



Concrete Pavement Tour/Meeting Minutes

**Washington, Pennsylvania
August 15-16, 2018**

The 2018 ACPA Pennsylvania Chapter/PennDOT/Turnpike concrete pavement tour and follow-up meeting, co-hosted by PennDOT District 12, the Pennsylvania Turnpike Commission, and PennDOT District 11, was held August 15 & 16 in Washington. Handouts provided to each participant included project highlights and illustrations of the site visits and drive-throughs as well as other information pertinent to the tour and meeting.

Over 110 individuals representing 40 organizations participated in the tour and/or meeting. These organizations included PennDOT Central Office and all eleven Districts, the Turnpike, Federal Highway Administration, another state highway agency, eleven construction firms, twelve material supplier or equipment manufacturing companies, eight consulting firms, two universities and three associations.

On Wednesday, August 15, a pre-tour briefing was held with all tour attendees. Kovach (Assistant District Executive for Construction, PennDOT District 12) opened the event with welcoming remarks. An overview of the tour and logistics/safety remarks were made, respectively, by Becker and Jucha of the ACPA Pennsylvania Chapter. The initial site visits to the project in District 11 and the Golden Triangle Construction concrete plant required that the buses travel to each of the sites separately for safety and better viewing. The buses remained together for the remainder of the tour to observe an active Turnpike paving project and a District 12 project that included a partially completed concrete roundabout.

The tour included commentary from several PennDOT, Turnpike, and industry personnel while travelling through past concrete pavement projects and at active locations where tour attendees had an opportunity to review site activities. A drive-through of the first divergent diamond interchange (DDI) constructed in the Commonwealth was also included as part of this tour.

The ACPA Pennsylvania Chapter appreciates the willingness and efforts of staff at PennDOT District 12, the Pennsylvania Turnpike Commission, and PennDOT District 11 for hosting the 2018 Concrete Pavement Tour/Meeting. We also acknowledge PennDOT Central Office staff assistance as well as the cooperation and assistance of Anthony Allegra Cement Contractor, CDR Maguire, Golden Triangle Construction, Independence Excavating, Joseph B. Fay, and the Lane Construction Corporation.

On Thursday morning, August 16, a follow-up meeting was held in Washington. The first session was facilitated by Jucha and began by Becker thanking all who attended the tour/meeting. These remarks were followed by a brief presentation by Kovach who provided an overview of tour activities the previous day.

Presentations were given on the following topics:

- New Standards and Specification; Fannin (Pavement Materials Engineer, PennDOT)
- Performance Engineered Mixes; Baer (Concrete/Soils Unit Manager, PennDOT)
- Just-in-Time Training; Forry (Materials Manager, PTC)
- Joint Sealing/Filling Issues; Jarvis (Construction Quality Assurance, PennDOT)

The first session concluded with McAuley (PennDOT Deputy Secretary of Transportation for Highway Administration) presenting PennDOT's Initiatives and Future Direction. He provided an overview of assets, and the collaboration and partnering taking place within the various Department/industry committees. He explained the systems in-place to manage PennDOT assets as well as providing details on the related CPQI initiatives and SHRP-2 research. He continued with a summary of efforts to improve

traffic and construction safety, concluding with a summary of material usage and future paving projects throughout the state.

Following a break, Koser (Chief, Pavement Testing and Asset Management Section, PennDOT) facilitated roundtable discussions led by Becker and Cribben (Construction Quality Assurance, PennDOT) on the following topics.

Noteworthy Practices/Opportunities for Improvement:

Becker began by noting differences in paving techniques seen on the two active paving projects visited during the tour, particularly use of dowel bar inserters versus staked load transfer assemblies (with shipping wires not cut), cement-treated versus asphalt-treated permeable bases, standard epoxy-coated dowels versus zinc-clad hollow dowels, mechanically inserted versus drilled tie-bars, a roughened edge longitudinal joint versus a keyway joint, a standard mix versus optimized mix, and more.

He noted the continued interest in ride quality. The Turnpike ride specifications which provides for an additional incentive for uncorrected lots, is being looked at by PennDOT.

