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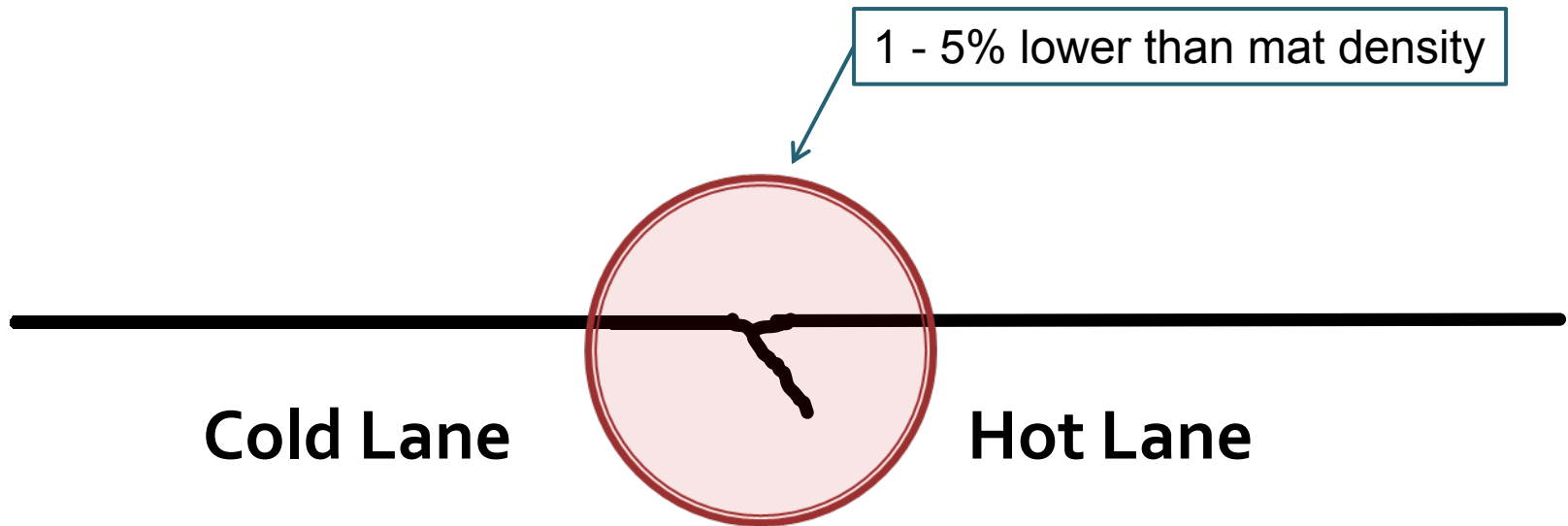
University of Arkansas, Dept. of Civil Engineering

HMA Longitudinal Joint Evaluation and Construction



*NCAUPG Technical Conference
February 2012*

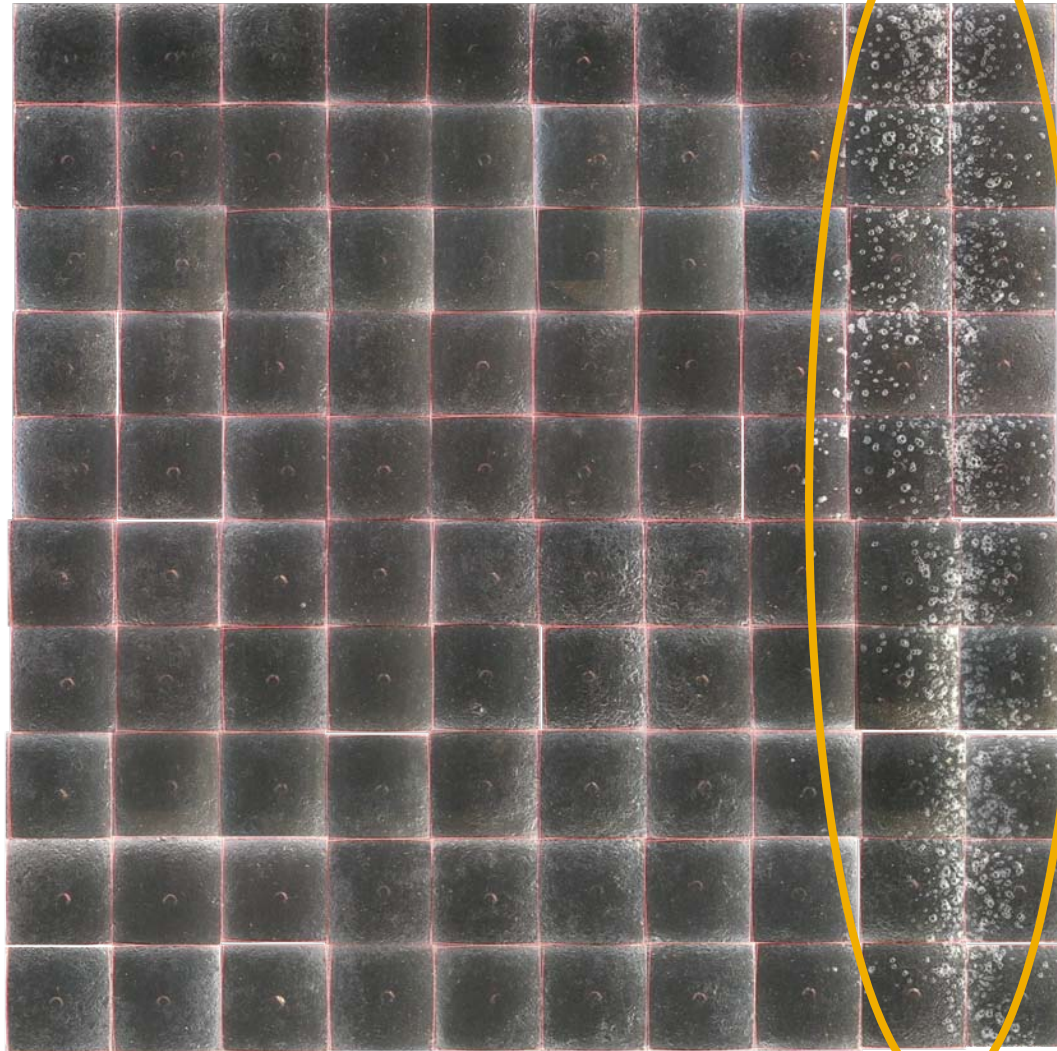
The Problem



The Problem



Vacuum Permeability



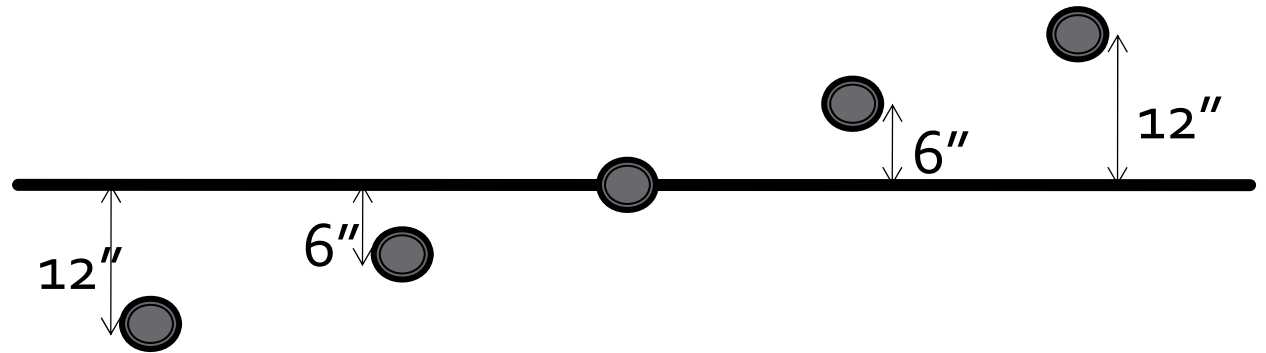
The Cause?

- Low Density
 - Permeability
 - Gradation
-
- *What should we measure?*



Phase I – How to Measure Quality?

