

Report:

Prioritizing Preservation for Locally Owned Bridges

FHWA-HIF-22-046



Source: Michigan DOT

Locally Owned Bridge in Michigan



U.S. Department
of Transportation
**Federal Highway
Administration**

FEDERAL HIGHWAY ADMINISTRATION
Office of Bridges and Structures
1200 New Jersey Avenue, SE
Washington, DC 20590
June 2022

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TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. FHWA-HIF-22-046	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Report: Prioritizing Preservation for Locally Owned Bridges		5. Report Date June 2022	
		6. Performing Organization Code: None	
7. Author(s) Eric Thorkildsen, Greenman Pedersen, Inc.		8. Performing Organization Report No.	
9. Performing Organization Name and Address Greenman Pedersen Inc., 325, West Main Street, Babylon, NY 11702		10. Work Unit No. None	
		11. Contract or Grant No. DTFH61-13-A-00005	
12. Sponsoring Agency Name and Address Federal Highway Administration 1200 New Jersey Ave SE, Washington, DC 20590		13. Type of Report and Period Report, 2022	
		14. Sponsoring Agency Code FHWA	
15. Supplementary Notes Laura Lawndy (COR), Raj Ailaney (Technical Lead)			
16. Abstract This report analyzed how local agency bridge owners prioritize preservation for their bridge inventory. This analysis uses data from a survey of approximately 500 local agency bridge owners representing tens of thousands of bridges and follow up interviews with select respondents. The report was able to highlight project selection processes for bridge preservation activities including funding sources, document typical bridge preservation actions, bridge asset management practices, successes and challenges to funding preservation and the status of the agencies bridge preservation program.			
17. Key Words Bridge Preservation, Locally Owned Bridges, Federal Funding, Local Agency Bridges		18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161. http://www.ntis.gov	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 32	22. Price Free

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized.

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Acknowledgments

The following American Association of State Highway Transportation Officials (AASHTO) Transportation System Preservation Technical Services Program (TSP2) members who were also liaison members to the FHWA Bridge Preservation Expert Task Group were instrumental in compiling, distributing and completing the survey and follow up interviews:

- John Hooks, Travis Kinney, Gregg Freeman, Ben Foster, Jason DeRuyer, David Miller

The following local and state agency representatives were either quoted in this report or provided information incorporated into this report:

- Rebecca Nix, Bridge Management Engineer, Utah DOT
- Pat Conner, Lead Engineer, Asset Management, Indiana Local Technical Assistance Program
- Paul Schwartz, Associate Deputy Commissioner, New York City DOT, New York
- Brian Tjernlund, Assistant County Engineer, Lee County Illinois
- Brian Keierleber, County Engineer, Buchanan County, Iowa
- Keith Cooper, Supervisor, Michigan DOT Local Bridge Program
- Monica Uribe, Michigan DOT Local Bridge Program
- Amanda Radcliff, County Engineer, Frederick County, Maryland
- William Fox, County Engineer, Cattaraugus County, New York
- Linda Newton, Local Highway Bridge Program Manager, Caltrans
- Jason K. Vivian, County Engineer, Tulare County, California

Introduction

This report analyzed how local agency bridge owners prioritize preservation actions for their bridge inventory. The study drew upon a survey and follow up interview with select agencies conducted by the American Association of State Highway Transportation Officials (AASHTO) Transportation System Preservation Technical Services Program (TSP2).

Data from the TSP2 survey resulted in responses from approximately 500 local agency bridge owners and State DOTs who answered questions on bridge inventory, funding sources, percentage spent on preservation and any additional information that could be provided. The survey was intentionally brief with only “yes/no” or short numerical answers. The TSP2 reviewed the respondents and conducted more detailed interviews with select agencies.

Data from the TSP2 survey and follow up interviews formed the basis of this report, which highlights project selection processes for bridge preservation activities, funding sources, typical bridge preservation actions, bridge asset management practices, successes and challenges to funding preservation, and the status of the agencies’ bridge preservation program.

Background

The Bipartisan Infrastructure Law established the Bridge Formula Program to replace, rehabilitate, preserve, protect, and construct highway bridges. However, the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21)^[1] and the 2015 Fixing America’s Surface Transportation (FAST) Act^[2] recognized preservation as vital to this approach and amended the definition of “construction” to include preservation projects as eligible for Federal funds*¹. State DOTs and some local agencies have taken advantage of this additional flexibility in funds.

Figure 1 is an example of premature deterioration of a reinforced concrete bridge substructure element when maintenance was neglected. This deterioration might have been mitigated by timely preservation action to the bridge deck expansion joint.

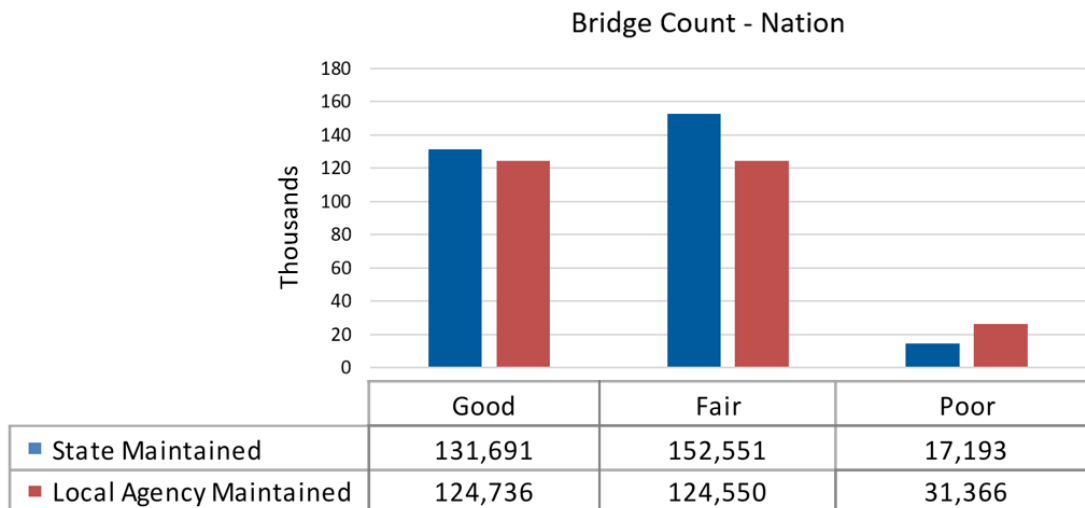
*¹ Section 1103 of MAP-21 amended the definition of “construction” in 23 U.S.C. 101 and adds preservation as an eligible cost of construction.