Weather conditions have all paving behind schedule, which will put additional pressure on paving contractors to complete paving operation, perhaps in unfavorable temperatures. Turnpike projects were cited since that corridor will not be opened to traffic for several years.

Stahl (Gulisek), Sciullo (Golden Triangle) and Forry commented that sawing, sealing and line striping in November is not conducive to producing a quality product. Project completion dates could be pushed back were it not for a “drive to get it done”. Kovach stated that they are driven by customers who think we take too long to finish projects. Projects also have phases that must be completed before winter, so they can be safely serviced. McAuley informed everyone that the Department is looking to reach a solution within contract specifications. *Following adjournment of this meeting, it was learned that the Governor signed an emergency declaration for all 67 counties; PennDOT and the Turnpike will work with contractors on a case-by-case basis to address scheduling issues.*

Because of the wet weather impacts, many projects will run late into the season; it was stated that joint sealants may not perform as expected. There is a need to look forward to changing schedules or move traffic to seal pavement under proper temperatures. Current schedules and proposals force the paving season from February to the end of November without concern for temperatures. The question remained that even if sealing can be properly performed, how will line striping be completed? Kovach stated that work should not be scheduled when not possible to properly undertake.

Koser commented on the importance of seeing concrete testing firsthand (specifically the performance engineered mixtures (PEM) tests), both the procedure for testing as well as the time it took to conduct the test.

Casilio (PACA) noted that paving on I-376 was being performed with an E-level aggregate and, time and distance of delivery is being addressed by the CPQI committee. Sciullo noted that their McClaren Plant visited during the tour is using aggregate shipped from Jim Mountain in Connellsville. He asked the Department to consider blending L-level aggregate with E-level. Baer explained that the Department is reviewing Vanport Limestone with the Aggregate and CPQI Committees and obtaining input on using/blending coarse aggregates. Optimized mixes could use #8 or #57 aggregates at some level. She is contacting other states that have skid issues as well as a limited variety of aggregates for their method of control.

Vandenbossche (University of Pittsburgh) suggested considering composite pavement and two-lift construction.

The past use of twenty-foot joint spacings on the Mon-Fayette Expressway and the award-winning section of I-79 was cited; it was asked what has driven all the changes to design standards for transverse joints and for concrete pavement bases. Becker summarized the changes, from 20-foot panels on 2A, to 20-foot skewed panels on open-graded stone (OGS), to 20-foot perpendicular panels on stabilized permeable bases, to 15-foot panels on stabilized permeable bases. The driver behind the changes was performance of skewed 20-foot panels on OGS which ranged from good to poor (with significant mid-panel cracking), with those that initially performed well after twenty-years, now showing signs of secondary base consolidation. On a related note, the decision to skew joints continues to present challenges, because of the complexity of patching a skewed joint and the additional cost of concrete removal needed to repair a skewed joint with a perpendicular patch. Finally, panels were shortened to 15-foot because mechanistic analyses showed that the risk of mid-slab cracking increases when panels are longer than 17-foot.

Presentation Follow-up Questions:

New Standards & Specifications:

No discussion followed.

Performance Engineered Mixtures:

The NCPTC is looking to showcase PEM at two locations this fall/winter in Pennsylvania. ACPA/PA, PACA, and PennDOT are discussing options for coordinating.

Just-In-Time Training:

Becker noted that one of the most beneficial portions of the preparation and training has been pre-meetings with the contractor. Everyone has learned something from the informal questioning and discussions. Publicly available JIT2 referenced documents are posted at www.LongerLifePavement.com (tab to Events/Training). Documents unique to projects, including the QC Plan and mix design, are discussed during training but not disseminated to outside parties.

Eisenhour (Guntert & Zimmerman) commented that most if not all paving manufacturers conduct paving schools; he invited guests to attend, noting that several agencies have sent personnel in past years.

Forry noted the need for training because of high turnover and loss of expertise; crews move from state to state thinking specifications are the same everywhere. States and agencies do different things, so it is important to make JIT2 germane to each project.

Kovach noted that the CPQI committee has discussed applying JIT2 to CPR work. Clarke (Swank) emphasized that each JIT2 session is unique and just because you may have attended one session, the personnel from each project to project who you will be making contact and communicating and collaborating with are different.

