

Table 12: Bridge Design Loads and Ratings

Rating / Truck Type	Maclay Bridge
Operating Load (Design)	(20.9 mton)
Truck 1 Type 3 ^(a) Rating	19 ton
Truck 2 Type 3-S3 Rating	29 ton
Truck 3 Type 3-3 Rating	37 ton
Inventory Load (Design)	(12.7 mton)
Truck 1 Type 3 ^(a) Rating	11 ton
Truck 2 Type 3-S3 Rating	17 ton
Truck 3 Type 3-3 Rating	22 ton

Source: MDT Bridge Management System, 2012

^(a) Posted at 11 tons

- The operating rating defines the absolute maximum permissible load level to which the structure may be subjected for the vehicle type used in the rating. This rating determines the capacity of the bridge for occasional use. Allowing unlimited numbers of vehicles at the operating level will compromise the bridge life.
- The inventory rating defines the load level which can safely use an existing structure for an indefinite period of time.
- The posting rating results in a load level which may safely use an existing structure on a routine basis for a limited period of time. When a bridge is not able to safely carry the loads allowed, it is posted for its inventory rating.

Since the 2011 Bridge Inspection Report was prepared, there has been further analysis of the bridge that resulted in the posted load limit being reduced from 14 tons to 11 tons. This reduction was based on analysis by MDT engineers. The two primary vehicles impacted by this reduction are school buses and fire trucks. School buses are generally within the 11 ton limit, as they weigh approximately 19,000 pounds when empty and 22,000 pounds when loaded. Fully loaded school buses are near or at the 11 tons limit. School buses are thus allowed across the bridge, as long as they do not exceed the posted 15 mph speed limit.

An agreement exists that allows the local rural fire department to operate their Type I fire engines (i.e. overweight vehicles) across the bridge, as long as they straddle the centerline of the bridge and travel no more than 5 mph.

The 2011 Bridge Inspection Report also noted some areas of concern related to a variety of bridge features. Some of these are reiterated below (see **Appendix B** for further detail).

- Transverse cracking in deck asphalt surfacing;
- Paint loss and rusting on various features, such as floor beams, bottom chords, and steel stringers;
- Minor cracking and spalling on concrete pier wall and abutments; and
- Moveable roller bearings are not functional and are out of alignment.

4.8.1. Sufficiency Rating

An important consideration in the evaluation of roadway bridges is the sufficiency rating associated with the structure. The sufficiency rating formula is the industry standard of evaluating highway bridge data to obtain a numeric value indicating the sufficiency of the bridge to remain in service. The sufficiency rating is expressed by a value ranging from 0 to 100 with 100 being an entirely sufficient bridge and 0 being an entirely deficient bridge. To receive funding through the Highway Bridge Replacement and Rehabilitation Program, structures must be classified as "Structurally Deficient" or "Functionally Obsolete" and have a sufficiency rating of 80 or below. Structures with a sufficiency rating of 0 to 49.9 are eligible for replacement, and structures at 50 to 80 are eligible for rehabilitation unless otherwise approved for replacement by the FHWA. The following criteria determine whether or not a structure is structurally deficient or functionally obsolete:

STRUCTURALLY DEFICIENT

A condition of 4 or less for any of the following:

- Deck Rating
- Superstructure Rating
- Substructure Rating

Or, an appraisal of 2 or less for the following:

- Structure Rating
- Waterway Adequacy

FUNCTIONALLY OBSOLETE

An appraisal of 3 or less for the following:

- Deck Geometry
- Under Clearance
- Approach Roadway Alignment

Or, an appraisal of 3 for the following:

- Structure Rating
- Waterway Adequacy

According to the National Bridge Inspection Standards (NBIS), condition ratings are used to describe an existing bridge compared with its condition if it were new. The ratings are based on the materials, physical condition of the deck (riding surface), the superstructure (supports immediately beneath the driving surface), and the substructures (foundation and supporting posts and piers). General condition ratings range from 0 (failed condition) to 9 (excellent condition). This differs from appraisal ratings, which are usually done in the office where access to all necessary information and specifications is available, and consider the field condition, waterway adequacy, geometric and safety configurations, structural evaluation, and safe load capacity of the bridge.

Based on the most recent Bridge Inspection Report, the Maclay Bridge was determined to be functionally obsolete, but not structurally deficient. Its sufficiency rating is calculated to be 27.3, which is less than 49.9, thereby making the bridge eligible for replacement.

A functionally obsolete bridge is one that was built to standards that are not used today. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be occasionally flooded. Functionally obsolete bridges

are not automatically rated as structurally deficient, nor are they inherently unsafe. American Association of State Highway Transportation Officials (AASHTO) standards specify single-lane bridges are appropriate on routes with AADT volumes less than 50 vpd. For the Maclay Bridge, the appraisal values for the "Deck Geometry" and the "Approach Roadway Alignment" are such that the bridge is categorized as being functionally obsolete. This is based on the single-lane width of the bridge being sub-standard for the current traffic volumes, and the sub-standard curves on both approaches to the bridge.

