

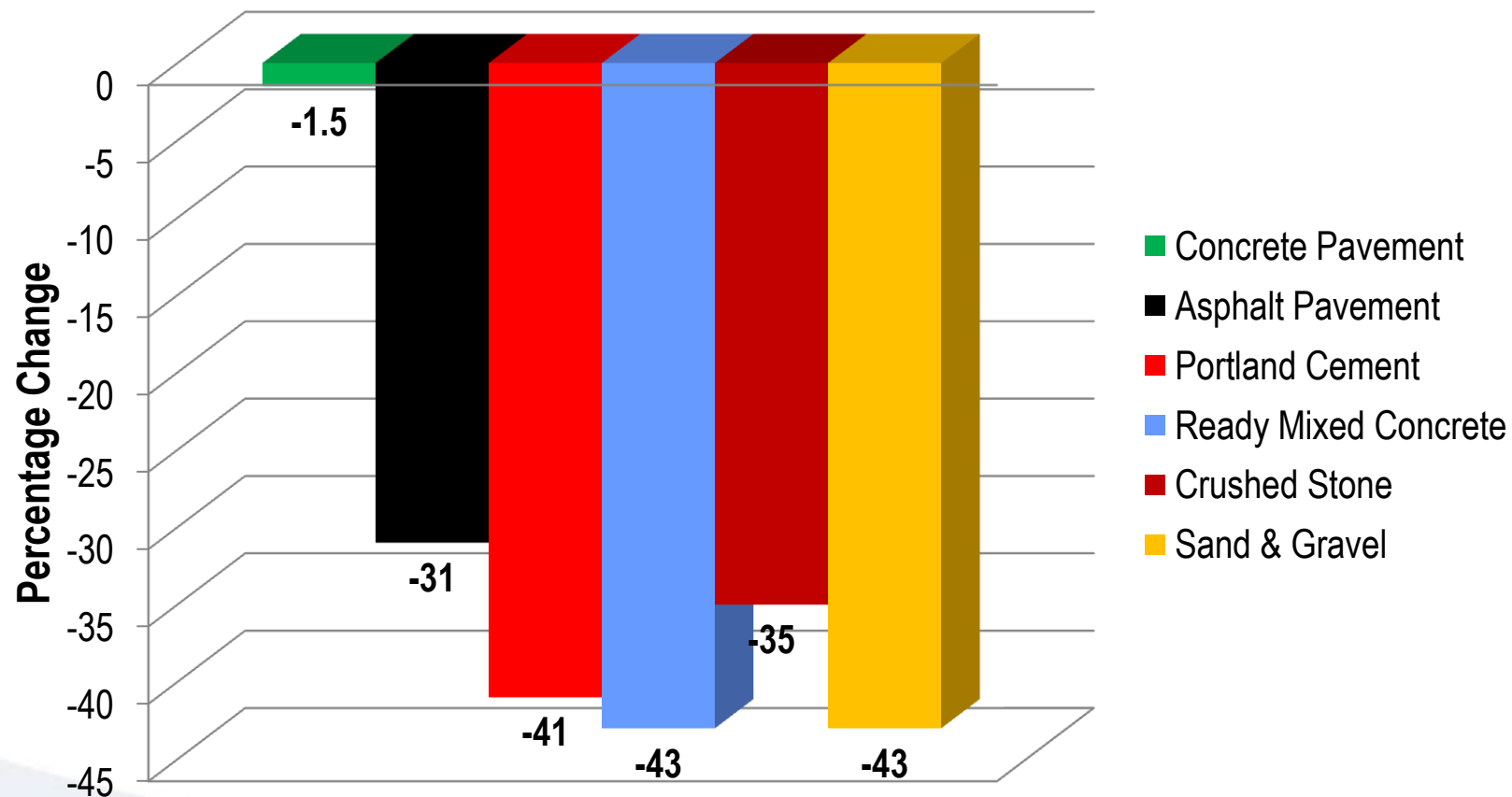
National Perspective on Concrete (Pavement)...

Gerald Voigt, President & CEO



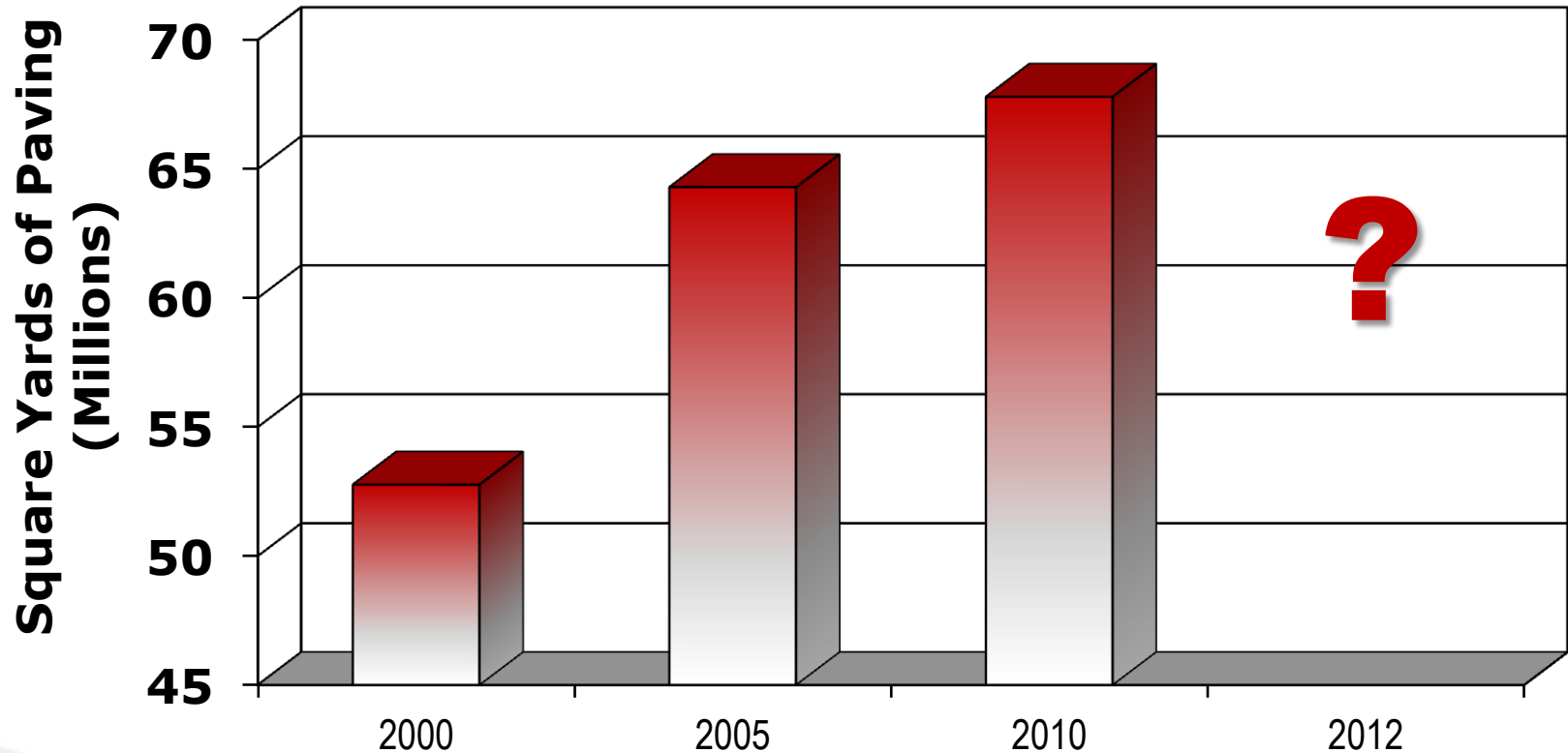
2012 AZ Pavement/Materials Conference

US Construction Materials Market Change 2006-2010



Source: American Concrete Pavement Assn., National Asphalt Pavement Assn., Portland Cement Assn., National Ready Mixed Concrete Assn., National Stone, Sand & Gravel Assn.

U.S. Concrete Paving – Growth Over Time!



Source: Calculated from Square Yard paving items in Oman Systems Bid Tabs Pro.

Drivers to Growth...?

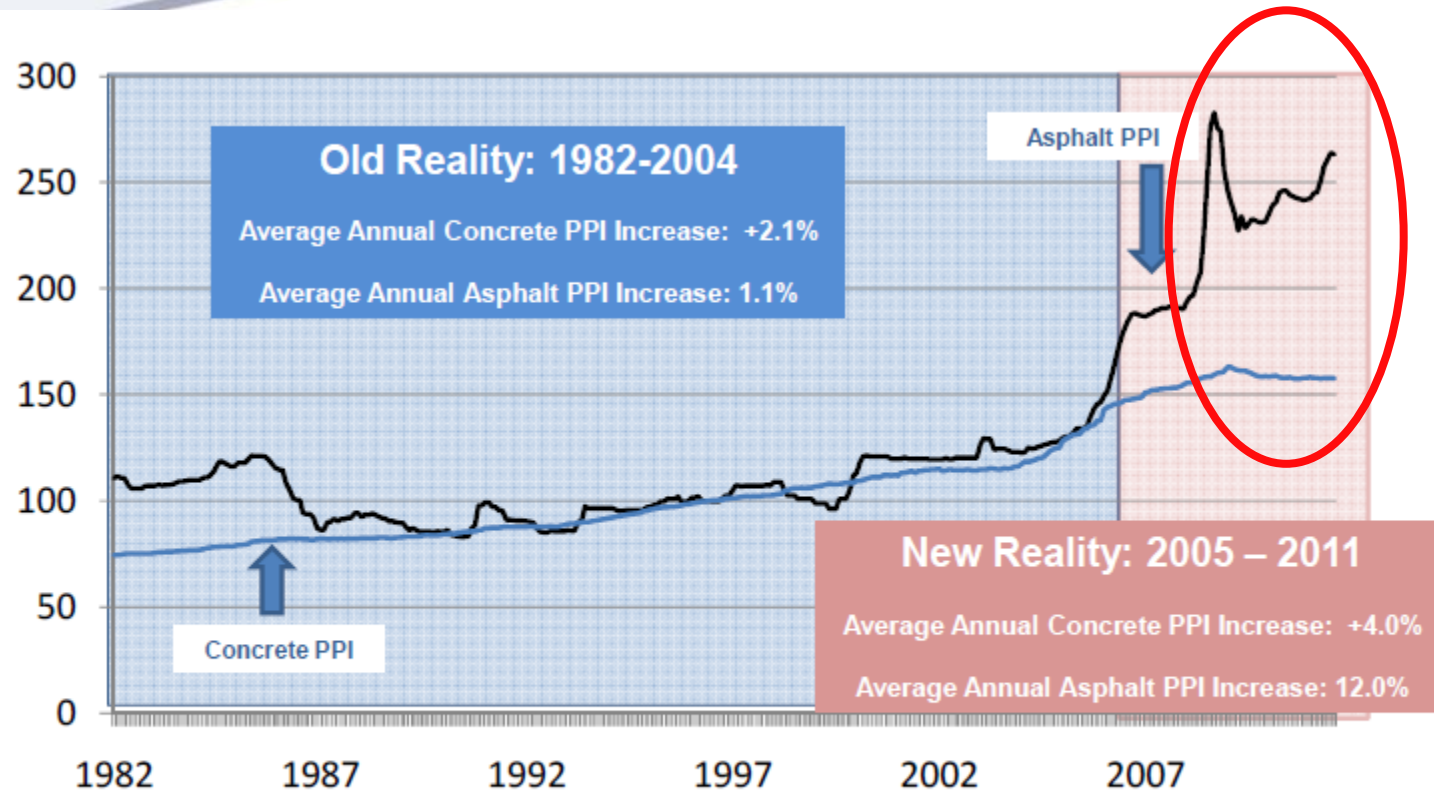
- **Cost** – Competitiveness of concrete better than ever
- **Sustainability** – The demand for sustainable solutions stronger than ever
- **Technology** – There is a wider array of concrete solutions





New Cost Reality

Paving Material PPI Comparison...

