

Joint Durability

National Concrete Pavement
Technology Center



The problem?

- Some joints are deteriorating faster than we would like



What Does it Look Like?

- Shadowing



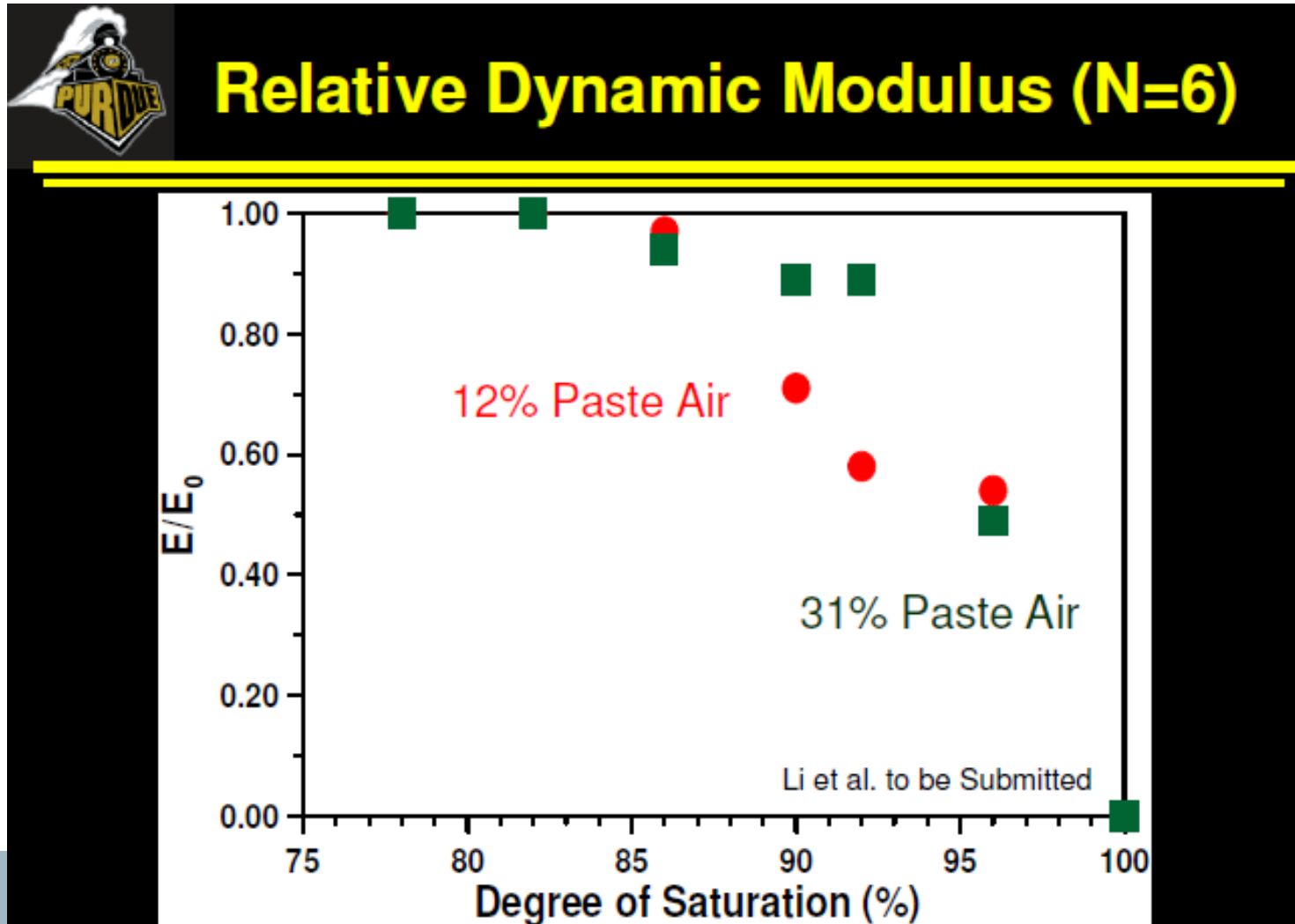
What Does it Look Like?

