Using Cement to Reclaim Asphalt Pavements

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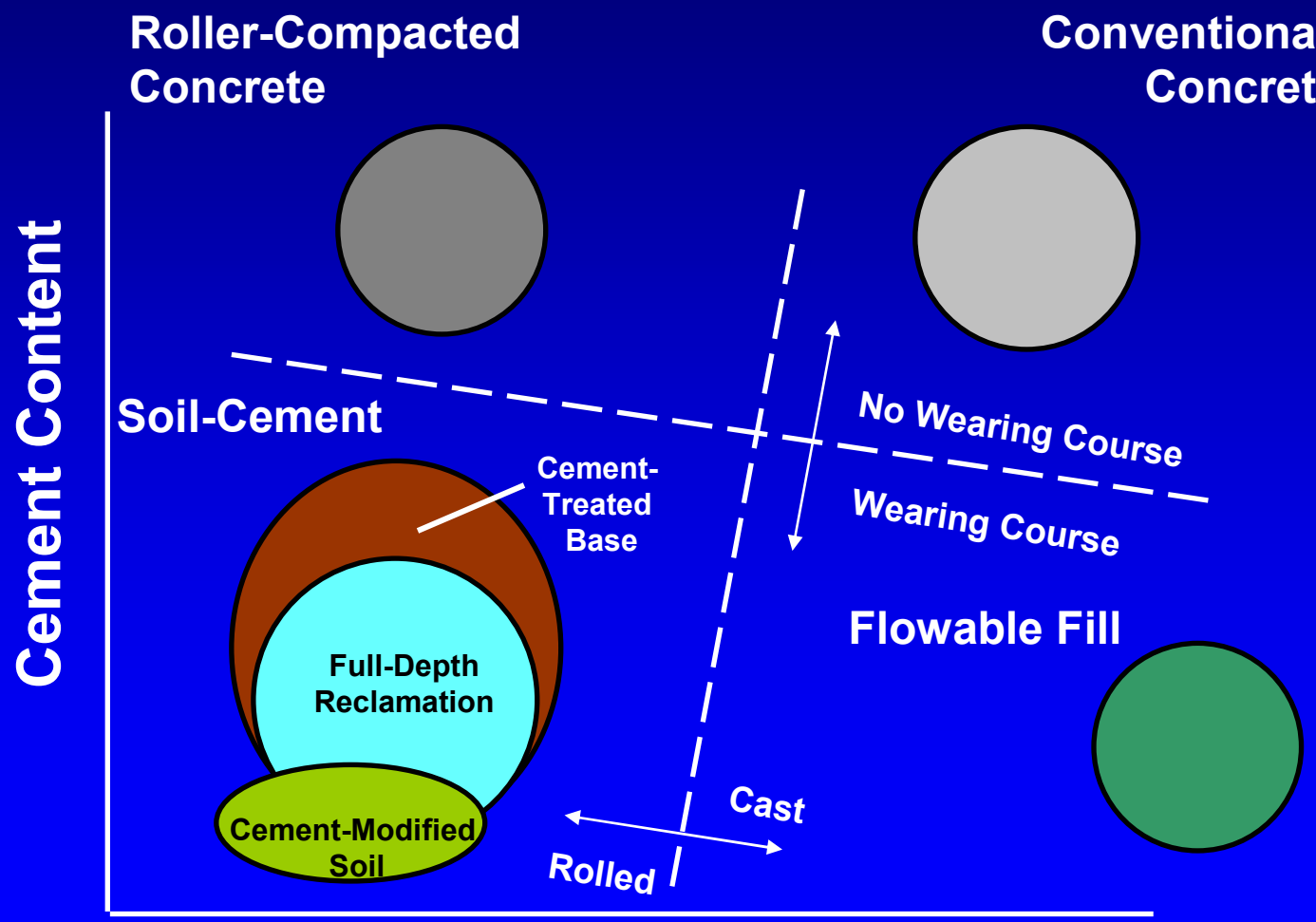
What is Cement Stabilization?

