



## National Concrete Consortium

September 13-15, 2011 Minutes

Rapid City, South Dakota

Welcome – Darin Hodges (SD DOT-host state) and Brett Trautman (MoDOT), NCC Chair

Session PowerPoint presentations are available on the [TTCC/National Concrete Consortium web site](#).

### [FHWA's Sustainable Pavements TWG – Gina Ahlstrom \(FHWA\)](#)

#### Comments/questions:

Will it just look at the pavement layer or overall structure? Both.

Could you highlight how the FHWA Sustainable Pavements Program is related to MIT work as well as CP Tech Center's sustainable pavements efforts? We established a TWG and included MIT, CP Tech, asphalt people, and large number of friends. We wanted everyone at the same table to provide synergy and collaboration efforts. Everyone is invited to join the friends email list. Next meeting is Nov 2-3 in Atlanta. You will get the minutes if you're on the friends email list. As it evolves we may provide some of this information on the FHWA web site as well.

The rating system out of the Environments Office—is that process evolving? That effort, the “INVEST Program” – develop rating tool for states to get a handle on sustainability for a particular project. Developed fast and was based on green roads project. It is voluntary, but the goal is for states to put project specific information in there and benchmark where that project is on the sustainability scale. States were asked to submit projects that they thought were sustainable. They hope to validate the tool, and early next year they will issue a newer version of the tool. Contact Gina for the web site where you can enter comments on your projects. This is a more holistic approach: design is just one part.

How does INVEST program relate to ASCE and their program? INVEST is working with ASCE to coordinate efforts. Tom Cackler is on the TWG so if you want any comments relayed, send them to Tom. You can also use the NCC listserv and our web site where we can link to documents so that we can keep everyone informed. We want to keep this NCC group informed and involved.

Are there aggregate experts in the group? Yes, Vulcan is represented. We welcome others to get involved.

### [Life Cycle Assessment/Life Cycle Cost Analysis - Jon Ochsendorf \(MIT\)](#)

This presentation was a summary of a recently completed report available online here: <http://web.mit.edu/scshub>.

#### Comments/questions:

Will the product of the research be a software tool we can use? This has been a big topic of discussion. We are not developing a tool at this point but are building the engine for the tool. Hopefully in the future this will be developed.

Could you address incorporating the randomness of some of these input variables? When you look at any one of these numbers, there is an amount of scatter statistically within the parameters. For example, you could be working with very low carbon cement and it would not be in your favor to use a national average value. We've tried in the report to do a first pass at quantifying sensitivity to the variability in parameters. We are trying to be more rigorous on quantifying this to have an impact on conclusions practitioners can draw. We're proud of our progress over the last two years, and we now have a framework on which to build.

What about other impacts beyond CO2 and greenhouse gases? You can look at other impacts such as water, ecosystems, deforestation, etc. Our model has the capability right now to quantify those other impact categories, but for clarity we have focused first on carbon emissions because some agencies are being asked to reduce carbon emissions. A new tool would want to focus on all factors.

What is the “harvest point” where you do the analysis? We don’t assume virgin extraction for steel. Some of the earlier LCA’s did that. We try to determine recycled content. We assume a higher recycled content. We imagine that the fly ash comes to the project carbon free. We only consider the transport of the fly ash in the carbon expended. We don’t include mining, etc. We believe that fly ash credits belong in concrete industry not energy industry.

#### [RCA Technical Deployment Plan – Gina Ahlstrom \(FHWA\)](#)

##### Comments/questions:

What aspects of the technology deployment plan would help your state in advancing RCA use? Do you think it is a valuable area? What additional research is needed with respect to RCA?

You should absolutely put a team together. We have huge stockpiles of fresh concrete in my state, mostly used as base, because that is what has been viewed as most cost effective. Is cost effectiveness being considered? There is concrete of all types coming into concrete dumps. It is difficult to realize a cost benefit unless you recycle it on site and use as base rather than force it back into the concrete mix. We need better data. When we recycle it into the same road it doesn’t get recorded.

RAP has been successful because there is a cost benefit. Could we realize the same cost benefit with RCA?

The reason they use the RAP has nothing to do with aggregate. It has everything to do with the hot mix binder. The more rejuvenators you add is the sole reason they use it. In my state, contractors will pay \$30-\$70 per ton to take an extra inch or two of HMA off when they’re rehabilitating a low volume road. I don’t see RCA being worth as much.

It makes more sense to recycle it on site as base than to force it back into the mix.

One resource that is coming out is an article in the current edition of *Public Roads* that we put together based on a TRB aggregate availability workshop that was held last January. The USGS is collecting data. Anything we can do to recommend how they can get better data would be helpful. Europe is recycling higher amounts than the US but there is a limit to how much you can recycle. Transportation costs are a big factor.