Source: GPI

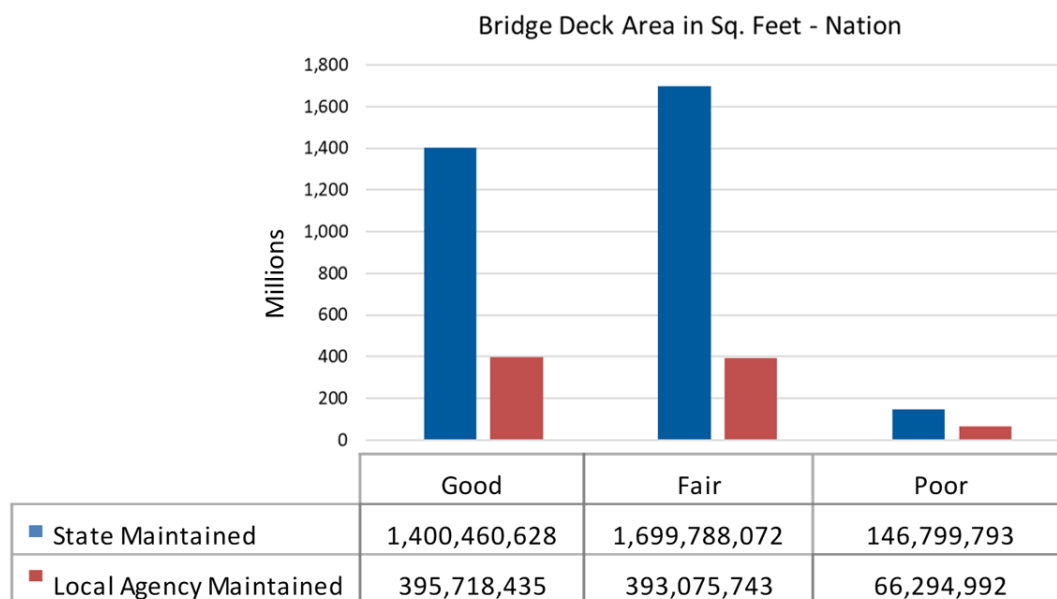
Figure 1. Photo. Reinforced concrete bridge substructure deterioration due to failed joint.

As per the 2020 National Bridge Inventory (NBI)^[4], while State DOTs own and maintain a larger deck area of bridges as they have bigger structures under their purview, local agencies have almost an equal number of bridges that they own and are responsible for maintenance. National Highway System (NHS) bridges classified as either in “Good” or “Fair” condition per the National Performance Management Measures (23 CFR 490 Subpart D) are common candidates for bridge preservation. (See 23 CFR 490.407).



Source: 2020 NBI

Figure 2. Chart. State Maintained vs. Local Agency Maintained Bridge Count.



Source: 2020 NBI

Figure 3. Chart. State Maintained vs. Local Agency Maintained Bridge Deck Area.

Outreach

The FHWA in 2010 formed an expert task group focused on bridge preservation that included representatives from State DOTs, industry and academia and representation from the AASHTO TSP2 membership. As for the TSP2, its principal mission as stated on its website^[3] is “... to serve as a clearinghouse with comprehensive and up-to-date information on efficient and effective preservation measures that enhance highway performance and extend useful life.” The TSP2 is one of 19 technical service programs within AASHTO and is structured with four regional bridge preservation partnerships in the Midwest, Northeast, Southeast and West. The groups are comprised of owners, suppliers, contractors, consultants, academia and other stakeholders interested in bridge preservation.

The TSP2 has a national working group focused on outreach to local agency bridge owners. The working group meets regularly and has developed various ways to outreach local agencies.

Training

The FHWA has developed educational tools to help local bridge owners with their preservation programs. Other organizations, including AASHTO Transportation Curriculum Coordination Council (TC3) And TSP2 National Local Agency Working Group, have developed training presentations in this area of interest. Available training specific to bridge preservation includes:

- FHWA NHI Courses, found at www.fhwa.dot.gov
- AASHTO TC3 Courses, found at www.tc3.transportation.org

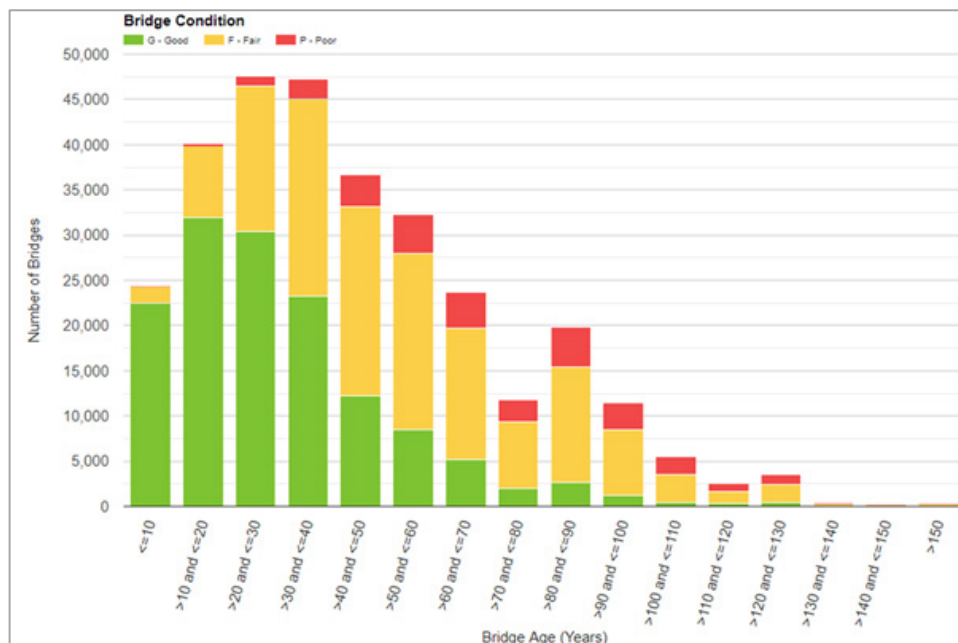
Information

In 2011, the FHWA published the “Bridge Preservation Guide” with a full update published in 2018. Since then, the Bridge Expert Task Group has also developed documents such as case studies, videos and pocket guides regarding specific aspects or actions of preservation. The Resources section of this document provides

links to the FHWA Bridge Preservation Guide and a link to a video on Bridge Preservation [7, 8].

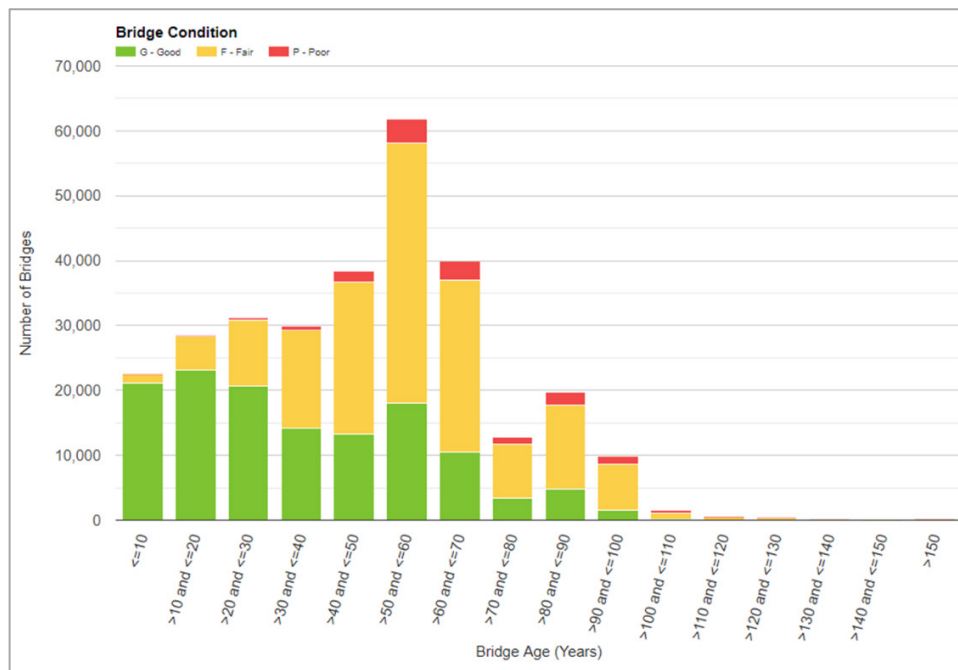
Trends in Locally Owned Bridge Condition

Nearly half of the nation's bridge inventory are owned by local agencies, and the data shows many of the bridges are in good or fair condition. Figures 4 and 5 show bridge condition versus bridge age for locally owned bridges and State-owned bridges, respectively. By comparing these two figures, there is a large inventory of State-owned bridges between 40 and 70 years old, whereas most of the local agency bridges are between 10 and 50 years old.