- Mixture of portland cement, soil/aggregate and water
- Pulverized, mixed, compacted to high density

Cement-Based Pavement Materials



Full-Depth Reclamation (FDR)

- Pulverization and recycling of asphalt and base
- Utilizes existing materials
- Fast and convenient
- Eliminates new base
- Environmentally friendly

Pavement Distress

Alligator Cracking

Base Failure

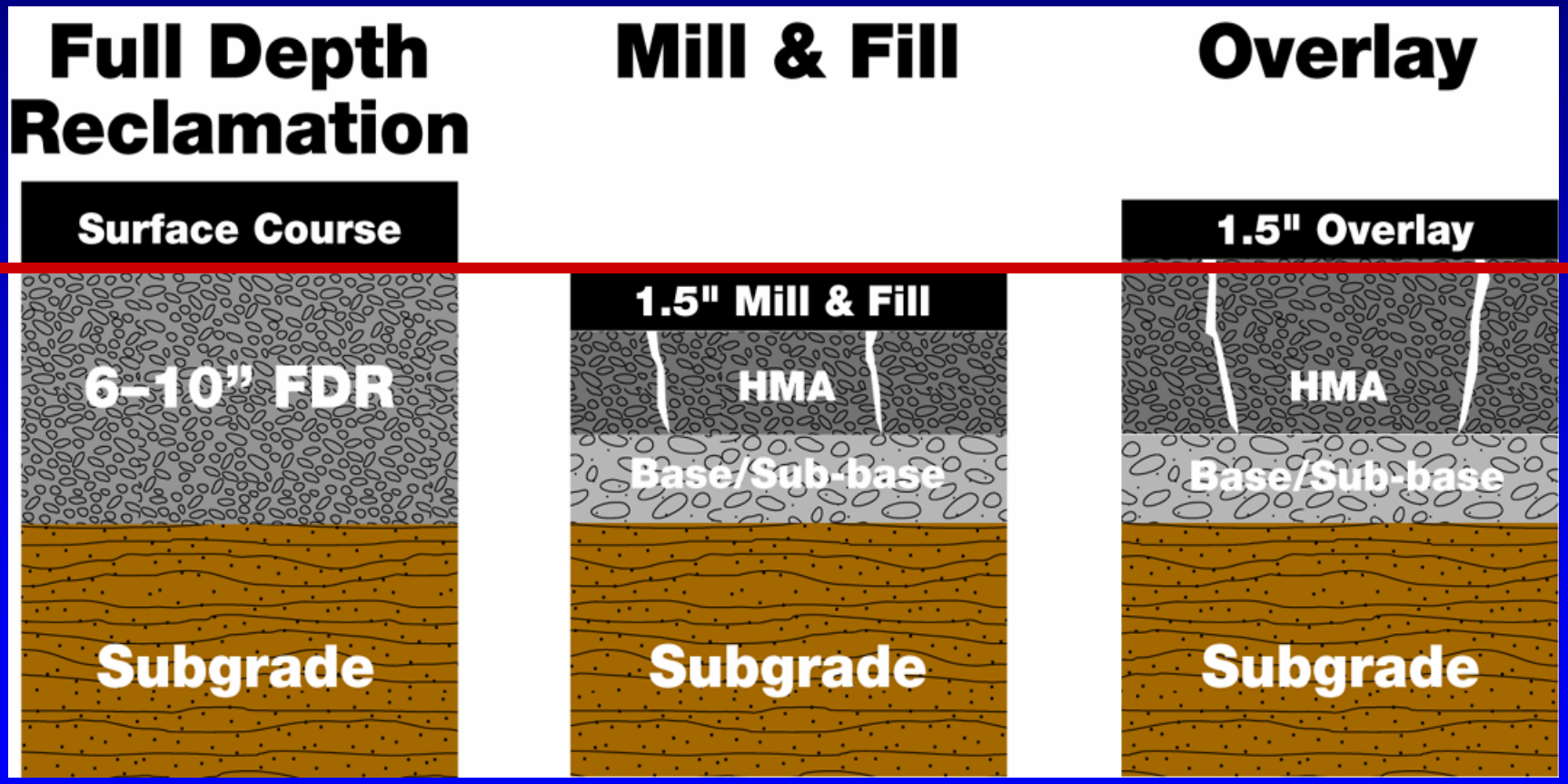
Pavement Distress

Excessive Patching

Advantages of FDR

- Use of in-situ materials
- Little or no material hauled off and dumped
- Conserves virgin material
- Saves cost by using in-place "investment"
- Saves energy by reducing mining, hauls

