

TAYLOR

CONSULTING GROUP LLC

PRODUCT DEVELOPMENT - PROMOTION - MARKETING - SALES



CESTEL



RETEM
3D STEEL
GRID



CONCRETE PAVEMENT
The Basics



THE GOLDEN SHIELD QUARTET

Golden Shield
Recording Artists

GOLDEN SHIELD
RAMP
RECORDING ARTISTS
Dodge

Common Questions & Comments

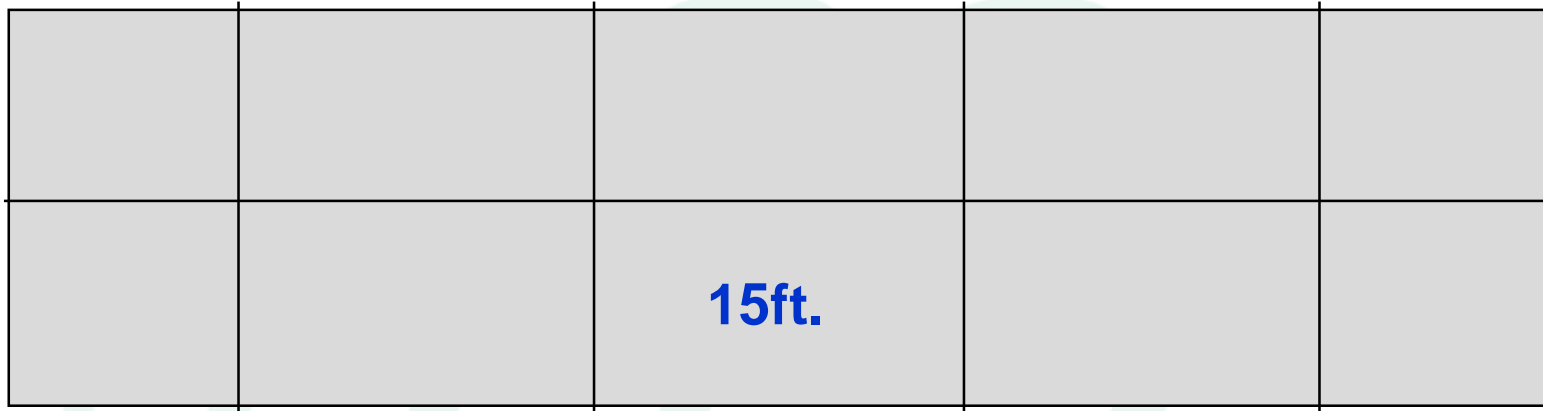
- What comes to mind when I mention concrete pavement?
 - Th-thump Th-thump
 - Longevity
- How much of ALDOT's Interstate roadways were placed in concrete?
 - 42%
- What were the three types of concrete pavement placed on Alabama's Interstates (1960's-1970's)?
 - Jointed Plain Concrete Pavement (JPCP)
 - Jointed Reinforced Concrete Pavement (JRCP)
 - Continuous Reinforced Concrete Pavement (CRCP)



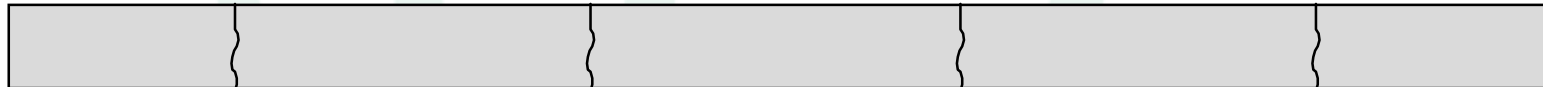
**CONCRETE PAVEMENT
TYPES**

Jointed Plain

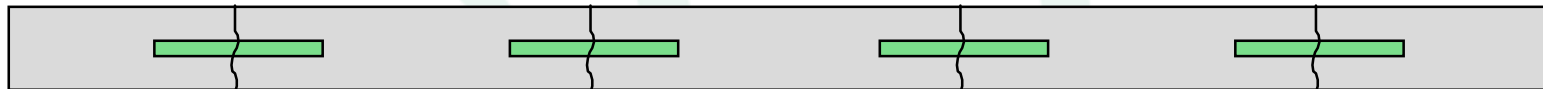
Plan View



Profile View

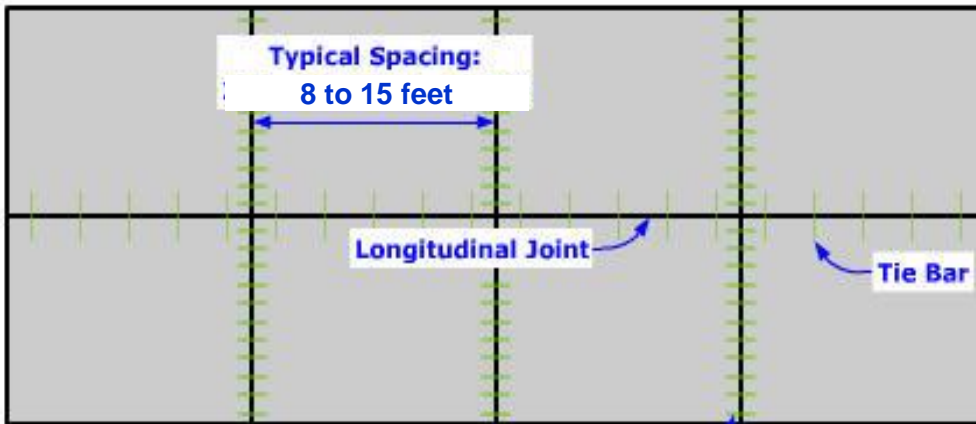


or



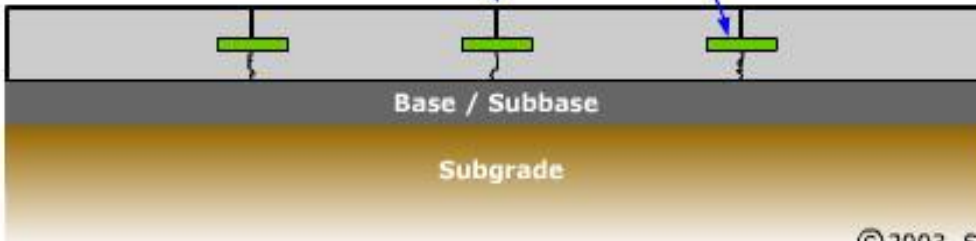
Jointed Plain Concrete Pavement (JPCP)

