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## 4.75 mm Surface

- History of poor friction performance
- Modifications to 4.75 mm mixture to increase macrotexture
  - Fineness modulus  $\geq$  3.30
  - Reduced P<sub>200</sub> from 6.0-12.0 to 3.0-8.0
  - Designed at 5.0% air voids
- Improved Friction by average of 11 FN



## 4.75 mm Surface

#### "Old" spec project





## 4.75 mm Surface

#### "New" spec project





# **Longitudinal Joints**

- 2 step method-based approach
- Hot applied joint adhesive
- Fog seal 1' on each side of joint
  - Also serves to seal centerline rumble strips







## **Durability Issues**

### Many contributing factors





## Tack Coat

### Ongoing Application Problem





# **Tack Coat**

- INDOT Specs state "tack coat shall be uniformly applied"
- Should be easy, right?
- But...
  - Contractors don't want to do it
  - Agency staff don't want to enforce it
- Research to determine feasibility of tack performance tests underway



# 5% Mix Design

- Optimizing Laboratory Mixture Design as it Relates to Field Compaction in order to Improve Hot-Mix Asphalt Durability
  - Design mix at 5% air voids and compact in field to 5% air voids
  - Lower design gyrations (30-50)
  - Improve durability/reduce oxidation
  - Initial results positive
  - 2 field trials done, further study ongoing



# **Recycled Materials / Durability**

	Maximum Binder Replacement, %								
ľ	Mixture Category	Base and Intermediate					Surface		
		Dense Graded			Open Graded		Dense Graded		
		25.0 mm	19.0 mm	12.5 mm	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm
	1	40.0			25.0		40.0		
	2								
	3						25.0		
	4								
Sa IND	5								
ARTRICE	TRAMAN								

# **Recycled Materials / Durability**

- Grade bump at 25% BR
- Maximum 25% BR from RAS
- Will modify RAS specs based on PP-78
- But INDOT is not seeing performance issues with RAP or RAS mixtures



# **Recycled Materials / Durability**

- INDOT has an HMA durability problem
- No evidence of a link to amount of RAP / RAS in mixture

### So what's going on?

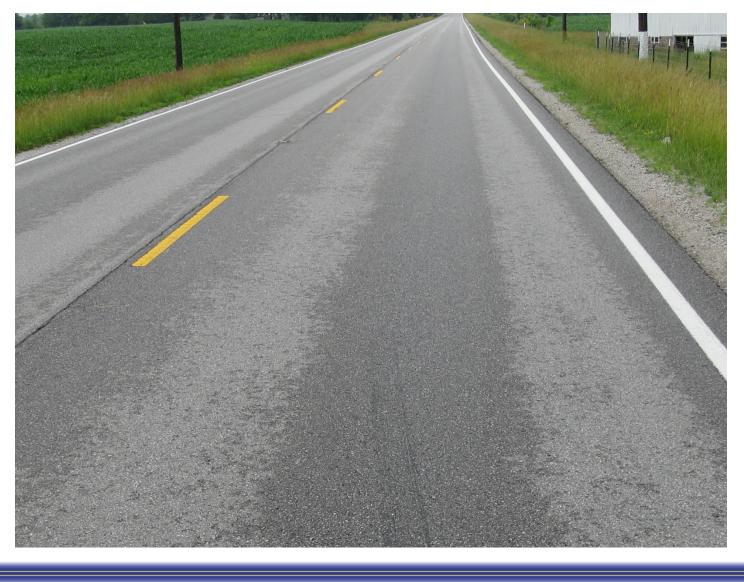


## 15% RAP





## 35% RAP





# Aggregate Gsb

- Previously, INDOT distributed list of aggregate Gsb values
- Contractor was allowed a tolerance from these values

Significant pattern of Contractor values higher than INDOT values



## Aggregate Gsb

- "Inflated" Gsb in mix design leads to:
  - Overestimated VMA
  - Underestimated Pba
  - Overall lack of binder



## Aggregate Gsb

INDOT now requires agency-tested Gsb to be used in mix design

This doesn't solve everything

How to get more binder into the mix?



## **Acceptance Procedures**

- The current method isn't working
- Performance Related Specs?
- How to get Contractor goals in line with Agency goals?
  - Incentive to innovate
  - Or just the incentive to do it right!



### **Questions?**

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