Joint Sealing

Stahl provided research history on sealant in the mid to late 1990's when there were durability issues. Hot material contacted moisture trapped in joints creating steam that affected bond. He recommended waiting a day or two after a rain event before sealing.

Becker noted that when concrete panels were at 20 feet the standard was neoprene seal. When the slabs were shortened, the Department gave Districts an option to use hot pour or neoprene. All but one District chose to use hot pour and since 2006 all do. Jarvis explained that seals have

changed because ASTM abandoned certain specifications which has driven the use of one material or another.

Kovach asked if narrower joints will make it more difficult to properly clean a joint; Clarke stated it is a challenge, but not impossible. Commentary followed that there is a need to agree to a test to determine if what we are doing is correct, with the correct material.

Districts with joint seal problems were asked for suggestions. Tom Adams (District 11) stated we need to be cognizant about specification changes that affect joint seal performance. For example, longitudinal tining may require keeping the sealant deeper below the concrete surface and more so with mechanically grooving. He stated that we need to be thinking about what life we should be expecting with joint seals; three to five years is the expected performance. Most agencies do not reseal as suggested. He also suggested that thought should be given to eliminating backer rods to fill (not seal) joints. He researched projects with closed cell foam. Loading had destroyed cells and his experience is that backer rods hold water.

Baer noted that Minnesota and the NCPTC are studying joint sealants. There are available published reports and ongoing research. Becker asked for Districts (9 & 11 expressed interest) to pilot various options. Kovach suggested we move immediately to a Type IV sealant until this is sorted out. We are currently not getting life expectancy from Type II sealants. A little more cost for material is better than early failures. Baer commented that using the NCPTC test results could move approval of Type IV sealants quickly into the Bulletin.

Discussion Topics:

Several questions/topics were proposed by tour participants on the registration form; several other topics were suggested for discussion by PennDOT and ACPA/PA members and staff.

Q. Why are non-destructive testing (NDT) methods/concepts not widely used?

Jarvis noted that the specifications require strength and time so there is no advantage. If the 96 hours wait to open a roadway to traffic was removed, there may be more reason to use a non-destructive method. Thomas (Golden Triangle) looked at maturity methods for use on projects. PTM #640 requires batching 4 cubic yards for each test and waiting 28 days. There is no time gained or advantage.

Ramirez (Quality Engineering Solutions) noted that the FWD is a good option for network analyses and an excellent tool for use at project levels.

Q. Has the new ASR specification presented challenges during this unusually cool spring?

Stahl responded yes, adding that it may not be an issue if scheduling kept paving out of February/March, and if specification requirements to wait 28 days and accelerated strengths for seven hours were changed.

Kovach believes the issue may be suppliers (ready-mix) who are not developing different mix designs at multiple mitigation levels. They are using one mix for bridge and roadways. They are not taking advantage of the lower mitigation level for pavement that would get them a higher strength sooner. Baer clarified the situation by stating that producers should develop alternate mix designs better suited for seasonal conditions.

Casilio said the issue was addressed in the Aggregate Quality Committee. Ready-mix producers expressed concern if they develop an AA design with an S2 or S3 mitigation level it consumes more time and work that is wasted because there is a misuse of the mix application.

The ASR specification is set up with strict guidelines on mitigation. If there was a range rather than specifics it would be an incentive to develop more mix designs. Baer explained that establishing ranges is not feasible because there are about 500 aggregate producers with varying aggregates in their quarries that can be mitigated at a lower level and others requiring higher mitigation.

Q. What is the rationale for keyways sometimes being required between mainline and shoulder longitudinal joints?

Becker stated that the Department years back eliminated the use of a keyway between mainline and shoulder. However, the policy was written so that keyways were only required between 501/501 pavement and 506/506 pavement; at that time concrete shoulders were paid for as a 658 item. Since then, we have gone to full-depth shoulders and again are using keyways between mainline and shoulder pavement. The CPQI joint group is waiting for the new FHWA technical advisory to be issued before undertaking any changes to jointing details.

