IDOT Update

Looking Forward

2012 Illinois Bituminous Paving Conference

December 12, 2012

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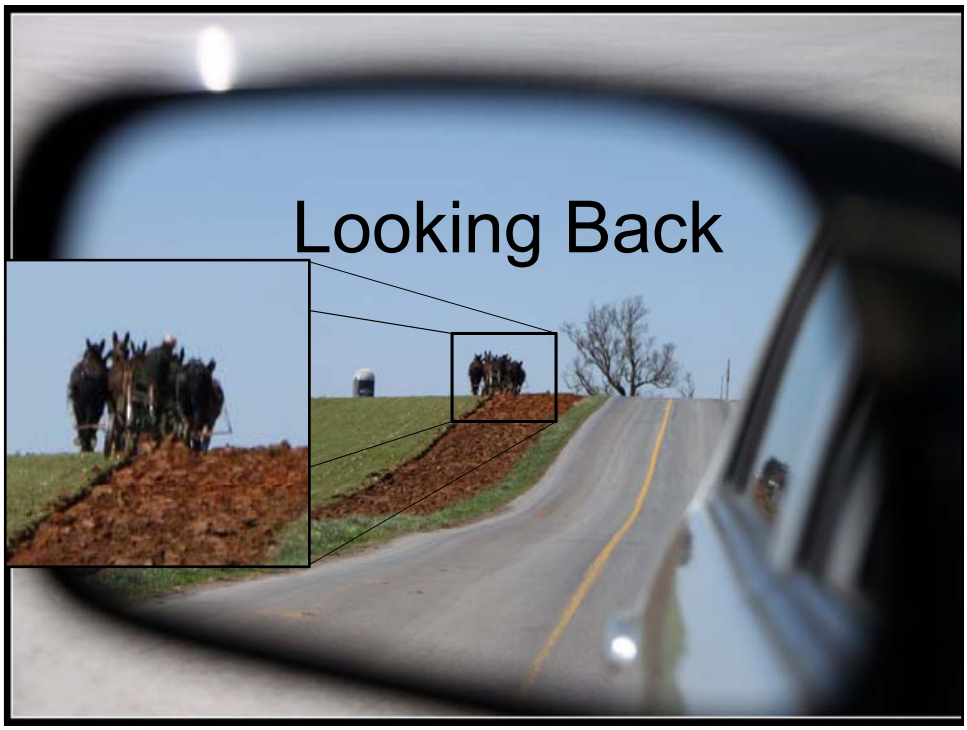
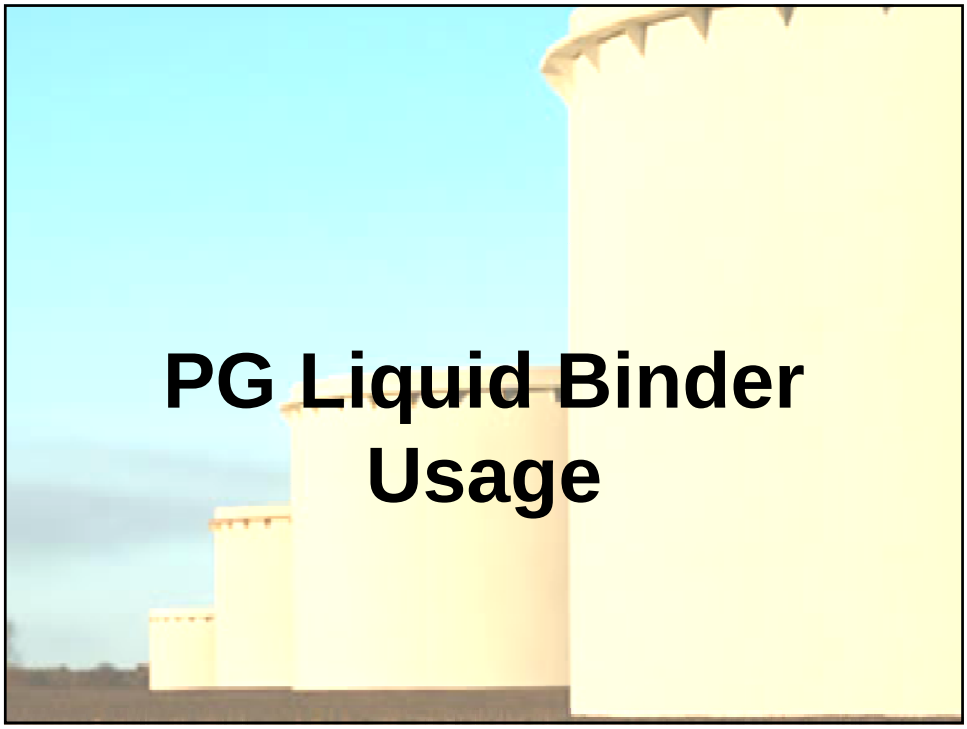
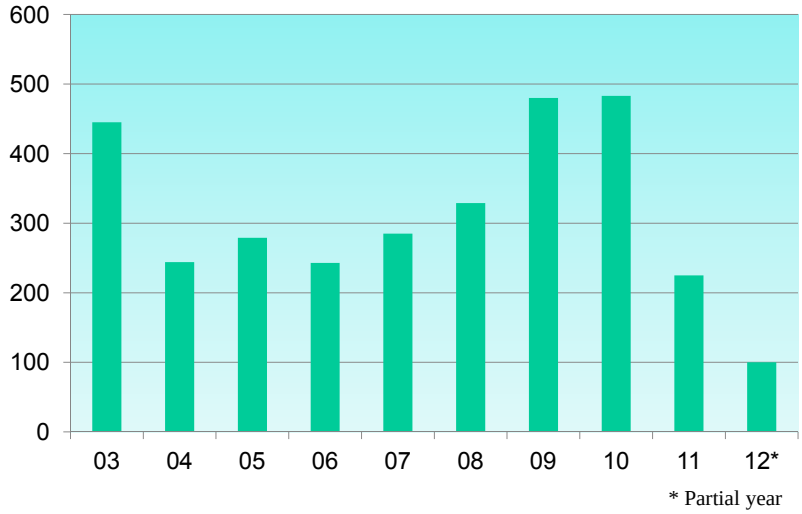
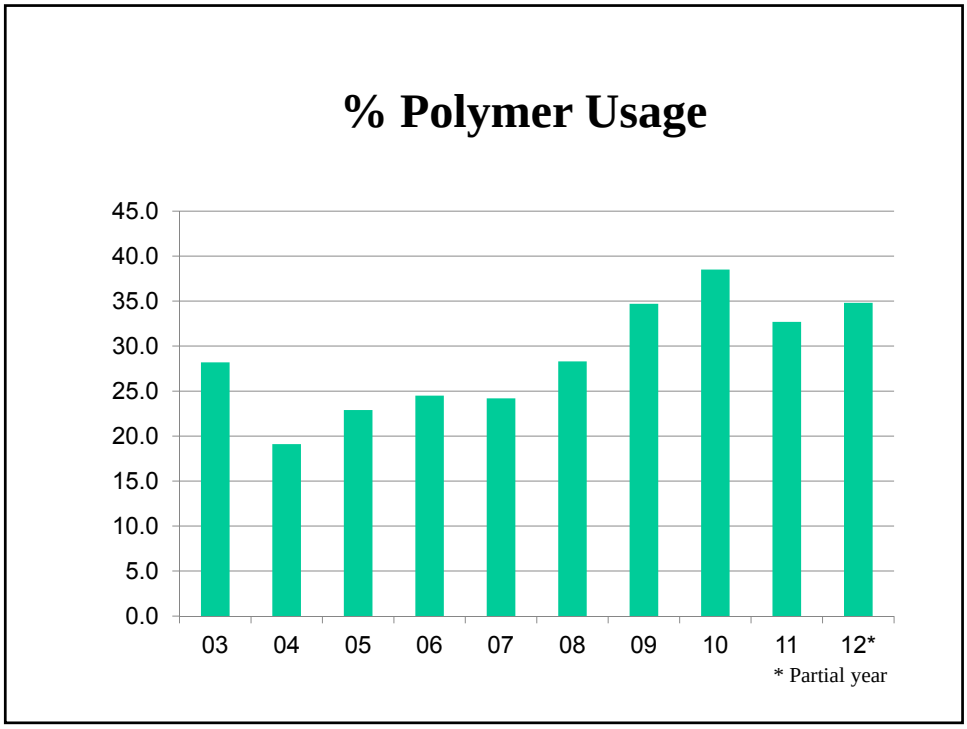