Source: FHWA InfoBridge Web Portal

Figure 4. Chart. Local Agency Owned Bridge Condition vs. Age.



Source: FHWA InfoBridge Web Portal

Figure 5. Chart. State Agency Owned Bridges Condition vs. Age.

National Survey

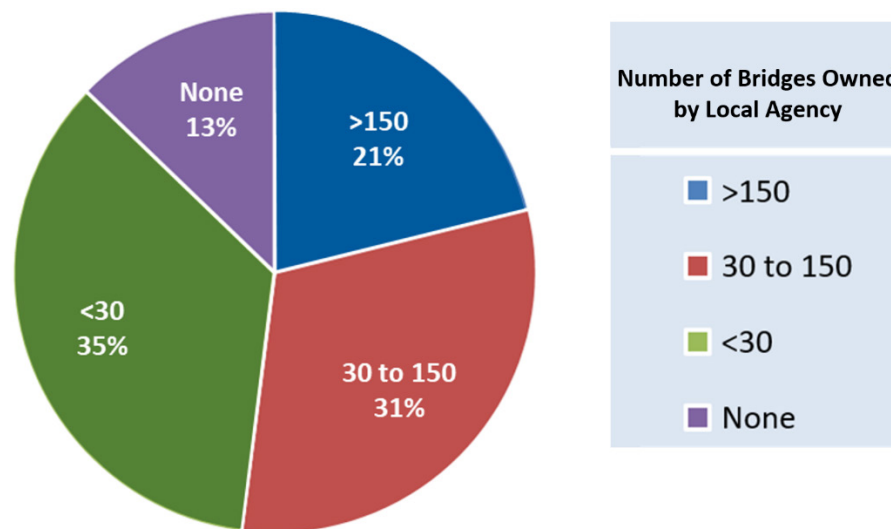
In August 2020, the TSP2 Local Agency National Working Group as part of its effort to promote bridge preservation to local agencies conducted a survey. The survey was distributed to various stakeholders to collect data on how local agencies prioritize their bridges for preservation, to identify funding mechanisms and to answer a variety of other important program information. The survey questions included:

- Respondent's name, agency and contact information.
- How many bridges are you responsible for?
- Do you perform any of the preservation, i.e., maintenance activities, as defined in the introduction of this survey?
- Does your agency have a program by which Federal funds can be used for bridge preservation?
- Does your agency have a program by which State funds can be used for bridge preservation?
- What percentage of your total bridge program is spent on preservation?
- If your own agency's funds are used for preservation activities, is there a direct revenue source such as a regional gas tax? (Respondents could select using a sliding scale or percentages.)
- Please provide any additional information you would like to share. (This allowed any further feedback with a text box.)

Over 500 responses were collected from representatives of counties, towns, townships, boroughs, cities, villages, and State DOTs. The majority of responses were from local agencies who owned bridges. There were also responses from State DOT staff involved with the local agency bridge program, staff from local technical assistance programs, and other stakeholders.

For the question of "How many bridges are you responsible for?", the total sum of bridges is approximately 41,000 bridges. However, many State DOT local agency bridge program managers also felt responsibility for their locally owned bridges, which resulted in some double counting or a total of over 85,000 bridges.

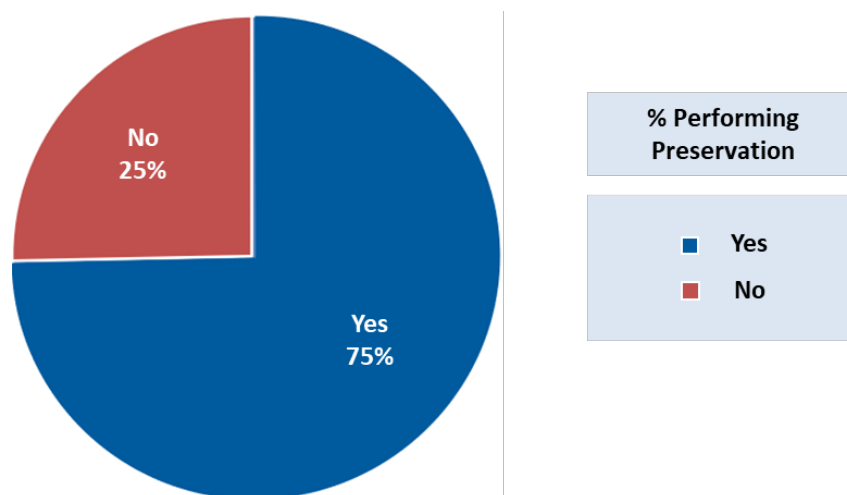
The largest local agencies responding were two counties in New Jersey with over 700 bridges each in their inventory and the New York City DOT with 675 bridges. Some survey respondents were only responsible for one bridge, and some did not answer that question. Figure 6 shows the results of the question.



Source: TSP2

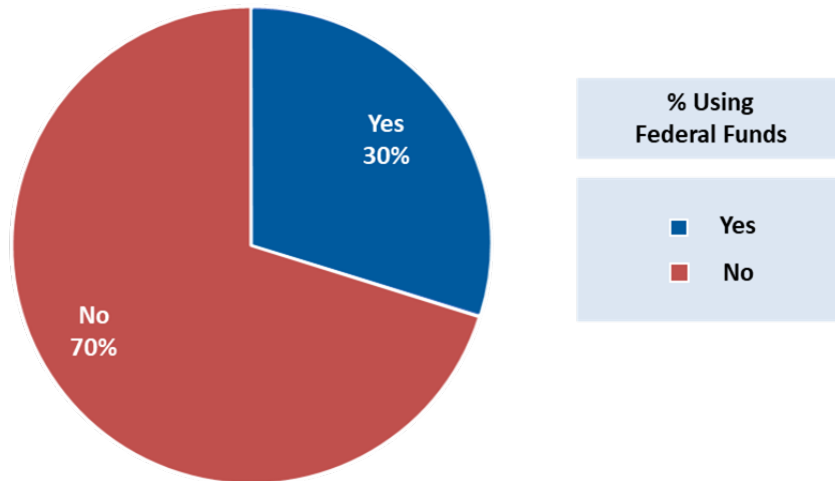
Figure 6. Chart. Percentage of respondents based on Number of Bridges owned by Local Agency.

Seventy-five percent of the respondents stated that they perform preservation activities as listed in the FHWA Bridge Preservation Guide^[7] as shown in Figure 7. Figure 8 shows that 30 percent of those agencies who have access to Federal funds use them for preservation activities and the average percentage of available funds spent on preservation was approximately 27 percent.