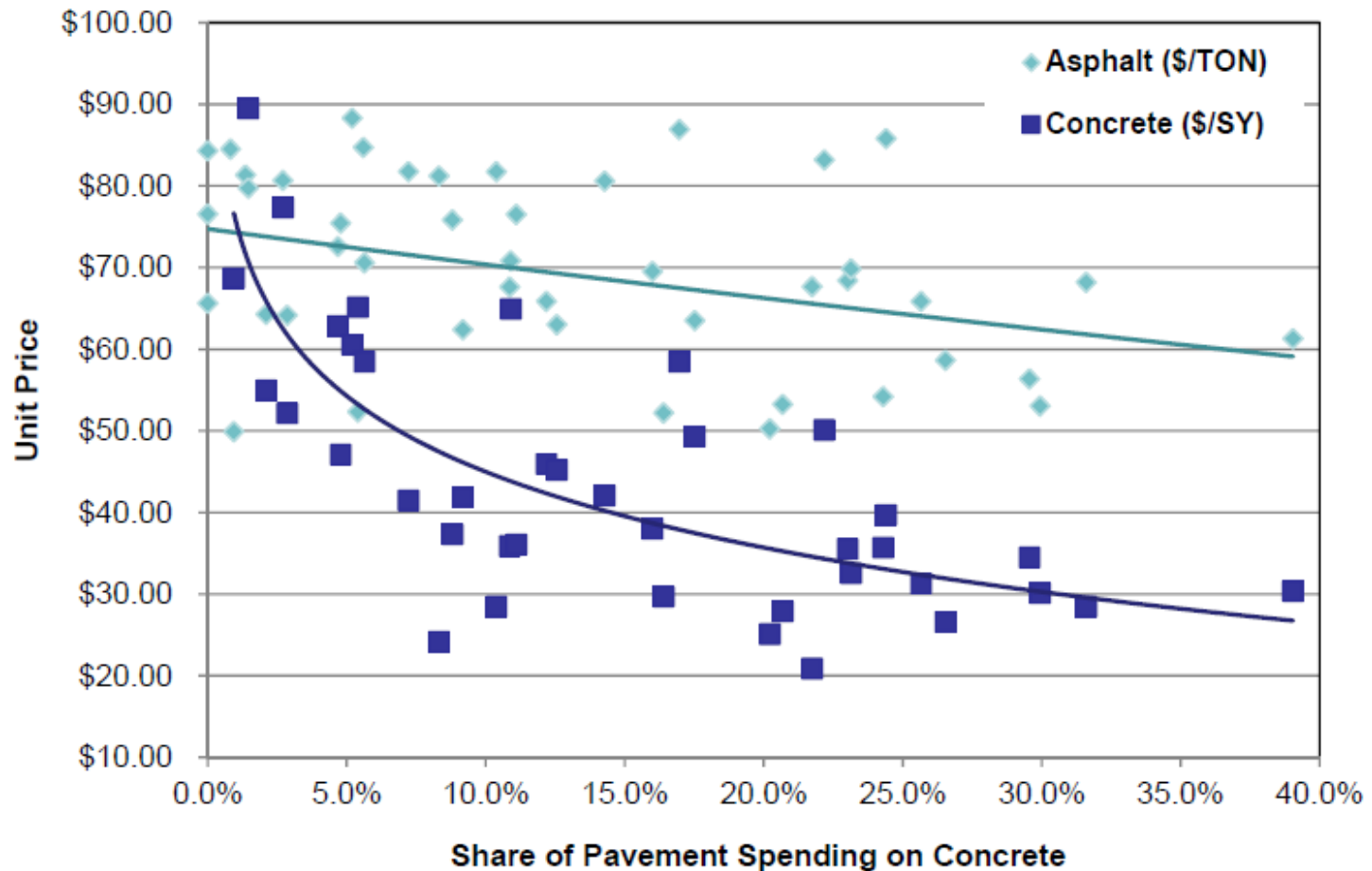


Source: Bureau of Labor Statistics, Producer Price Indices

1996 = 100

Impact of Competition...

Between Industries



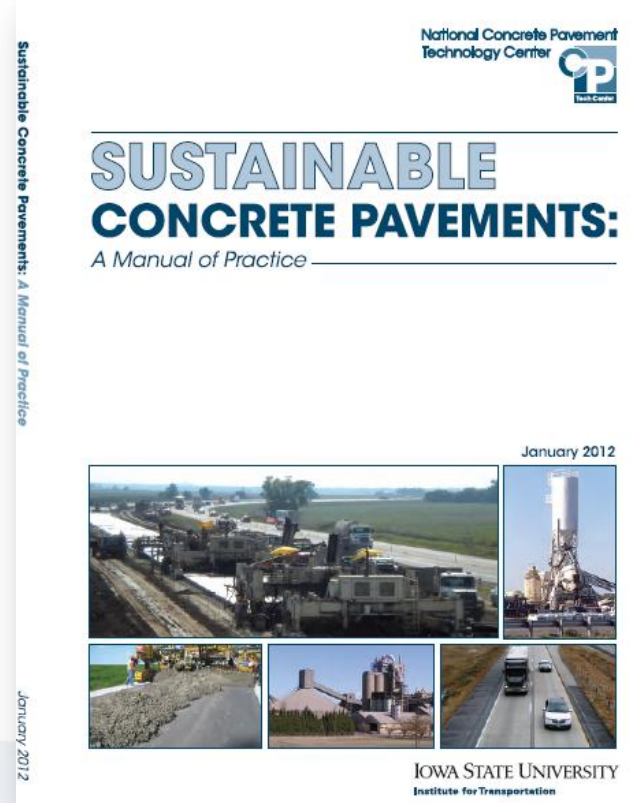
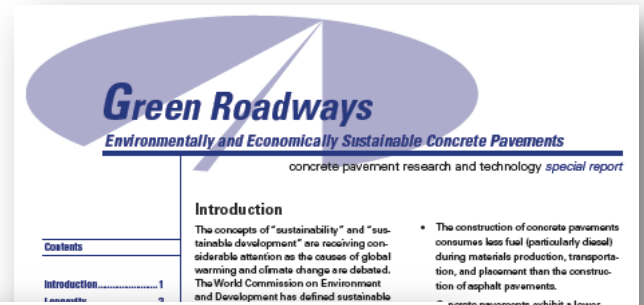
Competition between industries is “found money” for a DOT that has primarily relied on asphalt



Sustainability

What is Sustainability?

- New reports explain...
longevity is the primary opportunity!!



Longevity Means...

Less-frequent reconstruction!

- Lower consumption of raw materials
 - Cement, aggregates, steel
- Lower energy consumption
 - Raw material processing
 - Rehab and reconstruction
 - Congestion



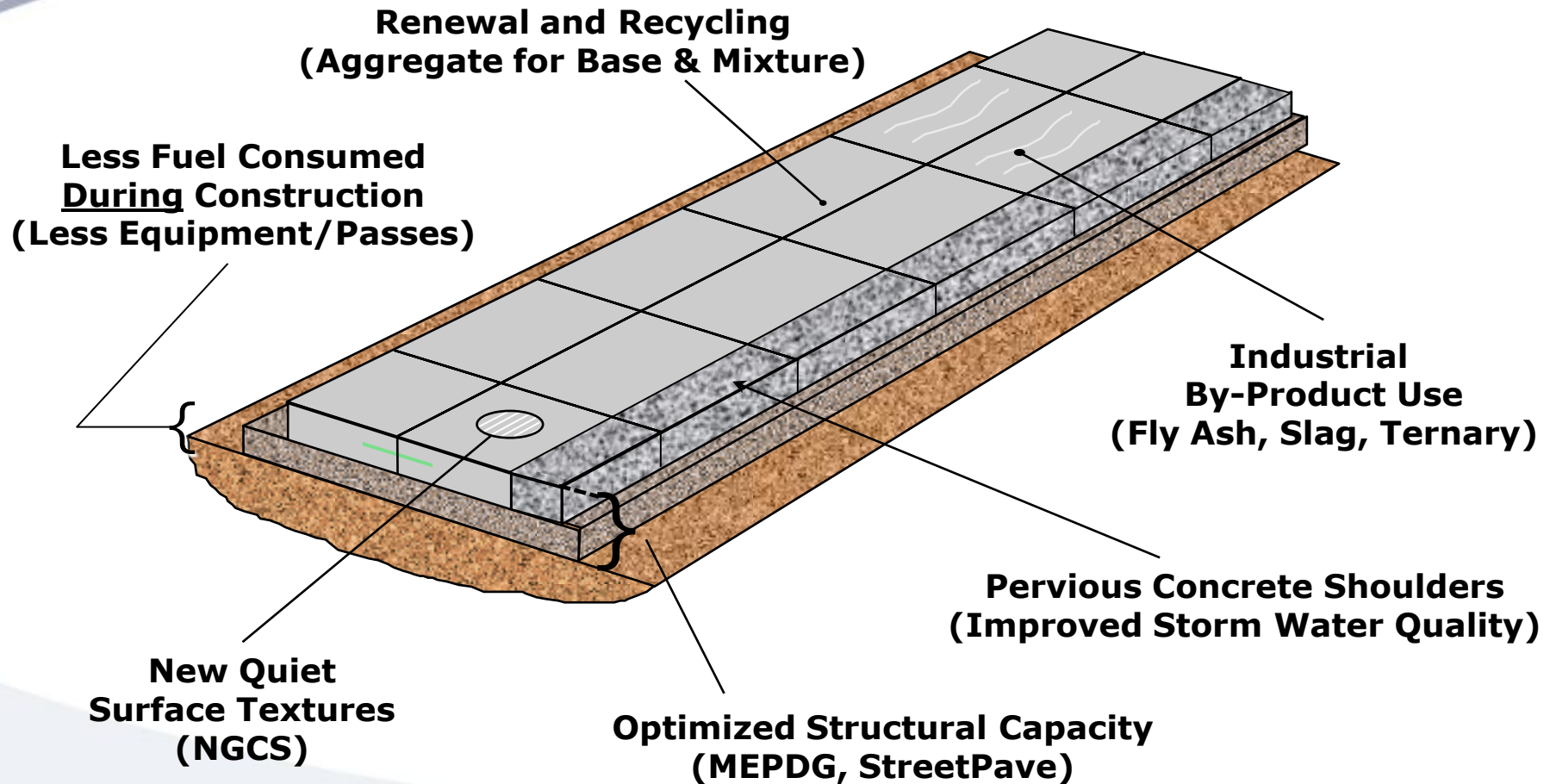
Longevity Means...

