Arizona Department of Transportation

Bridge Group

Bridge Preservation Program

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Table of Contents

BRIDGE GROUP

BRIDGE PRESERVATION PROGRAM

Section 1 Background

Federal-aid highway funds are authorized by Congress to assist State Department of Transportation in providing for construction, reconstruction, and improvement of highways and bridges on eligible Federal-aid highway routes and for other special purpose programs and projects.

The Intermodal Surface Transportation Efficiency Act (**ISTEA**) of 1991-1997 requires each state to submit a Statewide Transportation Improvement Program (**STIP**). The Transportation Equity Act for the 21st Century (**TEA-21**) of 1998-2004 is the continuation of the ISTEA program; it ensures Americans prosperity and quality of life into a new century. Its goal is to improve safety, protect public health, the environment, and create opportunities for all Americans. Under **TEA-21**, Highway Bridge Replacement and Rehabilitation Program (**HBRRP**) funds may be obligated for Preventive Maintenance (**PM**) on Federal-aid highway bridges (other than bridges on roads classified as local roads or rural minor collectors). A **PM** activity is eligible for federal assistance if the State demonstrates, to the satisfaction of the Secretary, that the activity is a cost effective means of extending the useful life of a Federal-aid highway.

The Safety, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (**SAFETEA-LU**) of 2005-2011 extended reimbursable systematic bridge preventive maintenance activities to include bridges off the Federal-aid system; specially, local streets and rural minor collectors. In 2008, the Highway Bridge Rehabilitation and Replacement Program was renamed the Highway Bridge Program (HBP). Effectively, this means all non-toll public highway bridges with spans greater than 20 feet and toll bridges meeting the requirements of **23 U.S.C 144 (1)** are eligible to receive Highway Bridge Program funding for preventive maintenance activities.

Moving Ahead for Progress in the 21st Century Act (**MAP-21**) of 2013-2014 has created a streamlined, performance-based, and multimodal program to address the many challenges facing the U.S. transportation network. These changes include improving safety, maintaining infrastructure, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery. Activities carried out under the existing formula programs, such as the National Highway System Program, the Interstate Maintenance Program, the

Highway Bridge Program, and the Appalachian Development Highway System Program, are incorporated into the following new core formula program structure:

- National Highway Performance Program (**NHPP**)
- Surface Transportation Program (**STP**)
- Congestion Mitigation and Air Quality Improvement Program (**CMAQ**)
- Highway Safety Improvement Program (**HSIP**)
- Railway-Highway Crossings (set aside from **HSIP**)
- Metropolitan Planning

Under **MAP-21**, the funding of Highway Bridge Program will be covered under **NHPP** and **STP** Programs.

Fixing America's Surface Transportation (**FAST**) **Act** of 2016-2020 is the first multi-year transportation bill since **SAFETEA-LU** in 2005 and provides a measure of financial stability for highway, highway and motor vehicle safety, public transportation, rail, research, and technology programs. It is being funded through September 20, 2020. The **FAST Act** maintains focus on safety, keeps intact the established structure of various highway-related programs, continues efforts to streamline project delivery and, for the first time, provides a dedicated source of federal dollars for freight projects.

As part of the **FAST Act**, congress has authorized non-National Highway System bridges on Federal-aid highways to be funded with **NHPP** funding. The Surface Transportation Program (**STP**) has now been converted into the Surface Transportation Block Grant Program (**STBGP**), acknowledging the flexibility of this particular category of funding.

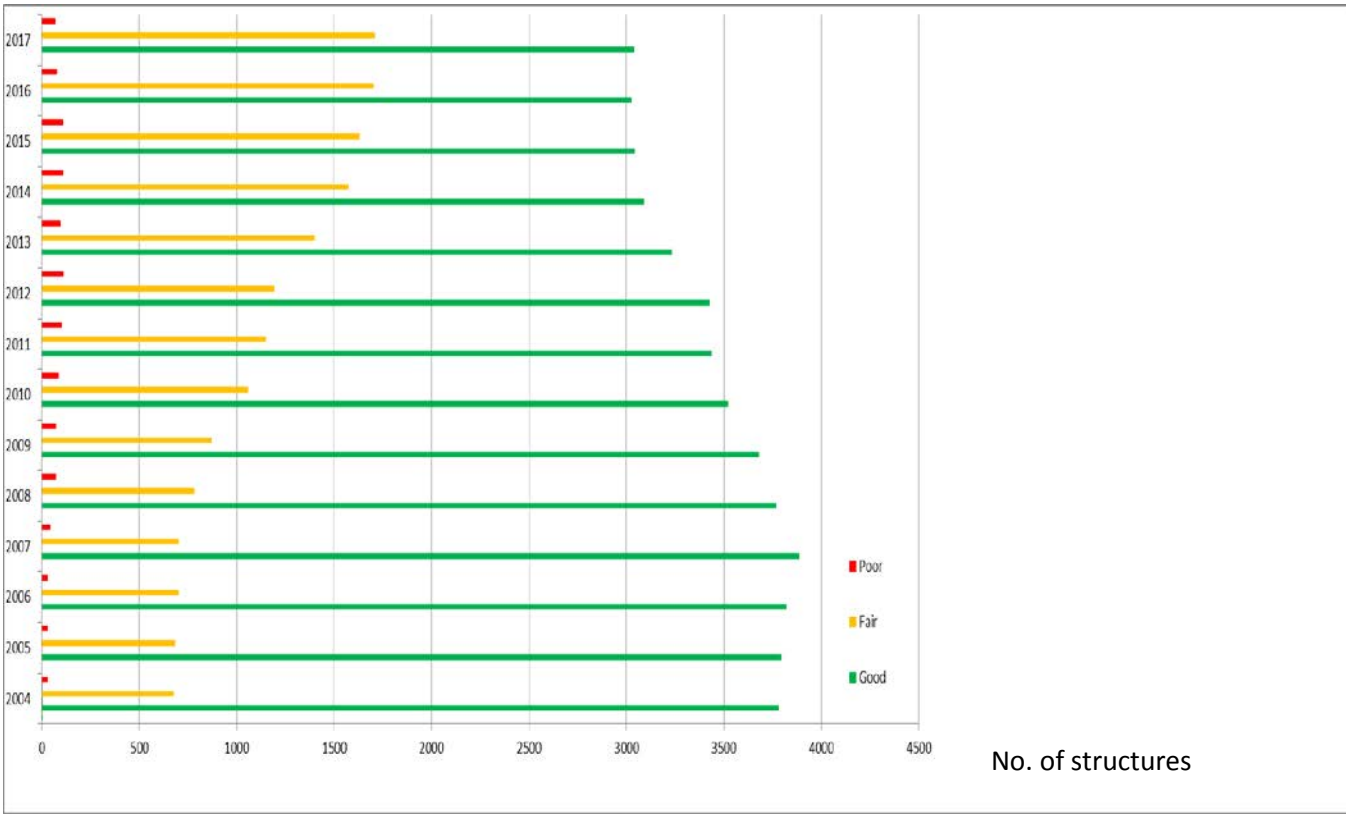
Under **FAST Act**, the funding for High Bridge Program will be covered under **NHPP** and **STBGP** programs.

Section 2 Introduction

State departments and other bridge owners are faced with significant challenges in addressing the Nation's highway bridge preservation and replacement needs. More than 25% of the Nation's 600,000 bridges are rated as structurally deficient or functionally obsolete. More than 30% of existing bridges have exceeded their 50-year theoretical design life and are in need of various levels of repairs, rehabilitation, or replacement. This issue is exacerbated by increasing travel demands, limited funding, and increasing costs of labor and materials. These circumstances have caused most bridge owners to become more reactive than proactive in their approach to managing and addressing their bridge program needs. (**FHWA Bridge Preservation Guide, 2011**)

In Arizona, based on the 2017 bridge inventory, there are 7,968 bridges owned by the State and local public agencies. 154 bridges (1.9% of the total) are listed as Structurally Deficient (**SD**) and 507 bridges (6.4% of the total) are listed as Functionally Obsolete (**FO**). Without the Bridge Preservation Program (**BPP**), the numbers of structurally deficient and functionally obsolete bridges will continue to grow.

The following bridge data collected from 2004 to 2017 indicates bridges in **ADOT** have gradually deteriorated from **good** to **fair.**



Good Primary structural elements exhibit a range from no deficiencies to some minor deterioration.

Fair Primary structural elements are sound, but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.

Poor Advanced section loss, deterioration, cracking, spalling, scour, or seriously affected primary structural components.