How much comfort is there in this room if we don’t know the source? Maybe that’s the research we need. We need to control the quality and also there are big transportation issues. It doesn’t make sense to transport large distances.

There is a recent mandate in California, but it is difficult to use RCA when don’t have data/technology. It puts us in a difficult position.

Does anyone use recycled material as filler material? I believe it is an efficient way of reducing environmental impact. You can derive value by adding aggregate value, but you actually get workability. You get ball-bearing self-compacting materials. I think it is a worthwhile consideration.

Is there research to be done on RCA and D cracking susceptibility? Is it ASR susceptible? If you don’t know where the aggregate came from—especially from extraneous sources—you can get some really strange concrete with a lot of clay.

We did a lot of recycling concrete pavement as far back as 1980s in Wisconsin, using up to 100 percent coarse aggregate as recycled material and up to 30 percent of fine aggregate. While it can be done, in addition to economics, constructability needs to be considered. Typical absorption of coarse recycled aggregate was 3-5%; fine up to 8% or higher. Trying to control quality and uniformity is very difficult. The fine aggregate sand size is not ball bearings. It is very harsh material. It is much harder to work with. You can use 100 percent in base but you have waste when using in the mix.

Purdue University/Indiana is doing a field trial demo project and producing some guidelines. Nancy Whiting would like to talk in detail with whoever is interested.

Missouri is finding that a high potential for D cracking is showing up.

On your research, do you use a screening test like the 1260 and see how performs? Run routine tests that would be run on virgin aggregate. Strength test?

I think we want to move the use of RCA forward but there are challenges.

Is this a funded activity? Are you trying to assess if you should pursue it or is it already in the pipeline? We're trying to advance use and analyze best ways. We want feedback from this group. Should we take it forward? I want to get the core group back together and discuss if we should form an ETG.

This crushed concrete is not going into the landfills. It is being used. We're not taking as much virgin aggregate out of the earth. Economically makes sense to put back into the base. Hauling costs are prohibitive. We're trying to use everything we can and put it back into the jobsite.

There may be EPA regulations. We need to plan what we will do.

#### [NCC Technical Training Opportunities – Dale Harrington](#)

Part of the TTCC/NCC pooled fund is training. The training available for 2011/2012 is for a one day training workshop or seminar on the following topics:

1. IMCP Manual, Integrated Materials and Construction Practices for Concrete Pavement: You may select specific subjects within the manual for emphasis if that is of interest.
2. Concrete Pavement Preservation Training
3. Design and Construction of Concrete Overlays
4. Roller Compacted Concrete
5. Concrete Pavement Surface Characteristics
6. Pervious Concrete Design and Construction
7. Concrete Paving Mixture (COMPASS Software explanation)
8. Quality in Concrete Paving Process (Quality Assurance Training)
9. Early Age Cracking
10. Cement Based Integrated Pavement Solutions

If you want to take advantage of these training opportunities, contact Dale Harrington or the CP Tech Center and we will do what we can to meet your training needs. It is easy to set up.

Mark Snyder indicated that two dowel bar publications have been distributed in your packets: a tech brief and a guide on standardized dowel load transfer systems. Maria Masten hopes to have dowel bar standards recommendations available in the next month. If you have comments, please let Tom, Maria, or Mark know.

#### [Partial Depth Repair Guide - Dale Harrington \(CP Tech Center\)](#)

The committee hopes to put this book out later this fall. It will be available on the web site and there will be a limited number of hard copies available.

#### Comments/questions:

There is a lot of cement in there; we see a good number of shrinkage cracks.

#### **Research Updates**

#### [Pavement Vehicle Interaction – Franz Ulm \(MIT\)](#)

#### Comments/questions:

Could you comment on your comparative examples for high and low volume concrete and asphalt? The relationship reversed for the low volume roads. Could you clarify why? The reason for this relates to the MEPDG design. You don't get to an IRI; you have to renew. Embodied energy for low volume roads appears to be higher than with concrete. Calculate proportionately. You can significantly reduce embodied energy.

You referred to FHWA data several times. Is this the Long-Term Pavement Performance (LTPP) data? Yes. My associate is now analyzing the data. Hopefully at the next meeting I should be able to give you a statistical analysis of properties. It would be interesting to run tests on it. The slightest crack reduces velocity quite significantly.

Regarding the low volume road analysis, are you going to put in the added roughness? On low volume roads roughness is a big factor. Weight limits are controlled on high volume roads but often not on these low volume roads. For example,

governors grant exemptions for farm equipment and logging equipment. I am interested in seeing your results when you add the added roughness because asphalt will deteriorate quicker under heavy loads. That might only mean 150 trucks per day, but all are running 110,000 to 120,000 lb loads.

The next step will be working on that deflection, the IRI as output. What is the probability of occurrence of certain loads? States must consider this if it affects your IRI.