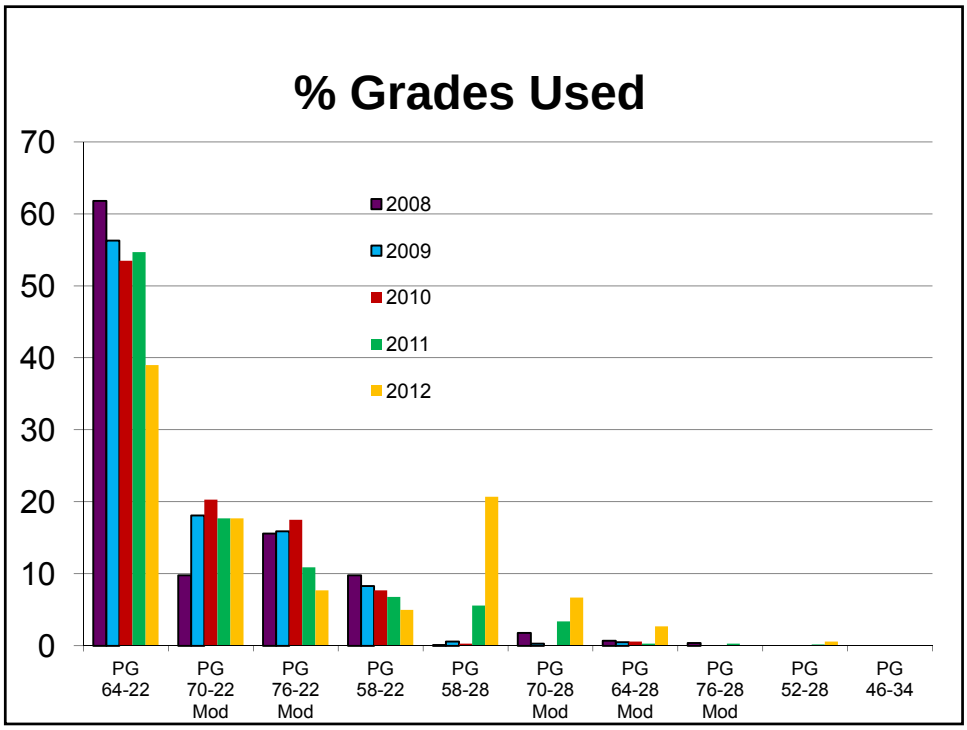


PG Binder Used (in thousand tons)

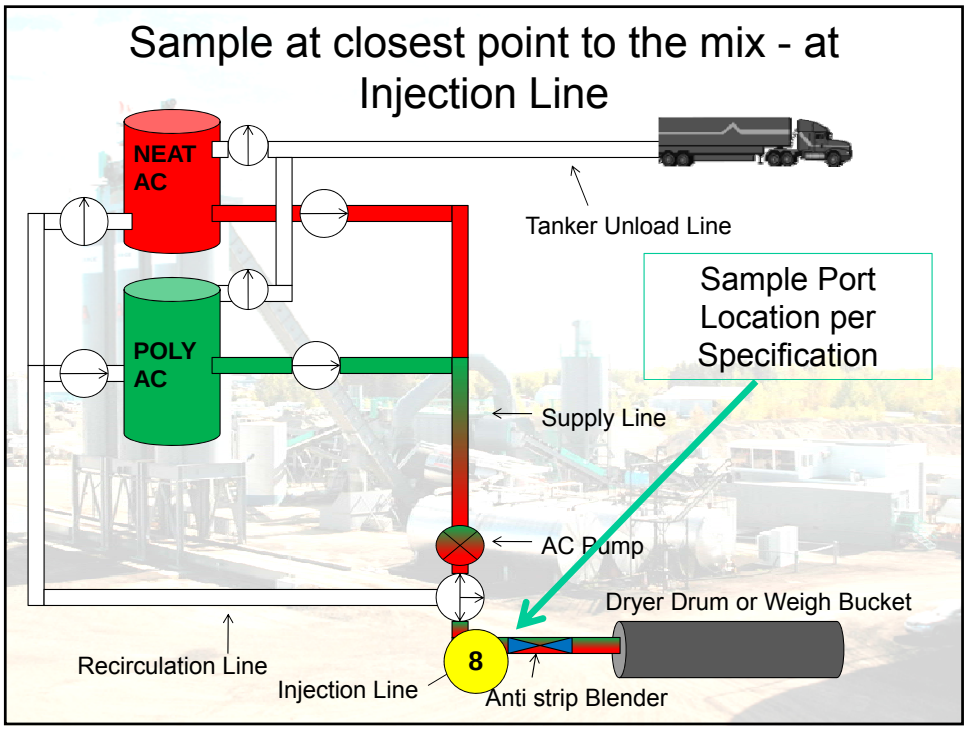


* Partial year


% Polymer Usage
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
03
04
05
06
07
08
09
10
11
12*
* Partial year


% Grades Used
70
60
50
40
30
20
10
0
2008
2009
2010
2011
2012
PG 64-22
PG 70-22 Mod
PG 76-22 Mod
PG 58-22
PG 58-28
PG 70-28 Mod
PG 64-28 Mod
PG 76-28 Mod
PG 52-28
PG 46-34


Liquid AC Sampling
at
HMA Plants


Sample at closest point to the mix - at Injection Line
NEAT AC
POLY AC
Tanker Unload Line
Sample Port Location per Specification
Supply Line
AC Pump
Dryer Drum or Weigh Bucket
8
Recirculation Line
Injection Line
Anti strip Blender

2012 District PG INV Field Samples

As of 11/21/12

District	Sample Total	Off Test	% Off Test
1	345	8	2.3
2	81	3	3.7
3	89	3	3.4
4	88	1	1.1
5	123	0	0
6	136	0	0
7	166	1	0.6
8	250	2	0.8
9	96	0	0
TOTAL	**1374**	**18**	**1.3 %**

District PG Investigative Field Samples

As of 11/21/12
2012 (2011) (2010)