A successful bridge preservation program seeks a balanced approach to maintenance, rehabilitation and replacement. Focusing only on replacing deficient bridges, while ignoring preservation needs, will be inefficient and cost-prohibitive in the long term. Adopting a "worst first" approach to managing bridge assets may also yield ineffective results as it allows bridges in good condition to continue to deteriorate in time. The previously "good condition" bridges will deteriorate into the deficient category which generally is associated with higher costs and other challenges in rehabilitation/replacement. (**FHWA Bridge Preservation Guide, 2011**)

The objective of a good bridge preservation program is to employ cost effective strategies and actions to maximize the useful life of bridges. Applying the appropriate bridge preservation treatments and activities at the appropriate time can extend bridge useful life at lower lifetime cost. Preservation activities often cost much less than major reconstruction or replacement activities. Delaying or forgoing warranted preservation treatments will result in worsening condition and can escalate the feasible treatments or activities from preservation to replacement. (**FHWA Bridge Preservation Guide, 2011**)

Section 3 Definitions and Guidance

Arizona Department of Transportation (**ADOT**)/Bridge Group's Bridge Preservation Program (**BPP**) is divided into three subcategories: bridge preventive maintenance, bridge rehabilitation and bridge replacement. All bridges must meet the National Bridge Inventory (**NBI**) criteria (carries a public road and is greater than 20 feet in length). The following are the definitions and considerations of needs for these three subcategories:

3.1 Bridge Preventive Maintenance

Definition - Preventive maintenance (**PM**) is a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without substantially increasing structural capacity. (**AASHTO Subcommittee of Maintenance**)

Bridge Systematic Preventive Maintenance Program Guidelines for State and Local Agencies is exhibited in **Appendix A** to show step-by-step procedures implementing preventive maintenance activities which extend the service life of State and Local bridges. Preventive maintenance includes cyclical (non-condition based) and condition-based activities.

3.1.1 Cyclical Preventive Maintenance Activities

Definition - Cyclical Preventive Maintenance Activities are performed on a pre-determined interval and intended to preserve existing bridge element or component conditions. Bridge element or component conditions are not always directly improved as a result of these activities, but deterioration is expected to be delayed (**FHWA Bridge Preservation Guide, 2011**). Different performance measures and frequencies may be established for cyclical activities based on the desired level of service and program goals.

Consideration of Needs

I. Identify program parameters, for example:

   1) Bridges that are in satisfactory to good condition (**NBI** General Condition Rating of 6 or greater and Element Condition of 2 or less for deck, superstructure or substructure elements)

II. Identify qualifying activities and associated frequencies, for example:

   1) Bridge cleaning- 1 to 5 year interval

      a) Bridge deck washings, for concrete bare decks and slab bridges (every 1 to 2 years)

      b) Bridge deck sweeping for other than concrete bare deck and slab decks (every 1 year)

      c) Other components than deck such as abutment caps and seats, pier caps and seats, drains, etc. (every 1 – 2 Years)

      d) Steel girders or truss bridges (every 5 years)

   2) Lubricate bearing/pins – 2 to 5 year interval

   3) Beam end painting/coating – (every 10 to 15 years)

   4) Installation of thin bonded polymer overlays such as epoxy concrete or polyester concrete – (every 10 to 15 years)

5) Sealing concrete deck with Methacrylate or other approved sealers – (every 3 to 5 years)

6) Sealing abutment caps and seats, pier caps and seats, pier columns/walls and barriers – (every 3 to 5 years)

III. Query bridge inventory to identify eligible bridge candidates

IV. Identify unit cost for the aforementioned activities

V. Calculate the total planned or cyclical **PM** needs based on the inventory and cost data (from the previous two steps, steps III and IV)

3.1.2 Condition-Based Preventive Maintenance Activities

Definition - Activities performed on bridge elements should be identified through the bridge inspection process. These activities are typically performed on a bridge that is in overall good to satisfactory condition with the intention to restore the affected bridge elements to a better condition than before. The condition-based preventive maintenance activities are designed to extend the useful life of bridges. (**FHWA Bridge Preservation Guide, 2011**)

Consideration of Needs:

I. Identify program parameters, for example:

1) Bridges that are in satisfactory to good condition (**NBI** General Condition Rating of 6 or greater or Element Condition of 2 or less for deck, superstructure or substructure elements)

II. Identify qualifying activities. Example of regular **PM** activities:

1) Sealing or replacing leaking deck joint

2) Eliminating deck joints. This can be done on its own or in conjunction with deck or superstructure replacement projects, or during overlay projects with experienced contractor

3) Painting steel bridges such as: full/zone/spot painting/coating. Considering the high cost associated with these activities, it may be a stand-alone bridge painting project

4) Installation of rigid deck overlays (Microsilica fume Modified Concrete or Latex Modified Concrete)

5) Installation of scour countermeasures

6) Seismic retrofit of superstructure or substructure

7) Removing channel debris

8) Cleaning brush from underneath and around bridges

9) Deck patching and repair

10) Rehabilitation/new Installation of deck drains acceptable by environmental protection agency

11) Replacing or repairing damaged substructure, including foundations

12) Repairing slope paving

13) Repairing, restoring and retrofitting of major structural elements such as beams, girders, abutments, piers, and foundations

III. Query bridge inventory to identify eligible bridge candidates

IV. Identify unit cost for the afore-mentioned activities

V. Calculate the total planned or non-cyclical **PM** needs based on the inventory and cost data (from the previous two steps, step 3 and step 4)

3.2 Deficiency Classification

Bridges may be classified as deficient based on type and severity of the problems they face, namely structural or functional problems. In general, when the problem is due to severe inadequacies in load or water flow carrying capacities, the bridge deficiency is classified as structural deficiency and when it is due to inadequacies in handling vehicular dimensions over and under the bridge, it is classified as functional obsolete.

3.2.1 Structurally Deficient (SD)

Bridges are considered **SD** if significant load carrying elements are found to be in poor condition due to deterioration and/or damage, or if the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing overtopping with intolerable traffic interruptions. (**FHWA Bridge Preservation Guide, 2011**)

SD is numerically defined as follows:

- A bridge component (deck, superstructure, substructure or culvert) having an **NBI** General Condition Rating of 4 or less (poor condition)

or

- Structural Evaluation or Waterway Adequacy rated 2 or less (a bridge with a very low load rating capacity, or a bridge that is subject to overtopping with significant or severe traffic delays)

3.2.2 Functionally Obsolete (FO)

Bridges are considered **FO** when the deck geometry, load carrying capacity (comparison of the original design load to the current State legal load), underclearances, or approach roadway alignment no longer meet the usual criteria for the system of which it is an integral part. In general, **FO** means that the bridge was built to standards that are not used today. (**FHWA Bridge Preservation Guide, 2011**)

FO is numerically defined as follows:

- An Appraisal rating of 3 or less for deck geometry, underclearances and approach roadway alignment

- An appraisal rating of 3 for structural evaluation and waterway adequacy

3.2.3 Sufficiency Rating (SR)

The sufficiency rating formula provides a method of evaluating highway bridges by calculating four separate factors to obtain a numeric value which is indicative of bridge's ability to remain in service.

Sufficiency Rating = S1 + S2 + S3 - S4, where

S1= structural adequacy and Safety (55% max.)

S2= serviceability and functional obsolescence (30% max.)

S3= essentiality for public use (15% max.)

S4= special reductions (13% max.)

Using this rating formula, a percentage is calculated on a scale ranging from 100 percent (an entirely sufficient bridge) to zero percent (an entirely deficient bridge).

The **SR** formula is described in **Appendix B** of **FHWA's** "Recording and Coding Guide for Structure, Inventory and Appraisal of the Nation's bridge"

3.3 Bridge Rehabilitation

Definition - Rehabilitation involves major work to restore the structural integrity of a bridge and to correct major safety defects as necessary. Bridge rehabilitation activities are considered bridge preservation, however functional improvements such as adding a travel lane or raising vertical underclearance, while often seen as rehabilitation, are not considered bridge preservation.

Bridge rehabilitation projects provide complete or nearly complete restoration of bridge elements or components. These projects typically require significant engineering resources for design, a lengthy construction schedule, and considerable costs. (**FHWA Bridge Preservation Guide, 2011**)

Consideration of Needs:

I. Identify program parameters. Bridges in fair to poor condition are qualified for rehabilitation and can be systematically prioritized based on their remaining service life and General Condition Ratings. The bridge must be classified as either structurally deficient (**SD**) or functionally obsolete (**FO**) as described in **SI&A** Sheet (Structure Inventory and Appraisal Sheet). The **HBP** criteria (bridge is either **SD** or **FO** or both, plus 50 <Sufficiency Rating ≤ 80, or **NBI** General Condition Rating of 5 and 4) can be used to identify the qualified bridges. In case if the deck rating is 6 but the deck has been exhibiting potential of accelerated deterioration then it will qualify for bridge deck rehabilitation.

