

Preventing Mix Segregation at the Paver



Outline

- Best practices for prevention of segregation
- Causes/ Remedies of Segregation at the Paver
- Thermal Segregation

Prevention Begins at the Plant

Segregation can occur any time between production and compaction



Truck Loading



Truck Loading



Truck Loading



Truck Loading



Truck Loading

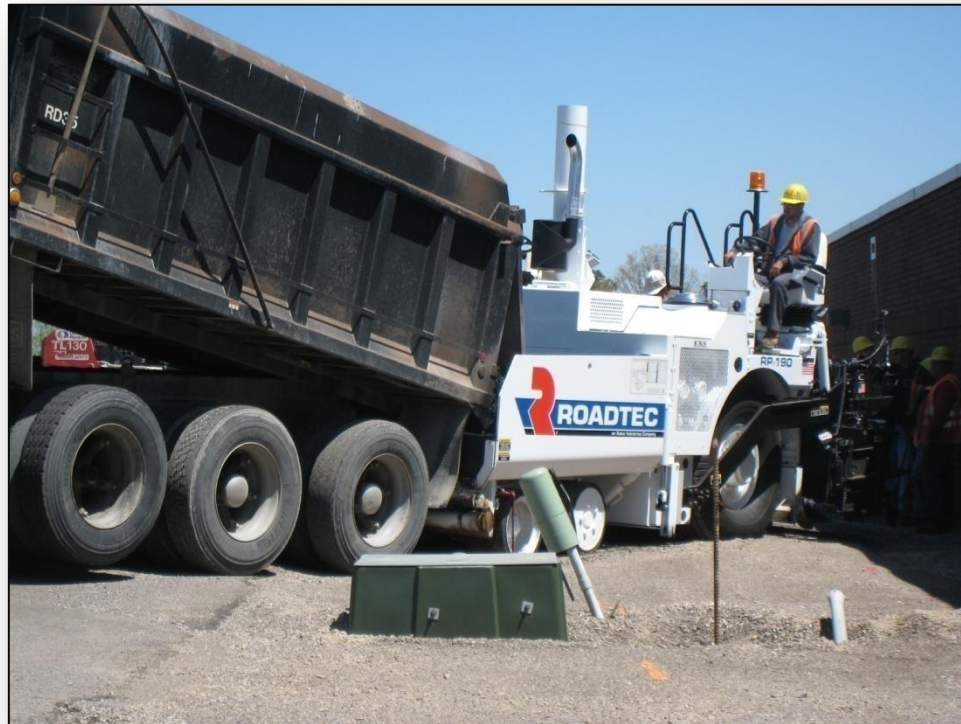


Trucking Transitions



Truck-Paver Contact

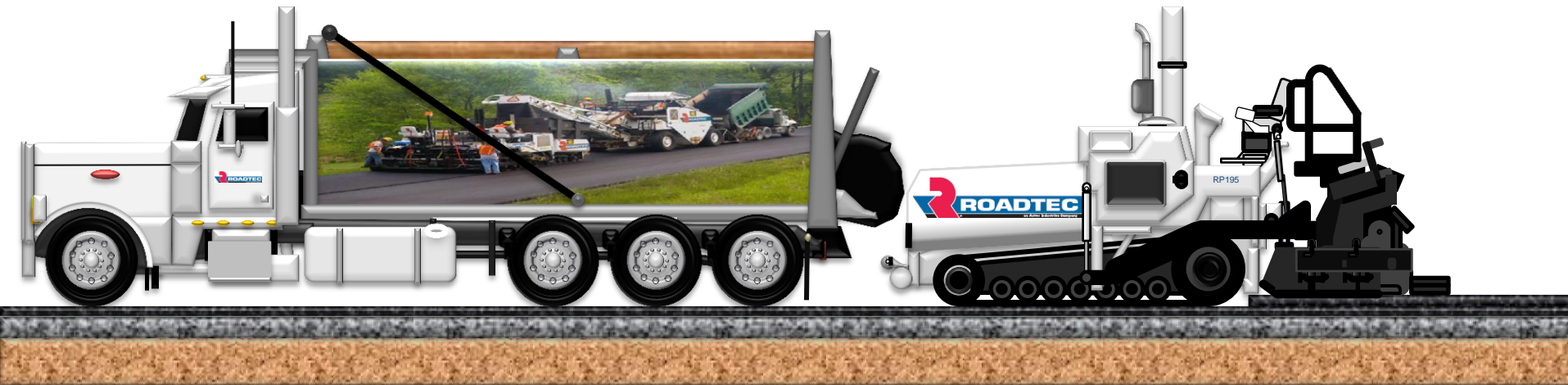
If trucks hold their brakes, the paver will slow down and the head of material will go up causing segregation



Truck Exchanges

When the paver picks up the truck, raise the bed so the material is in contact with the gate before discharge

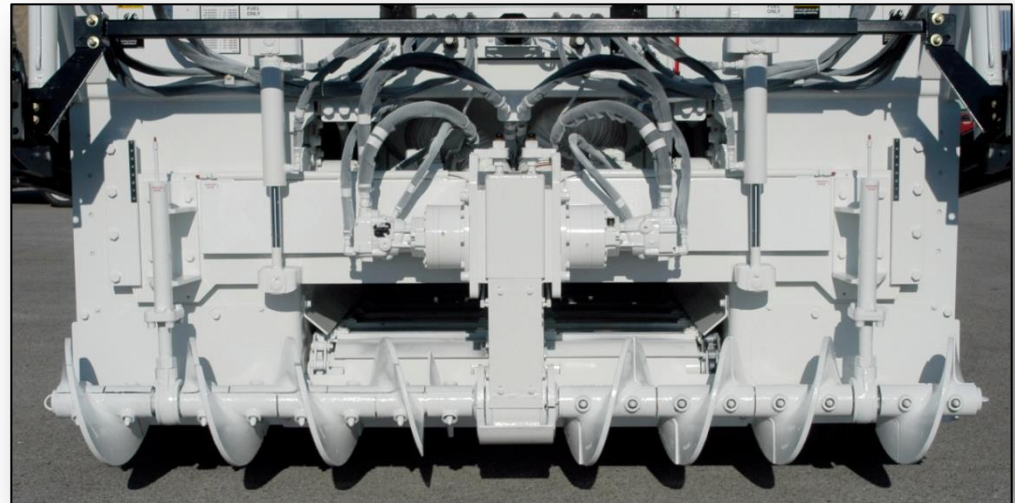
The goal is to move the material as a single mass



