



Concrete Pavement Bus Tour/Meeting Minutes

Wyomissing, PA
August 31 – September 1, 2016

The 2016 PennDOT/ACPA Pennsylvania Chapter concrete pavement bus tour and follow-up meeting was held August 31 & September 1, 2016, in Wyomissing, PA.

On Wednesday August 31, welcoming remarks were made by Assistant District Executive for Construction Al Picca. An overview of the day was provided by District Materials Engineer Bill Eibach, and ACPA Penn Chapter staff members John Becker and Rich Jucha. Two of the sites visited today were able to accommodate only 50 individuals simultaneously, which necessitated having the two tour buses travelling separate routes. The tour covered active concrete overlay and reconstruction paving operations on Interstate 81 in Schuylkill County, a tour of the Lehigh Hanson portland cement manufacturing plant in Evansville, and the Northeast Prestressed Products plant in Schuylkill Haven. A visit of the concrete batch plant on the I-81 project was also included as part of this day's event.

The tour included commentary by PennDOT and industry personnel on several projects/corridors constructed with concrete, including several sections of mainline Interstate 78 and 81 (one section on each of these Interstates in District 8), and several sections of US-222. An exercise was undertaken by Steve Koser and Halley Cole asking participants to evaluate the ride condition of pavements built between 1970 and 2015. A summary of the actual ride ratings follows these minutes. In summary, the Interstate pavements driven between site visits continue to be mostly in the excellent to good category; pavements on US-222 were generally rated fair.

The ACPA Pennsylvania Chapter extends our appreciation to PennDOT Engineering District 5 for their willingness to work with the industry on this event as well as their hospitality as hosts. We also would like to acknowledge the assistance of PennDOT Central Office, District 8, as well as staff at Lehigh Hanson, NPP, and Hi-Way Paving for their cooperation and efforts in making this year's tour very successful and informative.

On Thursday, September 1, a follow-up meeting was held in Wyomissing. This included the following:

- Presentations on the following topics:
 - District 5 Overview (Mike Rebert, P.E., District Executive)
 - Concrete Overlays (Josh Freeman, Bureau of Project Delivery)
 - Long-Life Concrete Pavement (John Becker, P.E., ACPA Penn Chapter)
 - Slag Aggregate (Steve Koser, P.E., Bureau of Maintenance & Operations)
 - I-81 Lessons Learned (Carl Knepper, District 5 Construction)

- The presentation made by Carl Knepper included lively dialogue from the group particularly on the merits and drawbacks of paving materials used for handling grade corrections. Using asphalt to make grade corrections may be easier, but concerns over long-term non-uniform consolidation and the effect it would have on concrete overlay performance led the National Concrete Pavement Tech Center to recommend using concrete in these areas. Using concrete does pose a challenge in achieving a D/3 saw-cutting depth, but it was noted that most states have overcome these concerns

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and use concrete for these type grade corrections; there are devices that can be rigged to allow variable depth saw-cutting to achieve appropriate saw cut depths. Dowel diameter size was also discussed, and it was noted that the design thickness of the overlay, not the thickness of the concrete in the grade correction areas, determines diameter size.

- A briefing and roundtable on pertinent concrete pavement topics was led by Joe Robinson and John Becker. These topics were primarily Concrete Pavement Quality Improvement priorities. Commentary made by participants added value and insight on these topics.

What's Done:

- New and revised 2016 PennDOT standards and specifications, specifically:
 - Long Life Concrete Pavement (Sect. 530)
 - Joint details for intersections and round-a-bouts (noting that the first concrete round-a-bouts in Pennsylvania have been paved using stringless paving), the number of dowels per joint will vary depending on slab width. Spacing of dowels will remain at 12 inches on center but distance from first dowel to edge of pavement may vary from six-inches minimum to 12 inches maximum. (RC 20)
 - Concrete Overlays (Sections 540,545, 548)
 - Roller Compacted Concrete (Sections 323, 502, 658)
- Longitudinal tining was discussed. FHWA has given states flexibility on texture specifications. Longitudinally tined projects are under construction and/or have been completed in Districts 9, 10, 11, 12 and the Turnpike. California has a long history of tining longitudinally, and several upper mid-western states have adopted same. Studies have proven no adverse effects on ride or safety, as long as tine spacing is no more than ¾ inches; there is a marked improvement in noise reduction.

Ongoing Efforts:

- Districts are considering Long Life Concrete Pavement; use guidelines need to be finalized and maintenance cycles need to be developed in order to do an LCCA.
- ASR specifications are expected out in 2017. There remains concern within industry regarding the benefit of additional mitigation at high substitution rates. Jucha outlined the related draft ASR Work Plan and its purpose. Horwhat provided the work plan status within PennDOT and the noted that there is a Precast appendix to the work plan.
- Mix optimization and aggregate blending are included in the LLCP specification and continue to be a TQI and STIC priority.
- Pavement ME calibration and implementation efforts were discussed; traffic and material sections are competed and in the validation process. Projects with ADT of 2,000 or more will require comparison designs to be developed using PavementME. There is no established date for sun-setting AASHTO93 (DarWIN) designs.
- Dowel bar alignment specifications will be reviewed by the CPQI Joint group. Shipping wires and keyways were discussed. “Do-not-cut wire” is specified for unbonded overlays. Contractors commented on the benefit of not cutting wires. There is noticeable movement as concrete is placed over baskets that have had shipping wires cut. The Department does not have a strong opinion either way but studies proved it is not necessary to cut the shipping wires. This will be discussed by CPQI.
- Keyways are required under 506 paving and is under review by CPQI Joint group. FHWA TA circa 1990 suggested adding a tie bar in lieu of using a keyway. Keyways are required between lanes that are paid for as a 506 item (i.e., if shoulder is a 506 item, keyways are required).
- The decision to dowel the shoulder transverse joint is required is generally left to the

discretion of the designers. It was suggested that when a shoulder is not anticipated to be converted to a travelling lane, a design analysis could be used to determine if dowels are needed. This topic will be discussed by the CPQI Joint group.