#### Pavement Foundations TPF 5(183) – David White (ISU-CEER)

This is an update on Pavement Foundations Project-TPF5 (183) a five-year study of which we are in year two. Non-uniformity affects stresses in the pavement. We need sites for category 5—new segmented test sections (need two-three for 2012 and two for 2013). Pavement foundation layer is about 56% of total cost.

What is controlling resilient modulus? Subgrade is. We have more evidence that sub layers are important. Base materials tend to be segregated. They need it to be flat and unsegregated.

#### Comments/questions:

Have you tested composite samples with geotextile separation? Yes, we did-- several times. We didn't have any conclusive outcome that showed significant difference. I don't think that means there isn't, but this was a limitation of our test. Material has no tensile restraint. We are rethinking how to test for that.

On the lay down for granular base, was segregated base put down with a lay down machine or blade spread? Seems like we need to use a lay down machine. This is pretty interesting. I observe that most material is placed in piles and then splayed out. Most don't use a lay down machine. Sometimes use machine guidance. For most part, we observed segregation shows up afterwards. Some states allow trim material to be put back and some don't.

Lay down works better than a blade. It is more uniform than a blade.

On your problem statement, what do you mean by "end of construction?" That means what you're going to pave on. You've built the foundation up.

With the subgrade in poor condition you won't solve the problem with the subbase totally, so is there a breakpoint where we know we need certain moisture or CBR value in the subgrade? Yes. There are rules of thumb on CBR. Found in sensitivity analysis, the stiffness of subgrade layer wasn't playing a role. Outcome from design said it didn't change things but if you have a variable CBR you have a situation that creates pavement stress.

RCA-didn't vary gradation. We want to vary the fines content and see what happens.

#### Joint Deterioration Interim Report– Tom Cackler, Peter Taylor, and Dale Harrington (CP Tech Center)

- [Overview](#)
- [Joint Deterioration Findings To Date](#)
- [Rehabilitation with Thin Overlays](#)
- Interim Joint Guide (distributed at the meeting)

TPF 5 (224) is ongoing with Iowa, Indiana, Michigan, Minnesota, New York, S Dakota, and Wisconsin. It is probably the most challenging problem we've tried to address at the Center. Builds on work that Larry Sutter did in S Dakota. We proposed fundamental study of air and permeability requirements. We have a proposal now in to the RMC Foundation for funding support.

We want three states that would work with us to build some sections—possibly in urban areas. Kansas has volunteered for the thin overlay. If interested, see Dale Harrington or Tom Cackler. We have funding through the RMC Foundation and would be willing to bring an expert team out for a workshop or meeting with agencies that are experiencing this problem—cities, counties, etc. We would provide some training to address this problem.

#### Comments/questions:

I've heard of a lot of old pavements that had performed well for 30 years but are now suddenly having joint issues. I suspect salt is the issue. We use more anti-icers prior to precipitation now, and the concrete is more able to absorb it. We started salt brining about that long ago. We're pouring this liquid into these joints now, and we used to go out with rock salt and

sand. We have to make concrete able to withstand its effects.

We can't change the salt brining because of safety concerns, so additional measures must be put in place on quality, joints, and drainage. You have to open it up and retrofit. Must have quality on the top.

[Pavement Management and Concrete Pavements \(PMS-Pavement Management Systems\)](#) – Larry Scofield

[Ternary Mixes Using High SCM's - Tyson Rupnow \(LaDOT\)](#)

Comments/questions:

This is a step in the right direction, but the long set times struck me. Systems were not optimized. Not sulfates, concrete mix as a whole. You cannot go into high replacement levels and still continue to use the regular type base. Our ready mix contractors have started mixing to determine these optimums. Our dosage rates for our admixtures were probably on the high side.

[Mix Track Update – Peter Taylor \(CP Tech Center\)](#)

Comments/questions:

Could you use this technology to get a reasonably accurate test of water/cement ratio? No. I suspect the microwave is a better way to go. It was the water that was fouling me up. I tried to include water in the calculations. You've also got water in the aggregate.

[Illinois Tollways Approach to Sustainable Pavements – Steven Gillen \(IL Tollways\)](#)

Comments/questions:

The crushers you used on the west side toll road were a really slick operation. Very impressive construction. Minimized haul time. With a user-fee system, you can't cut traffic down.

Not familiar with RAP or FRAP (fractionated RAP) – fractionated means sized. The asphalt industry can't use the coarse aggregate again that we could use. Tons of this stuff is available. Is anyone else using it? Florida has looked into it and Idaho did a minor study. Jeff Roesler did a big study at the University of Illinois. Europe has used it in two-lift, Austria in particular.

[Update on Use of Fly Ash - Ben Franklin \(Headwaters\)](#)

[Concrete Delivery Time Update - Maria Masten \(MN DOT\)](#)

Comments/questions:

What was the condition of the concrete in lab and in field? The concrete was soft and sitting in lab; always turning in the field. Spacing data is there.

