COUNTY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT
TRANSPORTATION DIVISION
123 East Anapamu Street
Santa Barbara, California 93101
(805) 568-3000

SCOTT D. MCGOLPIN
Director

June 25, 2018

DESIGN CRITERIA

FOR LOW VOLUME ROADS

This memorandum establishes roadway and bridge design criteria for the County of Santa Barbara Public Works Department on low volume roads ("LVR") within the County's maintained system and shall be a supplement to the currently approved County Design Standards.

Qualifying Roads:

Roadway must satisfy both of the following criteria:

1) Local rural road or a local road with rural characteristics such as no curb, no gutter, no lighting, sparse development (e.g. Ashley Road and East Mountain Road in Montecito); and
2) Average Daily Volume (ADT) not exceeding 400 vehicles/day for new improvements. On existing roads, guidelines can be extended to roads with ADT up to 1000 vehicles per day with approval by the County Traffic Engineer.

Roadway Design Criteria

Existing Roadways:

1) Existing roads and bridges may be constructed either by:
    a. Maintaining the existing cross section; or
    b. Reducing the cross section

    With approval by the County Traffic Engineer.

2) Existing roads and bridges within a curve may be reconstructed without changing the curve geometry if the approaching operating speed is within 20 mph of the curve operating speed. Collision history will also be considered by the County Traffic Engineer prior to approval.

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New Construction:

1) New construction is defined as a project that:
    a. Constructs a new roadway in an area that did not previously have a roadway; or
    b. Modifies the existing centerline alignment horizontally > 25 feet or for a distance greater than 1000 feet.

2) Table 1 shows the minimum width of the traveled way based on Road Condition/Function and the ADT.

Table 1 - Minimum Width of Paved Traveled Way Based on Road Condition/Function and ADT

	Minimum Width of Traveled Way (Ft)		
Road Condition/Function	under 50 veh/day (two-way single-lane)	50 to 250 veh/day	250 to 400* veh/day
Within agricultural zoning	15	22	24
Used by trucks (more than 20% ADT)	16	20	22
Other roads (used mainly by passenger vehicles)	14	18	20

***Column 3 (250 to 400 veh/day) can be adopted up to 1000 veh/day with the approval of the County Traffic Engineer**

3) The minimum shoulder width shall be 2 feet.
4) The clear zone shall be a minimum of 7 feet for design speed of 25 mph or less and 10 feet for design speed of more than 25 mph. A reduction of clear zone due to existing site conditions must be approved by the County Traffic Engineer.
5) Roads with anticipated ADT of less than 100 veh/day may allow two-way single-lane bridges if site conditions allow adequate site distance. Adequate site distance determination shall be approved by the County Traffic Engineer. If approved, the required width for the traveled way may be 2 feet less than the numbers in the "under 50 veh/day" column.
6) The minimum design speed shall be 30 mph. On mountainous roads design speed may be reduced to 20 mph if approved by County Traffic Engineer.
7) Table 3-9 in AASHTO *A Policy on Geometric Design of Highways and Streets* should be used to obtain the required superelevation. Using the table, a reduced design speed may be used. The reduced design speed is 15 mph for mountainous roads and 20 mph for all other roads. The maximum superelevation (e_{max}) to be used for the design is 6%.

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Qualifying Bridges:

Bridge design criteria for LVR may be applied if condition (1) and at least one of conditions (2), (3), or (4) exist at the bridge site:

1) Average Daily Traffic (ADT) of the road is less than 400 or for existing bridges up to 1000 with approval of the County Traffic Engineer.
2) The drainage channel upstream or downstream of the site does not have the capacity to retain the 100 year design flow.
3) The cost to design and construct a bridge meeting otherwise applicable standards is 30% greater than the cost for a bridge designed and constructed using the criteria specified below.
4) A bridge designed and constructed using the criteria specified below increases the chance the road will remain in service during or immediately after high flow events over the existing condition.

Bridge Design Criteria:

Qualifying bridges on existing and new roadways may be designed and constructed pursuant to the following criteria:

1) Design speed may match existing roadway geometry with a target minimum design speed of 20 MPH. This may be lowered with approval by the County Traffic Engineer. Include consideration of any special traffic control devices to address lower design speeds at the bridge approaches.
2) Reduced flow capacity with adequate consideration of overtopping during high flow and bulking events. The recommended design flow is Q_{50} with no freeboard. Lower flow capacity shall be approved by the Engineering Section Manager.
3) A rural road crossing design shall include overtopping considerations and analysis of the project area.
4) Hydraulic Design – Structure hydraulic design shall follow Low Water Bridge criteria outlined in the U.S. Department of Agriculture Forest Service: Washington, DC, USA, 2006 Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations. Vented Fords with concrete box culverts having the culvert bottoms submerged may be allowed if approved by the Engineering Section Manager. Figure 1 illustrates examples of a Vented Ford and Low Water Bridge. Copies of the design considerations can be downloaded at https://www.fs.fed.us/eng/pubs/pdf/LowWaterCrossings/LoWholeDoc.pdf