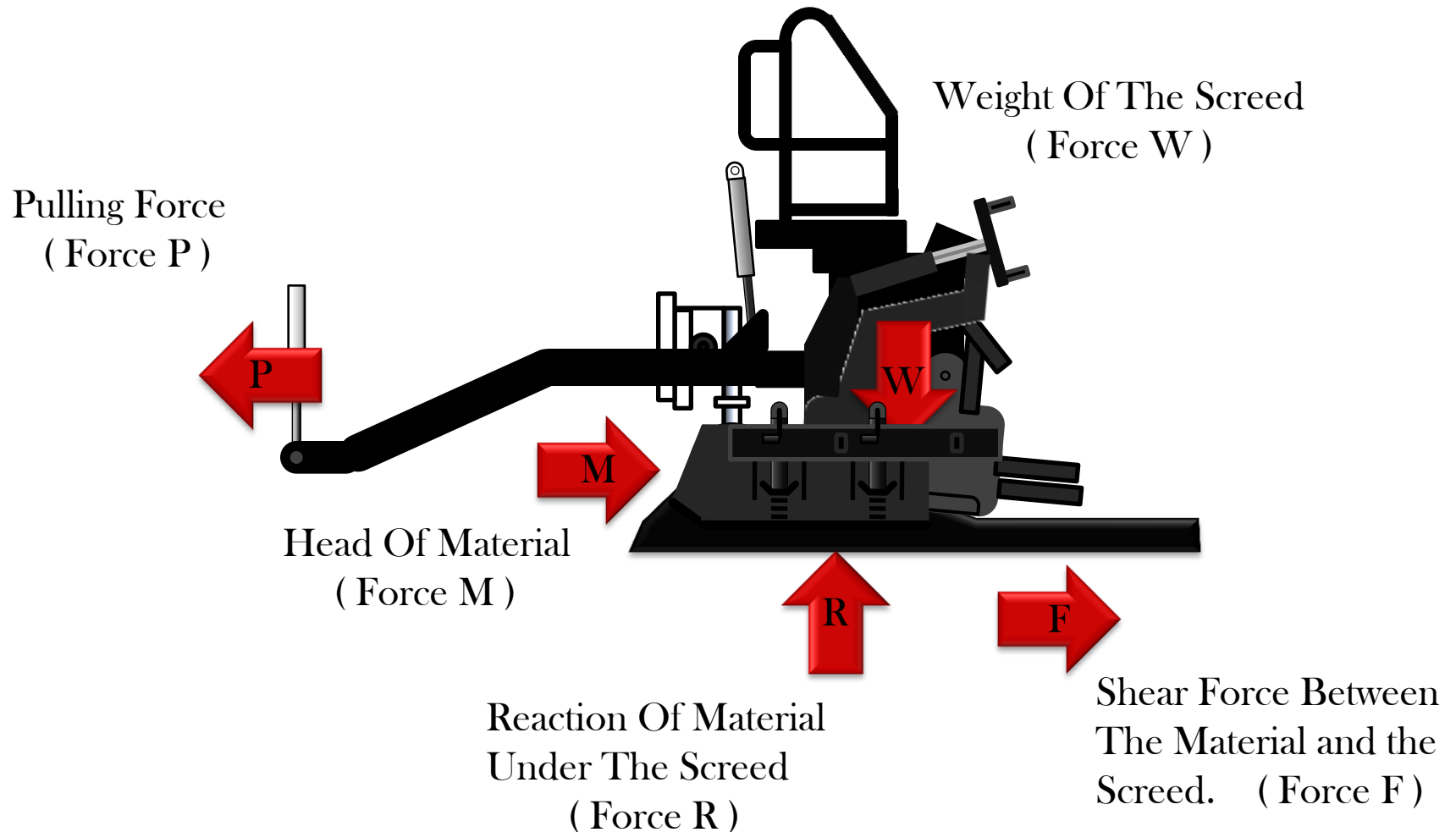
Material Management

Key Points in Prevention of Segregation:

- Keep Material Contained
- Prevent Excessive Rolling of Materials
- Move Material in a Smooth Uninterrupted Manner



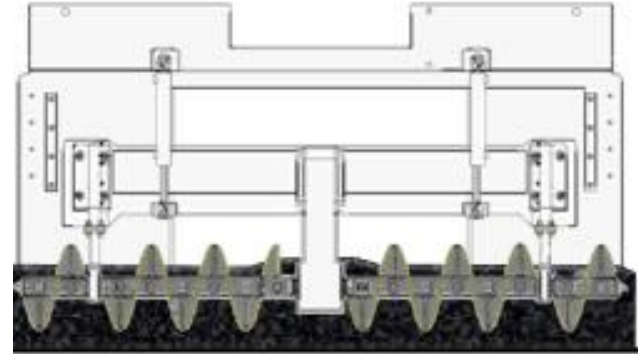
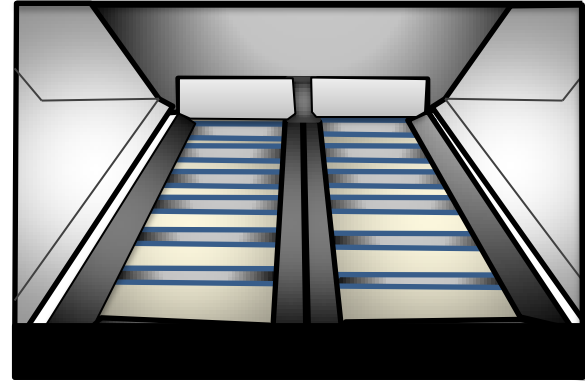
Forces acting on the screed