Top View

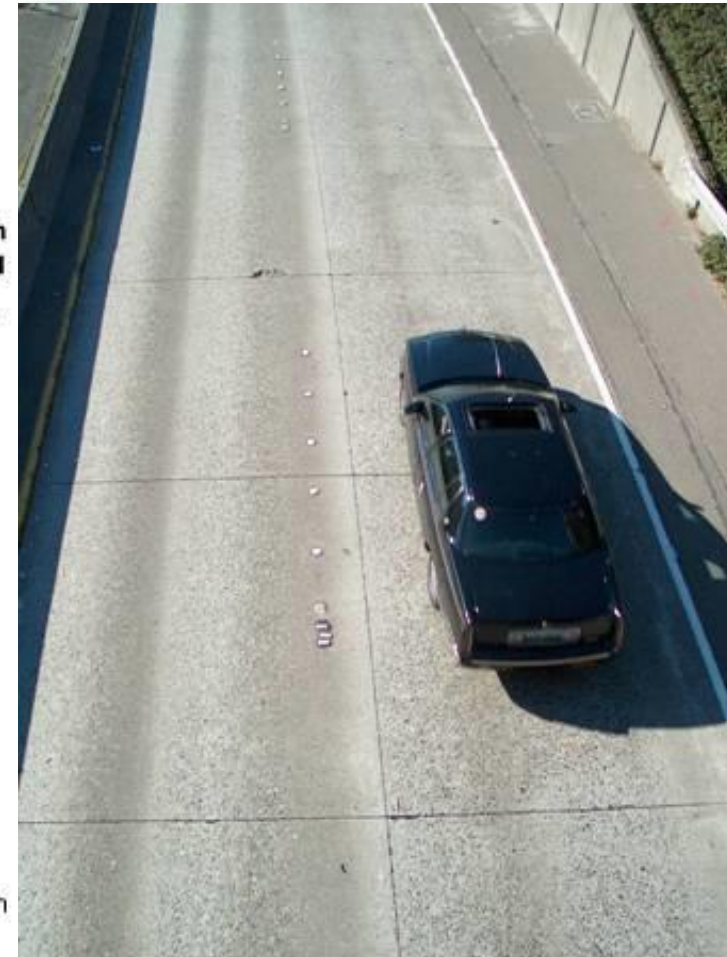


Direction
of Travel
→

Side View



©2003 Steve Muench



Jointed Plain



Jointed Reinforced

■ Plan



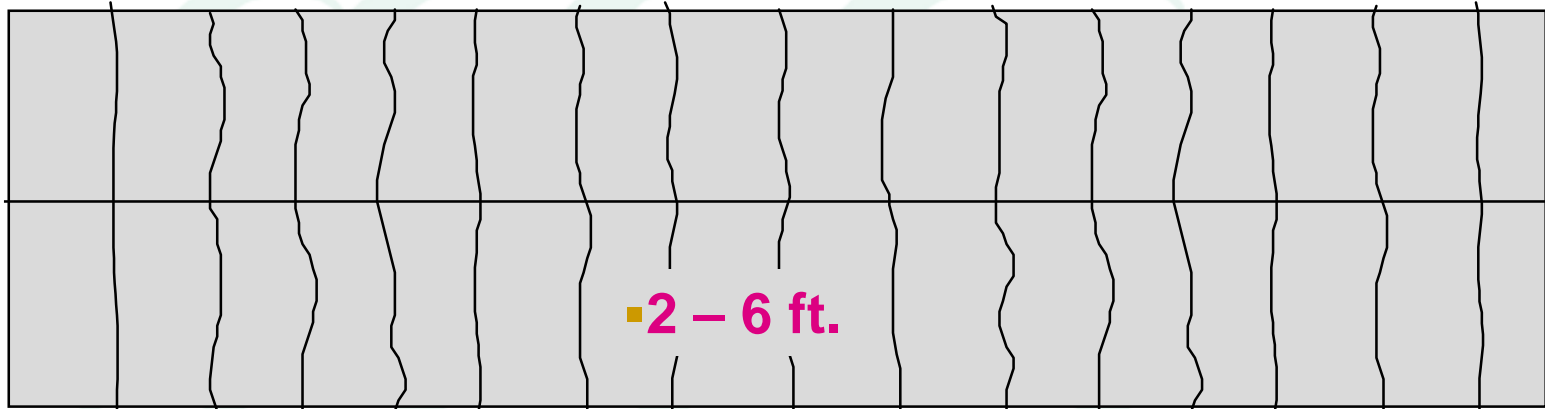
■ Profile



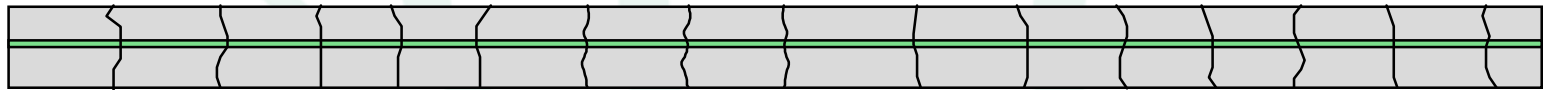
Steel Mesh 0.10 to 0.25% cross sectional area

