

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 *	AFD20
Committee Name *	Standing Committee on Pavement Condition Evaluation
- Date(s) reviewed	February 2020
- Change, if proposed***	No change proposed.
- No. of official members approving change/total number of members **	31/32 responded affirmatively to not changing the name. Eight members did not vote after repeated emails.
Committee Scope *	This committee is concerned with the concepts, systems, and procedures for the acquisition and processing of data characterizing pavement condition to support pavement management.
- Date(s) reviewed	February 2020
- Change, if proposed ***	This committee is concerned with concepts, systems, and procedures for the acquisition, processing, and implementation of pavement performance data.
- No. of official members approving change/total number of members **	27/32 voted to approve. Eight members did not vote after repeated emails. The primary purpose of this change in scope is to make people aware that pavement performance data is being used for much more than pavement management. It is used for safety, reporting federal measures, reporting condition, and other uses outside of a pavement management system.

* 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

2.1

Year	2017	2018	2019	2020
Number of Members in Attendance at Annual Meeting		21	24	28
Number of Visitors in Attendance at Annual Meeting		56	69	63
Number of Papers Reviewed		30	38	40
Total Number in Attendance at Mid-Year Meeting	NA	NA	NA	

2.2

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

This Committee does not hold mid-year meetings (at least it has not since the Chair became a member in 2004). The committee will begin mid-year meetings in 2020 with focus on Research Needs Statements and Synthesis topics.

2.3

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

2018

- a. MMO Detection for Improved Crack Data Quality, Richard Fox-Ivey, Pavemetrics
- b. Interstate Highway Pavement Sampling, Dr. Amy Simpson, Wood E&IS
- c. Idaho District 6 Network Level Pavement Structural Data Analysis, Aaron Gerber, Kercher Group

2019

- a. Pavement Distress Detection Based on Distributed Machine Learning Algorithms and Deep Learning for Smart Cities using Real-time Sensor Data, Dr. Parth Bhavsar, Dr. Seyed-Farzan Kazemi: Postdoc Research Associate, CREATEs, Rowan University
- b. Evaluation of Road Surface Conditions by Connected Vehicles, Dr. Xiong Yu, Case University
- c. Toward a Swarm of Inexpensive Multimodal Sensor Systems for Autonomous and Quantitative Condition Assessment of Roads, Dr. Mohammad Jahanshahi, Purdue University
- d. Cobblestone and Concrete Pavement Distress Discussion, Maddalena Romano, New York City DOT

2020

- a. Planning of the 2020 ICMIPA International Conference on Managing Pavement Assets, Dr. Omar Smadi, Iowa State University
- b. Sub-mm 3D Laser Imaging and Future of Pavement Condition Surveys, Dr. Kelvin Wang, Waylink

- c. LiRA project - Live Road Condition Surveys Based on Data Collected from Car, Matteo Pettinari, Danish Road Authority; Asmus Skar, DTU Civil Engineering; and Eyal Levenberg, DTU Civil Engineering

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.

2.5

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

We had previously submitted this topic via RNS but it never got picked up by NCHRP. This topic was picked up by FHWA, funded, and the following document was issued:

- Practical Guide for Quality Management of Pavement Condition Data Collection

We had two RNS that were submitted by other entities but which has substantial input by the Committee. These are:

- Pavement Surface Georeferencing and Registration Standards and corresponding Certification and Validation Processes for Assessing Mobile Road Mapping Systems.
- Development of a Viewer Software for the 2D/3D Data Format of Pavement Surface.

2.6

Provide titles of synthesis topics submitted (by year):

- 2020 - Assessing the impact of evolving pavement data collection technology on pavement data quality management and MAP-21 target setting.

2.7

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

The Committee consists of 38 members. This is considered a full Committee slate. There is a suitable balance between US representatives and International representatives (31 US and 7 International - this is an increase of 3 International representatives since last TSP). Of these members, 15 are members of a minority demographic (an increase of 4) – 40 percent, which is a significant percentage.

Six members are female, a number that has doubled with the last rotation. Consideration of women for the next rotation will continue to be a priority.

AFD20 continues to see a lack of representation from the Northwest (2) and Central areas of the country. During the next rotation, females from the Northwest and Central regions will be proactively sought. The Committee has good membership by young members (4), the entire allotment is filled. We have identified and actively encouraged membership by the States and thus have raised representation from 6 to 9 State members.