- 3 Projects



"Good"



"Bad"



"Ugly"

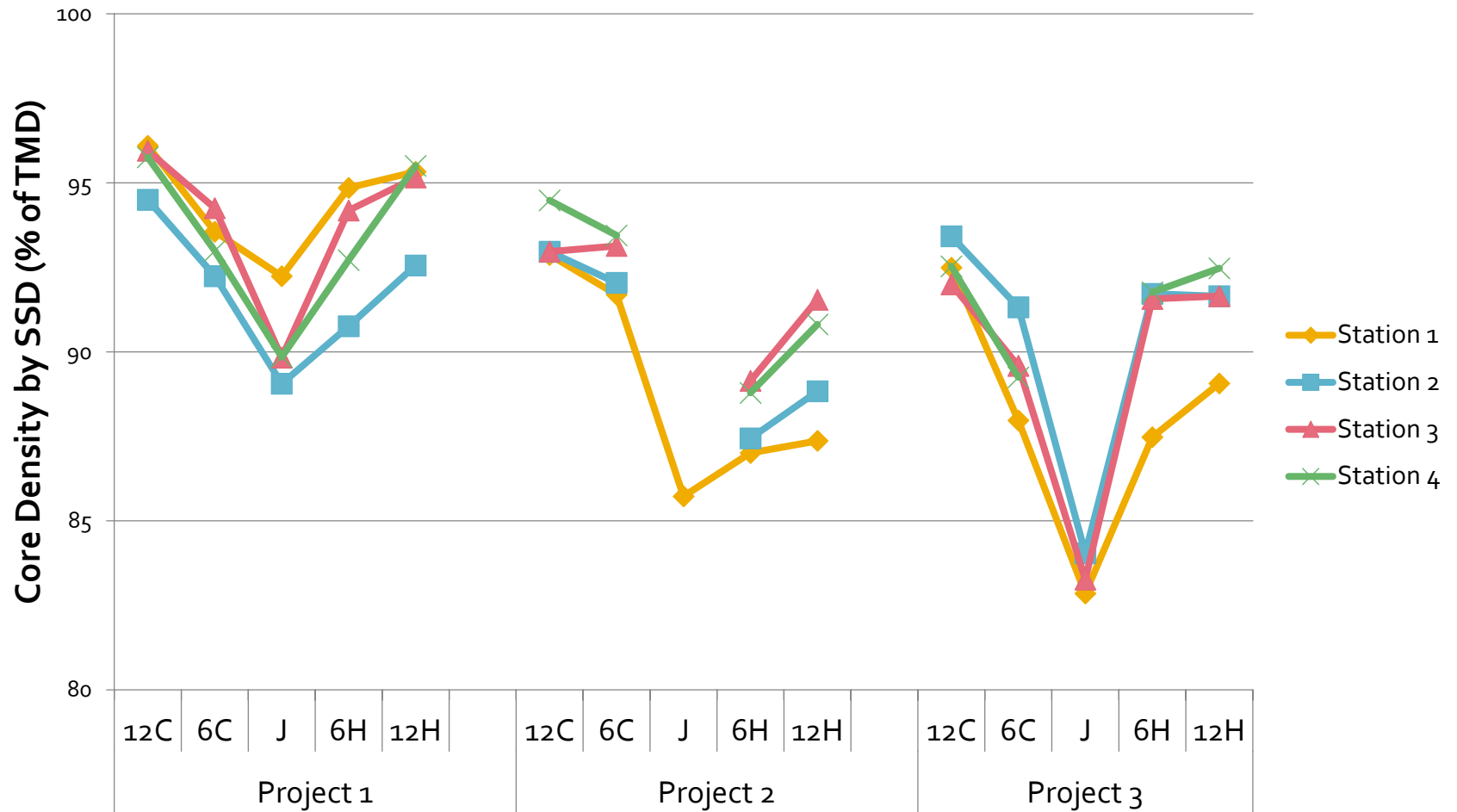
Phase I Testing



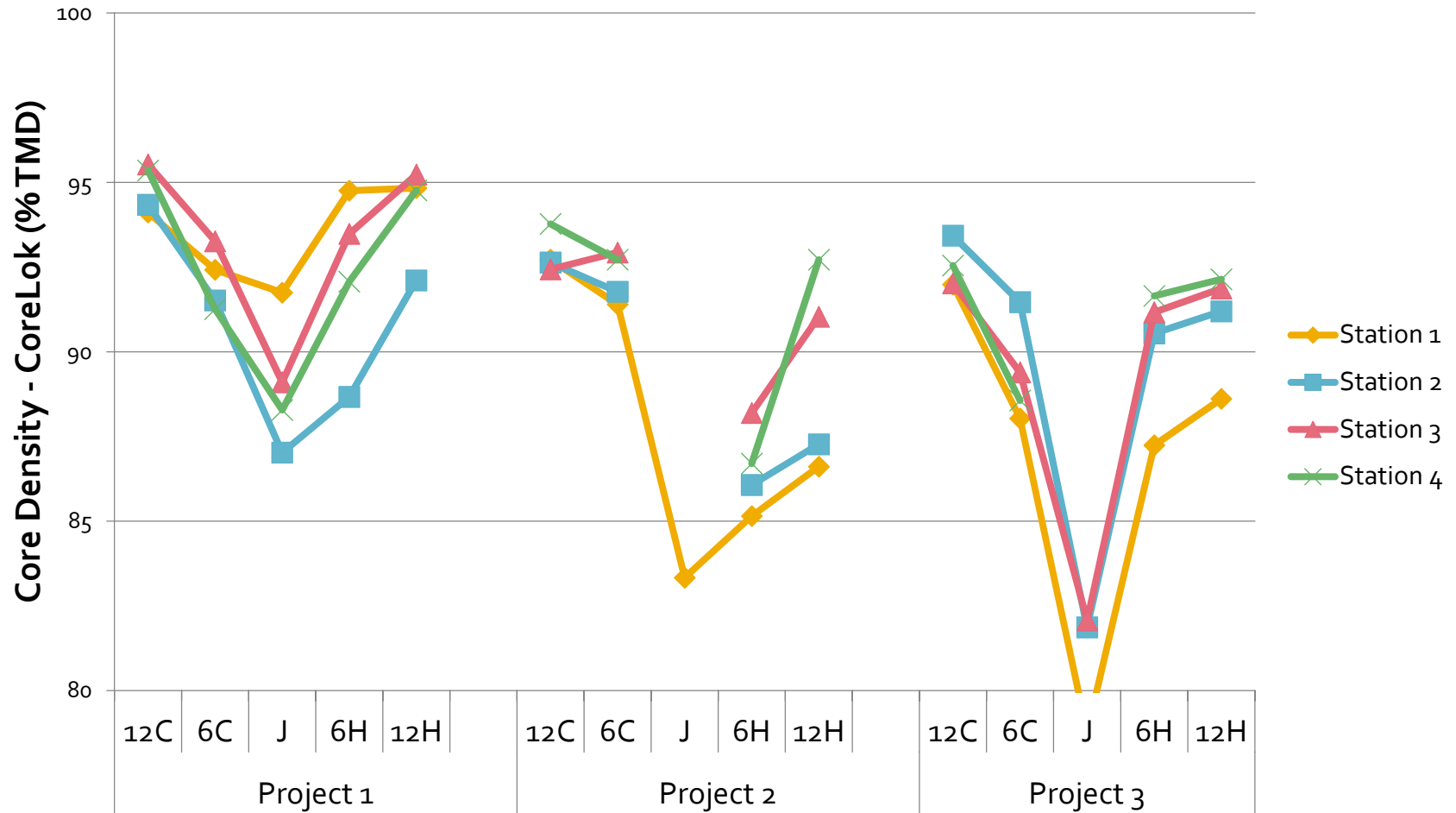
Nuclear Density



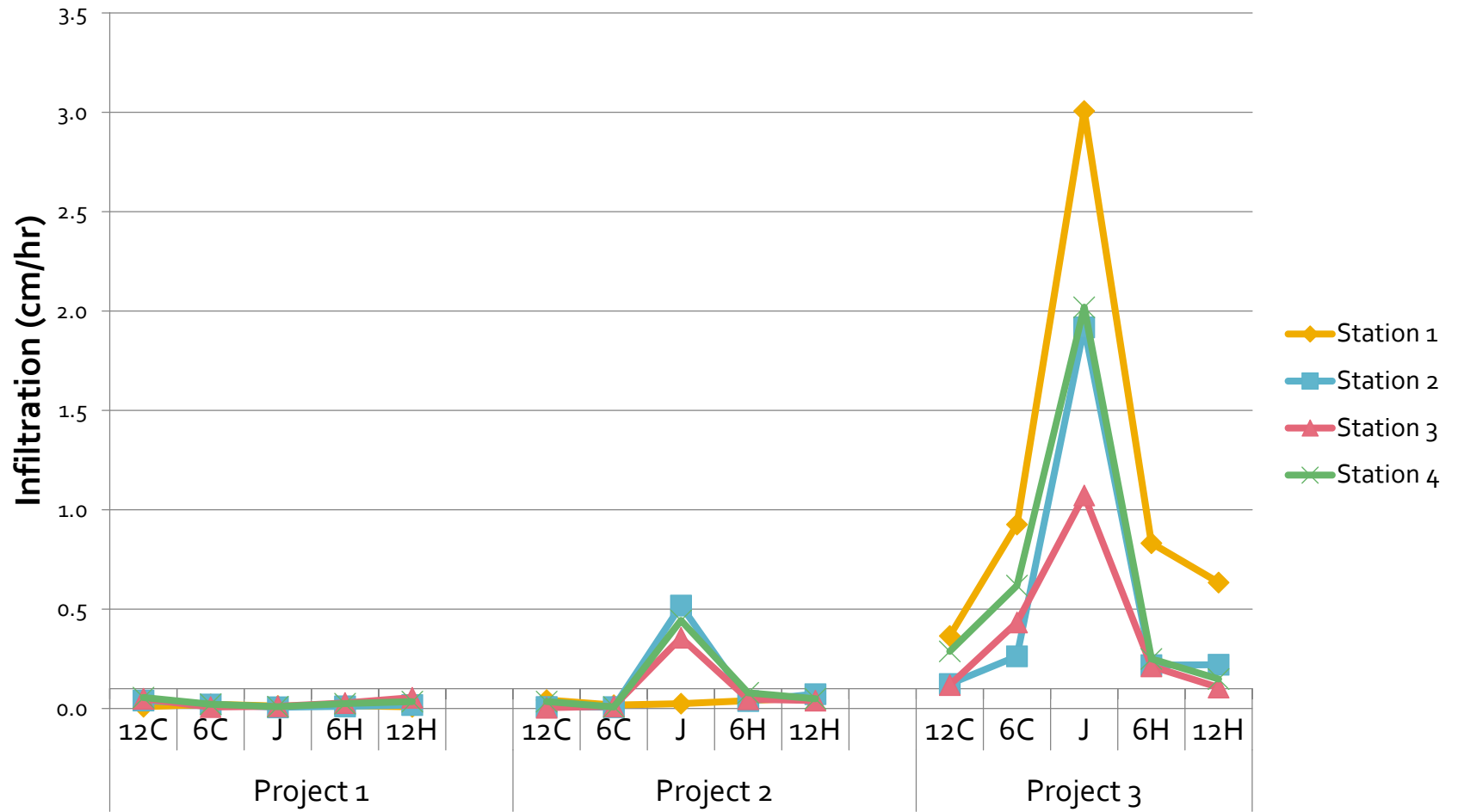
Core Density - SSD



Core Density - CoreLok



Infiltration



Discrimination / Accuracy

- Discrimination
 - Density – all methods significant
 - CoreLok provided greater discrimination than SSD
 - Permeability – significant
 - Joint \neq away from joint, successfully separated projects
- Accuracy
 - Density – most ranked correctly
 - CoreLok and SSD best
 - Nuclear – trouble consistently identifying marginal quality
