

FHWA Pavement Preservation Strategic Plan

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FHWA Pavement Preservation Strategic Plan

Introduction

Federal Highway Administration (FHWA) guidance describes preservation as work that is planned and performed to improve or sustain the condition of the transportation facility in a state of good repair.¹ Preservation activities generally do not add capacity or structural value but maintain the overall condition of the transportation facility. In general, the goals of pavement preservation activities include preserving the investment in a roadway, enhancing safety, extending pavement life, improving functional performance, and contributing to increased user satisfaction without increasing structural capacity.² A common mantra of pavement preservation is *keeping good roads good*. Constructing quality pavement preservation treatments while the pavement condition is still satisfactory can impede deterioration, extend service life, and improve functionality in a cost-effective manner.

Although the benefits of pavement preservation are generally recognized, its systematic implementation in pavement management practice is still underdeveloped. Thus, increasing the understanding of the life cycle of pavement preservation techniques is important for project planning purposes. The Moving Ahead for Progress in the 21st Century Act (MAP-21; P.L. 112-141) required all State departments of transportation (DOTs) to develop risk-based transportation asset management plans (TAMPs) for pavements and bridges on the National Highway System.³ Life-cycle planning, which is defined in 23 CFR 515.5 as a process to estimate the cost of managing an asset class or sub-group (for example, pavements) over its whole life with consideration for minimizing cost while preserving or improving the condition, is a required component of TAMPs.⁴

Advancing effective application of pavement preservation involves better integration of research, implementation, and deployment activities as well as considerations of pavement management and asset management. To that end, FHWA has refocused its Pavement Preservation Program to prioritize these various needs.

The main objective of this document is to outline the strategic plan for the FHWA Pavement Preservation Program. This plan reflects efforts to date, key stakeholders, and opportunities to advance effective adoption of a pavement preservation program.

To identify key elements of this strategic plan, a meeting was held in March 2019. Participants included representatives of FHWA offices (Headquarters, Resource Center, Turner-Fairbank Highway Research Center (TFHRC), Federal Lands Highways (FLH), and Division Offices) involved with carrying out the Agency's pavement preservation activities. As a result of this meeting, the strategic elements of the FHWA Pavement Preservation Program have been designed to align

¹ [Guidance on Highway Preservation and Maintenance memo dated February 25, 2016.](#)

² See 23 U.S.C. 116(a)(2).

³ 23 U.S.C. 119(e)(1).

⁴ 23 CFR 515.9.

with FHWA's overall mission and directed toward addressing existing efforts, stakeholders, research, education, and deployment needs. This plan is intended to help define the path forward to facilitate the FHWA's role in the effective implementation of pavement preservation.

Background

History

With the massive expansion of the roadway system and increases in traffic volume during the last 50 years, the importance of sustaining the long-term performance, maintenance, and preservation of roadways has emerged. Historically, agencies focused on construction and major rehabilitation with little or no emphasis on performance and preservation. Agencies experimented with applying specific project treatments at specific locations but not as part of systemwide pavement programs. Many projects demonstrated that the proper application of a treatment could extend the life of a pavement at a relatively low cost. However, not all projects were successful due to factors such as poor timing, inappropriate treatments, substandard materials, and inexperienced construction crews. Furthermore, agencies have not typically dedicated funding toward pavement preservation, nor considered it in design. Shifting of program emphasis from building and improvement to long-term performance and preservation involves both a national scope and a local sense of purpose.

