

Current NCSC Research

APAI Technical Committee Meeting
September 25, 2013



Optimizing Compaction

- *Optimizing Lab Mixture Design as it Relates to Field Compaction to Improve Hot-Mix Asphalt Durability*
 - Design mixes at and compact to 5% in the field
 - Started 7/1/2011, test section placed this summer
- Concept:
 - Use same aggregate stockpiles
 - Same crushed faces, FAA and hardness
- Decreasing gyrations→
 - Change in gradation
 - Lower mix stiffness
 - Easier compaction

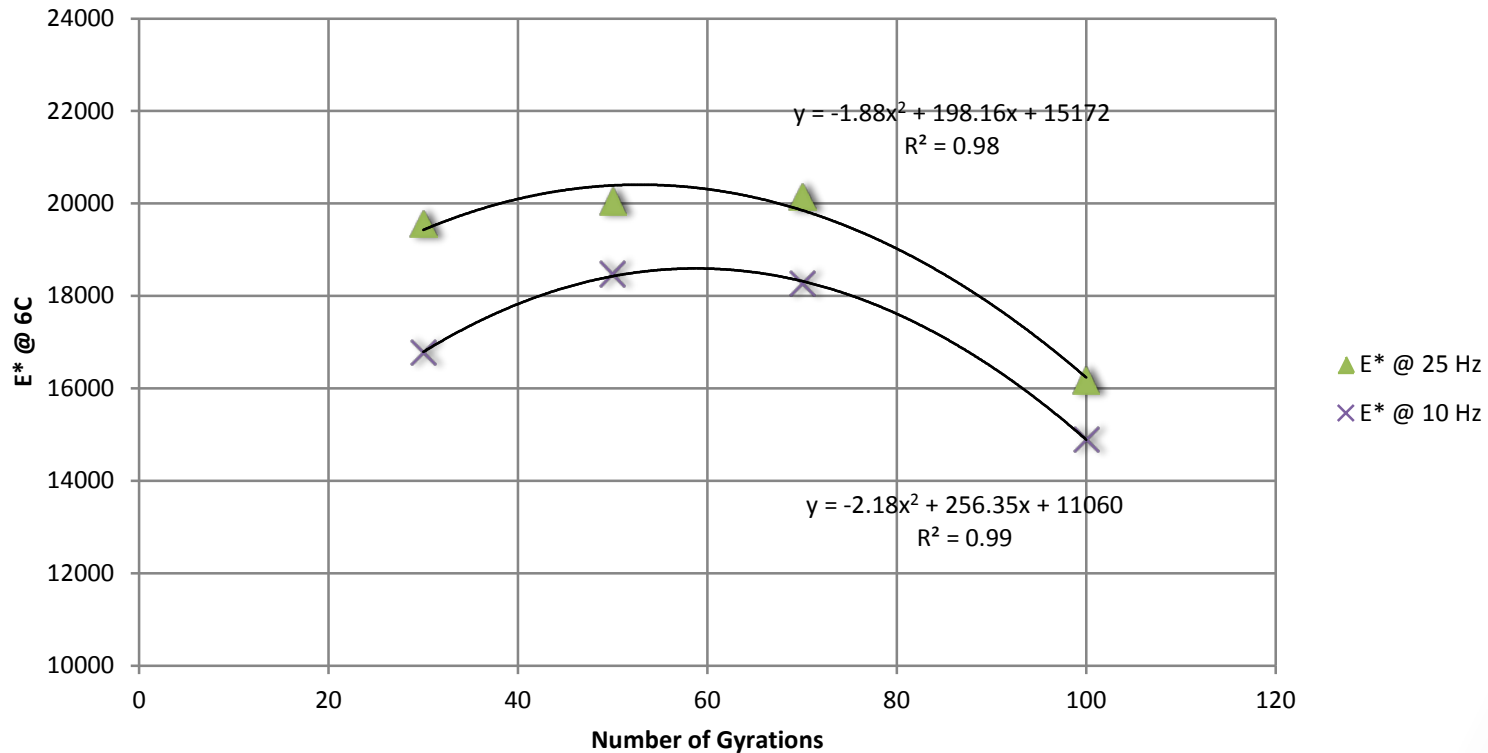
Approach

- Start with 3 current mix designs
 - 9.5 and 19 mm
 - 100 gyration mixes
 - 3-10 and 10-30 million ESAL designs (~50% of INDOT work)
 - Dolomite, limestone and blast furnace slag with PG 64-22
- Adjust gradation to achieve 5% voids at different gyrations
 - 70, 50 and 30 gyrations
 - Maintain VMA and effective binder content in 5% void mixes
 - Bailey method used to guide adjustments