 - Permeability - 2/3 ranked correctly
 - Gradation – approx. 1/2 ranked correctly

Phase II – Construction Techniques

- 2 Jobs
 - 3 testing locations at each section
- Joint Construction Techniques
 - 8 methods (sections) on each job
- Testing
 - Density (field and laboratory)
 - Field Permeability / Infiltration

Project Site #1



Project Site #2

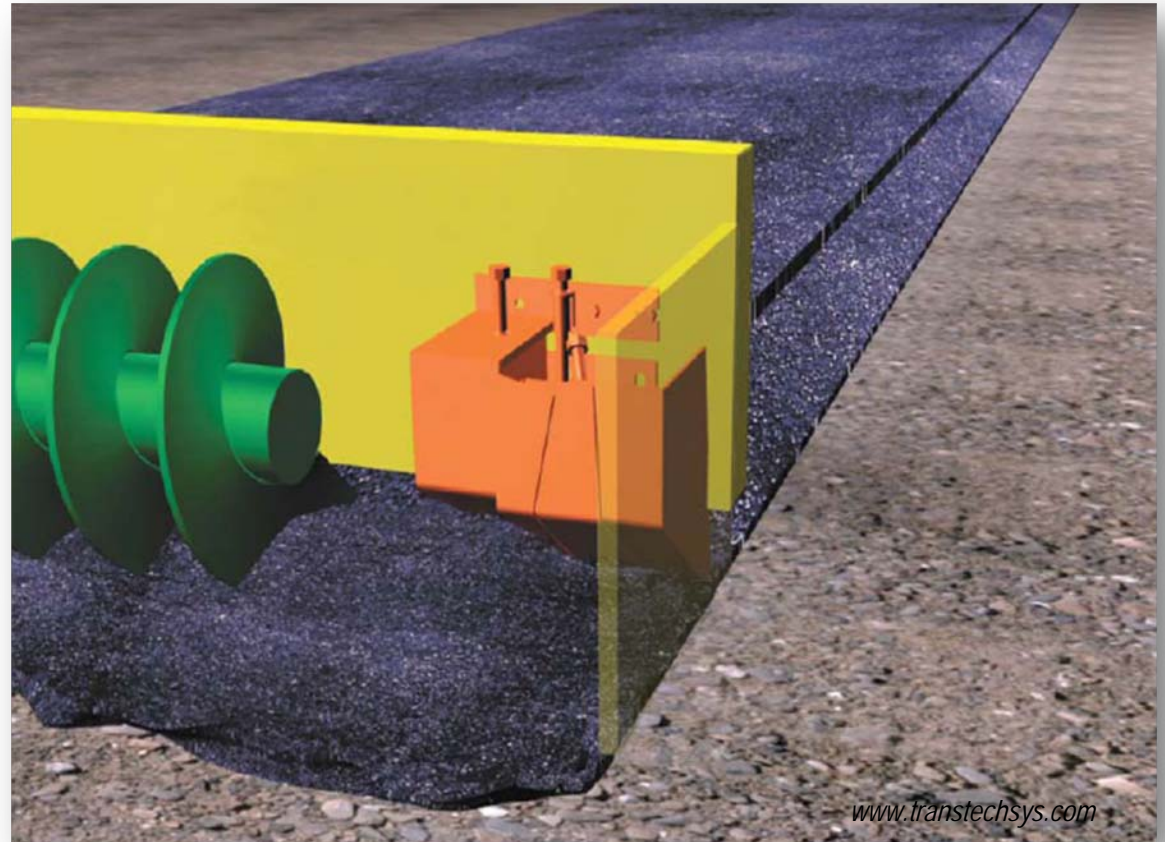


Project Site #2



Notched Wedge Joint Maker (NW)

- Overlap
- Safety Edge
- Aggregate Interlock



Notched Wedge (NW)



CrafCo Joint Adhesive (CF)

- Bond cold and hot side of joint
- Reduce permeability



CrafCo Joint Adhesive (CF)



JOINTBOND® (JB)