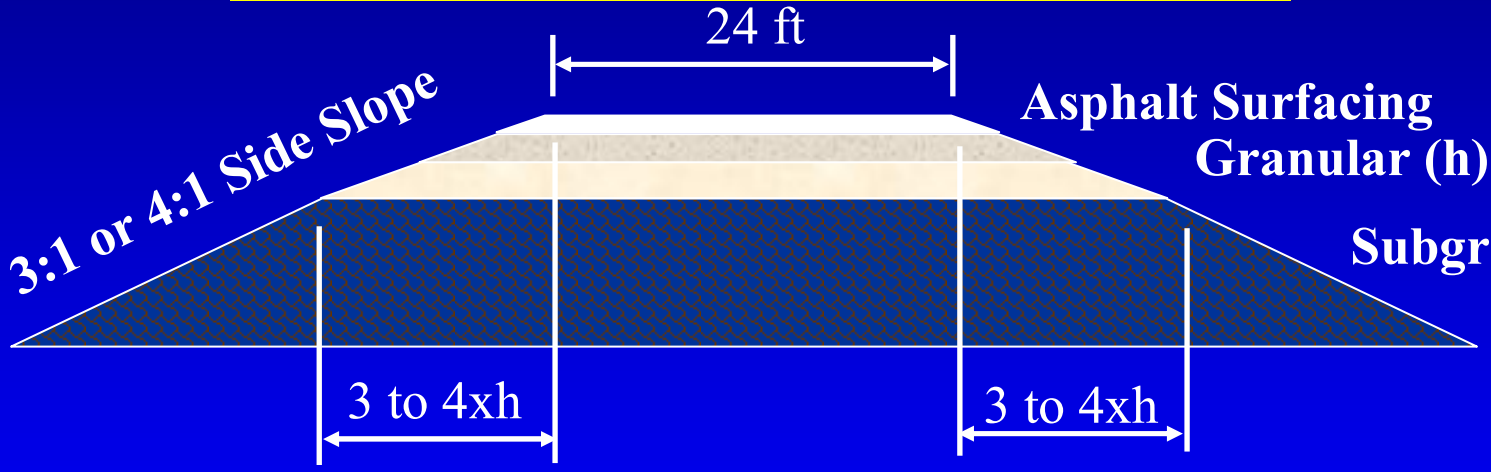
Benefits


Full Depth Reclamation
Surface Course
6–10” FDR
Subgrade
Mill & Fill
1.5" Mill & Fill
HMA
Base/Sub-base
Subgrade
Overlay
1.5" Overlay
HMA
Base/Sub-base
Subgrade