II. Establish criteria for deck rehabilitation projects: deck in poor condition but the superstructure and substructure in fair to good condition

III. Establish criteria for superstructure replacement projects: deck and/or superstructure in poor condition with substructure in fair to good condition

IV. Establish criteria for substructure enhancement project

V. Identify activities. For example:

1) Overlay, partial or complete deck replacement

2) Retrofit fatigue prone steel details

3) Retrofit fracture critical members (FCM) or add redundancies to superstructure in order to remove FCM status

4) Superstructure replacement

5) Strengthening

6) Incidental widening

VI. Query bridge inventory to identify eligible bridge candidates

VII. Identify unit cost for the afore-mentioned activities

VIII. Calculate the total planned rehabilitation needs based on the inventory and cost data (from the previous two steps, steps VI and VII)

3.4 Bridge Replacement

Definition - Total replacement of a structurally deficient or functionally obsolete bridge with a new facility constructed in the same general traffic corridor. A nominal amount of approach work, sufficient to connect the new facility to the existing roadway or to return the grade line to attainable touchdown point in accordance with good design practice is also eligible. The replacement structure must meet the current geometric, construction and structural standards required for the types and volume of projected traffic on or under the facility over its design life.

Similar to bridge rehabilitation, bridge replacement projects require engineering resources for design, a substantial and complex completion schedule, and considerable cost. Life cycle costs and other economic factors are usually considered when weighing rehabilitation versus replacement costs. (**FHWA Bridge Preservation Guide, 2011**)

Bridge replacement is not considered a preservation activity but it is considered a part of ADOT Bridge Preservation Program.

Consideration of Needs:

I. Identify program parameters. Bridges in poor condition are qualified for bridge replacement and can be systematically prioritized based on their remaining service life and General Condition Ratings. The bridge must be classified as either structurally deficient (**SD**) or functionally obsolete (**FO**) as described in **SI&A** Sheet (Structure Inventory and Appraisal Sheet). The HBP criteria (bridge is either **SD** or **FO** or both, plus

Sufficient Rating ≤ 50, or **NBI** General Condition Rating of 4 or less) can be used identify the qualify bridges.

II. Establish criteria for bridge replacement projects: deck and/or superstructure are in poor condition but the substructure is in fair to poor condition)

III. Deficient bridges with sufficiency rating between 50 to 80 may be replaced if were justified to be more cost effective than rehabilitation based on the current bridge condition, safety measures, remaining service life, level of service, and life cycle cost analysis

IV. Replacement may be considered when the rehabilitation cost reaches 60% of the replacement cost thus depending on **ADOT** and **FHWA** approval.

V. All deficiencies must be corrected including safety features such as: bridge rail, approach rail connection, and transitions. Geometric and structural features must meet current standards for replacement, or deviations must be approved

VI. Bridges replaced or reconstructed to current standards are not eligible for federal funding for a 10-year period, unless the work is part of a specially approved phased set of construction project. The 10-year rule does not apply to projects which include only seismic retrofit, scour retrofit or structural steel painting.

VII. Query bridge inventory to identify eligible bridge candidates

VIII. Identify unit cost for the above-mentioned activities

IX. Calculate the total planned replacement needs based on the inventory and cost data (from the previous two steps, steps VII and VIII)

Section 4 Bridge Preservation Program Resource and Process

Under **MAP21**, the **HBP** funding was no longer a stand-alone bridge program but was merged into **NHPP** and **STP** programs as previously stated. This has been continued into the **FAST Act** under the **NHPP** and new **STBGP** programs. **ADOT** has the Bridge Preservation Program (**BPP**) that handles bridge project needs for State and Local Public Agencies (**LPAs**). This program consists of the following subprograms:

4.1 Bridge Inspection and Minor Repair Subprogram

This subprogram is used to perform bridge inspection, scour retrofit and bridge minor repair projects. The current annual budget for this subprogram is $8.0 million. Under bridge inspection,

ADOT inspects its own bridges and all but three Local Public Agencies (Phoenix, Maricopa County and Pima County). The funding is divided by type of activity and agency:

Type of Activity and Eligible Agency	**Funding Amount**
Bridge Inspection for State including LPAs (on/off system)	$4.0 million
Bridge Inspection for Self-Inspecting LPAs (on system)	$1.0 million
Scour Retrofit & Bridge Minor Repair projects for State	$3.0 million

Note: The program amount may be adjusted in the future based on the needs

4.2 Bridge Rehabilitation and Replacement Subprogram

This subprogram has two components, **BRON** (Bridge Fund for On System) and **BROS** (Bridge Fund for Off System). The **BRON** is dedicated for eligible bridges located on the Federal-Aid routes (on system), and the **BROS** is dedicated for eligible bridges on non-Federal-Aid routes (off system). The present funding is divided by components and may be adjusted based on future needs:

Component	**Funding Amount**
BRON for On-System	$52 million
BROS for Off-System	$3.9 million

The funding targets for **BRON** can be met by utilizing a bridge management system to predict the bridge rehabilitation/replacement needs. However, in the absence of a meaningful predictive system, initial funding targets for each of the three categories (Preventive Maintenance, Rehabilitation, and Replacement) are distributed as follows:

Categories	**Funding Apportionment by %**	**Funding Amount**
Preventive Maintenance	15%	$7.8 million
Rehabilitation	50%	$26 million
Replacement	35%	$18.2 million

The funding target for **BROS** is mainly for off system local bridges and it should be established by **ADOT LPA** (Local Public Agency) based on local needs. Local public agencies who apply for **BROS** funding will follow the policy established by **ADOT LPA** Section for eligibility. A list of eligible local agency bridges can be found on the ADOT Bridge Group website.

The Bridge Group will check the initial budget against performance targets. If the performance targets are not achieved or met, **BRON/BROS** needs to be either adjusted or optimized to meet the current budget targets. Different targets may be established for bridges located on **NHS** versus the interstate depending on the volume of traffic passing through each route.

4.2.1 State Highway On-System Selection and Programming Process

The following process will be performed and refined as needed on an annual basis.

1) The Bridge Group will identify eligible structures for Preventive Maintenance, Bridge Rehabilitation and Bridge Replacement from the statewide inventory system. The District will provide input and verification from field reviews to identify eligible structures

2) These bridges will be ranked based on calculated scores (see prioritization process below) for both **BR** and **BROS** funds and the list of bridges will be provided to the District Engineer

3) During the Planning to Programming (**P2P**) annual meeting, the team will review the bridge priority list with other stakeholders and bridge remediation will be combined with other construction projects if it is feasible

4) Bridge Group will consolidate the list, allocate the funds to qualified projects, and coordinate with Priority Programming to program these projects into the Five Year Tentative Program

5) Multimodal Planning Division (**MPD**)/Bridge Group will review, revise and submit the final list to Transportation Board for approval

6) After Transportation Board's approval, these bridge projects will be officially listed in the ADOT Five Year Transportation facilities Construction Program

7) These bridge projects will follow the project development process for scoping, design and construction.

8) These rehabilitated and replaced bridges will be inspected, opened to traffic and subjected to proper maintenance during their service life.

4.3. Prioritization Process

Until **BrM** (Bridge Management System) is fully functional with updated inspection data, available new deterioration model and cost related data, the following ranking criteria will be used to aid in prioritizing the funding and programming of eligible projects. These criteria consider the applicable factors obtained from **NBI data** in the following table:

Items applicable to bridges:

N29, N109, N41, N19, Deficiency Classification, S.R., N58, N59, N60, N27, N64, N26, N51, N92A, N113, N53/N54, N55/N56, N71, N72, Elevation

$$Bridge\ Priority\ Ranking = \sum_{i=1}^{i=20} (NBI_i) * Weighing\ Factor_i$$

Items applicable to culverts:

N29, N109, N41, N19, Deficiency Classification, S.R., N62, N27, N64, N26, N51, N113, N71, N72, Elevation

$$Culvert\ Priority\ Ranking = \sum_{i=1}^{i=15} (NBI_i) * Weighing\ Factor_i$$

NBI Item	Weighing Factor			
	0.25	**0.50**	**0.75**	**1.00**
N29- Average Daily Traffic (ADT)	0 - 200	201 - 1000	1001 - 6500	>6500
N109- % Truck Traffic (ADTT)	0 - 5	6 - 10	11 - 15	>15
N41-Weight Restricted	B (Open-posting recommended but not implemented)	D (Open-posted or closed if not for shoring)	P (posted)	K (closed)
N19 - Detour Length	0 – 5 miles	6 – 10 miles	11 – 15 miles	> 15 miles
Deficiency Classification	-	-	-	Structurally Deficient or Functionally Obsolete
Sufficiency Rating, S.R.	80-70	70-60	60-50	<50
N58- Condition Rating of deck (N/A to culvert)	6	5	4	<4
N59- Condition Rating of Superstructure (N/A to culvert)	6	5	4	<4
N60- Condition Rating of Substructure (N/A to culvert)	6	5	4	<4

N62- Condition Rating of Culvert	6	5	4	<4
N27 - Year Built	1980 – 1990	1970 – 1979	1960 – 1969	<1960
N64 - Operating Rating	31 to 35 tons	26 to 30 tons	20 to 25 tons	< 20 tons
N26 - Functional Classification	Local	US Route	State Route	Interstate
N51- Bridge Deck Width	-	-	-	Substandard
N92A- Fracture Critical Member Present (N/A to culvert)	-	-	-	Yes
N113 - Scour Vulnerable	-	-	-	Yes
N53 & N54 - Vertical Over/Under Clearance Deficiency (N/A to culvert)	-	-	-	Yes
N55 & N56 Horizontal Clearance Deficiency (N/A to culvert)	-	-	-	Yes
N71 - Waterway Adequacy	-	-	-	Inadequate

N72 - Approach Roadway Alignment Deficiency	-	-	-	Yes
Elevation	-	-	-	>4000 ft or using de-icing material

Each factor has a maximum weight of one point. This methodology is monitored yearly for modifications for continuous improvement.

