

# WMA on the Move

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# Questions?

1. What is Warm Mix Asphalt (WMA)?
2. Why are we shifting to WMA?
3. What are the benefits to Minnesota?
4. How is it being used?





## What is WMA?



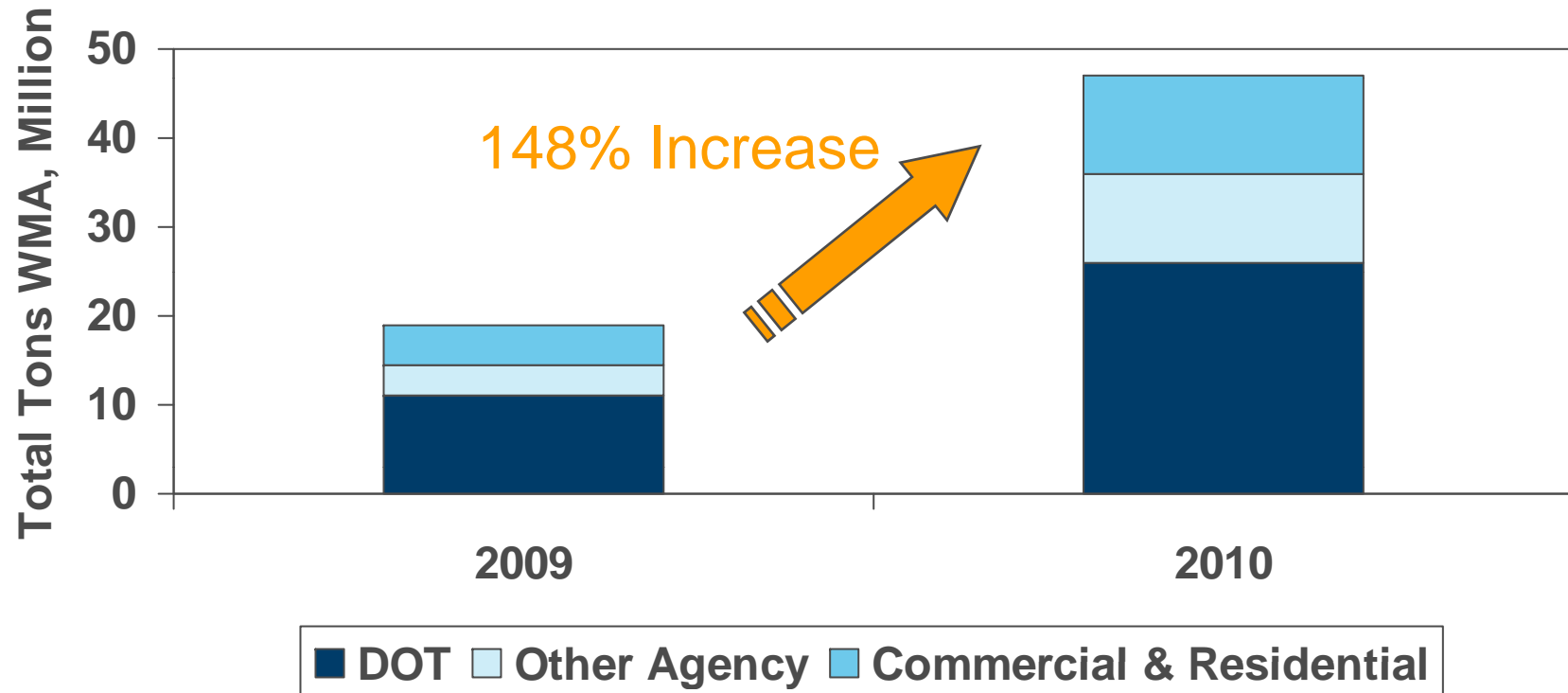
# What is Warm Mix?

Asphalt mix that includes a technology which improves the production and placement of conventional asphalt mix at significantly lower temperatures.



# Rapid Growth of WMA

## Estimated Total Tons WMA



Source: Hansen, Kent R. "RAP, RAS & WMA Survey." Second International Warm Mix Conference. Hyatt at the Arc, St. Louis. 11 Oct. 2011.