Continuously Reinforced

■ Plan



■ Profile



Steel 0.6-0.7% by cross-sectional area

Continuously Reinforced



Continuously Reinforced



Continuously Reinforced



Alabama's Concrete Intersections

1992

- Jasper
- Monroeville
- Tuscumbia
- Montgomery
- Troy

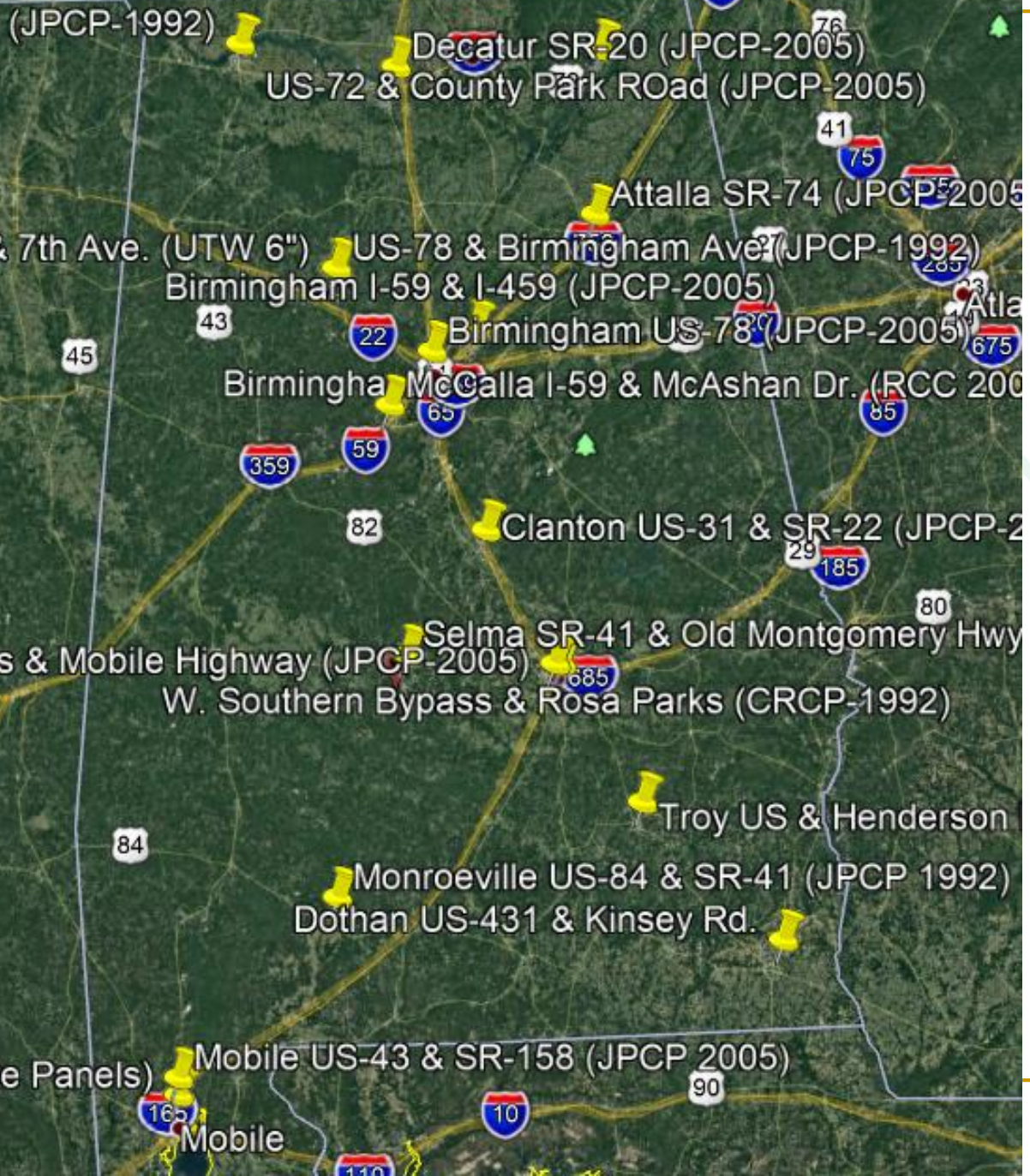
2000-2010

- Jasper
- Calera
- Selma
- Montgomery
- Decatur
- Mobile
- Clanton
- Auburn
- Atalla
- Dothan

2022-

Goal - Two in
each Region

\$30M Yearly



East Central Region (Contact Steve Haynes and Steve Walker)			
Route		County	Letting Month
SR 31/SR 25		Shelby	July
US 78/I-20 Exit 156		St Clair	September
US 29/I 85		Chambers	November
West Central Region (Lyndi Blackburn)			
Route		County	Letting Month
US 11 at Ed Stevens and Middle Coaling Rd		Tuscaloosa	September
Southwest Region (Mack Outlaw and John Reef)			
Route		County	Letting Month
State Route 10 and 28		Wilcox	August
State Route 43 Thomsville		Clark	August
US 43 and I 65 Pilot Gas Station		Mobile	August
St Stephens Road at I65 Exit 8		Mobile	November
North Region (Clint Baker)			
Route		County	Letting Month
US 72		Colbert	August
State Route 13/US 43		Franklin	August
State Route 33		Lawrence	August
Leesburg area AL68/25 Cherokee County			
Southeast Region			
Route		County	Letting Month
Northern Blvd		Montgomery	June

New Pavement Systems

- Roller Compacted Concrete Pavement
- Whitetopping
- Precast Panels

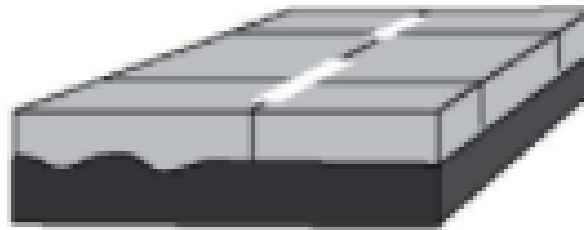
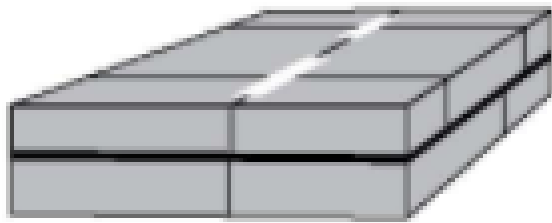
New Pavement Systems