Note: Maximum score for Bridge is 20 and for culvert 15.

4.4 Deterioration Models

Deterioration models are an important feature of the process of evaluating the effectiveness of the Bridge Preservation Program (**BPP**). Deterioration models are needed to perform network and bridge level evaluations for expected and projected budgets and are useful in predicting future performance measures. Analyses can be used to justify the benefit of **BPP** and to support requests for funding. Often, these models are developed for the agencies through the use of local universities and research program dollars or by agency personnel. **BrM** comes with default models that typically need to be customized based on an agency's environmental and operational conditions for the bridge inventory.

4.4.1 Simplified Deterioration Models

Until **BrM** can be customized based on actual needs, a simplified deterioration model using NBI component-level condition rating data was developed (element-level data may be developed once the data collections are completed in the future).

This simplified deterioration model is based on the following assumptions:

1. The service life of an existing bridge or deck (elevation less than 4000' or not in an environment utilizing de-icing agents) built before 1970 is 50 years (if constructed from 1970 to 2010, bridge service life is 75 years and when built after 2010, the expected service life is 100 years). Culvert expected service life is 100 years regardless of the construction date (culverts less than 2 feet fill will be treated as bridges). The expected service life of an existing deck in an elevation over 4000' or in an

environment utilizing de-icing agents built before 1970 is 25 years (if constructed from 1970 to 2010, deck service life is 30 years and when built after 2010, the expected service life is 35 years)

2. This simplified deterioration model is based on the deterioration of deck, superstructure, substructure and culvert during their life span (see the tables and charts below).

3. Deck service life may be limited to 35 years due to environmental conditions (high elevations and/or using de-icing agents).

4. Steel bridge painting system will be treated as a special case which also will be impacted by the environmental condition

5. The average cost of bridge improvement based on type of work is summarized in the following table:

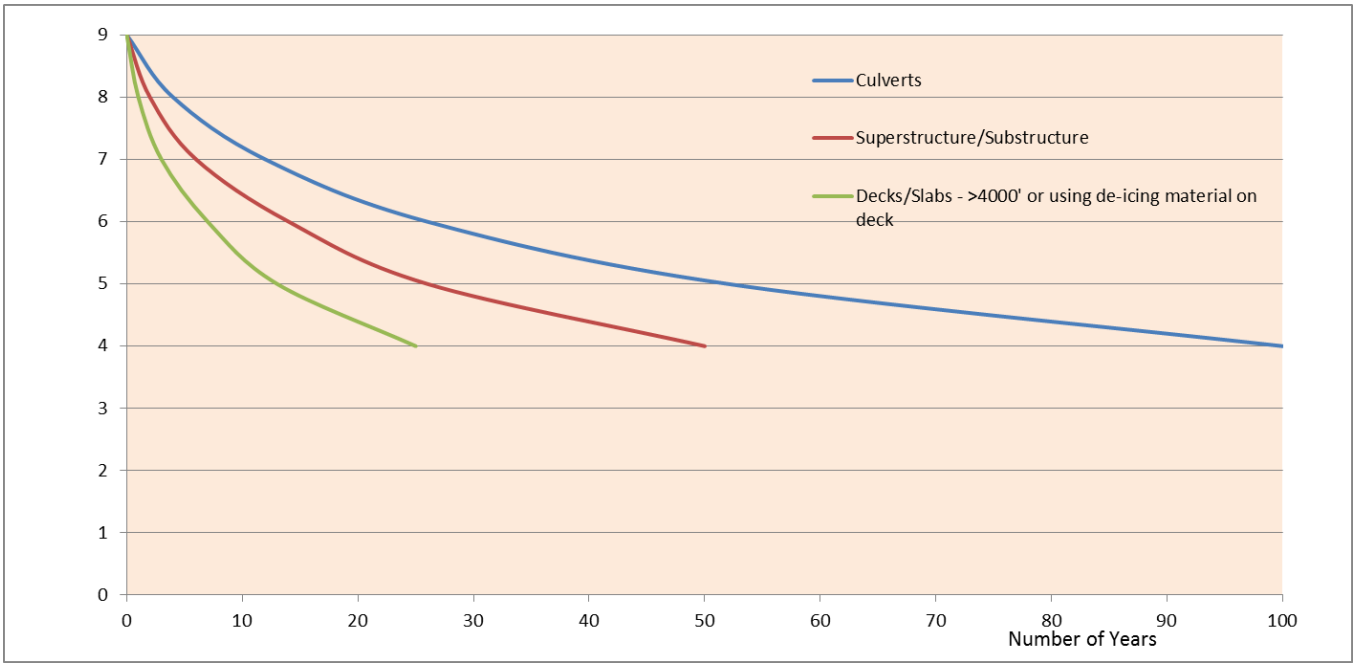
Type of Activity	Condition Rating Upgrade	Cost in $ per Square feet
Preventive Maintenance	Satisfactory (6) to Good (9-7)	10 - 50
Rehabilitation	Poor/Fair (5-4) to Good (9-7)	150 – 200
Rehabilitation	Poor (4 or less) to Fair (6-5)	50 - 150
Replacement	Poor (4 or less) to Good (9-7)	200 – 300

Based on the above assumptions, a simplified deterioration model for deck, superstructure, substructure or culvert is established as follows:

I. Structures built before 1970

Condition Rating Decline	Deck, >4000' or using de-icing agents -Years	Superstructure or Substructure - Years	Culvert - Years
From 9 to 8	1	2	8
From 8 to 7	2	4	12
From 7 to 6	4	8	20
From 6 to 5	6	12	28
From 5 to 4 or less	12	24	32
Estimated Life, Years	25	50	100

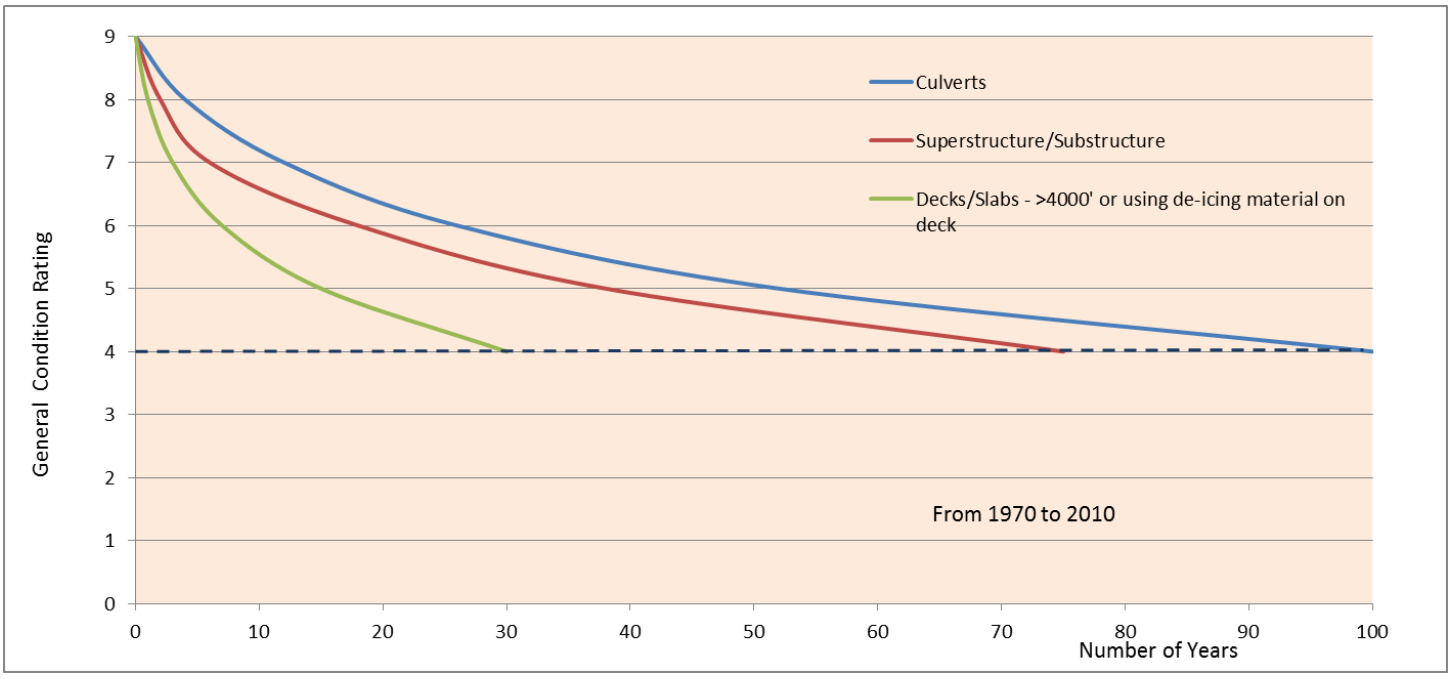
Note: Deck limited to 35 Years in general



