

# FHWA BRIDGE PRESERVATION EXPERT TASK GROUP (BPETG)



9/29/2016

Strategic Plan – Final

The FHWA Bridge Preservation Expert Task Group Strategic Plan identifies strategic objectives, actions and tasks in the area of highway bridge preservation by working collaboratively with Federal, state and local agencies, industry, and academia.



# FHWA Bridge Preservation Expert Task Group (BPETG)

## STRATEGIC PLAN – FINAL

### VISION

Bridge preservation today...for a better transportation infrastructure tomorrow.

### MISSION

The BPETG will advance and improve the state of the practice in the area of highway bridge preservation by working collaboratively with Federal, state and local agencies, professional associations (AASHTO, TRB, etc.), industry, and academic interests.

### GOALS

- **Provide guidance on cost-effective bridge preservation strategies** for increased service life of highway bridges to support the national economy and quality of life for users
- **Promote bridge preservation as a component of asset and performance management** by demonstrating the need and benefits of adequate funding for preserving existing infrastructure
- **Advise and assist in developing educational materials on bridge preservation strategies**, materials, technologies and specifications
- **Foster a collaborative environment that encourages research and innovation** by identifying gaps and supporting an outcome-driven work plan that reflects a balanced and prioritized consideration of research, policy, program development, and deployment initiatives

### OBJECTIVES

The following strategic objectives and action item provide direction for future work:

**Strategic Objective 1** – Provide guidance on cost-effective bridge preservation strategies

**Strategic Objective 2** – Promote bridge preservation as a component of asset and performance management

**Strategic Objective 3** – Advise and assist in developing educational materials on bridge preservation

**Strategic Objective 4** – Foster a collaborative environment that encourages research and innovation

## WORK PLAN (2016 – 2018)

### Strategic Objective 1 – Provide guidance on effective bridge preservation strategies

#### ACTION 1 – UPDATE THE FHWA BRIDGE PRESERVATION GUIDE

Champion	Start Date	End Date	Outcome/Product
Raj Ailaney	April, 2016	April, 2017	Revised Bridge Preservation Guide

Background – The FHWA Bridge Preservation Guide provides bridge related definitions and corresponding commentaries, as well as the framework for a systematic approach to a preventive maintenance program. The guide was originally published by FHWA in August, 2011, when SAFETEA-LU was in effect and bridge repair and rehabilitation activities were funded by the Highway Bridge Program. With the enactment of MAP-21 and now FAST-Act, the Highway Bridge Program was replaced by the National Highway Performance Program and Surface Transportation Block Grant Program. These two programs now allow bridge preservation activities to be eligible for Federal funds. As a result, FHWA guidance on bridge preservation was changed on February 25, 2016. Now, there is a need to revise the FHWA Bridge Preservation Guide, so that, it is consistent with the new law and revised FHWA policy.

*Tasks:*

1. Review FAST Act, FHWA policies and memos related to bridge preservation
2. Develop draft update of the revised guide to share with BPETG members and get input from AASHTO and TRB Technical Committees
3. Revise and publish an updated guide

#### ACTION 2 – DEVELOP A TRANSPORTATION ASSET PRESERVATION PORTAL

Champion	Start Date	End Date	Outcome/Product
Chris Keegan / Raj Ailaney	April, 2016	March, 2018	Web-based Preservation Portal

Background – Preservation offers State DOTs a way of increasing the return on their infrastructure investment. States have developed their own maintenance/preservation reference manuals, repair handbooks, and established maintenance policies, programs and practices. States can also use knowledge from NHI courses for maintaining transportation assets. However, there is a need for establishing a repository of information on preservation/maintenance actions that is readily available via internet. This web based portal will provide ready access to the state and local agency engineers, and also foster consistency among states and local agencies in maintaining and preserving their transportation assets.

*Tasks:*

1. Establish a pooled fund project, promote to bridge preservation community and solicit funding
2. Develop statement of work, advertise and hire a consultant
3. Provide guidance to the contractor and contract with NCPP to include the portal on TSP2 website

**ACTION 3 – DEVELOP POCKET GUIDES SERIES ON PRESERVATION OF DECK, SUPERSTRUCTURE, SUBSTRUCTURE, AND CULVERT**

Champion	Start Date	End Date	Outcome/Product
Gregg Freeman / Sue Lane	April, 2016	Varies	Pocket guides to improve construction quality

Background – To promote preservation activities with an emphasis on construction quality, it is proposed to develop a series of several pocket guides on decks, superstructures, substructures and culverts. Following titles will be covered in these series:

**Decks:**

Series	Title	Target Completion Date	Members
D-1	Deck Cleaning and Washing		<b>Fred Grant</b> – DBI Services; Michael C. Brown - VTRC
D-2	Deck Crack Sealing and Overlays		<b>Gregg Freeman</b> – Kwik Bond Polymers; Jason DeRuyver – MDOT; Mike Stenko - Transpo
D-3	Deck Joints Maintenance		<b>Debbie Steiger</b> – Watson Bowman Acme; Phil Benevides – Emseal Bridge and Highway
D-4	Deck Drainage System Maintenance		
D-5	Deck Corrosion Protection		

**Superstructure:**

Series	Title	Target Completion Date	Members
SP-1	Bridge Coatings		<b>Ross Hammond</b> – FL DOT
SP-2	Impact Damage Repairs		
SP-3	Beam Repairs and Strengthening		
SP-4	Maintenance of Bearings		

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Substructure:

Series	Title	Target Completion Date	Members
SB-1	Concrete Crack Repairs		
SB-2	Pile Repairs		
SB-3	Scour Repairs		

Culverts:

Series	Title	Target Completion Date	Members
CV-1	Culvert Cleaning		
CV-2	Corrugated Metal Pipe Repair		
CV-3	Concrete Pipe Repair		

*Tasks:*

1. Gather Subject Matter Experts for each category
2. Develop proper installation/repair guidelines
3. Develop checklists for equipment and tools needed for proper installation/repair
4. Identify limitations and restrictions including regional climates, traffic, and storage
5. Identify potential failure mechanisms and how to avoid them
6. Recommend training for proper installation for contractors and inspectors
7. Identify required technical support during installation
8. Recommend quality control and quality assurance guidelines
9. Develop presentation and training in support of the pocket guides
10. Present and monitor feedback from attendees

**ACTION 4 – DEVELOP A FORMALIZED ANALYTICAL APPROACH/DECISION-MAKING PROCESS FOR BRIDGE PRESERVATION ACTIVITIES**

Champion	Start Date	End Date	Outcome/Product
George Hearn / Bruce Johnson	April, 2016	March, 2017	Improved processes for bridge preservation activities

Background – First, define some terms:

*Beneficial* preservation program: Costs of preservation actions are less than (monetized) benefits.

*Optimal* preservation program: A beneficial program in which *benefits*, or (*benefits – cost*), or other objective measure is maximized.

*Effective* preservation program: An optimal program that is modified by practical constraints such as coordination of work along route segments, and deployment of crews/contractors to perform similar actions at many bridges in one geographic region.

We seek effective programs for preservation.

An optimal program maximizes some objective measure. Measures can be comparisons of direct costs and direct monetary benefits such as (*benefit – cost*). Measures can be weighted by effect on road users (*benefit – cost*) X ADT. Many measures can be proposed.

The outcome of a mathematical optimization for bridge preservation depends on deterioration rates of bridge elements, extensions to service life gained by preservation actions, and costs of actions. These quantities vary slowly year-to-year. As a result, an optimization performed in one year has results that are similar to results from previous years. Effective preservation programs that are modifications of optimal programs also will apply similar sets of actions and intervals for actions over many years. For this reason, programs can be reduced to agency rules, and rules persist over many years (see Objective 2 Action 1). Periodically, the optimization must be performed anew, and effective programs adjusted in response.

We will collect and report on approaches to optimization of programs for bridge preservation and the effective (practical) programs that are based in optimization.

*Tasks:*

1. Collect/form objective measures for use in optimization of preservation programs.
2. Collect/form process to monetize benefits of preservation.
3. Collect/list considerations to address in formation of effective programs for preservation.
4. Assemble a report on the information collected in tasks 1, 2 and 3.

**Strategic Objective 2 – Promote bridge preservation as a component of asset and performance management**

**ACTION 1 – DEVELOP AGENCY POLICY RULES FOR BRIDGE PRESERVATION DECISIONS**

Champion	Start Date	End Date	Outcome/Product
George Hearn / Dave Juntunen	April, 2016	March, 2018	Agency policy rules for selecting bridge preservation activities tied to bridge management products

Background – Policies, expressed as rules, are needed for systematic, automatic direction/administration of programs for bridge preservation. Policy should be based on quantitative evaluations to identify effective programs. Evaluation of programs is addressed in objective 1 action 4.