- Roller Compacted Concrete Pavement



New Pavement Systems

- Whitetopping

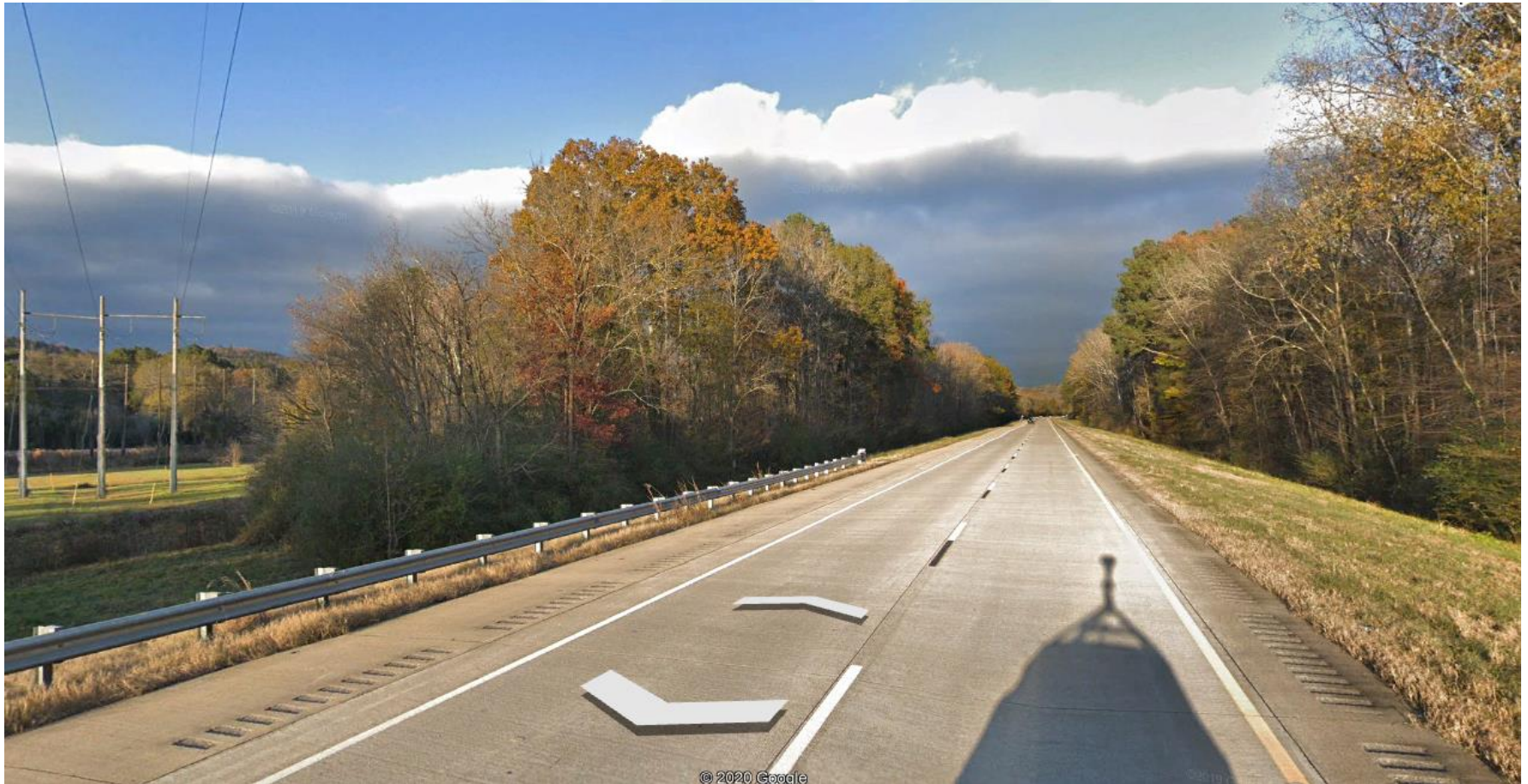


Montgomery W. Southern Bypass & Mobile Hwy. (JPCP - 2005)





Gadsden I-59 Unbonded Overlay JPCP



New Pavement Systems

- Precast Panels



The Details

- Jointing
- Types of Joints
- Load Transfer
- Joint Sealing
- Joint Spacing

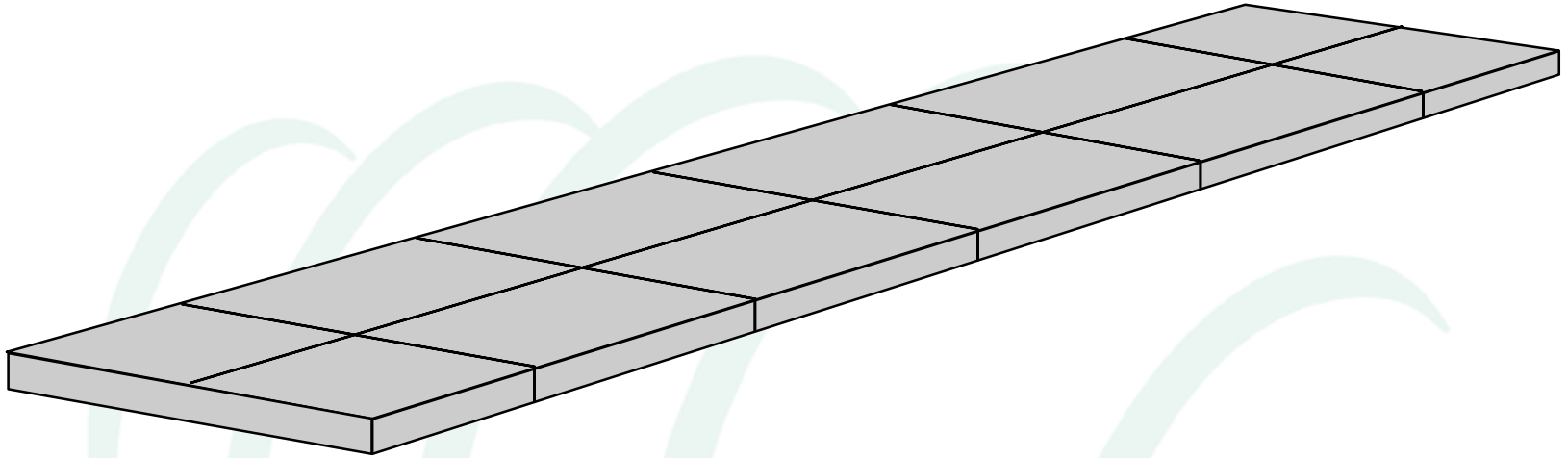


JOINTING

Why Are Joints Needed in Concrete Pavement?

