

BRIDGE REPLACEMENT AND REHABILITATION PROGRAM

INTRODUCTION

An integral element of the City's transportation infrastructure is a network of bridges designed to carry vehicular, railroad, light rail, pedestrian, and bicycle traffic across approximately 30 canals and waterways in Sacramento. These bridges enable essential activities, such as commerce, transportation and emergency services to take place in an efficient and economical manner.

Routine maintenance of the City's bridges is performed by City operations and maintenance staff. Maintenance tasks are identified through a combination of visual inspections performed by City staff and more in-depth, formal, inspections performed under the direction of Caltrans staff. The results of the Caltrans inspections are forwarded to the City for information and, when appropriate, corrective action is taken.

Since the majority of the City's bridges are constructed of reinforced concrete, which requires little or no maintenance, structure upkeep costs are minimal. However, the cost for capital improvement projects needed to upgrade or replace existing structures represents a continuing major investment in the City's bridge infrastructure.

The City's bridge replacement and rehabilitation program was designed to identify and prioritize needed improvements to the City's existing bridge inventory. (New bridge construction projects are prioritized along with major street projects since they are integral to new roadways.) Rehabilitation projects can consist of large-scale maintenance projects (such as the painting of steel structures) or repairing and upgrading the structural, service, and functional elements of an existing structure. Typically, if the cost of the needed improvements is greater than fifty percent (50%) of the cost of a new structure, and the remaining life expectancy of the existing structure is short, the structure is considered eligible for replacement.

GOAL AND POLICIES

The Bridge Replacement and Rehabilitation Program is consistent with the following City of Sacramento 2030 General Plan (adopted March 3, 2009) and 2035 General Plan Update (to be adopted in 2014) goal and policies:

Goal

Comprehensive Transportation System. Provide a transportation system that is effectively planned, managed, operated, and maintained.

Policies:

- **Travel System.** The City shall manage the travel system to ensure safe operating conditions.
- **Facilities and Infrastructure.** The City shall effectively operate and maintain transportation facilities and infrastructure to preserve the quality of the system.

PROJECT LIST DEVELOPMENT

Eligibility Criteria

The Sufficiency Rating assigned by Caltrans is a numeric value that indicates the sufficiency of a bridge to remain in service. Sufficiency Ratings range from zero to 100, with zero representing an entirely insufficient or deficient bridge, and 100 representing an entirely sufficient bridge. Structures that are assigned a Sufficiency Rating of 80 or less are considered eligible for replacement or rehabilitation.

Project Identification

Caltrans inspects and assigns Sufficiency Ratings to all structures in the City's inventory which carry vehicular traffic or cross a route carrying vehicular traffic and are a minimum of 20 feet in length. Sufficiency Ratings are established by using federal bridge inspection and appraisal guidelines, and represent a weighted analysis of a bridges structural adequacy and safety, serviceability and functional obsolescence, and essentialness for public use. In addition to the sufficiency rating, Caltrans assigns a status flag indicating whether a bridge is Structurally Deficient (SD) or Functionally Obsolete (FO) The SD/FO status of a bridge is determined through the results of the structural inspections and appraisals performed by Caltrans in accordance with item 9 of the Federal - Aid Policy Guide for Title 23, CFR 650.

Candidate bridge replacement and rehabilitation projects are identified by reviewing the Sufficiency Ratings and the SD/FO Status Flags assigned to the structures by Caltrans. City bridges that are not inspected by Caltrans are reviewed periodically and, if known deficiencies exist, are added to the candidate list. All of the bridges in the Year 2005 Transportation Programming Guide are inspected by Caltrans.

PROJECT RANKING PROCESS

Eligible projects are ranked in order of priority based on a deficiency rating system. The higher the total deficiency points assigned to a candidate project, the higher the project is ranked on the list. The ranking consists of assigning deficiency points to each of three major categories. The three categories and their weighting with respect to a maximum deficiency point total of 100 are listed below:

1. Structural Deficiency (Max. Points: 50)

Points = 50 If the Sufficiency Rating \leq 50 and the structure is flagged as Structurally Deficient (SD) or Functionally Obsolete (FO)

Points = 25 If the Sufficiency Rating \leq 80 and the structure is flagged as Structurally Deficient (SD) or Functionally Obsolete (FO)

Bridges rated Structurally Deficient (SD) or Functionally Obsolete (FO) with a Sufficiency Rating (SR) ≤ 50 are eligible candidates for replacement under the State of California, Highway Bridge Replacement and Rehabilitation Program (HBRRP). Bridges rated Structurally Deficient (SD) or Functionally Obsolete (FO) with a Sufficiency Rating (SR) ≤ 80 are eligible for rehabilitation under this program.

2. Service Deficiency (Max. Points: 20)

The service deficiency of a bridge is determined by comparing the type of facilities it provides to those which are desired. The three types of facilities considered are vehicular, bicycle, and pedestrian. The cumulative score in the service deficiency category has a range from 0 to 20, with 20 reflecting a high degree of deficiency.