Q. How is the microwave oven test working for determining water/cementitious ratios:

It is being reported that there are challenges in seeing the microwave oven test correlate with batch plant tickets. Current ASTM test procedures require testing the sample in the microwave for five-minutes, five-minutes, and two-minutes thereafter until most of the water is evaporated. Some believe that the two five-minute cycles dries/hardens the sample; Minnesota is evaluating starting the test using 2-minute cycles.

Q. What are challenges that need to be overcome for the use of concrete overlays?

Adams noted that asphalt paving can be performed at night, pavement drop-offs are an issue in urban areas. Gary Marks (District 9) reported that cracking has occurred on a bonded concrete over concrete overlay. Becker stated that bonded concrete over concrete is the most sensitive and least forgiving overlay type; matching joints is challenging, and good bonding is essential.

Q. How should we be handling dominant joints during design & construction?

Evaluating the effects of adjacent lanes placed in different environmental conditions when there is accumulated movement at isolated (dominant) joints was first raised as an issue at the 2002 concrete tour/meeting. There have been only four projects over the past 20-years where this situation has caused shear cracking to develop. With many paving schedules pushed back because of wet weather, there may be more paving taking place in differing environmental conditions this year. Becker will take this topic to the CPQI joint group for discussion.

Q. Does cement stabilization hold promise for future projects?

Cost saving of over \$3.3 million was reported for the I-376 District 11, Golden Triangle Construction project. Sciullo noted that this change allowed temporary widening to take place which helped the project schedule. It was noted that stabilized subgrade does hold up better under truck traffic when placing the next layer of base.

Q. What are some of the best practices being employed for concrete spall repairs?

Districts have had very mixed performance with spall repairs and most were reluctant to respond to this question. It was cited that patch preparation is critical as well as is material selection.

Q. Should 14-foot outside lane configurations be considered by PennDOT?

Kovach cited merits in considering the configuration used by the Turnpike for rural limited-access facilities. Becker cited that by striping the outside lane at 12-feet, we change the loading on slabs from an edge load to an interior load, reducing deflections and thereby improving the likelihood of better performance.

Wrap-Up

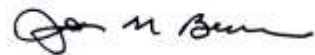
In the interest of time, detailed discussion on CPQI priority topics were tabled. Koser referenced Page 31 of the handouts, noting the status of issues that the CPQI has placed a priority on. Becker will survey attendees asking what the CPQI should be working on to improve the quality of concrete pavements.

McAuley thanked everyone for their participation. Becker thanked District 11 & 12, the Turnpike, Central Office staff and presenters for their efforts, and attendees for their comments. The meeting adjourned at 12:15pm.

These minutes were prepared by Becker & Jucha and reviewed by PennDOT District and Central Office staff and Pennsylvania Turnpike Commission staff prior to distribution. Appendix A lists all the individuals who participated on the tour and/or meeting. Appendix B lists a summary of action items developed from these meeting minutes as well as from discussions held during the tour.

Post-Script

Appendix C includes feedback received on technical matters and other observations received from Tour/Meeting survey respondents. Presentations, a copy of the tour handouts, and these minutes have all been posted on the Chapter's website at www.LongerLifePavement.com.



John M. Becker
ACPA Pennsylvania Chapter
September 18, 2018

APPENDIX A

Concrete Pavement Tour (08/15/2018) and Meeting (08/16/2018) Participants

ACPA Pennsylvania Chapter

- M John M. Becker PE
- M Richard R. Jucha P.E.

AECOM

- Oliver Green P.E.

Anthony Allega Cement Contractor

- F Joe Allega, Sr.

APC

- M Aaron S. Hoover

Callahan Paving Products

- M Brian L. Eberhart

CDR Maguire Group, Inc.

- F Dale Rosinski

Cemex

- Thomas R. Hunt

Crafco

- M Brian Hatfield

Diamond Products

- M Alan Haynes

The Euclid Chemical Company

- Jason Roby

FHWA Pennsylvania Division

- M Jennifer A. Albert

The Fort Miller Company

- M Dan E. Moellman

Gibson-Thomas Engineering

- Jerome F Bendo

Golden Triangle Construction

- Trey Buccil
- F Jack Detz
- F Joe Fischer
- Anthony Pastin
- F Bernard Perry
- Stephen Raffa
- M David M. Scullio P.E.
- F Sean Stiger
- M David C. Thomas

Gulfsek Construction

- Brandon Farrell
- M Mark T. Ondecko
- M Clayton J. Stahl P.E.