Managing the Feed System

Components

- Conveyors
- Flow Gates
- Auger Height
- Auger Speed
- Feed Sensor Placement



Paving crews are tasked with syncing the delivery of material to the screed and the travel speed of the paver

Balancing Act

Material Level in Hopper

Feed Sensor Position

Screed Adjustment

Paver Speed

Conveyor Speed

Auger Speed



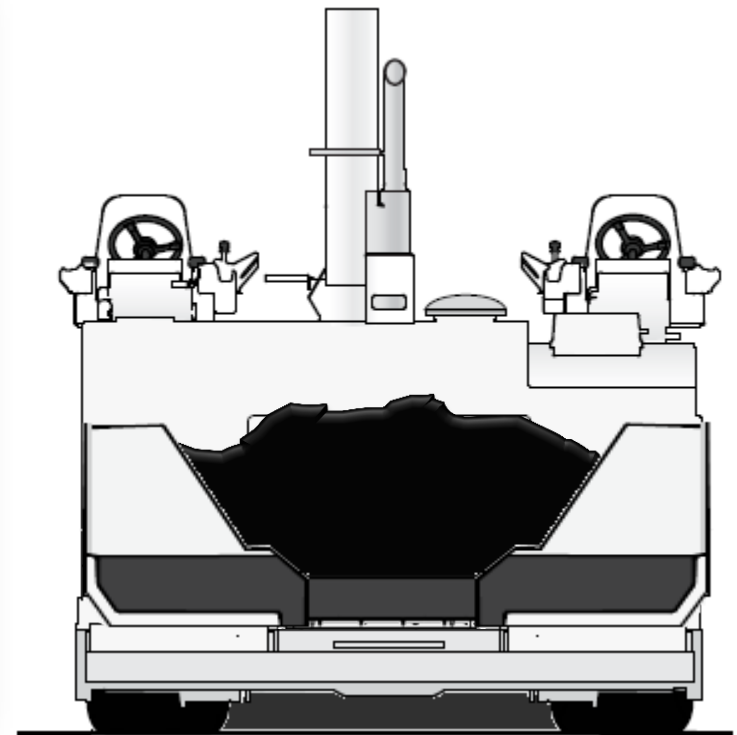
Flow Gates

Auger Position

When should I empty the Hopper?

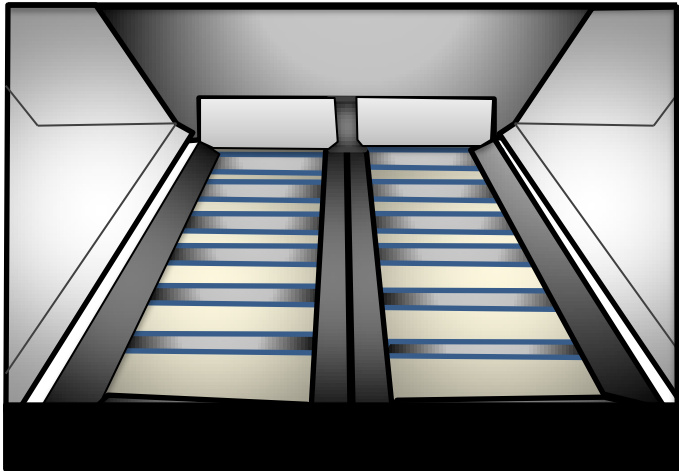
When working with segregating materials, the hopper wings should only be cycled with the hopper relatively full.

Set and keep the conveyor deck covered with a minimum of 6 to 10 inches of material. (152-254mm)



