

Welcome

**2013 NDOR City/County  
Asphalt Update Webinar**

# Nebraska Asphalt Update

Leveling Course  
Asphalt Patching  
Foamed Asphalt  
Longitudinal Joint Density  
Crumb Rubber Binder Specification  
Open Discussion

Robert C. Rea  
Nebraska Department of Roads



# Leveling Course

Impermeable Mix + Heat + Moisture = Mumps





## Modified Mix Design so the mix could 'Breathe'



# Leveling Course Spec. Changes

## Gradation Change

Gradation Control Points for  
0.19 Inch (4.75 mm) Nominal Size

English Sieve (Metric)	Control Points (percent passing)	
	Minimum	Maximum
1/2 inch (12.5 mm)	<del>100.0</del> 98.0	100.0
3/8 inch (9.5 mm)	<del>100.0</del> 93.0	100.0
No. 4 (4.75 mm)	<del>90.0</del> 85.0	100.0
No. 8 (2.36 mm)	<del>70.0</del> 50.0	<del>90.0</del> 65.0
No. 16 (1.18 mm)	<del>50.0</del> 30.0	<del>65.0</del> 50.0
No. 30 (600 µm)	<del>35.0</del> 20.0	<del>55.0</del> 40.0
No. 50 (300 µm)	<del>15.0</del> 10.0	30.0
No. 100 (150 µm)	10.0	18.0
*No. 200 (75 µm)	<del>5.0</del> 4.0	10.0





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- Density and CAA are not in pay factor



# Patching

# NEW PATCHING SPECIFICATION



All work is subsidiary to the PATCHING TON Bid Item



# Asphalt Patching Spec. Update

- Payment by the ton of hot mix for all work necessary for the removal and replacement of the area of patching



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  - (As is currently done for all depths)





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- Payment by the ton of hot mix for all work necessary for the removal and replacement of the area of patching
- For patch areas over 16 in. depth, the additional work will be paid for under rental of equipment
  - (As is currently done for all depths)
- Lime/WMA and binder will be paid with regular units under the contract.



# Asphalt Patching Spec. Update

- 1) For patches **16-inches (40cm) deep or less**, determined at the time of patching, the patching will be measured by the ton (megagram) of "Asphaltic Concrete for Patching, Type \_\_\_\_" required to complete the patch and repair any faulty subgrade. No equipment rental will be paid for this work, and all equipment used to complete the work shall be subsidiary to the item, "Asphaltic Concrete for Patching, Type \_\_\_\_."
- 2) For patches **more than 16 inches (40cm) deep**, determined at the time of patching, the patching will be measured by the ton (megagram) of "Asphaltic Concrete for Patching, Type \_\_\_\_" required to complete the patch and repair any faulty subgrade. Additionally, the hours of equipment rental required to complete the patching and repair in that portion of the patch deeper than 16-inches will be measured by the hour of equipment rental in accordance with Section 919. Only approved equipment needed to patch and excavate the failure is to be rented, and only the time utilized to perform the work in the region deeper than 16-inches (40 cm) is to be measured. Excluded is any equipment needed to haul asphalt to the site.



# FOAMED ASPHALT RECYCLING PROJECT











**MORE ON THE WAY**





# LONGITUDINAL JOINT DENSITY SPECIFICATION



Draft by July 1, 2013



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Draft by July 1, 2013



# Crumb Rubber Asphalt





# Types of Crumb Rubber Binder Modification

- 3 Methods:
  - Wet (Unstable Suspension)



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  - Terminal Blended (Stable Suspension)
  - Terminal Blended (Fully Dissolved)



# Crumb Rubber Asphalt in NE

## Crumb Rubber Binder Modifiers

This provision is to provide the Contractor the option to allow or to include crumb rubber as a modifier for Performance Graded Binders.

The Contractor shall use all necessary requirements for proper production, blending, agitation, storage, mixing, handling and any other procedures or equipment necessary to ensure consistency and homogeneity of the modified product.

All testing and acceptance will be performed as outlined in these special provisions for Performance Graded Binders with the following modifications:

1. Paragraph 5.4 (solubility) of AASHTO M320 is void.
2. Paragraph 5.5 (micron requirement) of AASHTO M320 is void.
3. Elastic Recovery shall be according to ASTM D6084 Procedure A, with the exception that the sample shall not be strained through a sieve.