II. Structures built from 1970 to 2010

Condition Rating Decline	Deck, >4000' or using de-icing agents -Years	Superstructure or Substructure - Years	Culvert - Years
From 9 to 8	1	2	8
From 8 to 7	2	4	12
From 7 to 6	4	12	20
From 6 to 5	8	20	28
From 5 to 4 or less	15	37	32
Estimated Life, Years	30	75	100

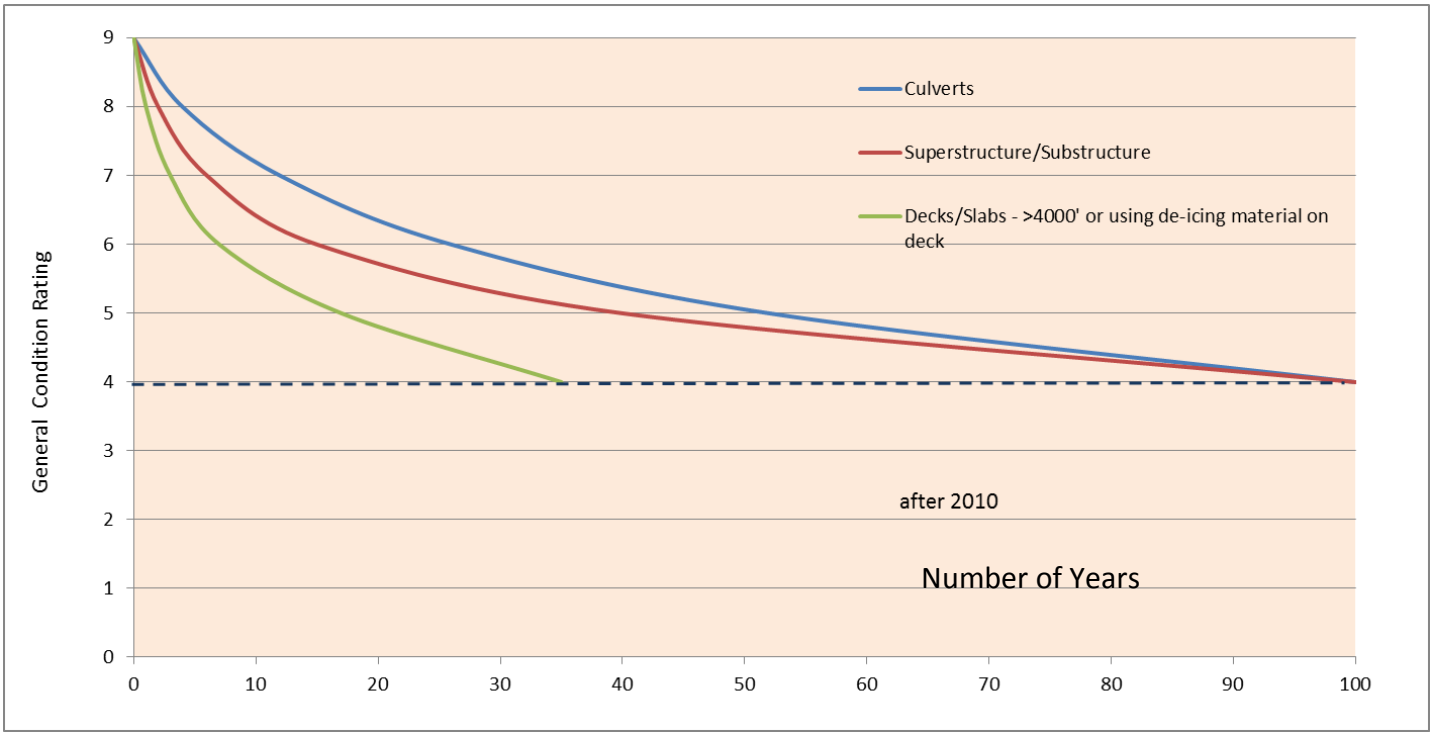
Note: Deck limited to 35 years in general



III. Structures built after 2010

Condition Rating Decline	Deck, >4000' or using de-icing agents -Years	Superstructure or Substructure - Years	Culvert - Years
From 9 to 8	1	2	8
From 8 to 7	2	4	12
From 7 to 6	4	16	20
From 6 to 5	10	28	28
From 5 to 4 or less	18	50	32
Estimated Life, Years	35	100	100

Note: Deck limited to 35 years in general



Once the simplified deterioration models for bridges and culverts are established, the bridge preservation program manager will project future budget needs based on the current BrM bridge database. In another words, the funding for the Bridge Preservation Program (includes preventive maintenance, rehabilitation and replacement) can be projected for future year needs based on the established performance criteria.

4.5 Recording and Tracking Bridge Preservation Work

In order to properly manage the bridges and structures owned and maintained by **ADOT**, it is essential to properly capture all work activities performed on the bridge and culvert assets. This includes work performed by both State Forces and by Contract. **ADOT's** Bridge Management Section (**BMS**) has utilized the Bridge Management System (**BrM)** database to capture and report all bridge preservation work performed on ADOT owned or maintained bridges and culverts to maintain efficiency. **BMS** should expand its database and make it more user-friendly to take full advantage of advanced features of the software once all data collections are completed.

All work performed on bridges and culverts by State Forces shall be reported through the District Maintenance Engineer/District Engineer by capturing all work activities as well as resource usage in terms of labor, equipment and materials. A list of bridge maintenance, rehabilitation, replacement, inspection, and rating activities can be found in **Appendix B** at the end of this document.

A large portion of work performed on bridges is accomplished by contract. In order to capture this work, it is necessary to capture the extent and costs associated with contract work managed by Contract & Specifications (**C&S**). **BMS** can interface with **C&S** database to capture the cost of all bridge work performed.

BMS bridge inspection teams will verify any completed bridge preservation activities during the routine inspection based on the newly created database for State Forces and by Contract (through **C&S** and Districts input). Initial and Special inspections will be performed for a new bridge construction and for all major rehabilitation of **SD** bridges, respectively.

Appendix A:

Bridge Systematic Preventive Maintenance Program Guidelines
For State and Local Agencies

I. Program Description/Purpose

Bridge Systematic Preventive Maintenance Program (B**SPMP**) is defined as follows:

"A planned strategy of cost effective treatments to existing bridges that are intended to maintain or preserve the structural integrity and functionality of elements and/or components, and retard future deterioration, thus maintaining or extending the useful life of a bridge."

A successful bridge program is based on a strategic, systematic, and balanced approach to managing bridge preservation and replacement needs. By focusing only on replacing deficient bridges while ignoring preservation needs will be inefficient and cost-prohibitive in the long term. Adopting a "worst first" approach to managing bridge assets may also yield ineffective results that allows bridges in good condition to deteriorate into the deficient category which generally is associated with higher costs and other challenges. Preventive maintenance techniques and strategies selected should be easily constructible in order to minimize traffic disruption and should provide relief from intensive or frequent repair activity.

The objective of a good bridge preservation program is to employ cost effective strategies and actions to maximize the useful life of bridges. Applying the appropriate bridge preservation treatments and activities at the appropriate time can extend bridge useful life at lower lifetime cost.

Preventive maintenance is part of the bridge preservation with narrow in scope for work than for preservation.

ii. Preventive Maintenance Eligibility

According to memoranda issued by **FHWA** on 11/26/2001 and 10/8/2004, the FHWA division office will work with the State to establish a preservation component, which is composed of various preventative maintenance activities and treatments. These include roadway activities such as joint repair, seal coats, pavement patching, thin overlays, shoulder repair, restoration of drainage systems, guardrail, signs, striping, lighting and signals, and bridge activities such as crack sealing, joint repair, seismic retrofit, scour countermeasures, painting, deck overlays, clean deck drains and spalled concrete repair. Many other activities that heretofore have been considered routine maintenance may be considered Federal-aid eligible on an area-wide or system-wide basis as preventive maintenance (i.e. extending the service life). This might include such work items as nationwide projects for periodic sign face cleaning of drainage facilities, corrosion protection, spray-applied sealant for bridge parapets and piers, etc.