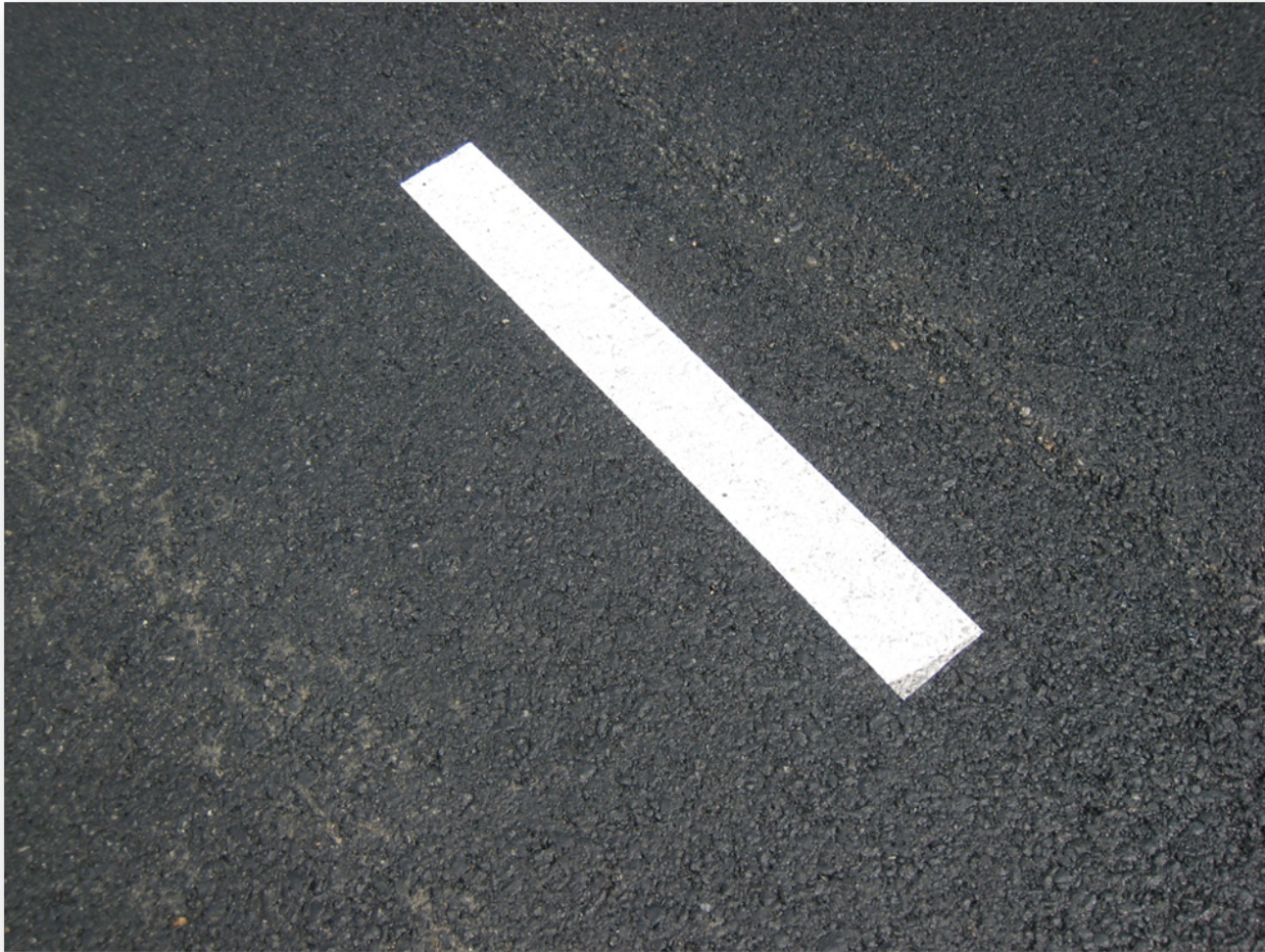
- Polymerized emulsion
- Penetrates surface
- Stabilizes joint



JOINTBOND® (JB)



JOINTBOND®



Joint Heater (JH)



Joint Heater (JH)

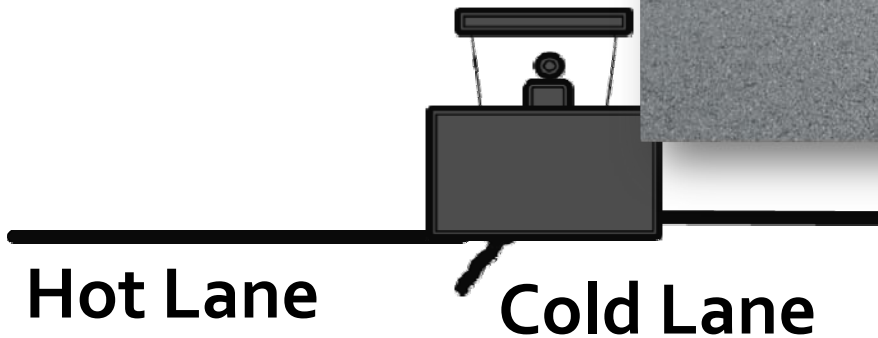


Tack Coat SS-1 (TC)

- Same as used for mainline paving operations



Hot Overlap (HO)



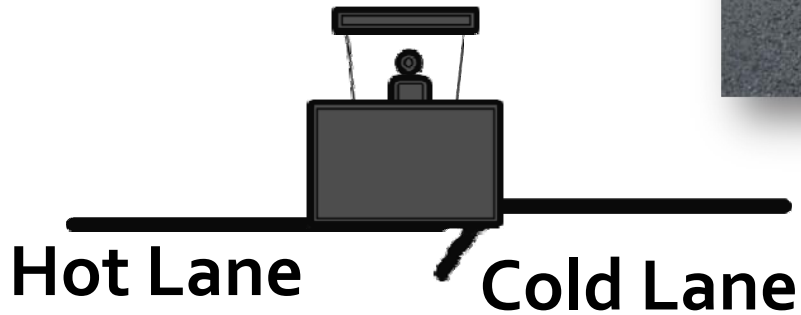
Hot Pinch (HP)



Hot Lane

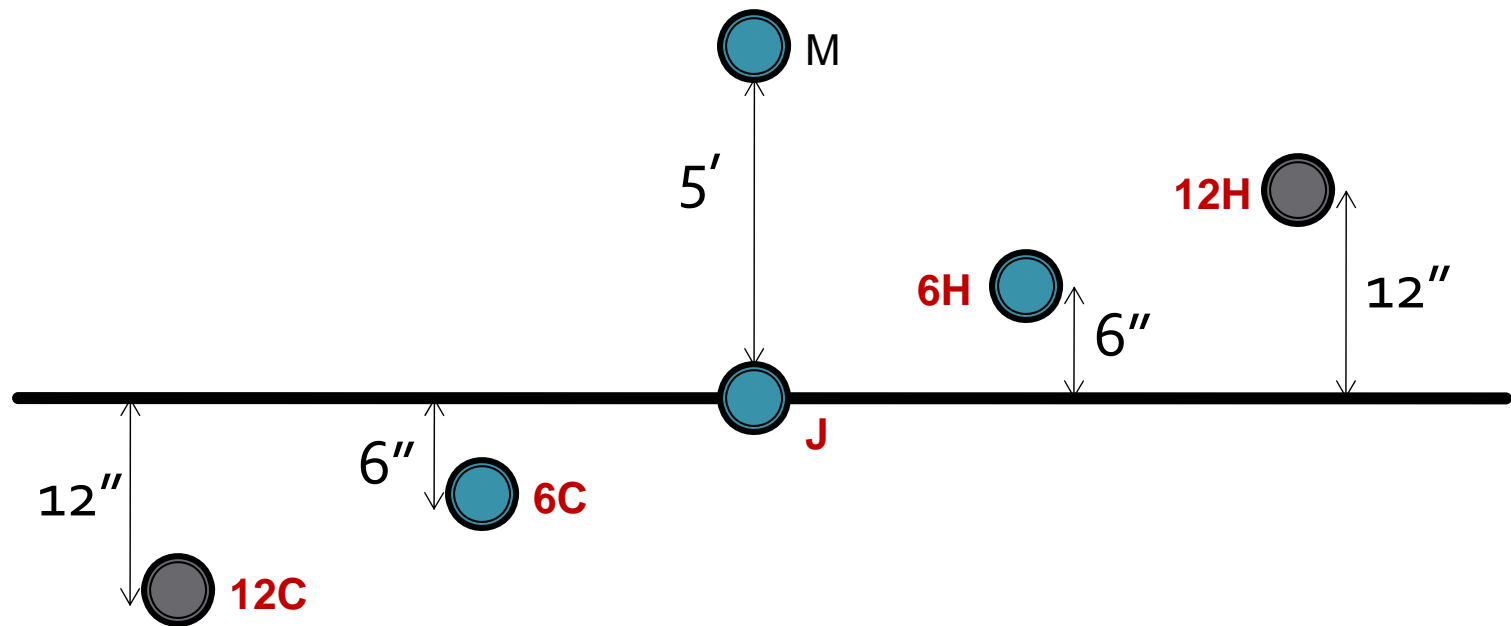
Cold Lane

Cold Roll (CR)

