

TRIENNIAL STRATEGIC PLAN (TSP)

Evaluation Period: February 1, 2017 to January 31, 2020

Please note that rows and boxes below expand as you enter the information

PART 1: Committee Name and Scope

This is an opportunity to review the officially approved name and scope that are posted on the TRB website and consider any necessary changes. If changes are needed, include the proposed scope statement and/or name and justification for the changes.

NOTE: A proposed committee name and/or scope change must have the approval of 2/3 of the official members of the committee. The balloting done at a committee meeting that has less than 2/3 of the members in attendance must be augmented with e-mail balloting of the members not in attendance.

Committee Code *	AFD50
Committee Name *	Standing Committee on Design and Rehabilitation of Concrete Pavements
- Date(s) reviewed	1/8/2018, 1/16/2019, 1/13/2020
- Change, if proposed***	N/A
- No. of official members approving change/total number of members **	
Committee Scope *	This committee is concerned with aspects of pavement design and rehabilitation that are specific to concrete pavement structures. Areas of interest include modeling of concrete materials for design and performance purposes, as well as pavement rehabilitation strategies using concrete.
- Date(s) reviewed	1/8/2018, 1/16/2019, 1/13/2020
- Change, if proposed ***	N/A
- No. of official members approving change/total number of members **	

* Show current, as it currently appears in the [TRB Online Directory](#)

** Includes Chair, Standing Committee Members, Emeritus Members, and Young Members

*** Show proposed, or Not Applicable

PART 2: Committee Accomplishments

NOTE: We have provided much of the information you need for boxes 2.2, 2.4, and 2.7 below and in attachments A, B, and C. We ask that you provide the remaining information.

2.1

Year	2017	2018	2019	2020
Number of Members in Attendance at Annual Meeting		27	18	24
Number of Visitors in Attendance at Annual Meeting		48	46	39
Number of Papers Reviewed		23	14	20
Total Number in Attendance at Mid-Year Meeting	28	18	17	

2.2

Sessions and workshops sponsored/cosponsored at the Mid-Year meeting, including name of co-sponsoring committee(s) if applicable (by year):

NOTE: Sessions and workshops sponsored/cosponsored at the Annual Meeting are listed in attachment A. List below all sessions and workshops sponsored/cosponsored at Mid-Year meeting, including name of co-sponsoring committee(s) if applicable (by year).

AFD50 Annual Meeting Sessions are noted in Appendix A

AFD50 typically holds a Joint Mid-Year meeting composed of a 1-day committee meeting and ½-day field trip with AFH50 and the details are noted in Section 2.3

2.3

Provide title(s) and presenter(s) for informal presentations made at Annual Meeting and Mid-Year Committee meetings (by year):

2020 AFD50 TRB Annual Meeting

- **Current Status of the LTPP SPS-2 Pavement Preservation Pooled Fund Study** (Kevin Sean)
- **New Faulting model for BCOA** (John DeSantis)

2019 Joint MYM held June 26-27 in Orlando, FL with AFH50

- **Designing Long-Life Concrete Pavements that Cost Less** (Rich Rogers)
- **FHWA Concrete Pavement Updates** (Tom Yu)
- **Florida DOT Concrete Pavement Test Road** (Jamie Greene, Florida DOT)
- **In-depth Analysis of Concrete Pavement Cracking** (Georgene Geary)

2019 AFD50 TRB Annual Meeting

- **Preservation Strategies for Concrete Pavements** (Kurt Smith)
- **Analysis and Testing Support – FDOT US 301 Test Road** (Dan Zollinger)

2018 Joint MYM held July 12-13 in Madison, Wisconsin with AFH50

- **Evaluation of the Effects of Deicers on Concrete Durability** (Danny Xiao)
- **FHWA Concrete Pavement Updates** (TBD, FHWA)

- **Overview: 13th International Symposium on Concrete Pavements (Manik Barman)**
- **Benefits of using structural fibers in concrete pavement/overlay**
- **SPS-2 Update (Steve Tritsch)**