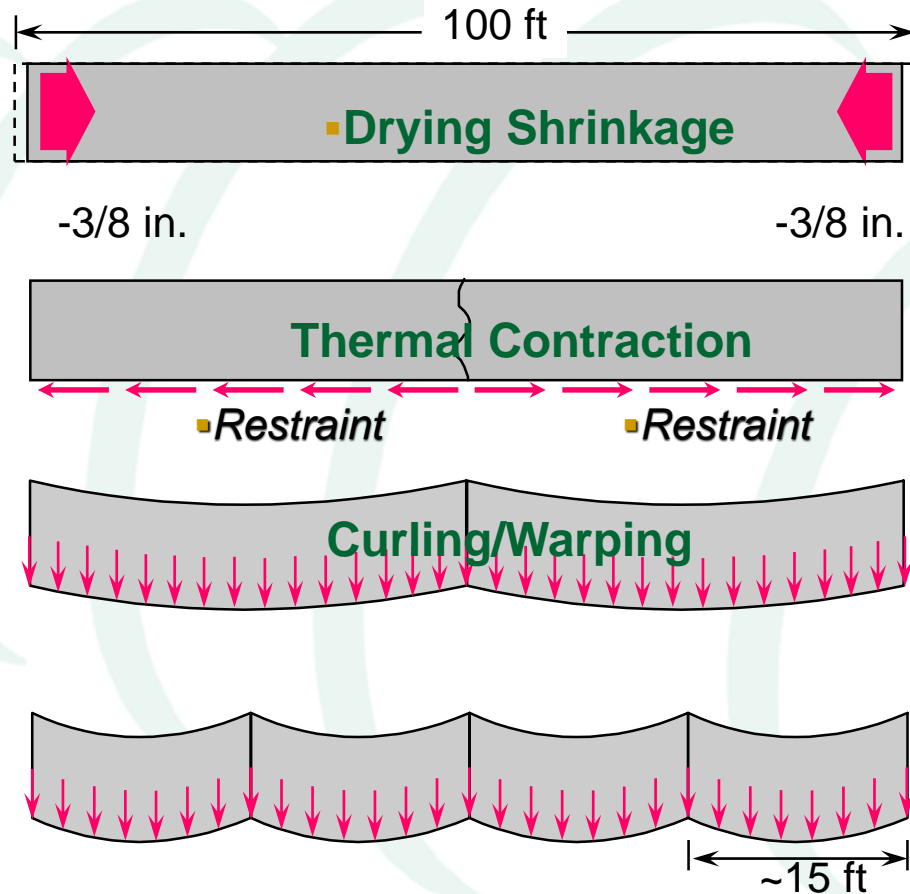


Controlled Cracking

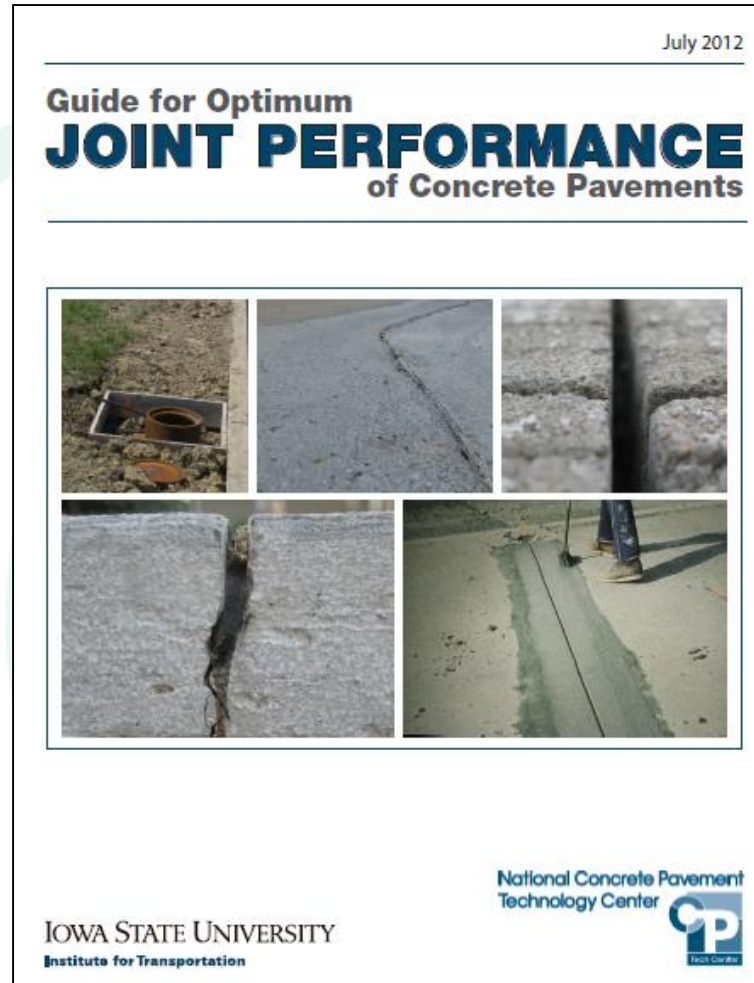


- Control the location, width, and appearance of expected cracks.
- Accommodate normal slab movements.
- Reduce stress build up.
- Provide load transfer where needed.
- Minimize performance implications of any random (unexpected) cracks.

Why Does Concrete Crack after Placement?



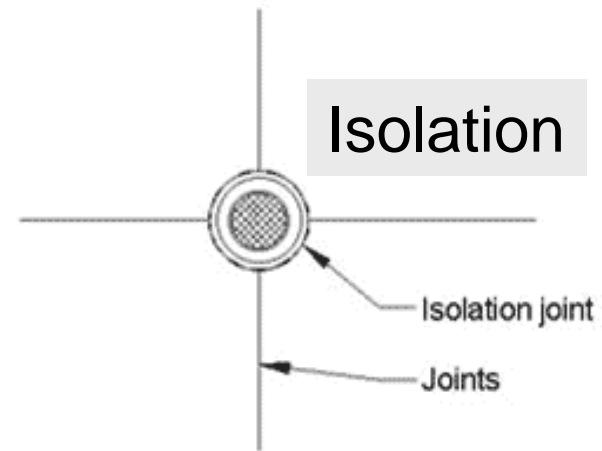
CP Tech Center: Joint Performance



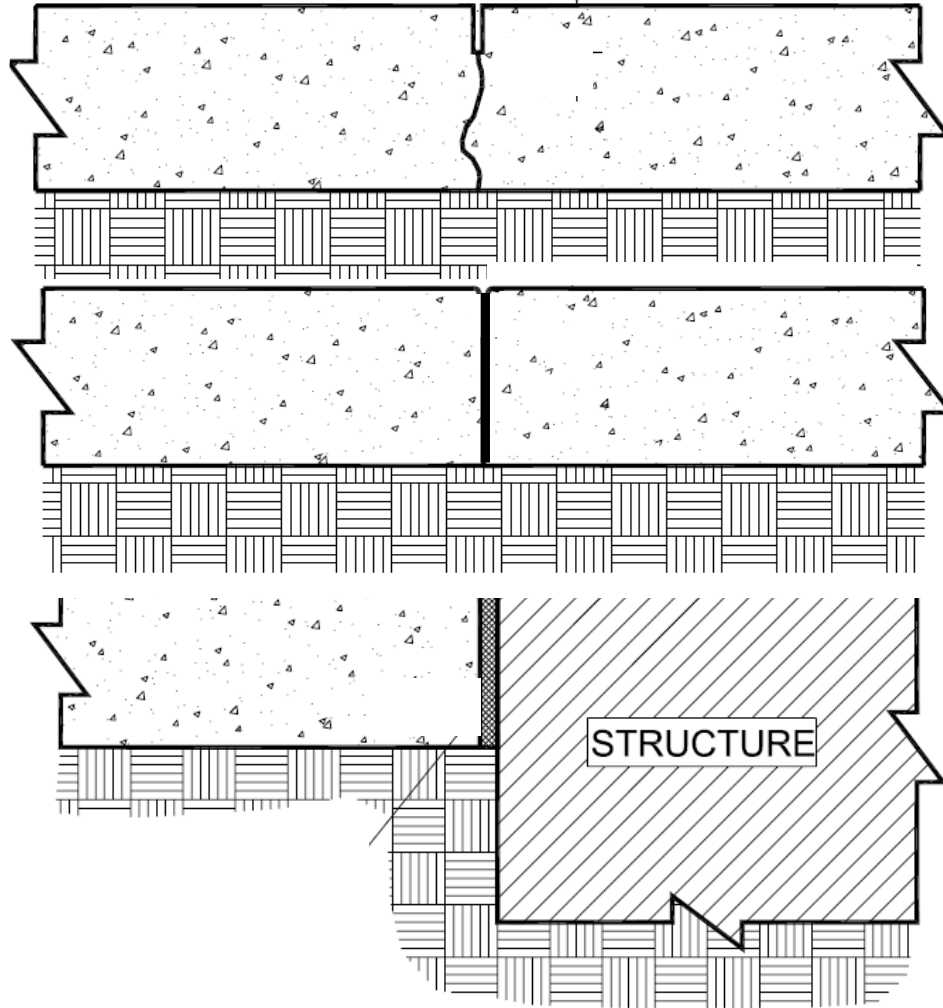


TYPES OF JOINTS

Definitions - Joints



Types of Joints: Schematic Representation



Contraction or Control

Construction

Isolation

Tooled Control Joints



Advantages:

- Simplest to make.
- Most reliable crack initiation.