## Why WMA?



# PERFORMANCE!!!

## Improvements in mix performance

- Increase use of modified binders
- Increase use of coarse mixes
- Required density

## Changes in lane closure requirements

- Night Paving
- Cool temperatures



# IARC Classification

International Agency on Cancer Research

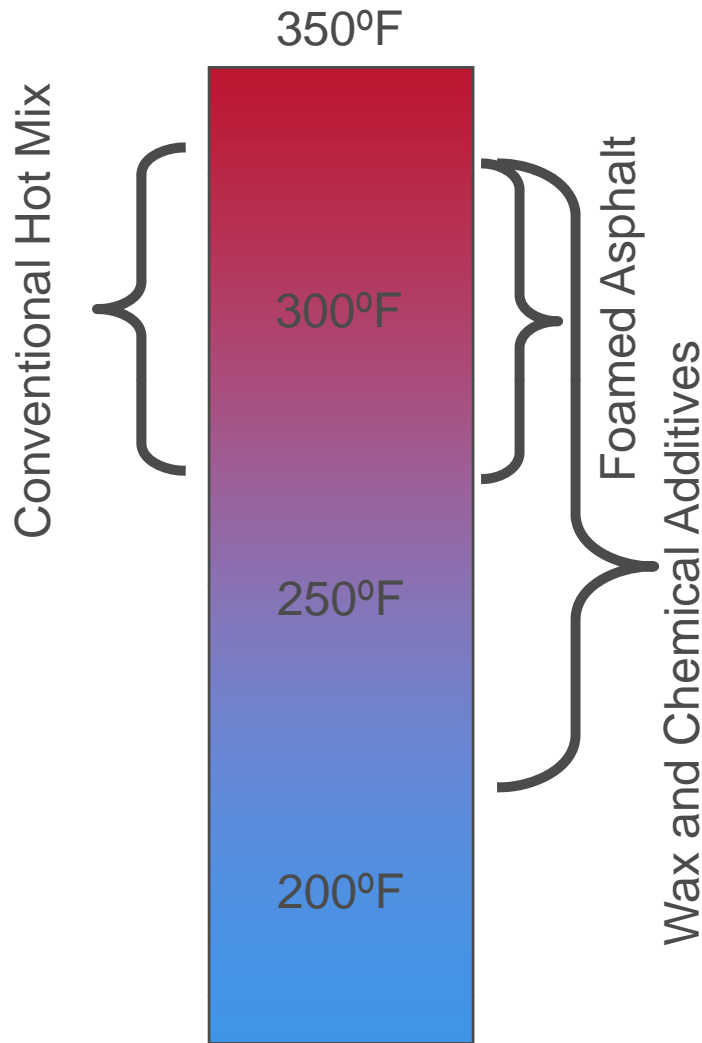
Reclassified asphalt paving fumes from unknown to possible carcinogen

The asphalt industry has worked for the past 20 years to reduce workers' exposure.

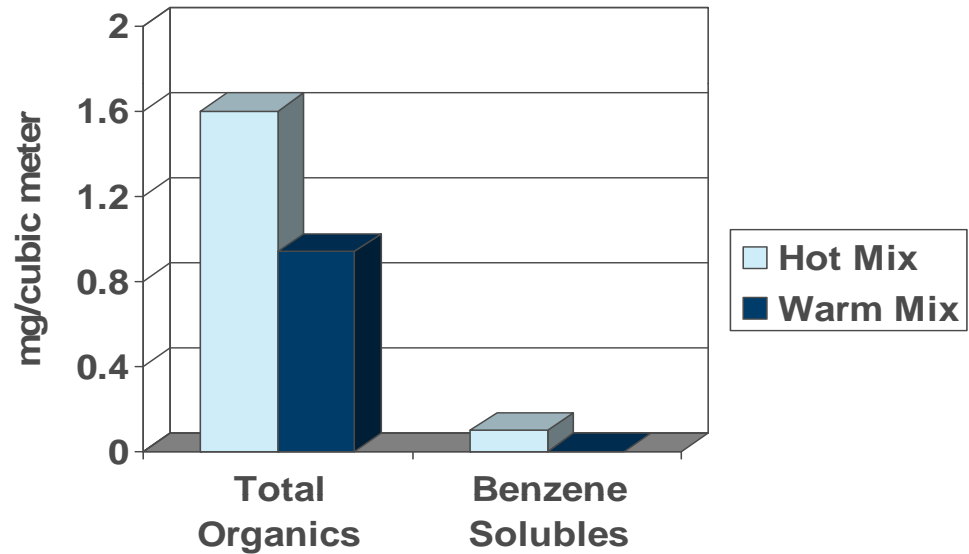
*“We use engineering controls and warm-mix asphalt to ensure that workers' exposures are low. Warm mix continues to reduce and eliminate paving site exposures.”*



