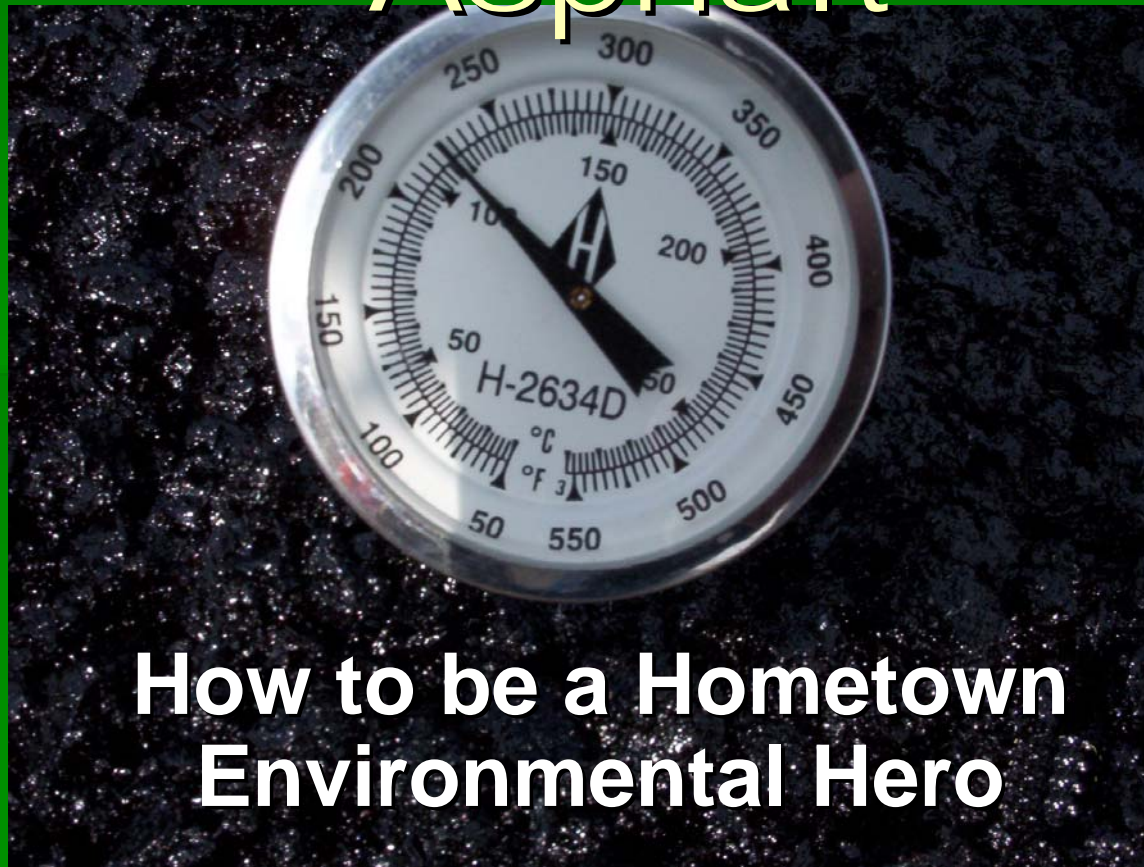


# Hot, Warm, Luke Warm and Cold Mix Asphalt



Cornell Local Roads Program



# Hot Mix Asphalt Mixes

- First Recorded Use: 620 B.C.
- 1870 : 1st true Hot Mix Asphalt pavement in the US was laid in front of City Hall in Newark, NJ



Invoice:  
Nebuchadnezzar Paving, Inc.



