

## TPF-5(291) DEVELOPMENT OF AN SPS-2 PAVEMENT PRESERVATION EXPERIMENT

Transportation Pooled Fund (TPF) Study 5(291), Development of an SPS-2 Pavement Preservation Experiment, was initially posted in August 2012. WSDOT was the Lead State and the State Highway Agencies (SHAs) from Arizona, California, Colorado, Georgia, Kansas, and North Carolina also contributed. Mr. Larry Scofield of the IGGA was the project Champion and played a key role in the development and evolution of the project. Requiring \$300,000 to be viable, contributions totaling \$420,000 were made to the project between 2013-2016. Following issuance of an RFP in 2015, NCE was selected to conduct the project work, commencing that November. More information regarding the solicitation can be found here: <https://www.pooledfund.org/details/solicitation/1336>.

TPF-5(291) experienced several changes over time, including retirements and moving into new organizational roles amongst the original TAC members, before concluding in late 2021. The purpose of this narrative is to provide a project overview, focusing on the major developments and TAC decisions over the years, and linking to the multiple activities and analyses conducted between 2015-2021. The TPF website contains quarterly reports as well as the documents referenced throughout the rest of this overview: <https://www.pooledfund.org/Details/Study/533>.

The original project report summarized the existing status of the various LTPP experiments and provided options for TAC consideration on how to implement a pavement preservation field study within the active SPS-2 test sections. Based on input from the TAC, there was a desire to determine whether predicted pavement performance and actual pavement performance matched sufficiently to use predicted performance as a control for test sections receiving a pavement preservation treatment. A modification was issued to perform a series of AASHTOWare PavementME Design software runs and compare predictions to actual performance. Based on these analyses, the predictions were not sufficiently accurate to serve as control sections. Both the original report (***Final Report – Development of SPS-2 Pavement Preservation Experiment – Phase I***) and the comparison report (***Final Report – Comparison of Predicted and Actual SPS-2 Performance Using AASHTOWare PavEME***) were reviewed and approved by the TAC. The final documents can be found here (expand the “Documents” section): <https://www.pooledfund.org/Details/Study/533>.

At the request of the TAC, information on work performed was routinely shared with the Long Term Pavement Performance (LTPP) Program. One of the FHWA LTPP Team Members served as a liaison on the TAC, and time was set aside at multiple Team LTPP Meetings (wherein the FHWA and representatives from the primary LTPP contractors would meet to discuss Program activities) to share updates on the status of TPF-5(291). Upon discussions over two years and multiple Team LTPP Meetings, it was determined by FHWA that any pavement preservation treatments applied to any of the test sections would immediately put the test section(s) out-of-study. Recognizing this, the TAC determined not to move forward with any field experiments and to pursue alternative analyses relevant to the SPS-2 test sections.

Concurrent with the discussions described above, it was approved to plan and support a series of SPS-2 Tech Days. The intent of the Tech Days was to inform a broader audience regarding the presence of the SPS-2 projects and of the Pooled Fund itself, and to solicit input regarding potential future activities. Conducting the Tech Days involved support from not just the Pooled Fund, but from the SHAs, industry, and the FHWA/LTPP Program. Table 1 shows the schedule of Tech Days performed.

While no two Tech Days were identical, the basic approach was to marry a classroom discussion with a field review of the SPS-2 project located in each State. The classroom presentations typically included a review of the LTPP Program, the SPS-2 experiment, and details on the construction of the SPS-2 project in that State. Other presentations included topics such as local approaches to pavement preservation, complimentary research at the local and national levels, and details specific to TPF-5(291).

A typical Tech Day included approximately 40 attendees, which were a mix of Agency, industry, academia, and contractor personnel. The field walks were particularly enlightening, where participants were struck by differences in performance between design features that were revealed over the 20+ years. Frequent observations included how well so many test sections were still performing, why some were performing better or worse than others, and how beneficial the experience was. Attendees were given layouts of the test sections and provided feedback regarding potential preservation activities.