# WMA Production Temperature Range



Every 10° degrees increase of temperature doubles exposure to asphalt fumes – BP





## Minnesota Benefits



# Cold Weather Paving

New York City  
32 ° F plus wind  
40% RAP PG 64-22



# Increased Recycled Content



**PG 58-22**

**37% RAP and 5% RAS**

Using high amounts of RAP & RAS even in cold temperatures like 25 ° F.

Reduced equipment wear and tear by lowering the production temperature to 325 ° F from 365 ° F (winter production temps).

Better workability with RAP & RAS.

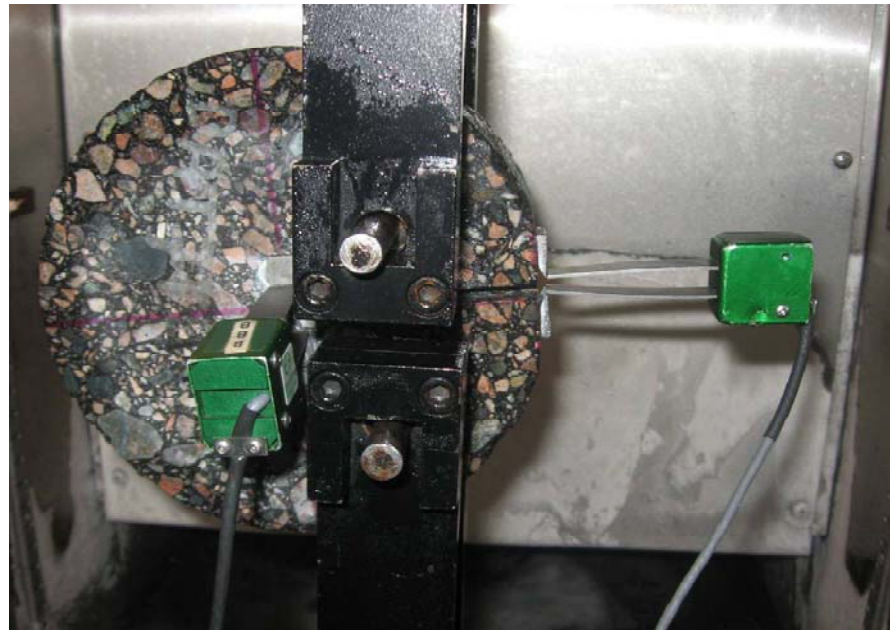
**SAVINGS** from asphalt content.



# Crack Resistance

## Disc Shaped Compact Tensile Testing

Fracture resistance evaluations of WMA PG 64-22 mixes at the Univ. of Illinois via ASTM 7313-06:

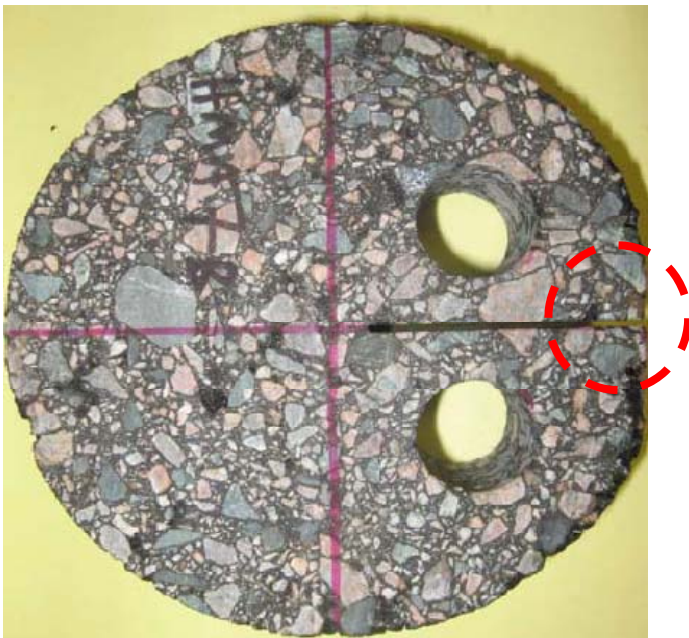


Disk-Shaped Compact Tension Test  
or the DC(T) test

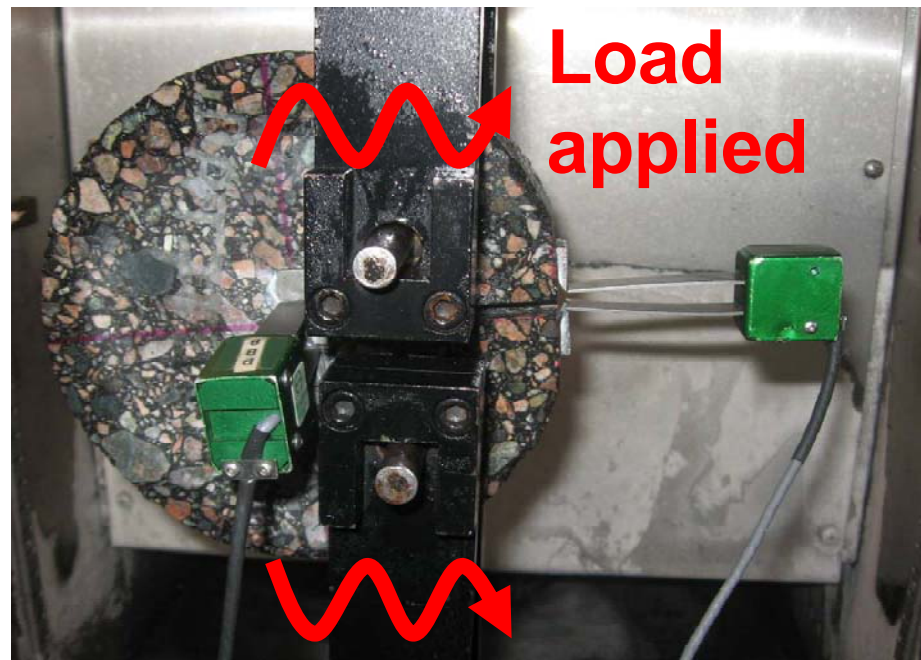
# Crack Resistance

## Disc Shaped Compact Tensile Testing

Fracture resistance evaluations of WMA PG 64-22 mixes at the Univ. of Illinois via ASTM 7313-06:



**Blade cut**

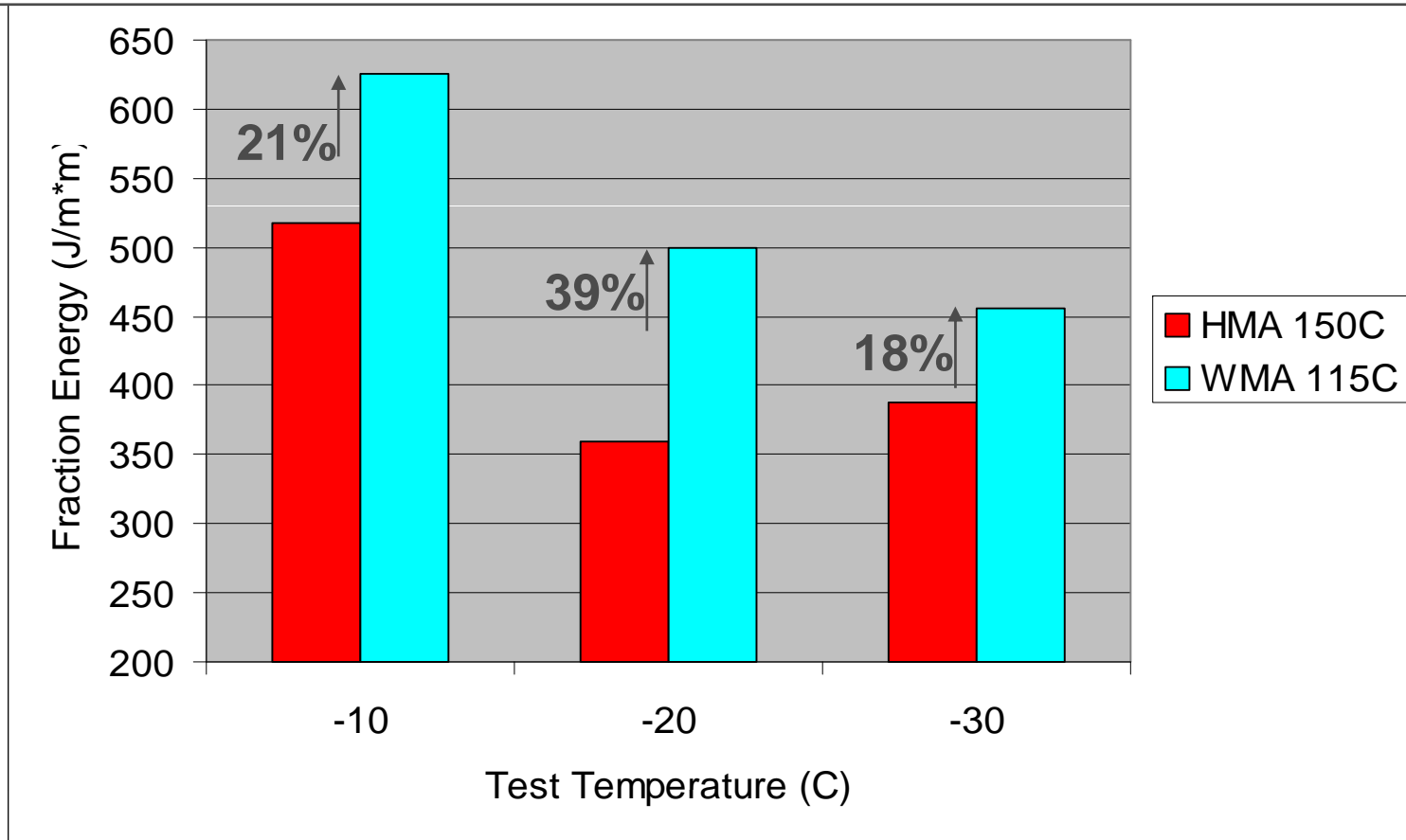


ASTM 7313-06 is also known as Disk-Shaped Compact Tension Test or the DC(T) test

# Crack Resistance

## Disc Shaped Compact Tensile Testing

18-39% more energy was required to crack WMA cores (blue) than HMA cores (red) at a given temperature (-10, -20, or -30°C).



# Crack Fill (No) Expansion



Lower paving temperatures  
**minimize** crack fill expansion!

Paving with WMA over surfaces  
with extensive crack fill...