Flow Gates

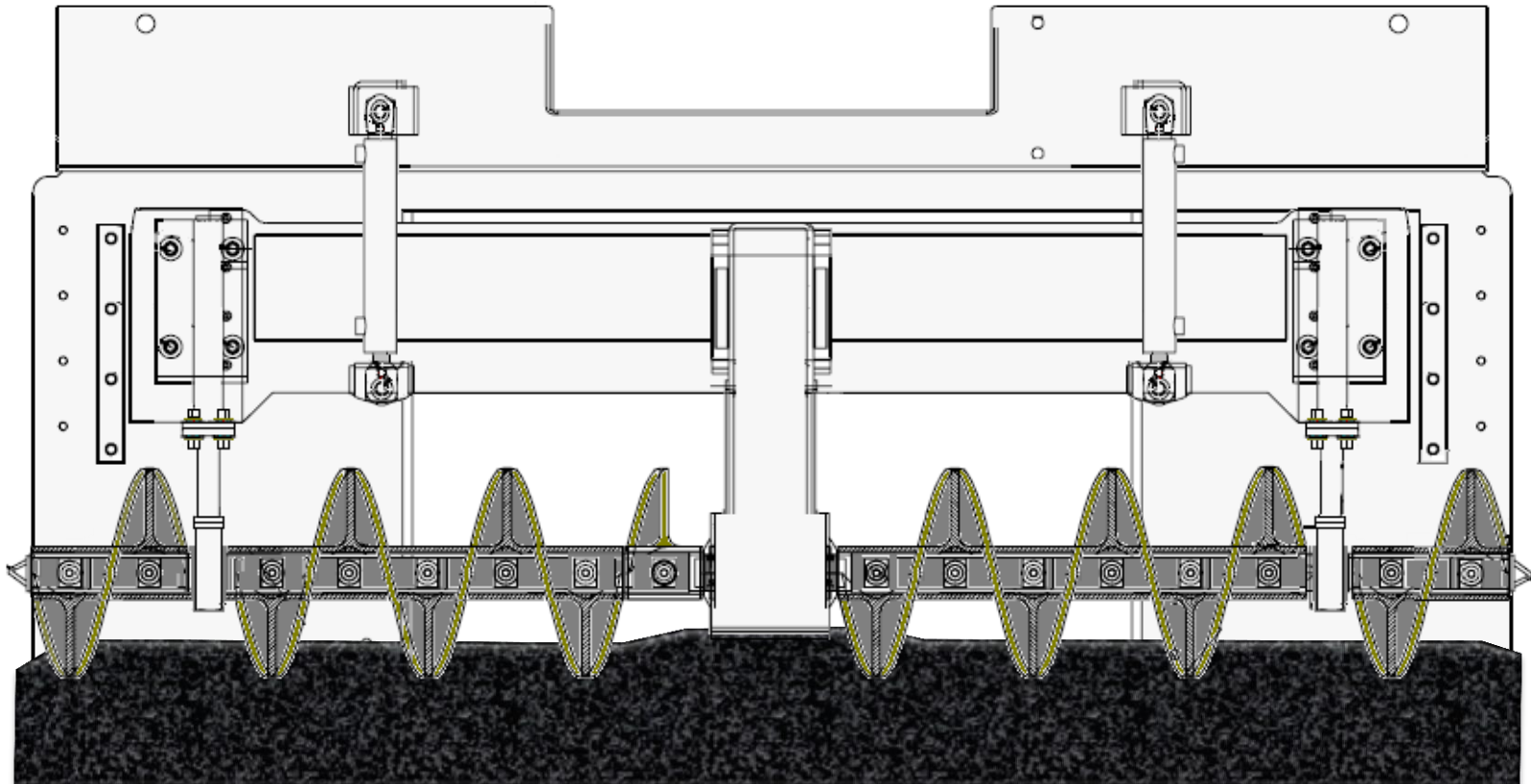
Flow gates are designed to Meter the amount of material that is delivered to the Auger Chamber.



Head of Material

The head of material is the amount of asphalt carried in front of the screed

Maintaining the correct head of material is **CRITICAL** for equilibrium/ smooth paving.

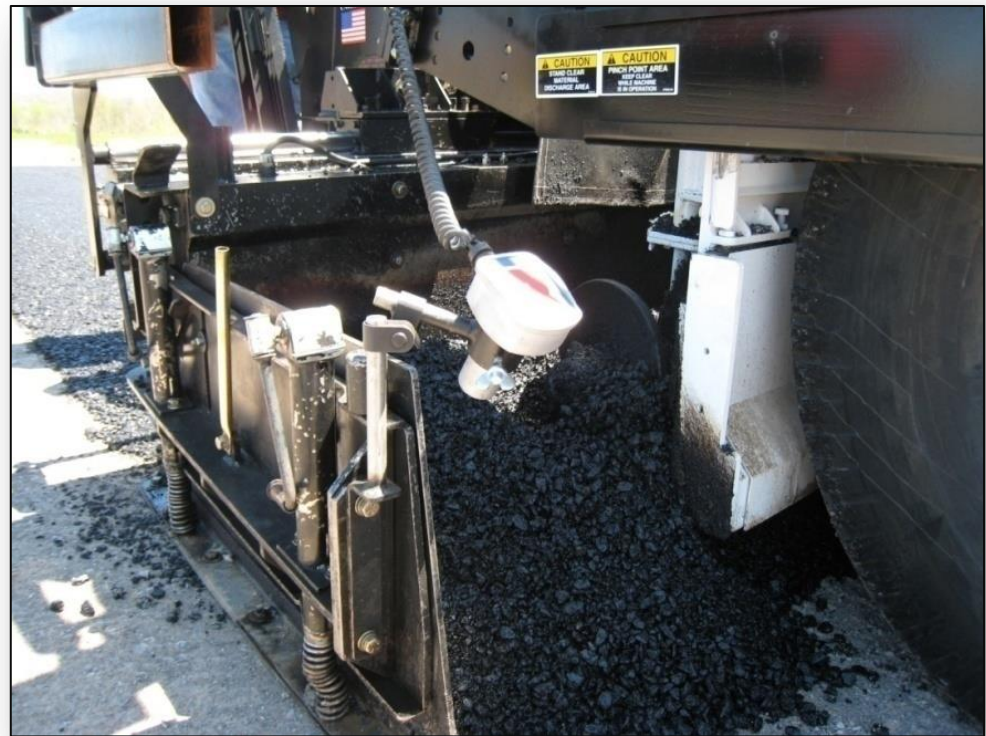


Correct Head of Material

Head of material should consistently cover $\frac{1}{2}$ the auger height across the screed box

Augers should be running 100 % of the time.
20-40 RPM

Augers that run at high speeds are constantly cycling on/off and creating segregation



Correct Head of Material



High Head of Material

Large pile of material shown here allows larger aggregates to separate

Large amount of material pushes the screed upward. To compensate, screed depth has to be lowered and the angle of attack is wrong

