

**TTCC/NCC MINUTES September 23-25, 2008**  
**Park Plaza Hotel, Bloomington, Minnesota**

**Tuesday, September 23, 2008 TTCC**

**Topic: Premature Joint Deterioration**

1. Overview of the problem: Peter Taylor, National CP Tech Center

PowerPoint: 01 Joint Rot.pdf

2. Overview of relevant studies

- South Dakota project on deicing material, Larry Sutter, Michigan Tech  
PowerPoint: 02 Deleterious Effects of Deicer.pdf
- Slag, Deicer scaling project, Doug Hooton, University of Toronto  
PowerPoint: 03 Deicer PFS.pdf
- Sliver Spalling, Toy Poole, ERDC, Corps of Engineers  
PowerPoint: 04 Joint Damage Offutt Airforce Base.pdf
- Indiana research, Jan Olek, Purdue University  
PowerPoint: 05 Joint Deterioration in Indiana.pdf

3. Discussion of joint deterioration, Tom Van Dam, Applied Technologies

- Is it a joint issue? Or a concrete issue?
- Is the problem that the mix is too fine, therefore too much shrinkage?
- Problems seem to show up in joints first – water and deicers are being held there so focusing on joints may solve some of the problems. Structure of the joint is different than the center of the slab.
- Deterioration of concrete: physical deterioration or chemical deterioration?
- What about admixture – what has changed?
- Significant changes when air-void was determined. In 1970 water reducer began to be used for air-void? Has water reducer changed?
- Cementitious material changing all the time, but paving has not changed since 1950. Mixes behave differently, but they are still treated the same by the paver.
- Colorado airport has two adjacent lanes, one is falling apart the other is not, why?
- Suggestion: Many systems are just barely in balance, so very small changes are noticed in the pavement. Temperature alone can make the difference between acceptable or terrible. Either we need more robust mixes or systems that allows for more variance.
- Is this problem more critical for airports than roadways? Airport and highway applications are separate problems.
- Need to make sure there are good controls; mid-panel as well as joints need to be studied since there are comparable concretes not having problems. Conclusions are sometimes wrong because no good control group.
- There are problems with joints and not with the middle of the slab. What is in the middle of the slab is close to what was originally placed on the joints – so what are the differences?
- Look at joints that are rotting on one side but not on the other.
- Penn DOT: pavement less than 5 yrs old is requiring joint repairs already and Penn DOT could supply lots of data.
- Indiana did internal research to see what was wrong with some of their pavement. So far, solutions for immediate problems have been the result, no systematic changes have been instituted.
- Contractors have spent lots of time and efforts coring joints and sending them to petrography. Research should now look at these cores. The reports may not have all the initial information needed, but specific problems that have been identified could be reviewed in light of similar sites where coring has been done. Petrographers should be contacted regarding their test results.
- For the most part, deicing does not seem to be the total culprit; scaling issues from deicers seems to be the biggest problem.
- The deicer study that was done at Michigan Tech had unanimous agreement that further study was needed. Fundamental question regarding the long term life cycle implications.

- South Dakota DOT has been involved in a pooled fund project and has agreed to be the lead state on another de-icer pooled fund project. A panel made up of states participating in the PFS would be convened to direct the workplan for the research. If so desired, joint rot could be part of this study. South Dakota indicated one of the thrusts of this study will be to expand the field work, including more documentation
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- Record keeping is important to determine not only what has gone wrong, but also for determining why some pavement performs well.

Something new for TTCC – identify an issue of common important and then suggest a research project to address it.

#### 4. CP Road Map Mix Track

- Update on pooled fund: Peter Taylor
- Update on mix manual: Leif Wathne, ACPA
- Update on hydraulic permeameter project: Tommy Nantung, Indiana DOT  
PowerPoint: 07 Indiana DOT Permeability PFS Update
- National Training Update: Tom Cackler/Dale Harrington, CP Tech Center  
PowerPoint: 07a Training slides

#### 5. Calorimetry “show and tell”

- An overview: Larry Sutter/Peter Taylor  
PowerPoint: 08 Calorimetry Overview
- Isothermal calorimetry: Dile Holton, TA Instruments  
PowerPoint: 09 Isothermal Calorimetry
- Semi-adiabatic calorimeter: Tim Cost, Holcim  
PowerPoint: 10 Practical SAC

**Wednesday, September 24, 2008 NCC**

#### **Host State Program**

- 35W Bridge Construction
- Concrete Pavements: Mike Darter, U of MN Pavement Research Inst.  
PowerPoint: 11 Concrete Pavements World Wide Perspective.pdf
- MnDOT/ MnROAD Concrete Update: Bernard Izevbekhai, MnDOT  
PowerPoint: 12 MnDOT Concrete Update.pdf  
PowerPoint: 13 MnDOT Pervious Concrete Initiatives
- Mn ROAD field trip

Thursday, September 25, 2008

### State reports on joint design and performance

- Dan Johnston, South Dakota: Pooled Fund Study on premature joint deterioration
  - Michigan, Minnesota, Pennsylvania, California, and Iowa expressed interest
  - Study panel will dictate research direction. Phase 1 could be what to do with what is out there, and phase 2 what to do next. Solicitation will be out soon. NCC meetings will have report on the progress or this research.
- Tom Cackler: The CP Tech Center
  - The CP Tech Center has a lunch-hour T2 program. Dale Harrington has about 2 years worth of monthly hour long presentations on the IMCP manual and other topics. DOT and industry co-sponsor the program, the CP Tech Center supplies the training personnel for 1 hour of training on a specific need.. Material is available from CP Tech if other states are interested in using this model.
  - The CP Tech Center has developed a three-ring binder containing the T2 material produced by the Center. Binders were distributed to TTCC states and will be updated as reports and other T2 materials is produced.
- California: what other states are working on pre-cast panels? Texas, Missouri, and New York would be interested in a group email system to discuss pre-cast panels.
- John Staton recognized Doug Schwartz from MnDOT for his years of service not only to MnDOT but for his involvement and support of the TTCC and NCC. Doug retired today.