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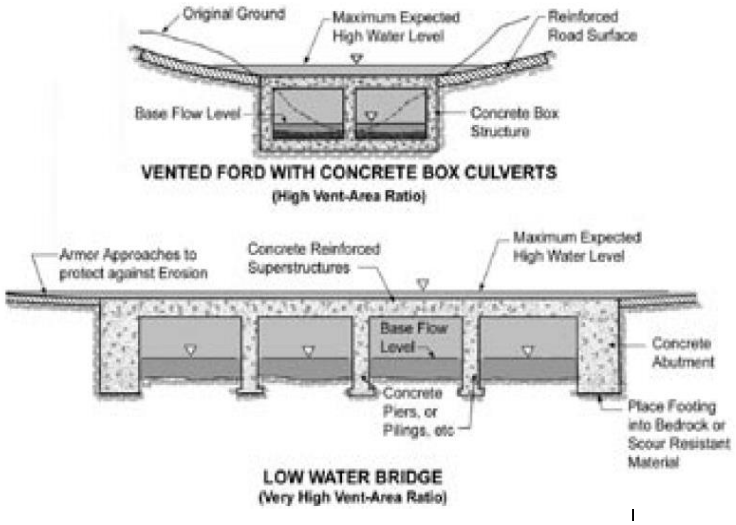

Figure 1 Vented Ford and Low Water Bridge

The minimum structure hydraulic capacity shall pass the bankfull flow of the immediate upstream or downstream channel or Q_{50}, whichever is less. Bankfull flow is considered to be that flow that just overtops the streambank or top of bank.

Streambank or top of bank shall be determined from the Santa Barbara County Streambank determination guidelines unless approved otherwise by the Engineering Section Manager. Top of the bank means the line formed by the intersection of the general plane of the sloping side of the watercourse with the general plane of the upper generally level ground along the watercourse; or, if the existing sloping side of the watercourse is steeper than the angle of repose (critical slope) of the soil or geologic structure involved, top of bank shall mean the intersection of a plane beginning at the toe of the bank and sloping at the angle of repose with the generally level ground along the watercourse. The angle of repose is assumed to be 1.5 (horizontal): 1 (vertical) unless otherwise specified by a geologist or soils engineer with knowledge of the soil or geologic structure involved.

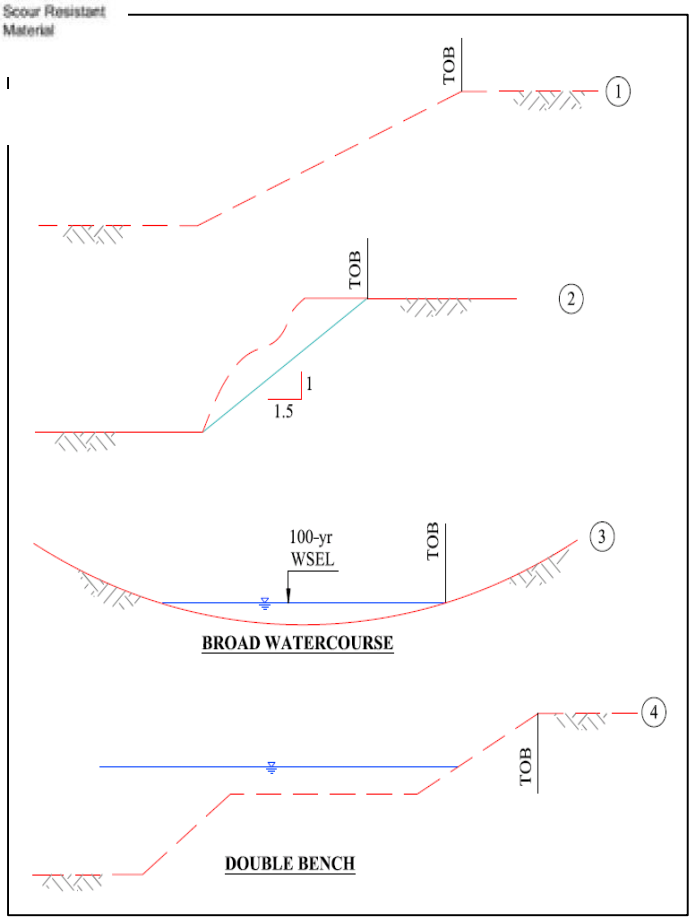

Figure 2 Top of Bank

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Structure hydraulic modeling shall include an overtopping analysis. At a minimum the channel shall follow the US Department of Transportation Federal Highway Administration Hydraulic Design of Safe Bridges, publication N0. FHWA-HIF-12-018, April 2012.

To the extent possible stormwater runoff from rural road bridges shall follow the runoff and treatment options outlined in the National Cooperative Highway Research Program Report 778 "Bridge Stormwater Runoff Analysis and Treatment Options" dated 2014.

5) Bridge rails:
   a. Bridge rails 4 feet or less from the edge of traveled way shall either meet the crash testing requirements of NCHRP Report 350 or AASHTO Manual for Assessing Safety Hardware (MASH) or can be geometrically and structurally evaluated as equal to a TL-1 (or higher) crash-tested system.
   b. Bridge rails between 4 feet and 8 feet from the edge of traveled way *may* be designed in accordance with 5) a. or for the transverse, longitudinal and vertical impact loads under TL-1 specified in AASHTO Table A13.2-1 with approval by the Transportation Deputy Director.
   c. Bridge rails greater than 8 feet from the edge of traveled way *may* be designed in accordance with 5) a., 5) b., or to sustain a transverse impact load of 5,000 pounds with approval by Transportation Deputy Director.

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