- Reduction in pollutants
 - Manufacturing, construction, congestion
- Lives saved
 - Rigid structure
 - Profile durability
 - Infrequent construction zones
- All these translate into economic benefits...



Longevity is the crucial element of sustainability!

Sustainable Opportunities *Beyond* Longevity



Can be achieved through selection, design and mixture optimization!

Sustainable Benefits *Beyond* Construction

THE USE PHASE...

Even larger impact than construction. Pavement deflection and roughness impact vehicle fuel efficiency

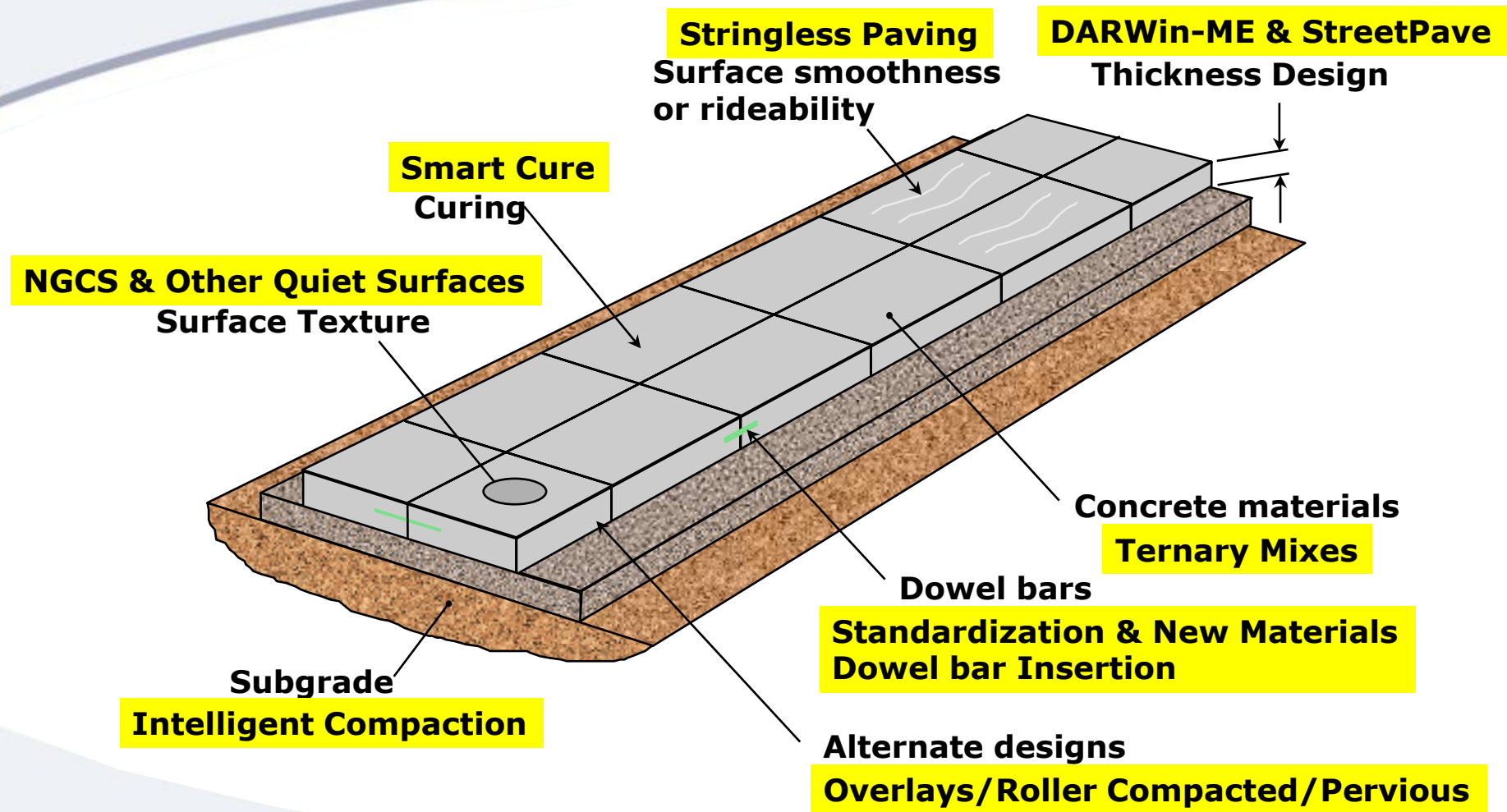


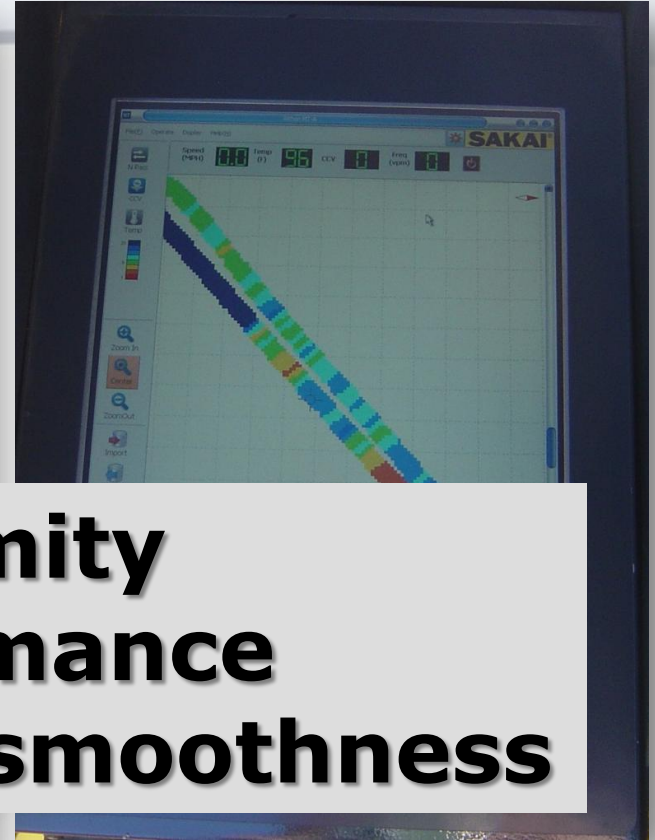
Per MIT Pavement Vehicle Interaction Research... to achieve the same stiffness and fuel consumption, asphalt pavement has to be about 60% thicker than concrete pavement.



Evolving Technology

Evolving Technology is Everywhere!



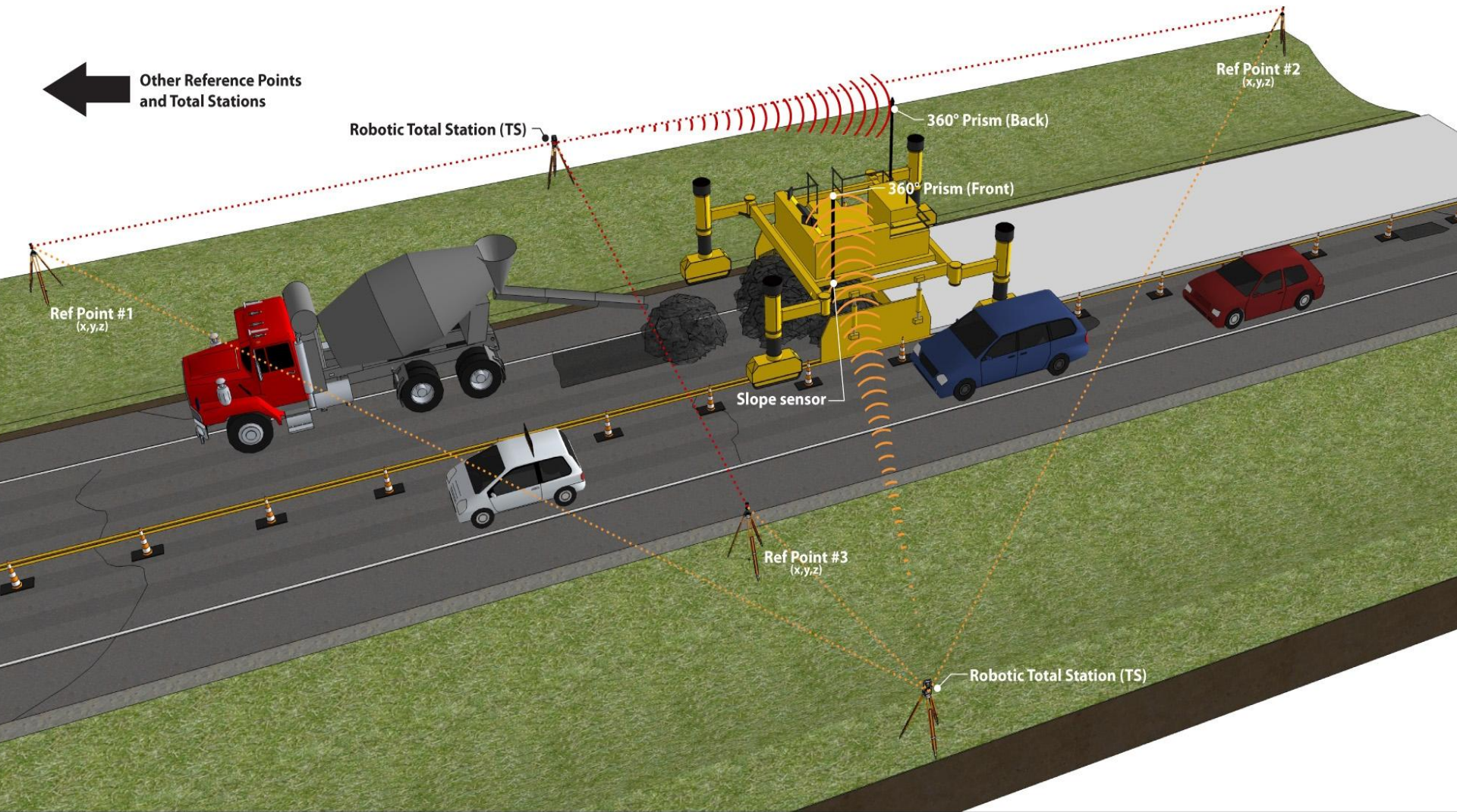


- **Improves uniformity**
- **Improves performance**
- **Helps pavement smoothness**



Intelligent compaction
and stringless trimming
of the grades...

Stringless paving technology for milling and slipform paving...





- **Improves smoothness**
- **Improves safety**
- **Reduces costs**





Variable-width paving...

- **Adds versatility**
- **Saves set-up/change time**





Two-lift
Construction
(wet on wet)...



