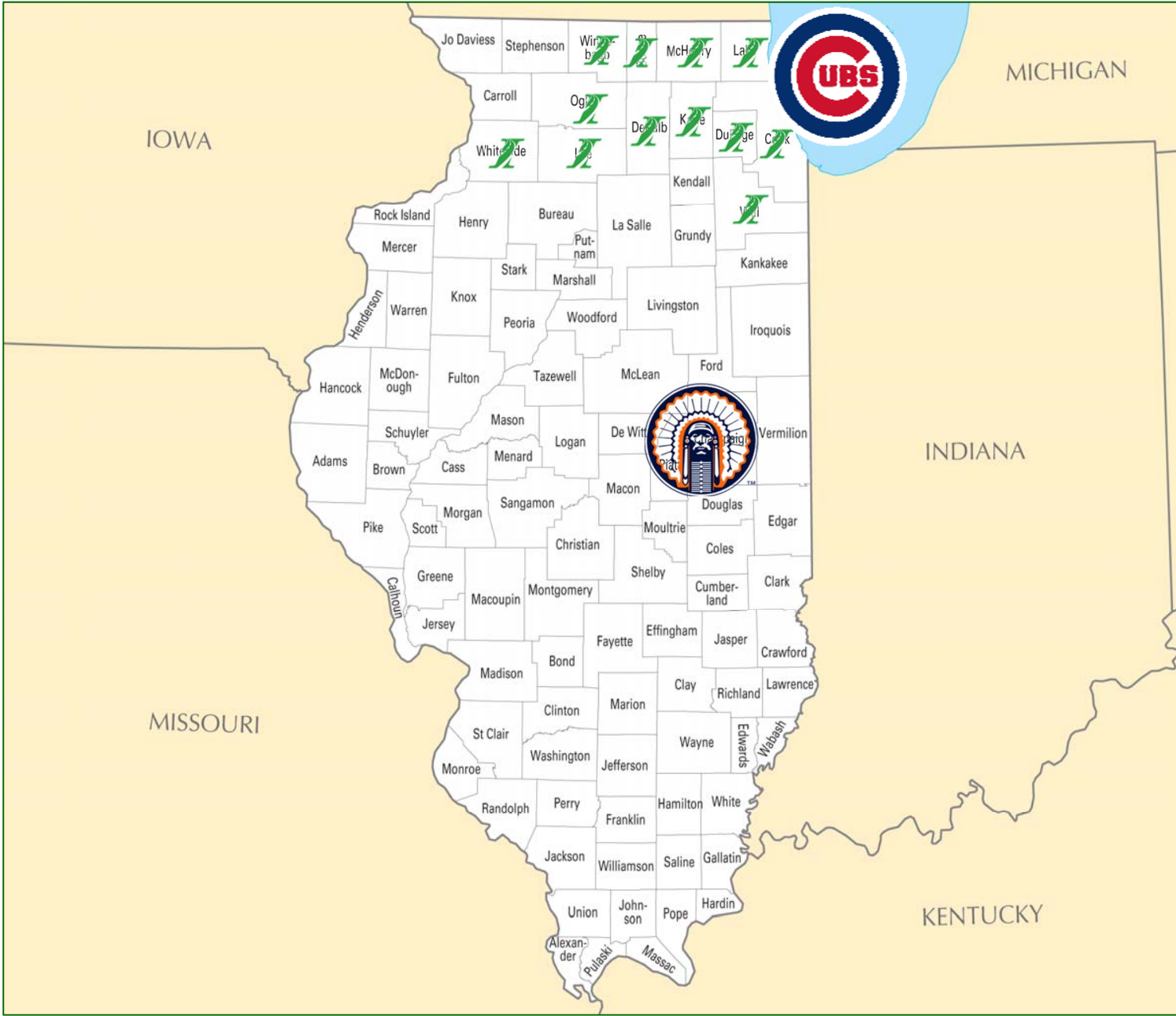


FIELD IMPLEMENTATION OF PERFORMANCE RELATED SPECIFICATIONS

T.H.E. Conference
Sarah Kilroy, P.E.
February 28, 2017

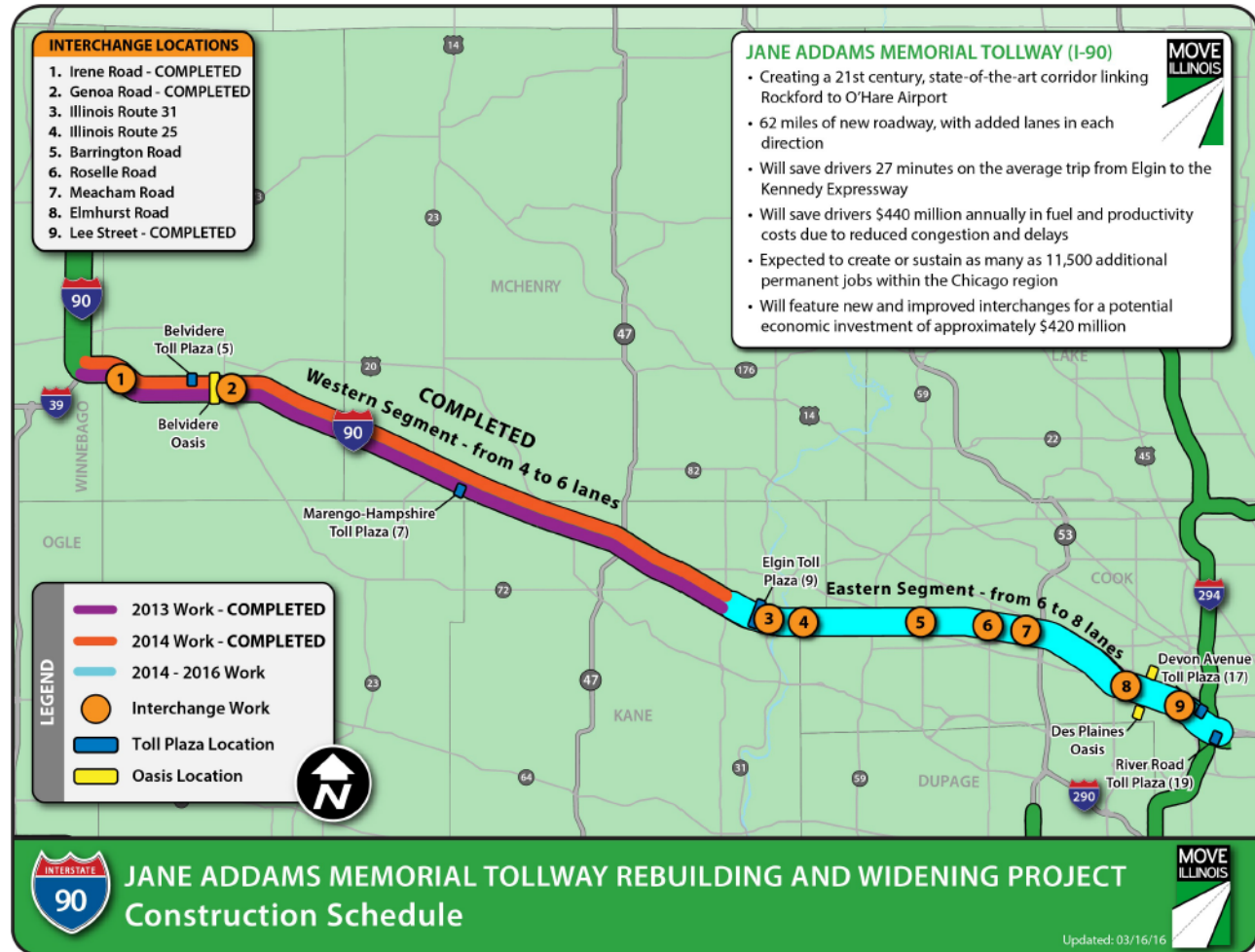




- \$2.5 billion of capital program
- 62 miles of roadway
- Western section completed in 2014
- Eastern Section completed in 2016



I-90 JANE ADDAMS MEMORIAL TOLLWAY



SUMMARY

2015

- Tackle outside lanes and ramps
- 9 mainline Contracts (4 paving Contractors)
- Eastbound and Westbound

2016

- Work in median, Lane 1 & 2
- 8 mainline contracts (5 paving Contractors)
- Eastbound and Westbound
- Completed!