- Bottom Up Moisture



Purdue Work

- Damage depends on saturation



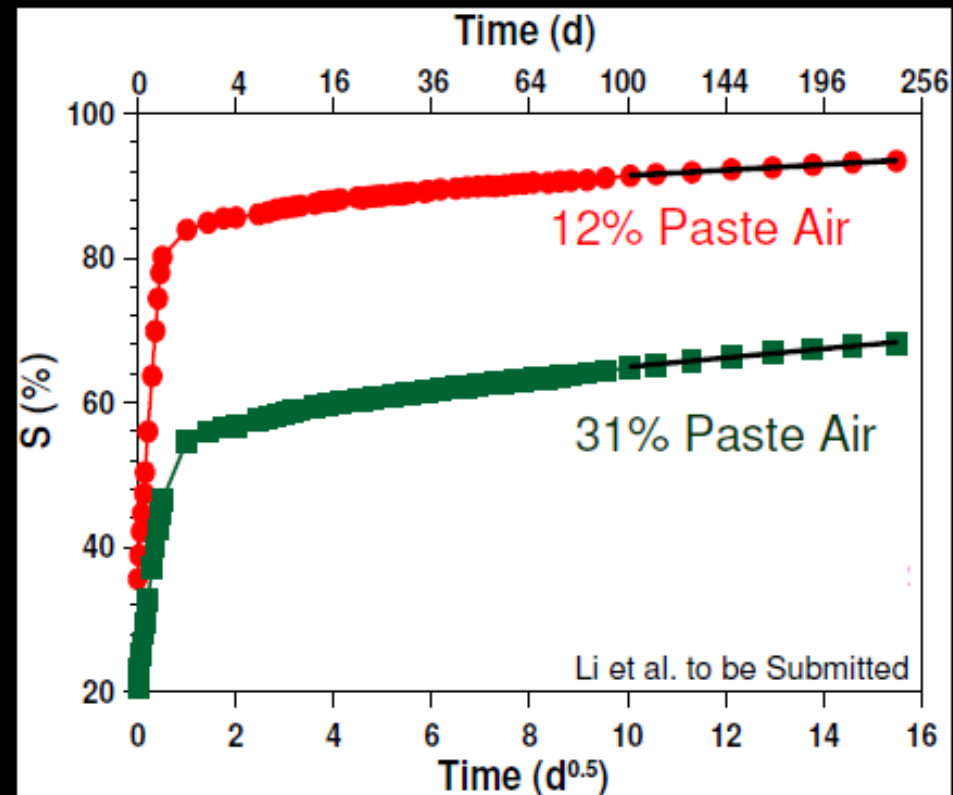
Purdue Work

- Saturation rate influenced by air and w/c




Experimental Procedures

- Degree of Saturation is more Important (Castro et al Submitted)