Existing Thin Paved Structure

Asphalt Surfacing
Subgrade

Conventional Build Up Granular Structure



Asphalt Surfacing
Granular (h)
Subgrade

Full-Depth Recycled Structure

Asphalt Surfacing
Stabilized Base
Subgrade

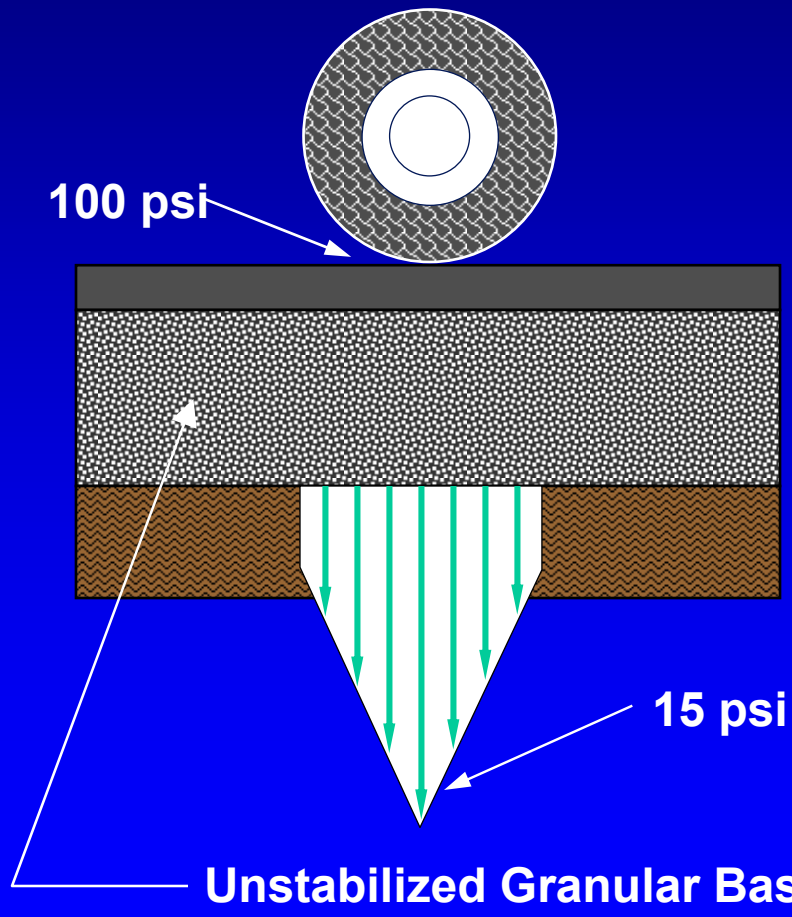
Cement Stabilization History

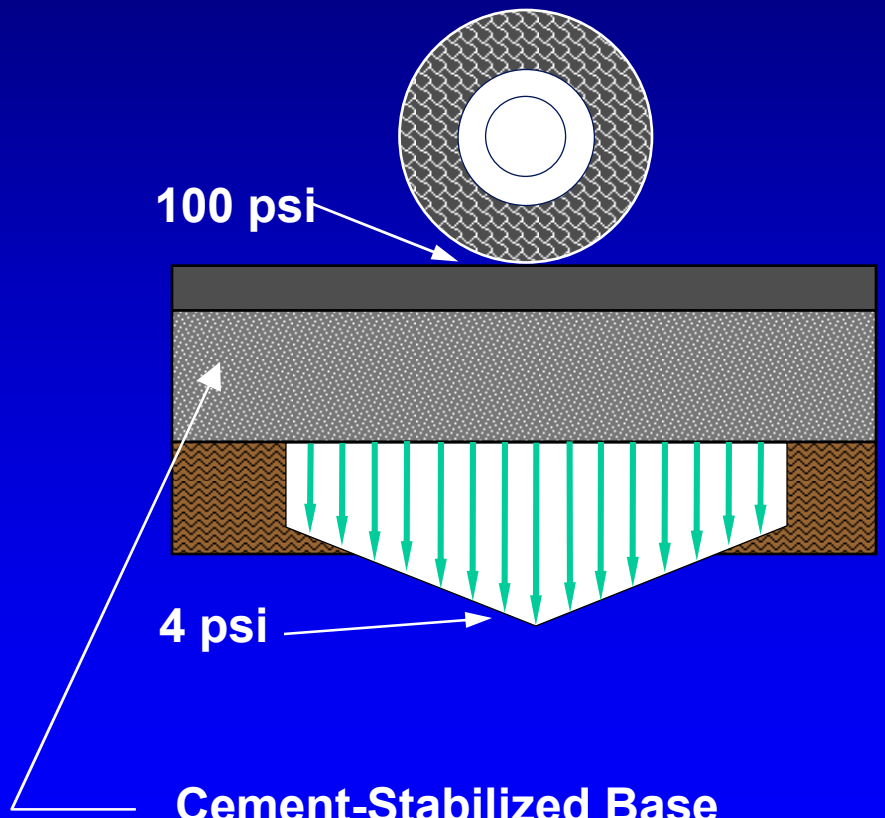
- 70 years of successful pavements
- Diverse geographic areas (Texas, Florida, California, Montana, Michigan, Canada)
- Wide variety of soil types
  - Gravels
  - Sands
  - Silts
  - Clays

“Portland Cement is probably the closest thing we have to a universal stabilizer.”