The final eligibility determination should be the result of collaboration between the State DOT and the division. This determination should be based on sound engineering judgment and economic evaluation, allowing flexibility in determining cost-effective strategies for extending the service life of existing pavement, bridges, and essential highway appurtenances on Federal-aid highways. .

iii. Bridge Systematic Preventive Maintenance Program (BSPMP) Goals and Objectives

The **goals** of **BSPM** program are:

1. Maintain the existing inventory of bridges in a structurally safe and serviceable condition.
2. Correct minor structural deficiencies in a timely manner in order to avoid later costly rehabilitation, reconstruction or replacement.
3. Extend the service lives of existing bridges.
4. Make efficient use of limited resources.

Preventive Maintenance (**PM**) should be performed at the optimal time or specified intervals to help preserve the structural condition of bridges or to extend the service life of bridges. Preservation of structural serviceability is a key element of the Program.

Preventive maintenance activities should concentrate on treating bridges in fair to good condition (see the definition below for fair and good) and showing no more than minor structural distress. Preventive maintenance activities should not degrade any safety or geometric aspects of the facility.

In most cases, projects may be undertaken without geometric enhancements, significant reconstruction or considerable upgrades. However, this should not be construed as authority to ignore major problems causing a bridge to be functionally obsolete or structurally deficient by **NBI** standards.

The **objective** of the **BSPM** is to implement timely preservation treatments on structurally sound bridges, thereby extending their useful life. Structurally sound may be defined as having an overall NBI General Condition Rating of 6 or greater for the deck, superstructure, substructure, or culvert components, or **AASHTO** Element Condition State of 1 or 2 for the elements associated with the deck, superstructure, substructure, and the culvert units.

Bridges that are currently programmed for rehabilitation or replacement are not eligible for funding under this program. State/local agencies may still pursue a preventive maintenance scope but justification must be documented in the project files for future audit purposes. The work should be limited to the minimum needed to keep the bridge operable until the rehabilitation or replacement project can be advertised. In this case, preventive maintenance activities may be incorporated into and funded as part of regular bridge rehabilitation projects.

To meet the **BSPMP** program goal, **ADOT** is developing a strategic investment plan to maintain 90 percent ([1- Total Deck Area of State Bridges Classified as Structurally Deficient/Total Deck Area of Bridges in a State] x100) of our bridges in "**Satisfactory** or **Good**" condition by 2017. An NBI (item 58, 59, 60 and 62) rating of 6 is considered as **Satisfactory** and a rating of 9-7 is considered **Good** condition in Arizona. **ADOT** expects this National Performance Measurement Criteria proposed by **MAP 21** can assist us to meet the goal for State bridges.

A local public agency may wish to consider establishing different goals and objectives for different highway systems, different functional classifications, or Average Daily traffic (**ADT**) ranges. These goals and objectives will subject to the approval of **ADOT LPA Section** and **FHWA** when local public agency submits **BSPMP** for funding request.

iv. Inventory and Condition Assessment

ADOT performs inspections according to the National Bridge Inspection Standards (**NBIS**) and collects **NBI** general condition rating data for bridge components, elements and additional Arizona-specific data not reported to NBI. These Arizona-specific items include posted vertical clearance, foundation type, foundation embedment, scour countermeasure, bridge rails, culvert dimensions and fills, etc.

ADOT provides a Bridge Inspection Guidelines which is a guidebook used by **ADOT**, **FHWA**, local bridge owners and engineering consultants to reference and clarify the requirements set forth by the **NBIS** and **ADOT**. The latest version of guidelines is going to be published in 2016.

Early communication for reporting bridge inspection maintenance and repair recommendations to the Districts and feedback from Districts to BMS is a good strategy to generate preventive maintenance and rehabilitation projects in time.

v. Needs Assessment

The needs of Arizona's bridges are assessed by the Bridge Management Section (**BMS**). The **BMS** created a spreadsheet under the "**Bridge Preservation Program**" to screen all bridges and generate suggested bridge preventive maintenance, rehabilitation and replacement projects based on NBI data (inventory and condition) and prioritization process. If deterioration model and cost data are introduced in to **BrM** then **BrM** will generate the network projects that need to be preserved in the future.

Preliminary cost estimates are generated using average unit cost to establish **BSPMP** funding needs. These cost estimates are calculated with **Bridge Preservation Program**. Specific bridges with unique **PM** needs are examined further during review sessions to compile final **BSPMP** needs.

Bridges that are structurally sound, and not recommended for replacement or rehabilitation are considered candidates for **BSPMP**. The condition-based **PM** needs are prioritized by assigning an Optimum Year and a Critical Year. Optimum Year is the first year when **PM** strategy can be cost effectively implemented. Critical Year is the year after which a proposed **PM** strategy is no longer cost effective. Typically, after the Critical Year, a more costly action would be required. For instance, coating of a steel superstructure would be highly prioritized if localized zones indicate more advanced corrosion relative to the overall corrosion of the girder.

A list of eligible bridges and their corresponding cyclical **PM** needs is prepared by the **BMS** based on the field inspection data and will be provided to the District Maintenance Engineer if state force can perform

the work. This work is programmed by the District Maintenance Engineer in accordance with the desired frequency for given activities. See work activities under cyclical **PM** from **Bridge Preservation Program**.

vi. Cost Effective PM Activities

The **FHWA Bridge Preservation Guide** provides examples of **PM** activities in **Section IV.B page 21**. These **PM** activities can be considered cost effective when applied to the appropriate bridges at the appropriate time using quality materials and workmanship.

It is important to address the root cause of deterioration that may eventually lead to deterioration of significant bridge components. For example, joint seal replacement or joint repairs can reduce the damage of the substructure elements such bearings, seats, and pier caps due to contaminants in conjunction with water leakage from the deck.

In some cases, some condition-based **PM** activities will eliminate the need for follow-up cyclical **PM** activities. For example, elimination of the deck joints from the bridges will provide long term protection of girders, beams, bearings, etc. Cyclical **PM** activities such as cleaning/washing deck joints, girders, bearings and seats may no longer be needed.

ADOT also likes to evaluate and develop District maintenance crews skills and abilities to perform preventive maintenance activities. The activities that can be performed by the District maintenance crews will be identified with available unit costs. Training for preventive maintenance will be made available to District maintenance crews which can be obtained through NHI training courses under FHWA-NHI-130107A/130108/130109A/130109B.

Other qualifying activities may be presented to the **FHWA** Division Office for consideration and approved on a case by case basis.

vii. Accomplishing the Work

Preventative maintenance work will be accomplished by a combination of projects let to the contractors and work performed by district maintenance crews. **ADOT** and **Local PLAs** will implement **BSPMP** according to the program outlines listed below. **ADOT** upper management is committed to the program and adequate resources are dedicated to manage the program. **BMS** from **Bridge Group** and **LPA Section** from **Infrastructure Delivery and Operations Division** (**IDO**) will take the lead to create **PM** projects for state and LPAs, prioritize the projects, allocate the budget, develop the **PS & E** package for advertisement, monitor the construction and maintenance activities and report the status of projects.

viii. Reporting and Evaluation

BMS/LPA/Districts will be responsible for tracking, evaluating, and reporting the planned and accomplished PM work on an annual and/or as needed basis.

Formalized process should be established by **BMS/LPA/District** to share the information by updating the current bridge database when the state or local agency bridge work has been completed.

The **BSPMP** should track expenditures over time. In most cases, this would be the dollars expended annually for the **BSPMP** that is compared with the improved condition of the system to ensure that the investment is providing the return expected.

ix. Funding Availability

The current amount of **BSPMP** funds will be determined based on the funding availability and will be programmed in Arizona Department of Transportation (**ADOT)** Five Year Highway Construction Program.

For state owned **BSPMP**, the initial funding is limited to $6,000,000 per year and **BSPMP** plan will be submitted and approved by federal Highway Administration (**FHWA)**. The funding may be increased or decreased pending the future needs.

For local agency owned **BSPMP**, the initial funding is limited to $200,000 per year per agency with a total cap of $2,000,000 per year and a **BSPMP** plan will be submitted and approved by **ADOT Local Public Agency Section (LPA) and FHWA** based on first come first served until the funding is depleted. The funding may be increased or decreased pending on the future needs.

x. Prequalification

1. In order to pre-qualify for **BSPMP** funding, bridge projects must be programmed into the Transportation Improvement Program (**TIP**) for a **COG/MPO** and programmed into the State Transportation Improvement Program (**STIP**) for the State. Please refer to **Project Prioritization Section** for more details.
2. General condition rating of **6** or greater **or AASHTO Element Condition State of 1 or 2** for the elements associated with the deck, superstructure, substructure, and culvert units.
3. Some of the preventive maintenance items such as cleaning, sealing, painting and debris removal will not be subjected to item 2 limitation (for bridges with Overall Bridge Rating **Poor**) based on further discussion with **FHWA** for state and **ADOT LPA Section** for locals.

x.1 Eligible applicants

Eligible applicants for **BSPMP** funding include State and all Arizona Local Public Agencies (**LPAs**). All other non-federal (Indian Tribes, etc.) or federal agencies (Forest Service, etc.) are excluded from this **BSPMP** program.

x.2 Eligible Works

Two types of treatments are considered to be eligible for BSPM funding:

1. Preventive (Cyclical) Maintenance – Specific activities that are scheduled on a fixed cycle that are intended to maintain a structure at its current level, and prevent deterioration.
2. Corrective (Condition-Based) Maintenance – Specific activities are not scheduled and are reactive in nature, intended to correct more extensive damage and prevent further deterioration but limited to localized areas of a specific structural element.