Please see Attachment C for a summary of Committee demographics.

2.8

Other Outputs of the Committee:

- The Committee co-sponsors the FHWA quarterly webinar series on Pavement Management.
- The Committee co-sponsored the 2019 Pavement Evaluation Conference held on September 17-20, 2019 in Roanoke, Virginia. The Committee Chair was on the Planning Committee for the conference.
- The Chair of the Committee has organized and conducted the Pavement Analysis Workshop (PAWS) held on Thursday of the TRB Annual Meeting. This workshop has about 80-100 attendees.
- The Committee Chair is serving on the TRB TRR Editorial Board in the areas of Pavements and Asset Management.

We conducted the following webinars.

- Use of Traffic-Speed Deflection Devices in Network-Level PMS Applications, in association with AFD10 and AFD80 (June 8, 2017). AFD20 is the primary sponsor and the Committee Chair moderated the webinar.
- New Pavement Engineering Technologies – the Long Term Pavement Performance Climate and Bind Tools, in association with AFD80 (2017).
- Using Pavement Management to Set and Analyze Targets for Federal Reporting (2018)
- Continuous Deflection for Comprehensive Pavement Assessments (May 30, 2019), in association with AFD80.

We have been accepted to present the following webinars in 2020:

- Certification and Verification of Pavement Condition Data from Image and Sensor Technology

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- (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).*

The Committee will continue leading efforts for coordinating and disseminating research related to the evaluation and monitoring of pavement condition data. There are currently various lines of investigation with goals in the short- and the long-term identified by the Committee to be conducted through calls for papers, synthesis, webinars and other activities and products. The following list describes some pressing issues within the Committee scope:

- **MAP-21 Pavement Performance Measures.** MAP-21 mandated a move to national pavement performance measures. Final rulemaking for establishing these measures was issued in 2017. In the short term, the Committee will work on continued implementation of the rules in the pavement monitoring area especially in the data quality aspect. We will sponsor a workshop in 2021 dealing with distress data collection and as part of this workshop we will have presentations on how distress data is being captured in the MAP-21 rules and what work remains to be done. We will also encourage papers and presentations that deal with this issue. In the long-term, the Committee will work on developing RNS to assist with continued implementation of the rules, for example establishing a format for pavement image data collection – the results of this research would yield efficiencies in data collection and higher quality in pavement condition monitoring.
- **Transportation Asset Management Plans.** MAP-21 also mandated each State to develop a risk based Transportation Asset Management Plan (TAMPs) for pavements and bridges on the National Highway System. These plans rely heavily on pavement performance data to fuel the analysis for the plan and reduce risk to the agency. In the short-term the Committee will review TAMPs produced by the States and identify the opportunities for improvement listed in each plan for pavement monitoring. The Committee will then develop RNS or synthesis statements to address the gaps identified. In the long-term, we will co-sponsor conferences, webinars and other technology transfer devices to help close the gap and enable more efficient and effective data collection to fuel future TAMPs.
- **Measurement systems for pavement surface condition** are in constant evolution geared by the continuous advances and innovations in sensor technology and data processing algorithms. For instance, advances in 3D optical systems and data acquisition components have allowed for increasing the number of transverse profile coordinates measured by automated systems from less than 50 to more than 4,000 in the last few years. In addition, new research is exploring the use of satellite, aerial and unmanned aerial vehicle 3D imaging, as well as the use of cell-phone sensor data for faster, more frequent and denser collection of pavement surface data. Through use of our Subcommittee, specifically formulated to deal with this issue in 2021 we will

develop an action plan for the Subcommittee and execute this plan in the years going forward. This is considered a critical activity for the Committee to remain relevant and forward looking.

- In addition to the advances in hardware, automated measurement systems have experienced significant improvements due to the application of recent research in the areas of image processing, data analysis, storing and management, among other innovations in the software side. Examples of such innovations include the increasing application of machine learning algorithms for enhancing the accuracy of detection and quantification of surface distresses. The fast-paced innovations in the area of data mining and image processing are expected to lead to new applications and enhanced capabilities in the area of pavement condition evaluation. We will encourage paper development and perhaps conduct a synthesis in this area.
- The current lack of protocols for evaluating the quality of measurements of automated systems for the measurements of surface condition result in discrepancies among different pieces of equipment, and in some cases across time, as reported by recent research studies. Studies for the evaluation of measurement accuracy and precision of pavement condition data at both the system and the subcomponent level have used different methods for producing reference values. These methods include the use of objects with known dimension or a ground truth measuring device. There is a need for universal methods and procedures to evaluate all equipment, as successfully implemented for validating inertial profilers. We will work with TPF-5(299) on this issue through Committee member involvement in the TPF. In fact, it is critically important to the Committee to interact with TPF-5(299) moving forward as it encompasses many of the goals of the Committee.