2018 AFD50 TRB Annual Meeting

- **Precast Concrete Pavement Technology Implementation Update (Shiraz Tayabji)**
- **ASCE Highway Pavement and Airfield Pavement Committees Recent and Planned Activities (Mohammed Amer)**
- **Concrete Pavement Design – Improvements That are Needed (Rich Rogers)**
- **ACPA Vision 2040 (Leif Wathne)**

2017 Joint MYM held June 15-16 in Pittsburgh, PA with AFH50 and in conjunction with the ACPA Summer Meeting

- **Zero Maintenance Roundabouts using CRCP (Shiraz Tayabji)**
- **Concrete Overlays (Julie Vandenbossche)**
- **ACPA Pavement Design Software Update (Eric Ferrebee)**
- **Bellefontaine First Concrete Street Recreation (Mark Pardi)**
- **Update on Florida’s Mainline Paving (Roger C. Schmitt)**

2.4

Provide titles of new research need statements (RNS) posted in TRB’s RNS database (by year):

NOTE: Attachment B shows all statements currently posted in TRB’s RNS database.

Added in 2018: “Developing Standard Test Methods to Determine the Mechanistic Properties of Pavement Layers for Concrete Pavement Design and Performance Analysis”.

Added in 2017: “Developing a More Mechanistic Approach for Designing Concrete Pavements and Their Supporting Layers”.

One RNS has been completed as a synthesis and was reported on the last TSP and has since been archived (Alternate Design/Alternate Bid) and one RNS is currently under consideration by NCHRP (Flooding and Inundation).

The committee members were recently polled relating to the 4 remaining RNS and action will be taken to update the RNS based on the feedback received. The CP Tech Center has also discussed updating the 2012 Concrete Pavement Research Roadmap, and if that occurs AFD50 members will be involved in the effort.

2.5

Provide title(s) of RNS submitted for funding consideration:

NOTE: If funded, include research project title/number and name of funding organization(s).

NCHRP 2021-C-16 Impact of Flooding and Inundation on the Performance of Pavements is under consideration currently for NCHRP 2021 funding

2.6

Provide titles of synthesis topics submitted (by year):

NOTE: **List** any synthesis topic(s) funded in a research program.

None

2.7

Membership Make-up: Please see Attachment C provided by TRB for summary details.

NOTE: **Comment** on demographics, balance or lack of balance of membership. Provide an action plan to address any deficiencies. See attachment C for summary details.

The committee is currently well balanced geographically and relatively diverse. There are at least 4 members from each U.S. region and the committee is 29% minority and 23% female. An additional DOT member has been added since the Appendix numbers were computed, therefore all the additional slots are filled except for international members. We did add a new international member since the last TSP.

2.8

Provide any of the following:

- Any special publications, such as TR circular, and conference proceedings
- Sponsored or co-sponsored specialty conferences, symposia, workshops, webinars or other joint efforts with other TRB committees, other TRB entities, or other organizations (i.e. AASHTO, FHWA, State DOTs, ASTM, ASCE, and/or other modes of transportation)

TRB Webinars:

Sponsoring Committee	Title	Date
2019		
AFD50	Concrete Overlay Performance and Research Innovations	9/5/2019
2018		
AFD50 (w/AFH50)	Roller Compacted Concrete Pavements State-of-the-Practice	2/14/2018
AFD50 (w/AFH50)	Permeable Concrete Pavements: State of the Practice	3/15/2018
AFD50 (w/AFH50)	Bases/Subbases for Concrete Pavements, Best Practices	4/17/2018
AFD50 (w/AFH50)	Internal Curing of Concrete Pavements: State of the Practice	5/24/2018
2017		
AFD50	Rigid Pavement Rehabilitation: Looking Back, Looking Forward	9/5/2017

Support for Specialty Conference

12th International Conference on Concrete Pavement, Minneapolis, Minnesota, scheduled to be held August 2020 but may move to 2021 due to Covid-19 issue.

