

A Contractor's Perspective on Achieving Quality and Smoothness in Hotmix Paving



PAVEMENTS/MATERIALS CONFERENCE

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Quality is in the eye of the beholder.

In construction, Quality is defined by the Owner.

- Through the specifications
- By paying incentives / disincentives



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Why does quality matter in Construction?

- Pride of ownership
- Reputation
- Improved Corporate Culture
- Product Performance / Warranties
- Bonus Incentives
- Confidence in Bidding



Workmanship

- Segregation
- Joints
- Smoothness
- Compaction





- Aggregate Properties
 - Specifications
 - Incentives/Disincentives
- Mix Properties
 - Specifications
 - Incentives/Disincentives

Why Incentives / Disincentives?

- Specification defines minimum Quality
- Allows Private Sector to be the Innovator
- To stimulate innovation, Bonus specification allows Contractors to risk money on new Methods and Equipment
- Allows successful Contractors method for recovering costs of innovation

Why not just Disincentives?

- Owner may pay for imagined risk at bid time
- Contractor's motives not same as Owner's
- Subtle Quality “defects” are tolerated
- No “incentive” to achieve the best

Quality does not have to cost more

- Highest Quality Contractors succeed through market competition
- Incentive evolves to lower and lower bids
- Lower Quality Contractors can't compete
- Better, smoother roads are built

Quality as a Corporate Culture

- Instilled in everyone that works there
- Gives the company a competitive edge
- Is good for the bottom line



One of the most obvious examples of Quality in Road Construction

SMOOTHNESS

- Lower fuel consumption
- Less pollution
- Less vehicle wear and tear and damage
- Less damage to freight
- Less pavement damage from vehicle dynamics
- Happier traveling public
- More money for roads!!!

The Keys to Smoothness:

The time, effort, and money spent to achieve a given level of final ride quality depends on:

- The pre-construction ride quality for overlays
- The number and types of opportunities for improvement
- The practices employed at each opportunity

Steps to Smoothness

- Be aware of every opportunity for ride quality improvement
- Know best practices
- Implement best practices
- Monitor your work – know what you can and cannot accomplish
- Be concerned and willing to learn

Opportunities for Improvement

- Corrections applied to existing surface
- Milling
- Intermediate lifts
- Corrections applied to intermediate lifts
- Final lift
- Corrections applied to final lift

Leveling Course





Pre-paving Grind



**Leveling Course Followed by
Grinding**

What you pave on matters





What you pave on matters

A photograph of a dark asphalt road with a yellow line, showing significant cracking and wear. The text "What you pave on matters" is overlaid in white.

What you pave on matters

General Best Practices

- Maintain constant speed – DO NOT STOP
 - Milling
 - Paving
- Balance operation
 - Mix production
 - Haul
 - To the paver, from the mill
 - Paver / Mill speed
 - Compaction of mix
 - Breakdown
 - Intermediate
 - Finish

Best Practices

- Reference as smooth a surface as possible
 - Existing surface
 - Previously-ground or placed lane



Skis

- Sense off the smoothest part of the pavement
 - reference the new mat or the adjacent mat
- Average the bumps out over the longest possible length
 - \$0.79 can be just as good as \$22,000