Cross-cutting issues include:

- **Funding Sources.** As funding sources for infrastructure continue to lag, it is imperative that pavement monitoring and evaluation be as efficient and effective as possible in order to develop information that can be used to make informed investment decisions that minimize cost and risk to owning agencies. In the short term the Committee will continue its efforts to standardize pavement crack detection technology, as mentioned previously, and sponsor RNS and synthesis that lead to better pavement monitoring data. In the long term, the Committee hopes to spearhead a campaign to formalize these pavement data collection standards through AASHTO and ASTM as appropriate. As a minimum, the goal is to have a pavement crack detection standard in place by 2022.
- **Innovation and R&D Funding.** As stated in the TRB document related to critical issues in transportation, innovation is lacking and funding is insufficient for research and development activities in the United States. To address this issue, it is imperative that the Committee leverage its connections within TRB, FHWA, AASHTO, ASTM, FAA, and other national bodies that have an interest in pavement monitoring to make sure that the research that is undertaken is coordinated and not overlapping. The Committee will use its membership's affiliations to review and comment on proposed research to make sure there is limited overlap and to increase dissemination of this research within the pavement monitoring community.
- Lastly, we will work on cross-cutting issues with other TRB committees especially AFD10, Pavement Management, AFD80 Pavement Structural Monitoring and Evaluation, and AFD90, Surface Properties – Vehicle Interaction. Formation of our forward-looking Subcommittee also provides us the opportunity to interact with other committees outside the normal pavements arena and these committees will be identified as part of the roll-out of this Subcommittee.

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 major themes for the Committee over the next three years are as follows:

Theme 1. Continue to advance current technologies, especially as it relates to distress, rutting, and faulting data in support of national Transportation Performance Management rules.

Theme 2. Identify and promote new and innovative pavement evaluation technologies.

Theme 3. Advance quality management of pavement condition assessment.

The short-term and long-term tactics to meet these goals are as follow.

Projects, activities and products that the Committee will undertake during the next three years.

- Begin holding mid-year meetings to focus on RNS and Synthesis statement generation and acceptance.
- Sunset the AFD20(1) Subcommittee's current scope and reform the Subcommittee with a new focus. The present Subcommittee's focus is on Computer Image Technology for Pavement Evaluation, as it has been since 1989 when it was founded. At this point the Subcommittee has done its job. We have started the reformulation into the Subcommittee on Innovations in Pavement Condition Evaluation by obtaining approval of the Subcommittee by TRB and naming a Chair. During the next year, we will stand up the Subcommittee by developing a scope, soliciting members, and developing an action plan for their work. This will allow a more forward looking perspective on the issue of Pavement Evaluation and be progressive and proactive in identifying and bringing forward innovative technology that otherwise may not rise to the Committee's attention.

- Transportation Research (TR) Circular Activity: The Committee plans to publish one TR circular within the next three years. The circular will be based on the Automated Distress Workshop to be held in 2021.
- Workshops and Sessions: Continue organizing workshops and sessions during the TRB annual meeting on recent advancements in Pavement Condition Evaluation with the primary goal of educating stakeholders and DOT personnel on new and innovative technologies. The following workshops are considered:
 - Hold two lectern sessions and one poster session per year.
 - 2021, 2022, 2023 – Pavement Analysis Workshop. This Workshop is primarily sponsored by AFD20 and creates an avenue for ongoing research to be disseminated. This workshop has historically generated about 8-10 presentations and 60-100 participants on Thursday of TRB.
 - 2021, 2023 – Automated Pavement Evaluation Workshop. We will conduct these workshops to showcase the latest technologies and advancements in pavement data collection.
 - 2022 – Workshop in conjunction with AFD10, Pavement Management. Historically we have co-sponsored a workshop with AFD10 on a topic of interest. Even with AFD10 moving to another section we still anticipate this collaboration.

How the current or proposed changed membership composition will respond to issues identified above.

