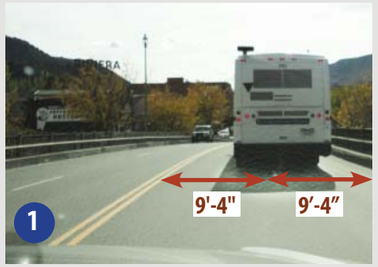
SH82
GRAND AVENUE BRIDGE

EXISTING BRIDGE CONDITIONS

Background:
The existing Grand Avenue Bridge was constructed in 1953 as a two-lane bridge with a sidewalk on each side of the bridge. In 1969, the sidewalks were removed to add two additional lanes. Currently the bridge is classified by CDOT as Functionally Obsolete (with a sufficiency rating of 47.4 out of 100) due to the issues of concern noted below with additional detail to the right. Due to old age of bridge (58 years), it is deteriorating rapidly, requiring more frequent repairs, and becoming more susceptible to failure every day.

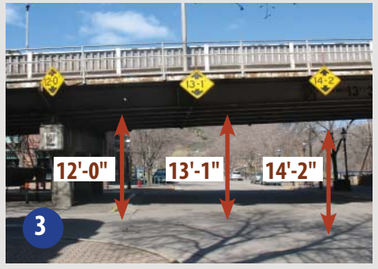
Geometric Deficiencies



The bridge is too narrow.*

Poor ADA and bike access to pedestrian bridge.

Vertical clearance to railroad.



Substandard vertical clearance at 7th Street.*

Substandard horizontal clearance at I-70.*

Piers force I-70 to have narrow shoulders.

*Items that contribute to low sufficiency rating.

Potential for Washout

Existing bridge piers are supported on shallow spread footings that are susceptible to erosion.

Bridge Structural Condition

6 **Based on the 2010 bridge inspection, the bridge condition has the following ratings:**

- **Bridge Deck** — **6 out of 9**
- **Superstructure (girders)** — **6 out of 9**
- **Substructure (piers and abutments)** — **6 out of 9**
- **Bridge Rail** — **substandard**

The remaining fatigue life, calculated using the current design standards, is estimated to be essentially depleted within the next five years.

Load Carrying Capacity

7 **The existing bridge load carrying capacity is 55% of new bridge design standards.**

Functional Obsolescence

8 **The bridge being considered "functionally obsolete" is the result of four geometric deficiencies:**

1. **The bridge is too narrow (see item 1)**
2. **Substandard vertical clearance at 7th Street (see item 3)**
3. **Substandard eastbound right horizontal clearance (see item 4)**
4. **Substandard westbound right horizontal clearance (see item 4)**

Additional Detail Information:

1. The existing lane widths are 9'-4", compared to 11'-0" wide approach lanes south of the bridge. Standard highway lanes are 12'-0". In addition, there are no shoulders on the bridge. The appraisal rating for bridge width is 2 out of 9.

2. Currently, the vertical clearance from the railroad tracks to the bottom of the bridge girders is 22'-6". The current railroad standards require 23'-6" clearance over railroads.

3. Currently, the vertical clearance from 7th Street to the bottom of the bridge girders varies from 12'-0" to 14'-2". This low clearance results in an appraisal rating of 3 out of 9. Current standards require 14'-6" clearance on local streets.

4. Piers are located less than 6' from the edge of traveled roadway on I-70, resulting in an appraisal rating of 3 out of 9. This close pier location does not allow for proper impact protection of the piers with guardrail, and existing piers were not designed for an impact load.

   The existing piers supporting the Grand Avenue Bridge pinch the width of I-70 below. The location of the piers adjacent to the east bound I-70 shoulder limit the length of the ramp as it merges onto I-70, not allowing for sufficient acceleration distance for traffic merging onto I-70 eastbound.

5. The existing bridge piers are supported on spread footings that rest 7' below the river bed. An underwater inspection in 1992 found that the river had caused erosion around the footing to a depth of 2' below a portion of the footing. (Scour hole depth equals 9' below river bottom.) This erosion was repaired at the time by filling the hole and placing rock around the footing to provide some erosion protection. Records show that this repair was intended to last eight years.

6. The condition rating indicates that the bridge is in satisfactory condition, but shows minor deterioration such as:
   - Deterioration of the concrete curbs and piers
   - Exposed reinforcing steel on the curbs and piers
   - Corrosion on the railing
   - Peeling paint that has led to girder corrosion
   - Corrosion of the girders
   - Damage to girders over 7th Street due to vehicular impact
   - Corrosion on the bridge supports

7. The bridge was designed in 1953 for two lanes of traffic using standards at the time. Current standards for a four-lane bridge require significantly more capacity. The bridge load capacity is substandard but not low enough to require the bridge to be load posted or to limit the use by legal roadway traffic. The noted load carrying capacity of 55% of new bridge design standards is relative to frequent common loads that a bridge experiences. The bridge is capable of carrying higher loads on an infrequent basis.

8. All four deficiencies must be corrected for the bridge not to be considered functionally obsolete.