PART 3: Committee Future Outlook Statement and Committee Three-Year Plan (Limit 1,500 words total)

Committee Future Outlook Statement

The committee future outlook statement should include a discussion of the primary factors and influences that will shape the transportation community and topic(s) within the committee's scope over the short-term (one to three years) and long-term (four to seven years). This statement should include:

- *Identification of emerging, critical, and cross-cutting issues **within the committee scope** (these issues could have been identified by the committee, Section, Group, Technical Activities Council, TRB Executive Committee, or other transportation committees and organizations);*
- *Identification of emerging, critical, and cross-cutting issues **outside the committee scope** that provide opportunities for liaison and collaborative efforts (these issues could also come from a wide range of sources).*

Within the Committee scope, emerging use and understanding of design of newer pavement rehabilitation techniques will be a major focus over the short-term. The American Concrete Pavement Association, the Concrete Pavement Technology Center, and the State DOT pooled-funded National Concrete Consortium (NC²) already consider design of both new and existing pavements (rehabilitation), and they are all represented on the AFD50 Committee. As more states use the new overlay features in the AASHTO Pavement ME Design software for rehabilitation design, it is possible that more research will be needed to consider issues that we have not previously addressed, such as new materials and methods in thin concrete overlays due to increase in use of concrete Performance Engineered Mixes (PEM), nano-silicas or other nanotechnology related material improvements. Our Modeling Subcommittee AFD50(1) is well poised to identify research needs related to these aspects of concrete pavement design and rehabilitation.

Outside the Committee scope, security and resilience of transportation infrastructure will become more important due to the increase in extreme weather events that we are experiencing. In the new TRB structure a new Transportation Sustainability and Resilience Group has been developed. This committee can work with Sections or individual committees in the new Group to identify research needs to improve resiliency and address the needs of security of our pavement infrastructure. With that a need for accurate asset management efforts will also be increased. Due to the longevity of concrete pavements it is not acceptable to manage the pavement as one line in a GIS, more information on the overall composition of the pavement, potentially BIM level information, will be needed.

As noted, in the near term the committee is continuing to focus on incorporating rehabilitation into the work of the committee. Looking forward, the committee will continue to focus on areas such as long-life concrete pavements (jointed plain concrete pavements [JPCP], jointed reinforced concrete pavements [JRCP], precast concrete pavement (PCP) and continuously reinforced concrete pavements [CRCP]), while also embracing new concrete pavement technologies (pervious and recycling), concrete overlays over asphalt (previously referred to as whitetopping), concrete overlays over concrete, roller compacted concrete (RCC), along with different types of concrete pavements, and overall sustainability issues. Some of these issues are described in more detail as follows:

Concrete Overlays/Concrete Pavement Rehabilitation

The next three years we are going to see budget increases in pavement rehabilitation rather than new construction. So, the emphasis will be on concrete overlays. There are two major ideas in how to accomplish this based on the budget and long-term planning. Some State DOTs are going to prioritize short section rehabilitation (to catch up with the pavement deterioration, in this case reactive rehabilitation) and there are some State DOTs that will wait until the pavement deteriorates to a point and do pavement rehabilitation in “corridors” (bigger and connected projects) rather than small sections. The small section pavement rehabilitation will need pavement design that is simple and based on an empirical design, while the corridor type projects will use a performance-based design such as Pavement ME. In the pavement rehabilitation for short sections we need to address the pavement drainage issue because most of the pavement sections from the past that need rehabilitation usually don’t have adequate pavement drainage. For the corridors, the pavement strategy will be concrete overlay or inlay that can be designed with the Pavement ME to meet the pavement performance in a longer term. For the concrete pavement in short sections, because this is going to be a rehabilitation option for a shorter-term solution, the current concrete overlay procedures should be refined and made generic so they can be applicable to any type of interlayer and base (existing asphalt or concrete pavement). That way the design will depend on the existing pavement condition and thickness. There should also be new guidelines for pavement candidates for concrete overlays over different pavement types and conditions.

Sustainability and Use Phase Life Cycle Assessment

According to the MIT Concrete Sustainability Hub, “two-thirds of a pavement’s total environmental impact over its lifetime occur during the phase in which the pavement is in use, well after material and design selections are made.” Concrete pavement offers significant advantages for use-phase LCA, including superior durability and lower fuel consumption from pavement-vehicle interaction. Concrete pavements deflect less under heavy loads and generally maintain smoothness over time, resulting in less rolling resistance and associated fuel consumption. With an increased emphasis on LCA for pavements, the committee will seek to support efforts related to demonstrate the advantages of concrete pavement. This may also include a new look at porous concrete pavements.