- Effort will be made to maintain a balanced distribution from diverse groups: academia, DOT/agency, and industry/consultants. The Committee will go through rotation in 2021 and the membership distribution is expected to remain the same except as identified previously in this TSP. The new joining members will be carefully selected to provide help identifying synthesis topics and in the development of appropriate and necessary RNS. This is the area within our Committee that has the most potential for improvement and as such we have identified a new RNS Coordinator to handle RNS development and submittal. This RNS Coordinator is a former Chair and has the requisite experience and knowledge to make grate improvements in this area for the Committee. He has already identified three high potential RNS statements for submittal this fall.

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.

- The Committee and Subcommittee will continue to provide numerous opportunities for participation of younger members and friends through various webinars, workshops, RNS development, etc. As mentioned above, the recently appointed Committee Research Coordinator has been very active in engaging and encouraging members and friends of AFD20 in the development of research needs statements (RNS). Specifically, during the next Committee meeting, we will devote half the meeting to a breakout sessions for brainstorming new and innovative topics for RNS. Since we always have a good turnout of Committee members and friends at our meetings, this will engage the young members, State DOTs members and friends of the Committee in the RNS and synthesis development process.

Committee's communication activities, and efforts to provide assistance and technology transfer to the transportation community

- The Committee recently developed a Committee Communication Plan. This Communications Plan has the following outline:
 - Broad Communication Purpose
 - Target Audiences
 - Key Communication Activities

- Communication Strategies
- Committee Communication Snapshot
- Enhancing Committee Communications
- Next Steps

We will continue to implement the plan.

- We will continue to solicit and hold webinars. The Committee has been very successful in obtaining approval for webinars in the past.
- Continue to utilize our Committee Google Site to facilitate communication <https://sites.google.com/site/trbcommitteeafd20/Welcome>. We will rebrand the site to our new name and number.
- Continue to utilize our LinkedIn account to spread information through that venue. We will rebrand the site to our new TRB name and number.

Research activities.

- AFD20 is making strong efforts to increase the quality and number of successful RNS it prepares and submits.
 - At the past annual meeting, substantial time has been devoted to this topic.
 - We have selected an energetic and experience RNS coordinator going forward.
 - We will also dedicate substantial time at the upcoming Committee meetings to address this need. We will hold a workshop style Committee meeting where we brainstorm, select and prioritize RNS and synthesis topics.
 - We have several new RNS statements under development and we are in the process of selecting three for further development for posting this fall.
 - The goal is to post three quality RNS statements and obtain funding for two projects during the next three years.
- We will continue to identify and synthesize statements. The goal is to produce one quality synthesis per year and obtain funding for one.
- When possible, participate in critical and cross-cutting issues identified by the TRB Executive Committee, the Technical Activities Council, and the Group/Section that fall under the scope of the Committee.
- Participate in FHWA/AASHTO efforts to update AASHTO standards on measurement of pavement cracking and rutting. This will be done through use of Committee resources to participate, implement and evaluate the results of the Transportation Pooled Fund study on this topic.
- Support the Road Profile User's Group (RPUG) and FWD User Groups.
- Co-sponsor a national pavement evaluation conference.
- Continue close coordination with the Long-Term Pavement Performance program on technical topics. We plan to investigate how Committee resources can best be used to further the goals of this unique research program. We will Co-Sponsor their yearly research results meeting during the TRB meeting.
- Continue to support technological advances in pavement evaluation technologies, including: Automated pavement distress measurement and interpretation technologies and development of one-pass measurement technology that integrates pavement distress features, transverse profile features, longitudinal profile features, safety and other features of the pavement infrastructure of interest to highway agencies.

The Committee has generated several research needs statements (RNSs) on relevant topics in the past for the National Cooperative Highway Research Program (NCHRP) but would like to achieve greater success in selection for funding. The Committee will focus on obtaining state DOT support and sponsorship for the research needs generated through the Committee for consideration by NCHRP.

The Committee will strengthen these relationships and find sponsors for its top Research Needs, and follow through with state DOT contacts to give these RNSs the best chance of competing for funds. The RNS database will be expanded through periodic solicitation and balloting of research needs statements each year so that top RNSs are stewarded through the NCHRP process, but other RNSs are retained unless they are no longer relevant.