Bridge owners employ systematic rules to identify candidate bridges and appropriate actions for preservation. Rules may be cyclic or conditional. A cyclic rule is set out as an action and an interval. “Wash every bridge once each year” is a cyclic rule. Conditional rules are set out as evaluation and decision leading to action. “Replace seals in strip seal joints when quantity in CS2 exceeds 20%” is a conditional rule.

We will collect existing policy rules of US DOTs, and report on the set of rules. We will also note similar/same rules among DOTs; will identify rules that address bridge preservation and rules that address rehabilitation or replacement. We will then offer a subset (union) of rules that are good examples, good advice, to owners needing guidance on agency rules for bridge preservation.

*Tasks:*

1. Collect agency rules. Use public websites of DOTs, and a questionnaire to DOTs.
2. Assemble, state-by-state, agency rules.
3. Sort the collection of rules into a) preservation-related, b) not preservation-related.
4. Identify similar rules in use at multiple DOTs.
5. Identify, by consensus of the ETG, a set of rules among existing rules at agencies, that are useful examples of rules for best practice in bridge preservation.
6. Prepare a report for public distribution. Include the full set of agency rules, the sort of rules in preservation/not preservation, and list the examples of useful rules.

**ACTION 2 – DEVELOP A WHITE PAPER ON “WHAT CONSTITUTES A GOOD BRIDGE PRESERVATION PROGRAM?”**

Champion	Start Date	End Date	Outcome/Product
Richard Dunne / John Hooks / Chris Keegan	April, 2016	February, 2017	White Paper or a NCHRP Study

Background – Even though bridge preservation means many different things to different people, bridge owners have been preserving their bridges for many, many years. As bridge owners have come to rely on



bridge preservation more and more; it is evident that a bridge preservation program is singularly important to insure bridge owners are performing the right action at the right time to maximize the service life of the bridge, and efficiently spend transportation funding which continues to be constrained, and the bridge needs are just one of the ever growing list of needs facing transportation agencies.

This white paper will outline key facets of a Good Bridge Preservation Program.

*Tasks:*

1. Collaborate with a State DOT to learn about their cyclical and condition-based preservation activities
2. Coordinate with maintenance material suppliers to identify best treatment cycles
3. Outline a framework for a Good Bridge Preservation Program

**ACTION 3 – COLLECT STATES’ PRACTICES ON SETTING PERFORMANCE TARGETS**

Champion	Start Date	End Date	Outcome/Product
Steve Varnedoe	April, 2016	August, 2017	Repository of agencies’ practices on performance targets

Background – Bridge performance reporting over the last several decades has principally been focused on safety related metrics which identify and quantify bridge deficiencies, e.g. % Structurally Deficient (SD) or % of SD Deck Area. Measuring and tracking deficient bridges is certainly important and necessary, however, an unintended consequence of this approach alone can be that it tends to orient programs around replacement and major rehabilitation options only, or a “worst first” strategy as is commonly known.

The MAP 21 and FAST Act Federal Transportation Bills place a significant emphasis on Asset and Performance Management with the aim of improving (and reporting on) network level performance for bridges and other transportation infrastructure. To that end, preservation of bridge and other infrastructure assets is recognized as an important strategy for extending service life and enhancing performance.

The on-going transition to element level bridge inspection is expected to yield valuable data on bridge condition (severity and extent) which can be incorporated into the analysis models and decision matrices of bridge management systems to produce more comprehensive work plans that include preservation actions. Properly timed bridge preservation actions may either prevent or postpone a bridge element from Condition State 1 from transitioning to Condition State 2. Further, certain actions may effectively restore the condition of a particular element from Condition State 2 to Condition State 1. New Performance Measures are needed that can better leverage data quantifying early signs of deterioration in order to trigger preservation strategies. Further, Performance Measures are also needed that quantify the performance and economic benefits of preservation actions at the individual bridge and network level. Accordingly, this will be the focus of the tasks associated with Action 3.

*Tasks:*

1. Reach out to the Performance Measures Work Group sponsored by the AASHTO TSP2 Southeast Regional Bridge Preservation Partnership to learn more about their efforts to date and request to be included in their regular conference calls.
2. Survey state DOT’s and other agencies responsible for inspection and management of public bridges to determine if they have developed bridge performance measures outside of those required by

MAP-21/FAST act that focus work efforts on preservation or the quantify performance and life extension benefits associated with preservation. This could be done through AASHTO TSP 2.

3. Engage the Bridge Management Software vendor community to document capabilities for constraining analysis or creating decision trees that incorporate preservation actions in order to generate associated performance reporting.