The segregated material and unbalanced screed forces will compromise mat quality

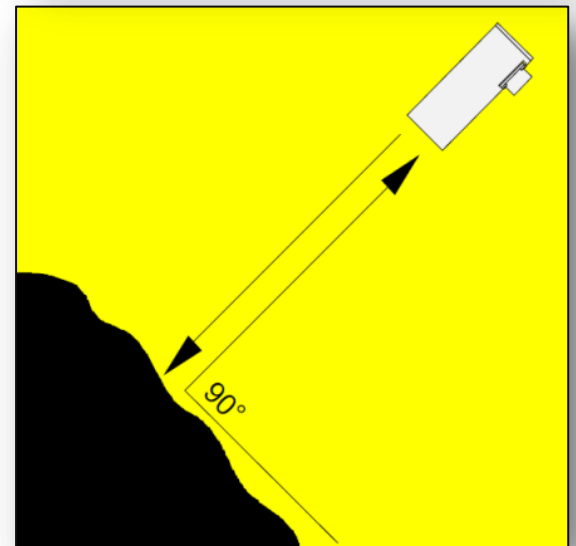


Feed Sensor Placement

Feed sensors control the level of material at the outboard ends of the augers

A misplaced feed sensor can cause irregular head of material and ultimately segregation in the mat.

The feed sensor should be mounted on the end gate and facing perpendicular to the face of the material as shown here



Auger Height

Auger height controls the head of material and is determined by mat thickness.

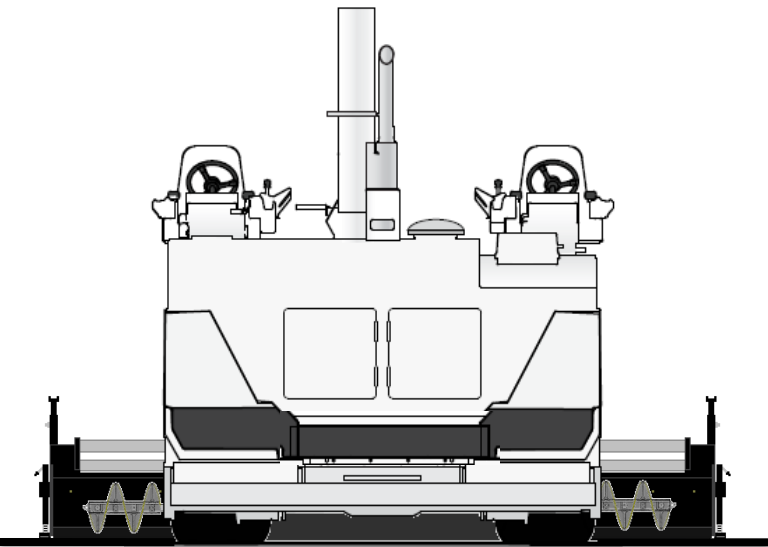
Add 2 inches to the loose thickness you are laying, or more for larger aggregates. (50mm)



Augers Extension

Auger extensions should always be used when wider paving is done.

Some material designs may require additional auger extensions that would not be required when working with traditional material designs.



Causes, Effects, and Remedies for Segregation



The Usual Suspects



- Longitudinal Segregation Streaks

- Shadowing

- End of Load Segregation

- Erratic surface segregation

- Thermal Segregation

Streaks Below Chain Case and/or Auger Bearing Supports



CAUSED BY:

Overloaded or inconsistent head of material allows larger aggregates to separate & topple into “Dead Areas” below chain case and outer auger bearings

REMEDY

Adjusting flow gates, conveyor speed, and auger speeds are all ways to control the head of material.

Auger height and feed sensor position should also be monitored

Centerline Streak



CAUSES

-High auger speed is pushing larger material to the outside, leaving a coarse surface under the center of the screed

-As conveyors deliver material to the augers, the large aggregates are being thrown forward underneath the paver

REMEDY

Slow the auger speed. Check Auger height.

Delta Plate is in place to prevent aggregate from landing beneath the paver

End of load Segregation



CAUSES

- Hopper wings cycled with low material level
- Conveyor deck ran dry
- Truck dumped improperly

REMEDY

- If necessary, stop paver to wait on truck before material level is too low
- Cycle hopper wings with at least 152-254mm material level

Erratic Flaws and Thermal Segregation



CAUSES

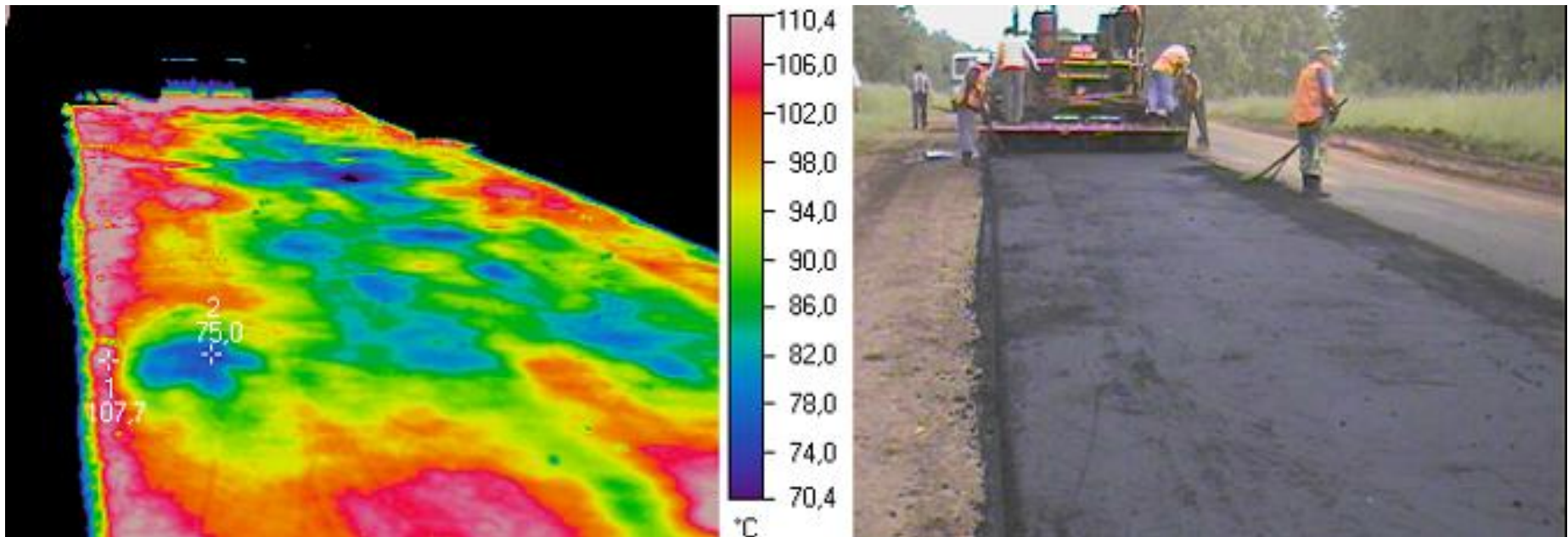
- Sudden change in paver speed
- Thermally Segregated Material
- Low/High Auger height