Attachment A

2020 Annual Meeting
AFD20 – Pavement Condition Evaluation

Committee Code	Session type	Title of Session
AFD20	Lectern Session	The Future of Pavement Condition Evaluation
AFD20	Workshop	Pavement Performance Analysis Workshop (PAWS)
AFD20	Published Meeting - Committee	Pavement Condition Evaluation Committee
AFD20	Poster Session	Pavement Condition Evaluation
AFD20	Lectern Session	New Horizons in Pavement Condition Evaluation
AFD20	Published Meeting - Committee	Computer Image Technology for Pavement Evaluation Subcommittee, AFD20(1)

2019 Annual Meeting
AFD20 – Pavement Condition Evaluation

Committee Code	Session type	Title of Session
AFD20	Published Meeting - Committee	Pavement Condition Evaluation Committee
AFD20	Published Meeting - Committee	Computer Image Technology for Pavement Evaluation Subcommittee, AFD20(1)
AFD20	Workshop	Pavement Analysis Workshop
AFD20	Workshop	Advances in Automated Pavement Cracking Data Collection and Analysis
AFD20	Poster Session	Pavement Monitoring: Looking to the Future
AFD20	Lectern Session	Pavement Monitoring: Advances in Practice
AFD20	Lectern Session	Pavement Monitoring: State of the Art

2018 Annual Meeting
AFD20 – Pavement Condition Evaluation

Committee Code	Session type	Title of Session
AFD20	Published Meeting - Committee	Computer Image Technology for Pavement Evaluation Subcommittee, AFD20(1)
AFD20	Published Meeting - Committee	Pavement Condition Evaluation Committee
AFD20	Workshop	Pavement Performance Data Analysis
AFD20	Lectern Session	Promising New Technologies in Pavement Evaluation
AFD20	Lectern Session	Pavement Evaluation: Current Issues and Solutions
AFD20	Lectern Session	Pavement Condition Evaluation: Advances in Practice

Attachment B**Research Needs Statements**

We had two RNS that were submitted by other entities but which has substantial input by the Committee. These are:

- Pavement Surface Georeferencing and Registration Standards and corresponding Certification and Validation Processes for Assessing Mobile Road Mapping Systems.
- Development of a Viewer Software for the 2D/3D Data Format of Pavement Surface.

We are also currently evaluating all of the RNS that appear online with a goal of advancing three this fall.

We had one RNS that was submitted through the ACRP process that is related to AFD20.

- Comparison of Tools and Use of Results for Determining Airfield Pavement Conditions

The RNS that appear on the TRB website include:

Impact on pavement network condition when converting an agency's data collection process from manual or semi-automated, to fully automated methods.

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 4/25/2018

Date Modified: 5/29/2018

Capturing Surface Defects (Oxidation, Weathering, and Raveling) on Bituminous Concrete Pavement Surfaces using Automated Pavement Data Collection.

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 4/25/2018

Date Modified: 5/29/2018

Capturing Joint Seal Damage and/or Loss in Jointed Concrete Pavement using Automated Pavement Data Collection.

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 4/25/2018

Date Modified: 5/29/2018

Closing the Gap between Network-Level and Project Level Pavement Evaluation

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 4/25/2018

Date Modified: 5/11/2018

Evaluation of Network-Level Pavement Structural Condition Using Continuous Deflection Testing Data

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 3/21/2016

Date Modified: 4/8/2016

Calibration and verification of pavement surface images.

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 3/21/2016

Date Modified: 4/8/2016

Methodology to Determine Requirements and Specifications for Pavement Condition Data

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 3/21/2016

Date Modified: 4/8/2016

Development of Automated Condition Data Processing Tools

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 1/17/2014

Date Modified: 1/28/2014

Establish and Develop Equipment Calibration Centers and Guidelines

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 1/17/2014

Date Modified: 1/28/2014

Establish and Develop Equipment Calibration Centers and Guidelines

Committee: AFD20, Pavement Condition Evaluation

Date Posted: 1/17/2014

Date Modified: 1/28/2014

Attachment C

Count of Committee Members

U.S. Members	30
Non-US Members	7
Minority	15
Female	6

Membership Make-up

Region

Northwest	Southwest	Central	Northeast	Southeast	International
2	11	3	8	6	7

Slots

International	Emeritus	Young	Main	DOT
5	2	4	24	2

Employer

Federal	State	Academia	Industry	Consultant	Local	Other
3	9	6	1	13	1	3