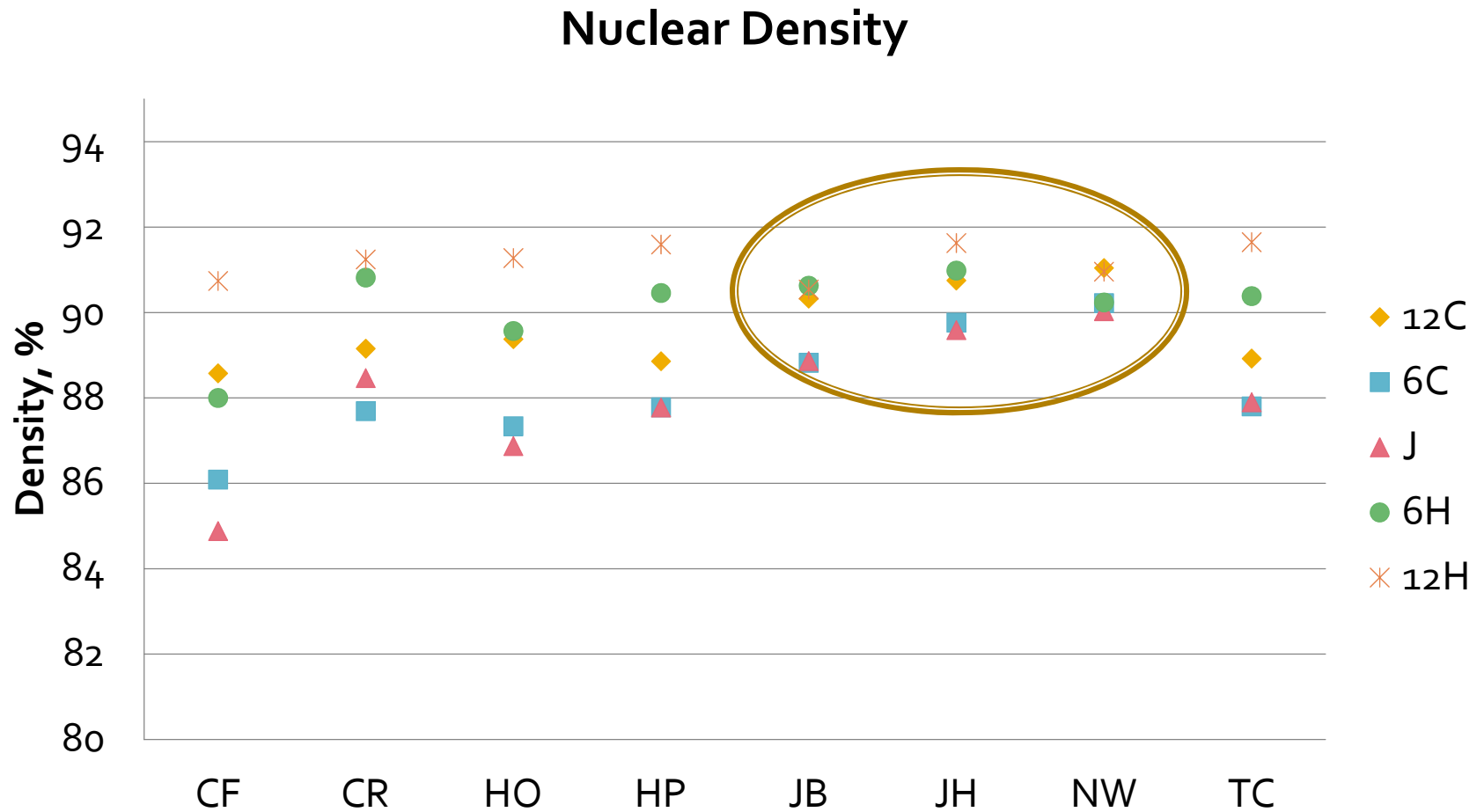


Testing Plan

- 2 Projects
 - 500 ft sections for each of 8 methods
 - 3 locations in each section

