JEFFERSON AVENUE FOOTBRIDGE STRUCTURAL EVALUATION EXECUTIVE SUMMARY

Springfield's historic footbridge was closed March 1, 2016 after an inspection revealed corrosion and steel loss in the north support column. Public Works hired Great River Engineering to conduct an initial evaluation for safety. While the bridge was not in imminent danger, it was deemed in the best interest of the public to close the bridge to conduct a full evaluation and determine repair options.

About the Jefferson Avenue Footbridge:

The Jefferson Avenue Footbridge was built in 1902 and is on the National Register of Historic Places. The 562-foot-long bridge allows pedestrians to cross 13 tracks of the Burlington Northern rail yard from Chase Street to Commercial Street and has done so for 114 years.

The footbridge underwent restoration in 2002, in time for its centennial celebration. The City of Springfield partnered with the Commercial Club to obtain federal transportation enhancement grants and Community Development Block Grant funding to conduct the repairs. In addition to the rehabilitation work on the footbridge, a gathering place plaza was created adjacent to the bridge. The rehabilitation work was conducted in 2001 and 2002 at a cost of just over $518,000.

EVALUATION PROCESS & FINDINGS

The structural evaluation of the footbridge was conducted in four phases:

PHASE 1: Observation – Field Inspection
Information was collected on the bridge and its individual members, including verifying the dimensions, corrosion of the steel, alignment and deformation.

PHASE 2: Qualitative Evaluation
Based on information from the Observation phase, we identified the criticality of the conditions, created by corrosion, alignment and deformation and the changes that would affect the performance of each member.

PHASE 3: Quantitative Evaluation
The structural evaluation included computation of the loads applied to each member and the capacity of that member to carry the load.

The data was prepared by analyzing the bridge in accordance with guidelines set by the American Association of State Highway Transportation Officials (AASHTO) as well as the American Institute of Steel Construction. The design required a pedestrian design live load of 90 pounds per square foot.

PHASE 4: Recommendations for Rehabilitation

In order to meet design code requirements, the bridge will need to be rehabilitated. This work will include replacing members that are deficient in capacity with new or strengthened members.

- One of every three primary members (36.4%) do not have adequate capacity and need repaired or strengthened.

- Six of the 10 vertical columns in the south approach need to be strengthened.

- The stairs on both north and south approaches need to be replaced. Incorporate ADA accessibility.

- The paint system is failing in numerous locations. It is recommended that the existing paint be removed to bare metal and that a three-coat paint system be applied. This approach to the rehabilitation will aid in impeding the corrosion and deterioration of the structure, thereby lengthening the life of the bridge.

LIFE CYCLE COST ANALYSIS

As with most local governments, the City of Springfield deals with increasing infrastructure needs with limited funding opportunities. Many agencies are investigating economic tools such as bridge life cycle cost analysis (BLCCA) to help determine the most cost-effective alternatives and communicate the value of those choices to the public. By factoring in all costs over a project's total multiyear life cycle, BLCCA helps ensure that an agency can optimize its investment and avoid selecting an alternative based solely on the lowest initial cost.

REHABILITATION AND LIFE-CYCLE OPTIONS

(A comprehensive breakdown of the rehabilitation options, their associated life-cycle cost, and corresponding affect on the health of the footbridge can be found in the attached infographic.)

Option A: Do Nothing

Do not rehabilitate the bridge and schedule its demolition with no plans for a replacement bridge.

Option B: Minimal Rehabilitation with Future Replacement

Provide a minimal rehabilitation today with a replacement structure in 2029. The minimal rehabilitation would strengthen or replace the deficient members and provide an overcoat paint system. This alternative will provide for stabilizing the structure and allow it to be opened to pedestrians, but will not provide long-term stabilization of the bridge and therefore accounts for a replacement bridge to be built in 2029.

Option C: Preserve the Original Bridge

Provide a full rehabilitation today and rehabilitation every 24 years. The full rehabilitation will strengthen or replace the deficient members and remove the existing lead based paint to bare metal, apply a zinc primer and two finish coats of paint. This painting system will mitigate the continued deterioration of the bridge lengthening the time between rehabilitations. Future rehabilitations (every 24 years) will be addressing members which have experienced corrosion and applying a full overcoat.

Option D: Full Rehabilitation with Future Replacement

Provide a full rehabilitation. The full rehabilitation will strengthen or replace the deficient members and remove the existing lead based paint to bare metal, apply a zinc primer and two finish coats of paint. Provide a replacement bridge in 2041.

Option E: Replacement Bridge

Remove the existing bridge and construct a replacement bridge.

JEFFERSON AVENUE FOOTBRIDGE

Rehabilitation & Life-cycle Options

What are the options?	How would this affect the condition & cost? ♥ $

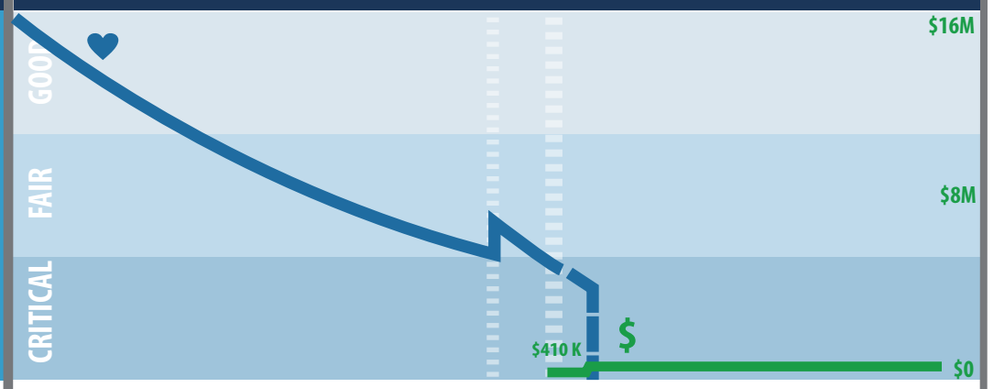
Do Nothing

Do not rehabilitate the bridge. Schedule for its demolition with no plans for a replacement.