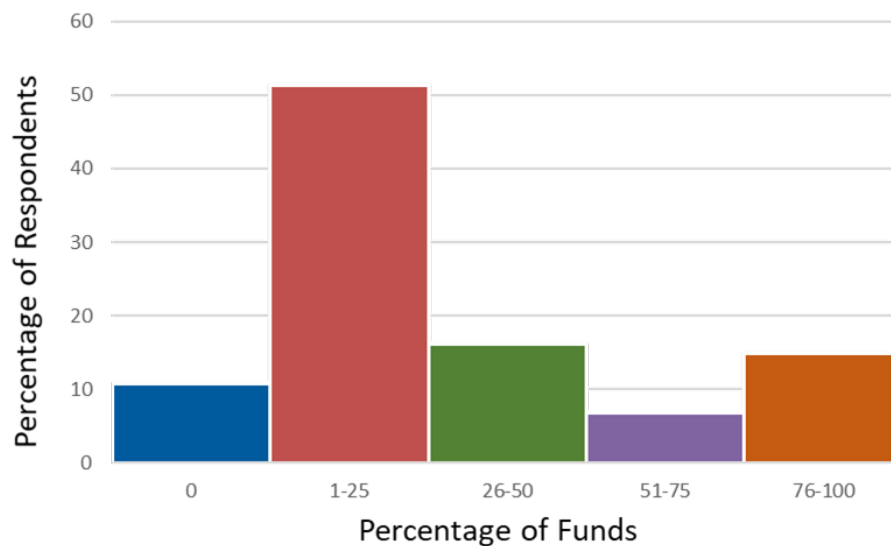
Source: TSP2

Figure 7. Chart. Percentage of Local Agencies who Perform Preservation.



Source: TSP2

Figure 8. Chart. Percentage of Local Agencies using Federal Funds for Preservation.



Source: TSP2

Figure 9. Chart. Percent of Total Funds Spent on Preservation.

Summary of Follow Up Interviews

As the national survey was intended to capture basic information, follow up interviews with select stakeholders were conducted to collect additional detailed information. The stakeholders were selected to ensure representation from the four geographic regions that comprise the AASHTO TSP2. State DOT members of the FHWA Bridge Preservation Task Group who serve as liaisons to the AASHTO TSP2 partnerships reviewed the list of over 500 survey respondents and considered the following selection criteria:

1. Target agencies with a broad range of bridge inventory from small to medium to large
2. Include agencies that perform preservation
3. Target agencies with a broad range of available funding either Federal and State funds used, only Federal or State
4. Target agencies with a broad range of percentage of funds spent on preservation

Tables 1 through 4 below represent each of the four TSP2 geographic regions with the local agencies considered for follow up interviews.

Table 1. North East Bridge Preservation Partnership

Agency	State	Bridges	Preservation	Federal Funds	State Funds	Percentage of Funds Spent on Preservation	Direct Local Revenue
New York City	NY	675	Yes	Yes	Yes	10	No
Carlisle Borough	PA	2	Yes	No	Yes	100	Yes
Frederick County	MD	221	Yes	No	No	35	No
Somerset County	NJ	780	Yes	No	Yes	15	Yes
Blair County	PA	120	Yes	Yes	Yes	100	Yes
Harford County	MD	248	Yes	No	No	70	Yes
City of Danbury	CT	40	Yes	No	Yes	35	No
Ulster County	NY	158	Yes	Yes	No	10	No
Cattaraugus County	NY	270	Yes	Yes	No	15	No

Table 2. Midwest Bridge Preservation Partnership

Agency	State	Bridges	Preservation	Federal Funds	State Funds	Percentage of Funds Spent on Preservation	Direct Local Revenue
Buchanan County	IA	260	Yes	Yes	Yes	14	Yes
City Highland Park	IL	18	Yes	No	No	10	Yes
Mt. Pulaski Township	IL	34	Yes	No	Yes	14	Yes
Allen County	IN	300	Yes	Yes	Yes	20	Yes
Blackford County	IN	58	Yes	Yes	Yes	50	Yes
Kent County	MI	170	Yes	Yes	Yes	50	Yes
St. Louis County	MN	595	Yes	No	No	5	Yes
Cass County	ND	500	Yes	No	No	10	No
Columbian County	OH	285	Yes	No	No	25	Yes
Montgomery County	OH	525	Yes	Yes	Yes	50	No
Jefferson County	WI	22	Yes	Yes	Yes	50	No
Chippewa County	WI	99	Yes	No	No	50	Yes

Table 3. Western Bridge Preservation Partnership

Agency	State	Bridges	Preservation	Federal Funds	State Funds	Percentage of Funds Spent on Preservation	Direct Local Revenue
Seattle DOT	WA	124	Yes	No	No	60	Yes
Bonner County	ID	38	Yes	Yes	Yes	48	Yes
Hood River County	OR	24	Yes	No	Yes	34	No
Santa Barbara County	CA	118	Yes	Yes	Yes	10	No
Boulder County	CO	92	Yes	No	Yes	10	Yes
Sonoma County	CA	328	Yes	Yes	Yes	5	No

Table 4. South East Bridge Preservation Partnership

Agency	State	Bridges	Preservation	Federal Funds	State Funds	Percentage of Funds Spent on Preservation	Direct Local Revenue
Montgomery County	AL	203	Yes	Yes	Yes	100	Yes
Tallapoosa County	AL	84	Yes	No	Yes	50	Yes
Martin County	FL	54	Yes	Yes	Yes	100	Yes
Taylor County	FL	47	Yes	Yes	Yes	75	Yes
City of Greensboro	NC	99	Yes	No	No	20	Yes
Chattanooga DOT	TN	84	Yes	Yes	Yes	100	No

The subjects covered in the follow up interviews included:

- Management of Bridge Inventory
- Process to Obtain Funds for Preservation
- Funding/Contracts for Preservation
- Training
- Preservation Actions
- Coordination with other Stakeholders
- Successes, Barriers and Possible Changes

Of the thirty-three agencies identified for a follow up interview, ten responded to the request. Their responses are summarized in the follow sections.

Management of Bridge Inventory

Nine out of the ten follow up interview respondents had a tracking system for their bridge inventory. For example, when able local agencies took advantage of the State DOT's bridge database and management system, like Michigan DOT and their management system. The use of spreadsheets was also common, and the use of a few proprietary access database products was noted. A noticeable trend based on the interviews was the larger the bridge inventory, the more sophisticated the management system.

Items of note for some specific local agencies include:

- The New York City Department of Transportation (NYC DOT) publishes an annual report on its structures^[14] which contains a list of all structures with critical findings, a historical summary of bridge inventory ratings going back 10 years, bridges with weight restrictions and condition ratings both summarized for the entire inventory and on a bridge-by-bridge listing.

- The City of Chattanooga, Tennessee is provided an electronic copy (i.e., a PDF) of its bridge inventory data from the Tennessee DOT. The City then enters the file into its database system where preservation actions can then be queried, grouped and prioritized.
- The Adirondack/Glens Falls Transportation Council (A/GFTC) oversees approximately 200 bridges in three counties just north of Albany, New York. To prioritize bridge work, the council hired a consultant to review prior inspection reports and assign work actions such as full replacement, major rehabilitation, minor rehabilitation and element specific repairs including preservation. Examples of element specific repairs included painting, concrete repairs, joint maintenance and overlays. A sophisticated spreadsheet was used that included element deterioration rates determined based on a review of the past 3 cycles of bridge inspection reports. A/GFTC used these deterioration curves to prioritize bridge preservation to keep bridges in good and fair condition from falling into a lower condition state. Rules were developed such as when to replace a wearing surface based on conditions states (CS). A screen shot from the management program user manual is shown below.