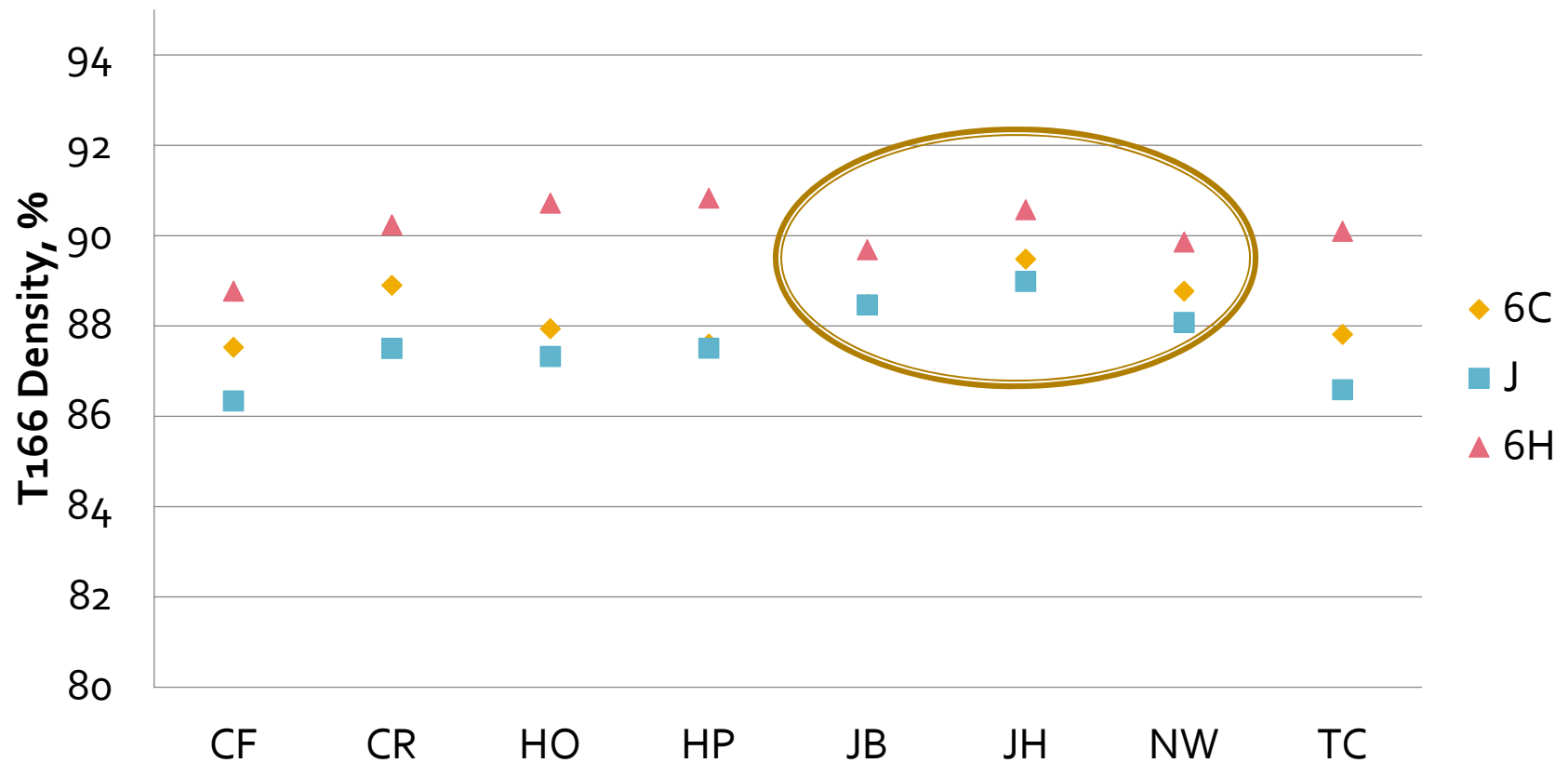


Distance from Joint



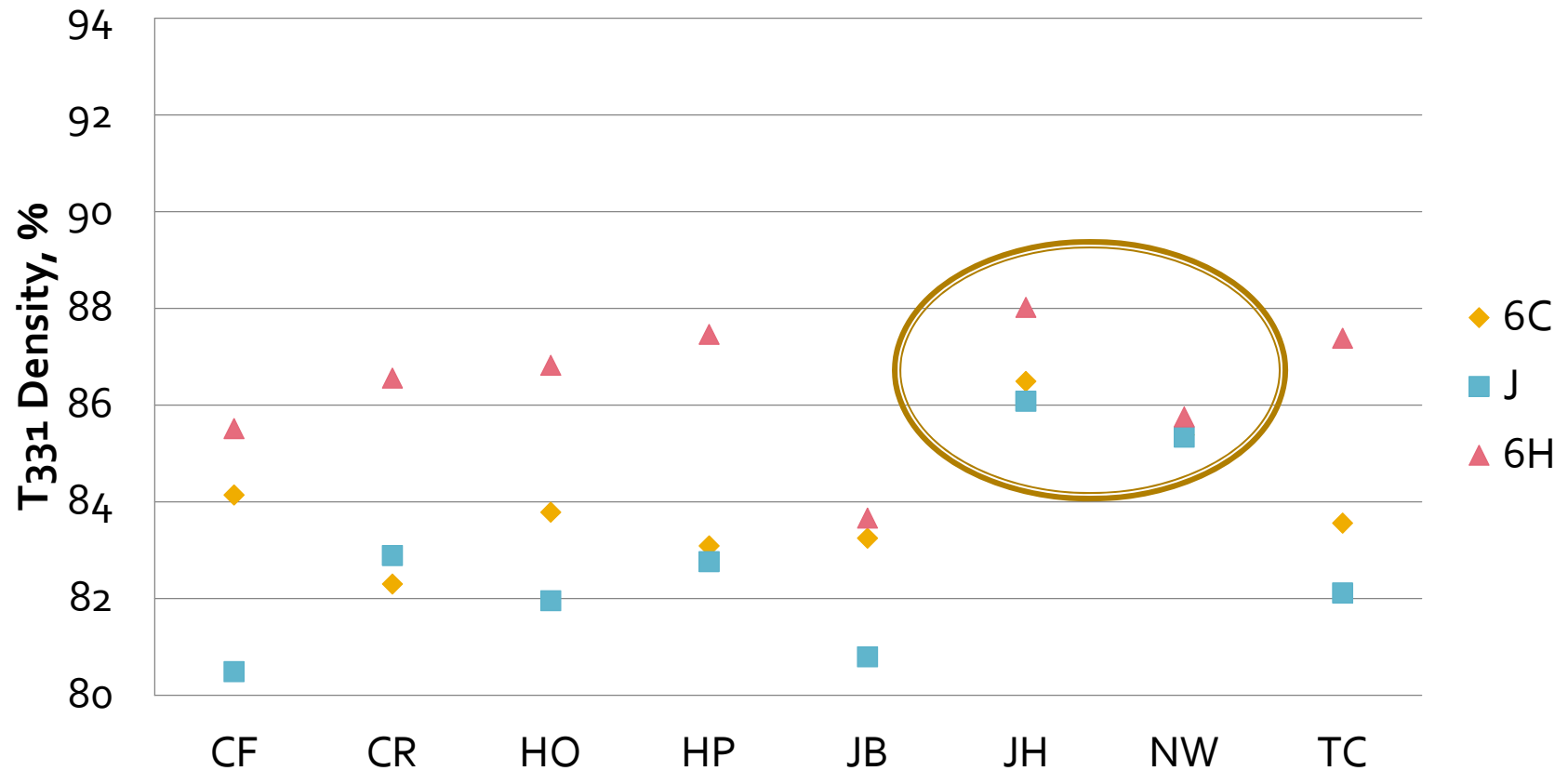
Distance from Joint

Core Density - T166

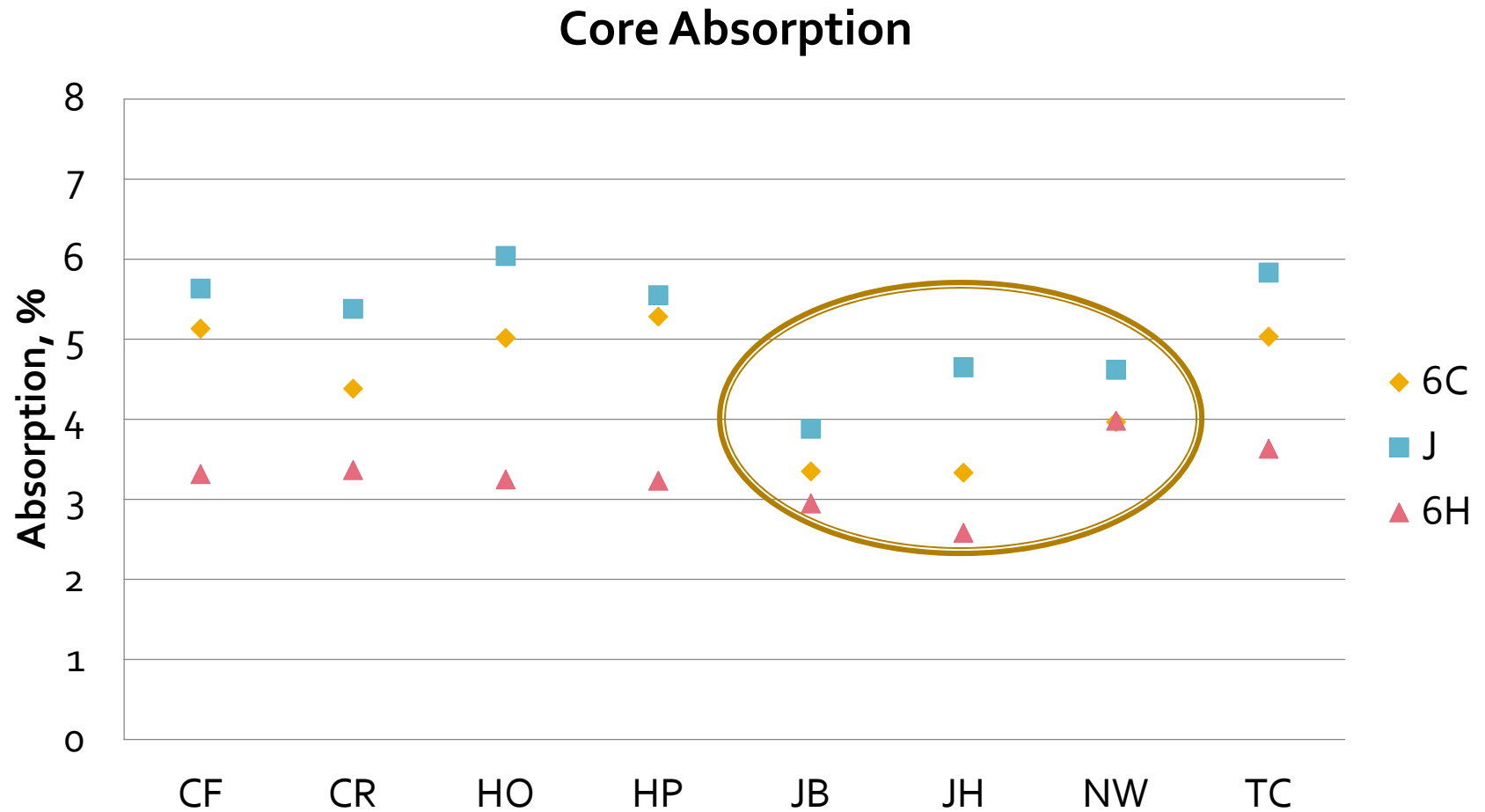


Distance from Joint

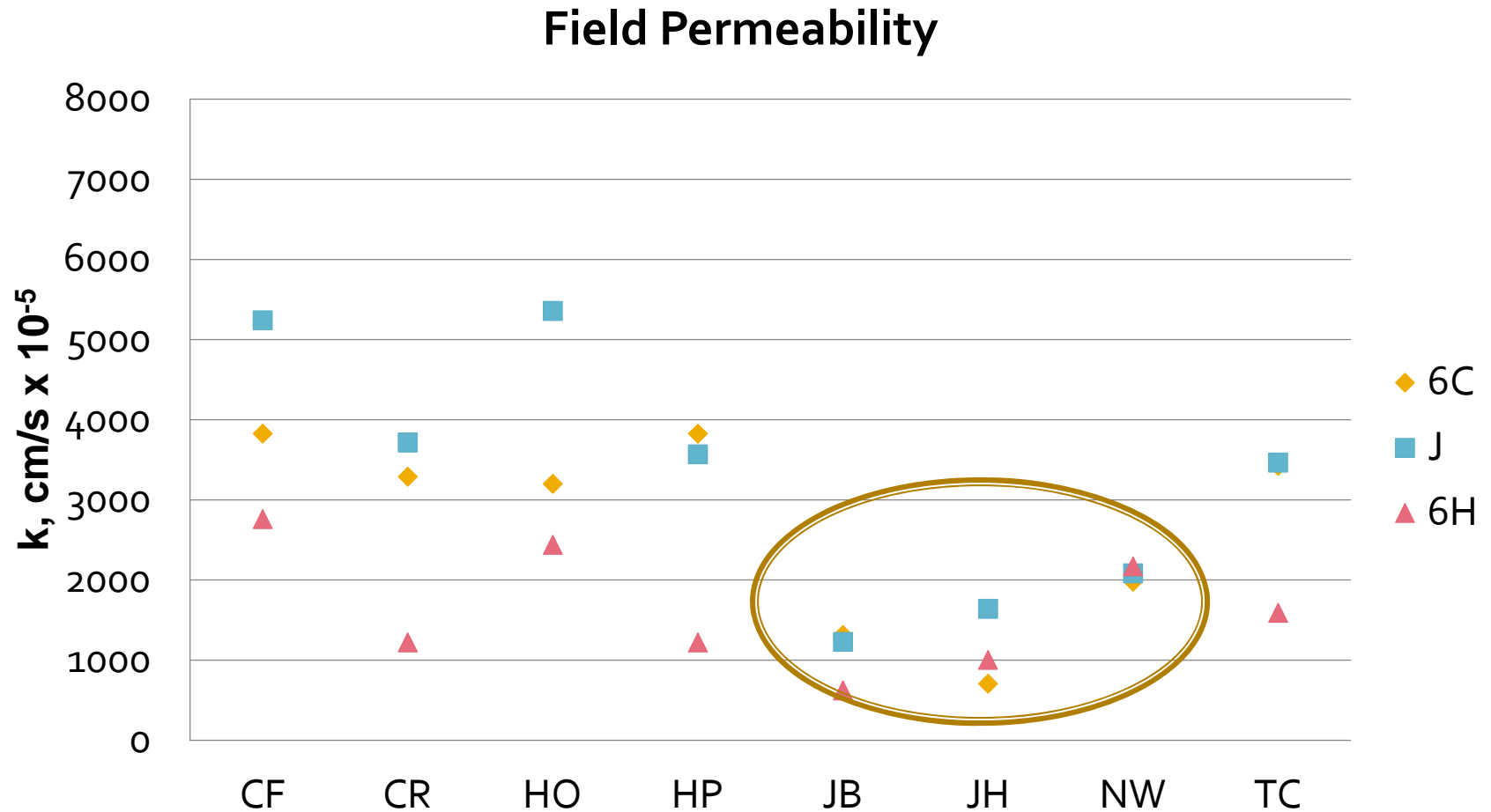
Core Density - T331



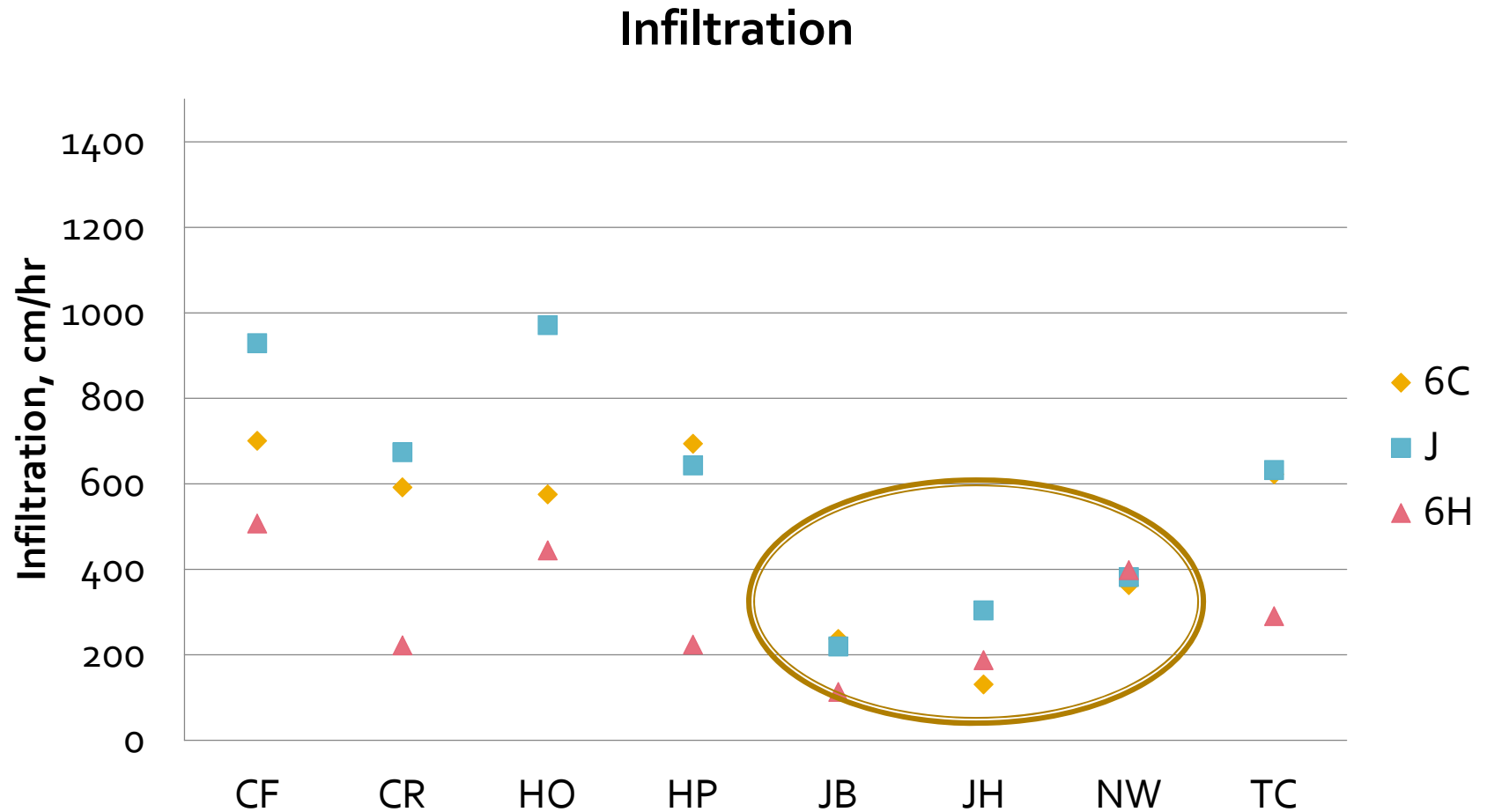
Distance from Joint



Distance from Joint



Distance from Joint

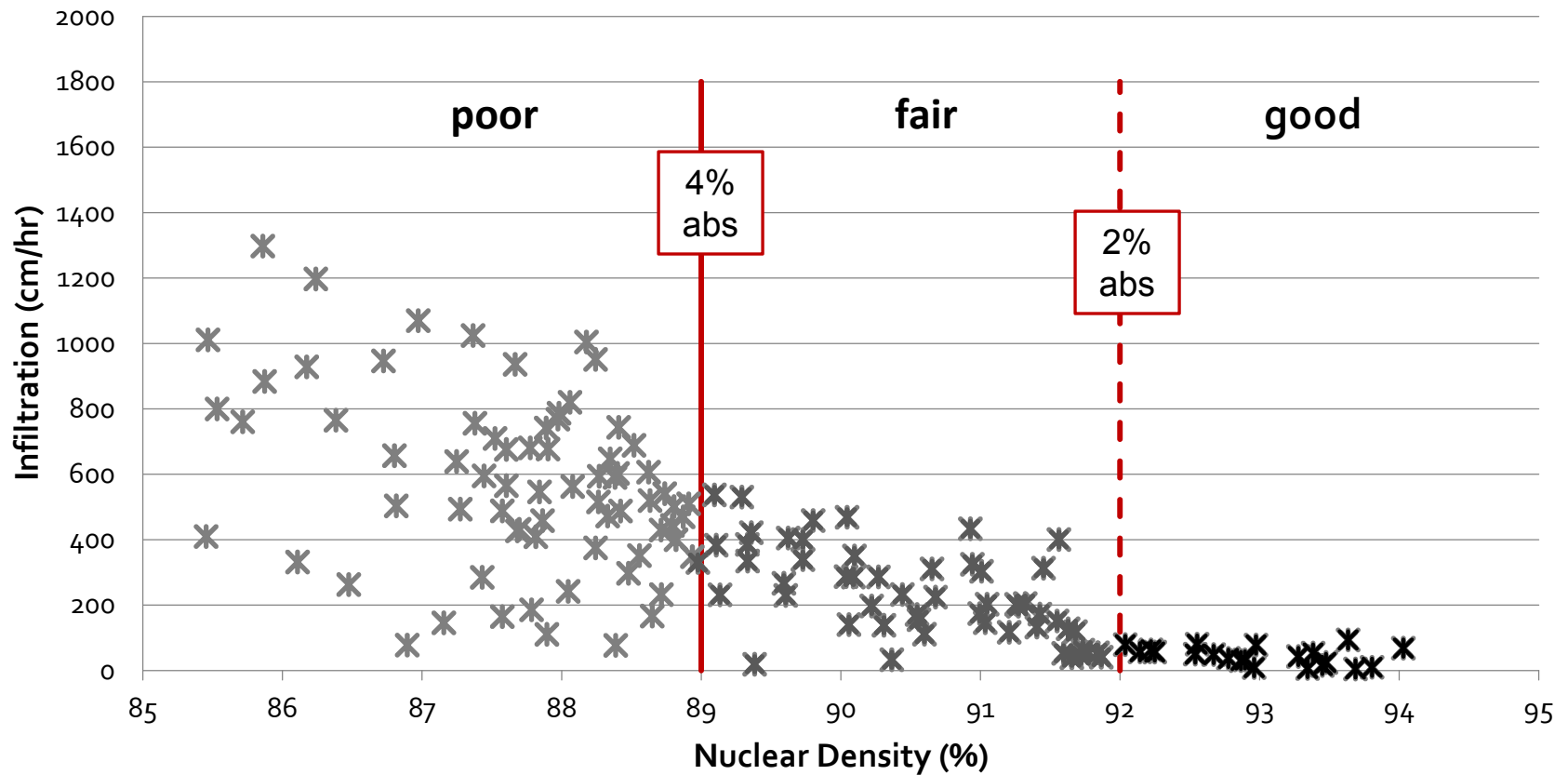


Statistically Speaking. . .

- Construction method – significant