Even if you have other factors right, bad aggregate supersedes those other factors. Minnesota has good aggregate.

Could you elaborate on what occurs at the remix? They revved it up. In the lab it just sat. They just mix 5 minutes more.

Why does Minnesota limit fly ash to 20 percent? Minnesota is conservative. In concrete paving we allow 30 percent. It's the way we've always done things and we're not comfortable going beyond that. It is really to save contractors from themselves. In a recent water/cement ratio pilot project—where it was 4 or 5 maximum - they were giving us 3.9's. Caused struggling in the field. We have a mentality shift to get through to get to that higher substitution. All parties need to work together.

#### **MEPDG Implementation: Successes and Challenges**

- [Overview of FHWA/AASHTO Implementation Efforts - Gary Crawford \(FHWA\)](#)

Summarized work done and information contained in the FHWA white paper titled, 'Implementing the DARWin-ME: Pavement Design Software to Support the MEPDG.' Will have reports available on web site in next six weeks.

[www.trb.org/mepdg](http://www.trb.org/mepdg) - free version

[www.fhwa.dot.gov/pavement](http://www.fhwa.dot.gov/pavement) - will post documents here

- [Understanding the MEPDG - Jim Mack \(Cemex\)](#)

Comments/questions:

Does this program lend itself to docks and ports? It does not; loading and traffic are different.

Do you re-run DARWin-ME just before construction once you know what the materials are? We have done some but not a lot. It would be good to do.

Is there applicability to lower-volume pavements, streets, and roads? I do not see big impacts on them with DARWin-ME, but there are big impacts for high-volume roads such as interstates.

- State experiences:
  - [Sensitivity Analysis - Tommy Nantung \(IN DOT\)](#)
  - [MEPDG PCC Local Calibration-Missouri - Brett Trautman \(MO DOT\)](#) - Acknowledgement to John Donahue who developed the presentation.

Comments/questions:

Do you have a pay adjustment for specifications for IRI? We have a ride spec. Going from PI to IRI.

Used 1.5% cracking for life cycle costs. Then diamond grind. This number was established by industry.

Are you confident that you are getting equivalent designs? We believe we are. If you do alternate bidding you have to get both asphalt and concrete industries in the room.

Pavement Foundation Considerations for DARWin-ME – David White (ISU)

The reality is that calculations are based on k value. Resilient modulus and sheer strength or coarse aggregate. Why are we using resilient modulus upfront? Creates commonality, but it is really being used to calculate other input values then used to calculate thickness. Why don't we just directly measure factors that are needed? Results for resilient modulus tests are inconsistent.

Geosynthetics (geogrids, geotextiles, and geocomposites) attack the mechanisms that degrade pavements. They separate, stabilize, help maintain original design, and improve drainage.

Base thickness under PCC—check profile before and after. Cost benefit. If you can maintain the integrity of the base material it would be optimum, but can you afford it? Separation material \$1.50. The payoff is substantial using separation materials.

Comments/questions:

The way a geogrid, for example, is manufactured has significant impact on performance. Full scale testing will indicate what performs better. Dr. White is looking forward to results from a current study.

Geosynthetics are proposed to be used as a bond breaker in California as one option along with AC bond breaker. Performance or application information available? Cackler will provide Parvini with this information.

Observation of performance assessment of chemically stabilized pavement subgrades.

Please make notes and give input to Dr. White on the sheet he provided.

[Committee Report on DOT Technical Support - Brett Trautman \(MO DOT\)](#)

Comments/questions:

The "train the trainer" method works very well.

*MCO Testing Guide* has been re-printed and is available from FHWA (Jim Grove) or CP Tech Center.

SCMs and controlling CO2 are the things of the future. Cement requirements are changing, and we need to be prepared.

Louisiana just purchased a NATLASS machine and looks forward to being able to share results with this group. There is interest in RCC in the asphalt industry as well.

Let us know if you need trainings on other topics.

We looked at costs for recent meetings and about half of your TTCC dues are used to fund your travel to these meetings. The other half has been used to address tech transfer needs (such as the dowel guide). We estimate there is about \$50K per year that we could invest in technical products. The idea we are offering is to work with this group on developing a mechanism to assist with training needs on specifications and practices on an ongoing basis. We could work with you to develop training for your states. We want to make it as easy as possible for the states to deal with specifications and practices and would update information on a continuing basis to stay current. If you like this concept and want to spend the funds that way, we would need an official resolution to do this so that we can work with the Iowa DOT on a specific contract for this.

The TTCC is a five-year pooled fund. Sandra Larson (IaDOT) has requested that it be a continuous pooled fund. It has been very slow in being posted on the pooled fund web site. Was the last meeting covered by pooled fund? We will check with her and send a note out on the status.