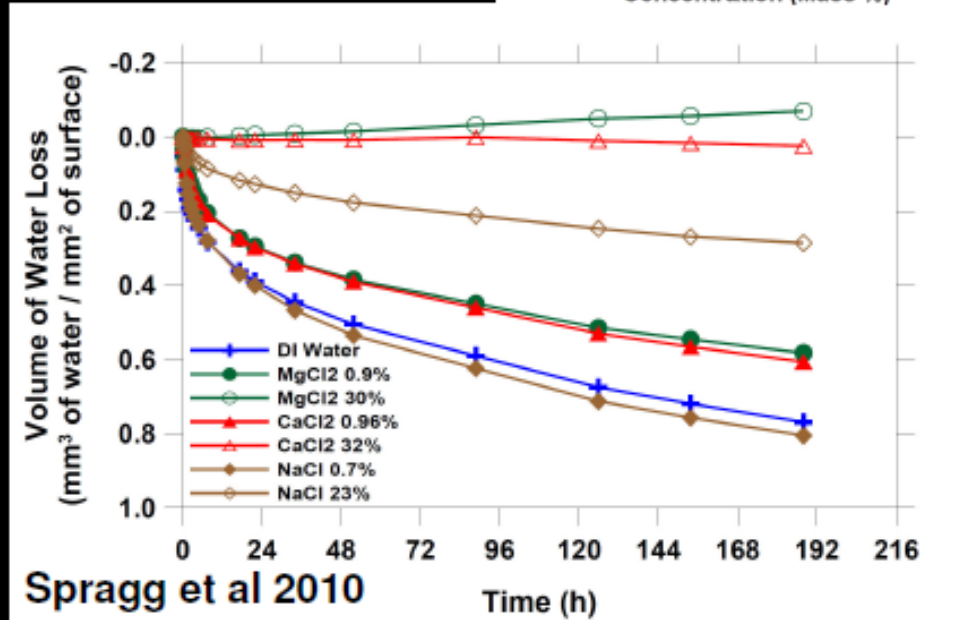
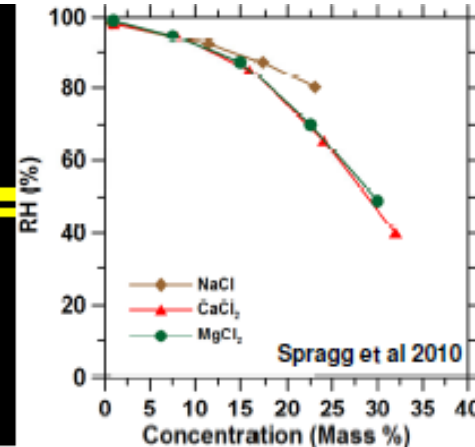
Purdue Work

- Some salts prevent drying



Drying of Concrete With Salt Solutions

- One-sided condition, 50 +/- 2% RH, 23 +/- 1°C
- Lower or no water loss or gain with higher salt concentrations
- Drying behavior explained by differences in solution and environmental RH



Some salts prevent drying

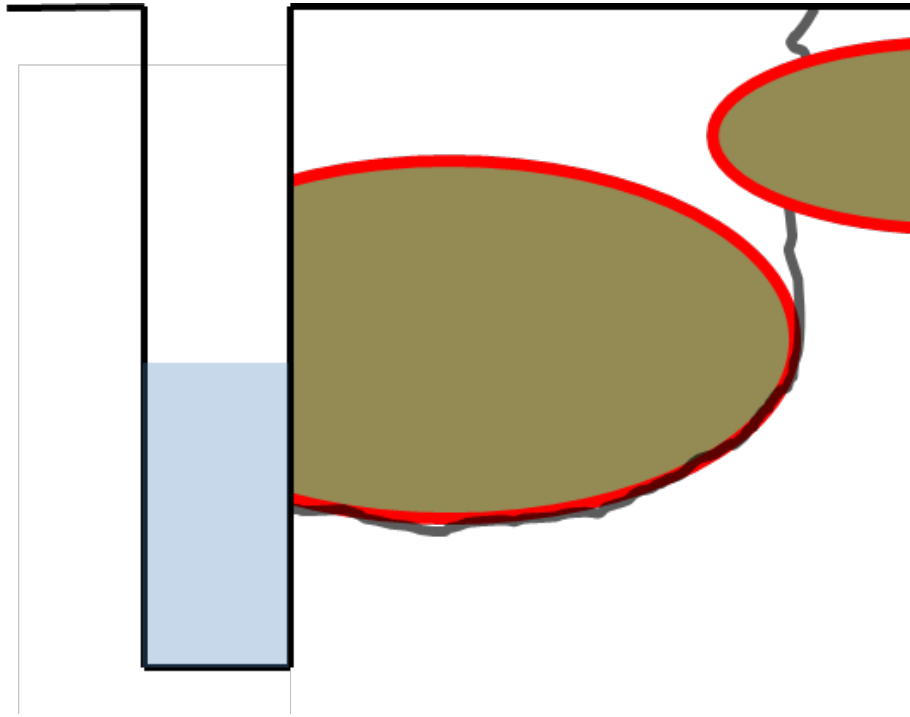


What Does it Look Like?