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# Questions & Open Discussion

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# Non-Nuclear Gauges Warm Mix Asphalt (WMA) Superpave Updates

Matt Beran

Nebraska Dept. of Roads

## Non-Nuclear Gauge: What brought it to NE?

- NDOR has 85 Nuclear Gauges



Asphalt Compaction

Soil Compaction

# Non-Nuclear Gauge: What brought it to NE?

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<u>Costs</u>	<u>Nuclear Gauge</u>	<u>Non-Nuclear Gauge</u>
Cost of Gauge	\$6,950	\$8,900
Radiation Safety & Certification Class	\$750	
Safety Training	\$179	
HAZMAT Certification	\$99	
RSO Training	\$395	
Maintenance/Re-calibration	\$500/year	\$500/year
Leak test	\$15	
Shipping	\$120	100
Radioactive Materials License	\$1,600	
Re-Licensing	\$1500/year	
Reciprocity	\$750	
<b>Cost for 1st Year of Ownership</b>	<b>\$12,858</b>	<b>\$9,500</b>
<b>Annual Costs after 1st year</b>	<b>\$2000/year</b>	<b>\$500/year</b>

Does not include personnel cost/time to track gauge storage, nuclear badge purchasing, tracking, monitoring, etc

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**85 Gauges x \$1500 = \$130,000/year**

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## Non-Nuclear Gauge: What brought it to NE?

- UNL Research Project from '09 – '11
- Investigated latest non-nuclear technology
- Tested 5 different soil and asphalt devices
- 13 Asphalt Sample Sites – Over 150 samples



# Non-Nuclear Gauge: What brought it to NE?

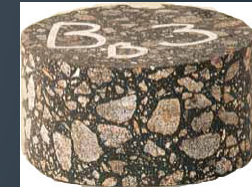
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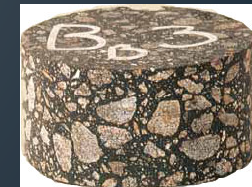
- Reviewed Correlation:
  - Non-Nuclear Gauge vs. Cores
  - Nuclear Gauge vs. Cores



Vs.



Vs.



# Non-Nuclear Gauge: What brought it to NE?

## Findings:

- PQI correlates very well to cores
  - Sample density 90% or greater



Vs.



# Non-Nuclear Gauge: What brought it to NE?

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Vs.



- PQI correlated better to the cores overall than Nuclear Gauge
  - Sample density 90% or greater



Vs.





# Asphalt Gauge: Where are we at?

- Allowance of Non-Nuclear Gauges – Feb. 2013
  - Provision is attached to Superpave Specification
  - Can find on our website:  
<http://www.transportation.nebraska.gov/mat-n-tests>



# Asphalt Gauge: Provision Highlights

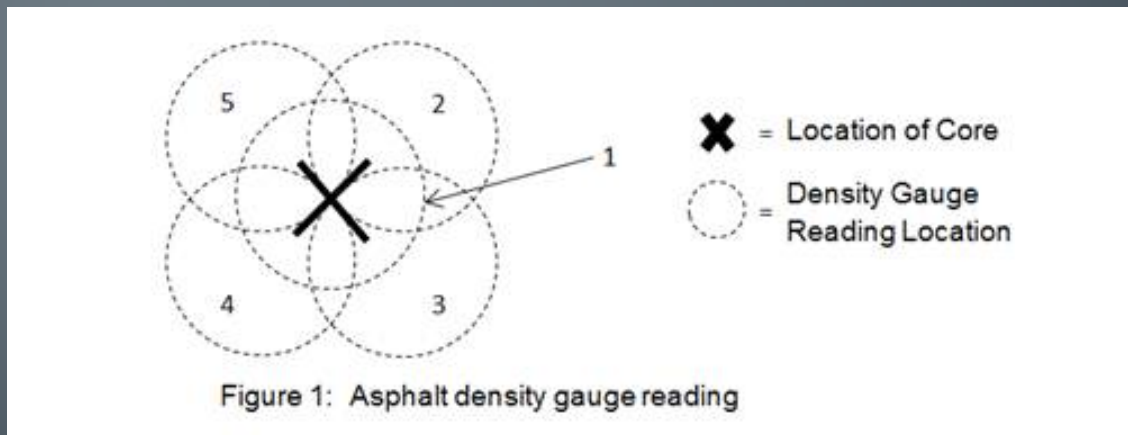
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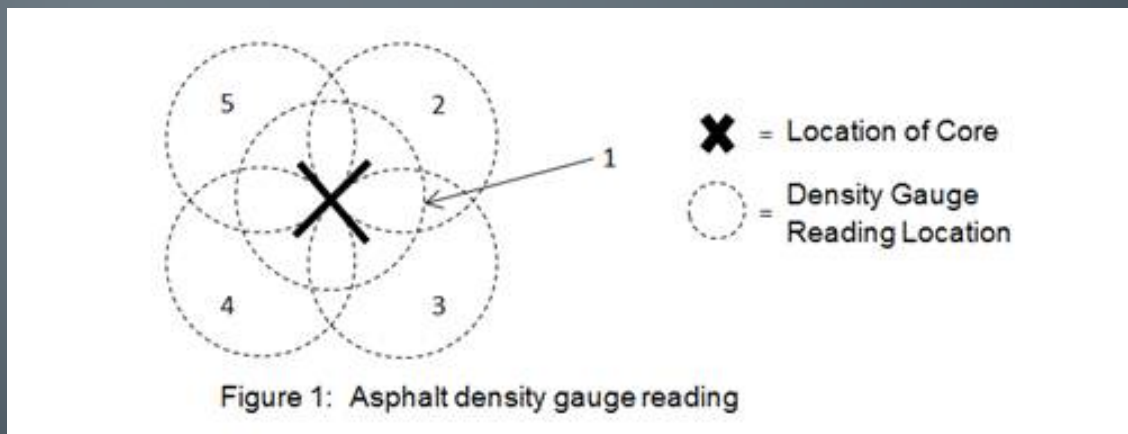
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- Average of 5 readings at each location:



- Any density reading below 90% will require a core cut to be used for density at that location



# Asphalt Gauge: How it Works

- Uses electromagnetic current to measure density
- Provides instantaneous density readout



# Soil Gauge:

- Tested 3 different soil devices
- Lightweight Deflectometer (LWD) was most accurate



# Soil Gauge: LWD – How it Works

- Drop Weight to Measure Deflection
- Testing and Acceptance Based on Moisture and Deflection

22 lb. Drop Weight

Data Collector

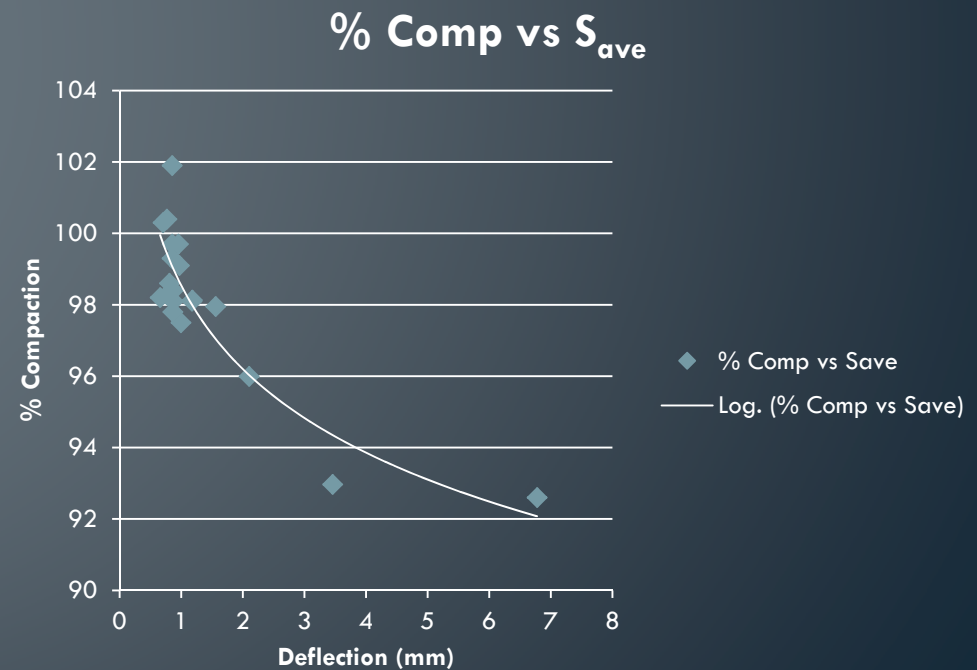
Load Plate



28.35"  
Drop  
Height

# Soil Gauge: LWD – How it Works

- Prep Surface
- Drop Weight 3x – Seating
- Drop Weight 3x – Measurements
- Measures:
  - Deflection
  - Velocity
  - Modulus



# Soil Gauge: LWD – Where are we at?

- Implementation over the next 2 years
  - 2013 – Purchase 8-10 Devices
  - 2014 – Purchase 30-50 Devices
    - Phase out Nuclear Gauges at end of 2014