Motion: The NCC authorizes the Iowa DOT as TTCC pooled fund administrator to contract with the CP Tech Center for a scope of services to address the recommendations at a level of \$50,000 annually. This level of funding is sustainable for technology transfer given the historical cost of member travel support and the current membership level. Masten moved. Rupnow seconded. Vote: unanimous approval.

#### TRB Problem Statements – Steve Tritsch (CMC Americas)

It was previously decided that this group should make proposals to the AASHTO subcommittees. Two statements will be brought to the TTCC/NCC spring meeting and we will choose one or two to move forward to AASHTO subcommittees. This group has a lot of credibility, and we believe AASHTO will move forward with what this group recommends. CP Tech will send the statements out to this group prior to the spring meeting for consideration. Anyone here can make changes to the problem statements. We want to make sure it is well vetted by NC2 so that changes won't be necessary when it gets to the AASHTO subcommittee.

#### Comments/questions:

A concern is the red tape associated with the process. A certain amount of turf is being protected. State representatives should contact your peers on the subcommittee on materials and explain the need for the research prior to the meeting next August in Mississippi.

We ask states in our region to endorse it first. Then it goes to the AASHTO SCOR. Need support from AASHTO RAC.

There are TRB committees on durability (Tyson Rupnow chairs), design (Dulce Feldman chairs), and construction (Roger Schmitt chairs), as well as a research and emerging technology committee.

We have had difficulty getting things moved forward in the TRB committees. We need more ground support.

Follow-up on recommended changes to AASHTO 253 and 254 procedures as a result of the dowel guide recommendations: a state does not have to bring the changes forward to AASHTO spec's so Tritsch will draft something on 253 and 254 for us to see at the spring meeting and the NCC members can be the mechanism to forward the recommended changes to AASHTO.

State Reports on MEPDG Implementation – Individual reports on the following questions are available on the web site.

1. Summarize your state's status as far as MEPDG Implementation.
2. What efforts have been made toward local calibration?
3. What additional information/support would assist your state with implementation?

#### Comments/questions:

When asked, fewer states thought the asphalt side is good on MEPDG than the concrete side. Mack thinks it improves as you use it.

Is it traffic volume that is the issue or is it the makeup? If you get the traffic volume right you are lucky because it is very hard to predict. AASHTO 93 is more conservative. Gives you almost an extra inch of concrete.

You have to be very careful with the traffic factor because it is not only volume, but loads and timing too. The most dangerous time for concrete is truck traffic at night when pavement is curling up. For asphalt, it is during the day when temperature is up. If you use the default factors from MEPDG, be very careful because it depends on the time of day. When truck traffic peaks is a big factor.

CTE was mentioned several times by states. If interested in data for your state, contact Rick Meininger (FHWA).

This is a complicated program, and there is only one company with a key to the black box. Can one company peer review it? Does anyone know what the site factors really are? Doesn't think we really have the ability to peer review this thing because states don't have the time to put into working out these models.

NCHRP sensitivity report will be out soon.

Other comments/issues for consideration by the group:

Everyone is doing more overlays now. A six-inch white topping was just done in Minnesota. They nailed the baskets down on one side and didn't in the other lane. Seventy-five to eight-five percent of them did not stay anchored down. How can we better anchor our baskets?

In Michigan, with concrete overlays, we are batching by weight but paying by volume. FHWA made clear that we would be paying off of in-place quantities. We've been doing investigating with digital terrain models before and after. We think this is showing a lot of promise to mathematically calculate in-place volumes.

Missouri is using LIDAR (laser). Takes a lot of manpower and effort but seems to work well.

Minnesota has always paid by square yard or cubic yard but switched a couple of years ago. For overlays we survey the interlayer after it is in place and then recalculate quantity. We pay up to 102% of that quantity based on the ticket so we do pay off the tickets.

North Carolina may be interested in hosting the spring 2013 meeting. The 2012 meetings will be in Oklahoma City and Seattle.

The meeting adjourned. The roster of attendees is listed below.