District	Sample Total	Off Test	% Off Test
1	345 (357) (654)	8 (11) (12)	2.3 (3.1) (1.8)
2	81 (122) (215)	3 (3) (4)	3.7 (2.5) (1.9)
3	89 (57) (121)	3 (0) (1)	3.4 (0) (0.8)
4	88 (112) (223)	1 (0) (0)	1.1 (0) (0)
5	123 (95) (176)	0 (0) (0)	0 (0) (0)
6	136 (189) (227)	0 (2) (2)	0 (1.1) (0.9)
7	166 (179) (209)	1 (0) (1)	0.6 (0) (0.5)
8	242 (260) (249)	2 (0) (7)	0.8 (0) (2.9)
9	81 (99) (122)	0 (1) (2)	0 (1.0) (1.6)

PAY FOR PERFORMANCE

PFP Implementation Schedule

- ✓2010
  - ✓Min. One PFP project / District
    - ✓≥ 8,000 tons individual mix
- ✓2011
  - ✓Min. 50% of all Interstate or Supplemental Expressway
    - ✓ ≥ 8,000 tons / mix
- 2012
  - All Interstate & Supplemental Expressway
    - ≥ 8,000 tons / mix

PFP/QCP Implementation Schedule Revised

- 2013 & 2014 & Beyond
  - ~~PFP will be expanded to include:~~
    - ~~Interstate & Non-Interstate projects ≥ 4,000 tons~~
      - ~~50% in 2013~~
      - ~~100% in 2014~~
  - PFP full implementation (above 8,000 tons)
  - QCP for projects < 8,000 tons
    - 2 Projects/District in 2012
    - 50% in 2013
    - 100% in 2014 – start rollout for LR&S jobs

2012 PFP Projects

District	Projects	Tons	% Jobsite
1	6	87398	0
2	1	8,516	100
3	3	99,227	100
4	2	57,807	100
5	6	97,522	50
6	2*	76,000**	100
7	6(7*)	141,757	100
8	1 (3*)	8,000 (44,000)	100
9			
Total	25 (30*)	476,851 (612,227)	

* With carryover
**Approximate

2012 PFP Projects

District	Projects	Surface	Binder
1	6	6	0
2	1	1	0
3	3	1	2
4	2	1	1
5	6	3	3
6	2*	1	1
7	6(7*)	5	2
8	1 (3*)	1	2
9			
Total	25 (30*)	19	11

* With carryover

2012 PFP Project Disputes

District	Projects	Disputes	
		Mix	Cores
1	6	3	9
2	1	15	5
3	3	0	0
4	2	0	0
5	6	0	0
6	2*	3	1
7	6(7*)	2	20
8	1 (3*)	2	0
9			
Total	25 (30*)	25	35

*Carryover

Average Pay

- Binder = 99.7
- Surface = 100.0
- Overall = 99.9

PFP Spec Revisions for 2013

- Increase timeframe for submittal of QC results to 48 hrs (allows aging to match IDOT)
- Exclude outer one foot of unconfined edge from random core calculations
  - Institute random 1test/half mile/unconfined edge core density with pay adjustment table similar to Dust/AC

Unconfined Edge Density Pay Adjustment Table

Density	Deduct / half mile / unconfined edge
≥ 90%	$0
89.0% to 89.9%	$1000
88.0% to 88.9%	$3000
< 88.0%	Outer 1.0 foot will require remedial action acceptable to the Engineer

QUALITY CONTROL FOR PERFORMANCE

2012 QCP Projects

District	Contract #	Mix Application	Tons	Pay	# of Mix Sublots tested by District
2	64529	N70 F Surf	5400	100%	2/6 = 33%
3	66A75	Surface	9,840	93.8%	10/10 = 100%
3	66A75	4.75 mm L.B.	4,920	99.5%	5/5 = 100%
3	66644	Surface	5,124	100.0%	5/5 = 100%
3	66644	4.75mm L.B.	2,509	100.0%	1/3 = 33%
8	76E52	Binder	1967	100.0%	2/2 = 100%
8	76E52	Surface	4103	100.0%	4/4 = 100%
9	78271	4.75 leveling Binder	6251.2	99.4%	2/7 = 29%
9	78271	C Surface	12929.6	97.9%	4/13 = 31%
			53,044	**99.0%**	**70%**

QCP Spec Revisions for 2013

1. Cap each Pay Parameter Prior to Calculating the Combined Pay Factor
2. Adjust Ranges for 103% Pay
3. Adjust Density for 95% Pay
4. Clarify Additional Dept. Testing/Results May be Included in Pay Calcs
5. Change Acceptable Limits density range for IL-4.75 from 92.0-98.0% to 90.0-98.0%
6. Increase timeframe for submittal of QC results to 48 hrs (allows aging to match IDOT)

Startup and Mix Issues

Startup/Test Strip Issues

- Adopt the same Acceptable Limits as PFP & QCP for Test Strips
- In addition to meeting JMF, the Voids must be within 2.0% - 6.0% for Dept to pay for Test Strip

Mix Changes

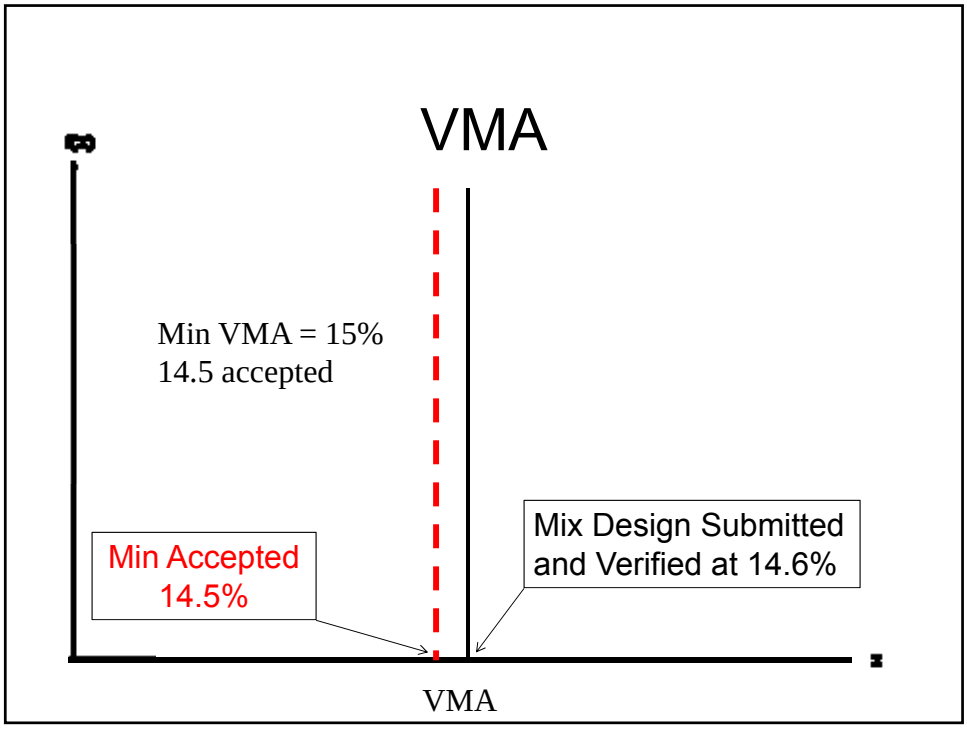
- Eliminate:
  - N105 Surface & Binder Mixes
  - IL-12.5mm Surface Mixes
- For 9.5mm mixes move to 32% passing #8
- Significant Figures & Rounding Issues
  - IDOT will Form Committee to Address
- Considering Min VMA of 15.0% instead of 15% (14.5%) for 9.5 mm mixes – will be delayed at least until 2014