# WMA – Current Use and Specification Updates

# Warm Mix Asphalt (WMA) – Current Use

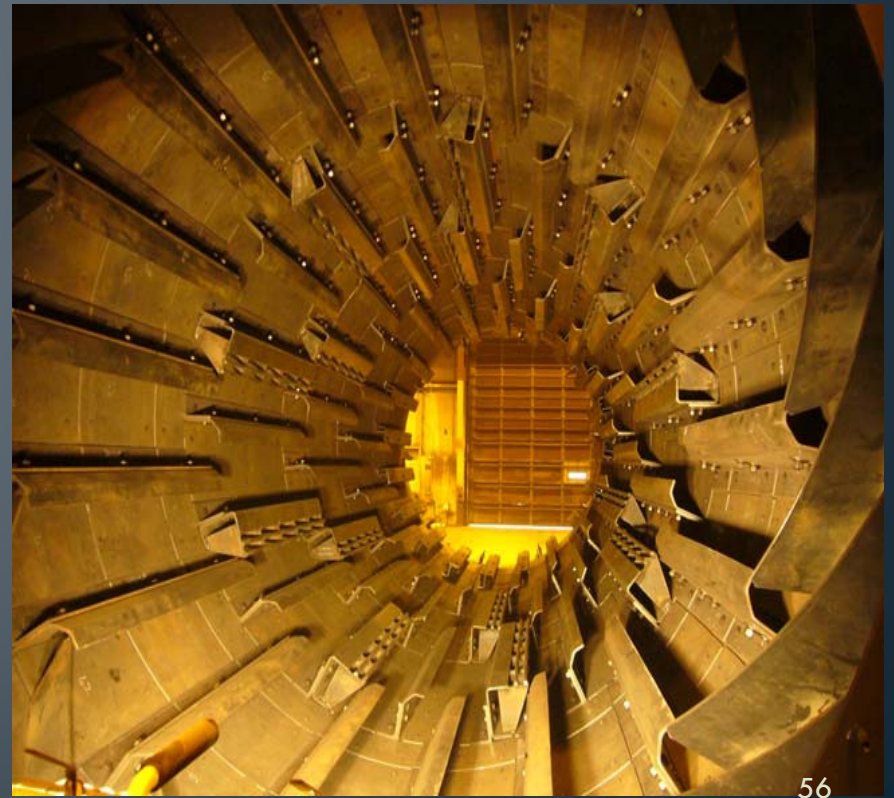
- 35 NDOR projects utilized WMA last year (40% of projects)
  - 95% Used Chemical Additive (Evotherm)
  - 5% Used Water-Injection (Foaming)

# Less Energy Consumption





# Reduced Plant Wear



# Less Emissions at Plant and Laydown





# Increased Thin Lift Strategies



# Less Potential to Boil Through



# Anti-Strip WMA Additives can offset cost



Hydrated Lime



Evotherm WMA

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- Savings Difficult to Calculate

# WMA – Specification History

Feb. 2012 – WMA Permissive Specification Included in all NDOR Hwy. Projects



April 2012 - Contractor Allowed to Bid \$0 for lime if using a WMA additive with anti-strip properties



July 2012 – NDOR/Industry meet to discuss updates to WMA Provision



Dec. 2012 – Updated WMA requirements utilized in Dec. Letting



Feb. 2013 – NDOR Pay Item “Lime/WMA” is implemented in Letting

# WMA – Specification Updates

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- Tensile Strength Ratio (TSR's) Testing done on first lot of production and randomly selected lots thereafter



# WMA – Specification Updates

- Tensile Strength Ratio (TSR's) Testing done on first lot of production and randomly selected lots thereafter
- Paid for by the unit “Lime/WMA” per hot mix ton
  - Ex. 10,000 ton project will have 10,000 units Lime/WMA
  - Replace item “Hydrated Lime for Asphalt Mixtures”

# WMA – Cities and Counties

- Many benefits to be reaped from the technology
- If Urban Superpave is used, WMA option must be requested and/or approved by governing City/County
- If interested in more information, please contact us.



# Updates to Superpave & Urban Superpave

Matt Beran

# Only 2 Changes

- Lime Correction Factor
- Sample of SPS Asphalt



## Lime Correction Factor



- NDOR had a correction factor of 0.4% for ignition oven readings.
  - Ex. Oven Readout = 5.0%, then Binder Content is 5.4%
- Sulfur in Binder tied up by hydrated lime, doesn't burn off.





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- Lower amounts of lime due to RAP
  - Research Study shows correction factor closer to 0.2 – 0.3%
- New Superpave and Urban Specs. now have correction factor at 0.3%
  - *Reminder: No correction factor on WMA when lime is not used!*

# Sampling of Asphalt – SPS

- **Previous Sampling Options:**
- In Windrow or Behind the Paver



# Sampling of Asphalt – SPS

- **Previous** Sampling Options:
- In Windrow or Behind the Paver



- **Now:** Contractor has the option of sampling **SPS** hot mix at the plant.

# Questions and Open Discussion

- Non-Nuclear Gauges
  - LWD
  - PQI
- Warm Mix Asphalt
- Superpave Updates
- Other