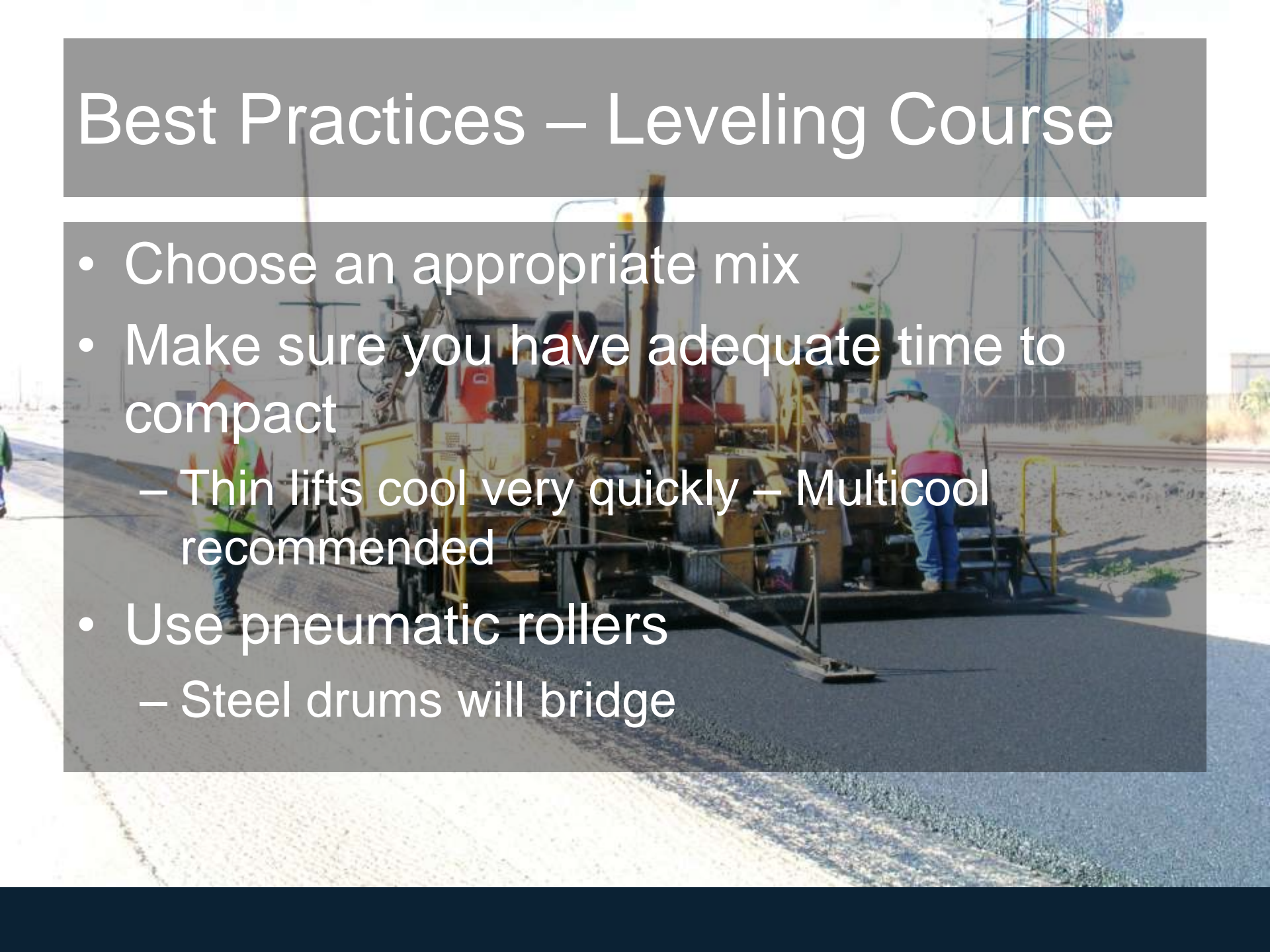
Best Practices – Milling

- Consistent maintenance
 - Blocks and teeth
 - Referencing equipment
 - Machine in general
- May want fine or micro-milling, especially for single, thin overlays



Best Practices – Leveling Course

- Choose an appropriate mix
- Make sure you have adequate time to compact
 - Thin lifts cool very quickly – Multicool recommended
- Use pneumatic rollers
 - Steel drums will bridge



- Choose an appropriate mix
- Control mix properties
 - Gradation
 - Binder content
 - Temperature
 - Segregation