Table 1. Completed SPS-2 Tech Days

TPF-5(291), SPS-2 TECH DAYS		
State	Date	Location
Arizona	2/21/2018	Phoenix
Colorado	3/23/2018	Denver
Washington	5/2/2018	Ritzville
Iowa	5/30/2018	Pleasant Hill
Kansas	10/2/2018	Abeline
North Dakota	10/16/2018	Bismarck/Fargo
California	3/12/19	Stockton/Delhi
Arkansas	3/19/19	Little Rock
Ohio	5/22/19	Delaware (OH)

In addition to broadening the knowledge regarding the SPS-2 experiment, the SPS-2 Tech Days also served as an excellent source of ideas regarding additional analyses beneficial to the pavement community. This resulted in selecting an array of studies and other project activities performed between 2019-2021. The subject matter of these studies along with the file names for the related reports (in ***bold italics***) are included below (as noted above, all documents can be downloaded from the "Documents" section on: <https://www.pooledfund.org/Details/Study/533>).

- Deterioration rates to evaluate impact of SPS-2 experimental design features: ***Final Report – Evaluating the Impact of Design Features on Pavement Performance***
- Utilizing existing performance data (FWD, distress, and longitudinal profile) to assess impacts of initial smoothness on performance, impact of shoulder type on performance, and impact of design feature on load transfer efficiency: also, ***Final Report – Evaluating the Impact of Design Features on Pavement Performance***
- Investigating the availability of existing data among non-LTPP data sources (e.g., through the respective SHA). This activity was stopped following the survey phase as planned visits to selected SHAs was not practical due to COVID-19.
- Leveraging two existing LTPP research reports and expanding with regards to SPS-2 test sections:
  - Areas of localized roughness (ALR)
  - Joint score

***Final Report – Analysis of Impact of Joint Score and ALR on Pavement Performance***

- Assessing previous analyses of SPS-2 projects and updating as practical utilizing the additional performance data collected since the original work was done. Also, updating the experimental matrix based on measured data (as opposed to the assumed properties when the projects were nominated): ***Final Report – Updating previous LTPP Analyses and the SPS-2 Experimental Matrix***
- A combined report including documenting performance trends at each SPS-2 experiment, assessing the impact of construction and materials issues on test section performance, reviewing early failures of SPS-2 test sections, and evaluating each state supplemental test section; supplemental test sections were selected and designed in addition to the core test sections by many of the SHAs: ***Final Report – Evaluating the Impact of Non-Experimental Factors on Pavement Performance***
- Assessing the impact of changes in climate, traffic, and overall condition on deterioration rate: *Final Report – Impact of Changes in Climate, Traffic, Distress, and Maintenance on Deterioration Rate* (includes Appendix B as a separate download)
- Comparing the performance of SPS-2 test sections to that of similar test sections as part of the SPS-8 experiment, including reviewing the previous FHWA report evaluating the performance of SPS-8 test sections: ***Final Report – Comparison of SPS-8 and SPS-2 Performance***
- Utilizing recent diurnal measurements of longitudinal profile, evaluate the results to see if there may be a neutral temperature that could be developed for each project and whether it relates to the time of paving: ***Final Report – Diurnal Changes in Roughness***
- Estimate the age of pavement at the time of failure based on projections of performance measured and selected failure criteria: ***Final Report – Service Life Evaluation***
- Plotting SPS-2 construction mix designs on Shilstone and Tarantula curves and assess whether there are relationships to field performance. Also assess whether factors such as paste volume, void ratio and other mix design parameters impacted constructability and performance: ***Final Report – Evaluating the Impact of Mix Design on Performance***

- Assess if MEPDG predictions improve based on the assumed PCC/LCB bond condition (unbonded vs. full friction loss at 240 months); this expanded into assessing the impact of these assumptions on all base types; also determine if using a different reliability improves predictions: ***Final Report – MEPDG Analysis of the PCC-Base Friction Loss***
- Evaluate in-situ diurnal and seasonal joint opening widths for those SPS-2 test sections included in the LTPP Seasonal Monitoring Program: ***Final Report – Evaluation of Transverse Joint Opening Width***

The above reports are intended to serve the pavement community. WSDOT's leadership in making this possible is greatly appreciated, as is the support from all of the TAC members over the years. This also wouldn't have been possible without the treasure trove of information available as part of the LTPP Program.