A

$410 Thousand
INITIAL COST

$410 Thousand
CUMULATIVE COST



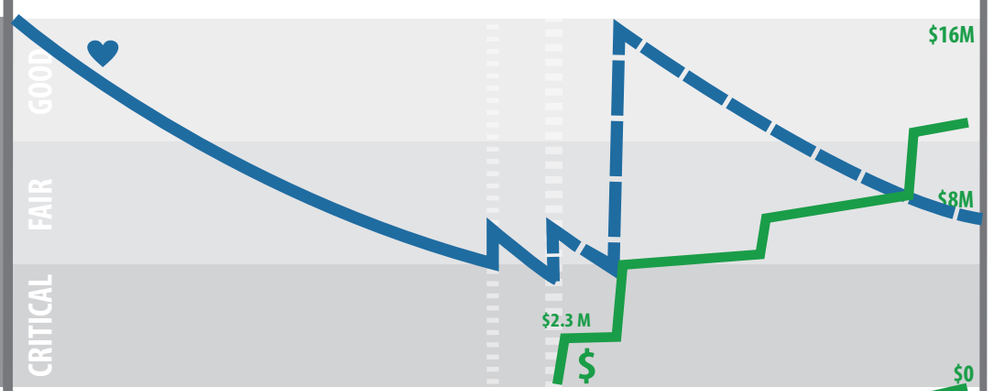
Minimal Rehab with Future Replacement

Provide a minimal rehab today with a replacement structure in 2029. The minimal rehab would strengthen or replace deficient members and provide an overcoat paint system.

B

$2.3 Million
INITIAL COST

$10.9 Million
CUMULATIVE COST



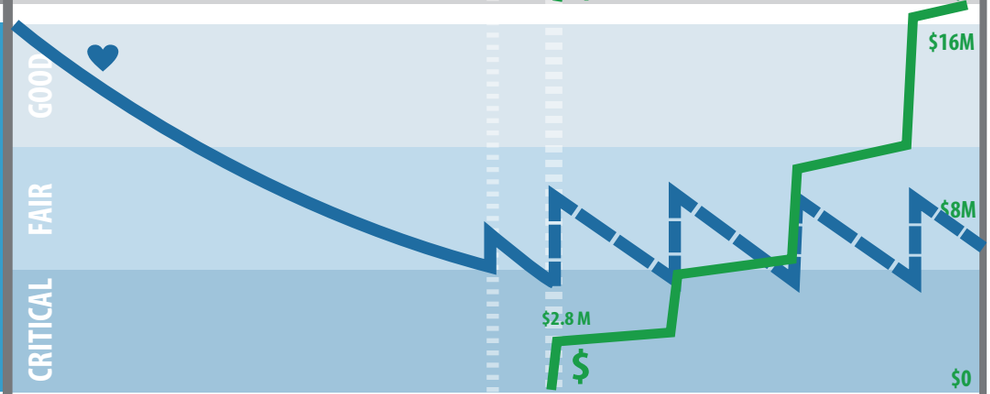
Preserve the Original Bridge

Provide a full rehab today and rehab every 24 years. Strengthen/replace deficient members. Remove the existing lead paint to bare metal, apply a zinc primer and two coats of paint.

C

$2.8 Million
INITIAL COST

$16.8 Million
CUMULATIVE COST



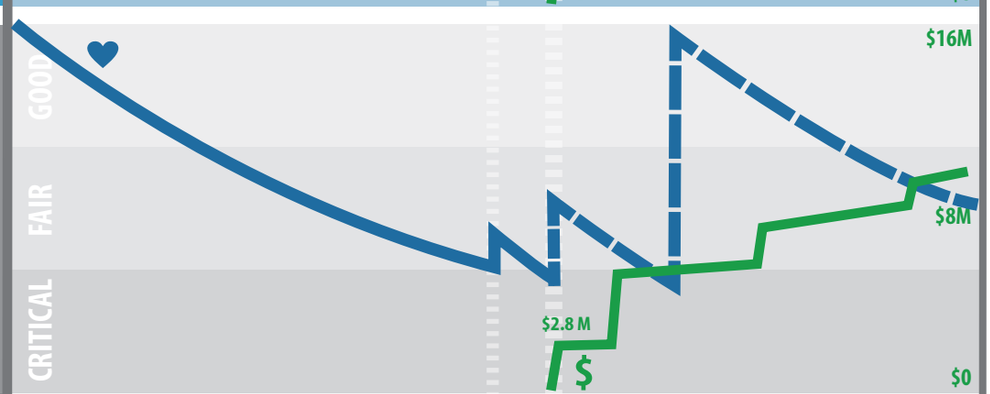
Full Rehab with Future Replacement

Provide a full rehab. Strengthen/replace the deficient members and apply a three-part paint system. Provide a replacement bridge in 2041.

D

$2.8 Million
INITIAL COST

$8.4 Million
CUMULATIVE COST



Replacement

Remove the existing bridge and construct a replacement bridge.

E

$3 Million
INITIAL COST

$8 Million
CUMULATIVE COST