Guntert & Zimmerman

- M John E. Eisenhour

Hi-Way Paving

- James R. Truman
- Edward T. Wessel

Independence Excavating

- F Doug Thomas

Johnson, Mirmiran & Thompson

- M Thomas A. Carey PE

Joseph B. Fay

- F Rich Schoedel

The Lane Construction Corporation

- Michael D Blanco P.E.
- M Rob J. Griffin
- M Tim A. Harden
- Harry E. Jack

Lehigh Hanson Cement Company

- M Dominic J. Jampo

Mackin Engineering

- Stephen Janosko
- Daniel W Platt

Matcon Diamond

- M Daniel Matesic

MMFX Technologies

- Jon Walter

New Enterprise Stone & Lime

- Lowell A. Jensen

PACA

- M Jim Casilio P.E.

PENNDOT Executive Office

- M George W. McAuley P.E.

PennDOT BOMO

- M Natalie Boyer
- M Steven L. Koser P.E.
- M Ty Reed

PennDOT BOPD

- M Dale R. Anderson
- M Patricia Baer
- M Garth D. Bridenbaugh P.E.
- M Joseph F. Cribben P.E.
- M Raymond DeArmitt
- M Neal W. Fannin P.E.
- M Sherry Hartman
- M David L. Jarvis, P.E.
- M Terry L. Kohler
- M Marcella J. Lucas
- M Mark Moore P.E.
- M Eugene Orlandi
- M Lydia E. Peddicord P.E.
- M Seth Wollinger

PennDOT District 01

- M Bill Carr
- M Kevin Hesson

PennDOT District 02

- M Brian Gresco
- M Robert Jaconski P.E.

PennDOT District 03

- M Ted Deptula
- M Gerald Wertz

PennDOT District 04

- M Daniel Stepaniants

PennDOT District 05

- M Michael W. Rebert P.E.
- M Mark H. Sharp

PennDOT District 06

- M James Kelly
- M Vicente R. Morales

PennDOT District 08

- M Michael Delter
- M Kevin M. Keefe

PennDOT District 09

- M Kevin M. Gnegy P.E.
- M Garry R. Marks P.E.

PennDOT District 10

- M Shaun Abraham PE
- M Richard J. Polenik P.E.

PennDOT District 11

- M Thomas Adams P.E.
- M John Bernard
- Steven Sneddon
- M Doug Thompson

PennDOT District 12

- M William H. Bromyard
- Dominec A. Caruso P.E.
- F Jeff Corazzi
- M Bryan T. Deangelis
- F Cindy Dunlevy
- M E. Scott Faleta P.E.
- M William L. Kovach P.E.
- M Stacy Lloyd
- M Jeremy S. Shaneyfelt

Penn State University

- M Jonathon Pisante

Pennsylvania Turnpike Commission

- Terry D. Dreher
- M Christopher A. Ferry
- F Steve Hrvoich

Quality Engineering Solutions

- Dennis A. Morlan P.E.
- M Luis Ramirez

SAI Consulting Engineers

- Kevin W. Lettrich P.E.
- Jim Lombardi

St. Marys Cement Company

- M Shawn P. Kalyn

Swank Construction

- M Geoffrey W. Clarke

TyE Bar

- Chad Johnson

University of Pittsburgh

- Maggie Bengé
- M Katherine R. Chmay
- M Nicole C. Souder
- M Steven Sachs, P.E., Ph.D.
- M Julie Vandebossche P.E., Ph.D.

Volkert

- Daniel L. Davis

Walsh Construction

- Dave Douglas
- M Kenneth L. Moore

West Virginia Division of Highways

- M Andrew Mays P.E.
- M Suman Thapa P.E.