## Fall 2011 TTCC-National Concrete Consortium Attendees - September 13-15, 2011

First	Last	Organization	City	ST	Email	Phone
Wayne	Adaska	Portland Cement Association	Skokie	IL	<a href="mailto:wadaska@cement.org">wadaska@cement.org</a>	847 972 9056
Gina	Ahlstrom	FHWA	Washington	DC	<a href="mailto:gina.ahlstrom@dot.gov">gina.ahlstrom@dot.gov</a>	202 366 4612
Ahmad	Ardani	FHWA	McLean	VA	<a href="mailto:ahmad.ardani@dot.gov">ahmad.ardani@dot.gov</a>	202 493 3422
Dobber	Bingamon	Holcim	Ada	OK	<a href="mailto:dobber.bingamon@holcim.com">dobber.bingamon@holcim.com</a>	580 421 2581
Aaron	Breyfogle	S Dakota DOT	Pierre	SD	<a href="mailto:aaron.breyfogle@state.sd.us">aaron.breyfogle@state.sd.us</a>	605 773 3871
Doug	Burns	PCA	Jordan	MN	<a href="mailto:dburns@cement.org">dburns@cement.org</a>	952 492 2701
Brent	Burwell	OK/AR Chapter, ACPA	Oklahoma City	OK	<a href="mailto:bburwell@pavement.com">bburwell@pavement.com</a>	405 767 5100
Mike	Byers	Indiana ACPA	Indianapolis	IN	<a href="mailto:mbyers@pavement.com">mbyers@pavement.com</a>	317 694 8792
Tom	Cackler	National CP Tech Center	Ames	IA	<a href="mailto:tcackler@iastate.edu">tcackler@iastate.edu</a>	515 294 3230
Gary	Crawford	FHWA	Washington	DC	<a href="mailto:gary.crawford@dot.gov">gary.crawford@dot.gov</a>	202 366 1286
Dan	Dawood	The Transtec Group	Austin	TX	<a href="mailto:dawood@thetranstecgroup.com">dawood@thetranstecgroup.com</a>	717 829 9816
Dan	DeGraaf	Michigan Concrete Association	Okemos	MI	<a href="mailto:ddegraaf@miconcrete.net">ddegraaf@miconcrete.net</a>	517 347 5632
Douglas	Dirks	Illinois DOT	Springfield	IL	<a href="mailto:Douglas.Dirks@illinois.gov">Douglas.Dirks@illinois.gov</a>	217 782 7208
Larry	Engbrecht	SD Chapter, ACPA	Pierre	SD	<a href="mailto:larrye.acpa@mncomm.com">larrye.acpa@mncomm.com</a>	605 945 0572
Joe	Feller	S Dakota DOT	Pierre	SD	<a href="mailto:joe.feller@state.sd.us">joe.feller@state.sd.us</a>	605 773 3401
Tony	Fiorato	Slag Cement Association	Glenview	IL	<a href="mailto:tony@slagcement.org">tony@slagcement.org</a>	847 977 6920
Tom	Fitzwater	PNA Construction Technologies	Atlanta	GA	<a href="mailto:tom@pna-inc.com">tom@pna-inc.com</a>	309 750 1534
John	Foster	S Dakota DOT	Pierre	SD	<a href="mailto:john.foster@state.sd.us">john.foster@state.sd.us</a>	605773 6234
John	Fowler	Florida DOT	Tallahassee	FL	<a href="mailto:john.fowler@dot.state.fl.us">john.fowler@dot.state.fl.us</a>	850 414 4373
Ben	Franklin	Headwaters Resources	Searcy	AR	<a href="mailto:bfranklin@headwaters.com">bfranklin@headwaters.com</a>	314 974 5095
Julie	Garbini	RMC Research & Educ Fndtn	Silver Spring	MD	<a href="mailto:jgarbini@rmc-foundation.org">jgarbini@rmc-foundation.org</a>	703 338 8647
Chet	Gibson	Lafarge Cement	Reston	VA	<a href="mailto:diane.cuva@lafarge-na.com">diane.cuva@lafarge-na.com</a>	703 480 6607
Steve	Gillen	Illinois Tollways			<a href="mailto:sgillen@getipass.com">sgillen@getipass.com</a>	630 241 6800
Andy	Gisi	Kansas DOT	Topeka	KS	<a href="mailto:agisi@ksdot.org">agisi@ksdot.org</a>	785 291 3844
Shannon	Golden	Alabama DOT	Montgomery	AL	<a href="mailto:goldens@dot.state.al.us">goldens@dot.state.al.us</a>	334 206 2410
Tom	Grannes	S Dakota DOT	Pierre	SD	<a href="mailto:tom.grannes@state.sd.us">tom.grannes@state.sd.us</a>	605 773 3428