QUALITY TESTING BACKGROUND



Quality Control (QC)

- Provided by General or Paving Contractor
- 100% testing

Quality Assurance (QA)

- Provided by Construction Manager
- PRS testing

Independent Assurance (IA)

- Provided by Tollway
- PRS Testing





ACCEPTANCE QUALITY CHARACTERISTICS

- Plastic Air Content
- 28 Day Compressive Strength
- Thickness
- Effective Dowel Diameter (EDD)
- Smoothness

AQC



PRE CONSTRUCTION PREPARATION

- **Sublot Designation**
- **Data Management**
- **Contractor Interface**
- **Training**

SUBLOT DESIGNATION

- Westbound example

WESTBOUND I-90 MAINLINE - MOT STAGE 1					
SUBLOT NUMBER	LANE 1		LANE 2		LENGTH
	STA. FROM	STA. TO	STA. FROM	STA. TO	
WB-1	3709+00.00	3718+50.00			950'
WB-2			3709+00.00	3718+50.00	950'
WB-3	3718+50.00	3727+95.00			945'
WB-4			3718+50.00	3727+95.00	945'
WB-5	3727+95.00	3737+40.00			945'
WB-6			3727+95.00	3737+40.00	945'
WB-7	3737+40.00	3746+85.00			945'
WB-8			3737+40.00	3746+85.00	945'
WB-9	3746+85.00	3756+30.00			945'
WB-10			3746+85.00	3756+30.00	945'
WB-11	3756+30.00	3765+75.00			945'
WB-12			3756+30.00	3765+75.00	945'
WB-13	3765+75.00	3775+95.00			1,020'
WB-14			3765+75.00	3775+95.00	1,020'
WB-15	3781+05.00	3786+55.72			550.72'
WB-16			3781+05.00	3786+55.72	550.72'
WB-17	3791+39.71	3801+68.17			1,028.46'
WB-18			3791+39.71	3801+68.17	1,028.46'
WB-19	3812+25.00	3821+55.00			930'
WB-20			3812+25.00	3821+55.00	930'
WB-21	3821+55.00	3831+00.00			945'
WB-22			3821+55.00	3831+00.00	945'



RANDOMIZED TEST LOCATIONS

- Independent Assurance (IA) provides excel spreadsheet
- Air, strength, thickness, and dowel bar locations

JT420186 - PERFORMANCE RELATED PORTLAND CEMENT CONCRETE PAVEMENT 13" (JOINTED)							AIR				STR
MOT STAGE	SUBLOT NO.	LANE	STA. FROM	STA. TO	DIRECTION	LENGTH	STA-1	STA-2	STA-3	STA-4	STA-#
1	WB-1	4	3590+40.00	3600+75.00	WB	1035.00	3593+72.44	3595+07.92	3599+77.92	3594+24.19	2
1	WB-2	3	3593+55.00	3603+45.00	WB	990.00	3597+20.61	3594+84.99	3602+82.53	3600+65.92	3

DATA MANAGEMENT

Created spreadsheet to manage quality characteristic data

- Each Contract has unique spreadsheet that contains specific eastbound and westbound sublots

This spreadsheet is used for computing the pay adjustment according to the performance-related specifications for rigid pavements as specified in the **PERFORMANCE-RELATED PORTLAND CEMENT CONCRETE PAVEMENT, JOINTED – 13 INCH (Tollway) Effective: August 22, 2014 & Revised: October 2014**

Enter Contract Number, Bid Price, Then Enter Strength, Thickness, Dowel Diameter, Air Quality, Smoothness in the appropriate Data sheet

Strength Quality Pay Factor:	100.6
Thickness Quality Pay Factor:	100.8
Dowel Diameter Quality Pay Factor:	99.5
Air Quality Pay Factor:	101.0
Smoothness Quality Pay Factor:	95.2
Calculated Pavement Quality Pay Factor:	97.0
85% and 105% Limited Pavement Quality Pay Factor:	97.0

CONTRACT NUMBER:

BID PRICE (\$/sq. yd.):

PRS AREA (sq. yd.):

Pay Adjustment (\$):



SUBMITTING DATA TO CONTRACTOR

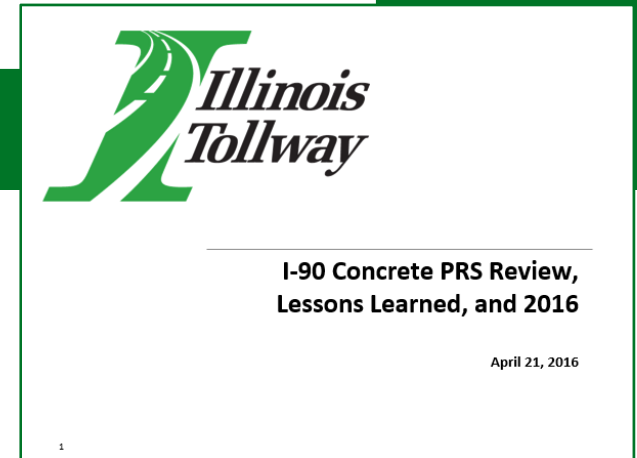


- Created new process within existing project documentation management system
- Submit data
- Review; Accept or Dispute
- Track Process Completion

EDUCATION & TRAINING



- Contractor
- QC Technicians
- Construction Management Team
- QA Technicians and Lab





FIELD IMPLEMENTATION

- **Typical Process**
- **Disputes**
- **Necessary Adjustments**

PRS TESTING PROCESS: DAY BEFORE

**Material Coordinator
identifies sublots**

**Contractor is planning to
pave**

- Make any location or subplot adjustments if necessary
- Document any adjustments

IA places thickness plates



PRS TESTING PROCESS: DAY OF



Plastic Air Content

- Measured by Quality Assurance (QA)
- At random station location
- 4 tests per sublot



PRS TESTING PROCESS: DAY OF

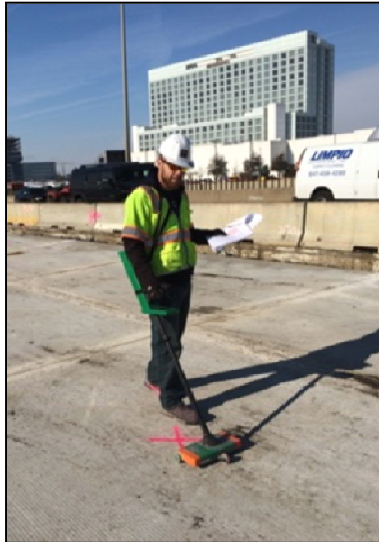


28 – Day Compressive Strength Specimen

- QA provides cylinder molds, lids
- QC casts specimens, protect on site, deliver to lab
- 1 test tied to plastic air test per subplot

PRS TESTING PROCESS: DAY AFTER

In the field:



In the office:



I-MIIRS

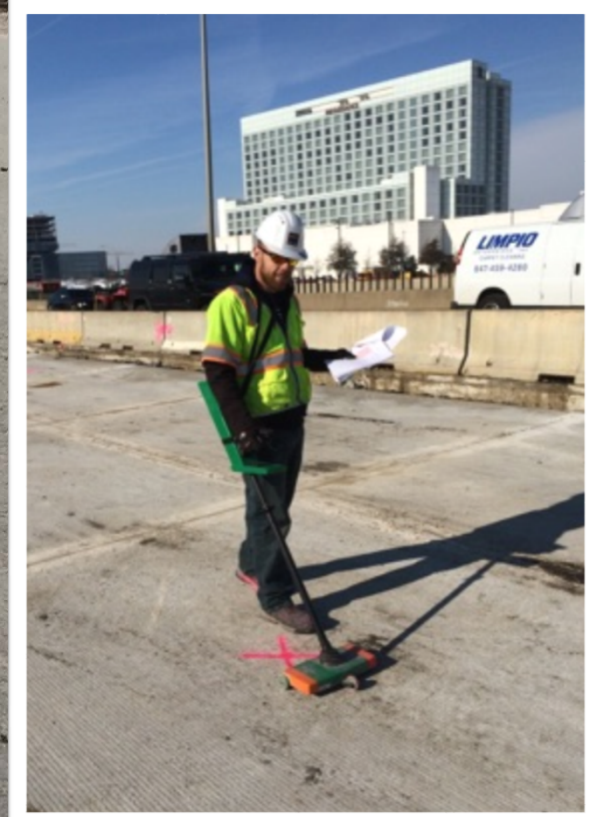


CYLINDER PROTECTION

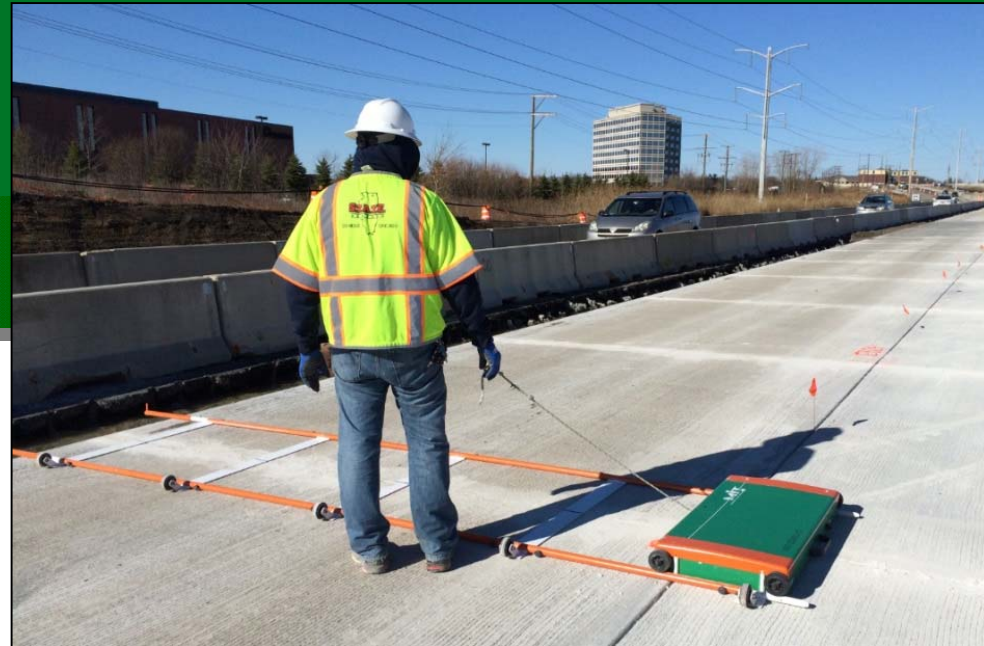


PRS DAY AFTER: PAVEMENT THICKNESS

- MIT Scan T2 (IA)
- 6 plates; 4 used for pay factor
- All 6 locations measured

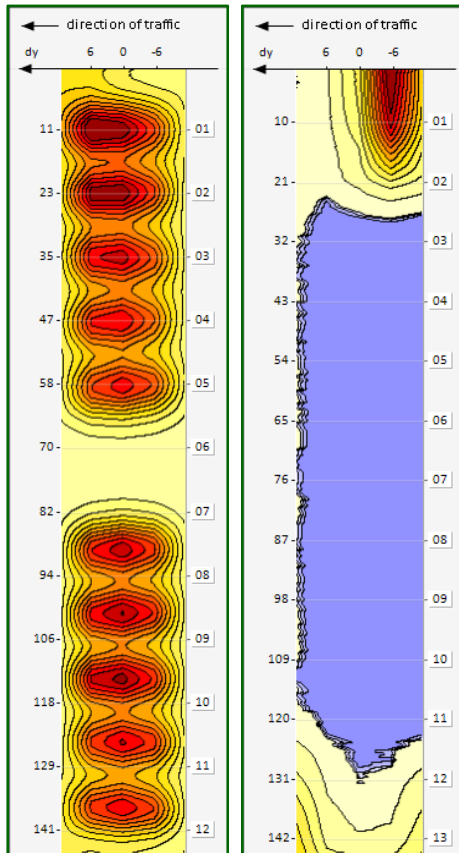


PRS DAY AFTER: DOWEL BAR ALIGNMENT TESTING



- MIT Scan2 BT (IA)
- 5 joints per subplot
- Calculate Effective Dowel Diameter (EDD)
- Target: 1.50
- Dowel baskets and DBI