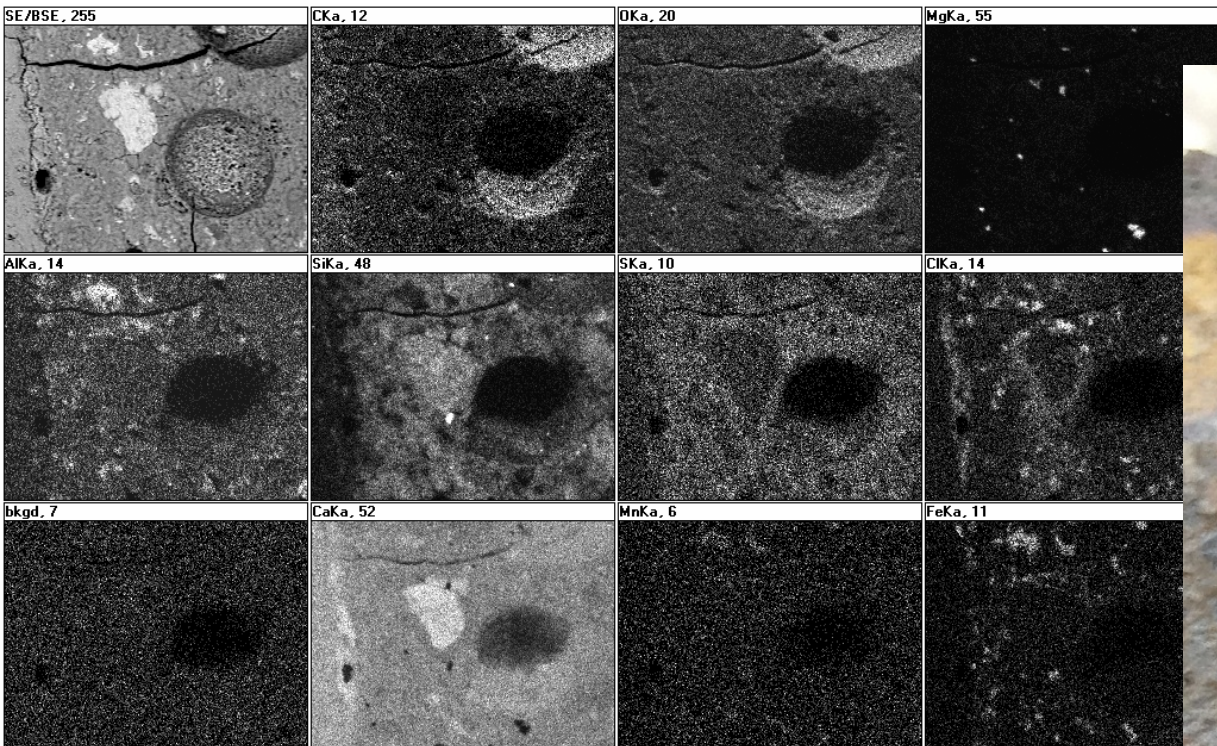
- Incremental Cracking



Interfacial Zone?



Interfacial Zone?