REMEDY

- Keep Consistent Paving Speed
- Truck Scheduling
- Material Transfer Vehicle

Issues Created by Thermal Segregation

- Cold spots
- Increased voids
- Inability to achieve compaction
- Premature pavement failure



Benefits of MTVs

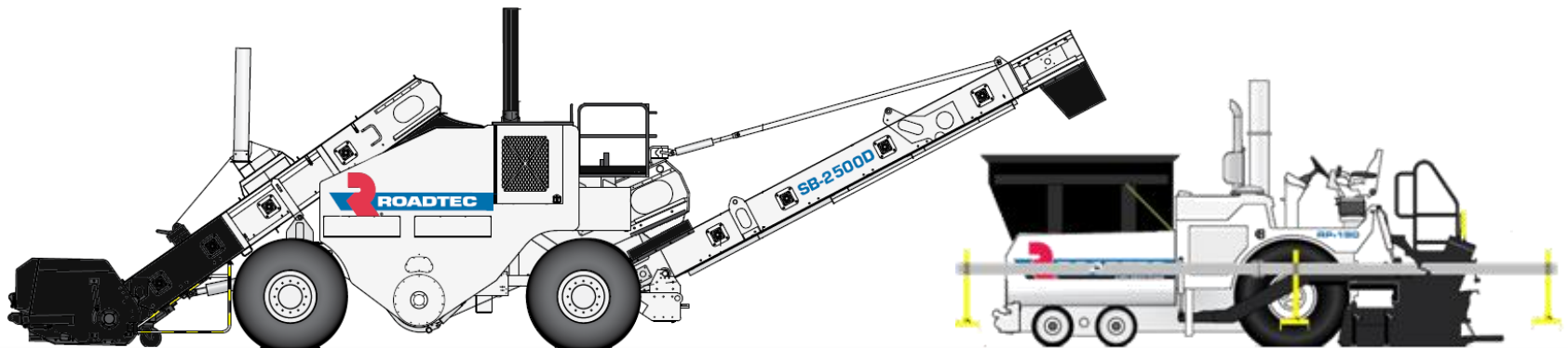
In summation, a remixing material transfer vehicle can combat the following enemies of smooth pavement surfaces:

End of Load Segregation

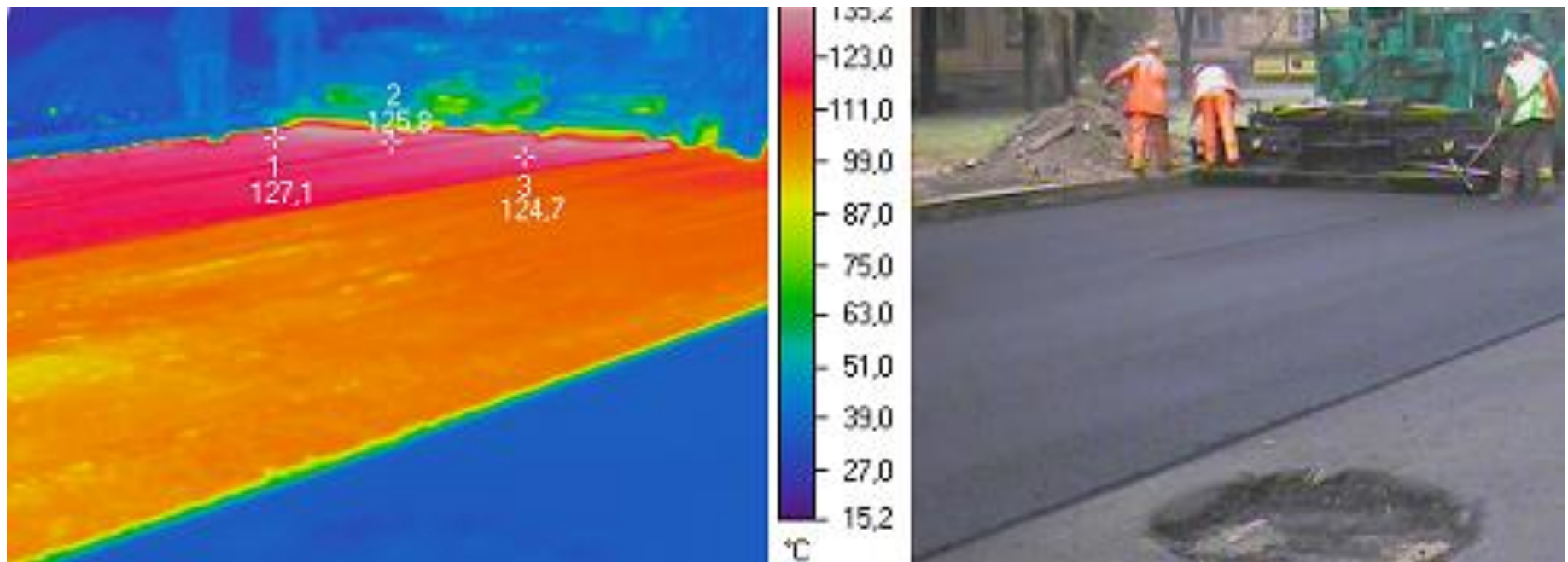
Paving stops due to truck delays (Surge Bin Capacity)