Mark	Grazioli	Michigan DOT	Lansing	MI	<a href="mailto:GRAZIOLIM@michigan.gov">GRAZIOLIM@michigan.gov</a>	248 483 5164
Jim	Grove	FHWA	Ames, IA	IA	<a href="mailto:jim.grove@dot.gov">jim.grove@dot.gov</a>	515 294 5988
Todd	Hanson	Iowa DOT	Ames	IA	<a href="mailto:Todd.Hanson@dot.iowa.gov">Todd.Hanson@dot.iowa.gov</a>	515 239 1226
Dale	Harrington	National CP Tech Center	Ankeny	IA	<a href="mailto:dharrington@snyder-associates.com">dharrington@snyder-associates.com</a>	515 290 4014
Gill	Hedman	S Dakota DOT	Pierre	SD	<a href="mailto:gill.hedman@state.sd.us">gill.hedman@state.sd.us</a>	605 773 5503
James	Hicks	CeraTech, Inc.	Baltimore	MD	<a href="mailto:jim.hicks@ceratechinc.com">jim.hicks@ceratechinc.com</a>	936 697 2893
Darin	Hodges	S Dakota DOT	Pierre	SD	<a href="mailto:darin.hodges@state.sd.us">darin.hodges@state.sd.us</a>	605 773 7193
David	Howard	Koss Construction	Topeka	KS	<a href="mailto:dmh@kossconstruction.com">dmh@kossconstruction.com</a>	785 228 2928
Joseph	Huerta	FHWA	Baltimore	MD	<a href="mailto:joseph.huerta@dot.gov">joseph.huerta@dot.gov</a>	410 962 2298
Al	Innis	Holcim	Dundee	MI	<a href="mailto:al.innis@holcim.com">al.innis@holcim.com</a>	734 529 4183
Bruce	Jones	Northeast Solite Corporation	Richmond	VA	<a href="mailto:bjones@kenlite.com">bjones@kenlite.com</a>	804 262 4570
Robert	Kennedy	Koss Construction	Topeka	KS	<a href="mailto:rlk@kossconstruction.com">rlk@kossconstruction.com</a>	785 228 2928
Steve	Koser	Pennsylvania DOT	Harrisburg	PA	<a href="mailto:skoser@pa.gov">skoser@pa.gov</a>	717 787 6899
Patrick	Kropp	Colorado DOT	Denver	CO	<a href="mailto:Patrick.Kropp@dot.state.co.us">Patrick.Kropp@dot.state.co.us</a>	303 398 6541
Todd	LaTorella	MO/KS Chapter, ACPA	Overland Park	KS	<a href="mailto:ToddL@moksacpa.com">ToddL@moksacpa.com</a>	913 381 2251
Christopher	Leibrock	S Dakota DOT	Pierre	SD	<a href="mailto:christopher.leibrock@state.sd.us">christopher.leibrock@state.sd.us</a>	605 773 3199
James	Mack	CEMEX	Houston	TX	<a href="mailto:jamesw.mack@cemex.com">jamesw.mack@cemex.com</a>	713 722 6087
Maria	Masten	Minnesota DOT	Maplewood	MN	<a href="mailto:maria.masten@state.mn.us">maria.masten@state.mn.us</a>	651 334 4015
Kevin	McMullen	Wisconsin Concrete Pvmt Assoc.	Madison	WI	<a href="mailto:kmcmullen@wisconcrete.org">kmcmullen@wisconcrete.org</a>	608 209 0878
Rick	Meininger	FHWA-TFHRC	McLean	VA	<a href="mailto:Richard.Meininger@dot.gov">Richard.Meininger@dot.gov</a>	202 493 3191
John	Melander	Portland Cement Association	Skokie	IL	<a href="mailto:jmelander@cement.org">jmelander@cement.org</a>	847 972 9054
Andrew	Mergenmeier	FHWA	Baltimore	MD	<a href="mailto:andy.mergenmeier@dot.gov">andy.mergenmeier@dot.gov</a>	410 962 0091
Kevin	Merryman	Iowa DOT	Ames	IA	<a href="mailto:kevin.merryman@dot.iowa.gov">kevin.merryman@dot.iowa.gov</a>	515 239 1848
Tommy	Nantung	Indiana DOT	West Lafayette	IN	<a href="mailto:tnantung@indot.in.gov">tnantung@indot.in.gov</a>	765 463 1521
Andy	Naranjo	Texas DOT	Austin	TX	<a href="mailto:andy.naranjo@txdot.gov">andy.naranjo@txdot.gov</a>	512 506 5849
Charles	Nmai	BASF Corporation	Beachwood	OH	<a href="mailto:charles.nmai@basf.com">charles.nmai@basf.com</a>	216 839 7302
John	Ochsendorf	Massachusetts Inst. of Tech.	Cambridge	MA	<a href="mailto:jao@mit.edu">jao@mit.edu</a>	617 253 4087