OKLAHOMA: Joint design and performance standards and practice on their website; new spec book should be on-line in the next year. Early entry sawing: if blade is going up rather than down, the tendency to spall the joint is greater, so look at rotation of the blade. At the end of pavement this upcut could blow out the edge.

INDIANA: Frequently maintenance is more reactive than preventative. Joint design and performance information on the website. How to better our pavement maintenance: focus on quality of concrete, specifically air-void system, improve density, permeability. Find out what air-void is presently in concrete – this may be the key to joints. Should pavements not be as strong? Should longitudinal joints not be as strong allowing them to open up a little more? Tie-bars? Change in how they are being used and not sure why. Looking to remove sealant from joints.

MISSOURI: Early entry sawing is not required, but some use it. Trying to include “bobsled” as optional. If joint is over ¼ inch, it is sealed in Missouri. Maintenance has not changed for a long time Joint information on website. New spec book sometime next year.

NORTH DAKOTA: Joints are sealed; most use silicone but up to the contractor. Three years ago ND did not allow early entry sawing; now specs leave it up to the contractor. But contractor has to replace uncontrolled cracking. Maintenance does not do maintenance on concrete. ND does not have a consistent practice on concrete maintenance – so some CPR is done, some joint replacing. Specs are on website. New printed spec book.

MINNESOTA: Maintenance is under contract. Anything wider than ¾ is resealed. It’s hard to find enough money for good maintenance. Higher gas tax, but less driving results in the same amount of available money. Can’t cut corners on CPR work – need contractor familiar with CPR and project manager that stays with it. As a test facility, MnROADS is a place to get people thinking. MnROAD found most moisture is coming in from shoulder and is suggesting better edge draining should be used.

GEORGIA: Maintenance handles small repairs, complete resealing projects, slabs. DOT maintenance forces are trained just like contractor forces – keeps everything uniform. Maintenance is good, however there are lots of roads that have exceed their life and need to be replaced. Specs are on website.

PENNSYLVANIA: Maintenance on concrete has been lax resulting in more overlays on concrete. That has changed in the last couple of years – more CPR now. Trying to educate our districts regarding CPR in conjunction with the ACPA chapter. Website is available.

KANSAS: Does some concrete maintenance. Joint deterioration seems to be related to air void; Kansas now uses air void analyzer extensively. Used it as spec the past four years – too early to see if it will have long term effect, but so far so good., [www.ksdot.org](http://www.ksdot.org) (specs and library)

Update on boil test: seems to suggest a pretty good correlation with rapid chloride. Seems to be giving us good information. Using KS aggregates almost exclusively, so it holds up with test results – there is an effect, but we’ve been able to “allow” for it since we use same aggregates.

SOUTH DAKOTA: All joints are sealed, early entry for transfer joints is allowed, no one is using it for longitudinal joints. Maintenance crews generally use asphalt to patch everything, but there is some CPR full depth or short repairs done. Specs are on website.

ILLINOIS: A lot of CRC is used. Not a lot of problems with joints. Specs on website.

LOUISIANA: Maintenance seems to be o.k. LA gets money every time there’s a major hurricane – this last time it went to bridges.

IOWA: Early entry sawing is allowed. It’s left up to contractors and most contractors do early entry for transverse joints; not really possible on longitudinal joints. Never enough money for maintenance. Iowa does not do re-sealing. Specs are on website

WISCONSIN: Does some CPR and sealing.

It appears a growing number of states do not seal - 6 of the states present do not seal or do a combination. Iowa has no-seal test sections. Katie Hall just finished a NCHRP project on joints and sealing. Overall recommendation seems to be not a lot of difference.

### **ACPA Database of State DOT Concrete Pavement Practices**

[http://www.pavement.com/Concrete\\_Pavement/Technical/State\\_Practices.asp](http://www.pavement.com/Concrete_Pavement/Technical/State_Practices.asp)

### **BUSINESS MEETING**

- Technical task force: are we striving for standardization? Michigan has reciprocity with Wisconsin so any testing results go to WI as well. Share testing results is good way to maximize testing.
- Dowel baskets. Michigan transfer standard is available, and also from NCC for states to use. General template. Revisiting that. Still about 30 specs out there still. Every DOT has some nuances making for about 30 different specs. Baskets are fabricated for each job – mid year CPA meeting asked if NCC could get a basket spec agreed upon. Even if only some parts of it can be standardized, fabricators could get some parts done.
- Also should look at Dowel bar optimization report.
- Standardization of dowel basket committee: Marie Masten, MnDOT; MiDOT tech; Glen Eader, Block (moline;Chicago) Chris Brakke, IaDOT; PennDOT; Steve Tritsch. Group will meet off-line and report back at spring meeting.

Suggestions for future meetings:

- Concrete structures (Steve Tritsch)
  - Durability of structures, differing specs for bridge decks, approaches, etc. High performance steel?
- Pavement Mix Design
- Drainage Systems
- Concrete Overlays: with price of asphalt, concrete overlays becomes an inviting alternative.
- Concrete pavement rehabilitation

Location:

Spring: Mid-March.

Host: Texas DOT

Site: San Antonio.

Program could include a steel mill tour, steel reinforced rolling mill