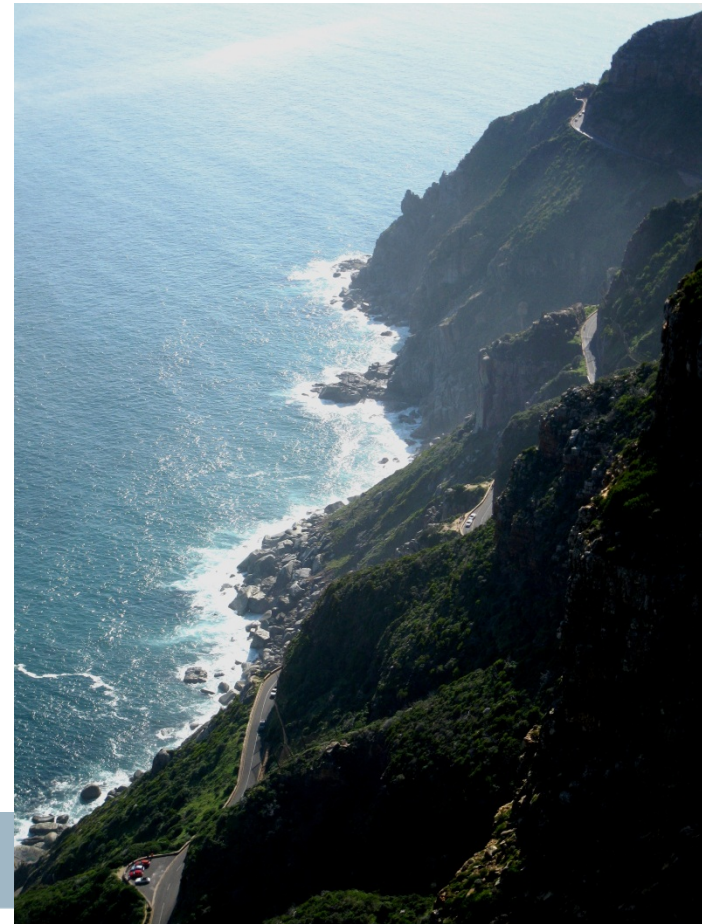
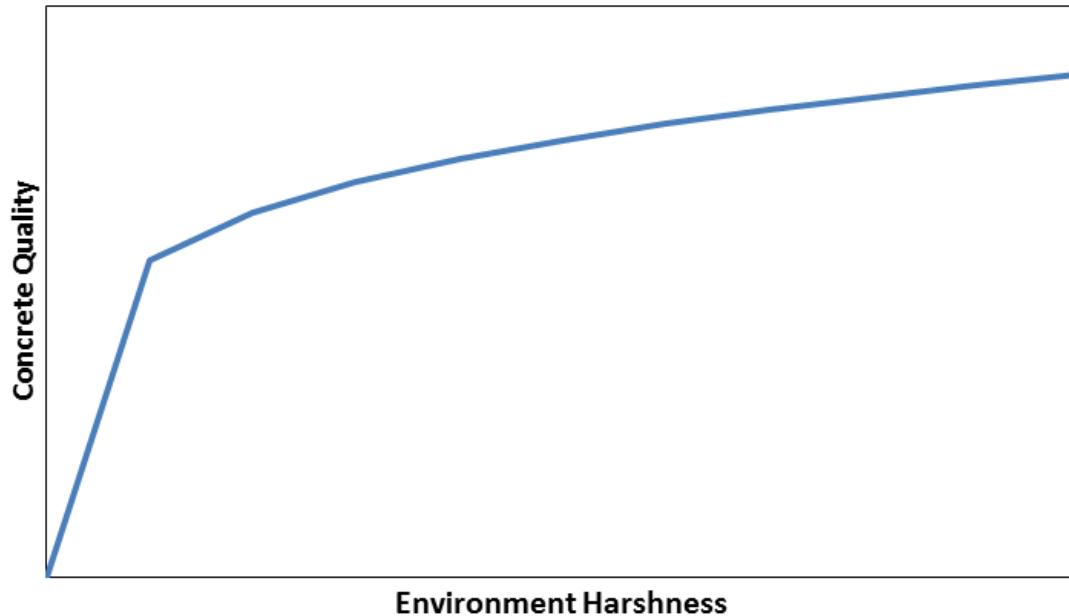


Interfacial Zone?