Vehicular Facilities.....(Max. Points: 10)

Points = 10 If V/C > 0.8 (below Level of Service C)
Points = 0 If V/C \leq 0.8 (Level of Service C or better)

Service deficiencies in the vehicular facilities of a structure are determined by evaluating the volume to capacity ratio (V/C) of the roadway segment between the two intersections nearest to the structure.

Bicycle Facilities.....(Max. Points: 10)

Points = 10 If Class II Bike routes¹ have a gap across or are detoured around the bridge

A gap across the structure exists when bike lanes on either the structure or its approaches are absent for an existing Class II Bike route. A gap also exists if the travel lane closest to the curb is less than 15 feet for bridges that are not included in the 2010 Bikeway Master Plan (BMP).

Pedestrian Facilities.....(Max. Points: 10)

Points = 10 If there are sidewalk gaps across the bridge

A gap across the structure exists if sidewalks are absent from the structure or its approaches in either direction of travel.

3. Functional Deficiency (Max. Points: 30)

The functional deficiency of a bridge is determined by evaluating the adequacy of its facilities. The factors used to determine and rate functional deficiency are summarized below.

Accident Rate.....(Max. Points: 10)

¹ A Class II Bike route is an on-street route with striped bike lanes.

The accident rate of the bridge is compared to the highest accident rate of all the bridges being evaluated. The accident rate used is the average rate for the three latest years for which accident data is available. Points are assigned as follows:

$$\frac{\text{3 Year Average Accident Rate}^2 \text{ of Project}}{\text{Highest Accident Rate of Projects Considered}} \times 10 = \underline{\hspace{2cm}}$$

Deck Geometry.....(Max. Points: 10)

The deck geometry adequacy is evaluated based on the geometric features of a structure with respect to minimum vehicle lane width, bike lane width, sidewalk width, and horizontal and vertical clearances³. Deficiency points are assigned to a structure that does not meet certain minimum criteria, as follows:

- 1 point per foot short for each vehicle lane width less than 11 feet
- 2 points per foot short for each bike lane less than 5 feet
- 2 points per foot short for each sidewalk width less than 4 feet
- 1 point per foot short of horizontal clearance less than 3 feet
- 1 point per inch short of overhead clearance less than 14 feet

Deficiency points are totaled for each structure and normalized, as follows:

$$\text{Points} = \frac{\text{Point Total of Project}}{\text{Highest Point Total of All Candidate Projects}} \times 10$$

Waterway Adequacy.....(Max. Points: 10)

- Points = 10 If bridge has a score \leq 3 for Caltrans Item 71
 Points = 0 If bridge has a score $>$ 3 for Caltrans Item 71

The Waterway Adequacy (Caltrans Item 71) is based on the frequency of floodwater overtopping the structure and approaches, and the significance of the resulting traffic delays. The Waterway Adequacy appraisal rating is reported on a scale of 0 (bridge closed) to 9 (superior to present desirable criteria). The City's rating system assigns waterway adequacy points to only those structures with a code of 3 (requiring high priority of corrective action) or less.

2 The accident Rate is the annual number of accidents per 1 million vehicle miles. Accident Rate = Accidents x 10⁶/ (ADT x segment miles x 365)

3 Horizontal clearance is measured from the edge of the travel lane to the nearest obstruction, such as an abutment, column, or bridge rail.

SUMMARY

Table F-1 presents the final point total and relative deficiency ranking for all twenty-six bridge rehabilitation and replacement projects, along with the ratings given for each of the three major evaluation categories. The table also lists the identified deficiencies for each structure. Figure F-1 depicts the approximate location of each of the bridge projects.

Three new projects were added to the list:

- Elvas Ave at J St
- Rio Linda Blvd at Hagginwood Creek
- Arden Wy at UPRR, BNSF, Amtrak, LRT

The following projects were deleted from the list:

- Norwood Ave at Arcade Creek – Completed
- Roseville Rd at Arcade Creek – Funded
- Auburn Blvd at Arcade Creek – Funded
- Rio Linda Blvd at Magpie Creek – Funded
- Vinci Ave at Magpie Creek Diversion – Most recent inspection report shows a Sufficiency Rating greater than 80 and no SD/FO flag
- Verano St at Arcade Creek – Most recent inspection report shows a Sufficiency Rating greater than 80 and no SD/FO flag
- Marysville Blvd at Arcade Creek – Most recent inspection report shows a Sufficiency Rating greater than 80 and no SD/FO flag
- Florin Perkins Rd at Morrison Creek – Most recent inspection report shows a Sufficiency Rating greater than 80 and no SD/FO flag
- Wyndham Dr at Union House Creek – Most recent inspection report shows a Sufficiency Rating greater than 80 and no SD/FO flag
- Gloria Dr at Main Canal – Most recent inspection report shows a Sufficiency Rating greater than 80 and no SD/FO flag