**FEWER** bumps

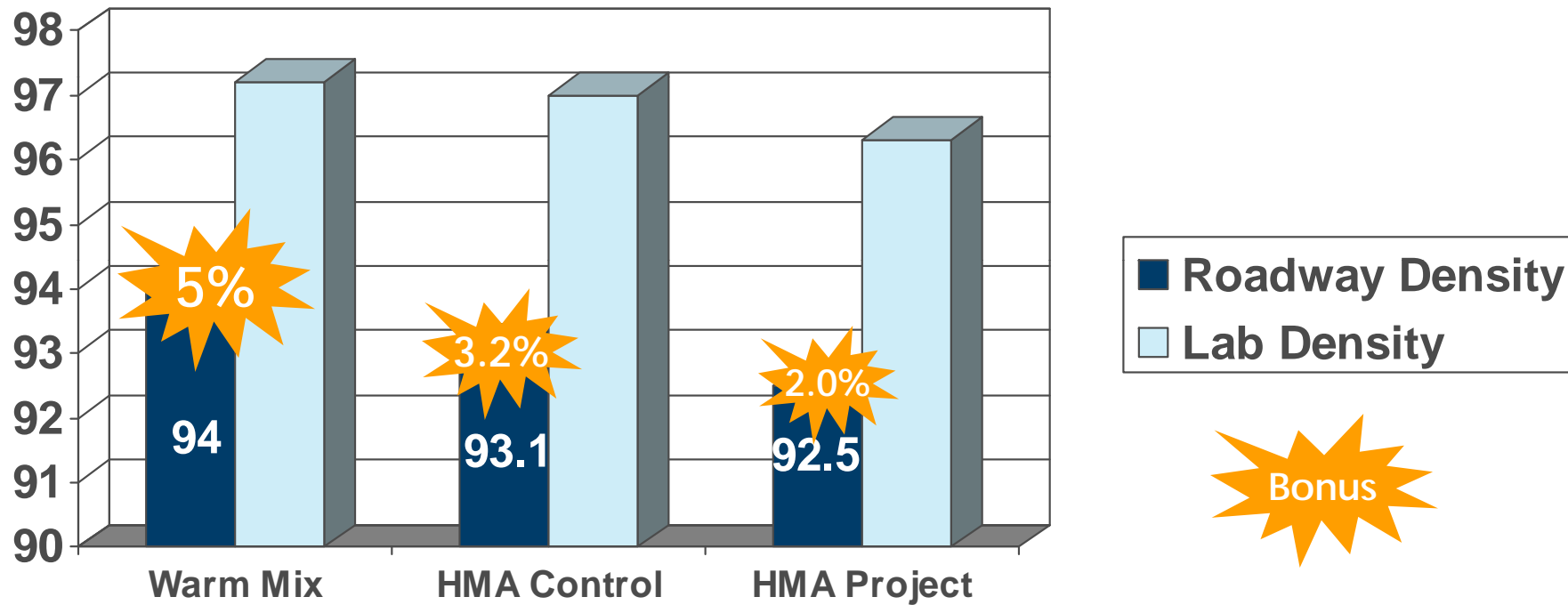
**SMOOTHER** ride



# Improved Compaction

Some WMA technologies can be used as a compaction aid to achieve density bonuses

TxDOT Densities and Bonuses using 4.6% PG76-22





## WMA Success Stories



# Colorado I-70



**Elevation: 8800' – 11,000'**

**Traffic: 30,000 AADT, 10% trucks, 4.85M ESALS (10-yr.)**

**Weather:**

- **Rain: 35"+**
- **Snow: 200"**
- **Freeze/Thaw: 150 – 200**

**Final Report Available from NCAT website**



# CA-1 Point Arena

~4000 ton 3/8" OGFC PG58-34PM

~1000 ton 1/2" HMA-A PG64-16

Low ambient temps

- Northern California Coast
- Low: 50° F; High 60° F
- Fog and drizzle

Mix Produced in Santa Rosa

**4 hour haul!!!**

## Construction



## 3-Years Later



# I-94 Milwaukee, Wisconsin



**Not achieving densities with HMA.**

**Density (plus density bonus) achieved using WMA as a compaction aid.**

**Air temperature of 22 F with winds from the northwest at 5 mph.**



# Conclusions

The future of asphalt paving is proven and available TODAY!!!

WMA technologies perform at varying levels and need to be understood by the Contractor.

WMA improves asphalt paving and offers benefits beyond emissions reductions.



# Thank you!



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