- **Facilitates recycling**
- **Optimizes use of aggregate**
- **Allows innovative surface layer**

More Sustainable and Durable Mixtures...

Hydraulic Cements

Portland
cements
ASTM C 150

Blended cements
ASTM C 595

ASTM C 1157

Supplementary Cementitious Materials

Slag
(ASTM C 989)

Pozzolans

- Fly ash (ASTM C 618)
- Natural pozzolans (ASTM C 618)
- Silica fume (ASTM C 1240)

- **Optimizes mixtures**
- **Use available resources**
- **Improves durability**

Binary Mixture:

Portland cement + 1 SCM

Ternary Mixture:

Portland cement + 2 SCMs

Quaternary Mixture:

Portland cement + 3 SCMs



Water

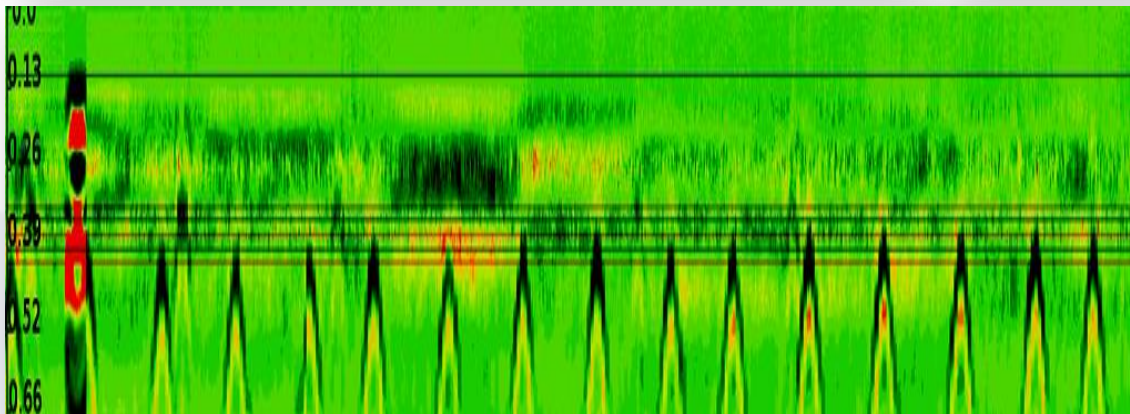
Aggregates

Admixtures



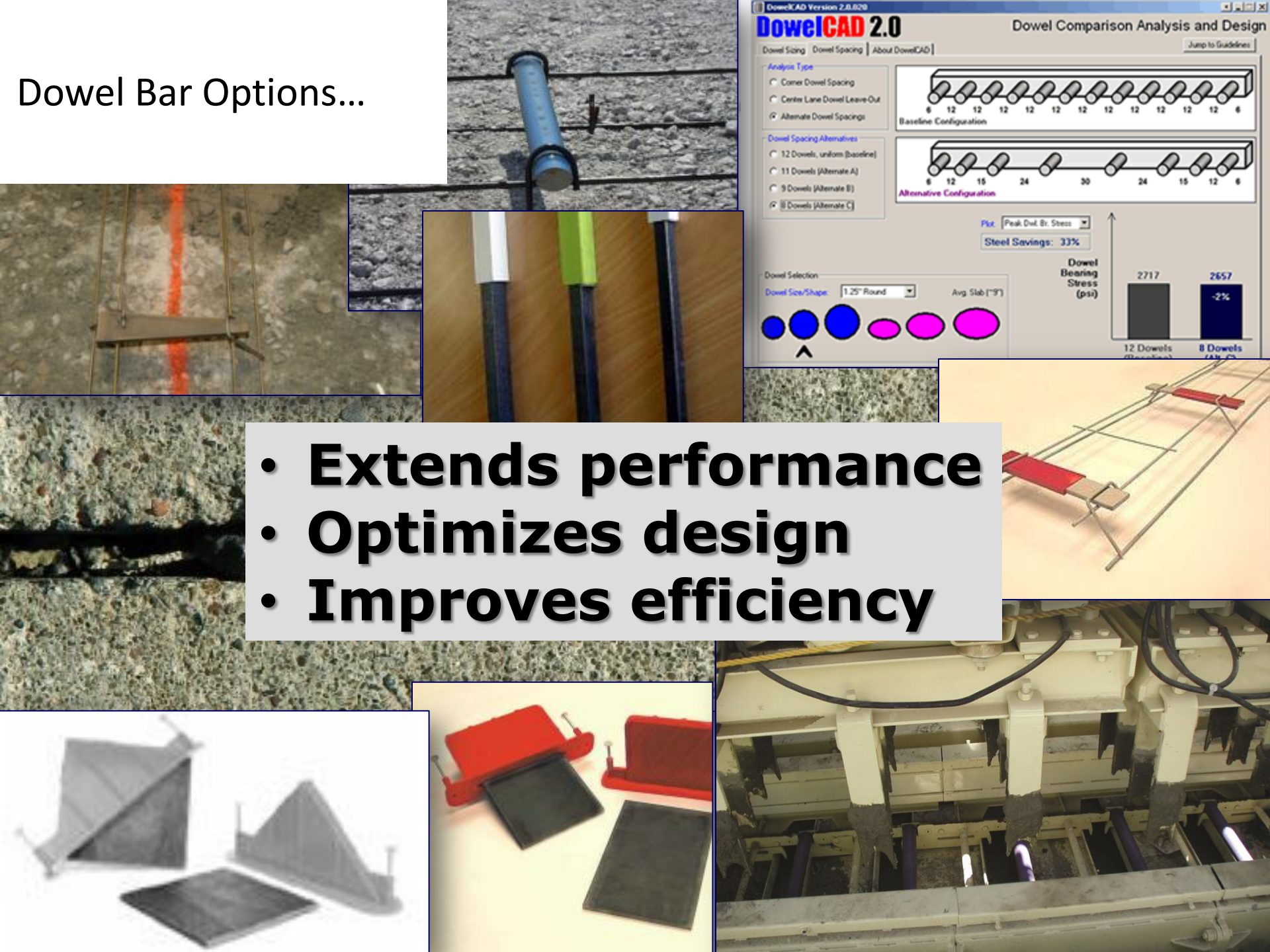


- **Improves quality Control**



Ground Penetrating Radar mounted on the paver to provide a 'real time' picture of tie bar placement...

Dowel Bar Options...



- Extends performance
- Optimizes design
- Improves efficiency

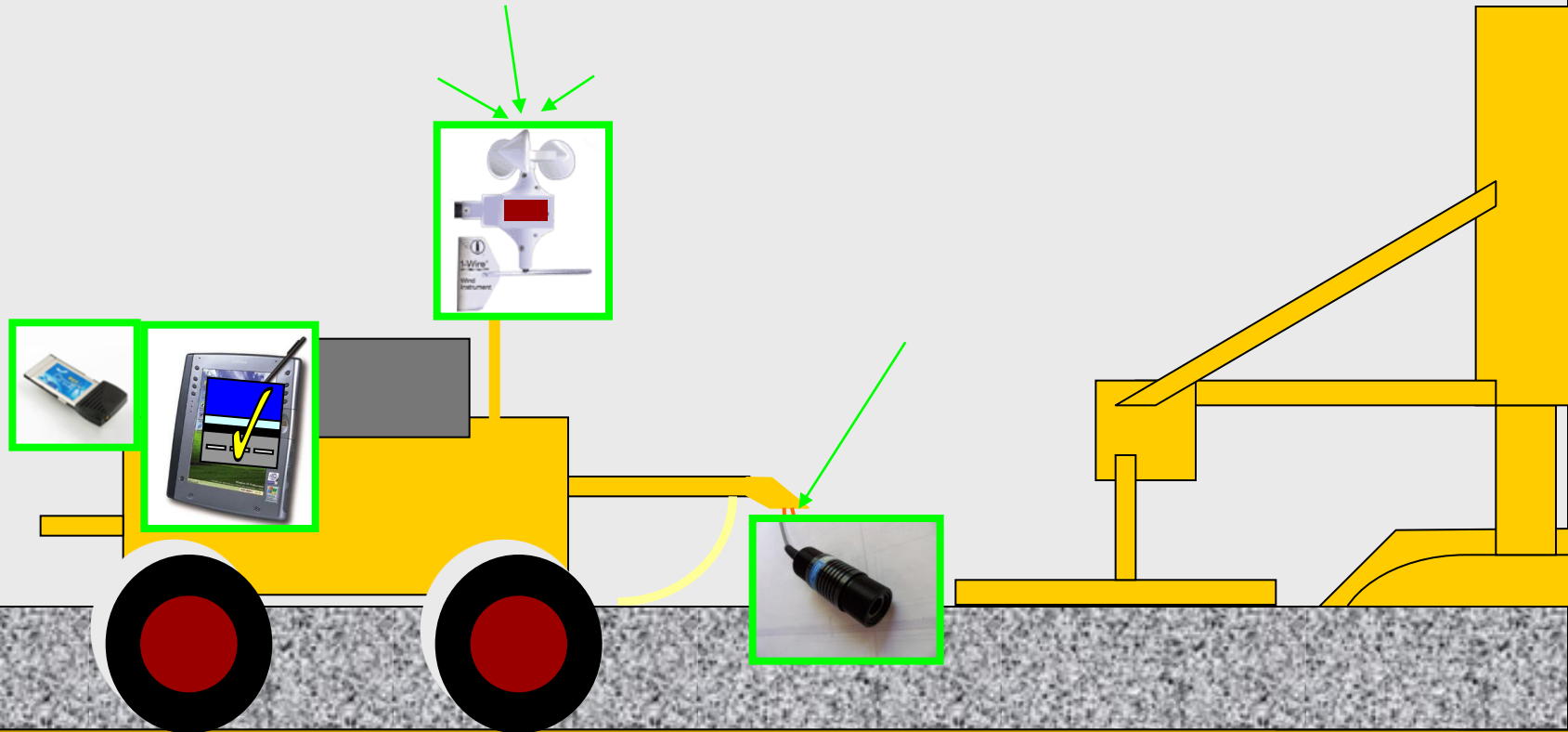


Dowel and steel
locating devices...