Thermal segregation due to long haul distances

Material segregation during truck delivery

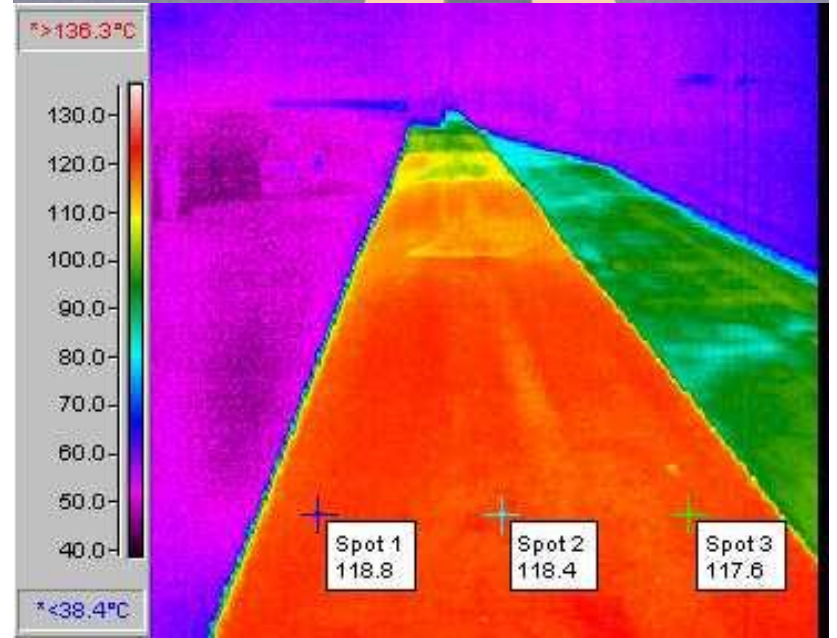
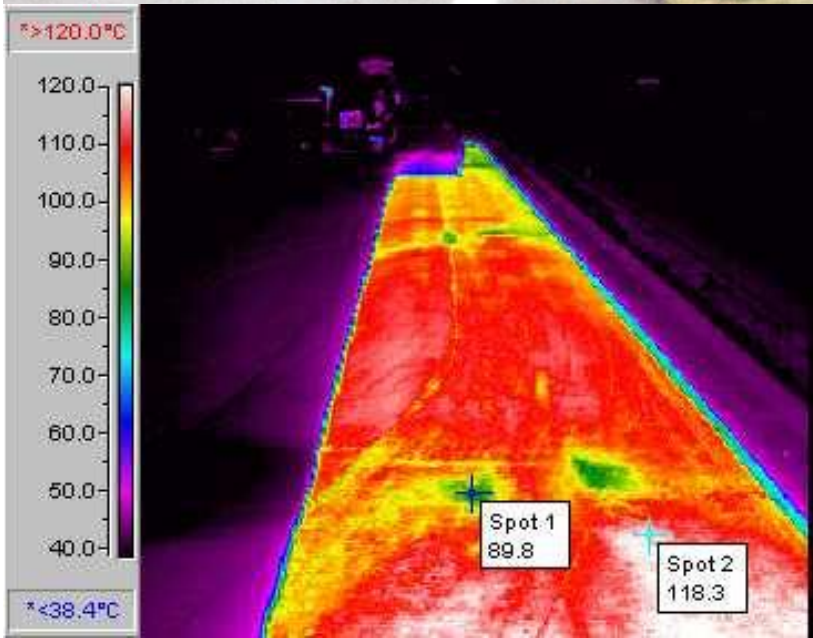