The FHWA has supported several important initiatives in the past to advance pavement preservation. One of the first activities was the Strategic Highway Research Program (SHRP). The program devoted resources to the Long-Term Pavement Performance Program (LTPP) for studies (known as Specific Pavement Studies SPS-3 and SPS-4) that developed and coordinated construction of test sections for asphalt and portland cement concrete surfaced roadways, respectively, in 1990. The Second Strategic Highway Research Program (SHRP2) included efforts focused on pavement preservation for high traffic volume roads. The main outcomes of this project included identifying several champion States that considered preservation systematically in their pavement management plans as well as the development of educational resources that address the needs of the practitioners. In 2008, FHWA published the Transportation System Preservation Research, Development and Implementation Roadmap.⁵ This report highlighted the need to integrate considerations of pavement preservation into pavement management systems. The FHWA's Every Day Counts (EDC) Round 4 included innovations that involved improving preservation construction practices and the inclusion of pavement preservation in overall strategic pavement programs.

While these activities demonstrated a strong interest in pavement preservation by FHWA and State DOT partners, a formal FHWA pavement preservation program has not existed for many years. In recent years, the requirements for TAMPs per 23 CFR 515.9, advances in the pavement preservation industry, and efforts on standardization for products and construction methods

⁵ Available at: <https://rosap.ntl.bts.gov/view/dot/36559>

suggest that the time is appropriate for FHWA to establish a dedicated Pavement Preservation program.

Linkage to the FHWA strategic plan & overall pavement program

The 2019-2022 FHWA Strategic Plan states:

The FHWA will continue to raise the awareness of proven strategies, such as performance-based practical design, and the use of preservation techniques to cost-effectively extend the service life of transportation assets that could further improve investment decision making.

Accordingly, the enhancement of current practices in pavement preservation directly ties into the FHWA Strategic Plan. Specifically, as related to asset management and performance management, pavement condition measures are designed to track activities that improve or sustain pavement performance. Pavement preservation is integral to the Agency's efforts to address the following strategic objectives from the FHWA Strategic Plan:

- *Improve program and project decision-making by using a data-driven approach, asset management principles, and a performance-based program that leads to better conditions and more efficient operations.*
- *Enhance the safety and performance of the Nation's transportation system through research and by accelerating the development and deployment of promising innovative technologies and practices.*

FHWA Roles & Responsibilities

A more coordinated FHWA pavement preservation program will yield a comprehensive set of resources to assist State DOTs and other highway owners to implement effective pavement preservation policies and programs. The FHWA Strategic Plan clearly establishes FHWA's role in preservation as one that will meet these needs. Specifically, this role in pavement preservation is as follows:

- To provide policy and leadership (including training and technology transfer) toward effective application of pavement preservation within an overall pavement management process.
- To demonstrate the economic, social and environmental benefits derived from proper implementation of preservation programs.
- To conduct and sponsor research to address pertinent pavement preservation questions and needs of national significance.

This plan will be implemented within the FHWA Pavement & Materials Program. The following teams are responsible for implementing the plan:

- Office of Research, Development, and Technology Office of Infrastructure R&D (RD): Infrastructure Materials (HRD-10), Infrastructure Analysis and Construction (HRD-20), and Long-Term Infrastructure Performance (HRD-30) Teams.

- Office of Technical Services Resource Center (RC): Pavement & Materials Technical Services Team.
- Office of Infrastructure Office of Preconstruction, Construction, and Pavements (HQ): Construction (HICP-30), Pavement Materials (HICP-40), and Pavement Design and Performance (HICP-50) Teams.

In addition, staff from the Office of Stewardship, Oversight, and Management's Asset Management Team, FLH and the Federal-aid Division Offices will be engaged as appropriate.

Stakeholders

Pavement preservation programs are generally conducted by State and local transportation agencies. These programs are supported by other government-sponsored, academic, and industry organizations that provide significant knowledge and expertise in pavement preservation. Key stakeholder organizations for pavement preservation include the following entities:

Government-Sponsored Organizations:

- American Association of State Highway and Transportation Officials (AASHTO)
- AASHTO Emulsion Task Force (ETF)
- American Public Works Associations (APWA)
- Transportation System Preservation Technical Service Program (TSP2)

Industry Organizations:

- American Concrete Paving Association (ACPA)
- Asphalt Institute (AI)
- Asphalt Emulsion Manufacturers Association (AEMA)
- Asphalt Recycling & Reclaiming Association (ARRA)
- Foundation for Pavement Preservation (FP²)
- International Grooving and Grinding Association (IGGA)
- International Slurry Surfacing Association (ISSA)
- Pavement Preservation & Recycling Alliance (PPRA)

Academic Organizations

- National Center for Pavement Preservation (NCPPI)
- California Pavement Preservation Center (CP2)
- National Concrete Pavement Technology Center (CPTech)

Pavement Preservation Technical Feedback Group (PPTFG)

Since the 1990s, FHWA has convened an external stakeholder feedback group to better understand public agency, industry, and academia needs and to support FHWA's efforts in preservation. The main goal of this group was to examine national efforts in pavement preservation and develop information that would bridge the knowledge gaps in research and

implementation. In 2019, the group was revamped to better align with FHWA's more focused approach to pavement preservation. The group, now called the Pavement Preservation Technical Feedback Group (PPTFG) is made of individuals that represent key stakeholders in pavement preservation. The new group is focused on conveying key challenges and observations from the pavement preservation community that will provide valuable technical information to FHWA's strategic program.

Making a Difference

In the preparation of this plan, the following opportunities were identified where FHWA can address specific pavement preservation needs identified by the various stakeholders:

- Expand the knowledge and experience in using various pavement preservation materials or technologies.
- Demonstrate the positive impacts (economic, environmental, and social) that can result from the use of a various pavement preservation treatments.
- Market the benefits of using pavement preservation approaches to pavement engineers, planners, designers, maintenance engineers, and executive management.
- Improve understanding and expertise in implementing pavement preservation programs as related to pavement management or other strategic processes.
- Encourage agencies to become more pavement preservation oriented through demonstration programs and other technical support.
- Foster collaboration and cooperation among stakeholders and partners.

Table 1 identifies opportunities specific to each group of key stakeholders. These potential opportunities were used to identify the strategic components of the Pavement Preservation Program outlined later in this plan.

Table 1: Potential Opportunities for Wide and Efficient Pavement Preservation Implementation Among Key Stakeholders.

Stakeholder	Opportunities
State DOTs	Expand existing pavement preservation programs and available treatments; develop appropriate specifications and inspection techniques to deliver successful preservation projects; measure and calculate benefits of strategic use of preservation techniques; incorporate pavement preservation in project planning and decisionmaking; and communicate benefits of a strategic pavement preservation program to management, elected officials, and the public.
Industry	Identify effective pavement preservation practices that provide substantial benefits when used strategically; provide educational and technical resources, specifications and standards for pavement preservation products and practices; identify champions to promote successful programs and practices.
Local agencies	Expand existing pavement preservation programs and identify new treatments that are practical at the local level; develop appropriate specifications and inspection techniques to deliver successful preservation projects; measure and calculate benefits of strategic use of preservation techniques; incorporate pavement preservation in project planning and decision-making; and communicate benefits of a strategic pavement preservation program to management, elected officials, and the public.
Public	Identify and support strategic efforts that result in improved conditions, lower costs, and improved resilience through expanded education programs.
FHWA	Define strategic pavement preservation life-cycle metrics and methods for calculating benefits, identify champions with successful programs and practices to promote technologies, encourage integration of strategic pavement preservation in planning, programming, and asset management activities; conduct needed research in pavement preservation products and construction techniques that extend pavement life and simplify specifications, testing, and inspection efforts; provide opportunities for education, training, and communicating strategic benefits to stakeholders.

Strategic Elements of Pavement Preservation Program

The graphical summary in Figure 1 conveys the strategic elements and their hierarchical linkages to the FHWA Pavement Preservation Program, including potential activities to support program strategies.