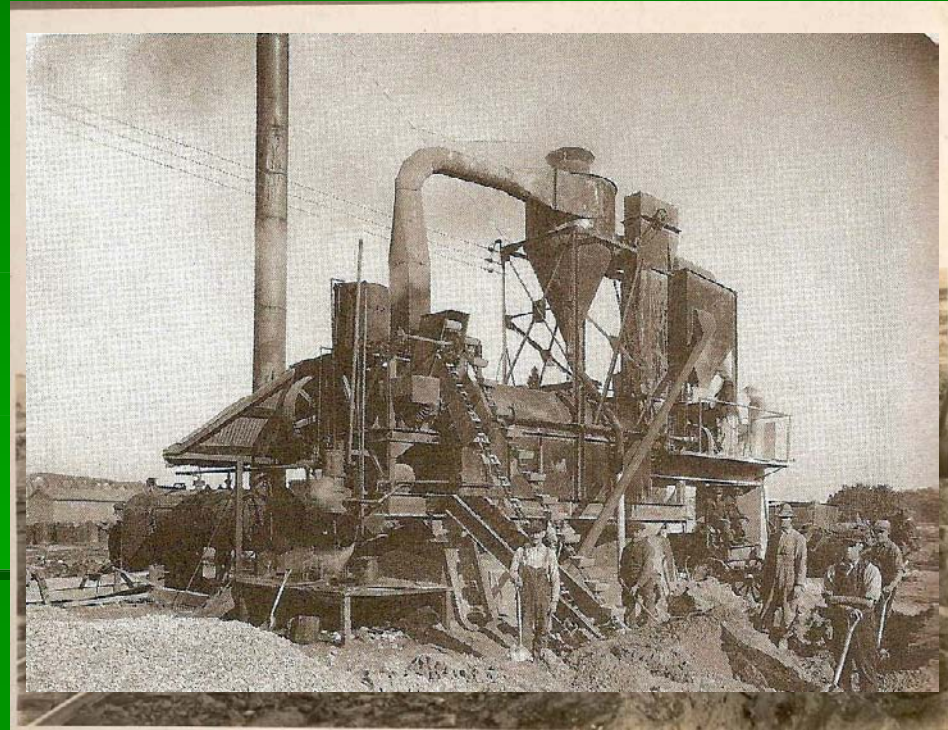
# Hot Mix Asphalt Mixes

- 1896, New York City adopted asphalt paving in place of brick, granite and wood block.
- 1900, Frederick J. Warren filed a patent for “Bitulithic” pavement, a mixture of bitumen and aggregate



# Hot Mix Asphalt Mixes

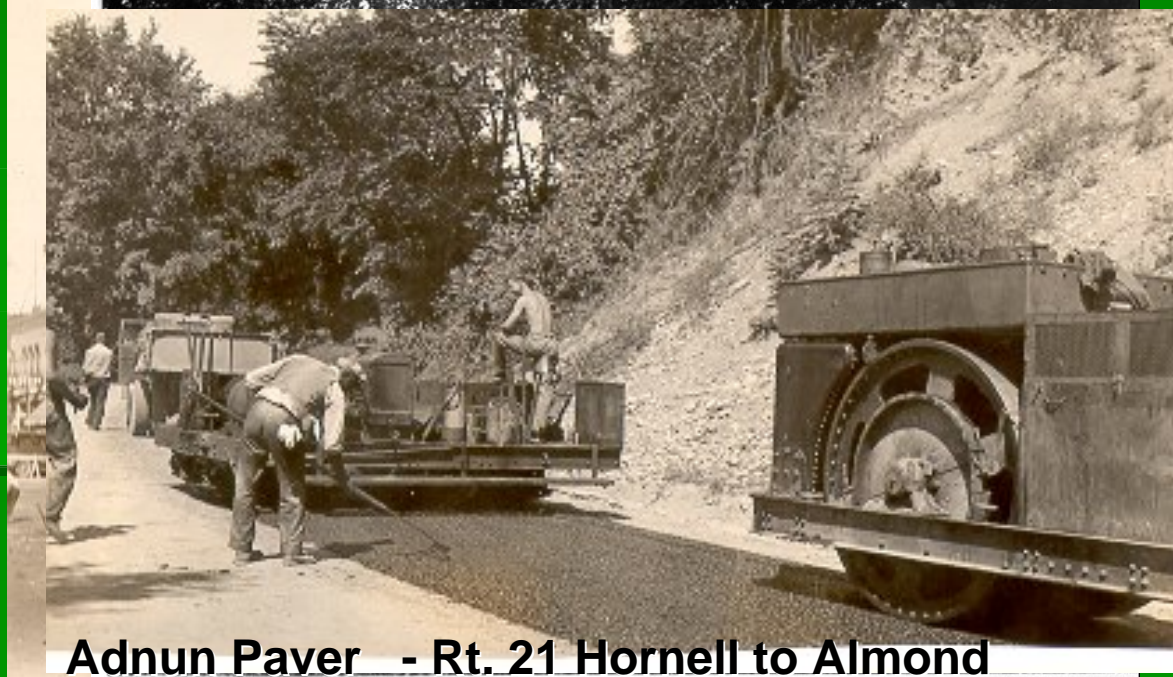
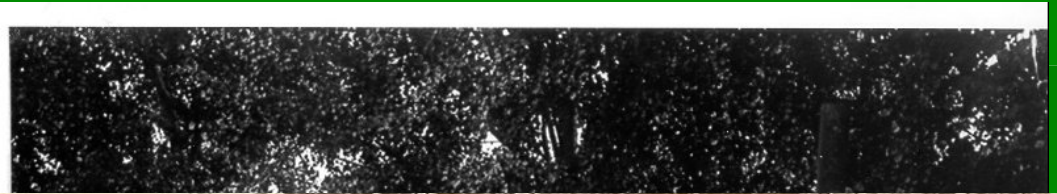
- 1900: natural sources of Lake Trinidad and Bermudez Lake in Venezuela.
- Warren Brothers built the first asphalt facility to contain virtually all the basic components of those of today in 1901.