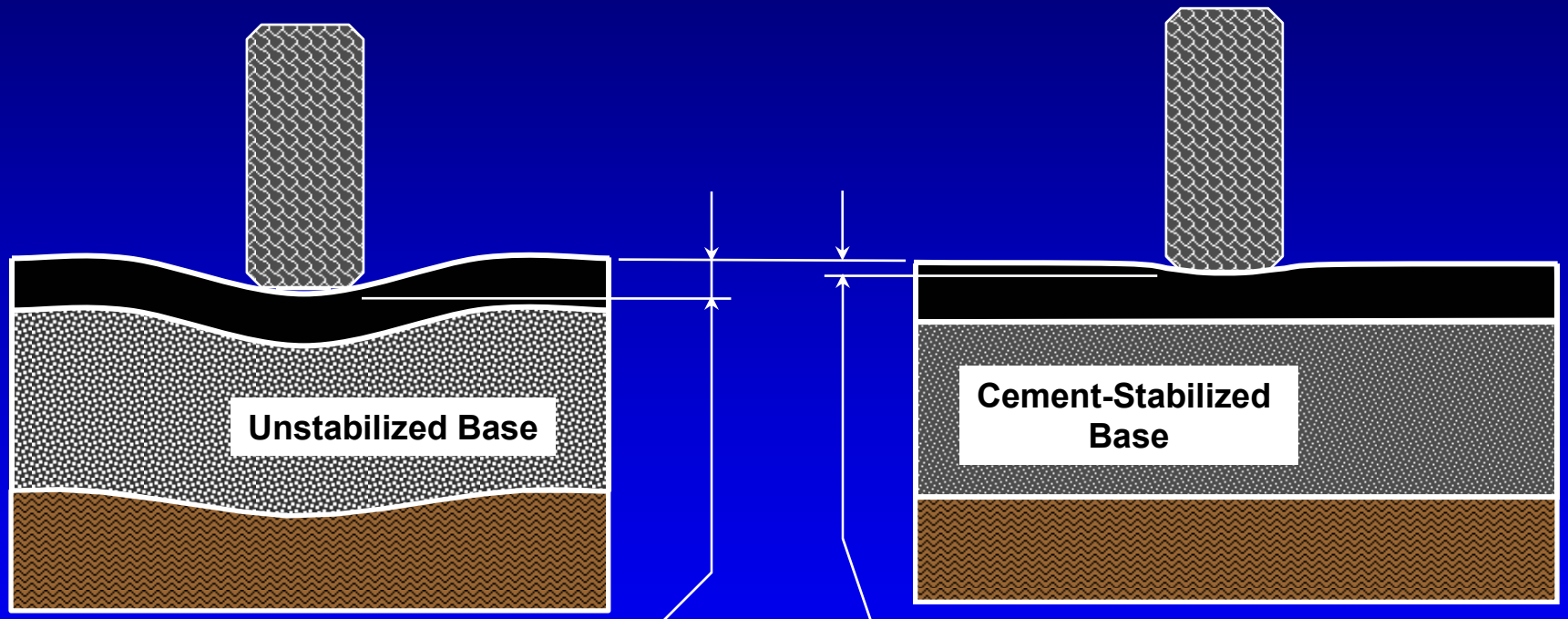
From U.S. Army Corps of Engineers report “Chemical Stabilization Technology for Cold Weather”, Sept. 2002