**Strategic Objective 3 – Advise and assist in developing educational materials on bridge preservation**

ACTION 1 – EDUCATE CONSTRUCTION PERSONNEL BY COLLABORATING WITH THE FOLLOWING ORGANIZATIONS: AASHTO TRANSPORTATION CURRIUCULUM COORDINATION COUNCIL (TC3), INTERNATIONAL CONCRETE REPAIR INSTITUTE, SSPC (FOR COATINGS)

Champion	Start Date	End Date	Outcome/Product
Jeffrey Milton / Andy Doyle / Mike Brown	April, 2016	Ongoing	Recommended training for construction inspectors assigned to bridge preservation activities

Background – Many bridge preservation activities are performed by contractors. State DOT’s will assign construction inspectors to monitor this work. The construction inspectors assigned to this work may not have the appropriate training and knowledge in bridge preservation activities. It is proposed to review the existing training opportunities that are available to construction inspectors assigned to bridge preservation activities and to recommend those existing courses or recommend new courses that will provide the necessary level of knowledge to ensure quality construction.

*Tasks:*

1. Develop a list of knowledge, skills, and abilities that are recommended for construction inspectors assigned to Bridge Preservation Projects
2. Review the existing courses that are available from the AASHTO Transportation Curriculum Coordination Council (TC3), International Concrete Repair Institute, SSPC (For Coatings), NHI, State DOT’s and other sources
3. Determine if the existing courses will provide the necessary knowledge, skills, and abilities, and if they do not, recommend new courses
4. Collaborate the BPETG group that is developing the pocket guides series on preservation of deck, superstructure, substructure, and culvert

ACTION 2 – PROMOTE PROJECT REVIEWS AND LESSONS LEARNED

Champion	Start Date	End Date	Outcome/Product
Anwar Ahmad	February, 2017	Ongoing	Technology deployment

Background – To deploy State DOT’s effective bridge preservation/maintenance practices, it is proposed that FHWA Resource Center in coordination with HQ, and State DOTs will plan and conduct regional peer exchange workshops.

*Tasks:*

1. Include the task in the FHWA Preservation Roadmap and request for funds.
2. Coordinate with State DOTs and conduct regional peer exchange workshops.

**ACTION 3 – DEVELOP VIDEOS ON BRIDGE PRESERVATION AND LOAD RATING**

Champion	Start Date	End Date	Outcome/Product
Sonny Jadun / Raj Ailaney / Anwar Ahmad	February, 2017	Ongoing	Technology deployment

Background – To deploy practices on bridge preservation and load rating, it is proposed that FHWA Resource Center in coordination with HQ, and States’ subject matter experts will develop scripts and hire a contractor to develop videos.

*Tasks:*

1. Submit a proposal and funding requests to the Resource Center Construction Team that coordinates the development of videos through the Federal-aid essentials video library
2. Coordinate with States’ subject matter experts on various topics to develop scripts
3. Coordinate efforts with the Office of Acquisitions to procure the needed services

**ACTION 4 – BRIDGE PRESERVATION WEBINARS**

Champion	Start Date	End Date	Outcome/Product
Ed Welch / Regional BPP Chairs	October, 2016	Ongoing	Webinars on bridge preservation

Background – To promote bridge preservation, it is proposed to present webinars on following suggested topics:

- Bridge Preservation Program – Agencies Practices
- Communication Strategies for Bridge Preservation
- Completed Research on Bridge Preservation
- Preservation of Deck, Superstructure, and Substructure Elements
- Contracting Methods for Bridge Preservation
- Performance-based Specifications

*Tasks:*

1. Coordinate with States’ subject matter experts, industry, academia, and Federal agencies to develop presentation material on various topics.
2. Develop agenda.
3. Present periodic webinars as appropriate.

**Strategic Objective 4 – Foster a collaborative environment that encourages research and innovation**

**ACTION 1 – EVALUATE SUSTAINABILITY OF THE RESEARCH ROADMAP**

Champion	Start Date	End Date	Outcome/Product
John Hooks / Ed Welch	April, 2016	ongoing	A process that ensures additions of new & completed research studies to the roadmap

**Background –**

1. The Research Roadmap was developed under an FHWA-sponsored project and published by FHWA in January 2008. Twenty-five fully developed research needs statements are included in the road map.
2. A few years later, the AASHTO TSP2 Oversight Panel commissioned a project to update the roadmap with consideration of the extensive volume of research done recently in the area of bridge preservation. As a part of the update, the degree to which the various objectives described in the research roadmap needs statements had been met by recent research was assessed.
3. Also as a part of the project, a database of key information on about 800 research projects on topics related to bridge preservation was developed. That database is online and searchable by all interested parties. These research projects were identified mainly by searching the online resources TRID and RIP as well as the websites of all of the state DOTs.
4. New research on bridge preservation topics is continually being done. Therefore, it is desirable to conduct an effort to keep the database up to date
5. In 2016 the TSP-2 Oversight Panel asked that the Research Roadmap be regularly updated as part of the Work Plan. This will generate a Research Roadmap that is a living document that is current and more apt to be utilized by the Bridge community.