Wicktek

- M Frank Yantek

Legend

- Tour Participant - Blue Bus (47)
- Tour Participant - Gold Bus (43)
- Tour Participant - Shadow Vehicle (3)
- F Tour Facilitator (11)
- M Meeting Attendee (76)

APPENDIX B

Summary of Action/To Do Items (from Minutes)

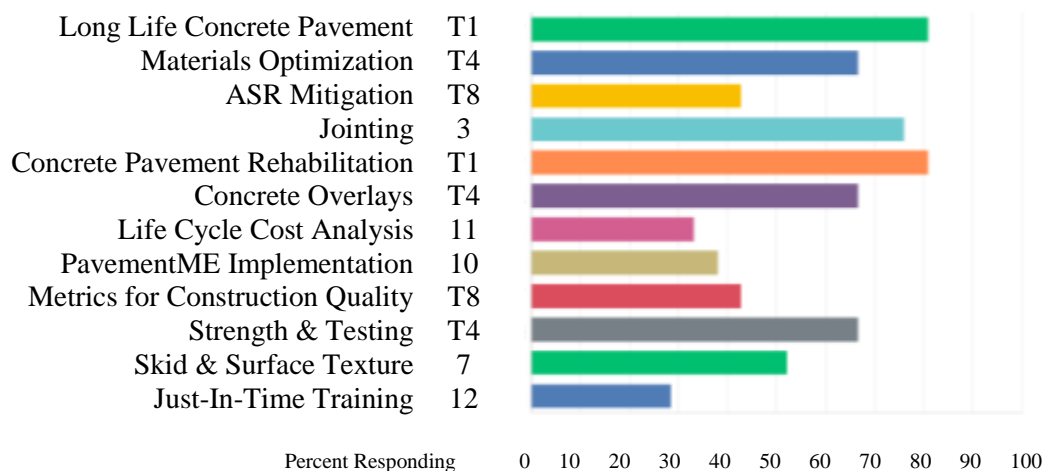
- The CPQI Jointing Group will consider the following:
 - the 14-foot outside lane standard used by the Turnpike for rural interstate projects
 - clarification on the need for keyways in travel/shoulder longitudinal joints
 - options/methods for addressing dominant joints for pavements constructed in differing environmental conditions
 - development of a concrete divergent diamond interchange standard RC drawing
- Joint sealing/filling:
 - The Department will consider the following:
 - expediting the process to facilitate allowing/requiring Type IV sealants to be used
 - consider piloting other concepts for sealing joints, including the elimination of backer rods, and reconsideration of neoprene seals
 - ACPA/PA will distribute the joint sealing/filling document to ADE/Construction and ADE/Maintenance groups
- The CPQI Strength & Testing Group will consider the following:
 - evaluating the microwave oven verification testing process to see if there are matters that can help improve this process
 - reviewing NDT testing procedures to see if there are requirements that are creating a barrier to NDT use
 - the opening to strength criteria for patches for conventional and accelerated work
- The CPQI Committee will discuss barriers to the use of concrete overlays
- PennDOT will review their ride specifications and take elements of the Turnpike's ride specifications into consideration

APPENDIX C

Post-Tour Feedback (through September 1)

Concrete Pavement Priorities

From the below list of CPQI priorities, tour/meeting participants were asked to identify those topics that were of importance to them; respondents also were asked to suggest any additional topics for consideration. The number next to each topic reflects the ranking of the topics based on the responses provided.



Additional topics suggested for consideration by the CPQI Committee:

- Use of expansion joints; practices used elsewhere

Other Feedback

Below lists items and topics (paraphrased) on what tour/meeting participants believed were the most important things learned by participating:

- Differences between two paving operations
- Specification options for mainline pavement
- Performance engineered mixture (PEM) testing
- Construction scheduling and a concern over placement of concrete pavement on embankments that have not gone through a winter cycle
- Observing dowel bar inserters
- The focus and commitment to use concrete pavement in western Pennsylvania; contractors need to continue providing a quality product
- The industry and PennDOT/Turnpike are working together to provide a quality product
- Concrete roundabouts were of interest
- Different methods for sealing joints and efforts needed to keep sealants in place
- Differences in quality between different projects
- Networking benefits
- Understanding the audience