# Hot Mix Asphalt Mixes

- Originally placed by hand
- 1920s Portland cement concrete mechanical spreaders
- 1930s Barber Greene first produced an asphalt finisher



Adnun Paver - Rt. 21 Hornell to Almond



# Hot Mix Asphalt Mixes

- Automated Plants
- Automated Pavers



- High Tech Vibratory Compactors





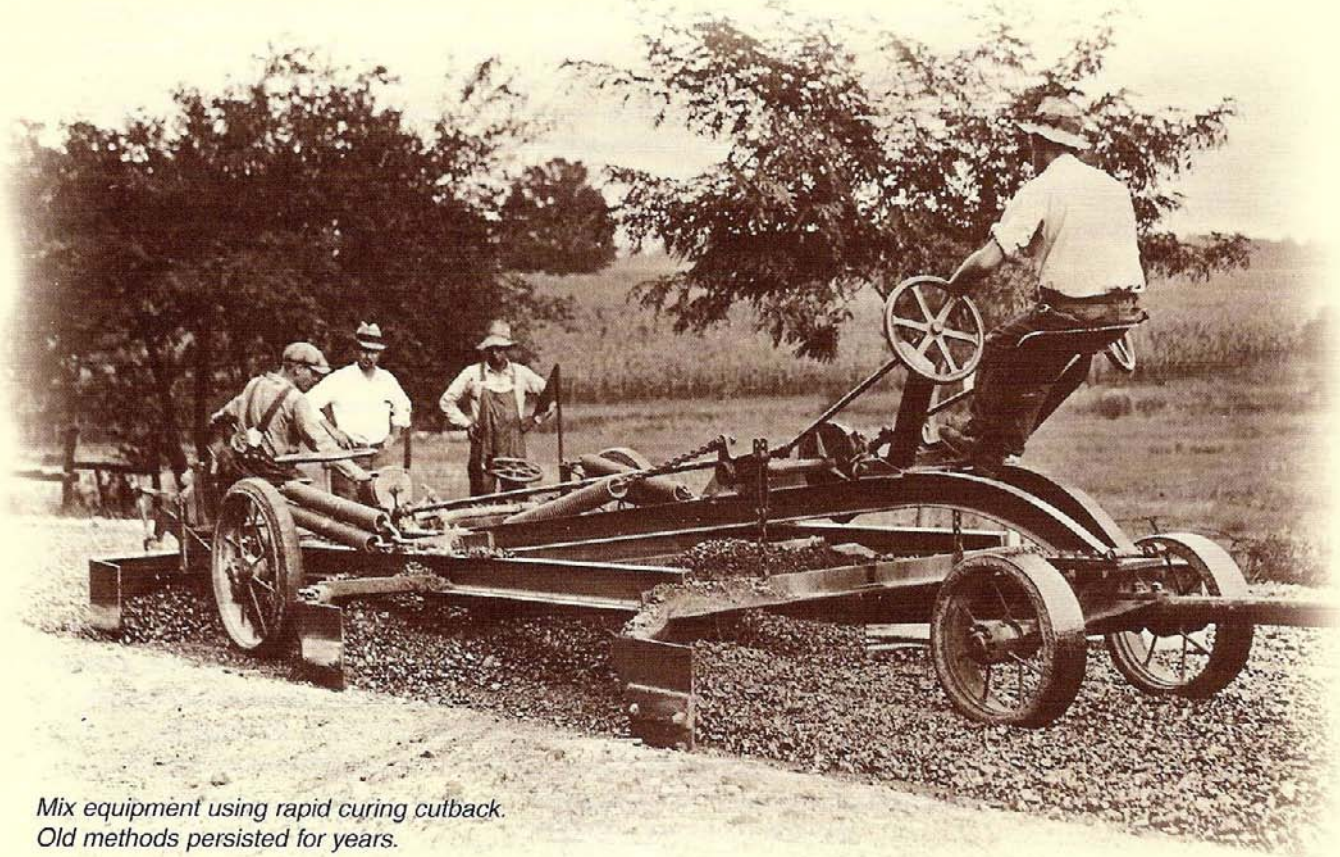
# Hot Mix Asphalt Mixes



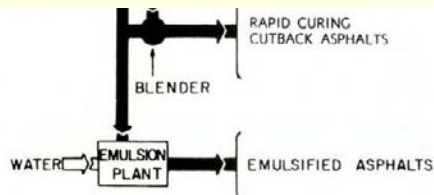
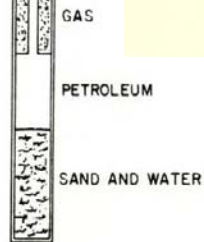
**Modern  
Day Hot  
Mix  
Asphalt  
Pavement**



# Cold Mix Asphalt Mixes



Mix equipment using rapid curing cutback. Old methods persisted for years.



