

## **RESOURCE ALLOCATION CATEGORY (SUBPROGRAM) DESCRIPTION**

### **Allocation Code and Title:**

122, Highway Bridge Deck Rehabilitation

### **Process Owner:**

Bridge Group, Assistant State Bridge Engineer - Operations

### **Program Purpose:**

Arizona Department of Transportation's efforts to keep pavements free of snow and ice accumulations have been made largely by means of widespread use of de-icing chemicals in the northern part of the state. The increasing usage of these chemicals has been accompanied, however, by the need for increasing attention to bridge deck maintenance and repair work. It is apparent that the use of de-icing chemicals is the basic factor in producing a severe exposure condition that can lead to premature deterioration of bridge decks. In addition to the de-icing of the bridge decks, which accelerates the unavoidable deterioration of structural elements due to age, many decks are reaching their design life and require rehabilitation or replacement.

Less conservative past design practices and improper construction methods have also contributed to the problem. Direct impact of traffic loads has increased the occurrence of deterioration and contributed to its magnitude. Bridge deck deterioration significantly affects the ride quality of the decks. Depending on its extent and location, deterioration can also impact the load carrying capacity of bridges. Fractures in concrete, loss of bond between rebar and concrete and loss of steel through corrosion all can result in loss of strength in reinforced concrete members. Preservation of bridge decks is a primary component of the ADOT mission. Bridge decks condition directly affects customer satisfaction.

The 122 Highway Bridge Deck Rehabilitation resource allocation category is a major component of the overall Bridge Preservation Program. Bridge deck rehabilitation candidates are generated from bridge inspectors' recommendations as a result of performing routine bridge inspections, special deck in-depth inspection and from District input. The Bridge Group Program Committee (consisting of the State Bridge Engineer, Assistant State Bridge Engineers, and Section Leaders) reviews these candidates and prioritizes the projects with final approval from the State Bridge Engineer. The allocation covers only the construction cost of the bridgework under the state fund. All development costs are funded through either the administrative budget or other subprograms (216, Construction Preparation: Bridge Group).

The objective of the Bridge Deck Rehabilitation Program is to restore the structural integrity of a bridge deck as well as to provide necessary work to correct major safety defects in cost effective approach. Measurable objectives include:

- Decrease the number of deficient bridge decks on the state highway system.
- Provide for a better ride quality to the motoring public.
- Bridge deck rehabilitation projects completed on time and within budget.

**Rationale for Desirable Allocation Level:**

We are requesting to increase the funding of the Bridge Deck Rehabilitation subprogram from its current annual allocation level of \$3,000,000 to \$4,000,000. The new funding level will enable the Bridge Group to better cope with the challenges that are described herein.

The bridge deck rehabilitation subprogram was created to provide funding to maintain the integrity of bridge decks and the safety of the traveling public. The current annual funding level of three million dollar for this need, though inadequate, provides a dedicated programming option to plan and prioritize bridge deck rehabilitation and/or replacement projects. However, the backlog of bridge decks needing rehabilitation remains high. In addition, conditions of these bridges are deteriorating with time to the extent that bridge deck replacement becomes the only option at a significantly higher cost. District maintenance has not been able to keep up with the continuous needs to patch and repair deteriorating bridge decks. Conditions of the bridges on the state highway system are monitored and rated during scheduled bridge inspections. Bridge decks with a rating of 6 (satisfactory) would require minor preservation in the near future to maintain deck integrity. Bridge decks with a condition rating of 5 (fair) and below would require deck rehabilitation in the immediate future to maintain deck integrity and safety. Lack of timely preservation may lead to bridge deck failure that would restrict traffic movement across the highway. In the past few years, four such failures occurred requiring lane closure and emergency deck repairs (Verde River Bridge SB on I-17, Markham Wash Bridge WB on I-40, Willow Creek Bridge on I-40, Johnson Rd TIUP on I-10 and Gila River Bridge at Bylas on US-70).

The following is a tabulation of ADOT bridges with deck condition rating of 6 and below:

Deck Condition Rating:	Number of Bridges
6 – satisfactory	404
5 – fair	77
4 – poor	19

A total of 96 bridges require bridge deck rehabilitation or replacement in the immediate future to maintain the integrity of those bridges and their ability to carry traffic. The estimated cost for these deck preservation needs is in excess of seventy five million dollars. Assuming a preservation time frame of ten years for these bridges and assuming that conditions are held constant on the remaining bridges in the inventory, the annual funding requirement would be in excess of six million dollars. Some of these bridges may be candidates for replacement or improvement as part of a larger development project. However, it is expected that at the minimum, an annual funding level of four million dollars would be required to maintain the minimum operating condition of the state bridge inventory.

### **Expected Program Duration:**

The Bridge Deck Rehabilitation Program is an ongoing program required to preserve the integrity of bridge decks on the Arizona Highway System. Discontinuation will result in a gradual deterioration of the structural integrity of bridge decks leading to the eventual need for the total replacement of numerous bridge decks at higher costs and may compromise the safety of the traveling public.

### **Program Management Process:**

#### **Budget Management**

The Assistant State Bridge Engineer - Operations is responsible for recommending program allocations and line items. Allocated budget is distributed to line item projects in the first three program years. Due to the inability to accurately forecast specific projects beyond three to four years, the last two program years are shown as a single lump sum amount in each year. A tentative project list is provided for the fourth program year lump sum. During each new program development cycle, the prior program tentative project list is modified and finalized as the new year-three projects, and a new tentative project list is prepared for year-four of the new program.

#### **Authority and Process for Lump Sum Expenditures**

The Assistant State Bridge Engineer - Operations has authority to allocate the lump sum budgets for the program years. Request for supplemental funding typically comes from Project Managers of line item projects. All allocations are subject to approval by PRB. New project recommendations require approval of PRB, PPAC and the Transportation Board. Contingency funds may be needed to increase funding for line item projects due to inadequate estimates or scope revision and must be approved by PRB, PPAC and the Transportation Board.

Contingency funds are obligated at bid advertisement with the projects they are associated with.

### **Project Recommendation Process**

A bridge deck rehabilitation project is established based on the information provided by bridge inspection personnel, special in-depth deck inspection and District input. The year-four tentative projects are scoped either by Bridge Group or by on-call consultants funded through the Bridge Group Construction Preparation item within the Design Support subprogram. During each program cycle, the Assistant State Bridge Engineer – Operations recommends line item projects for the new year-three, and a new tentative project list for the new year-four, based on the current allocation levels to Bridge Group Program Committee with final approval of the State Bridge Engineer.

### **Project Design Process**

Line item projects are either designed by in-house staff or by on-call consultants funded out of the Bridge Group Construction Preparation item. All other development costs are funded from Right-of way support, Environmental Support, and Utility Support subprograms as appropriate. Project design follows the ADOT Development Process Guidelines.