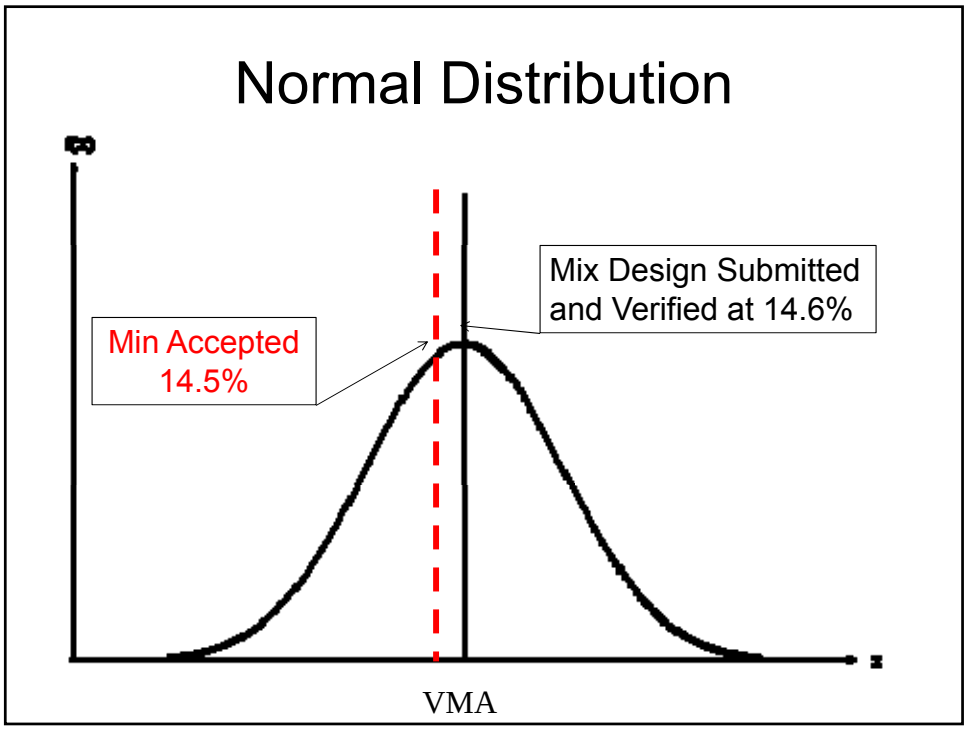
Streamlining Mix Design Verification

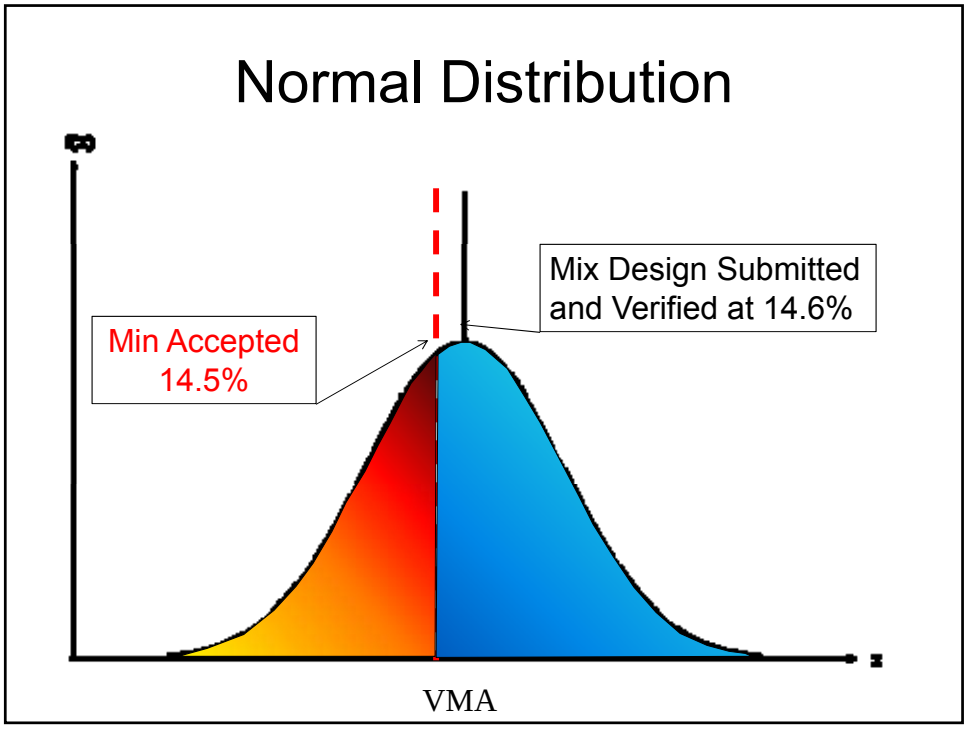
- Option in Verification Procedure to allow Districts to paper verify w/ mix testing performed only on TSR & Hamburg Wheel