Examples of Preventive Maintenance (**PM**) and Corrective Maintenance (**CM**) activities and typical frequency that may extend the life of bridges were presented in the **Bridge Preservation Program** or can be found in **FHWA Bridge Preservation Guide**.

x.3 Ineligible Projects

1. Major bridge rehabilitation or replacement (deck, superstructure and substructure).
2. The increase of facility capacity (widening and strengthening).
3. Routine Maintenance (responsibility of the **State** and **LPA**s).
4. Bridge Inspection

xi. Project Prioritization

ADOT and **LPAs** must develop objective procedures to prioritize their preventive/corrective maintenance projects and submit them to **FHWA** (for ADOT and LPAs) and **ADOT LPA Section (**for LPAs**)** for review and approved. These procedures must be included in the project files for review in future audits. The highest priority projects should include the repair of scour countermeasure, embankment erosion control and the repair, restoration, and retrofitting of structural elements.

Priority should be given to bridges that are not eligible for rehabilitation or replacement under the federal restrictions. The intent of the program is to keep these bridges in structurally good condition, to maximize their service life and to conserve limited funds available for bridges that do require major rehabilitation or replacement.

Priority consideration factors for **State** and **LPAs** bridges are routes, detour length, ADT, ADTT, asset values, condition ratings, etc. Please refer to the **Prioritization Process** list in the **Bridge Preservation Program**.

xii. Project Development Process

xii.1 Design Standards

Design Standards for state preventive/corrective maintenance projects are defined in **Bridge Practice Guidelines** under **ADOT Bridge Group** website and **AASHOTO LRFD Bridge Design Specifications**.

Local agencies are required to specify the appropriate design standards in their project files for future audit purposes. This is critical to avoid jeopardizing federal funds and potential tort liabilities against local agencies. In order to use federal funding for **LPA** projects, design standard from **LPAs** shall comply with federal design standards and regulations. For non-NHS routes, design standard should comply with **ADOT** design standards.

xii.2 Major scope changes during the performance of preventive/corrective maintenance activities

Scope changes that result in project work beyond preventive maintenance must have documented justification that is reviewed and approved by **ADOT** and the **FHWA** following customary project development procedures.

State and locals will prepare scope changes document with back up data and obtain the approval from **FHWA** (for state and locals) and **ADOT LPA Section** (for locals) by delaying other preventive/corrective maintenance projects in their **BSPMP** to pay for the cost increase.

If the funding increases due to major scope changes and exceeds the funding limitation, further discussion with **FHWA** (for state and locals) and **ADOT LPA Section** (for locals) will be needed to resolve excessive funding issues.

xiii Implementation

Participating state and local agencies will need to develop a Bridge Systematic Preventive Maintenance Program (**BSPMP**). The program shall be submitted to the **FHWA** coordinator (for state and locals) and **ADOT LPA Section** Coordinator (for locals) in electronic spreadsheet format. The highest priority projects will be at the top of the spreadsheet.

Each line in the spreadsheet will represent one bridge. Examples are:

Project Name	Project No.	Route	MP	Project Priority	Type of Preventive Maintenance	Project Cost
State						
Santa Cruz	xx-xx	19	25	1	Deck sealing	$20,000
Pima Mine	xx-xx	19	30	1	Deck sealing	$20,000
Ash Fork I	xx-xx	40	146	2	Deck flushing	$5,000
Ash Fork II	xx-xx	40	148	2	Deck flushing	$4,000
Local						
Phoenix	xx-xx	N/A	N/A	1	Seal joint	$50,000
Phoenix	xx-xx	N/A	N/A	2	Spot paint	$50,000
Maricopa	xx-xx	N/A	N/A	1	Deck sealing	$20,000
Maricopa	xx-xx	N/A	N/A	2	joint lubricant	$5,000

Each spreadsheet shall include as a minimum:

1. For each bridge: Bridge Name/Number, Project Number, Route, MP, the priority for funding (lowest number is highest priority), county geographic location, name of implementing agency, facility carried, feature intersected, location, Sufficiency Rating, Deficiency Classification, all Preventive Maintenance (**PM**) and Corrective Maintenance (**CM**) treatments for each bridge, unit cost of **PM/CM** (related to bridge elements), federal funds, running summary of federal funds, state/local matching funds, and running summary of state/local matching funds. The federal reimbursement rate is 94.3% of the eligible project cost.
2. If a local agency wants to be reimbursed for the future costs of developing a **BSPMP**, a line in the spreadsheet must be added (priority=1) that includes the costs to develop future year BSPMPs.
3. All references to cost include only reimbursable costs such as preliminary engineering (**PE**), indirect, Right of Way acquisition, Temporary Construction Easement (**TCE**), construction and construction engineering, and contingency. Contingency is not to exceed 25% for programming purposes. Contingency shall be reduced to 10% maximum for construction authorization.
4. Other fields may be included for convenience by the local agency.
5. The Department will accept updated **BSPMP** no more than twice a year from local agencies. The **ADOT LPA Section** Coordinator must receive the **BSPMP** by September 30th for funds to be obligated in the next fiscal year, and January 30th of each year for adjustments. No time extensions will be granted.

The local agency must have qualified in-house or contracted staff to develop the **BSPMP**. Minimum qualifications for staff or consultants developing the **BSPMP** are:

1. Be professionally licensed civil engineer in Arizona
2. Have expertise in bridge preventive maintenance treatments,
3. Have expertise in interpreting information in the NBI Bridge Inspection Reports including element level inspection items.

Cities and other local entities may contract with **ADOT** to develop and implement their **BSPMP**s. If the **State** is implementing the **BSPMP** for their agencies, the name of the agency implementing the **PM** in the **BSPMP** will be the **State** even though another agency may own the bridge.

The costs of developing the **BSPMP**, including approved indirect costs are federally reimbursable and may be included in the **BSPMP**.

State needs to set up a lump sum item for "Planning of the Bridge Systematic Preventive Maintenance Program for **State** and **LPAs**" in the **ADOT** Five Year Highway Construction Program. This will allow **State** and **LPAs** to hire consultants or fund staff to develop their **BSPMPs**. This item will be only funded in FY 2017 and after as described in the previous **Funding Availability** segment.

Xiii.1 Steps to implement the BSPMs

1. During the planning stage, the **State/LPA** staff will automate using bridge inventory data (including conditional data) and applying statewide preventive maintenance criteria for identifying and prioritizing work based on the benefit of the type of work performed.
2. If there are potential projects and **State/LPA** want to be reimbursed for developing their **BSPMP**, the **State/LPA** must submit a request for **PE** authorization to FHWA. Reimbursable work may only commence after the **State/LPA** has received notice of work authorization from FHWA.
3. The **State/LPA** should then proceed to perform a detailed review of their bridge inspection reports and maintenance history of bridges in their inventory. Note that not all the work recommendations in the inspection reports are necessarily eligible for preventive maintenance reimbursement. Many recommendations are advisory routine maintenance activities. The **State/LPA** qualified staff or consultants need to review all their bridge inspection reports to properly scope projects and prioritize projects for incorporation into the **BSPMP**.
4. The **State/LPA** should finalize their procedures for prioritizing projects. (A copy must be kept in the project files needed for future audits.)
5. The **State/LPA** transmits the **BSPMP** with cover letter certifying compliance with these program guidelines. The electronic copy (any spreadsheet format) should be included on a CD with the paper transmittal letter. The **ADOT LPA** Section Coordinator must receive the **BSPMPs** by **September 30th** for funds to be obligated in the next fiscal year, and **January 30th** of each year for adjustments. No time extensions will be granted.
6. Based on the LPA submittal of **BSPMPs**, the **ADOT LPA Section** Coordinator will create a **BSPMP** item in the lump sum **TIP** backup list and allocate funds in the lump sum item for each **COG/MPO** under **TIP**.
7. The **ADOT** will provide the **TIP** lump sum backup list for each **COG/MPO** and **BSPMP** in the **COG/MPO's** region.
8. The **COG/MPOs** will amend their **TIPs** appropriately.
9. The **LPA** will initiate the project(s) through the **ADOT LPA Section** in accordance with the **ADOT LPA** Manual.
10. After the **TIP** is adopted and the project(s) has been initiated, **PE** may be obligated at the local agency level for all projects included in their **BSPMP** using one federal aid project. These **PE**

projects will be closed out after 4 years and then new **PE** projects may be initiated. Complex projects should not use the "grouped" **PE** federal aid project number to avoid excessive future paperwork. **LPAs** should contact their **ADOT LPA Section** Coordinator for further advice. Joint Project Agreement will be required before the PE projects can be authorized and started.