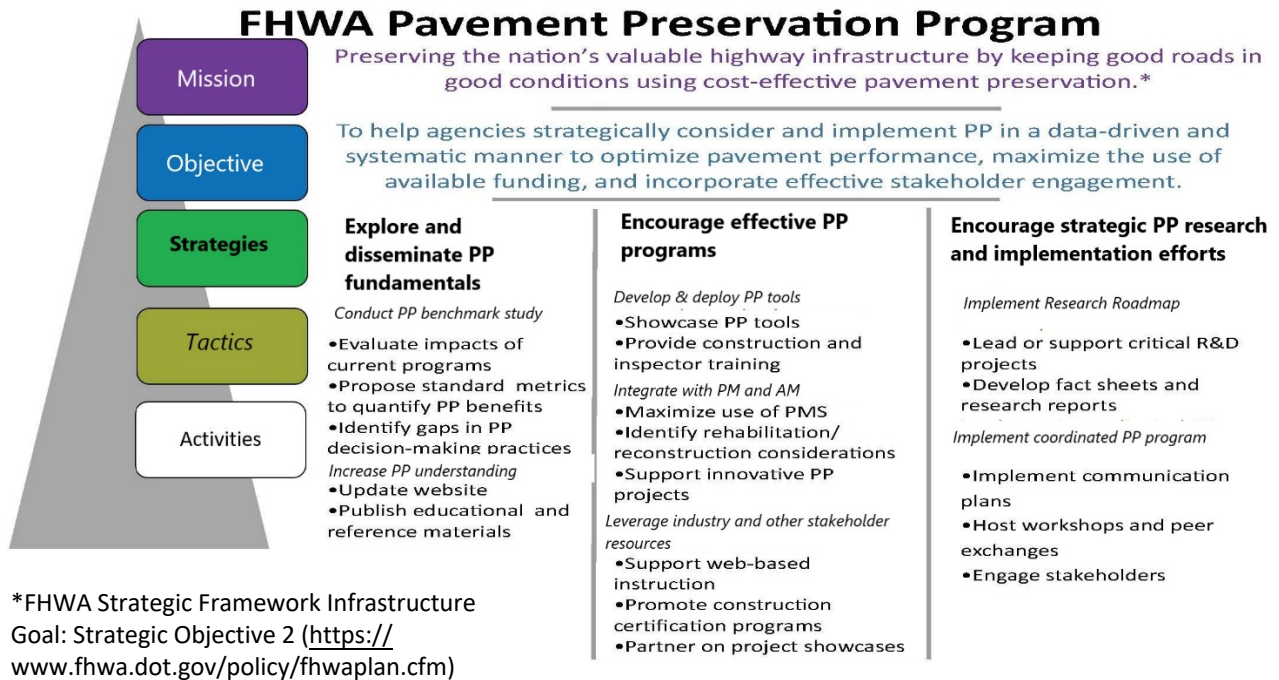


Figure 1: Strategic Elements of FHWA Pavement Preservation Program.

Mission

Preserving the nation's valuable highway infrastructure by keeping good roads in good conditions by using cost-effective pavement preservation.

Consistent with the FHWA Strategic Plan 2019-2022, the Program's mission statement reflects the importance of asset management and performance-based considerations that are cost-effective and data-driven.

Objectives

Since there is no Federal statutory mandate to implement pavement preservation programs and activities,⁶ the primary objective for the Pavement Preservation Program is to help State and local agencies to strategically consider and implement pavement preservation programs in a data-driven and systematic manner to optimize pavement performance, maximize the use of available funding, and incorporate effective stakeholder engagement.

Achieving this objective is expected to lead to significantly lower annual expenditures per mile of roadway for highway agencies. For example, Ohio DOT reports that the State realized approximately \$300 million in cost reductions due to its strategic preservation program. This funding was reallocated to priority projects.⁷

Strategies

Strategy 1: Explore and disseminate fundamentals of pavement preservation

One of the major stumbling blocks for pavement preservation has been an inconsistency in quantifying benefits, particularly when evaluating entire networks and when considering long-term impacts. This issue will be addressed through a benchmarking study capturing existing State practices and expectations as well as proposing methods for quantifying benefits. This effort will be followed by a program to enhance the education of stakeholders on pavement preservation treatments, project selection, quantification of impacts, and measuring benefits. Some of the specific activities to support this strategy are listed.