- Improves Quality Control
- Improves Quality Assurance



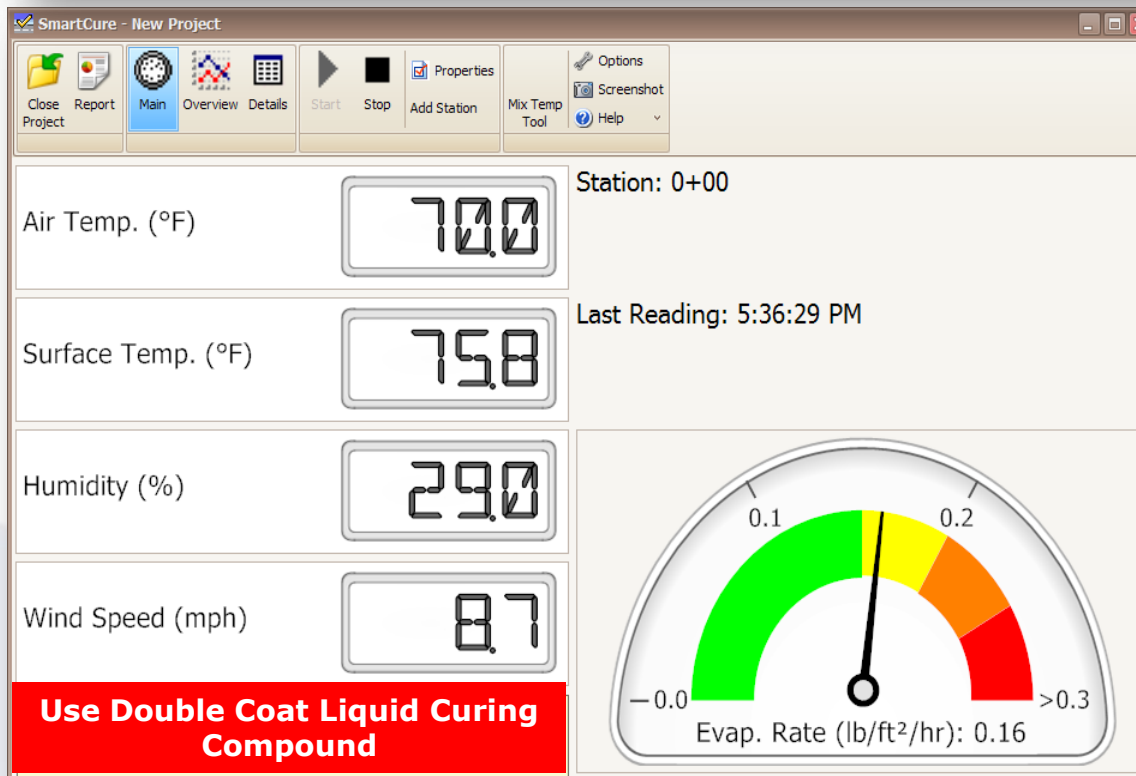
SMART CURE - system mounted on the curing cart to provide a 'real time' picture of curing need and recommendations...





SMART CURE – Curing compound application altered per evaporation rate on site...

Improves Durability



Pre-cast Concrete Pavements...



- **Saves repair time for ultra-high traffic**
- **Allows manufactured durability control**



Roller-Compacted Concrete (RCC)...



Roller-Compacted
shoulders

- **Opens to traffic quickly**
- **Very durable material**
- **Cost effective**

highway

Pervious Pavements...



- **Versatile for storm-water issues**
- **Saves land for retention**

Hot-Applied Polymer Resin Flexible Patching Materials...



- **Elastic, Forgiving material**
- **Wide application possibilities**





Self-Leveling, Cement-Based, Thin Overlay Repair Materials...



- **Self-leveling**
- **Thin application possibilities**



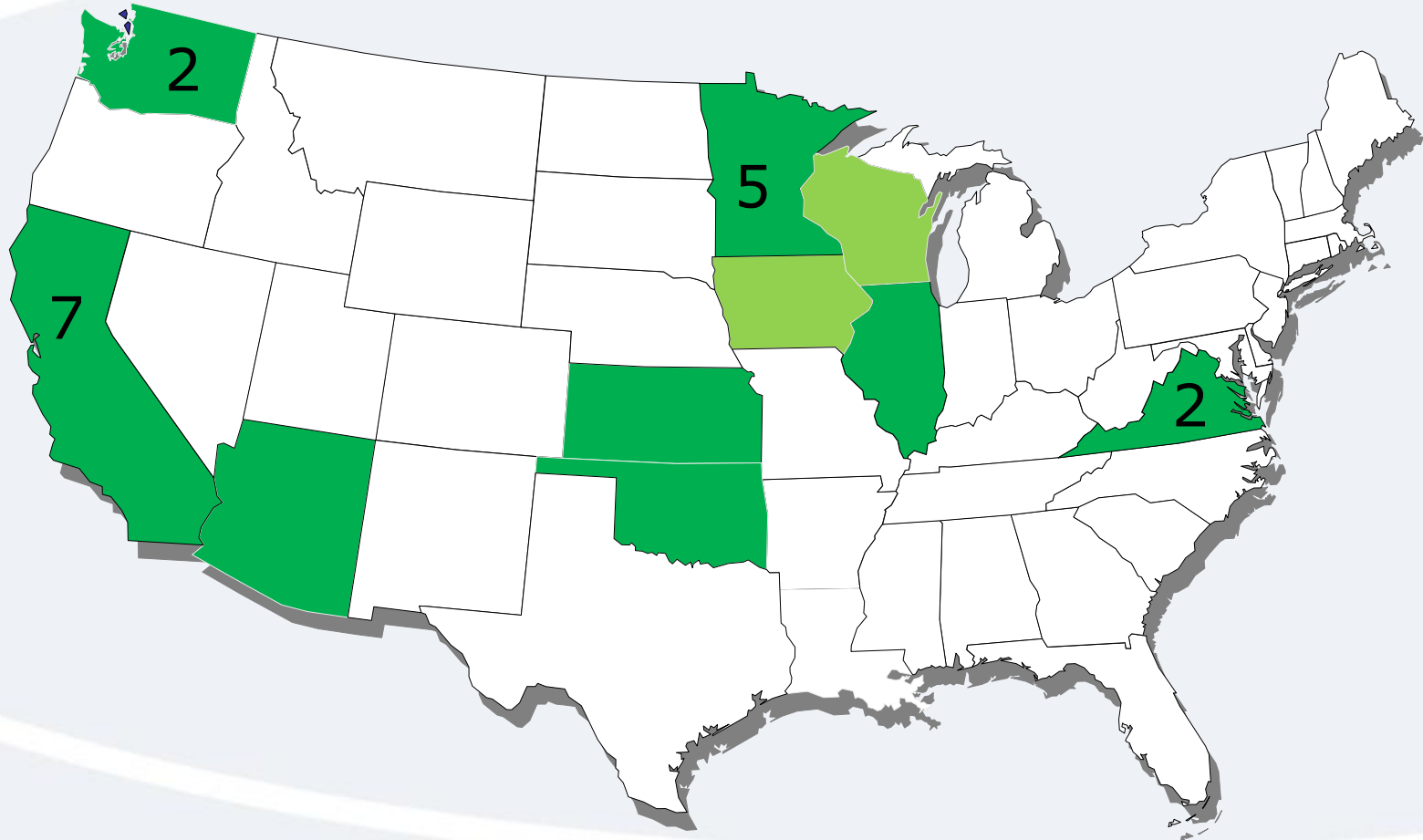


Surface Texture Innovation

Next Generation Concrete Surface for Tire-Pavement Noise Control



NGCS Sites



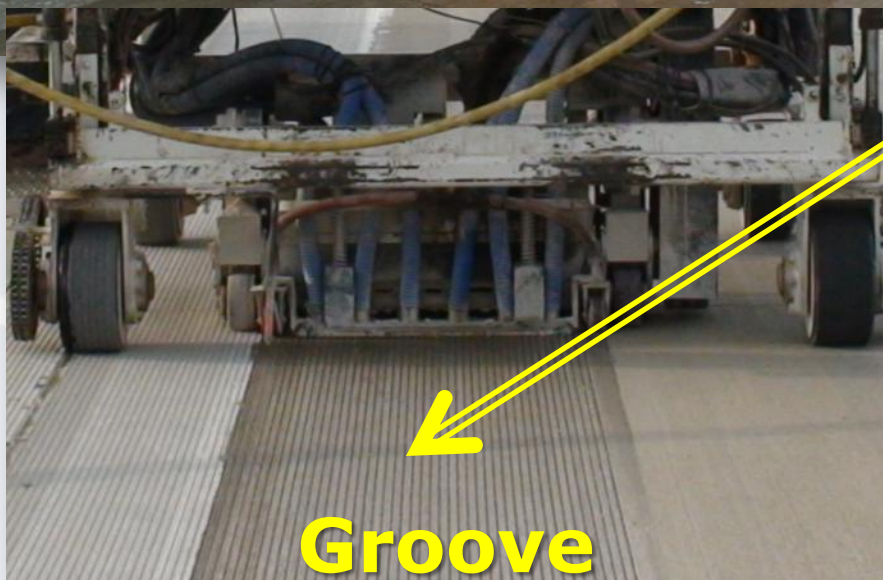
NGCS has Been Placed in 10 States at 17-22 Locations with the Oldest Being 5 Years

Employs Diamond Grinding Equipment

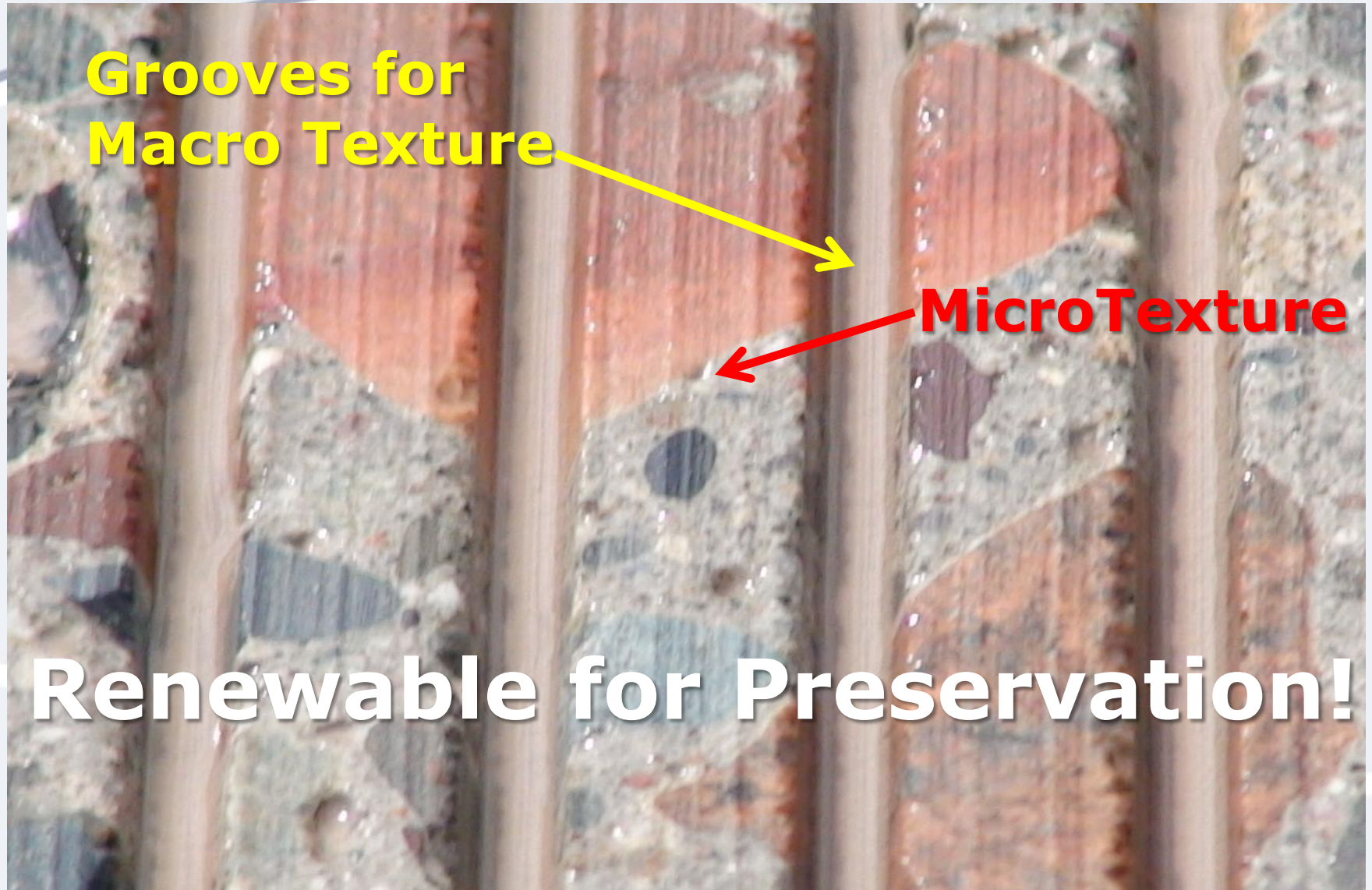


I-10 in Phoenix

NGCS Construction (Two Parts)