Asset Management/BIM for Pavement

Today data collection is performed predominately by using 2D or 3D (dimensional) lasers at highway speed to collect the data for pavement distresses, but it was not that long ago that this data was collected manually. The level and quality of performance data has taken a quantum leap in just the past two decades. The result of this is that life cycle modeling of concrete pavements will improve with this additional statistically valid data, and with that will come more accurate estimates of pavement life. This information needs to be developed and fed back into design and asset management systems to recognize the real economic return of concrete pavements. Building information systems (BIM) for pavements is another way to manage and align this data for the future.

Connected/Automated and Electric Vehicles

Connected/automated vehicles (CAVs) represent a disruptive technology that have the potential to dramatically change the way roadways are designed, including pavements. Truck platooning, for example, is one of the near-future technologies that will affect pavement design with

increased channelization of heavy wheel loads, shorter following distances, and the potential for higher traffic volume at all hours of the day. Additionally, the potential for sensors and other technology in the pavement surface presents opportunities to promote the benefits of concrete pavement and even further, specialized concrete pavements such as modular pavements. Additionally, with the rapid deployment of electric vehicles (EVs), there may be additional opportunities for using concrete pavements to support infrastructure such as dynamic vehicle charging systems in pavements.

Precast Concrete Pavement

Precast concrete pavement (PCP) technology is gaining wider acceptance in the U.S. for rapid (overnight) repair and rehabilitation of concrete pavements, as well as for reconstruction of heavily trafficked asphalt concrete intersections and freeway ramps. Widespread use of PCP in the U.S. is fairly recent, with most projects in service less than about 15 years old. Nonetheless, dozens of projects have been constructed, and advances continue to be made in all aspects of the technology, including panel design, fabrication, and installation. PCP technology is being used for intermittent repairs (both full-depth repairs and full panel replacement) and for continuous applications (longer-length/wider-area rehabilitation) with service life expectations of at least 20 years for repairs and at least 40 years for continuous applications, without significant future corrective treatment. Many of the obstacles to the use of precast pavement (e.g., cost and unfamiliarity with the technology) have been overcome through widespread deployment in several states. The committee will continue to help advance precast concrete pavement as a tool for applications where it is most beneficial, such as rapid (overnight) rehabilitation of concrete pavements in high traffic volume facilities where lengthy lane closures cannot be tolerated.

Concrete Pavement Performance Prediction using Machine Learning

Machine learning algorithms use computational methods to “learn” information directly from data without relying on a predetermined equation as a model. The algorithms adaptively improve their performance as the number of samples available for learning increases. The committee will encourage the use of machine learning in the hopes of accurately predicting concrete mechanical and thermal properties based on the existing concrete mixture data from LTPP sections. Many previous studies have already identified the hierarchy of the mixture inputs and its importance on concrete pavement performance in design and field construction stages. By teaching computers to learn from experiences and existing data, the algorithms will accurately predict the performance of concrete pavement.

Other Needs

Roundabouts have become mainstream in many states, and the design of roundabouts is maturing, but little has been developed specifically related to material for roundabouts, especially CRC roundabouts or proper jointing for JPC roundabouts.

A current NCHRP synthesis on joint sealing and maintenance may provide additional answers to the Seal or not to seal question, revving this issue and potentially providing some additional data driven guidance. This also may provide an opportunity to look more at permeable bases or how best to keep water out of the pavement.

The American Concrete Pavement Association recently published and shared with the Committee their “Vision 2040: The Future of Concrete Pavements Imagined” document. The document covers many of the areas that have already been discussed here, while also noting

that there will continue to be an emphasis on long life concrete pavements (LLCP) which can be achieved through improvements in materials like PEM (performance engineered mixes), construction methods (like BIM and stringless) and innovative subgrade treatments.