Table 13 shows the sufficiency rating for the Maclay Bridge. For the "Under Clearance" criteria, a notation of "N" means that the structure does not pass over a highway or railroad and is not relevant to the functionally obsolete sufficiency rating criteria. Off-system bridge data statewide suggests that 98.3 percent of all off-system bridges have a sufficiency rating higher than the Maclay Bridge health index.

Table 13: Bridge Sufficiency Rating for Maclay Bridge

Criteria	Maclay Bridge
Structurally Deficiency Sufficiency Rating Criteria	
Deck Rating	6
Superstructure Rating	6
Substructure Rating	5
Structure Rating	4
Waterway Adequacy	8
Functionally Obsolete Sufficiency Rating Criteria	
Structure Rating	4
Deck Geometry	3
Under Clearance	N
Waterway Adequacy	8
Approach Roadway Alignment	3
Sufficiency Rating	27.3
Structure Status	Functionally Obsolete / Not Structurally Deficient

Source: MDT Bridge Management System, 2012. Calculations for Sufficiency Ratings utilize a formula that includes various factors determined during the bridge field inspection and evaluation.

4.8.2. Bridge Health Index

The "Health Index" is a variable based on "weighting" bridge components to establish a clear, dependable communication of bridge performance information to management, elected officials, and the public. The Bridge Health Index is a 0-100 ranking system for bridge maintenance with 100 being a "best" condition and 0 indicating a "worst" condition. The health index provides an indication of how individual bridge components rank on the 0-100 condition scale. To generate a health index rating for the entire bridge, weighted values are assigned to the individual bridge components according to the economic consequences of their failure. Thus, components whose failure has relatively little economic effect, such as railings, receive less weight than those whose failure could close the bridge, such as girders. The Health Index number provides a performance measure and management tool for bridge maintenance.

The health index is not an FHWA directive for assessing bridges, rather, it was developed by the California Department of Transportation (Caltrans) and its computations are now included in bridge management software. Guidance provided by Caltrans suggests that the health index concept for a single bridge be evaluated in context with a statewide network of bridges. Based on the recent October 31, 2011 bridge inspection, the Maclay Bridge was given a health index of 89.91. Montana's statewide off-system bridge data indicates that 72.9 percent of all off-system bridges have a health index higher than the

Maclay Bridge health index. This health index value places the Maclay Bridge near the bottom quartile of all off-system bridges.

4.9. PARKING CONSIDERATIONS

Over the past 30 years, Missoula County has passed numerous resolutions that restrict parking within the vicinity of the Maclay Bridge. Although comments made at the first informational meeting do not indicate parking is an issue, research of past resolutions indicates that parking concerns have existed since at least 1979. Copies of various parking resolutions are included in **Appendix C. Table 14** identifies the resolution number, title, passage date, and summarizes their content.

Table 14: Missoula County Parking Resolutions

Resolution Number	Resolution Title	Passage Date	Summary Description
79-128	REGULATION OF PARKING, CONGREGATING, ETC. ON MACLAY BRIDGE	24-Jul-79	<ul style="list-style-type: none"> Prohibits parking on the Maclay Bridge and the road right-of-way leading to it for 500 yards Prohibits loitering on, fishing from, diving or jumping from, and climbing or congregating on the Maclay Bridge Requires signing on the Maclay Bridge and approaches prohibiting parking Allows Missoula County Sheriff to take action to ensure compliance
90-064	A RESOLUTION CREATING A RESIDENTIAL ON-STREET PARKING PERMIT REGULATION PROGRAM IN THE MACLAY BRIDGE AREA	18-Jul-90	<ul style="list-style-type: none"> Established the Maclay Bridge On-Street Parking Permit Regulation Program Between June 1st and September 30th Between 3:00 pm and 6:00 am Created boundary of program – just east of Humble Road & west to Blue Mountain Road
91-067	A RESOLUTION SUPERCEDING RESOLUTION NO. 90-064, A RESOLUTION CREATING A RESIDENTIAL ON-STREET PARKING PERMIT REGULATION PROGRAM IN THE MACLAY BRIDGE AREA, SIGNED JULY 18, 1990 (AMENDING SECTION 1, PARAGRAPH A)	17-Jul-91	<ul style="list-style-type: none"> Added clarification to "Section 1, Paragraph A" of resolution 90-064
99-003	REGULATING PARKING, CONGREGATING, ETC. ON MACLAY BRIDGE AND AMENDING RESOLUTION 79-128	7-Jan-99	<ul style="list-style-type: none"> Amended resolution 79-128
2011-073	REGULATING PARKING, CONGREGATING, ETC. ON MACLAY BRIDGE AND AMENDING RESOLUTION NO. 91-067	7-Jun-11	<ul style="list-style-type: none"> Amended resolution 91-067 Extends the parking district boundary further to the east along North Avenue, past Humble Road, by 300 feet At the request of landowners

Source: Missoula County Public Works Department, 2012

In addition, a review of Missoula County "911 Calls" was completed. In a search of the call records for the Orchard Homes and Target Range areas for June, July and August of 2010 and 2011, numerous citations were issued (see **Figure 6**) in response to activities near the bridge. These citations included the following categories:

- Criminal Mischief, Curfew and Loitering, Disorderly Conduct, Disturbance, Suspicious Activity
- Extra Patrol
- Hazardous Vehicle
- Other Hazard