alts  
rly

f

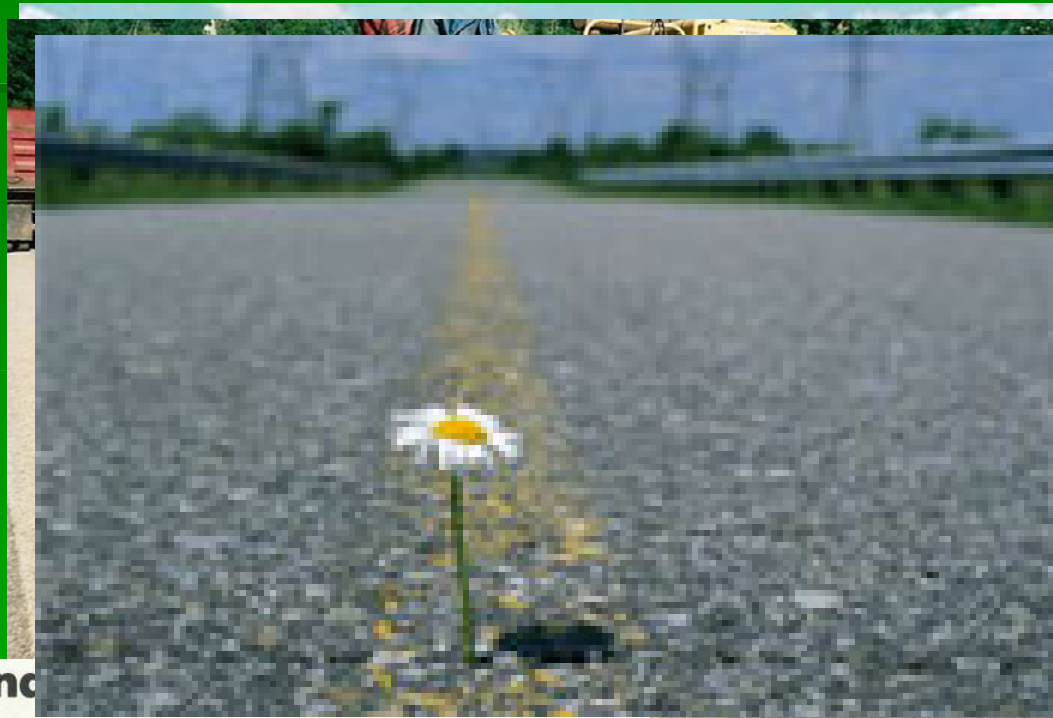
## Emulsions





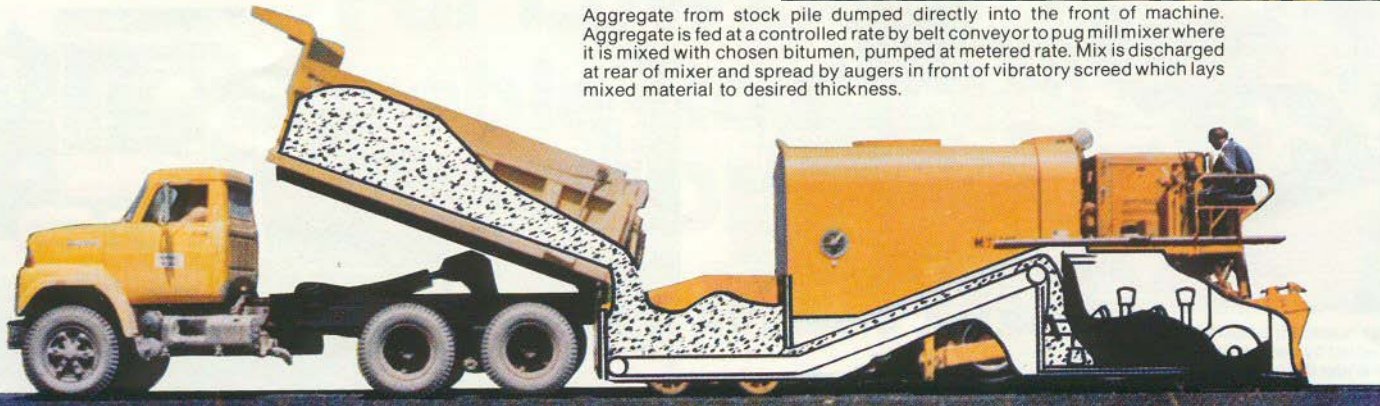
# Cold Mix Asphalt Mixes

- Flexible but strong to withstand temperature fluctuations
- Mixed at a central plant or on-site in portable plants
- Ambient temperatures reduce emissions, fumes and energy needs
- Minimizes transportation and material costs
- Cost-effective paving for