Approach (continued)

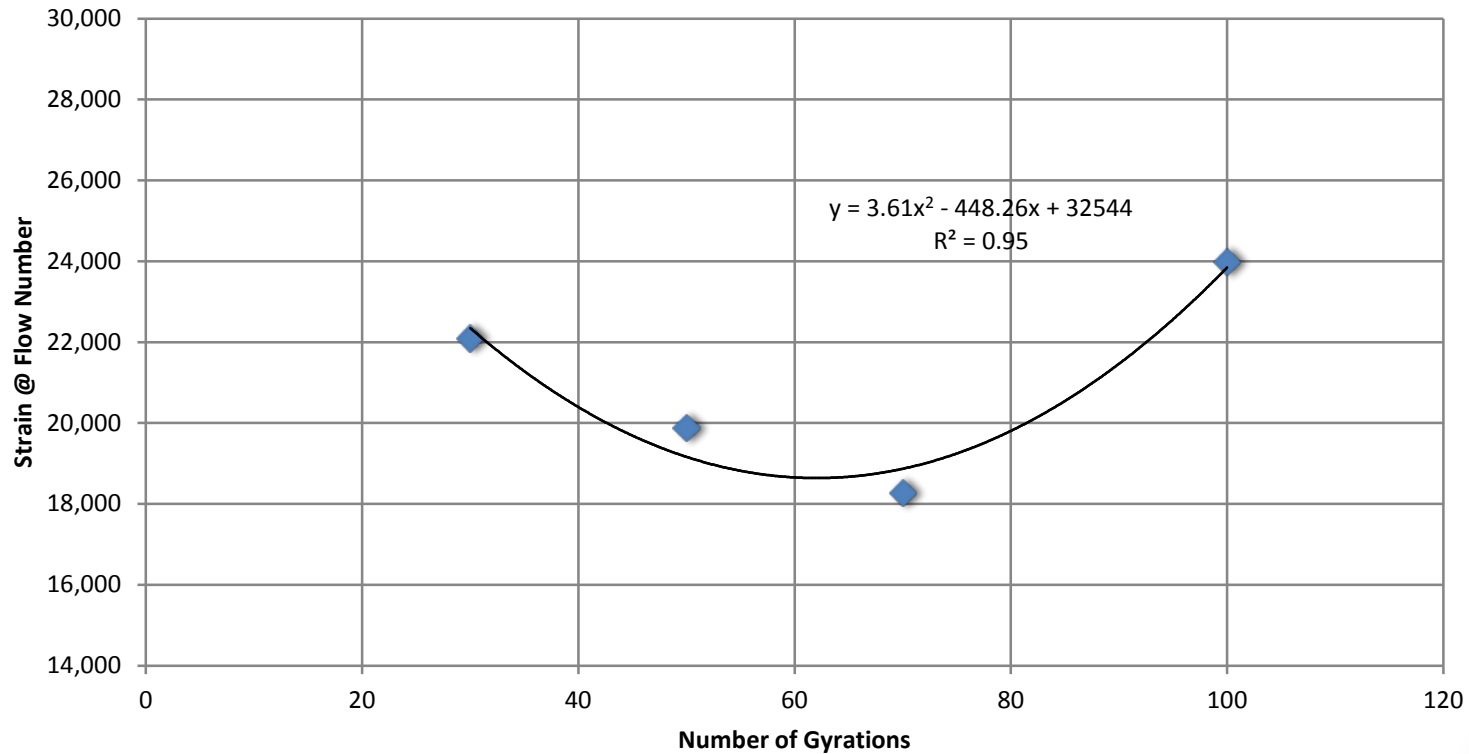
- Test mechanical properties of the mixes
 - Want same (or better) mechanical properties in the higher air void mixes as the original mix provided
 - Do not sacrifice rutting resistance for higher density
 - Test 100 gyration mix at 7% and others at 5% air voids
 - Determine number of gyrations to achieve 5% air voids and similar (or better) mechanical properties
- Field Validation
 - Can we achieve higher densities with revised mix design?