Committee Three-Year Plan

The committee plan is a short, focused statement of where the committee wants to go and how to get there. The committee plan may include, but is not limited to:

- ***projects, activities and products** that the committee will undertake during the next three years to address the emerging, critical, and cross-cutting issues identified above;*
- *how the current or proposed changed membership composition will respond to issues identified above;*
- *strategies to encourage significant involvement by the committee's Young Members, state DOT members, and other key constituents, both during committee meetings and at other times;*
- *committee's communication activities, and efforts to provide assistance and technology transfer to the transportation community;*
- *research – for the TRB committees, “research” is a very broad concept that can begin with providing the user perspective on research needs, writing research needs statements, tracking research, understanding the funding available for research in their topic area, developing case studies, lessons learned, disseminating research, technology transfer, and other activities that will advance the state of the practice. Potential research activities are:*
 - *research directions, results, and needs or gaps;*
 - *plan for maintaining and augmenting the Research Need Statements (RNS) database;*
 - *efforts to address research implementation and user needs, and ways to identify research use and implementation.*

The specific activities noted below will be discussed at each Annual Committee meeting to monitor progress and celebrate success. Specific committee members or friends will be identified as responsible for carrying out the action items in the Three-Year Plan (with the assistance of others as necessary). The annual committee meeting minutes will contain a Follow-Up Items Table (like the one included in the AFD50 2020 annual meeting minutes) to clearly define action items, accepted responsibilities and any related deadlines. Future action items noted below may change or have items added, dependent on the discussion at the annual or mid-year meetings, the prevailing conditions and the desire of the committee members.

2020:

- Webinar on the Concrete Overlay Design Procedures on Existing Concrete Pavement (Tom Burnham, lead)
- Workshop or session related to results of NCHRP 01-61 (Tom Burnham, lead)
- Workshop for TRB 2021 AM on challenges and solutions facing concrete pavement, ‘material to design to construction to rehabilitation needs’ (Shiraz Tayabji, lead)
- Develop Joint 2021 session with AFH50 on ICCP best papers (Georgene, lead, Sabrina and Tom Burnham to assist)

- Potential Joint Mid-Year meeting in conjunction with 12th International Conference on Concrete Pavement Conference in Minneapolis or web-based mid year meeting
- Develop RNS on how to address confusion over terminology of concrete overlays and clarify reasons for any differences in design procedures

2021:

- Webinar sharing information related to workshop/session that covered the results of NCHRP 01-61
- Webinar on presenting guidelines for selecting concrete overlay candidates
- Webinar on the design and performance of Fast-Track Cast In-Place Jointed Plain Concrete Pavements.
- Joint Mid-Year meeting potentially in Sacramento, California
- Develop RNS based on most needed area of the current Concrete Pavement Road Map

2022:

- Webinar on specifications and plans for Precast Concrete Pavement (PCP).
- Potential workshop looking at ‘Ten years after MEPDG’, what are the best outcomes? What already changed?
- Potential session based on a call for papers related to comparing differences in design pre-MEPDG and AASHTO PMED. How did the changes affect the overall design, beyond pavement thickness?
- Potential workshop on design details and construction of concrete pavement as a follow-up to the 2020 ‘material to design to construction to rehabilitation needs’ Workshop. Many ideas had been introduced in those two topics and their links. How can we get what we designed for?
- Potential joint mid-year meeting in a midwestern or northeast state.
- Potential workshop on the newly developed faulting model and its impact on concrete pavement performance

2023:

- Webinar on the experience of State DOTs on Continuously Reinforced Concrete Pavements.
- Potential workshop on the use of geotextile for pavement drainage alternatives or as a separator layer. Currently, based on typical Pavement ME design, a concrete pavement designs driven by IRI instead of the fatigue cracking should be adjusted without making the subbase thicker.
- Potential webinar based on the previous year’s workshop and/or session on MEPDG/Pavement ME changes.
- Develop RNS based on most needed area of the current Concrete Pavement Road Map

Attachment A

2020 Annual Meeting

AFD50 – Design and Rehabilitation of Concrete Pavements

Committee Code	Session type	Title of Session
AFD50	Lectern Session	MnROAD: A Quarter Century of Concrete Design and Rehabilitation Contributions
AFD50	Poster Session	Jointed Plain Concrete, Continuously Reinforced Concrete, Airfield, and Novel Pavement Design and Modeling
AFD50	Published Meeting - Committee	Design and Rehabilitation of Concrete Pavements Committee
AFD50	Lectern Session	Concrete Overlays: Modeling, Fibers, and Materials
AFD50	Published Meeting - Committee	Advanced Concrete Pavement Modeling Subcommittee, AFD50(1)
Cosponsored with AFD40 and AFD60	Sunday Workshop	Impact of Connected and Automated Vehicles on Pavement Performance
Cosponsored with all Pavement committees	Thursday Workshop	Pavement Analysis Workshop (PAW)