11. **LPAs** may then proceed with preliminary engineering and National Environmental Policy Act **(NEPA)** clearance at the bridge specific level following the standard federal aid process defined in the Local Assistance Procedures Manual.
12. The **R/W** and Construction activities for one or more projects will be implemented under new federal aid projects and follow the normal federal aid process. **R/W** and Construction will only be funded if sufficient funds are available in the **COG/MPOs** lump sum for this activity. Excessive **R/W** cost for **PM**/**CM** projects have the lowest priority in the **BSPMP**. **LPAs** and the **ADOT LPA Section** Coordinator must consult the **BSPMP** which shows the allocated amounts for each project. If the actual project costs come in higher than what has been allocated to a project, then other projects may need to be deferred until a new **BSPMP** can be developed and amended into the **TIP**.
13. Only **LPAs** with **Certification of Acceptance (CA)** status can advertise for construction.
14. All federal aid requirements must be followed.

xiv. Insufficient Funds

In the event there are insufficient funds to implement all the **BSPMPs**, **the ADOT LPA Section** will determine how much **BSPMP** total funds are available and will properly distribute what is available to each **BSPMP** based on total cost for each **BSPMP**. Only those projects above the "cut off" running total in the **BSPMP** will be eligible for available funds.

Another way to deal with insufficient funds is on first come-first served basis criteria for now. **ADOT/LPA Section** will develop the proper selection criteria in the coming years.

xv. Department Oversight for LPAs' BSPMP

As noted in some of the above items, identifying eligible **PM** work, some ADOT oversight will be required for complex situations. In addition, if preventive maintenance activities exceed $50/ sq ft (total deck area basis), the scope of the **PM** must be approved by **ADOT Bridge Group** on a case by case basis. The **ADOT LPA Section** will review the **BSPMPs** to determine which projects need review. All **BSPMP** projects are subject to full oversight and review by the **ADOT LPA Section** as defined in the **ADOT LPA Manual**.

The unit cost threshold for oversight may change at the discretion of the **ADOT LPA Section** as the Department gains experience administering this program for local agencies. The Department, in coordination with **FHWA**, will conduct periodic program reviews or audits to determine compliance with these guidelines and to monitor the performance of the **Local Bridge Systematic Preventive Maintenance Program**.

xvi. Definitions

AASHTO: American Association of State Highway Transportation Officials

BSPMP: Bridge Systematic Preventive Maintenance Program. A list of preventive maintenance projects that **State** and **LPAs** want to implement.

Department: Arizona Department of Transportation.

LPA Coordinator: ADOT Local Public Agency Section Engineer. The LPA Coordinator is the point of contact for local agencies regarding all local assistance projects.

TIP: Transportation Improvement Program.

STIP: State Transportation Improvement Plan. This plan identifies activities to improve transportation in Arizona. The plan must be financially constrained within available revenue.

LPA: Local Public Agency. The term "Local Public Agency" means a county, city, town, or township, municipal or other local government entities with authority to finance, build, operate, or maintain toll or toll-free facilities.

MPO: Metropolitan Planning Organizations. These agencies develop regional TIPs.

COG: Council of Governments. These agencies develop regional TIPs

NBI: National Bridge Inventory. This is a database of bridges that contains information from the Bridge Inspection Reports.

PM: Preventive Maintenance. Preventive maintenance is "a planned strategy of cost effective treatments applied to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without substantially increasing structural capacity)."
Preventive bridge maintenance is a planned strategy of cost effective treatments applied at the proper time to preserve and extend the useful life of a bridge.

Appendix B:

BRIDGE PRESERVATION ACTIVITIES

I. BRIDGE MAINTENANCE ACTIVITIES

State Force Code	By Contract Code	Activity Name	Activity Description	Unit of Measure
S100	C100	Ordinary Maintenance – Deck	Minor Maintenance work that preserves/extends the life of the deck or corrects minor defects. Examples: bridge deck cleaning, temporary deck patching.	EA
S101	C101	Deck Patching	Permanent patching to bridge decks.	EA
S102	C102	Seal Cracks – Deck	Sealing of cracks in bituminous or concrete deck surfaces.	EA
S103	C103	Thin Overlay	Application of thin-bonded epoxy/polyester concrete overlay to bridge decks.	EA
S104	C104	Joint rehabilitation	Maintenance of bridge deck joints. Examples: removal/replacement of joint material, repair/patching of joint walls.	EA
S105	C105	Rigid Overlay	Application of latex/silica fume overlay to bridge decks.	EA
S106	C106	Rail Repair	Repairing or maintaining the rail system on a bridge. This includes rails, parapets, curbs, safety walks and all associated supports and connections. Some of the activities is mainly maintenance items and will not subject to federal reimbursement unless it is programmed systematically	EA
S107	C107	Asphalt Overlay	Application of Asphalt overlay to bridge deck	EA
S200	C200	Ordinary Maintenance – Superstructure	Minor maintenance work that preserves/extends the life of superstructure or corrects minor defects. Examples: superstructure clearing, clean/lubricant bearings.	EA
S201	C201	Concrete Superstructure Repair	Repairs to concrete bridge superstructures and all related supporting activities, such as blocking and jacking of the superstructure.	EA
S202	C202	Steel Superstructure Repair	Repairs to steel bridge superstructures and all related supporting activities, such as blocking and jacking of the superstructure.	EA
S203	C203	Bearing Repair	Repair, realignment or replacement of bridge bearing devices.	EA
S204	C204	Paint – Superstructure	Painting or coating structural steel on a bridge. Examples: spot painting, overcoating, recoating, and zone coating.	EA
S300	C300	Ordinary Maintenance – Substructure	Minor maintenance work that preserves/extends the life of the substructure or corrects minor defects. Examples: substructure cleaning, erosion stabilization, debris/vegetation removal.	EA
S301	C301	Substructure surface repair	Repairs to the exposed surfaces of bridge substructures.	EA
S302	C302	Substructure – Repair Undermining	Filling scour holes, installing rip-rap or other scour countermeasures to prevent or stabilize scour at bridge substructure.	EA
S400	C400	Ordinary Maintenance – Culvert	Minor maintenance work that preserves/extends the life of other elements of a structure or corrects minor defects. Examples: culvert cleaning, erosion stabilization, debris/vegetation removal.	EA
S401	C401	Culvert – Surface Repair	Repairs to culvert and all related supporting activities. Examples: patching spalls/delaminations, sealing cracks, repairing damaged headwalls/endwalls.	EA
S402	C402	Culvert – Repair	Filling scour holes, installing rip-rap or other scour countermeasures to prevent or stabilize	EA

		Undermining	scour at culvert.	
S500	C500	Ordinary Maintenance – Miscellaneous	Minor maintenance work that preserves/extends the life of other elements of a structure or corrects minor defects. Examples: stream bank stabilization, debris/vegetation removals.	EA
S501	C501	Approach Slab Repair	Maintenance of bridge approach slabs. Examples: repairing settlement, repairing cracks, patching, installing/repairing pressure relief joints, replacing overlay	EA

II. BRIDGE REHABILITATION AND REPLACEMENT ACTIVITIES

	C1000	Deck Replacement	Replacement of bridge deck	EA
	C1200	Superstructure Replacement	Replacement of bridge superstructure	EA
	C1300	Substructure Major Rehabilitation	Replacement/major rehabilitation of bridge substructure.	EA
	C1400	Culvert Major Rehabilitation	Rehabilitation/restoration of culvert. Examples: extending existing pipe or box culvert, sleeve installation, flowline restoration.	EA
	C1500	Culvert Replacement	Replacement of culvert.	EA
	C1600	Bridge Replacement	Replacement of total bridge structure	EA
S1700	C1700	Safety Inspection – State	Inspection of state owned bridges	EA
S1800	C1800	Safety Inspection – Locals	Inspection of local owned bridges	EA
S1900	C1900	Safety Inspection – Self-Inspecting Agencies	Inspection of local owned bridges	EA
S2000	C2000	Bridge Rating – State	Perform load rating analysis for state bridges	EA
S2100	C2100	Bridge Rating - Local	Perform load rating analysis for local bridges	EA
S2200	C2200	Bridge Rating – Self-Inspecting Agencies	Perform load rating analysis for self-inspecting agencies bridges	EA
S2300	C2300	Bridge Management	Management tasks performed. Examples: developing bridge maintenance work schedules, planning and budgeting future work needs, overseeing work associated with structures.	EA
S2400	C2400	Preliminary Engineering	Development of plans, specifications and/or contract documents for structures identified as needing rehabilitation or replacement.	EA