Change in Dynamic Modulus (Lab 19.0 mm)



Peaks at 53 and 59 gyrations.

Change in Strain at Flow Number (Lab 19.0 mm)



Minimum at 62 gyrations.

Field Trial

- SR15, June 2013
- Start up problems but eventually were able to achieve the desired compaction level
 - Tried N30, voids were high; 92.3%
 - Changed to N50; average density = 95.2%
- No change in equipment nor roller patterns
- Dynamic modulus and flow number testing completed on trial mixes; Cantabro underway
- Analysis underway; draft final report in preparation

Analysis of the MSCR Asphalt Binder Test and Specifications for Use in Indiana

Business Owner: Matt Beeson

Study Advisory Committee: Kumar Dave, INDOT; Gerry Huber, Heritage Research Group; Kevin Nelson, Seneca Petroleum; Tom Duncan, FHWA

Start date: September 1, 2013

Duration: 24 months

Problem Statement

- Binder data from INDOT OMM shows some binders (polymer modified) are over-engineered and contain more polymer than needed for good performance.
- Excess polymer is added to ensure compliance with existing binder specifications.
- A new binder spec, AASHTO MP 19, uses a new test called the Multi-Stress Creep and Recovery (MSCR) test to better characterize modified binders.
- MP 19 may lead to lower polymer contents while maintaining good performance, thus lowering costs.
- This project will investigate if INDOT should adopt the new specification and, if so, how.
- May also be a means to allow GTR as competitor to polymers.

Research Approach

- Compare the performance of binders formulated to meet the current specs to binders formulated/optimized to meet MP 19.
 - Obtain optimized binders from Missouri
- Analyze existing OMM data.
- Confirm performance through high temperature mixture tests using MP 19 and conventional binders.
- Analyze results and develop recommendations.

Deliverables

- Recommendations regarding whether INDOT should implement MP 19.
- If yes, recommended changes to existing specs (Section 401, 902, Design Manual, etc.) will be drafted.
- Training materials to explain the changes to INDOT personnel, consultants and producers.

Outcomes

- Missouri initially made MP 19 optional; all binder suppliers opted to use the MP 19.
- Estimated cost savings in Missouri was \$80 per ton of binder.
- If the findings support implementation, INDOT could expect to see lower material costs for equal pavement performance.
- Costs savings could be \$3.6 million/year based on FY2013 lettings and 45,000 liquid tons of PG 76 binder used.

NCHRP Synthesis Project

- *Pavement Patching Practices*
- Patching practices for asphalt and concrete pavements
- Programming, equipment, monitoring, materials, performance, etc.
- Survey and literature review
- 49 states responded, 20 local agencies, 5 Canadian agencies and 34 European agencies
- Hot mix asphalt is most commonly used for patching both concrete and asphalt pavements
- Use of maintenance contracts more common in Europe, gaining in USA.
- Final report under review; to be completed next month.

NCHRP Synthesis Project

- *Fiber-Based Additives in Asphalt Materials*
- In contracting stage
- Set to start November 1, 2013 for one year.
- Your comments and experiences would be helpful.

AMRL Accreditation

- AMRL accredited in Binder, Mix and Aggregates
- Continuing to maintain records and accreditation

Third Party Testing

- Testing aggregate source for Polish Resistance (ITM 221)
- Binder extraction and testing for RAP mix design
- Mix and binder testing of recycling agent
- Friction testing of thermoplastic material
- Tack coat bond strength testing for a DOT

- Currently having friction testing equipment recalibrated – should be back in business soon.

North Central Asphalt User Producer Group

- Next meeting in downtown Kansas City, MO
- Probably February 18-20, 2014
 - Back-up dates February 25-27
- Topics include:
 - Ground Tire Rubber
 - RAP and RAS
 - Tack Coats
 - Smoothness
 - Friction
 - Intelligent Compaction and more

Questions?

Thank you!