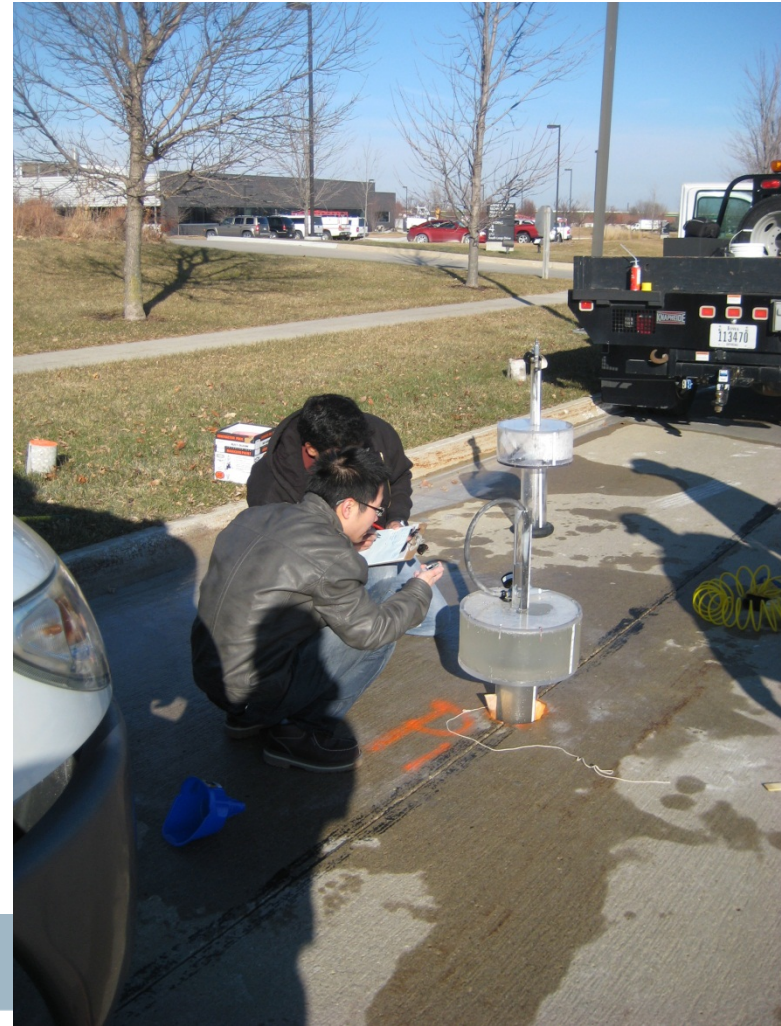


Walking a Cliff Edge

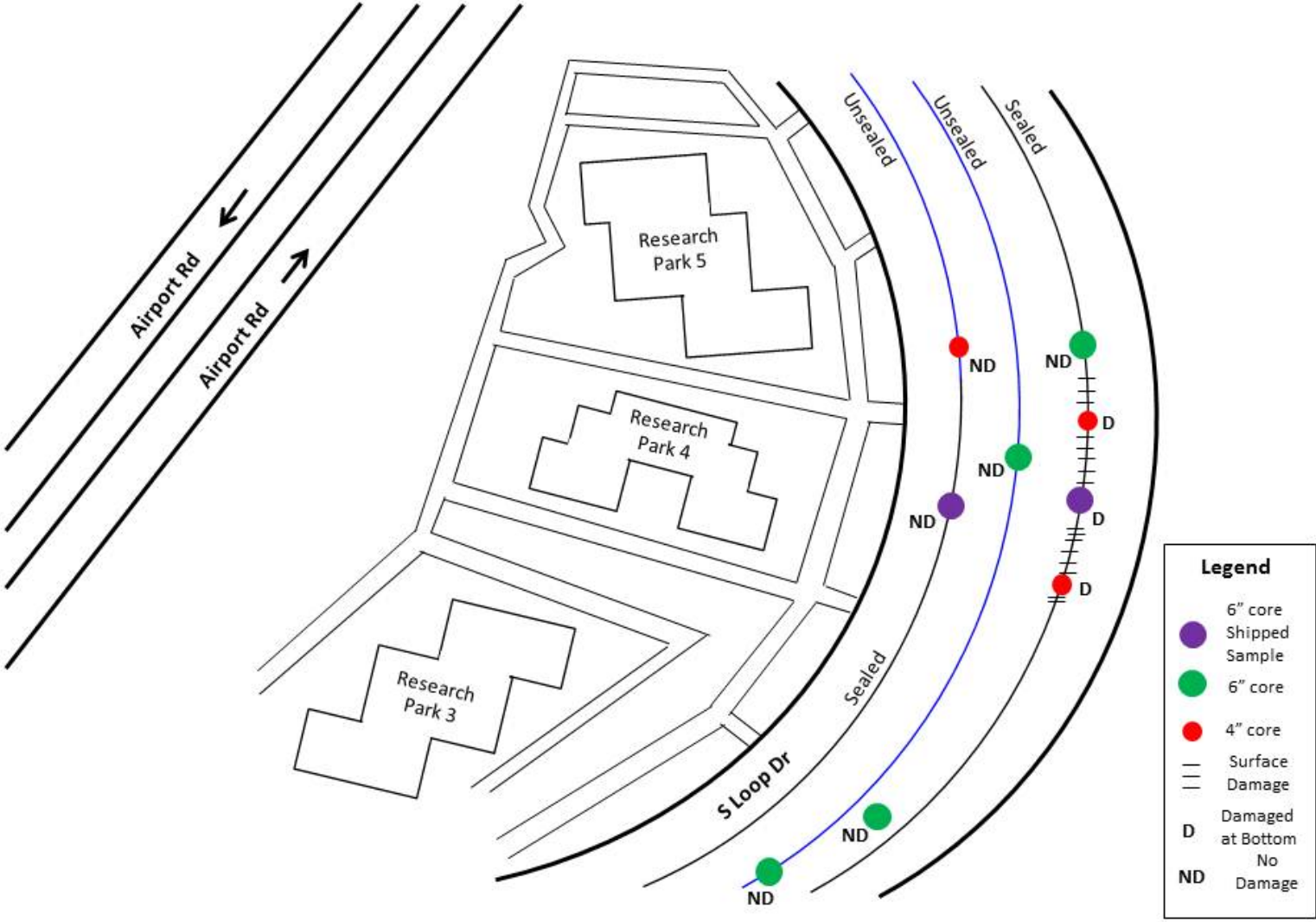
- In situ air content
- w/cm
- Saturation
- Salts



Base Permeability



An Example



So

- Water has to be prevented from saturating the concrete
 - Prevent water from ponding in the joint
 - Prevent water from penetrating from the base
- Permeability of the concrete should be as low as practically feasible
- The air void system in the in-place concrete must be adequate

Prevention

- New concrete
 - Ensure the system can dry out
 - 5% minimum behind the paver
 - 0.42 max w/cm
- Curing
- Surface sealants
- Monitor saw condition
- Choose salts carefully