Disadvantages:

- Most noticeable joint.
- Not smoothest for rolling wheels.
- Not designed for sealers / fillers.



Rules of Thumb for Sawcut Joints

- Depth:
 - Conventional Sawing:
 - Minimum of $\frac{1}{4}$ of the depth: e.g. 8" thick = 2" deep
 - Recommended $\frac{t}{3}$
 - Early Entry Sawing:
 - Typical 1" to 1.5" depth

Reservoir

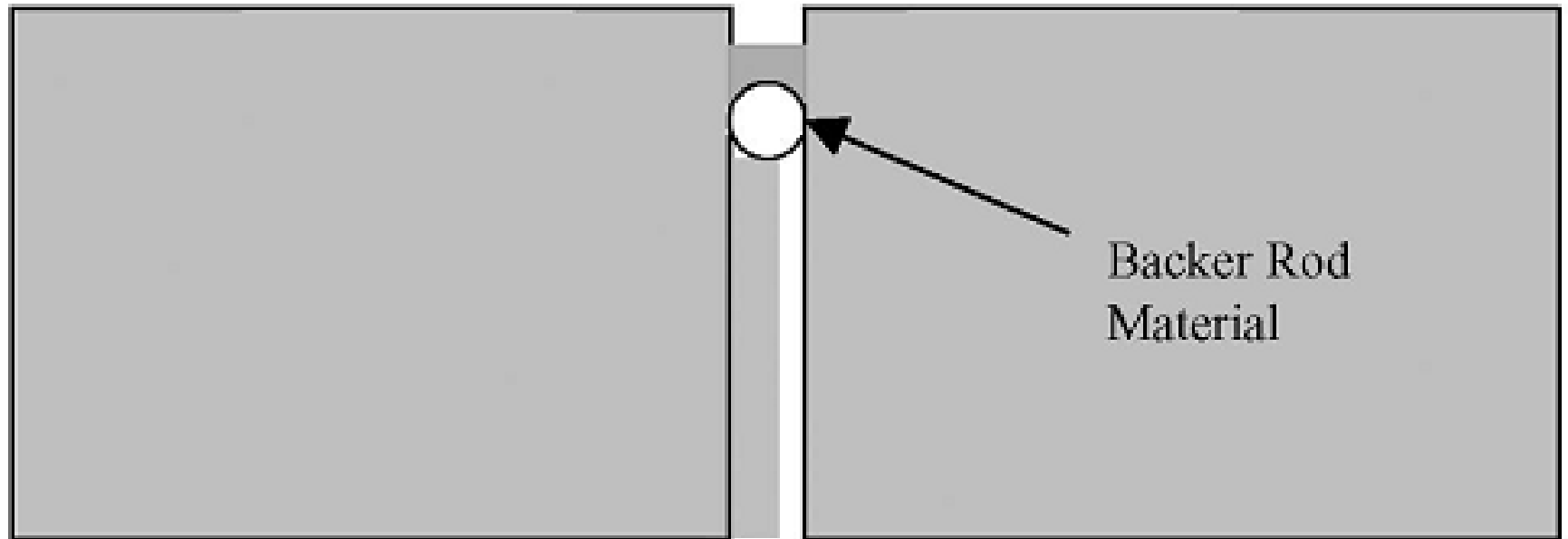


Fig. 4.7—Joint sealant reservoir.

Timing of Joint Sawing—A Critical Factor



This joint was sawed at correct time

Sawcut joints with conventional saws must be made within 4-12 hours after final finishing.



This one was sawed too late

Saw Blades

- Most common are industrial diamond (require water cooling).
- Must match the saw blade to the concrete which is based primarily on aggregate hardness but also depends on power output of saw.
- Very thin blades (~2 to 3 mm) may be used when joint sealing is not specified.



Early Entry “Dry Cut” Saws



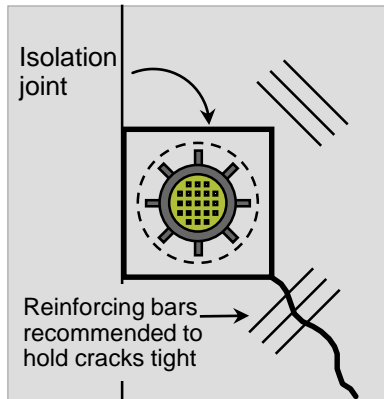
- Designed to initiate cracks with a shallow cut made much earlier than with wet-cut saws.
- Timing - “window of opportunity” is 1 to 2 hours.