Training:

- Just-in-time training (JIT2) for contractors and inspectors was developed as a result of efforts to improve quality. The Turnpike chose JIT2 over warranties and added that JIT2 will include a follow-up lessons learned session after paving begins and follow-up training in each new construction season.
- CPR training was offered by ACPA Pennsylvania on proper installation techniques since many Districts have had issues with patching.

Innovations:

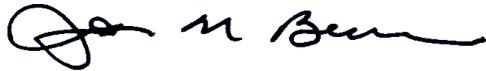
- Contractor incentives for smoothness has improved ride quality and durability. Water/cement ratio is an incentive in LLCP specifications. Use of PWL for concrete has stalled.
 - Precast concrete pavement standards are in place. District 3 closed a lane on Sunday and opened same on Friday before high volume of traffic, but had issues in shoulder with placement of baskets and joints. District 6 placed 270 concrete slabs on Interstate 676 with positive results.
 - PennDOT commented that a recycled concrete pavement specification has been in existence since 1994. Recycled concrete is very beneficial as 2A. It is angular, bonds, is dense and has some cementitious characteristics. It was stated that recycling is estimated to be 50% of the cost to purchase and transport new aggregate. There is concern for the generation of Tufa, but the potential can be reduced by keeping 200 mesh material below 5%. It was added that recycled concrete is “Green” and a cost saver. There is potential for alkalinity in runoff so stockpile control is important. Several Districts have used recycled concrete as a subbase, District 2 the most recent, with positive results. Pennsylvania does not allow recycled concrete as a component in concrete mixes.
 - PennDOT stated that recycled concrete can be used as a base without freeze thaw testing. The European Freeze Thaw specification relates to natural aggregate and slag.
 - Non-destructive testing has been used on a few concrete pavement projects with much success.
 - Efforts to improve concrete pavement ride quality using real time smoothness measurements is a work in progress; RTS numbers do not correlate well with actual IRI numbers. It was recommended that Real Time Smoothness results should be used only as a guide.
 - Evaluating the performance of continuously reinforced concrete pavement (CRCP) is an agenda item for the Design TAG. Several Districts did not have good results with their projects. This initiative has stalled but the study is anticipated to recommence shortly. Texas and Illinois regularly use CRCP; California is developing a 100-year design using CRCP.
- Miscellaneous:
 - The actual ride ratings of the pavements that were part of the tour and that were evaluated by tour participants will be distributed.
 - A follow-up is needed regarding freeze-thaw testing that is required for natural aggregate and slag but not recycled concrete specific to whether freeze-thaw testing of the recycled concrete required if the crushed concrete contains slag aggregate.

Discussions concluded at 12:15 p.m. Becker and Robinson thanked District 5, the presenters, and all attendees for their participation. Action items will be developed by Robinson and Becker and established in consultation with the Concrete Pavement Quality Improvement Committee at their September 20 meeting.

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A survey will be provided to all participants to allow them to evaluate the value of this tour and to gather feedback for future tours. All presentations, a copy of the tour handouts, and these minutes will be posted on the Chapter’s website at www.pa.pavement.com. If you have any questions, please contact the staff of the ACPA Pennsylvania Chapter at 717-441-3506.

These minutes were prepared by John M. Becker, P.E., and Richard R. Jucha, P.E., ACPA Pennsylvania Chapter on September 29 and reviewed by PennDOT District 5 and Central Office staff prior to distribution.



John M. Becker, P.E.
ACPA Pennsylvania Chapter

Distribution:

- All Tour Participants
- PennDOT Bureau Directors
- PennDOT ADEs Design, Construction, Maintenance
- PennDOT PME/DMMs
- CPQI Committee
- ACPA Penn Chapter Board of Directors

Actual Ride Conditions

<i>(IRI Ranges, NHS Interstate)</i>				<i>% Excellent (≤ 70)</i>	<i>% Good (71-100)</i>	<i>% Fair (101-150)</i>	<i>% Poor (>151)</i>
	Location	Year Built /CPR	Segments				
B	I-78, MP 8.4-11, Berks Co	2000	15	87%	13%		
C	I-78, MP 0.0-8.4, Lebanon Co	1990/2008	34	82%	18%		
D	I-81, MP 89-97, Lebanon Co	2004	29	100%			
J	I-78, MP 30.2-33.3 Hamburg	2007	14	21%	79%		
K	I-78, MP33.3-35.4, Lenhartsville	1985/2000	8	13%	75%	13%	
<i>(IRI Ranges, NHS Non-Interstate)</i>				<i>% Excellent (≤ 75)</i>	<i>% Good (76-120)</i>	<i>% Fair (121-170)</i>	<i>% Poor (>171)</i>
N	US-222, Kutztown Bypass	1972 /2010	22		18%	77%	5%
Q	US-222, SR-61 to Business 222	1970/20XX	12		33%	25%	42%
R	US-222 (Park Road)	1997	22	5%	64%	32%	