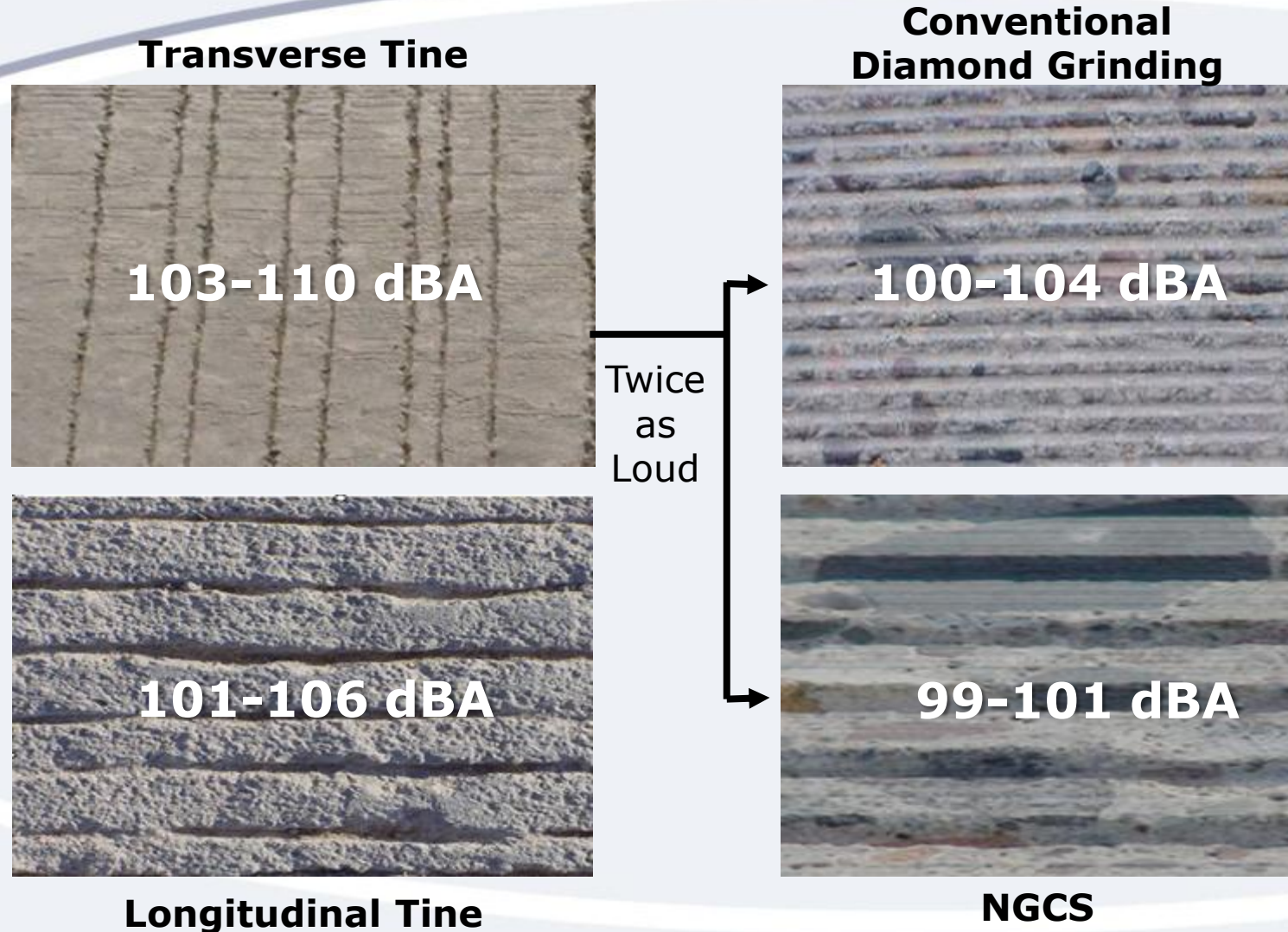
NGCS Texture



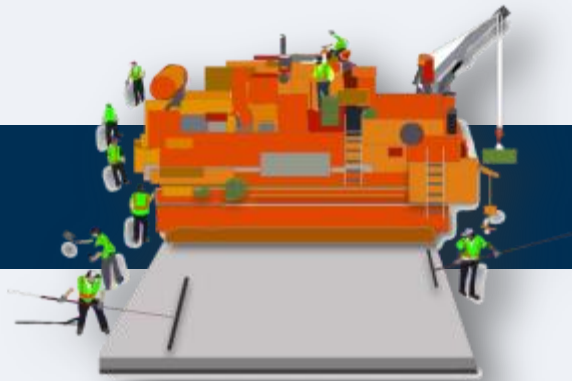
Arizona NGCS On I-10



Noise from Concrete Textures

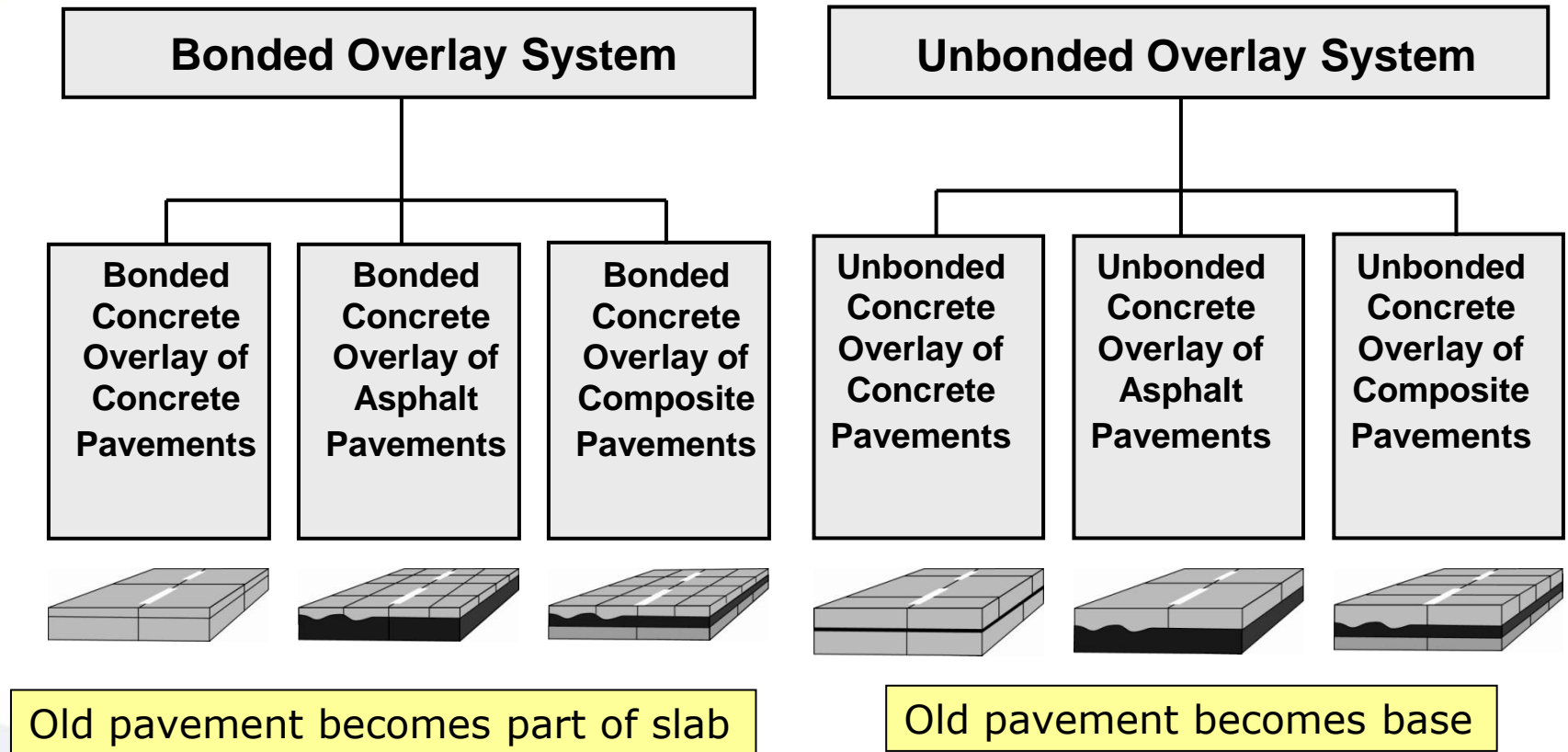


Perspective: AZ ARFC varies from 96 dBA at Const. to 103 dBA after 7 yr.