Wearing Surface Items

If more than 25% of the wearing surface is CS-3 and CS-4, then a total replacement of the wearing surface is assumed. The replacement wearing surface is assumed to be asphalt with a sprayed applied waterproofing membrane. For item 581.01, the unit price average is higher than 581.02, so the higher price item is used to be conservative. The formula for the quantity of item 402.128303 is shown below. 40 tons is added to account for approaches.

$$\text{Item 402.128303: (Wearing Surface Area)} \times \left(\frac{1 \frac{1}{2} \text{ in}}{12 \frac{\text{in}}{\text{FT}}} \right) \times \left(150 \frac{\text{LB}}{\text{CF}} \right) \times \left(\frac{1}{2000} \frac{\text{TON}}{\text{LB}} \right) + 40 \text{ TON}$$

See the table below for all items used in the wearing surface estimate.

Wearing Surface Items		
Item Number	Item Description	Assumptions
581.01	REMOVAL OF BITUMINOUS CONCRETE OVERLAY (BRIDGE)	*Unit Price is Pay Item Catalog average of past 5 years (more expensive than 581.02)
595.98200018	SPRAY-APPLIED, WATERPROOFING MEMBRANE	*Unit Price is Pay Item Catalog Average past 5 years
402.128303	12.5 F3 TOP COURSE HMA, 80 SERIES COMPACTION	*Unit Price is Pay Item Catalog Average past 5 years, assumed 40 tons for approaches

Source: A/GFTC

Figure 10. Screenshot. A/GFTC Bridge Asset Management User Guide.

When local agencies used consultants for bridge inspection work, most contained a task in the scope of work to deliver the data either in a management system or in a format that could easily be inputted into a management system.

Process to Obtain Funds for Preservation

The process and procedures for obtaining funding for preservation varied amongst the follow up interview respondents.

The use of Federal funds was typically part of a State DOT “pass through” and were distributed based on a written process or agreement. One of the survey respondents described a “pass through” as Federal funds received by the local agency through coordination from their State DOT. For example, Frederick County, Maryland has a Memorandum of Understanding with the Maryland DOT State Highway Administration titled

“Federal-Aid Project Guidelines and Working Agreement” (Amanda Radcliff, Frederick County, Maryland).

Most respondents indicated that local funding is primarily used for bridge preventive maintenance.

Examples of funding sources that respondents stated are used for bridge preservation include:

- Federal funds*
- State gas tax
- County tax
- Local use fee
- General fund
- Local gas tax
- Local property tax
- License plate tax
- Vehicle registration fee
- Sale of bonds
- Grants

*For further information on the Federal-aid process, please view Funding Basics and Eligibility - Federal-aid Program Overview- Federal-aid Essentials for Local Public Agencies.^[9]

It should be noted that several of the survey responses commented that their allocation of funds for bridge maintenance and preservation did not meet their bridge needs.

Contracts for Preservation

Four of the ten follow up interview respondents use a mix of either contractors or in-house staff to perform their preservation projects and that decision is based on the complexity of the work and funding sources. The complexity of the work includes expertise of in-house forces and availability and cost of equipment.

Five of the ten follow up interview respondents stated that when pursuing Federal funds for preservation work, they tend to use contractors for the work because the entire project can be included in an all-encompassing contract. For example, two of the interviewed agencies stated that it would be difficult to procure Federal funds for only materials and equipment and then use in-house maintenance forces to perform the preservation work. The follow up interview revealed that local agencies that use only local funds for preservation work tend to use in-house maintenance forces.

Local agencies are also bundling bridge preservation projects into larger contracts to entice contractors and allow some efficiency and cost savings by combining similar work actions.

Training of Staff or Contractors

Two of the ten follow up interview respondents stated that some of their training delivered is through the State’s Local Technical Assistance Program (LTAP) or directly with the host State DOT. For example, Iowa DOT developed a training video that demonstrates how to perform epoxy injection for concrete repairs.^[12] This allowed Buchanan County, IA to use in-house forces rather than contracting for the work. (Brian Keierleber, Buchanan County, Iowa).

The FHWA’s National Highway Institute (NHI) provides an instructor-led course on bridge maintenance that covers many bridge preservation actions and is targeted toward in-house staff.^[11]

Preservation Actions

Most follow up interview respondents are performing some bridge preservation actions. The most common are bridge joint and drain cleaning. Others included:

- Sealing, caulking of concrete
- Debris cleanup (may have been misinterpreted as routine maintenance)
- Rip rap placement and repair
- Bridge washing
- Spot/Zone painting
- Bearing maintenance/Repair
- Overlays
- Epoxy injections

In the review of survey responses and follow up interviews, it appeared that although the FHWA Bridge Preservation Guide was referenced and examples of preservation actions were provided, the agencies use different terminology, depending on their legal authorities. For example, the NYC DOT Bridge and Tunnel Report (2019)^[14] does not use the word “Preservation” but contains a section of overall bridge program called “Preventive Maintenance” and includes other actions such as removal of homeless encampments, snow removal and oil spills.

Prioritization of Preservation Projects

While the FHWA encourages the prioritization of preservation projects to maintain bridges in good and fair condition, all the follow up interview respondents are still following a “worst first” approach. For example, a city in Colorado stated that it prioritizes bridge actions based on urgency, condition and cost. One respondent stated that funds are very limited, and he directs them toward bridge replacements. Another respondent stated “There is no culture of preservation. Almost all of the repairs are reactive.” Other agencies stated that they did look at preventive maintenance in a subjective decision-making process based on cost, in-house expertise and institutional knowledge.

Another challenge faced by local agencies is when funds provided from the State DOT are accompanied with stipulations. For example, one large city stated that any State DOT funds received are to be directed toward bridge replacements and repair of complex structures like long span and movable bridges.

Coordination with other Stakeholders

Of the follow up interview respondents who commented on communication with stakeholders, all indicated positive communication with the majority working directly with their respective State DOT, FHWA Local Technical Assistance Program (LTAP) and minor interactions with Federal agencies. Upon review of the ten follow up interview responses, it seemed the more positive the communication, the more successful the program.

As an example, the Indiana LTAP offers core classes on developing an asset management plan and hosts a recurring asset management conference to enhance communication. Inviting all stakeholders to the conference is important for coordination. All 92 counties hire consultants to do their bridge inspections, and part of the

bridge inspection report is recommendations on replacement, rehabilitation, maintenance and preservation, the consultants are all invited to the conference in addition to local agency bridge owners.

Success to Bridge Preservation

Of the ten follow up interview respondents, eight that used local funds for bridge preservation felt their program to be a success. They were able to have more control over proactive maintenance and felt they could avoid the lengthy paperwork that accompanies the use of Federal funds. During the follow up interview, the respondents were not asked to clarify what kind of lengthy paperwork was required for the use of Federal funds.

Barriers to Bridge Preservation

Most local agencies that responded to the follow up interview expressed concerns about using Federal funds due to the environmental review processes.