TABLE F-1

**YEAR 2014 - BRIDGE REPLACEMENT/
REHABILITATION**

| 2014 Rank | 2010 Rank | Council District | Bridge No. | BRIDGE NAME | SD/FO FLAG | Sufficiency Rating | Structural Deficiency Score | Service Deficiency Score | Functional Deficiency Score | TOTAL SCORE |
|--|-----------|------------------|------------|---|------------|--------------------|-----------------------------|--------------------------|-----------------------------|-------------|
| Maximum Points in Scoring Category: | | | | | | | 50 | 20 | 30 | 100 |
| 1 | 3 | 6 | 24C0076 | H STREET @ American River | FO | 59 | 25 | 20 | 10.2 | 55.2 |
| 2 | 7 | 4 | 24C0364L | I STREET @ I Street Viaduct | SD | 67.9 | 25 | 10 | 17.5 | 52.5 |
| 3 | 1 | 4 | 24C0006 | JIBBOOM ST @ UP RR YARD | SD | 54.2 | 25 | 20 | 6.3 | 51.3 |
| 4 | 6 | 8 | 24C0093 | LA MANCHA WAY @ Elder Creek | SD | 71.9 | 25 | 20 | 0.5 | 45.5 |
| 5 | 12 | 5 | 24C0300 | SUTTERVILLE ROAD @ UP RR, BNSF RY & 24th St | FO | 78.7 | 25 | 20 | 0.3 | 45.3 |
| 6 | 9 | 3 | 24C0069 | ELVAS AVENUE @ H Street | FO | 76.1 | 25 | 10 | 3.9 | 38.9 |
| 7 | 16 | 6 | 24C0143R | HOWE AVENUE @ University Avenue (Northbound) | | 68.3 | 0 | 10 | 3.7 | 13.7 |
| 7 | New | 3 | 24C0071 | ELVAS AVENUE @ J Street | | 76.9 | 0 | 10 | 3.7 | 13.7 |
| 9 | 14 | 6 | 24C0143L | HOWE AVENUE @ University Avenue (Southbound) | | 68.4 | 0 | 10 | 3.6 | 13.6 |
| 10 | 17 | 6 | 24C0142R | HOWE AVENUE @ La Riviera Dr (Northbound) | | 70.4 | 0 | 10 | 3.1 | 13.1 |
| 11 | 19 | 6 | 24C0107L | HOWE AVENUE @ American River (Southbound) | | 57.6 | 0 | 10 | 2.9 | 12.9 |
| 12 | 15 | 6 | 24C0142L | HOWE AVENUE @ La Riviera Drive (Southbound) | | 68.6 | 0 | 10 | 2.7 | 12.7 |
| 12 | 18 | 6 | 24C0107R | HOWE AVENUE @ American River (Northbound) | | 58.4 | 0 | 10 | 2.7 | 12.7 |
| 14 | 20 | 8 | 24C0091 | STOCKTON BOULEVARD @ Union House Creek | | 63.6 | 0 | 10 | 1.3 | 11.3 |
| 15 | 24 | 7 | 24C0521 | FRANKLIN BOULEVARD @ Union House Creek | SD | 91.8 | 0 | 10 | 0.6 | 10.6 |
| 16 | New | 2,3 | 24C0353 | ARDEN WAY @ UP,BNSF,AMTRAK,SCRTD LRT | | 77.7 | 0 | 10 | 0.2 | 10.2 |
| 17 | 23 | 8 | 24C0252 | MACK ROAD @ Morrison Creek | SD | 92.6 | 0 | 10 | 0.1 | 10.1 |
| 18 | 11 | 5 | 24C0289 | 56TH AVENUE @ South Sacramento Drain | | 75.1 | 0 | 10 | 0.0 | 10.0 |
| 19 | 26 | 8 | 24C0219L | CENTER PARKWAY @ Elder Creek | SD | 82.9 | 0 | 0 | 5.7 | 5.7 |
| 20 | 28 | 6 | 24C0096 | STOCKTON BOULEVARD @ Morrison Creek Tributary | | 77.9 | 0 | 0 | 1.8 | 1.8 |
| 21 | New | 2 | 24C0127 | RIO LINDA BOULEVARD @ Hagginwood Creek | | 73.1 | 0 | 0 | 0.7 | 0.7 |
| 22 | 29 | 7,8 | 24C0299 | CENTER PARKWAY @ Strawberry Creek | SD | 93.5 | 0 | 0 | 0.2 | 0.2 |
| 23 | 30 | 6 | 24C0097 | STOCKTON BOULEVARD @ Morrison Creek | | 74.4 | 0 | 0 | 0.1 | 0.1 |
| 24 | 31 | 8 | 24C0116 | FRANKLIN BOULEVARD @ Laguna Creek | SD | 93.7 | 0 | 0 | 0.0 | 0.0 |
| 24 | 32 | 5 | 24C0295 | EXECUTIVE AIRPORT ROAD @ Executive Drain | | 52.6 | 0 | 0 | 0.0 | 0.0 |
| 24 | 32 | 4 | 24CO378 | K STREET @ K Street at Holiday Garage | | 78.9 | 0 | 0 | 0.0 | 0.0 |

"New" in the 2010 Rank column indicates projects added this year.