Concrete Overlays

Concrete Overlays for All Situations

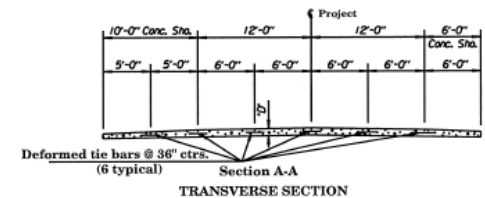
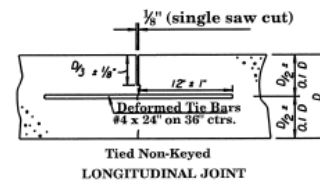
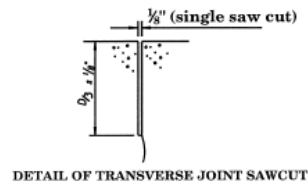
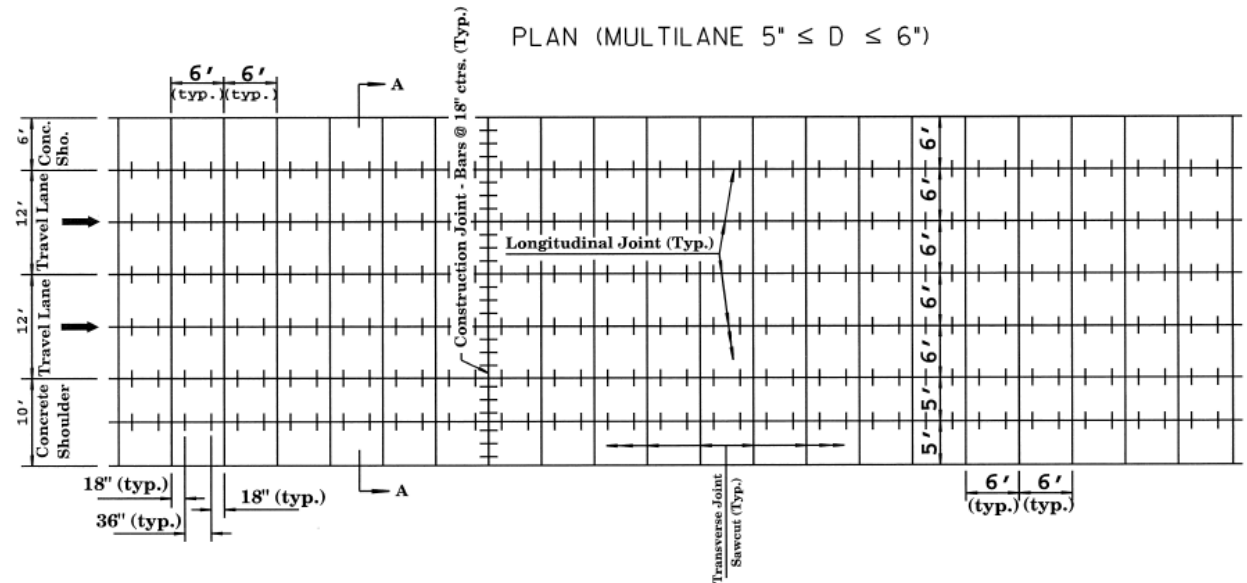


Notable Recent Projects

- I-70 Kansas
 - 4 lane rural interstate – paved 30-ft wide
 - 6x6x6 design on asphalt
 - 1.5 million square yards
- US-18 Iowa
 - 2 lane highway
 - 4 in. nominal unbonded concrete on composite pavement
 - Maintained traffic on 2-lane rural project

I-70 Kansas Plan Section

40 ft.



I-70 Kansas Full-Width Paving



Courtesy, Koss Construction

I-70 Kansas Stringless Paving

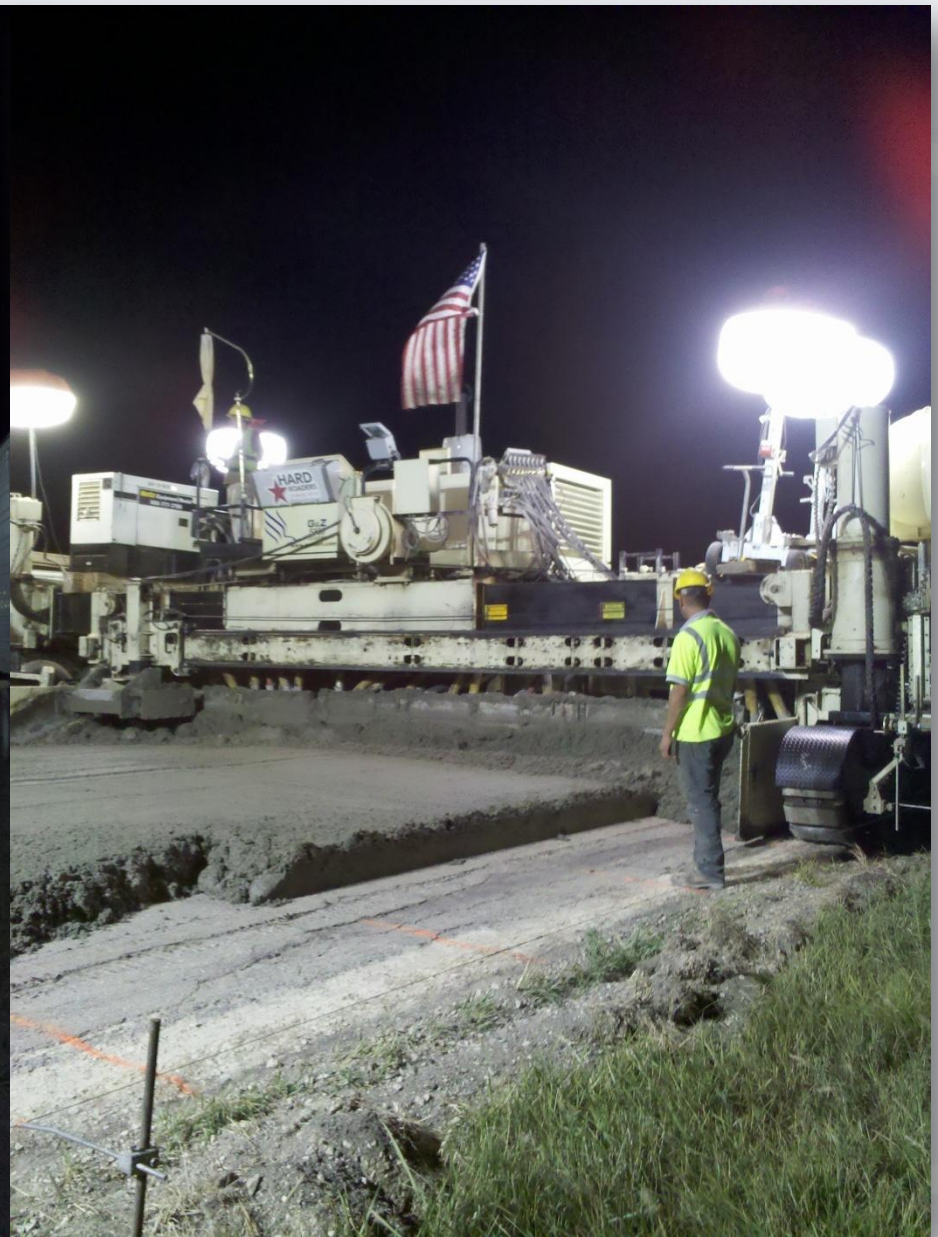


I-70 Kansas 6x6x6 – Full Width Paving



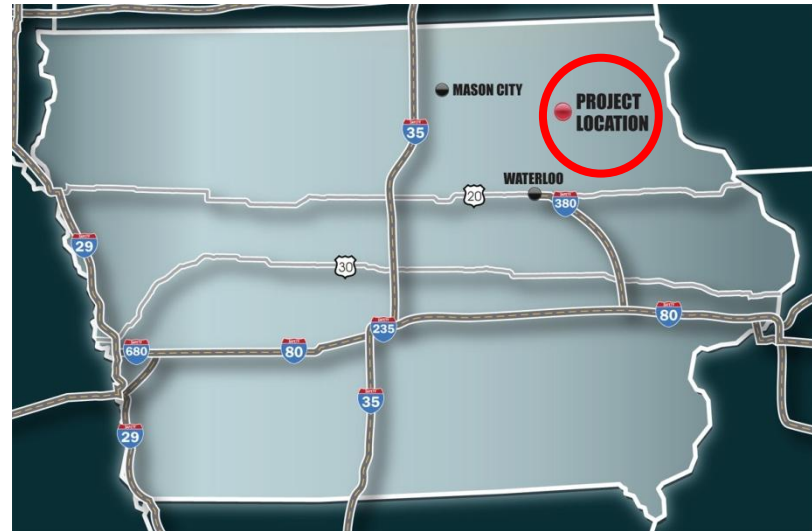
Courtesy, Koss Construction

I-70 –
Nighttime paving to
control built-in
smoothness and help
curing in “dog days”
heat...

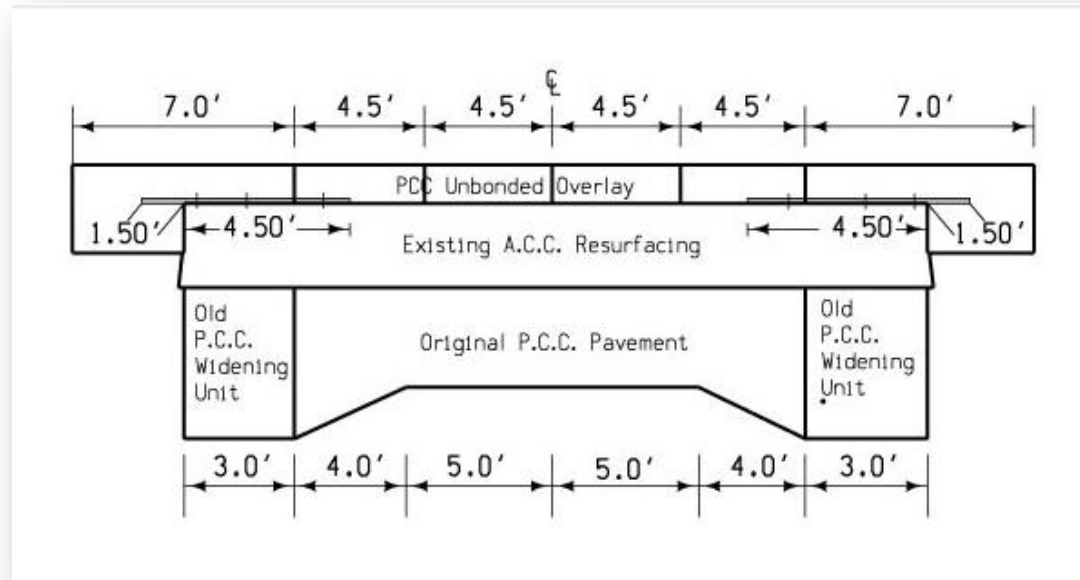


US-18, Iowa

Typical of
thousands of miles
of rural roads in
U.S.