Rebecca Nix, Bridge Management Engineer at Utah DOT, stated, “We provide Federal funds to local agencies for rehabilitation and replacements of bridges, but typically not for preservation activities, unless they are done in conjunction with a larger rehabilitation project. Preservation is typically funded through local agencies.”

Brian Tjernlund of Lee County, Illinois responded in the initial survey, “We would like to do bridge maintenance, but since funding is so limited, that to do emergency bridge repairs, we have to figure out what to cut out of our regular construction program to pay for it. As it is, we can no longer keep up with maintenance on any part of our roadway system. Due to the lack of funding, maintenance is rarely done. Most of our township bridges are mostly paid for through Illinois's Township Bridge Program (TBP). However, the funding is so limited with TBP, we can only replace a township bridge about once every 2 years.”

Example Funding Sources for Bridge Preservation

The survey, interviews and further research found several good examples of funding for bridge preservation. Unless otherwise indicated, the following information is based on the survey responses and FHWA did not independently confirm its accuracy.

New York State DOT (NYSDOT) Marchiselli Aid

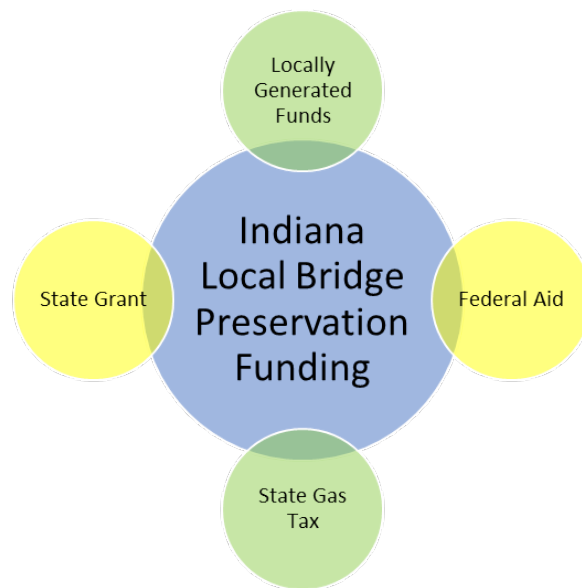
The Municipal Streets and Highway Program, more commonly known as the Marchiselli Program, provides NY State funds to NYSDOT which may be used for up to 75 percent of the non-Federal share of many types of local highway projects, including bridge projects. NYSDOT is divided into geographic regions and some regions have embraced the use of these funds for bridge preservation work. Every two years the NYSDOT calls for projects to be funded and placed in the State Transportation Improvement Program (STIP). Some of these projects are dedicated to bridge maintenance and preservation and may include work on bridge expansion joints, bearings and other deteriorated bridge elements and preventive actions such as bridge washing. Local agency bridge owners can access these funds through the NYSDOT. For example, Cattaraugus County, NY has used these funds for bridge washing, but the funding is provided on a two-year cycle. However, for some of its open deck steel grate bridges, an annual cleaning is needed, and local funds supplement the off years (William Fox, Cattaraugus County, NY). These projects are typically contracted out, as that makes the funding easier to document rather than using in house maintenance staff.

Indiana DOT Funding Methods

The Indiana Local Bridge Preservation is funded through the following methods:

1. Locally generated funds, particularly the Cumulative bridge fund is the “go-to” fund for bridge preservation. These funds are part of the property taxes each county assess and controls. They are reoccurring, predictable and dedicated funds for the highway department to use solely on its bridges (construction, re-construction, rehabilitation, preservation, maintenance). These funds need no state or federal approval or application process to utilize, just public bidding and purchasing requirements apply. The same is true for other locally generated funds.
2. State gas tax funds are collected including vehicle registration fees and distributed directly to local highway departments. Similar to the local generated funds, there is no application or other State awarding process for use of funds. State Statute requires 50 percent of these funds to be used on “construction, reconstruction and preservation.” This helps promote use of funds to be used on preservation.
3. State Grant Fund: This is a grant program administered by the DOT that a local bridge owner can apply for use on bridge preservation (as well as rehabilitation and reconstruction). This is typically a \$200 million+ program where a county can get either a 75 percent grant or 50 percent grant of the total cost of a proposed project (depending on population). For a local to be eligible to apply for these funds they are required to have an asset management plan. The asset management plans also help promote preservation type of projects.
4. Federal Aid: This is defined by the Indiana LTAP as funds coming from Federal sources. If a local bridge owner has a State-approved bridge asset management plan, the owner can apply for bridge preservation funds using Federal sources. The preservation project needs to be included in the State Transportation Improvement Plan (STIP) which is a multi-year capital improvement plan.

While there are no prescribed amounts dedicated to preservation solely, all dedicated funding for local transportation is flexible enough to be allowed for preservation activities for bridges. Figure 11 is used by the Indiana LTAP to visually show the funding methods.



Source: Indiana LTAP

Figure 11. Graphic. Indiana Local Bridge Preservation Funding.

Pennsylvania Municipal Liquid Fuels Program

This statewide program funds a range of projects to support construction, reconstruction, maintenance and repair of bridges and roads. These funds are only available to local agencies who submit annual reports and allocation is based on population and miles of roads on the approved Liquid Fuels Inventory.

Figure 12 is a screen shot of a publication issued by PennDOT regarding use of funds for this program. The full publication can be found at <http://www.dot.state.pa.us/public/PubsForms/Publications/PubPercent209.pdf>

4.7 PROCEDURE TO ESTABLISH A PROJECT

The criteria appearing in Figure 4.a below are used to determine when Project Approval is required for work on County owned bridges utilizing Act 44 funds.

Criteria To Determine When Project Approval Is Required	
Bridges	For bridge maintenance/preservation activities, confer with a District Municipal Services Representative to determine if a project approval is required. All rehabilitations, replacements or any other work that affects the carrying capacity of the structure or the waterway areas require project approval.

Figure 4.a Criteria To Determine When Project Approval Is Required

Process for Obtaining Project Approval

1. The county officials shall notify the Municipal Services Representative that work has been proposed utilizing Act 44 funds.
2. The county officials or engineer shall make an appointment with the Municipal Services Representative to review the proposed work to determine if it fits the

Source: PennDOT

Figure 12. Screenshot. Excerpt from PennDOT Policies and Procedures for the Liquid Fuels Tax.