## Automatic on-site mixing and

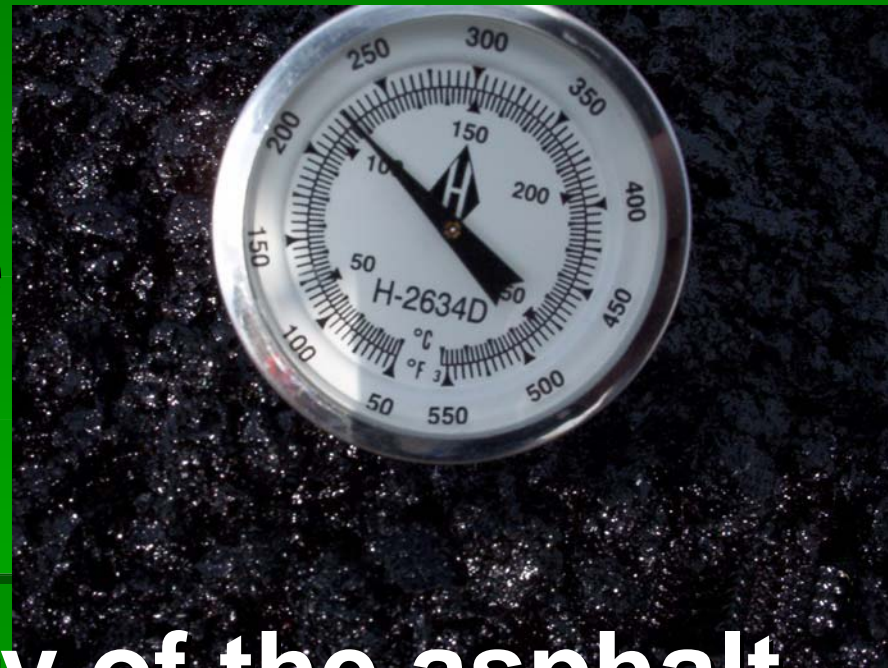
Aggregate from stock pile dumped directly into the front of machine. Aggregate is fed at a controlled rate by belt conveyor to pug mill mixer where it is mixed with chosen bitumen, pumped at metered rate. Mix is discharged at rear of mixer and spread by augers in front of vibratory screed which lays mixed material to desired thickness.



# Warm Mix Asphalt Mixes

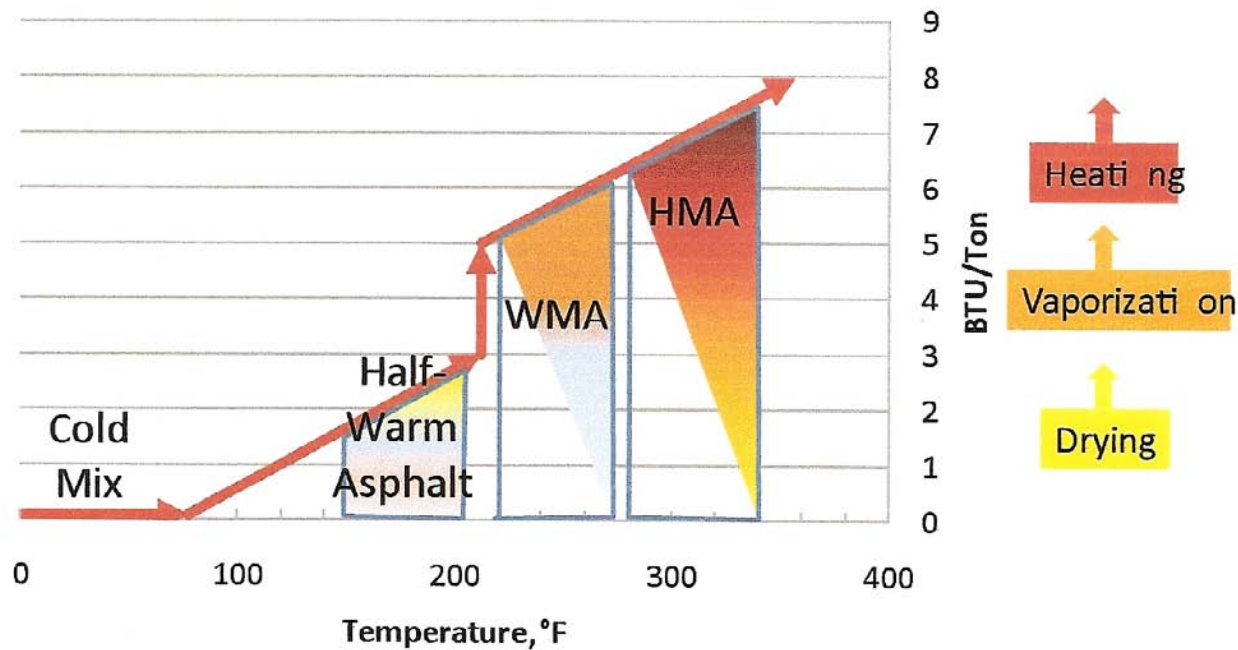
## What is “warm Mix”?

