

DECEMBER 2010
ADAIR COUNTY
MINIMUM BRIDGE STANDARDS

PURPOSE

The Minimum Bridge Standards shall serve to provide consistent guidance to those decisions makers involved in the process of replacing bridges in Adair County. The standard shall consider the various needs within the County and allow for methods of design and construction that deliver the best value to the County.

The Minimum Bridge Standards for Adair County shall provide guidance for the following aspects of bridge design & construction;

- Project Classification
- Bridge Width
- Bridge Length
- Bridge Opening & Hydraulics
- Truck Loading & Load Ratings
- Channel Alignment
- Bridge Rail

PROJECT CLASSIFICATION

Projects shall be classified as either a Large Scale Project or a Small Scale Project. This classification would likely be performed by the Road & Bridge supervisor in consultation with representatives of the County Commission or an Engineer with bridge experience in Adair County. In general, the projects should be classified according to the following criteria;

Large Scale Projects – A project that requires a bridge length, span arrangement, and height that is greater than what is normally built by the County Bridge Crew and would typically be built by a contractor. An example of a Large Scale Project would be a bridge over the Chariton River or over sections of the Salt River. These projects are normally expected to have a long service life, maybe in the range of 75-100 years. To widen these bridges would likely be cost prohibitive and required modifications of reinforced concrete foundations and overhanging decks.

Small Scale Projects – A project that has a bridge length, span arrangement, and height that is consistent with the capabilities of the Road and Bridge department. An example would be a 60 feet long single span bridge or a 150 feet long, 3 span bridge using 3 simple steel girder spans. These bridges have historically been built using multiple steel beams with no deck overhang, precast backwalls, and low height bridge rail. These projects are normally expected to have a service life of 30-50 years. These bridges could normally be widened by adding a few piling, a few girders, and a section of deck adjacent to the existing construction at a reasonable cost if necessary.

Bridge Geometry & Load Ratings

It is in the best interest of the residents of Adair County to build new bridges which best reflect the needs of the community and provide a good balance of function, initial cost, life expectancy.

At the time of this Standard was developed, the population in Adair County was fairly stable and showed signs of very slow growth. The trend has also been for farm equipment to get larger and more powerful. Farmers have transitioned from dump trucks to large grain carts and semis as a means from getting their crops from fields to the bins. Combines have become quite large and some cannot cross a 16 feet wide bridge.

In regards to bridge loading, it is in the best interest of Adair County to build bridges which can carry the traffic which may legally be on the roads. The design bridge loading directly affects the cost of the bridge because of its affect on the size of the bridge girders. Generally, a 2-lane bridge designed for an HS20-44 loading will required higher capacity girders than a 16 feet wide bridge designed to carry one lane of traffic and meet the "NO-POST" requirements of the MoDOT.

Bridge Hydraulics

A detailed discussion of bridge hydraulics is beyond the scope of this Standard. It shall be the intent of this standard to design and build bridges that do not create a worsened flood condition.

For Small Scale Projects, this intent can be satisfied by building a new bridge that provides an opening that is larger than the old bridge.

For Large Scale Projects, an engineer should be retained to study the hydraulics of the site and recommend an opening size and arrangement.

If an engineering analysis is required to satisfy a state or federal funding source then it shall be done, no matter if the project is Small or Large in scale.

The channel alignment should always be considered during the design and construction of a new bridge. Unless shown to be inadequate, the channel banks shall be laid back at 2h:1v slope and lined with rock blanket within the limits of the County right of way. The creek alignment at the bridge shall provide the smoothest, straightest flow path possible within the limits of the project and within the limits of a reasonable bridge length.

Traffic Volume

Many roadway and bridge guidelines use Average Daily Traffic as a major factor in determining an appropriate width. The reality is that most roads and bridges in Adair County are considered low volume local rural roads with current ADT of <50 and 20 Year ADT <100. Therefore, the majority of this standard is focused on low volume roads. If a current or future ADT is expected to exceed 200 then an engineer should be consulted to advise on roadway alignment, bridge width, and bridge railing.

Bridge Deck Material

There has been much timber used in Adair County for decking and bridge girders. Many of the timber girder bridges have been replaced with steel and concrete girder bridges. There are still many sites that have timber decks. The County shall have the option to use either timber or concrete decking as it deems appropriate based on the best value at the time a bridge deck is needed.

SUMMARY OF MINIMUM STANDARDS FOR NEW BRIDGES IN ADAIR COUNTY

	Small Scale 1	Small Scale 2	Small Scale 3	Small Scale 4
Road Use	Connects 2 paved roads. Serves large row crop area. Frequent maintenance required due to traffic volume. 20 Yr<100 ADT	Connects 2 gravel roads. Not a large row crop area. Regular maintenance required due to traffic volume. 20 Yr<100 ADT	Dead end road or a loop road. Not a row crop area. Low traffic volume. Mostly used by people that live on the road.	Serves a rural subdivision. Road may be taken over by a City someday due annexation. May be paved some day. 20 Yr ADT > 100
Minimum Width	20 feet	20 feet	16 feet	24 feet
Loading	2-Lane No-Post	2-Lane No-Post	1-Lane No-Post	2 Lane HS20-44
Rail	If no history of safety problems then low height rail and sign markers are okay. If a history of safety problems then use crash tested rail.	If no history of safety problems then low height rail and sign markers are okay. If a history of safety problems then use crash tested rail.	Low height rail okay with sign markers.	Use a crash tested system.
Hydraulics	Provide a larger hydraulic opening. Set the bottom of girder higher than the old bridge opening. Set bottom of girder at or slightly above high water elevation from a local eyewitness.	Provide a larger hydraulic opening. Set the bottom of girder higher than the old bridge opening. Set bottom of girder at or slightly above high water elevation from a local eyewitness.	Provide a larger hydraulic opening. Set the bottom of girder higher than the old bridge opening. Set bottom of girder at or slightly above high water elevation from a local eyewitness.	Provide a larger hydraulic opening. Set the bottom of girder higher than the old bridge opening. Set bottom of girder at or slightly above high water elevation from a local eyewitness.
Bridge Deck Material	Reinforced Concrete	Reinforced Concrete	Concrete is preferred but timber is allowed.	Reinforced Concrete

	Large Scale Projects
Road Use	All uses
Minimum Width	24 feet between the rails
Loading	2-Lane HS20-44
Rail	A crash tested system appropriate for the future ADT.
Hydraulics	In accordance with the Engineer of Record. The new bridge shall not create a worsened flooding condition when compared to the old bridge.
Bridge Deck Material	Reinforced Concrete

All new bridges shall be designed to meet the recommended live load deflection limits of the AASHTO bridge design specification.

EXCEPTIONS: Bridges that are being repaired do not fall under these standards.