Huntsville Airport

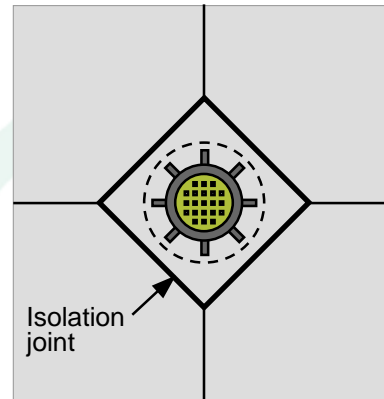


Common Details for Isolation of Fixtures

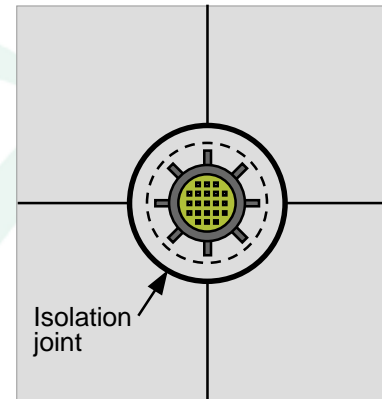
Square



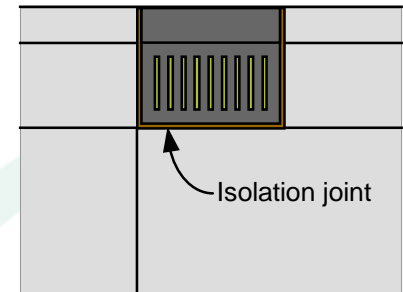
Diagonal



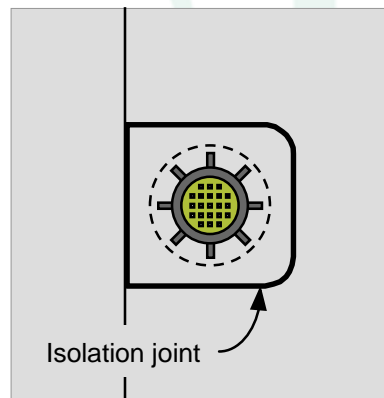
Circular



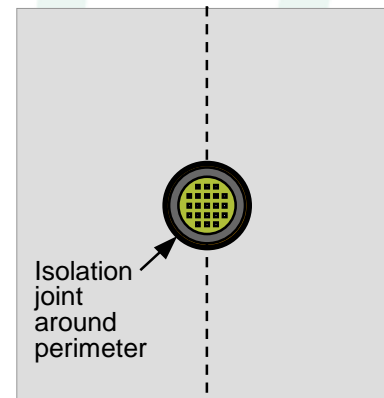
Inlet



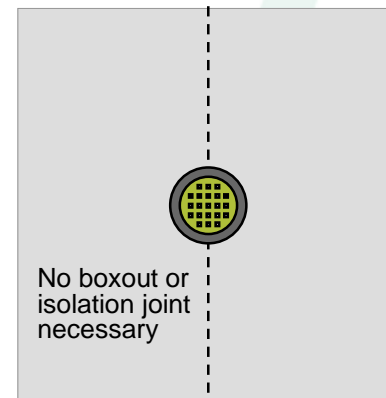
Square with Fillets



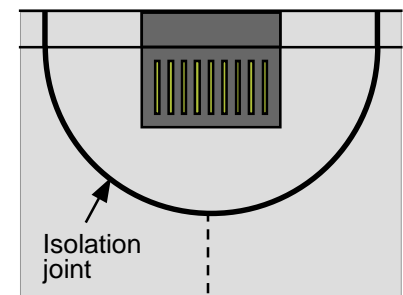
None



Telescoping Manhole



Inlet - Round





How to determine...

JOINT SPACING

Rules of Thumb for Jointing & Slab Dimensions

- Spacing:
 - Recommendation of 2.5 times the depth in feet
 - For example: 4" thick = 10' maximum (4 x 2.5)
- Panel shall be kept as square as possible
 - L:W of 1½:1 (Maximum length to width ratio)

Joint Layout Guidelines

■ What You Should Do:

- ❑ Jointing plan drawn by designer of record, or submitted by contractor & approved by designer.
- ❑ Match existing joints or cracks.
- ❑ Cut at the proper time.
- ❑ Adjust spacings to avoid small panels or angles.
- ❑ Intersect curves radially, edges perpendicular.
- ❑ Keep panels square.

■ What You Should Avoid:

- ❑ Jointing plan left to field personnel with no oversight.
- ❑ Slabs < 1 ft. wide.
- ❑ Slabs > 15 ft. wide.
- ❑ Angles < 60° (90° is best).
- ❑ Offset (staggered) joints.

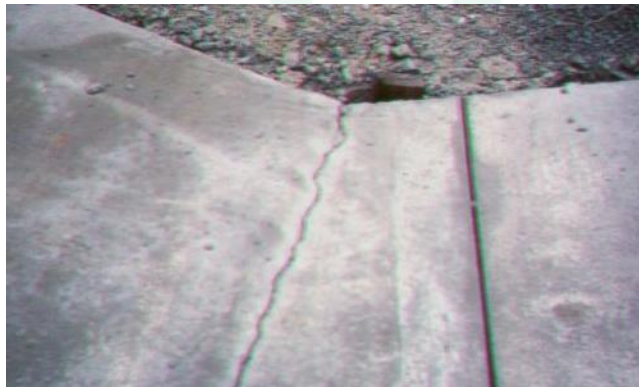
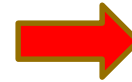


Jointing Layouts:

Corners, acute angles,
edges with extreme
curvature

↑ Carry joint through curb
(integral curb shown)

Intersect joints
(Avoids acute angles)



Intersect at corners

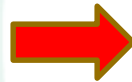


Jointing Layouts: Corners, acute angles, edges with extreme curvature



Meet structures at corners

Avoid acute angles
(Intersect at perpendicular)





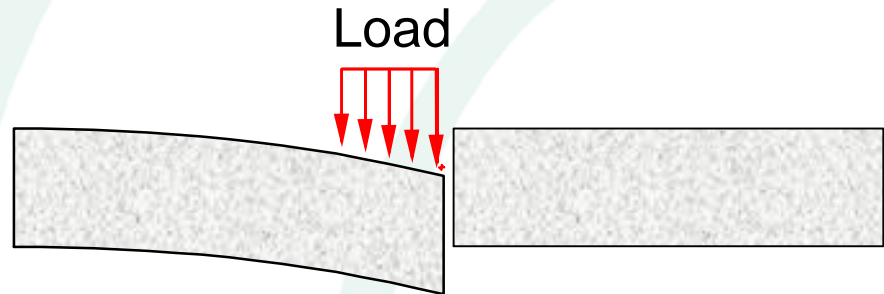
LOAD TRANSFER

Definition – Load Transfer

- Shear strength provided at joints (or cracks) by **dowels** and/or **aggregate interlock**.
- Significantly reduces load-related deflection.

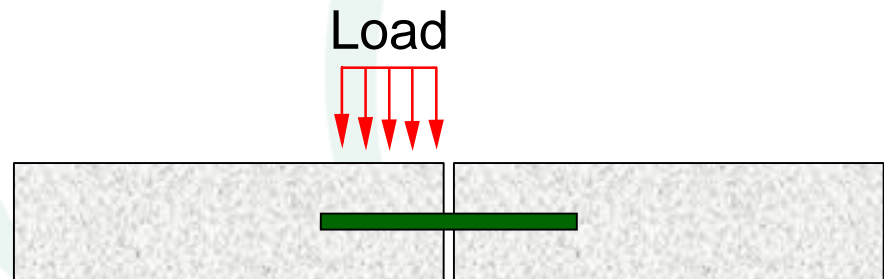
Without load transfer:

Excessive deflections and flexure - same as free edge loading.



With load transfer:

Deflections and flexural stresses are reduced.