Best Practices

– Paving

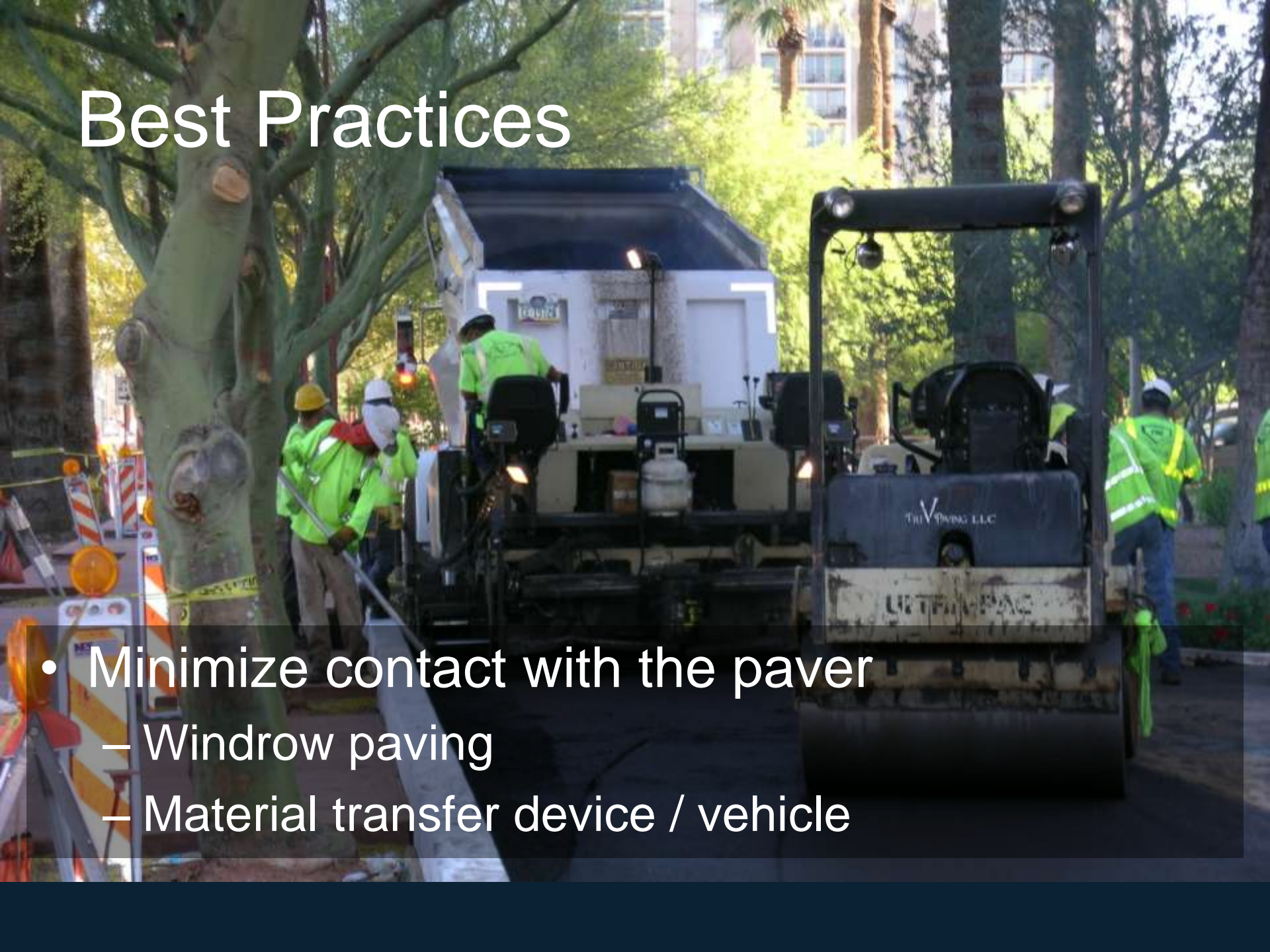


Best Practices – Paving

- Balance production / haul / placement / compaction
- Monitor time available to compact
 - Multicool
 - May need to adjust for changing conditions