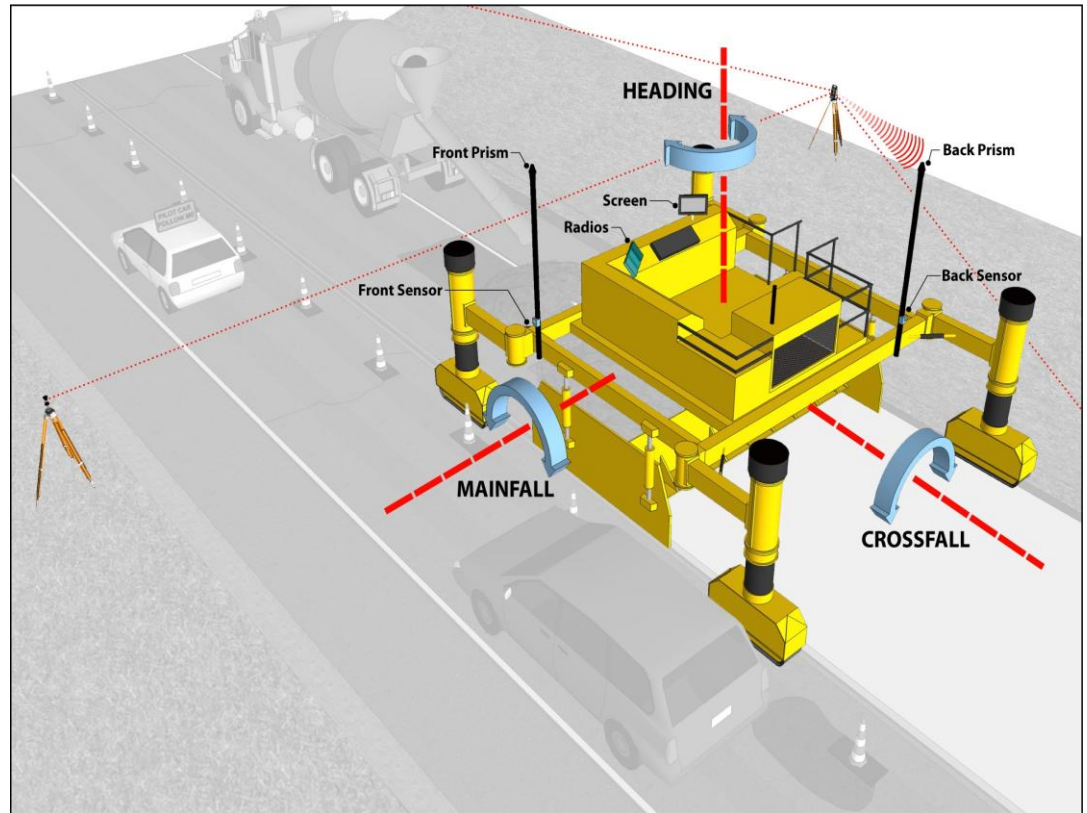
US-18 – Cross Section



Unbonded concrete overlay on asphalt includes widening with overlay

US-18 – Stringless Technology

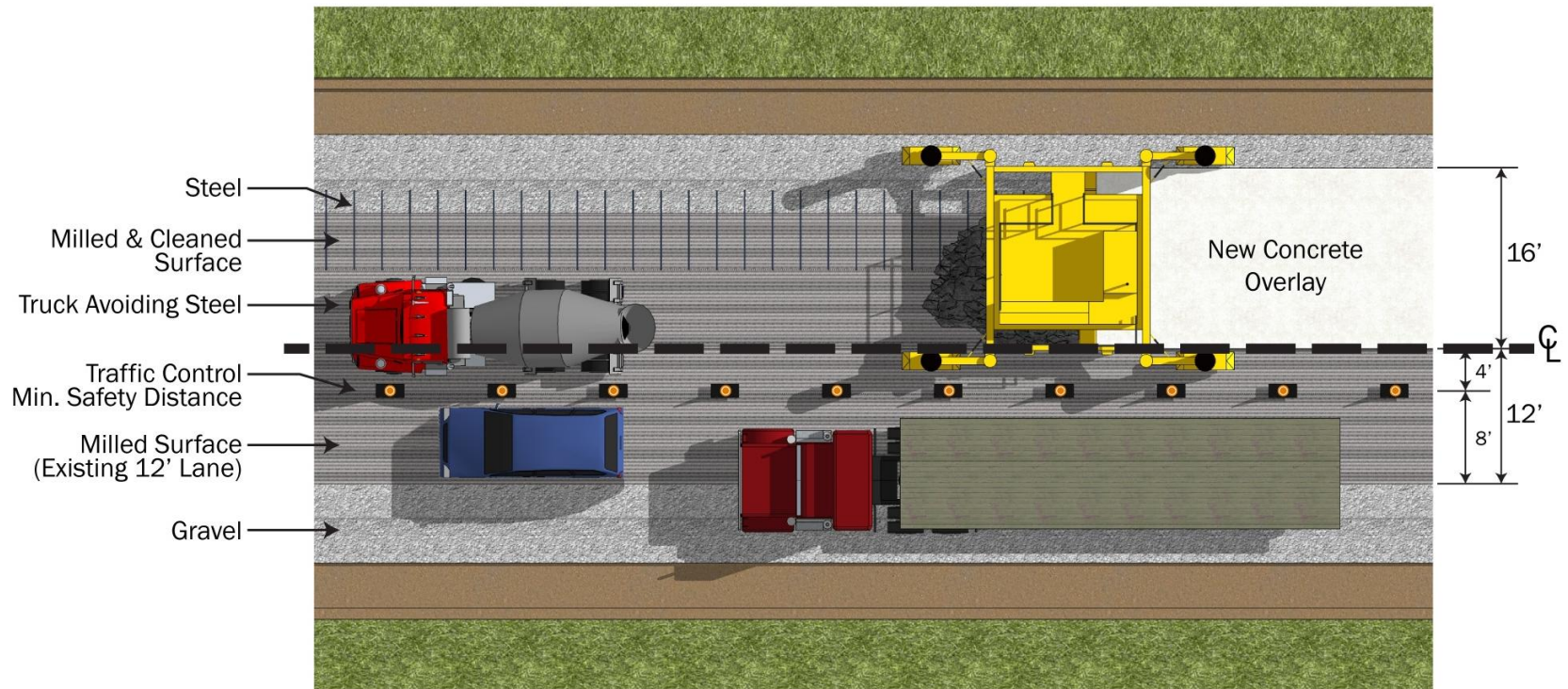
Stringless paving
technology
made this project
possible to build under
traffic...
Single-lane wide paving.
Minimal side clearance.
Pilot car for traffic
control.



US-18 – Stringless Profile Milling



US18 – Paving Under Traffic Scenario



US18 Bonded Concrete Overlay

US-18, Iowa

Stringless paving

Traffic management
“without a detour”

Minimal clearances



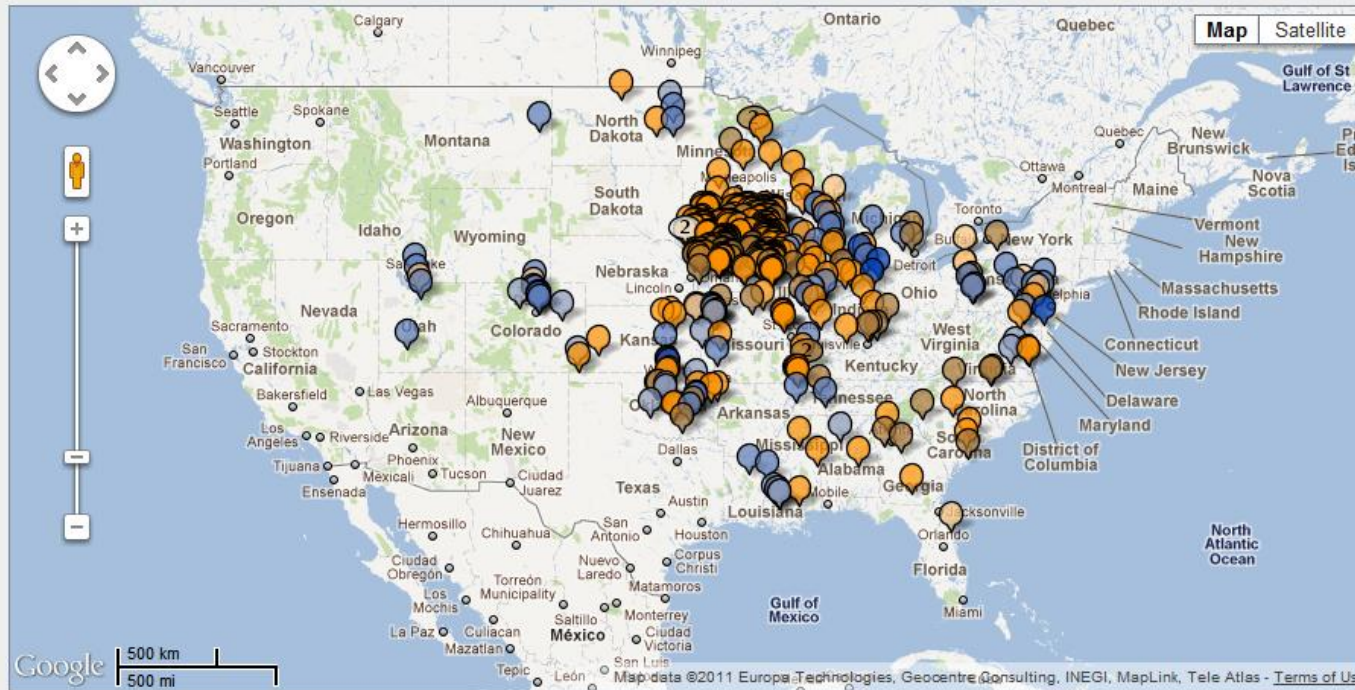
The National Concrete Overlay Explorer

[Instructions](#)

516 Items

MAP VIEW • TABLE VIEW • DETAILS VIEW

64 results out of 516 cannot be plotted.



● Bonded on Asphalt ● Bonded on Composite ● Bonded on Concrete ● Unbonded on Asphalt ● Unbonded on Composite ● Unbonded on Concrete ● mixed

Disclaimer: Every effort has been made to ensure that all information presented in this National Concrete Overlays Explorer is as accurate as possible as of the last posting date: 11/14/2011. If you have any questions or concerns about the data on a particular project, please contact the local ACPA Chapter or State Concrete Paving Association for the state in which the project exists; contact information is available [here](#). If you experience any problems with, or have any comments on, the functionality of this site please contact the [ACPA](#).

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Search

Concrete Overlay Type

82 Bonded on Asphalt
14 Bonded on Composite
33 Bonded on Concrete
251 Unbonded on Asphalt

Application

376 Highway
64 Street/Road
37 NA
21 Airport

State

2 AL
1 AR
19 CO
1 DE

Overlay Thickness (in.)

11 2 - 3
43 3 - 4
75 4 - 5
78 5 - 6

Year Constructed

2 1960 - 1965
4 1970 - 1975
8 1975 - 1980
48 1980 - 1985

Project Size (SY)

274 0 - 50000
118 50000 - 100000
46 100000 - 150000
13 150000 - 200000

Joint Spacing (ft)

113 15
63 15 Skewed
58 Missing Value
52 6

Reinforcing



Early Experiments in
Transportation

Closing Comments...

Closing Comments/Summary...

- Demand is up!
- Drivers include cost competitiveness, sustainability and new technology (solutions!)
- Technology advancements are happening on many fronts
- Concrete overlay use growing rapidly
- This isn't the "old" concrete industry anymore!

Closing Comments/Summary...

- With growth:
 - New pavers in the market
 - New designers (and owners)
 - New ideas
- These are challenges we must address



Where is ACPA Heading...?

- We've Adapted to:
 - The new trends/market conditions
 - Customer's changing needs
- We're Focused on:
 - Helping maintain/improve construction quality
 - Helping public sector adopt new technology
 - Producing cost-effective long-term solutions
 - Producing cost-effective short-term (preservation) solutions



Thank You ACPA Members...!

- Membership development and delivering value to members is top priority for ACPA
 - Strength in numbers
 - Foster innovation
 - Invest in the industry
- It is together that we make it happen
- We can't do it without you!



Questions?



www.pavements4life.com