PRS DAY AFTER: EFFECTIVE DOWEL DIAMETER (EDD)



Contract **I-15**

Sublot	Station	Construction Date	Test Date	EDD	Joint Score
WB-08	3743+15	10/25/2016	10/27/2016	0.00	5
WB-08	3743+30	10/25/2016	10/27/2016	1.50	3
WB-08	3743+45	10/25/2016	10/27/2016	1.50	1
WB-08	3743+60	10/25/2016	10/27/2016	1.50	1
WB-08	3743+75	10/25/2016	10/27/2016	1.50	1

Dowel Diameter (inches):	1.50
PCC Thickness (inches):	13.0
Scan Direction Outside Joint to Inside Joint:	N (Y = Yes OR N = No)
Slab Width (ft):	12.0

PRS TESTING PROCESS: 28+ DAYS AFTER

- At 28 days, QA tests cylinders and uploads compressive strength results to I-MIRS
- GC/CM/CCM coordinate smoothness testing with IA



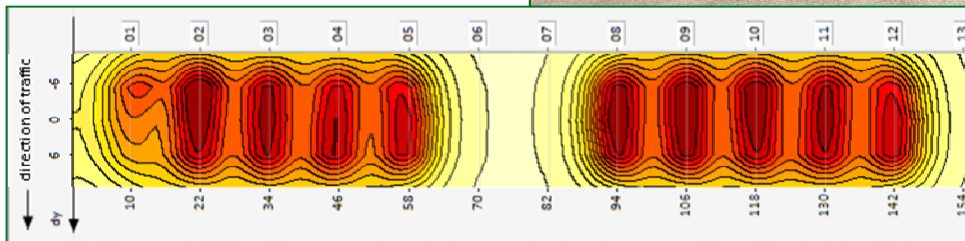
SMOOTHNESS DATA COLLECTION

- Truck mounted inertial profiler (IA)
- Measured in each wheel path of each subplot
- International Roughness Index (IRI)
- Target: 60 in/mi
- Rejectable: > 80 in/mi
- Allowed retesting, re-retesting, re-re-retesting, re-re-re-retesting...



DISPUTE RESOLUTION

- Plastic Air Content
- 28-day Compressive Strength
- Pavement Thickness
- Effective Dowel Diameter (dowel alignment)
- Smoothness





NECESSARY ADJUSTMENTS

- Plastic air content test location
- Limits of sublot due to hand pour
- Inclement weather



ADJUSTING TEST LOCATION

- A random air test located within first three truckloads is moved to the fourth truckload
- Multiple air tests in one (1) load
- Rule of thumb: 25 ft.
- Casting strength specimens during dual lane paving