James	Page	Georgia DOT	Forest Park	GA	<a href="mailto:jpage@dot.ga.gov">jpage@dot.ga.gov</a>	404 363 7513
Nigel	Parkes	PNA Construction Technologies	Atlanta	GA	<a href="mailto:nigel@pna-inc.com">nigel@pna-inc.com</a>	770 455 6800
Jim	Parry	Wisconsin DOT	Madison	WI	<a href="mailto:James.Parry@dot.wi.gov">James.Parry@dot.wi.gov</a>	608 246 7939
Mehdi	Parvini	California DOT	Sacramento	CA	<a href="mailto:mehdi_parvini@dot.ca.gov">mehdi_parvini@dot.ca.gov</a>	916 227 5848
Brian	Raecke	S Dakota DOT	Pierre	SD	<a href="mailto:brian.raecke@state.sd.us">brian.raecke@state.sd.us</a>	605 773 3639
Matt	Ross	Penhall Company	Overland Park	KS	<a href="mailto:mross@penhall.com">mross@penhall.com</a>	816 803 9331
Tyson	Rupnow	Louisiana DOT	Baton Rouge	LA	<a href="mailto:Tyson.Rupnow@la.gov">Tyson.Rupnow@la.gov</a>	225 767 9148
Mark	Russell	Washington DOT	Tumwater	WA	<a href="mailto:russelm@wsdot.wa.gov">russelm@wsdot.wa.gov</a>	360 709 5479
Paul	Schubert	Jarden Zinc Products	Greeneville	TN	<a href="mailto:pschubert@jardenzinc.com">pschubert@jardenzinc.com</a>	423 329 1502
Clayton	Schumaker	N Dakota DOT	Bismarck	ND	<a href="mailto:cschumaker@nd.gov">cschumaker@nd.gov</a>	701 328 6906
Larry	Scofield	IGGA	Mesa	AZ	<a href="mailto:lscofield@pavement.com">lscofield@pavement.com</a>	480 775 0908
Grant	Scott	Kiewit Corporation	Omaha	NE	<a href="mailto:grant.scott@kiewit.com">grant.scott@kiewit.com</a>	402 943 5071
Kenny	Seward	Oklahoma DOT	Oklahoma City	OK	<a href="mailto:kseward@odot.org">kseward@odot.org</a>	405 522 4999
Jason	Smith	S Dakota DOT	Pierre	SD	<a href="mailto:jason.smith@state.sd.us">jason.smith@state.sd.us</a>	605 773 4464
Mark	Snyder	ACPA-Pennsylvania	Bridgeville	PA	<a href="mailto:msnyder@pavement.com">msnyder@pavement.com</a>	412 979 8332
John	Staton	Michigan DOT	Lansing	MI	<a href="mailto:statonj@michigan.gov">statonj@michigan.gov</a>	517 322 5701
Nilesh	Surti	N Carolina DOT	Raleigh	NC	<a href="mailto:nsurti@ncdot.gov">nsurti@ncdot.gov</a>	919 909 6493
Larry	Sutter	Michigan Tech	Houghton	MI	<a href="mailto:lsutter@mtu.edu">lsutter@mtu.edu</a>	906 487 2268
Peter	Taylor	National CP Tech Center	Ames	IA	<a href="mailto:ptaylor@iastate.edu">ptaylor@iastate.edu</a>	515 294 9333
Lori	Tiefenthaler	Lehigh Hanson, Inc.	Irving	TX	<a href="mailto:lori.tiefenthaler@lehighhanson.com">lori.tiefenthaler@lehighhanson.com</a>	972 653 6130
Brett	Trautman	Missouri DOT	Jefferson City	MO	<a href="mailto:Brett.Trautman@modot.mo.gov">Brett.Trautman@modot.mo.gov</a>	573 751 2926
Steve	Tritsch	CMC Americas	Lenexa	KS	<a href="mailto:steve.tritsch@cmc.com">steve.tritsch@cmc.com</a>	913 624 4186
Franz	Ulm	Massachusetts Inst. of Tech.	Cambridge	MA	<a href="mailto:ulm@mit.edu">ulm@mit.edu</a>	617 253 3544
Tom	Van Dam	CTL Group	Skokie	IL	<a href="mailto:tvandam@ctlgroup.com">tvandam@ctlgroup.com</a>	847 972 3150
Suneel	Vanikar	FHWA	Washington	DC	<a href="mailto:suneel.vanikar@dot.gov">suneel.vanikar@dot.gov</a>	202 366 0120
Denise	Wagner	National CP Tech Center	Ames	IA	<a href="mailto:dfwagner@iastate.edu">dfwagner@iastate.edu</a>	515 294 5798
Leif	Wathne	ACPA	Washington	DC	<a href="mailto:lwathne@acpa.org">lwathne@acpa.org</a>	202 330 3492
David	White	CEER - ISU	Ames	IA	<a href="mailto:djwhite@iastate.edu">djwhite@iastate.edu</a>	515 294 1463
Nancy	Whiting	Purdue University	West Lafayette	IN	<a href="mailto:whiting@purdue.edu">whiting@purdue.edu</a>	765 463 2000
Kameron	Williams	Lafarge Cement	Lees Summit	MO	<a href="mailto:kameron.williams@lafarge-na.com">kameron.williams@lafarge-na.com</a>	816 251 2103
Steve	Wobken	Ash Grove Cement	Lincoln	NE	<a href="mailto:steve.wobken@ashgrove.com">steve.wobken@ashgrove.com</a>	402 429 2807
Tony	Zander	Indiana DOT	West Lafayette	IN	<a href="mailto:azander@indot.in.gov">azander@indot.in.gov</a>	765 463 1521
Matt	Zeller	CPAM	St Paul	MN	<a href="mailto:mjzeller@cpamn.com">mjzeller@cpamn.com</a>	651 762 0402