How mix looks with Shuttle Buggy mixing augers

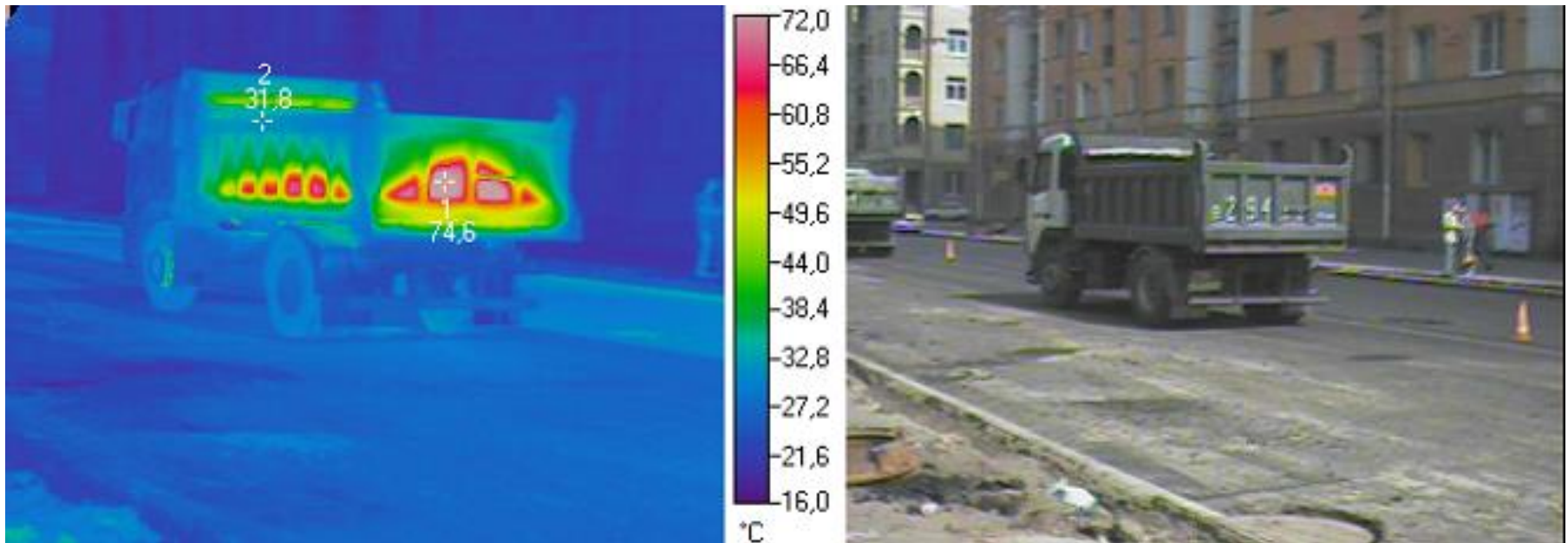


St. Petersburg, Russia behind SB-2500 of VAD Company only 2 to 3° Celsius temperature difference across the mat.

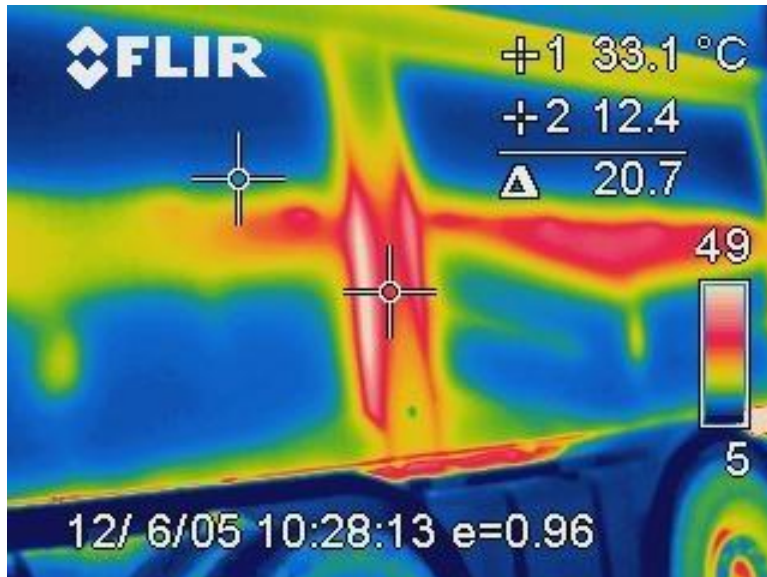
Shuttle Buggy Cures End of Load Segregation



No matter how simple the truck



No matter how complex the truck



Insulated Truck owned by a large Dutch Contractor

Non-Contact Paving

- Remove trucks from paver
- Trucks are not bumping paver causing it to change speed and put marks in mat



New NDT Technologies

- Few advances in last 10 years in measuring HMA quality
- Localized segregation of new overlays is a major concern
- Need for 100% Coverage devices

Infra-Red



- Temperature Uniformity During Placement
- Location and Duration of Paver stops

Ground Penetrating Radar



- Directly related to in-place density after compaction

Moba Pave IR

Long Life Pavement

Proper Sub-grade

Substantial Structural life

Pavement Smoothness

No Material Segregation

No Temperature Segregation

Uniformity of Density

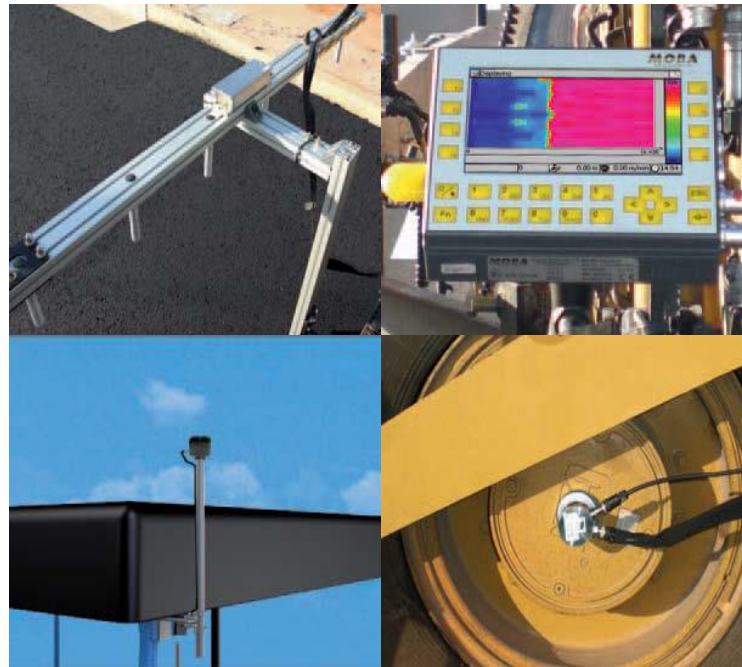
Speed of Construction

Minimizing Traffic Delays

Low Price



MOBA Pave-IR



- Real time infrared logging
- Temperature tied to location using GPS coordinates

Send in the Mill

What Happened to the Margin?



Not who you need on your Job

If we screw it up bad enough, these guys will come fix it and we can do it a second time.

Remember it cost a whole lot more to do it twice than to do it correctly the first time.



Thank you