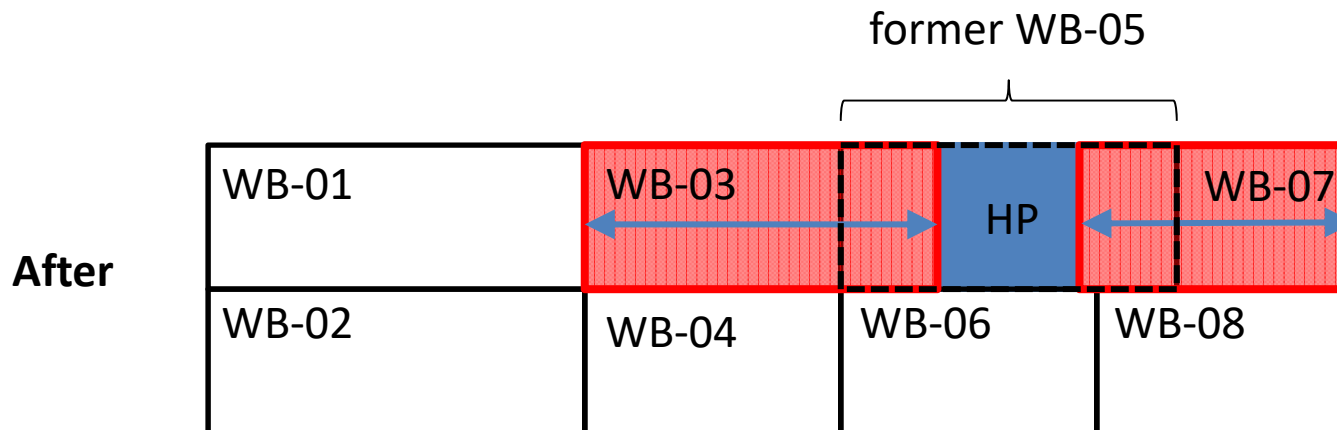


SUBLOT LIMITS

GC responsible to identify any hand pour locations with CM/Material Coordinator

Before

WB-01	WB-03	WB-05	WB-07
WB-02	WB-04	WB-06	WB-08



ENVIRONMENTAL FACTORS

- 2015: conditions required cold weather protection
- Strength and smoothness not used in Composite QPF Calculation



FINAL THOUGHTS



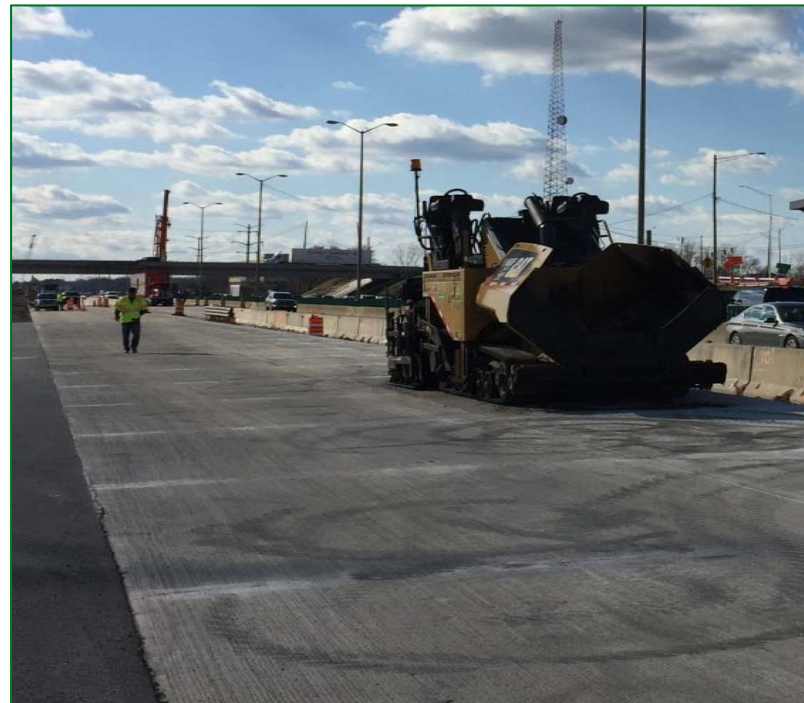
FULL ATTENTION TO PRS PAVEMENT

Diminished resources from other activities



SMOOTHNESS TESTING OBSTACLES

- Equipment, traffic control or construction operations on pavement
- Pavement not cleaned properly



