

## 513 BRIDGES AND ASSOCIATED RETAINING WALLS

### A. Bridge Design Criteria

Except as specified below, Whatcom County bridges, whether on public roads or on private roads, shall be designed and constructed to meet the minimum performance requirements and criteria set forth in the latest edition of "Standard Specifications for Highway Bridges," adopted by AASHTO and in accordance with the requirements of WSDOT Standard Specifications. Bridge and approach railings shall be provided in accordance with those references or with WSDOT Standard Plans. All new bridges shall be designed to carry an AASHTO HS 20-44 live load or greater. All bridge work is subject to flood and critical area review.

### B. Definitions

Bridge: A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between under copings of abutments or spring lines of arches or extreme ends of openings for multiple structures, which may include pipes, boxes, arches and multi-plate culverts, in series where the clear distance between openings is less than half of the smaller contiguous opening.

### C. Bridge Geometrics

1. For public roads, and for private roads with an ADT of greater than 60, the bridge shall provide for the full width and configuration specified for the functional classification of the road being served. This may include the traveled way plus curb, sidewalks, walkway, and/or shoulder on one or both sides. Requirements for utilities shall be duly considered. Bridge roadway width shall be measured between curbs or between faces of rails, whichever is less, but in no case shall it be less than 24 feet.
2. For private roads with an ADT equal to or less than 60, a one-lane bridge with stop control on each side may be permitted based on the judgment of the Technical Administrator, provided that adequate sight distance is provided on both bridge approaches. Minimum curb to curb width in this case shall be 14 feet.
3. For private driveways with an ADT equal to or less than 10, a one-lane bridge may be permitted with stop control on each side, provided that adequate sight distance is provided on both bridge approaches based on the judgment of the Technical Administrator. Minimum curb to curb width in this case shall be 12 feet.
4. If in the judgment of the Technical Administrator, significant pedestrian, bike and/or horseback traffic can be expected, the Technical Administrator

may require that the facilities for these other modes of traffic be separated from motor vehicle traffic.

5. Approach railings shall be made structurally continuous with bridge railings and shall meet specifications as cited in Section A above.
6. The height of bridge clearance above streams shall be as specified in Section 513.D.

#### D. Bridge Clearance Requirements

1. Bridge clearance over water features:
  - a) All new bridges shall be designed to convey flows for runoff events up to and including the 100-year event while maintaining a no-rise condition to the upstream hydraulic surface. To assure this goal, the bridge must provide sufficient clearance (vertical clearance between the 100-year flood elevation and the low chord of the bridge) to allow for passage of debris.
  - b) The minimum design clearance for all new bridges is three (3) feet between the 100-year flood elevation and the lower chord of the bridge. Estimation of the 100-year flood flow and channel hydraulics shall be in accordance with the most current version of the WSDOT Hydraulics Manual. Design clearance(s) less than three (3) feet may be allowed based on the judgment of the Technical Administrator.
2. Bridge clearance over other features:
  - a) Bridge over a roadway - minimum vertical clearance is 16.5 feet.
  - b) Bridge over a railroad track - minimum vertical clearance is 23.5 feet.
  - c) Pedestrian bridge over a roadway - minimum vertical clearance is 17.5 feet.

#### E. Design Submittal Requirements

The following elements shall be provided for review as part of a complete and comprehensive proposal for any bridge installation:

1. Hydraulic report – The hydraulic report shall be prepared and stamped by a Professional Engineer licensed in the State of Washington with expertise in hydraulics and scour analysis. At a minimum, the report should include the following items:

- a) Basin hydrology evaluation, including the expected range of flows in the waterway.
  - b) Channel hydraulics evaluation, including 100-year flood elevation relative to the bridge elevation and the corresponding maximum expected water velocity.
  - c) Scour evaluation, including scour depth calculation, bridge foundation review, and design of mitigation measures if necessary.
  - d) If situated in a floodplain, verification that a “no-rise” condition exists.
2. Geotechnical report – The geotechnical report shall be prepared and stamped by a Professional Engineer licensed in the State of Washington with expertise in soils and foundation design. At a minimum, the report should include the following items:
- a) Soil boring at each bridge support (including intermediate piers if any).
  - b) Laboratory analysis of relevant soils properties.
  - c) Analysis of soil bearing properties.
  - d) Foundation type recommendation.
3. Structural design – The structural design shall be prepared and stamped by a Professional Engineer licensed in the State of Washington with expertise in bridge design. At a minimum, the design should include the following items:
- a) Review of design criteria for compliance with Whatcom County Road Standards Section 513.
  - b) All relevant calculations and analysis required by current AASHTO and WSDOT standards.
  - c) Specifications for all necessary materials.
  - d) Seismic and wind design.
  - e) Statement confirming that items 1 and 2 above have been reviewed and incorporated within the design proposal.

#### F. Record Drawing Submittal

Upon completion of construction, the structural engineer of record shall submit the following information:

1. Record drawing specifying any deviations from the approved design pursuant to section 507.
2. Construction inspection records pursuant to section 511, documenting that the bridge was constructed in accordance with the plans and specifications. Required records include but are not necessarily limited to concrete air entrainment, water content, admixture content, and compressive test results, if applicable; material certifications for any steel members; and pile driving records if applicable.
3. Load Rating documentation, detailing the load carrying capacity of the bridge in accordance with AASHTO standards.
4. Future inspection and maintenance procedures – The structural engineer of record shall specify the inspection and maintenance frequencies and procedures for the bridge and all its components.

#### G. Bridge Approach Slopes

On streams with levees, the portion of the approach slopes subject to floodwaters must be connected to the existing levees and the approach slopes must be designed to meet Federal Emergency Management Administration (FEMA) levee construction and stability standards.

#### H. Bridge Retaining Wall Design Criteria

Bridge retaining walls shall be designed and constructed consistent with the minimum performance specifications of AASHTO as set forth in the latest edition of "Standard Specifications for Highway Bridges," and in accordance with the performance specifications of WSDOT Standard Specifications.

#### I. Bridge Maintenance and Inspections

The owner of the bridge shall have the responsibility of maintaining the bridge in a safe condition, taking into account any inspection(s) and maintenance procedure(s) listed from section F-4 above. The owner shall also have the responsibility for compliance with any inspection, testing, frequency interval and/or reporting criteria listed within, or as a condition of, any County permit or project approval by the County.