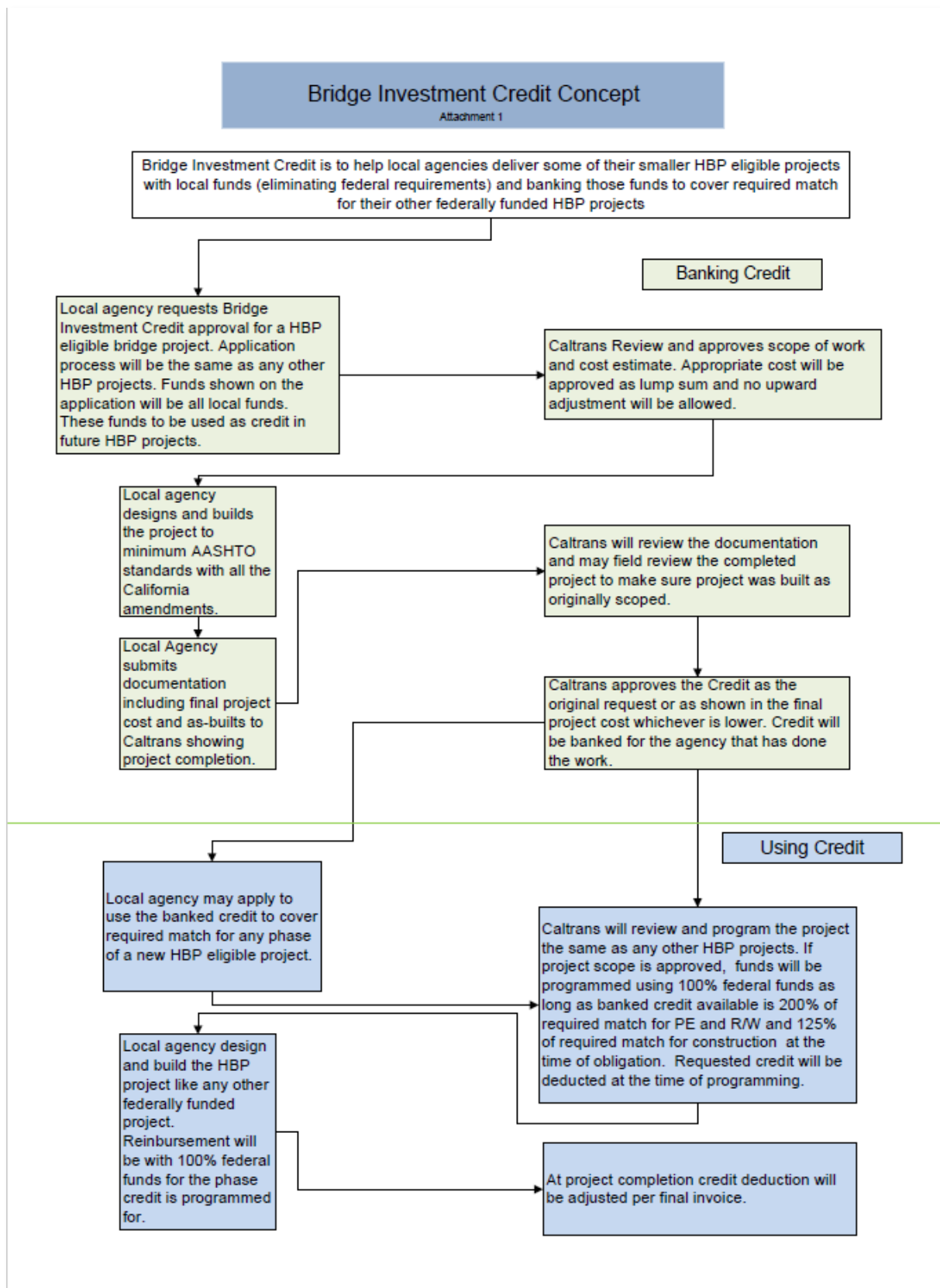
Tulare County, California Local Tax

According to Jason K Vivian, Tulare County, Tulare County Association of Governments (TCAG) has a local funding source, which has provided bridge preservation funds.

California DOT (Caltrans) Local Agency Incentive

The Caltrans Local Assistance Highway Bridge Program Bridge Investment Credit (BIC) provides an incentive for local agencies to use local funds on bridge preservation projects by crediting these funds for future projects that involve federal funding. Caltrans reported in the follow up interview that the most efficient use of federal funds is to maximize federal funds on fewer, larger budget projects which allow non-federal sources such as local funds to be used on smaller budget projects. Many local agencies have identified smaller budget projects as bridge preservation which has resulted in an increase in overall funding for preservation. Figure 13 provides a flowchart describing the BIC concept.

Information on the BIC can be found in Chapter 6 of the Caltrans Local Assistance Program Guidelines, see link <https://dot.ca.gov/-/media/dot-media/programs/local-assistance/documents/lapg/g06.pdf>. Additional BIC resources can be found on the Caltrans Highway Bridge Program website at <https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-bridge-program>.



Source: Caltrans

Figure 13. Screenshot. Flowchart from Caltrans on Bridge Investment Credit Concept.

Example Frameworks for Prioritizing Preservation for Locally Owned Bridges

Survey results showed that local agencies successful in bridge preservation integrated several components to produce a positive result. Increasing the number of integrated components increases the chance of success which can be described as a framework, as shown by Indiana DOT and Michigan DOT.

Indiana DOT Framework

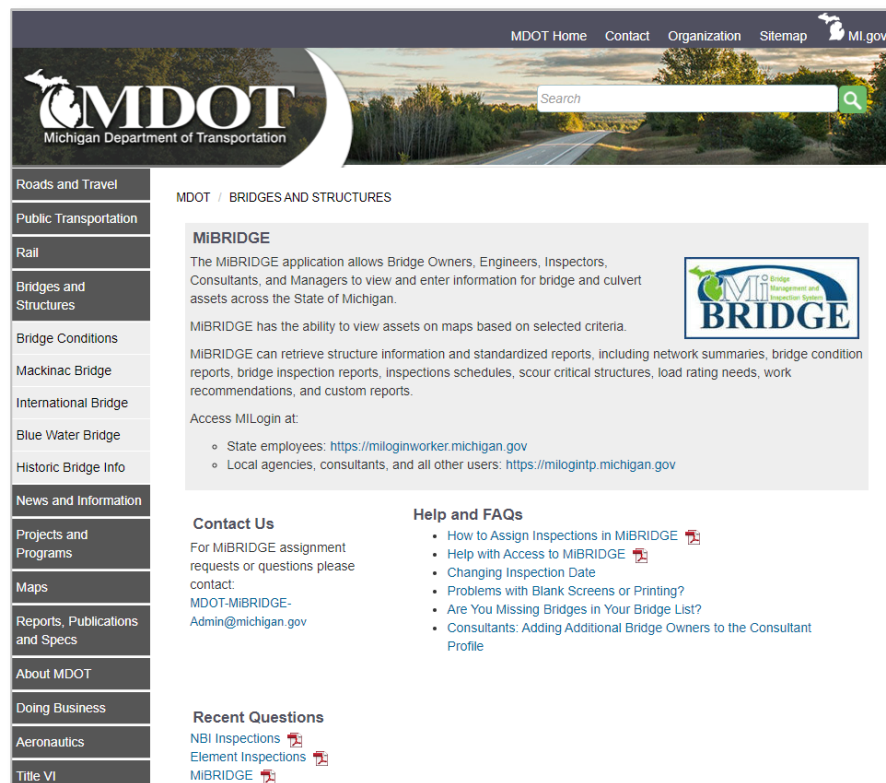
During the TSP2 follow up interviews, the team interviewed the Asset Management Lead Engineer for the Indiana DOT Local Technical Assistance Program (LTAP). The LTAP program in Indiana is administered by Purdue University. This individual is an engineer very familiar with how bridge preservation fits into an overall successful asset management program. This is the first successful framework component in that this champion of bridge preservation holds a crucial role in the communication and training to local agencies and has the subject matter expertise to successfully perform his duties. His passion for bridge preservation led him to train and educate local agencies to not only perform preservation but to spot and remediate problems at the bridge inspection stage. He says that bridge asset management is just one duty of many for a county engineer who must manage bridges and perform winter maintenance.