Conduct benchmarking study of pavement preservation

- Identify current pavement preservation practices using a survey of agencies.
- Conduct a literature review of effectiveness of pavement preservation approaches.
- Research possible metrics to measure effectiveness of pavement preservation in reducing costs, maintaining conditions, and sustaining roads.
- Identify knowledge and experience gaps in pavement preservation decisionmaking practices, such as data collection and network-level evaluation.

⁶ The provisions in 23 U.S.C. 116(a) define pavement preservation programs and activities and make them part of preventive maintenance. However, the provision does not mandate State action in this area.

⁷ ODOT, *Transportation Asset Management Plan*, p. 79 (2019), available at: http://www.dot.state.oh.us/AssetManagement/Documents/ODOT_TAMP.pdf.

Increase fundamental understanding of pavement preservation

- Coordinate the development and implementation of a plan for educating and communicating various aspects and benefits of pavement preservation to different audiences (executive, engineering, public, industry).
- Improve the FHWA website by consolidating, reorganizing, and updating pavement preservation content.
- Publish documents such as case studies for engineers and business cases for executives on safety, investment, and time considerations.
- Facilitate education and training.
- Publish infographics, videos, and demos.
- Host peer exchanges, site visits, and conferences.
- Partner with Transportation Research Board (TRB) committees.

Strategy 2: Encourage effective pavement preservation programs

Facilitating the broad adoption of pavement preservation into existing pavement programs is a key part of the strategic program. Agencies that have resolved past issues with preservation projects and that have trained staff to conduct the program are likely to realize significant benefits. To facilitate the implementation, several activities were identified and outlined. First, the development and deployment of tools directed toward implementation should be undertaken. Second, pavement preservation will be integrated with the existing performance management, pavement management, and asset management activities. Third, an effort will be undertaken to maximize industry and other resources to support effective pavement preservation programs.

Develop and deploy pavement preservation tools

- Implement a pavement preservation tools showcase.
- Conduct training in pavement preservation construction.
- Conduct training in inspection of pavement preservation projects.
- Identify pavement preservation considerations during pavement design activities.

Integrate pavement preservation with Pavement Management and Asset Management

- Provide training on making pavement preservation as an integral part of life-cycle analysis for pavements.
- Provide techniques and tools to identify appropriate preservation, rehabilitation, and reconstruction options.
- Encourage use of innovative pavement preservation applications.
- Maximize use of Maintenance Management Systems (MMS) for tracking pavement preservation performance.

Leverage industry and other stakeholder resources

- Encourage use of existing web-based training programs.
- Support pavement preservation certification programs for construction personnel and inspectors.

- Support industry and agency showcases for successful pavement preservation programs.

Strategy 3: Facilitate strategic pavement preservation research and implementation efforts

A recent effort to develop the Pavement Preservation Research Roadmap identified several issues related to the selection, design, and installation of pavement preservation products on roads that need further investigation. The FHWA and other stakeholders will conduct research projects to address the most critical of these needs and focus attention on linking the findings to implementation efforts.

Implement the Pavement Preservation Research Roadmap

Based on the Research Roadmap, research activities should aim to enhance the following aspects of pavement preservation:

- Asset management and pavement management systems;
- Pavement preservation treatment design – selection and timing;
- Materials and appropriate specifications;
- Construction and contracting alternatives;
- Accelerated and long term performance; and
- Long-term benefits.

Results from these studies will be provided using fact sheets, reports and other publications.

Develop and implement a coordinated Pavement Preservation Program

A key aim for developing this strategic plan is to provide a framework for a more coordinated FHWA pavement preservation program that can most effectively address the gaps and needs of various stakeholders. The following activities will help ensure this coordination as well as accountability in carrying out this plan.