**Tasks:**

1. Search the same resources on a yearly basis to identify and capture information on any projects previously missed as well as any that have been recently initiated. Consider also searching non-domestic databases and agencies.
2. Consider including data on studies that have submitted for possible NCHRP funding but have not been approved.
3. Share the roadmap capabilities with related organizations. (Presentations at Annual Meetings of TSP-2 Partnerships, TRB, SCOM & SCOBs)

**ACTION 2 – DEVELOP IMPLEMENTATION MODEL FOR RESEARCH PROJECTS**

Champion	Start Date	End Date	Outcome/Product
Sue Lane / Ted Hopwood	April, 2016	Ongoing	Development of a model to increase research

			implementation, and a pilot implementation of a bridge preservation research project
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Background – Much research is going on throughout the U.S. on bridge preservation topics. This research ranges in size from a large program such as the FHWA’s Long-Term Bridge Performance (LTBP) Program, to regional research efforts through the four regional bridge preservation partnerships, and also to individual State Planning and Research (SP&R) studies. These research results become most valuable when they are communicated and implemented, including training as appropriate. A plan or model is needed for communication and implementation of these research results.

This task closely aligns with Actions 1, 3, and 4 of Strategic Objective 4 of the BPETG Strategic Plan, and therefore necessitates coordination with BPETG members and external stakeholders.

*Tasks:*

1. Identify various models/plans currently available for research implementation, including training as appropriate, and the success and shortcomings of each model/plan.
2. Identify the audiences involved in the implementation of bridge preservation research.
3. Decide if one model/plan will fit all sizes and audiences of research (small, medium (regional), and large), or if the model/plan needs to be specialized for each size or audience of research.
4. Select one research study from each size or audience, and develop pilot implementation plans for each one.

**ACTION 3 – PROMOTE INNOVATIVE BRIDGE MATERIALS**

Champion	Start Date	End Date	Outcome/Product
Bruce Johnson / Dave Juntunen / Jeffrey Milton / Michael Stenko	April, 2016	August, 2017	Process improvement and national or regional product/treatment specifications

Background –To identify the impediments that are confronting bridge owners and industry in embracing both new and existing technologies related to bridge preservation, BPETG conducted two separate surveys. The two main findings were:

- 1) Lack of consistency in the evaluation, testing, and approval processes. For example, a product manufacture goes through various processes with each state DOT in order to have a product placed on the approved list for the same product or treatment; and
- 2) Lack of national or regional specifications. Product/treatment specifications vary by state for using the same product or treatment

It is desired that further collaboration between specific groups such as the AASHTO Subcommittee on Bridges and Structures (SCOBS), the AASHTO Subcommittee on Materials (SOM), the Bridge Technical Working Group

of the AASHTO Subcommittee on Maintenance, FHWA, and Industry is essential in developing feasible solutions and associated steps to address these impediments.

*Tasks:*

1. Reach out to the Chairs of Subcommittee on Bridges and Structures, Subcommittee on Materials, and Subcommittee on Maintenance
2. Develop recommendations to AASHTO that standardizes the requirements and processes for products and treatments approval and implementation for adoption on national and or regional basis.
3. Identify a few commonly used bridge preservation products/treatments and develop specifications for these products/treatments that can be adopted nationally and or regionally by State DOTs.

**ACTION 4 – IDENTIFY UNDERUTILIZED RESEARCH RESULTS**

Champion	Start Date	End Date	Outcome/Product
John Hooks / Jason DeRuyver / Ed Welch	April, 2016	August, 2017	Utilization of Research

Background –

1. An extensive volume of research related to Bridge Preservation has been accomplished and other research is underway or proposed.
2. The degree to which the results of this research have been implemented is not clear and there has not been a comprehensive assessment of the potential for implementation of any individual study or group of complementary studies. The underutilization of bridge preservation research is evident in the continued call for Syntheses of projects completed.

*Tasks:*

1. Develop a means of easily defining available, implementable research results.
2. Define under implemented research and promote second phase research involving implementation
3. Propose syntheses where appropriate.
4. Promote implementation of results in various, appropriate bridge preservation applications.