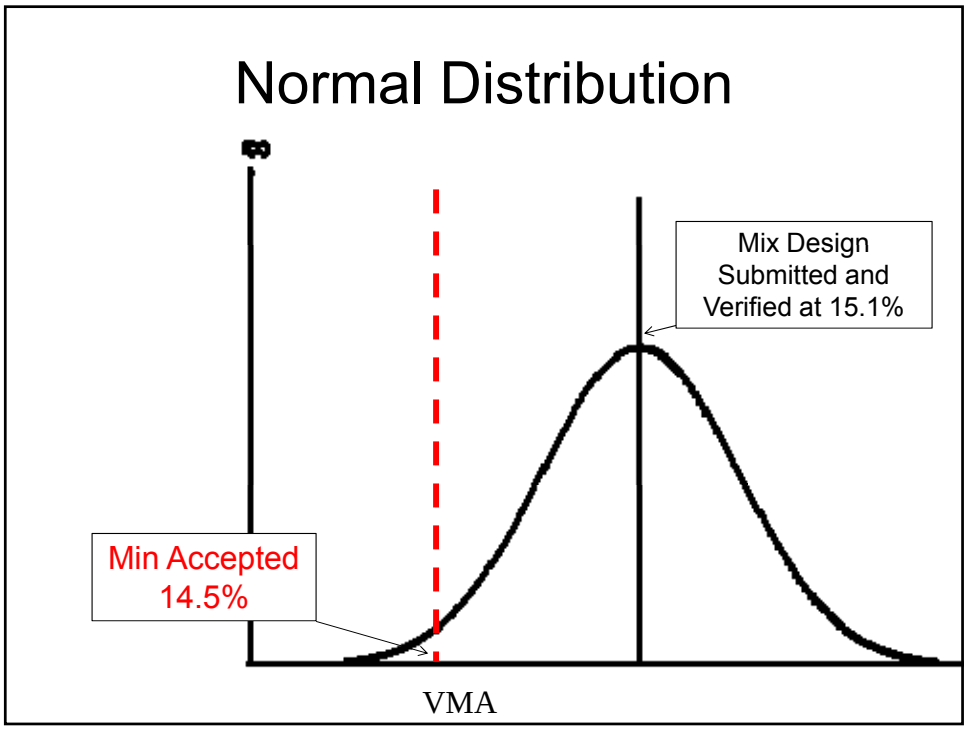
Walking on the Edge Issues

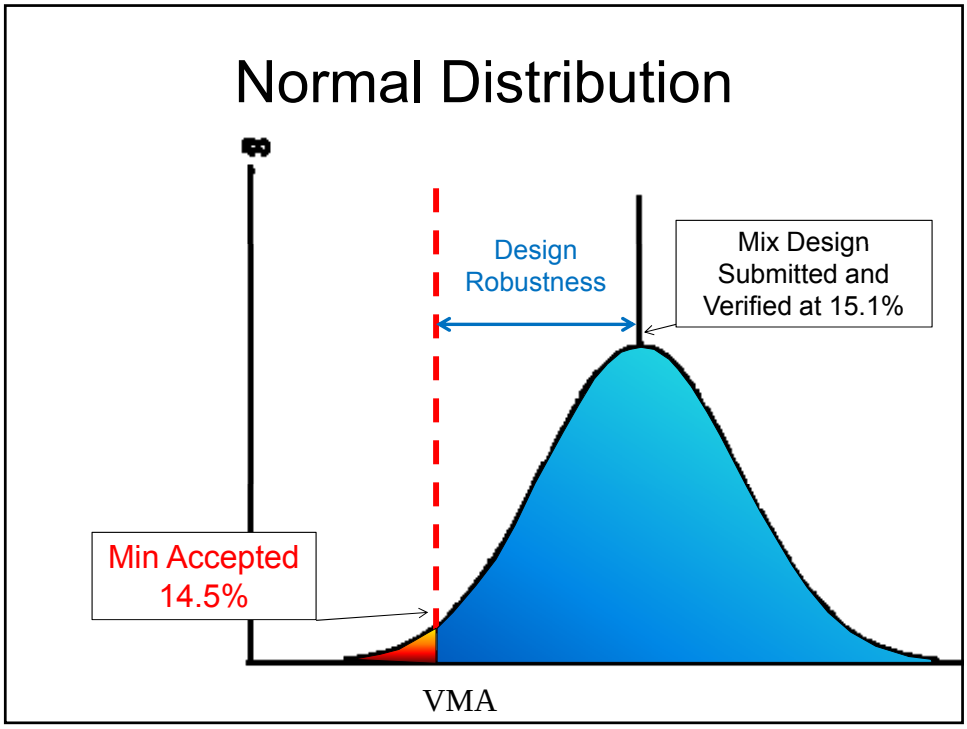
- Mix designs that barely meet criteria – send for verification on a wing and prayer
  - Just barely passed – a good thing right?
  - Cheap source but highly variable gradation may be costly in the end
- Bad Sampling methods

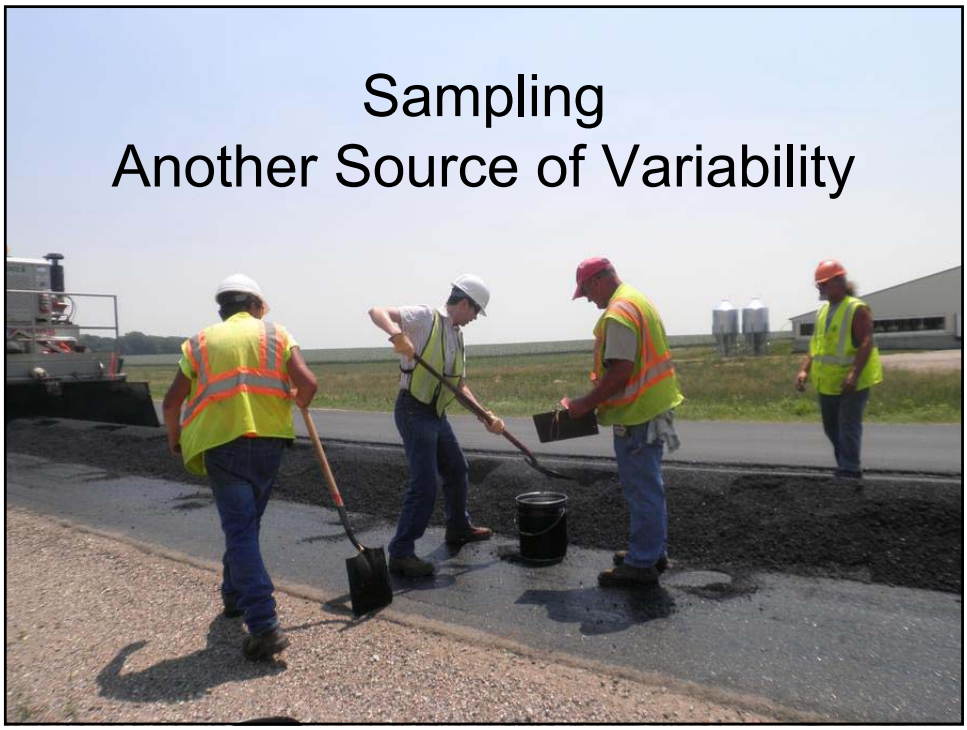

VMA
Min VMA = 15%
14.5 accepted
Min Accepted
14.5%
Mix Design Submitted
and Verified at 14.6%
VMA


Normal Distribution
Mix Design Submitted
and Verified at 14.6%
Min Accepted
14.5%
VMA


Normal Distribution
Mix Design Submitted and Verified at 14.6%
Min Accepted 14.5%
VMA


Normal Distribution
Mix Design Submitted and Verified at 15.1%
Min Accepted 14.5%
VMA


Normal Distribution
Design Robustness
Mix Design Submitted and Verified at 15.1%
Min Accepted 14.5%
VMA


Sampling
Another Source of Variability

Avoid the Cliff!

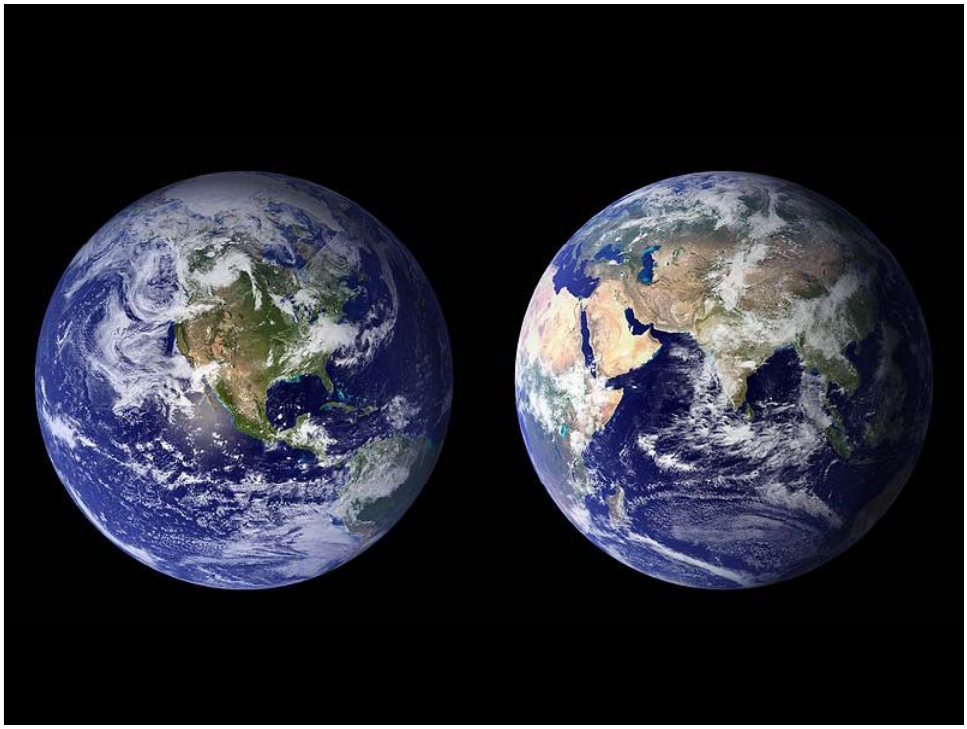
- Don't carry bad QC/QA habits to PFP or QCP
  - Seek "robust" designs that allow a margin of variability
  - Recognize lab to plant issues i.e. VMA collapse
- Make sure sampling is representative
  - If sample is questionable – combine all material, re-blend and re-split while being witnessed
- Poor sampling, marginal mix design, ignoring lab to plant issues (dust/VMA collapse) and variable aggregate supply
  - Bad combinations!
  - Adds up to Remove and Replace $$$