2019 Annual Meeting
AFD50 – Design and Rehabilitation of Concrete Pavements

Committee Code	Session type	Title of Session
AFD50	Published Meeting - Committee	Advanced Concrete Pavement Modeling Subcommittee, AFD50(1)
AFD50	Published Meeting - Committee	Design and Rehabilitation of Concrete Pavements Committee
AFD50	Lectern Session	Modeling the Response of Concrete Highway and Airfield Pavements
AFD50	Lectern Session	Practical Applications in Concrete Pavement
AFD50	Poster Session	Roller Compacted and Prestressed, Precast Pavements
Cosponsored with all Pavement committees	Thursday Workshop	Pavement Analysis Workshop (PAW)

2018 Annual Meeting
AFD50 – Design and Rehabilitation of Concrete Pavements

Committee Code	Session type	Title of Session
AFD50	Published Meeting - Committee	Advanced Concrete Pavement Modeling Subcommittee, AFD50(1)
AFD50	Published Meeting - Committee	Design and Rehabilitation of Concrete Pavements Committee
AFD50 Cosponsored by AFH50 and AFH20	Workshop	Dowel Placement Evaluation and Tolerance
AFD50	Lectern Session	Proven Performance of Concrete Overlays: Part 1 (Part 2, Session 541)
Cosponsored with AFH50	Lectern Session	Proven Performance of Concrete Overlays: Part 2
AFD50 Cosponsored by AFN20	Lectern Session	PavementME: Local Calibration and More
AFD50	Poster Session	Topics Related to Concrete Pavement Design and Rehabilitation of the Future
Cosponsored with AFD80	Sunday Workshop	Innovative use of Precast Concrete to Rehabilitate Rigid and Flexible Pavements
Cosponsored with all Pavement committees	Thursday Workshop	Pavement Analysis Workshop (PAW)

Attachment B

Research Needs Statements

Developing Standard Test Methods to Determine the Mechanistic Properties of Pavement Layers for Concrete Pavement Design and Performance Analysis

Committee: AFD50, Design and Rehabilitation of Concrete Pavements

Date Posted: 4/18/2018

Date Modified: 4/25/2018

Developing a More Mechanistic Approach for Designing Concrete Pavements and Their Supporting Layers

Committee: AFD50, Design and Rehabilitation of Concrete Pavements

Date Posted: 3/18/2017

Date Modified: 3/20/2017

Alternate Design/Alternate Bid Process for Pavement Type Selection Synthesis *Archived due to research completed - Synthesis Report 499 (2017)*

Committee: AFD50, Design and Rehabilitation of Concrete Pavements

Date Posted: 1/2/2017

Date Modified: 1/9/2017

Impact of Flooding and Inundation on the Performance of Concrete Pavements, *Submitted to NCHRP2021*

Committee: AFD50, Design and Rehabilitation of Concrete Pavements

Date Posted: 1/2/2017

Date Modified: 3/18/2017

Improved Curing of Concrete Pavement

Committee: AFD50, Design and Rehabilitation of Concrete Pavements

Date Posted: 2/26/2014

Date Modified: 2/28/2014

Determine the Effect of Construction Factors on Concrete Pavement Design Parameters

Committee: AFD50, Design and Rehabilitation of Concrete Pavements

Date Posted: 11/22/2010

Date Modified: 5/9/2013

Attachment C

Count of Committee Members

U.S. Members	32*
Non-US Members	3
Minority	10
Female	8

Membership Make-up

Region

Northwest	Southwest	Central	Northeast	Southeast	International
4	7	10	4	7*	3

Slots

International	Emeritus	Young	Main	DOT
3	2	4	24	2*

Employer

Federal	State	Academia	Industry	Consultant	Local	Other
3	6*	11	4	10	0	1

*1 State DOT added after this report was pulled