- Technologies
- Allow aggregate coating at lower temperatures
- Reduce Viscosity of the asphalt
- Temperatures 35 to 100 F°  
Lower



# Warm Mix Asphalt Mixes

## ■ Classification By Temperature





# Warm Mix Asphalt Mixes

## Classification By Type

**1. Organic Additives**

**2. Foaming**

**3. Other Stuff**



# Warm Mix Asphalt Mixes

- Organic Additives
  - Fisher-Tropsch Wax
  - Montan wax
  - Fatty Amides



**Sasobit®**



# Warm Mix Asphalt Mixes

- **Foaming**
  - **Foaming nozzle**





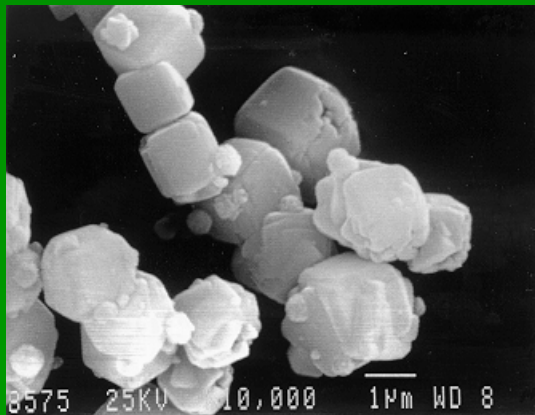
# Warm Mix Asphalt Mixes

- **Foaming**
  - **Hydrophilic Material**



**Advera**

**ASPHA-MIN**



# Warm Mix Asphalt Mixes

- Foaming
  - Other Methods



Low Emission  
Asphalt



# Warm Mix Asphalt Mixes

## ■ Other Stuff

- WAM-Foam



Shell Bitumen

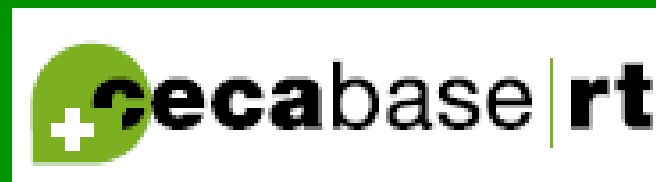


- Rediset WMX



REDISSET™ WMX

- Cecabase

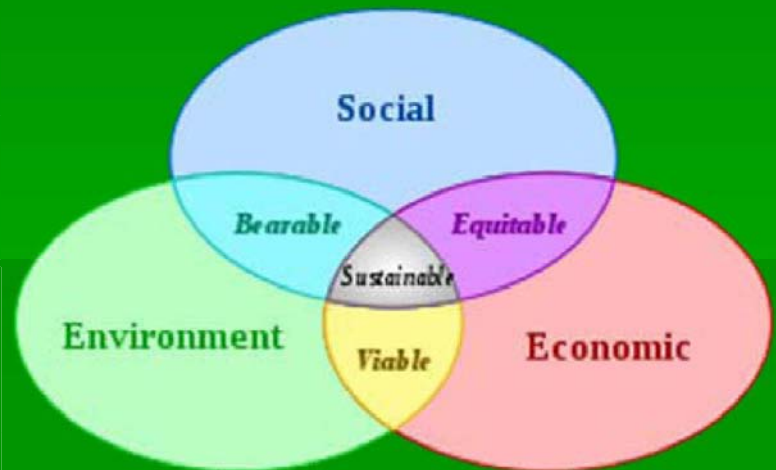




# Why Warm Mix?

- **Sustainable development is development that *"meets the needs of the present without compromising the ability of future generations to meet their own needs."***

**Sustainability**



**BLADES**



# Why Warm Mix?

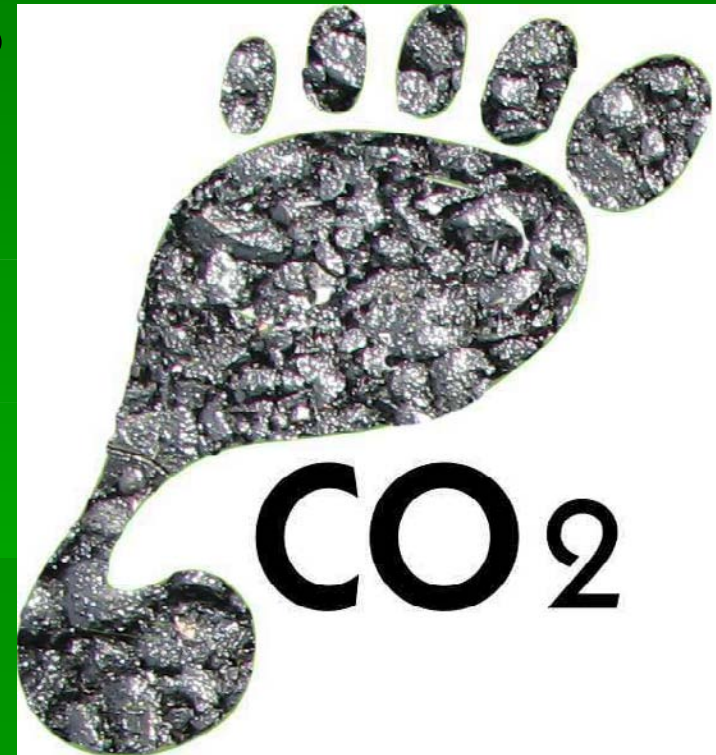
- Worker Safety: Asphalt Fumes



# Why Warm Mix?

## ■ Reduced Emissions

Emission	Average
CO <sub>2</sub>	28%
SO <sub>2</sub>	27%
VOC	35%
CO	24%
NO <sub>2</sub>	63%
DUST	47%