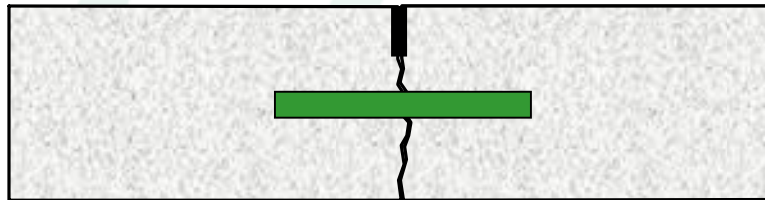
Load Transfer

- Load Transfer is a Function of:
 - ❑ Aggregate Interlock
 - ❑ Stiffness of Supporting Layers
 - ❑ Mechanical Devices (i.e. Dowels)

Dowels...



Dowels provide load transfer and allow the joints to move.



Dowel Bar Recommendations

Thickness (in)	Diameter (in)	Length (in)	Spacing (in)
< 10	1.25	18	12
10 or greater	1.50	18	12



NATIONAL CEMENT

The National Cement Company, Inc.

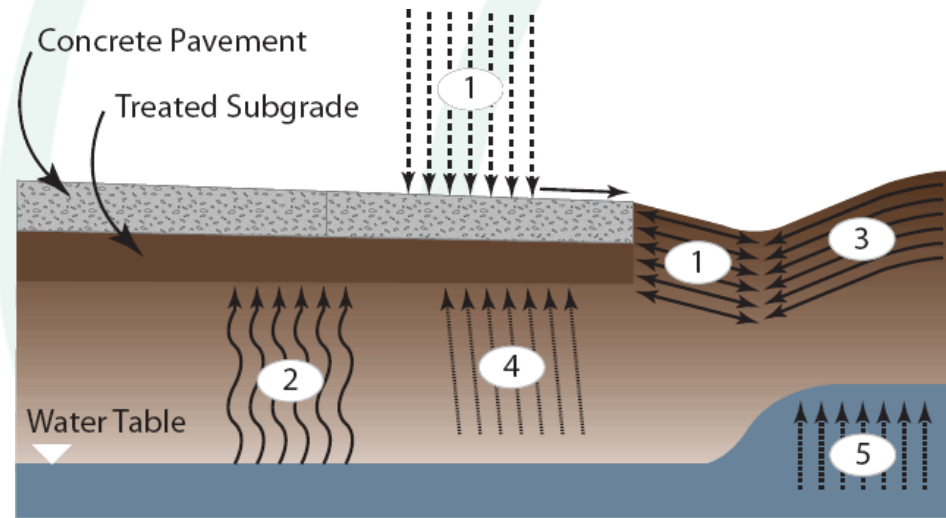
Do I or Don't I...

JOINT SEALING

Joint Sealing

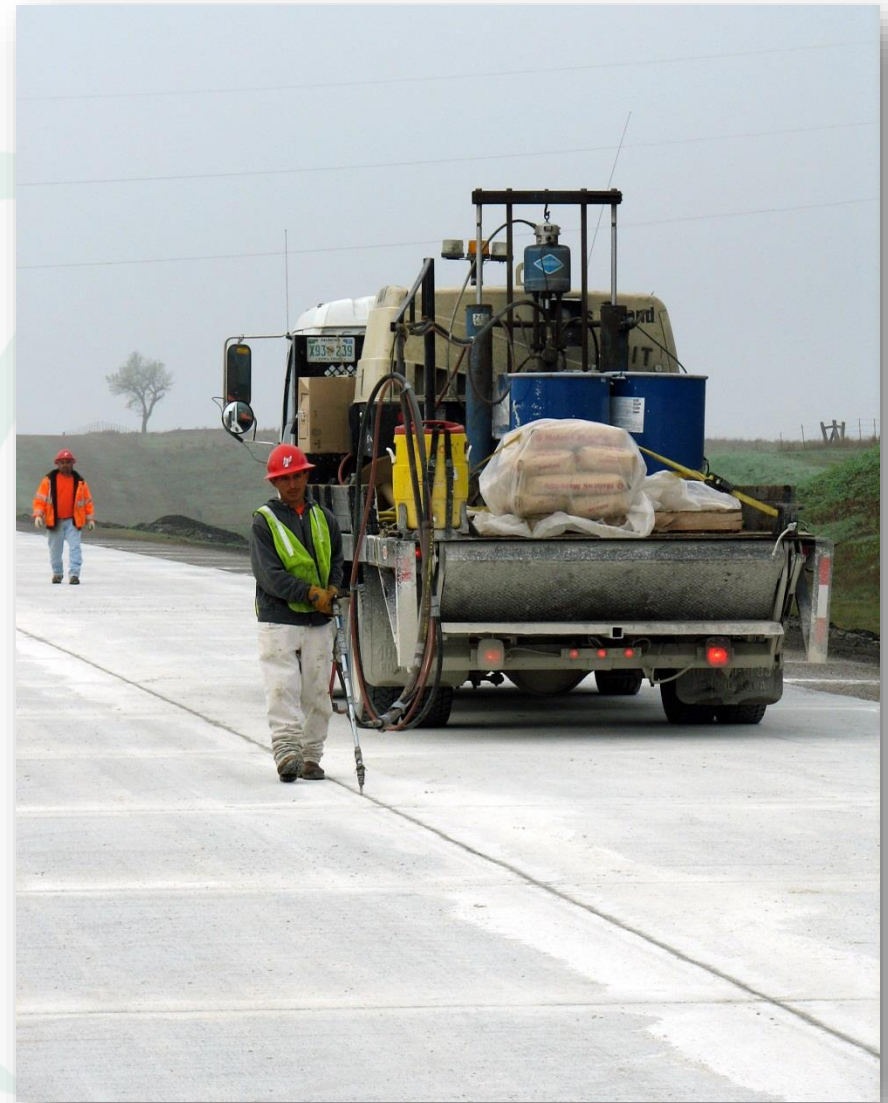
Minimize surface water & incompressibles into pavement system in an attempt to reduce:

- Subgrade softening
- Pumping/Faulting
- Erosion of fines
- Spalling



Joint Sealants

- Three basic types are:
 - Hot poured (10 yr)
 - Silicone (10-15 yrs)
 - Preformed (20 yrs)
- Applicable specs for each type.
- Specialty types (e.g., jet fuel resistant, self-leveling and no tooling, etc.), and backer rods are available in literature and from manufacturers.



Sealing? Make Certain the Joint is Clean!

- All sealed joints must be cleaned immediately behind saw cutting or joint widening and immediately prior to sealing operations:
 - Removes saw-cut slurry, soil, sand, etc.
- Cleanliness of both joint faces is extremely important to concrete/sealant bond.



It's Not Hard to Check...

- If wiping a finger along the face picks up dirt or dust, recleaning should be done before sealing!







12/04/2018 15:59









Huntsville Airport

