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

<table>
<thead>
<tr>
<th>English Sieve (Metric)</th>
<th>Control Points (percent passing)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 inch (12.5 mm)</td>
<td>100.0-98.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>3/8 inch (9.5 mm)</td>
<td>100.0-93.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>90.0-85.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>No. 8 (2.36 mm)</td>
<td>70.0-50.0</td>
<td>90.0-05.0</td>
<td></td>
</tr>
<tr>
<td>No. 16 (1.16 mm)</td>
<td>50.0-30.0</td>
<td>65.0-50.0</td>
<td></td>
</tr>
<tr>
<td>No. 30 (600 µm)</td>
<td>25.0-20.0</td>
<td>55.0-40.0</td>
<td></td>
</tr>
<tr>
<td>No. 50 (300 µm)</td>
<td>15.0-10.0</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>No. 100 (150 µm)</td>
<td>10.0</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>*No. 200 (75 µm)</td>
<td>5.0-4.0</td>
<td>10.0</td>
<td></td>
</tr>
</tbody>
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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
Asphalt Patching Spec. Update

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• 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)
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.
- 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.
MORE ON THE WAY
LONGITUDINAL JOINT DENSITY SPECIFICATION

Draft by July 1, 2013
Types of Crumb Rubber Binder Modification

- 3 Methods:
  - Wet (Unstable Suspension)
Types of Crumb Rubber Binder Modification

- 3 Methods:
  - Wet (Unstable Suspension)
  - Terminal Blended (Stable Suspension)
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- 3 Methods:
  - Wet (Unstable Suspension)
  - Terminal Blended (Stable Suspension)
  - Terminal Blended (Fully Dissolved)
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.
Crumb Rubber Asphalt in NE

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Questions & Open Discussion

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Crumb Rubber Binder Specification
Open Discussion
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?**

- NDOR has 85 Nuclear Gauges

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<th>Nuclear Gauge</th>
<th>Non-Nuclear Gauge</th>
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<tr>
<td>Cost of Gauge</td>
<td>$6,950</td>
<td>$8,900</td>
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<tr>
<td>Radiation Safety &amp; Certification Class</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td>Safety Training</td>
<td>$179</td>
<td></td>
</tr>
<tr>
<td>HAZMAT Certification</td>
<td>$99</td>
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<tr>
<td>RSO Training</td>
<td>$395</td>
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<tr>
<td>Maintenance/Re-calibration</td>
<td>$500/year</td>
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<tr>
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<td>$15</td>
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<tr>
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<td>Cost for 1st Year of Ownership</td>
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</tr>
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<td>Annual Costs after 1st year</td>
<td>$2000/year</td>
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Does not include personnel cost/time to track gauge storage, nuclear badge purchasing, tracking, monitoring, etc.
**Non-Nuclear Gauge: What brought it to NE?**

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85 Gauges x $1500 = $130,000/year
Non-Nuclear Gauge: What brought it to NE?

- UNL Research Project from ‘09 – ’11
Non-Nuclear Gauge: What brought it to NE?

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- Investigated latest non-nuclear technology
- Tested 5 different soil and asphalt devices
- 13 Asphalt Sample Sites – Over 150 samples
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- Tested 5 different soil and asphalt devices
- 13 Asphalt Sample Sites – Over 150 samples
- Reviewed Correlation:
  - Non-Nuclear Gauge vs. Cores
  - Nuclear Gauge vs. Cores
Non-Nuclear Gauge: What brought it to NE?

Findings:

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

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

- Test run according to AASHTO TP 68 and as directed
**Asphalt Gauge: Provision Highlights**

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- First 3 density locations on project cored for correction factor, every 15\textsuperscript{th} density after that
Asphalt Gauge: Provision Highlights

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• Average of 5 readings at each location:
Asphalt Gauge: Provision Highlights

- Test run according to AASHTO TP 68 and as directed
- First 3 density locations on project cored for correction factor, every 15th density after that
- 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

![Graph showing % Comp vs Save relationship with deflection (mm) on the x-axis and % Comp on the y-axis.](image)
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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  - Dependent on amount of additive used, mixture materials, etc.
- 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-stripe 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

• Increased Hydrated Lime minimum rate from 1.0% to 1.25% (by weight of virgin aggregate)
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• No control strip required
WMA – Specification Updates

• 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
• 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.
Lime Correction Factor

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• Lower amounts of lime due to RAP
  • Research Study shows correction factor closer to 0.2 – 0.3%
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• Lower amounts of lime due to RAP
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• 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