Fine Mix HMA

- Less large stone on large stone
- Relies on crushed fine on fine fractions
- Larger stone floats in matrix
- Why?
  - Improved compactability– Higher Joint Density
  - Less permeable
  - Longer life
  - Less Segregation

Update

- Slow rollout – more trials in 2013
- ICT Fine Graded Research:
  - Lab Testing Complete – Favorable Results
  - ATLAS Testing In-Progress
- Districts 3, 5, 7 and 8 now using fine graded binder
- District 9 will be using soon



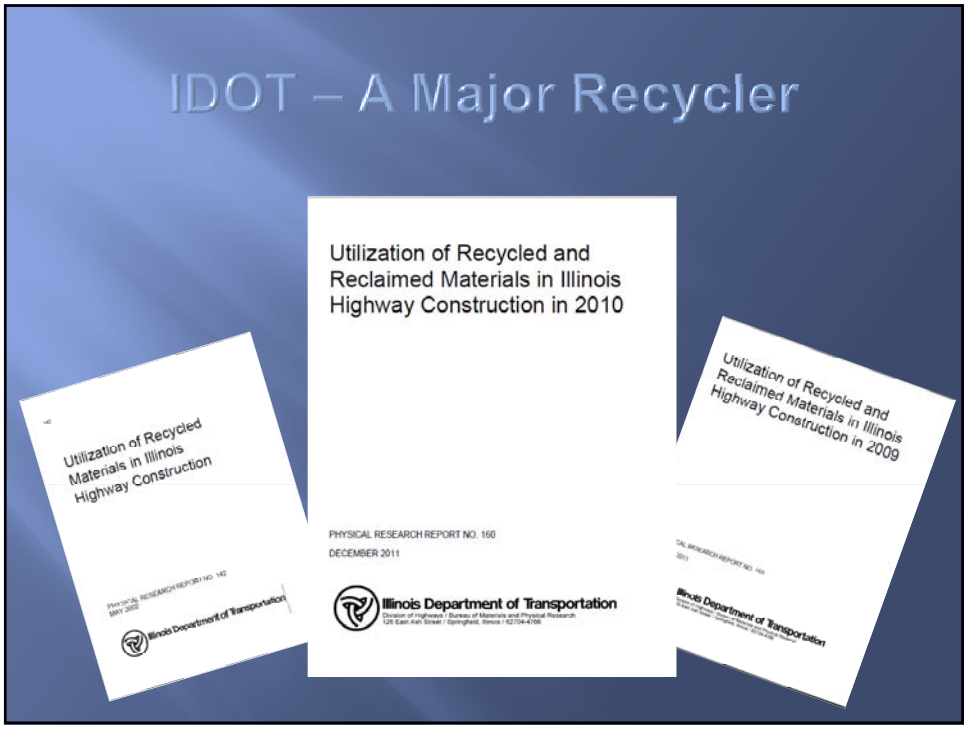
Sustainability:

Is the capacity to endure. For humans, sustainability is the long-term maintenance of responsibility, which has environmental, economic, and social dimensions, and encompasses the concept of stewardship, the responsible management of resource use. (Wikipedia)

Green Movement

Elected officials can't help themselves for voting "green"

Green Road Ahead


IDOT – A Major Recycler
Utilization of Recycled and Reclaimed Materials in Illinois Highway Construction in 2010
PHYSICAL RESEARCH REPORT NO. 160
DECEMBER 2011
Illinois Department of Transportation
Utilization of Recycled Materials in Illinois Highway Construction
Utilization of Recycled and Reclaimed Materials in Illinois Highway Construction in 2009


Recycled and Reclaimed Materials Utilized in Highway Construction 2010
Utilization of Recycled and Reclaimed Materials in Illinois Highway Construction in 2010
DECEMBER 2011
Illinois Department of Transportation
Very popular report especially after elections
http://www.dot.il.gov/materials/research/pdf/prr160.pdf

Recycled and Reclaimed Materials Utilized in Highway Construction 2010

- Air-Cooled Blast Furnace Slag
- By-Product Lime
- Crumb Rubber
- Fly Ash
- Glass Beads
- Glass Cullet
- Ground Granulated Blast Furnace Slag
- Microsilica
- Reclaimed Asphalt Pavement
- Reclaimed Asphalt Shingles
- Recycled Concrete Material
- Steel Reinforcement
- Steel Slag
- Wet-Bottom Boiler Slag

2010 Recycling

- 1.7M Tons
  - 73,913 semi truck loads
  - Line of Trucks 700 miles long
  - Downtown Chicago to Mississippi River on I-57 (both directions)
- Value $53M

Recycling Research

- Past few years have completed several studies to address recycling issues
  - Quality of materials
  - Engineering of end product
  - Health and safety issues
- Illinois Center for Transportation
  - http://www.dot.il.gov/materials/research/ict.html
- Bureau of Materials and Physical Research
  - http://www.dot.il.gov/materials/research/reports.html
- FHWA – RAP Expert Task Group (ETG)
  - http://www.morerap.us/index.html

Need for "Greener" & Low Cost Options Going Forward


PAVEMENT PRESERVATION


HOT-In-place Recycling
GALLAGHER
ASPHALT


COLD In-place Recycling

RAS – Type I vs. Type II

Type I – New material (Pre-Consumer)

Type II – Roof Tear-Off's (Post-Consumer)

Two Sources

- Manufacture "waste" – Type I
  - Not technically "waste" but IL EPA monitors usage
    - Apply for Benefitual Use Determination (BUD)
- Tear-offs – Type II
  - Headed for landfill as waste
  - To reclaim/divert from landfill
    - Must follow regulatory processes of ILEPA
      - No hazard to environment
      - Benefitual use of material
      - Apply for Benefitual Use Determination (BUD)
    - BUD's granted by ILEPA before use in IDOT project

Construction and Demo Debris Recycling - MBL

Landfill $$: IN Only
C & D Site $: IN = OUT

INCOMING

- New Building Waste
  - Lumber, pallets and plywood
  - Metal
  - Drywall scrap
  - Contractor waste bags/containers
  - Scrap roofing/siding/flooring
  - Waste containers
  - Carpet
  - Brick/block/stone/concrete/ tile
- Mixed Demo Waste
- Tear-off Roofs/shingles