Prevention - Topical Sealants

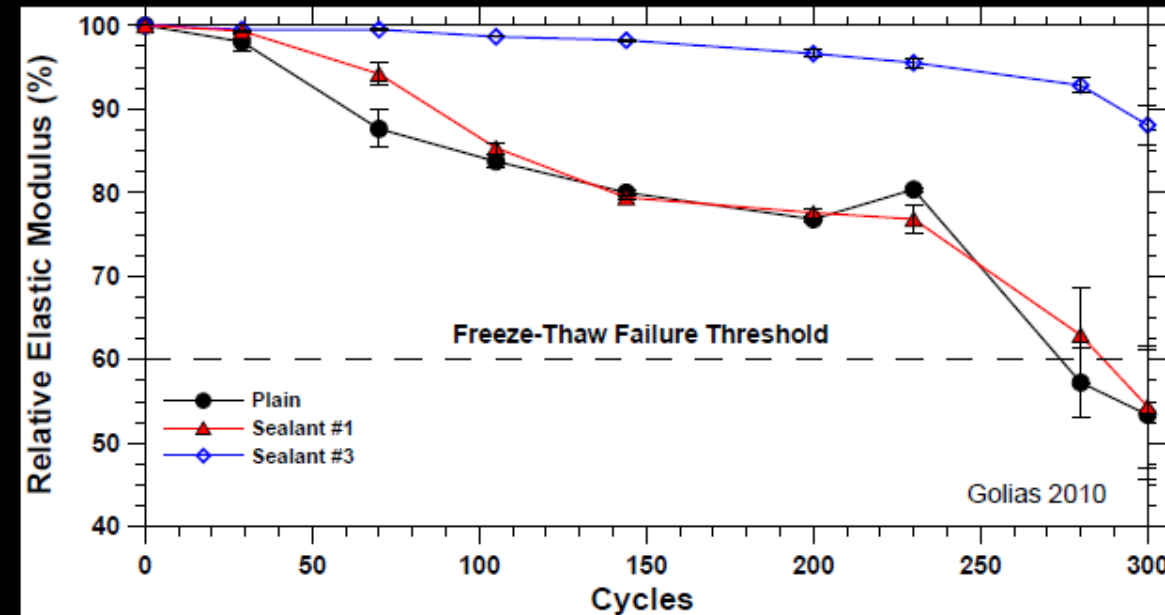
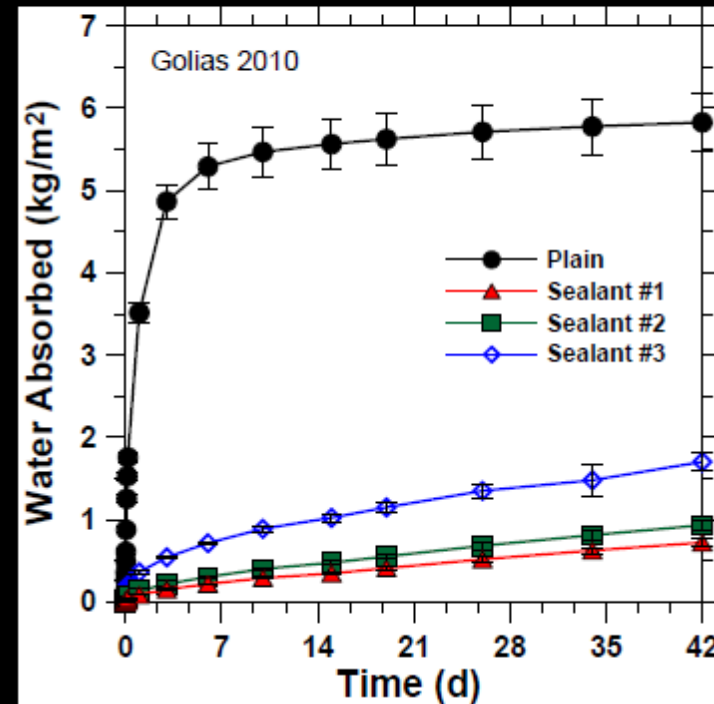


Water Absorption



- All sealants effective at reducing the

Freeze-Thaw Durability (ASTM 666A)



Where next

- Coop contract ends July 2012
- Pooled fund ends July 2013
- Continuing work
 - Field analysis
 - Mechanism details
 - Surfaces sealant evaluation
 - Helping local authorities

Help

SEPTEMBER 2011

Interim Guide for Optimum
JOINT PERFORMANCE
of Concrete Pavements



IOWA STATE UNIVERSITY
Institute for Transportation

National Concrete Pavement
Technology Center 

Guide for

Concrete Pavement Joint Rehabilitation
with Thin Concrete Overlays

Phase I Report

Advance Copy



National Concrete Pavement
Technology Center