Indiana's State funding source as discussed in the prior section gives project selection preference to local agencies that have an effective asset management plan. Although the funding source typically goes to rehabilitation or replacement, it does encourage preservation.

In Indiana, internal communication plays an important role as regularly scheduled partnership meetings are held between State DOT, local agencies, Indiana County Engineers Association (counties own the local bridges) and FHWA concerning funding and preservation.

Michigan DOT Framework

Michigan DOT's (MDOT) Local Agency Bridge Program represents another successful framework for prioritizing bridges for preservation. The program was created by legislation in 2004 and is unique amongst State DOTs and represents a 3-year bridge program that replaces, rehabilitates, maintains the local bridge inventory. The program uses the "MiBridge" bridge management and inspection system used statewide by MDOT and made available to all local agency bridge owners.



Source: MDOT

Figure 14. Screenshot. MiBridge Portal Instructions for Local Agency Bridge Owners.

The working groups that help prioritize the bridges include local advisory boards, regional bridge councils and MDOT's local bridge unit. MDOT has seven geographical regions and part of the program's success is local stakeholder involvement. MDOT developed a rating system to allow the regional bridge council members to vote on which bridge preservation projects to prioritize. Criteria includes physical condition of the bridge and importance of the structure. Physical condition is rated based on structural adequacy for the traffic using it, approach features, safety and meeting of minimal design criteria. Bridge importance is based on an evaluation of detours, functional adequacy and economic importance.

Another framework component is the ease of obtaining funding as discussed in the prior section. According to MDOT, the forms to fill out by local agencies are straightforward and do not contain excessive hurdles. An example form from Michigan DOT can be found at this link <https://mdotjboss.state.mi.us/webforms/GetDocument.htm?fileName=0258.pdf>

The website for the MDOT Local Bridge Program^[11] provides several important items for local agency bridge owners including an asset management guide, requirements for the bridge selection process and applications for the current fiscal year bridge program where you can nominate projects.

Specific to bridge preservation, referred to in Michigan as preventive maintenance, the bridge program sets aside about 30 percent of its funds toward these preservation actions. This number is subjective and considered (by MDOT) to be a reasonable number to balance preservation verses replacement or rehabilitation. Some MDOT regions can go as high as allocating 50 percent of funds toward preventive maintenance. MDOT's Local Bridge Rating Point Guidance (as applied to bridge preservation projects) is shown in Figure 15.

Preventative Maintenance (PM) Projects (by council)

The council members should review PM applications and create a priority list of the PM projects prior to the rating review meeting. The members, as a group, will discuss their individual rankings, their reasoning, and then may consider the computer-generated points to determine their final list of priorities.

Source: MDOT

Figure 15. Callout. Preventive Maintenance Rating per MDOT Local Bridge Program.

Streamlining the Environmental Process in Bridge Preservation

In the follow up interviews several local agencies expressed as a potential barrier the environmental requirements for bridge preservation projects, both State and Federal. With the additional time and effort to comply, they used those funds towards higher cost projects such as full bridge replacement or rehabilitation.

The Michigan DOT (MDOT) had similar issues and developed a streamlined process for environmental compliance of bridge preservation projects. Any local bridge projects administered by MDOT must follow both Federal and State regulations which includes environmental. Each local agency must submit a Local Agency Environmental Clearance form^[12].

This form specifically lists Threatened and Endangered Species (T&E) exemptions of bridge preservation actions, see Figure 16. The form also allows exemptions from the MDOT State Historic Preservation Office for preservation actions.

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**LOCAL AGENCY ENVIRONMENTAL
CLEARANCE FORM**

SOCIAL, ECONOMIC AND ENVIRONMENTAL EVALUATION

The National Environmental Policy Act (NEPA) of 1969 [42 USC § 4331] is a US environmental law enacted to 'encourage productive and enjoyable harmony between man and his environment'. Its aim is to protect and preserve social and cultural resources, economic welfare, and the preservation/protection of the natural environment.

Under NEPA, all federal undertakings (receiving federal aid, permits, licensing or oversight) must have an environmental evaluation completed prior to the start of project construction or implementation. The following MDOT environmental evaluation form is provided on behalf of local road agencies to ensure federally funded or permitted road projects are compliant with NEPA standards. A complete and MDOT approved evaluation form must be on file before funding can be released. Failure to complete an environmental evaluation will result in delay or loss of funding.

Source: MDOT

Figure 16. Callout. MDOT Local Agency Environmental Clearance Form.

Conclusion

This report highlights the local agency project selection processes for bridge preservation activities, funding sources, typical bridge preservation actions, bridge asset management practices, successes and challenges to funding for the agency's bridge preservation program. This analysis is based on a national survey and follow up interviews with select stakeholders, both conducted by TSP2. Examples were provided that address a comprehensive preservation program, however as a whole stakeholders are still striving for enhancements that further the application and effectiveness of preservation.

This report study demonstrates that prioritization of bridge preservation for locally owned bridges involves several components that when integrated produce a framework.

The following elements of a framework applied in Michigan and Indiana have helped these two states in promoting bridge preservation among local agencies:

1. Subject matter expertise in a critical position
2. Multiple funding sources
3. Communication amongst stakeholders
4. Passion amongst the stakeholders
5. Training of stakeholders
6. Understanding the value of pre-emptive preservation actions
7. Incorporating repair and maintenance recommendations into bridge inspection reports

Resources

1. Moving Ahead for Progress in the 21st Century Act (MAP-21), found at <https://www.fhwa.dot.gov/map21/>
2. Fixing America's Surface Transportation (FAST) Act, found at <https://www.fhwa.dot.gov/fastact/>
3. AASHTO TSP2 website can be found at <https://tsp2bridge.pavementpreservation.org/>
4. National Bridge Inventory, found at <https://www.fhwa.dot.gov/bridge/nbi.cfm>
5. National Bridge Inspection Standards, found at <https://www.fhwa.dot.gov/bridge/nbis.cfm>
6. Federal Highway Administration (FHWA) Bridge Preservation Guide, (2018), found at <https://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf>
7. FHWA video Bridge Preservation for Local Agency Operations Staff, found at <https://www.fhwa.dot.gov/federal-aidessentials/catmod.cfm?category=other>
8. National Highway Institute, found at <https://www.nhi.fhwa.dot.gov/>
9. FHWA Federal-aid Essentials for Local Public Agencies website, found at <https://www.fhwa.dot.gov/federal-aidessentials/>

10. Iowa DOT training video that demonstrates how to perform epoxy injection for concrete repairs, found at <https://www.youtube.com/watch?v=jv2d70J3Pp8>
11. Michigan Local Bridge Program website, MDOT - Bridge Program, found at https://www.michigan.gov/mdot/0,4616,7-151-9625_25885_40558---,00.html
12. Michigan DOT Local Agency Environmental Clearance form – 5323 NEPA form, found at <https://mdotjboss.state.mi.us/webforms/GetDocument.htm?fileName=5323.pdf>
13. Office of the New York State Comptroller, (2017). “Local Bridges by the Numbers,” found at <https://www.osc.state.ny.us/files/local-government/publications/pdf/local-bridges-by-the-numbers.pdf>
14. New York City Department of Transportation Bridge and Tunnel Condition Annual Report (2019), found at <https://www1.nyc.gov/html/dot/html/infrastructure/annualbridgereport.shtml>



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