# Why Warm Mix?

- Reduced Fuel and Energy Usage



- Burner Fuel – over 35%

- Electric: No Increase



# Why Warm Mix?

- Improved Field Compaction
- Reduced Viscosity of binder



# Why Warm Mix?

- Longer Haul Distances
- Extending Paving Season





# Why Warm Mix?

- Higher RAP Percentage



## Fine and Coarse RAP Sizing



# Why Warm Mix?



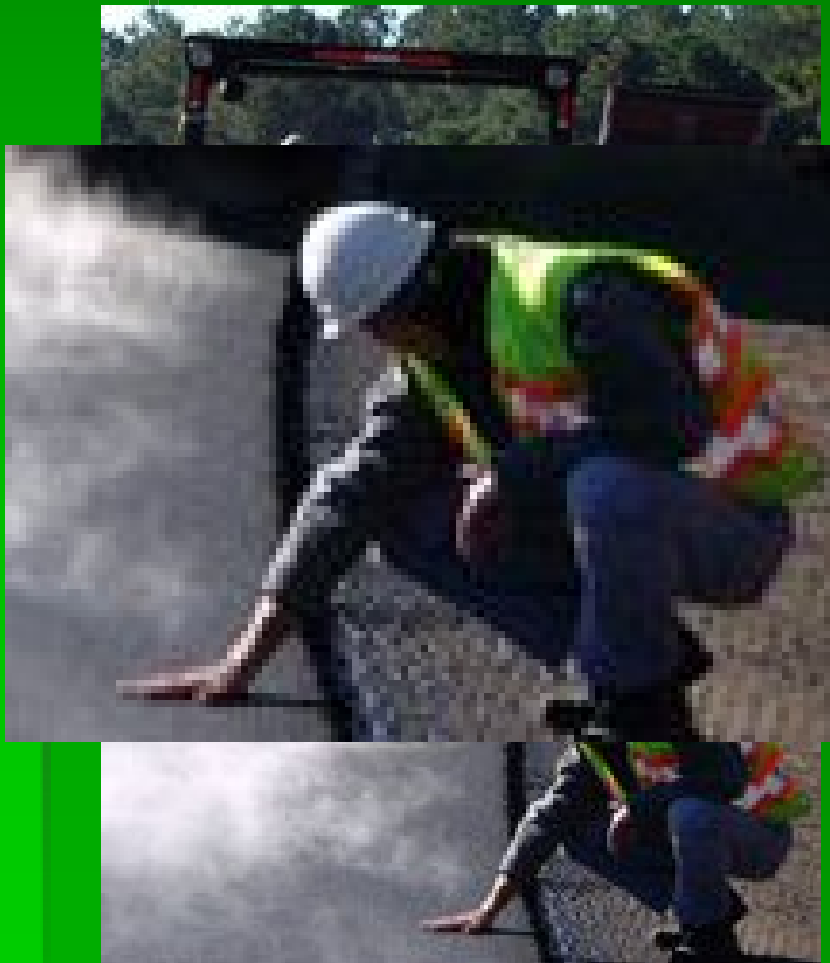
- Thick Lift Patching
- Frankfurt Airport:
  - 24" Deep in 7.5 Hr.