Increased Rigidity Spreads Loads





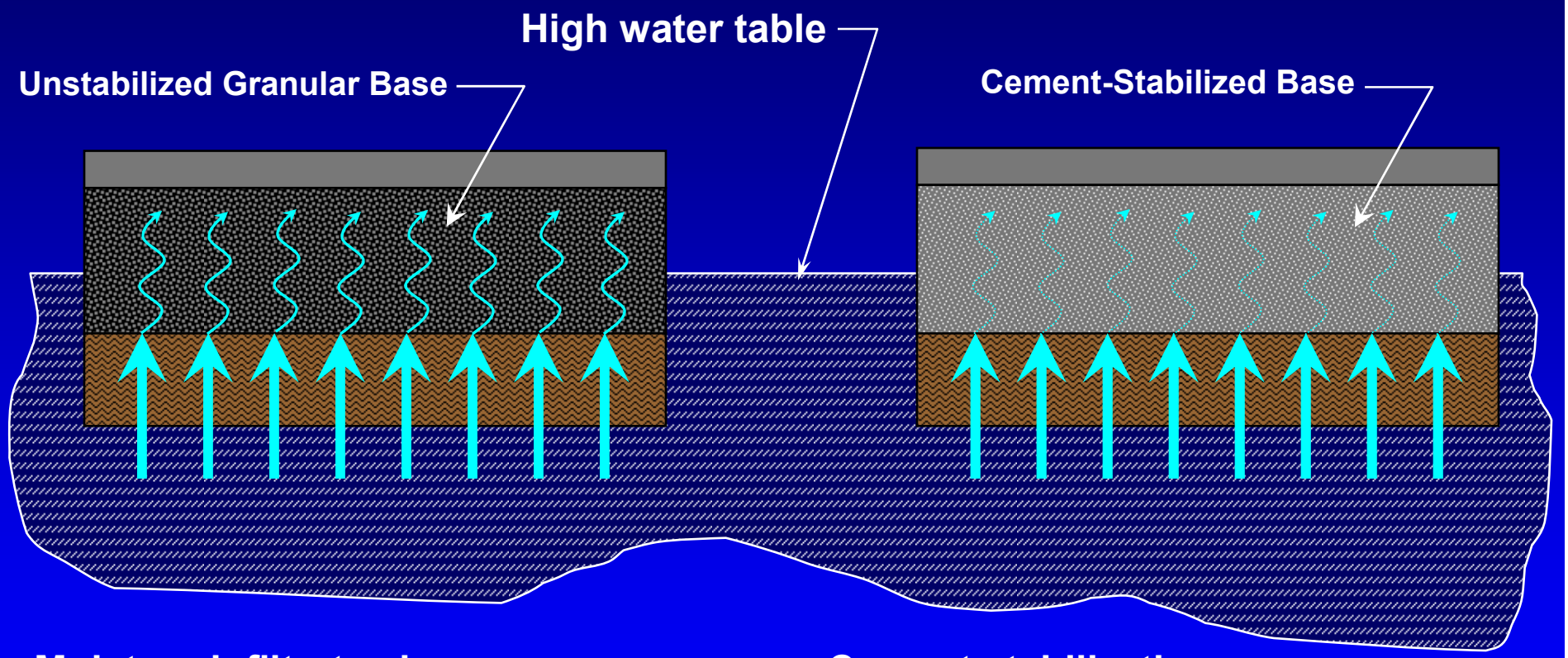
Eliminates Rutting Below Surface



Rutting can occur in surface, base and subgrade of unstabilized bases due to repeated wheel loading

Cement-stabilized bases resist consolidation and movement, thus virtually eliminating rutting in all layers but the asphalt surface.

Reduced Moisture Susceptibility



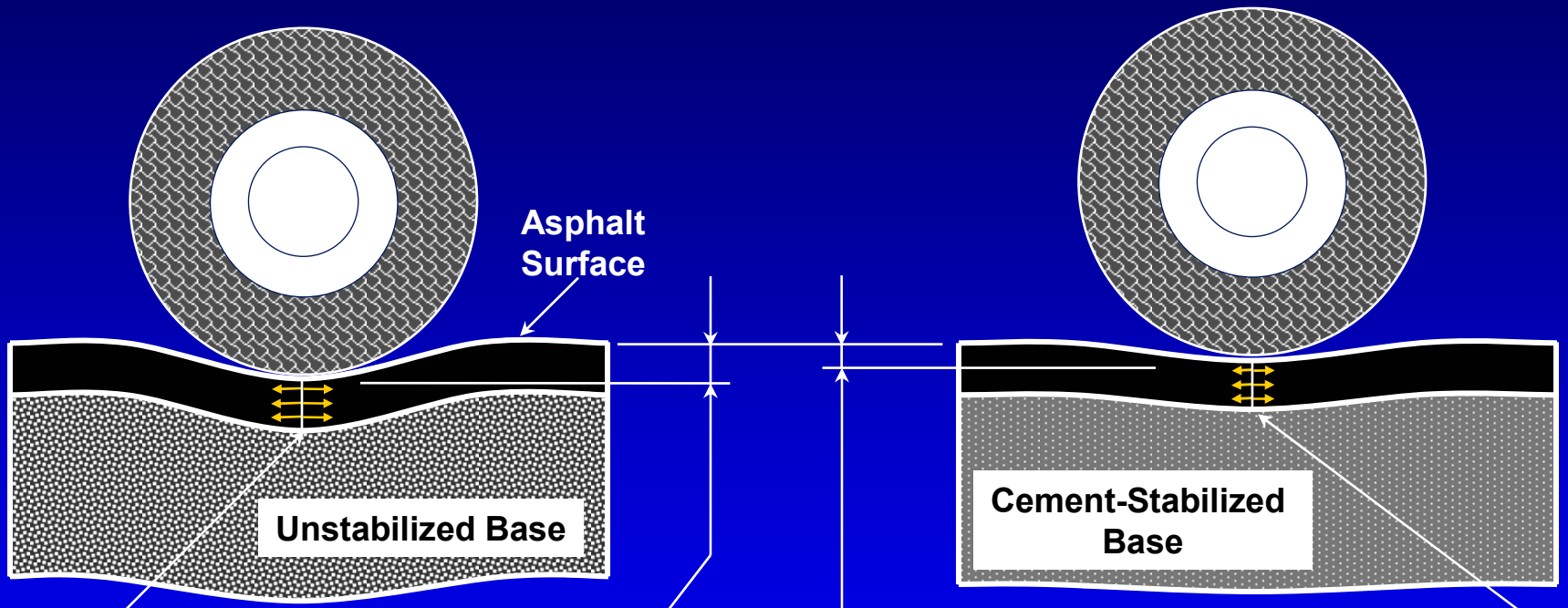
Moisture infiltrates base

- Through high water table
- Capillary action
- Causing softening, lower strength, and reduced modulus

Cement stabilization:

- Reduces permeability
- Helps keep moisture out
- Maintains high level of strength and stiffness even when saturated

Reduced Fatigue Cracking



High deflection due to low base stiffness

Results in high surface strains and eventual fatigue cracking

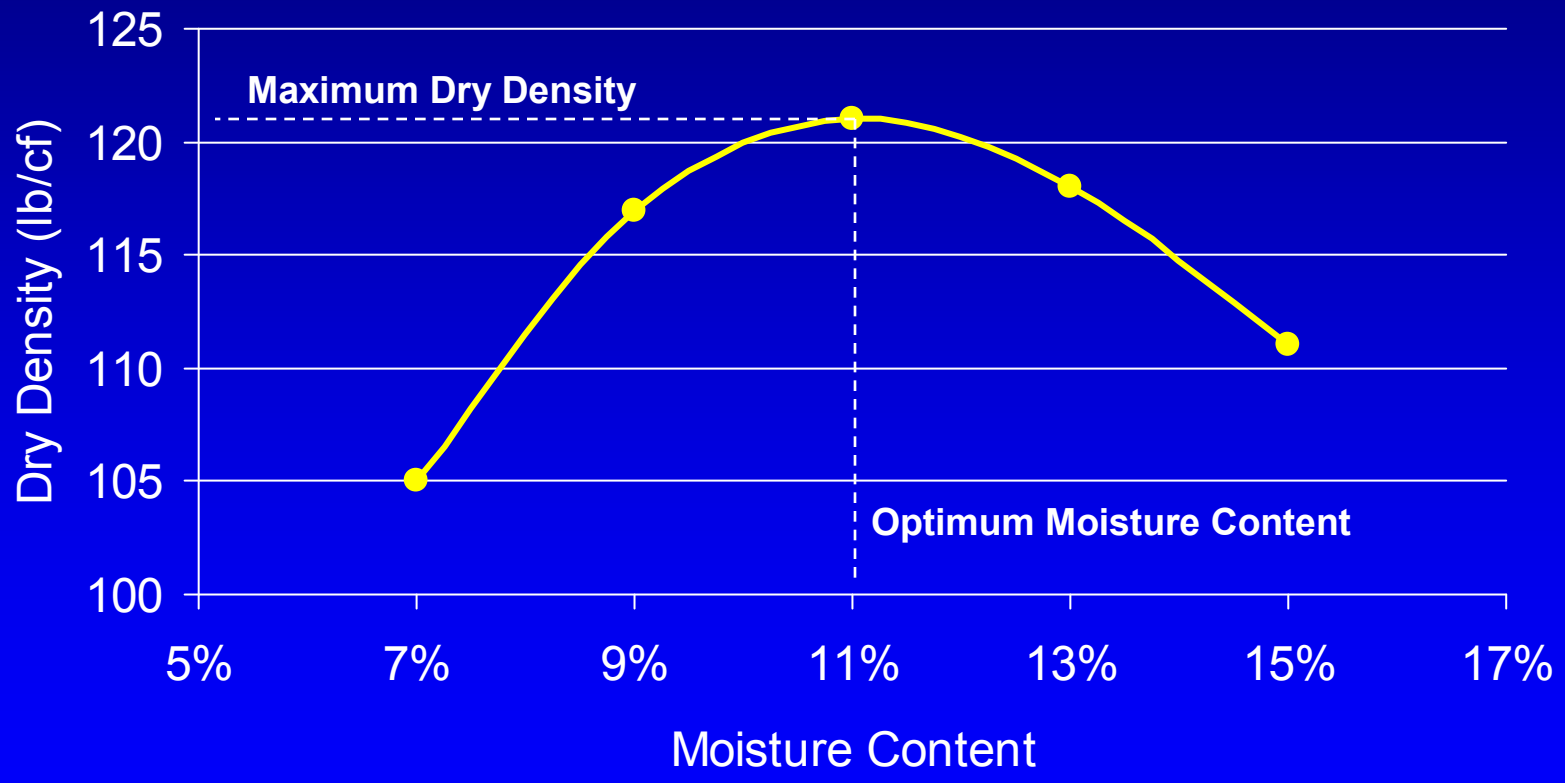
Higher stiffness of cement-stabilized base produces lower deflections

Resulting in lower surface strains and longer pavement life

FDR Engineering

- Evaluation of existing materials
- Design of stabilized mix
- Thickness design
- Construction procedures
- Quality control