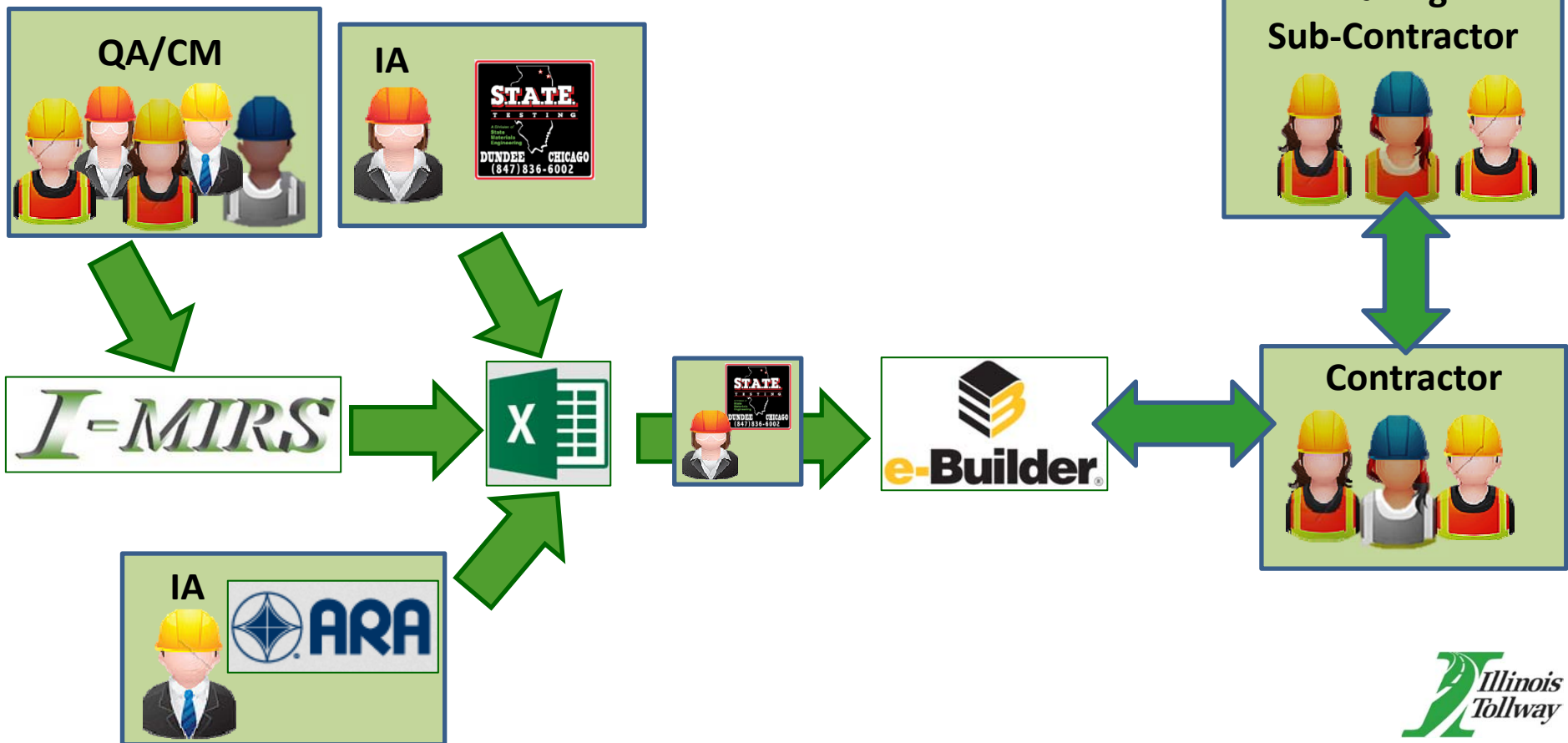
SUCSESSES & IMPROVEMENTS

- Overall success!
- \$\$\$ incentives
- Contractor generally given benefit with any issue, error, concern
- Important that the Tollway was willing to compromise
- \$ dis-incentives
- Project close out can take time
- Change/evolution CAN be good



DATA MANAGEMENT

- Not fully automated at this point
- Large volume of data input to monitor
- Timeliness of Data submission



INCENTIVE \$\$\$

PERFORMANCE-RELATED PORTLAND CEMENT CONCRETE PAVEMENT, JOINTED – 13 INCH (Tollway) Effective: August 22, 2014 & Revised: Octo

Enter Contract Number, Bid
Then Enter Strength, Thickn
in the appropriate Data she

Strength Quality Pay Factor:	101.8
Thickness Quality Pay Factor:	101.0
Dowel Diameter Quality Pay Factor:	99.9
Air Quality Pay Factor:	101.4
Smoothness Quality Pay Factor:	99.9

CONTRACT NUMBER:

BID PRICE (\$/sq. yd.): \$

PRS AREA (sq. yd.):

Calculated Pavement Quality Pay Factor: 104.0

85% and 105% Limited Pavement Quality Pay Factor: 104.0

Pay Adjustment (\$):



THANK YOU