# Why Warm Mix?

- Better Working Conditions
  - Fumes

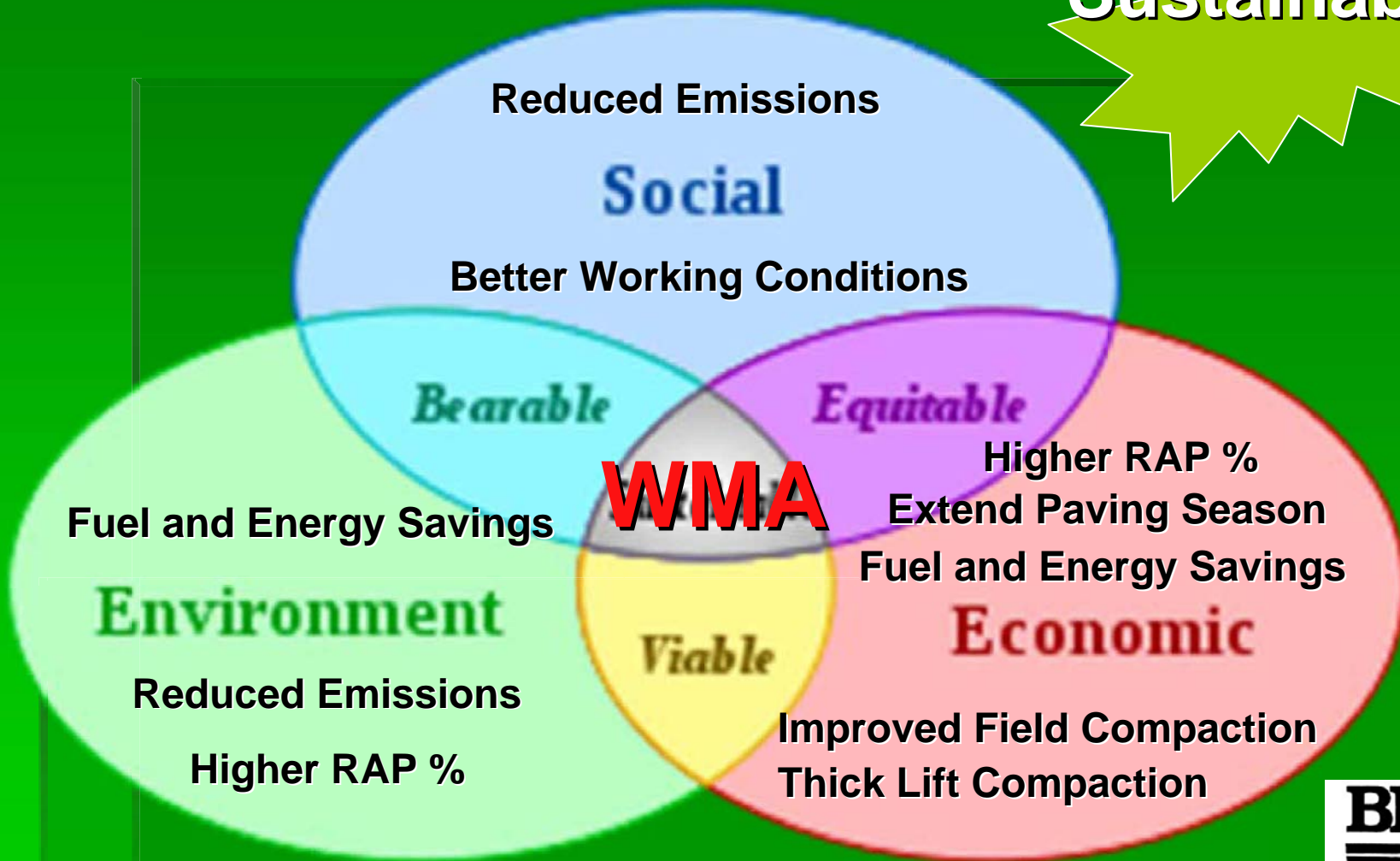
And Heat





# Why Warm Mix?

**Sustainability**



# What does this all mean?

- **Great Stuff –**  
**But** How Much  
does it Cost?
  - Additional Cost  
to produce.
  - **BUT** Lower  
Energy costs



# What does this all mean?

- **National Gurus: 90%  
Warm Mix in 5 years**
- **NYSDOT:  
Preliminary  
Specification  
Imminent**
- **“Environmental”  
Climate of the day  
will promote it’s use**

**It's coming  
to a plant near you!**

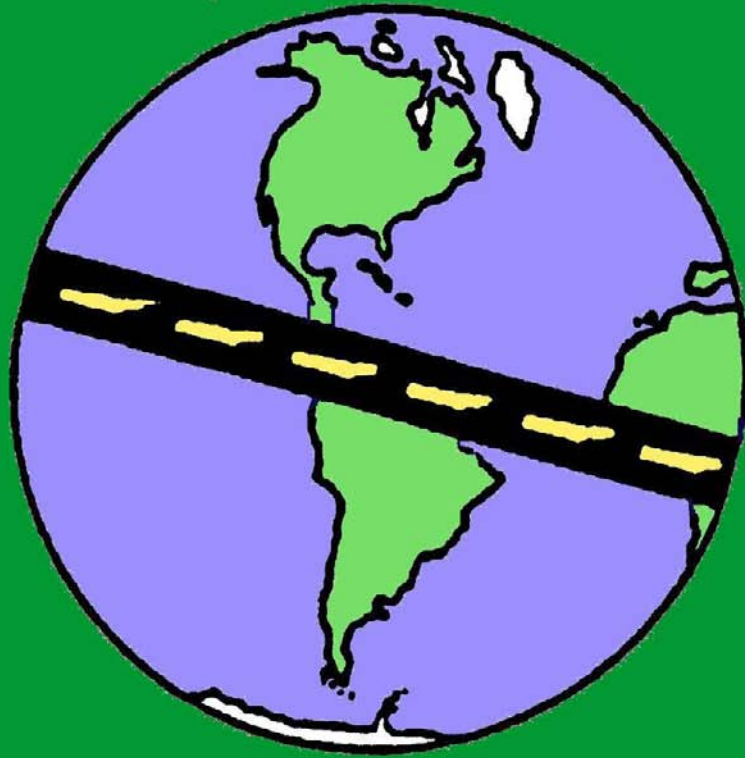




# What does this all mean?

- **Business as usual**
- **Results that are as good if not better!**





# PAVE THE PLANET

One World  
One People  
One Slab of Asphalt

Warm  
Mix  
Asphalt

Change  
We  
Can  
Live  
With!