- Develop a coordinated communication and marketing plan;
- Link deployment and research activities;
- Hold regular FHWA program meetings; and
- Engage stakeholders through FHWA participation and sponsorship of various activities such as conferences, workshops, webinars, and the technical feedback group.

Measures

To help evaluate the effectiveness of the strategies identified for the Pavement Preservation Program, the following measurable outcomes have been identified for each strategy. FHWA will track ongoing pavement preservation activities in the transportation community and as appropriate will adjust its objectives and strategies to best meet the needs of stakeholders and address the opportunities identified in this plan.

Table 2: Strategies and Measurable Outcomes of the Pavement Preservation Program.

Strategy	Measurable Outcome
1) Explore and disseminate fundamentals of pavement preservation	Conduct benchmarking study. Develop metrics definition document and outreach program.
2) Encourage effective pavement preservation programs	Lead transportation pooled fund study to demonstrate integrated systems approach to pavement preservation.
3) Facilitate strategic pavement preservation research and implementation efforts	Initiate research projects with States on benefits of pavement preservation

Implementation Plan

Table 3 projects a 5-year implementation plan for the FHWA Pavement Preservation Program. This plan will be reevaluated annually to ensure that the Program is aligned with the priorities of FHWA as well as the needs of the Program’s stakeholders.

Table 3: 5-year (2020-2024) Implementation Plan for Pavement Preservation Program.

#	Tactic	Strategy	Impacted Stakeholders	Timeframe	Responsibility
1	Conduct Benchmarking/Metrics Study	Strategy 1	All	2021-2022	HICP-50
2	Evaluate whether the definition of pavement preservation would benefit from clarification.	Strategy 1	State and local DOTs	2020-2024	HICP-50, HCIP-30
3	Implement PP tools showcase and demonstration program	Strategy 2	State and Local DOTs	2020-2024	HICP-30, HICP-50, RC
4	Publish Pavement Preservation Research Roadmap	Strategy 3	All	2020	HRD-20, HICP-30
5	Develop and implement communication plan	Strategy 2	All	2021-2024	HICP-50
6	Formalize training efforts and develop tools for knowledge transfer	Strategy 2	All	2020-2024	RC, HICP-30, HICP-50, Industry, Academia

#	Tactic	Strategy	Impacted Stakeholders	Timeframe	Responsibility
7	<i>Facilitate critical research projects</i>	<i>Strategy 3</i>	<i>All</i>	<i>2020-2024</i>	<i>HRD-10</i>
8	<i>Hold biannual PPTFG meetings</i>	<i>Strategy 3</i>	<i>All</i>	<i>2020-2024</i>	<i>HICP-30, RC</i>
9	<i>Develop pavement preservation considerations reference document</i>	<i>Strategy 2</i>	<i>All</i>	<i>2020-2022</i>	<i>HICP-30</i>
10	<i>Conduct pavement preservation treatment research using the pavement testing facility</i>	<i>Strategy 3</i>	<i>All</i>	<i>2021-2024</i>	<i>HRD-10</i>
11	<i>Participate in the NCAT/MnROADS Preservation Pooled Fund Study</i>	<i>Strategy 3</i>	<i>All</i>	<i>2020-2024</i>	<i>HRD-20, RC</i>
12	<i>Encourage quality assurance (QA) in pavement preservation</i>	<i>Strategy 2</i>	<i>All</i>	<i>2021-2024</i>	<i>HICP-30</i>

Conclusion

This is a new era for the pavement preservation program at FHWA. This plan is aimed at assisting FHWA in delivering a pavement preservation program that meets the needs of our stakeholders. The FHWA is committed to working with its partners to raise the awareness of proven preservation strategies by exploring current practices, disseminating information to increase understanding, encouraging effective programs, and facilitating strategic research and implementation efforts.