OUTGOING

- Wood Scrap
  - Mulch
  - Fuel for power generation
- Aluminum scrap
- Copper scrap
- Steel/iron scrap
- Plastic/vinyl scrap
- Recycled Aggregate (brick, stone, tile & concrete)
- Shingles (sorted)
- Fiber
- True waste – landfill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Sort and Grind

- Final sort
- Grind
- Screen
- Ready for HMA

Engineering Asphalt Binder Replacement (ABR)


Goldilocks HMA Mix
Not too hard
Not too soft
“Just right”


Too Hard

Controls

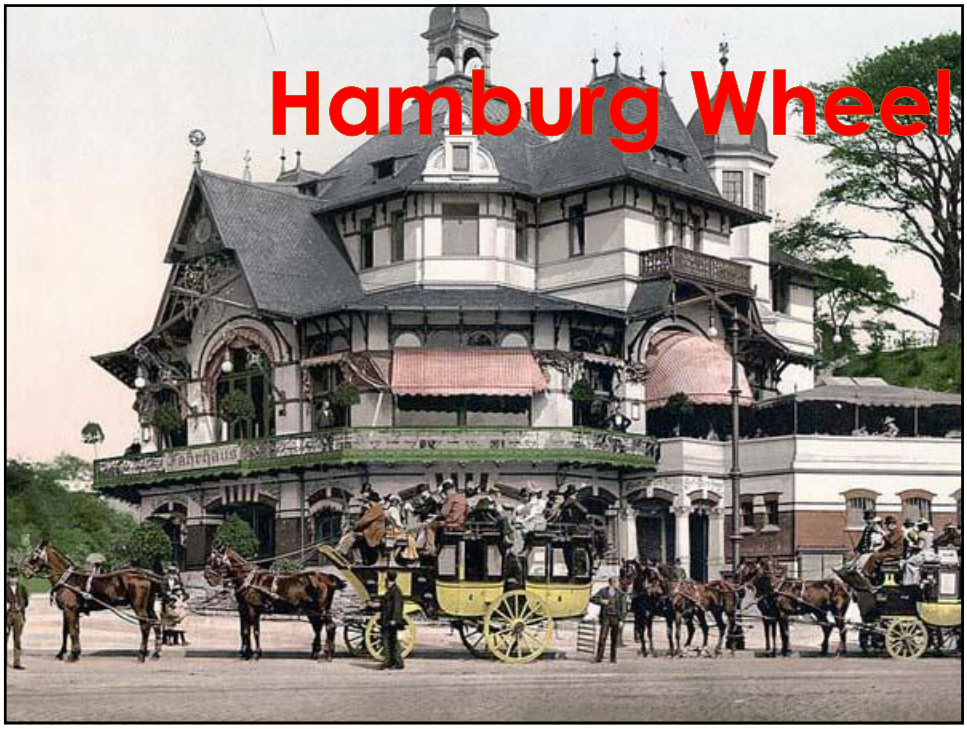
- Too Soft
  - Stripping – TSR
  - PG Grade selection (Polymer)
  - Hamburg
- Too Hard
  - Limits on Replacement Asphalt (RAP/RAS %)
  - Grade bumps down with higher replacement %
  - Max Tensile Strength
  - Fracture toughness requirement (under research)

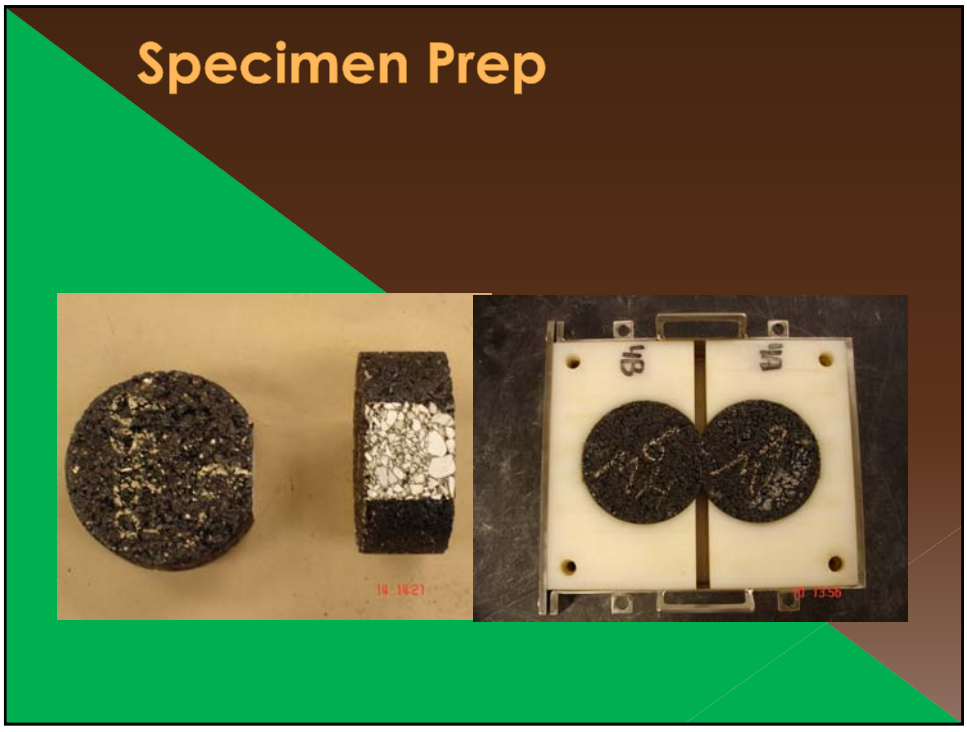
Controls

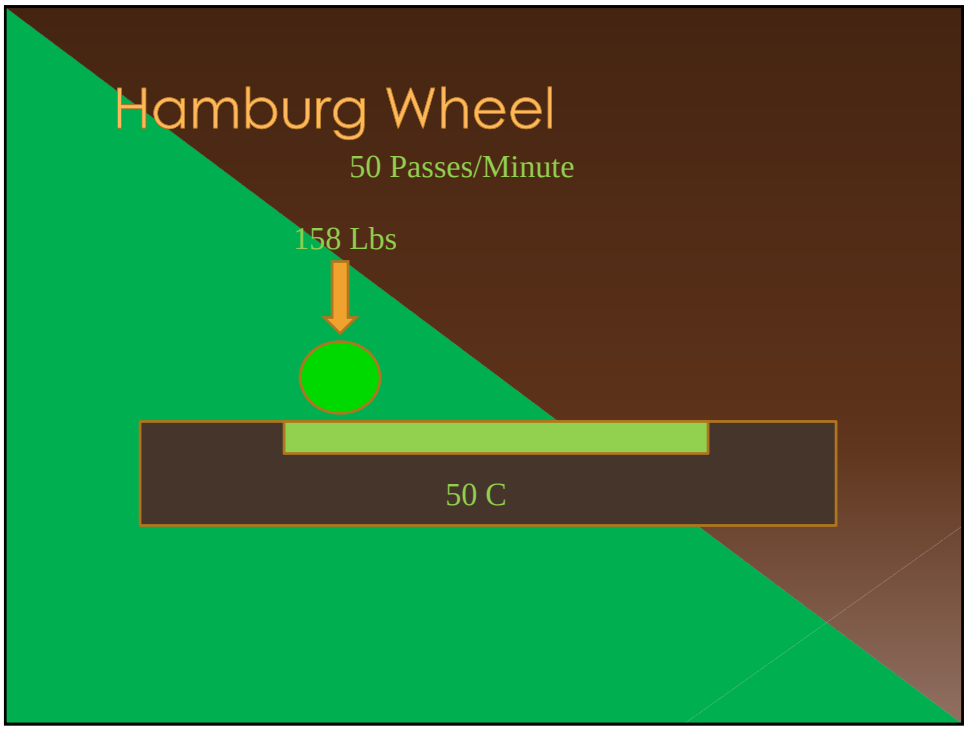
- Too Soft
  - Stripping – TSR
  - PG Grade selection (Polymer)
  - Hamburg
- Too Hard
  - ~~Limits on Replacement Asphalt (RAP/RAS %)~~
  - ~~Grade bumps down with higher replacement %~~
  - ~~Max Tensile Strength~~
  - Fracture toughness requirement (under research)