Moisture/Density Relationship



ASTM D558

Unconfined Compressive Strength

Typical Recycled Base and Surface Thickness

Road Function	Typical Thickness	Recommended Surface
Residential	5 in	0.75 – 1.5 in
Secondary	8 in	1.5 – 2.5 in
Highway	10 in	2 – 3+ in

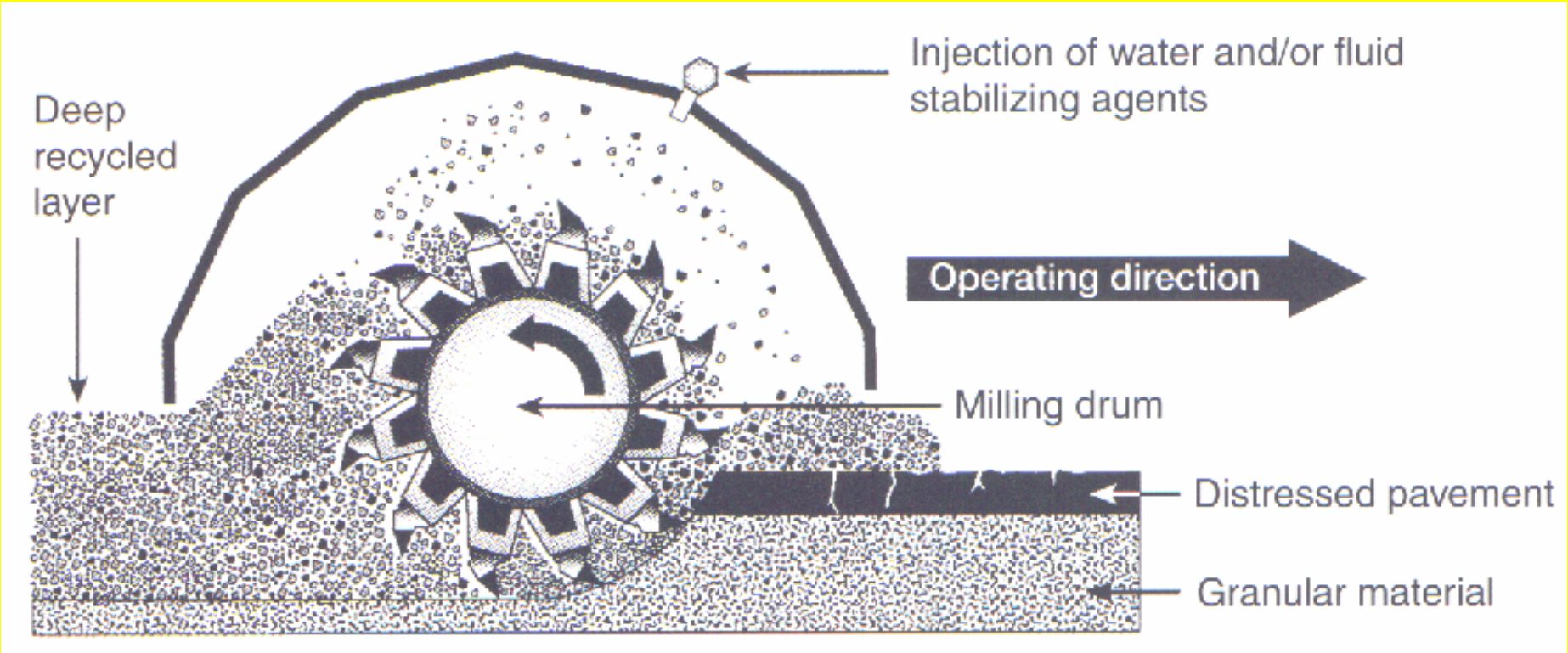
Recycling Process

- Simple process
  - Cement Spreader
  - Motor Grader
  - Pulverizer/reclaimer
  - Water truck
  - Roller/compactor
- Fast

Pulverization

- Pulverize mat to appropriate gradation
- Typically 1-2 passes

Inside a Reclaimer



Aggregate Adjustment

Cement Spreading

- Cement is spread on top in measured amount

Blending and Moisture Addition

- Cement is blended into pulverized, recycled material
- Water is added to optimum moisture

Grading

- Material is graded
- Excess removed

Excellent Time for Widening!!

Example:

Montgomery County, NY

Compaction

- Material is compacted
- 95% Proctor density minimum

Curing

Water

Prime Coat

Surfacing

- Surface course applied
  - Chip seal
  - Asphalt
  - Concrete

Thank You!

www.cement.org/pavements

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