Best Practices

- Minimize contact with the paver
 - Windrow paving
 - Material transfer device / vehicle



Best Practices – Paving

- Avoid thermal and mechanical segregation in the hopper
 - Either fold the wings after every load, or never fold them
 - Do not run the hopper below half full



Best Practices – Paving

A yellow paver machine is shown in the process of dumping material from its hopper onto a road surface. A large black tire is visible in the foreground, and an American flag is on the side of the machine. The background shows a road and some greenery.

- If end dumping
 - Do not back into the paver – let the paver pick up the truck
 - “Break” the load before releasing the end gate
 - Flood the hopper

Best Practices – Paving

Do not allow
material to
overflow



Best Practices – Paving

A close-up photograph of a Caterpillar paver machine. The machine is yellow and has a large hopper with two large, dark, rectangular flow gates. The hopper is filled with a dark material, likely asphalt or concrete. The machine is positioned on a paved surface, and the flow gates are open, allowing the material to fall through. The Caterpillar logo is visible on the top of the machine.

- Set flow gates to allow for balanced flow and steady flight chain operation
 - If paver is not centered on pass, adjust accordingly

Best Practices – Paving

- Use auger and tunnel extensions as necessary
- Use material management / anti-segregation baffles / chain curtains / etc.



Best Practices – Paving

A close-up view of a paving machine's screed assembly spreading a thick layer of dark asphalt. The machine's metal frame and rollers are visible, with a large pile of material ahead of the screed. A worker in a high-visibility vest stands in the background near the machine's controls. The scene is set on a construction site with a clear sky.

Maintain a constant (and proper) head of material ahead of the screed

Best Practices – Paving

- Create as straight a joint as possible
 - Stringline and guide
 - If you cut the longitudinal joint back, cut it in a straight line
- Pave in constant widths as much as possible
- If you have to adjust widths, do it slowly and adjust material flow

Best Practices – Paving

- Minimize raking
- Do not walk on the mat



Best Practices – Paving



- Do not park the rollers on the mat
- Reverse roller direction at an angle
- Control roller speed, particularly on turns

Rolling

- Don't transfer adjacent bumps onto new mat by rollers straddling it
- Roll off mat - don't stop on the hot mat
- For ACFC's - achieve breakdown / compaction with one roller, 2 finish rollers running ONE direction only in tandem

Best Practices – Paving



- Use a straightedge on construction joints
- Leave enough manpower and material to build the joint

Expected Outcome


- Ride quality after any given opportunity for improvement
 - Depends on the existing ride quality
 - Will generally be no better than about 60% of pre-operation ride quality
- Your results may vary – you need to know what you can accomplish
- Good best practices have big influence

THE MOST IMPORTANT PART!

- PERSONEL - THE REAL KEY
 - Education
 - Expectations
 - Access your Assets
 - Share the Wealth



EXPECTATIONS

- 
- A yellow CAT roller is paving a road. In the background, a large white truck is parked. The scene is outdoors on a clear day.
- Make sure everyone knows what the specification is
 - Tell everyone what is expected of them.
 - Make the people who do the job every day part of the quality process

ACCESS YOUR ASSETS

- Turn loose your innovators
- No toleration for failures is bad climate for taking risks (and finding innovations)



SHARE THE WEALTH!!

- Laydown Crew
- Truckers
- Millers
- Plant Operators
- Mechanics
- Traffic Control
- Quality Control

Zen And The Art of Asphalt Paving



- Remain constant
 - Continuous uninterrupted process
- You want Equilibrium
 - Production Consistency
 - Quality Consistency
 - Heat Consistency
 - Personnel Consistency

Some Days



Construction Practices

Paving in wet weather or cold weather may lead to premature failures



Questions?



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