- Distance from joint – significant
- Interaction – significant
 - Permeability / Infiltration
 - JB and JH – Low permeability at and away from the joint
 - Others – High permeability at joint, lower values away from the joint

Data Groupings

Nuclear Density vs. Infiltration



Conclusions

- Joint Heater

- Joint Bond

- Notched Wedge

Best Performers

- Rolling Patterns

- Tack Coat

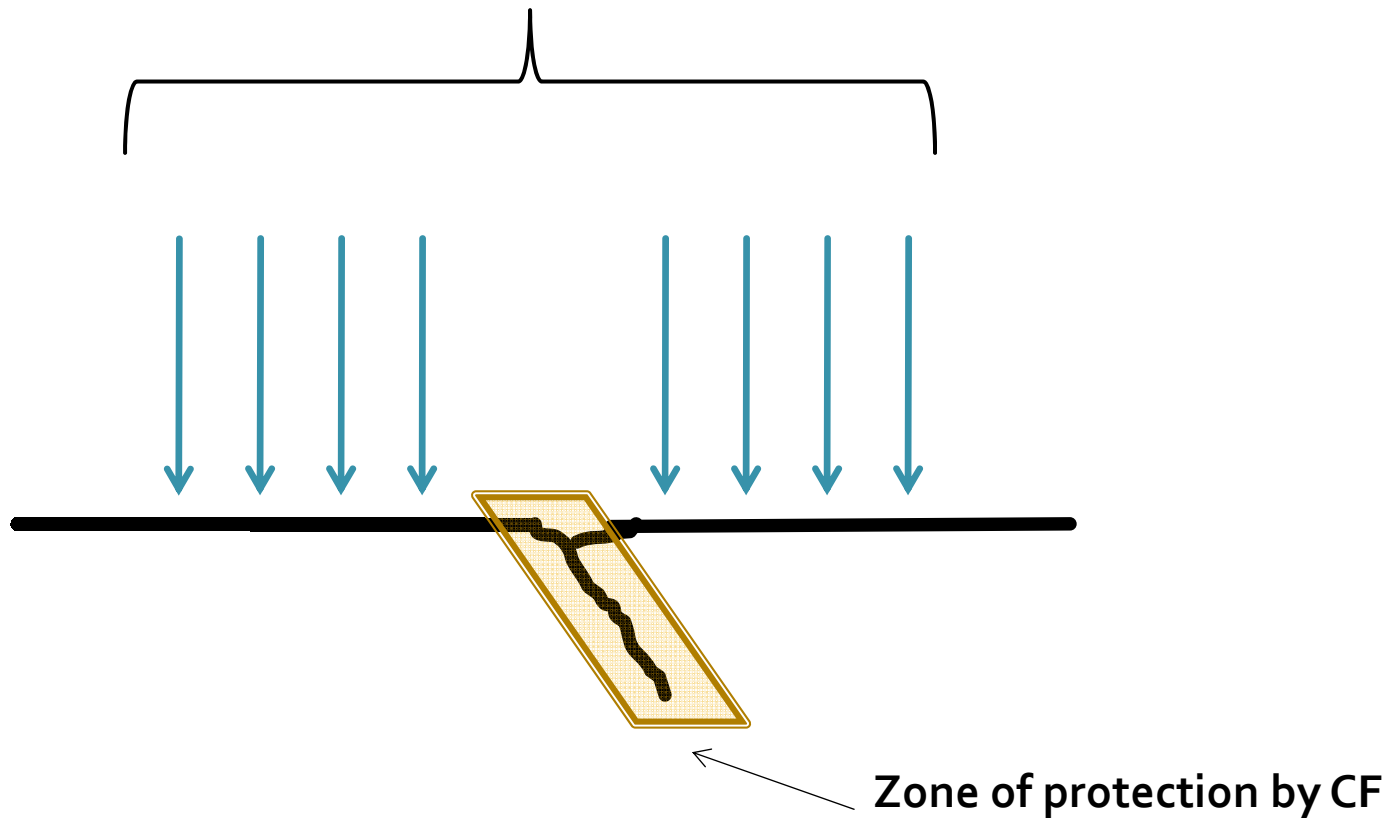
Not as successful

- Crafcoc

Unsuccessful

Joint Adhesive

Permeable area near joint



Recommendations

- Use Density as measure of quality
 - Already used for QC/QA efforts
- Joint Requirements
 - 89 percent minimum density
 - 4 percent maximum absorption
- Allow contractor to make informed decision regarding specific joint construction method
 - Emphasize the importance of good construction techniques

Acknowledgements

- Leela Bhupathiraju
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- Southern Star Materials, Inc.
- Pavement Technologies, Inc.

Thank You