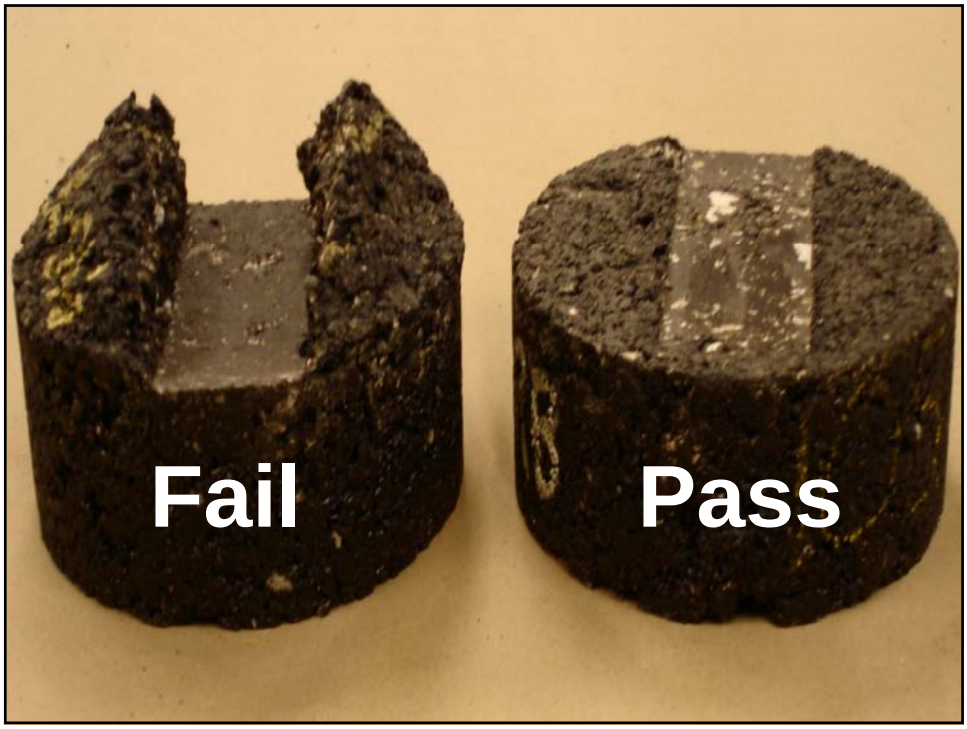
Grade Bumping is Critical

- Low amounts of AC replacement can be tolerated with little or no impact
- Around 20% replacement mix properties are impacted
  - Grade bumping policy
    - Above 20% - bump down
    - PG64-22 to PG 58-28 to… (PG46-34 for 40%+)?
  - If not followed – shorter pavement life due to cracking


Hamburg Wheel


Specimen Prep


Hamburg Wheel
50 Passes/Minute
158 Lbs
50 C



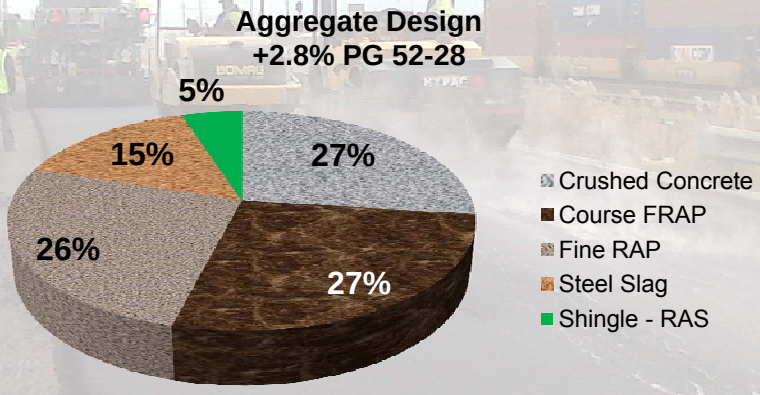
Implementation Schedule

- 2011
  - High Replacement RAP and RAS
  - Permissive use Warm Mix
- 2012 - 2013
  - Other New mixes (fine graded) and Renewals
- 2014 on
  - Full Implementation

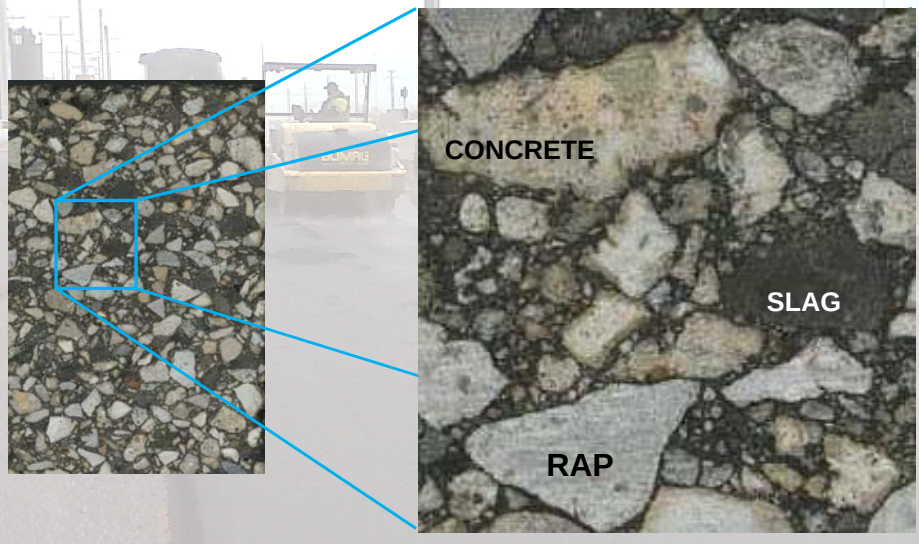
Total Recycle Asphalt (TRA)

- Sustainability Features
  - Over 97% recycled material – no mined material
    - Concrete Aggregate
    - RAP
    - RAS
    - Slag
  - 57% Asphalt Binder Replacement (ABR)
- Engineering Features
  - N50 Mix “D” Surface
  - PG52-28
  - TSR = 109.5/120.4 = 0.91
  - Hamburg - 5.3mm Ave @ 20,000 Passes
  - 20% reduced cost of mix

Mix Details



Total Recycle Asphalt



TRA Future

- Testing of plant produced material
  - District
  - BMPR
  - ICT @ UIUC
- Demo projects 2013 construction
- Special Provision for use as soon as 2014