



## *Local Programs Procedures*

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### **LPP 96-02 Design Standards for Non-NHS Projects**

References: LPP 94-11, "Revision to LPP 94-06 Revised Policy on Design Exceptions"  
LPP 95-07, "Reengineering"  
23 U.S.C. Section 109, "Standards"

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Approved: \_\_\_\_\_

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The purpose of this Local Programs Procedure (LPP) is to:

- (1) Designate statewide design standards, specifications, procedures, guides and references that are acceptable for application in the geometric and structural design of Federal-aid projects off the National Highway System (NHS).
- (2) Describe procedures to allow the use of certain local design standards, including standard specifications and standard plans, as an acceptable alternative to statewide standards for Federal-aid projects off the NHS.
- (3) Revise design exception approval procedures for Federal-aid projects off the NHS.

The procedures will be incorporated into the appropriate chapters of the new Local Assistance Procedures Manual when it is released.

#### **CURRENT PROCEDURES:**

Currently, all local Federal-aid non-NHS projects must meet statewide standards defined in Section 8 of the *Local Programs Manual, Vol. I*.

Limited approval of design exceptions has been delegated to local agencies by LPP 94-11. Local agencies which have developed and adopted local design standards to meet the needs of their community must still determine if the statewide standards have been met and then justify and approve any exceptions on a project-by-project basis.

LPP 94-11 limited the delegation of design exception approval authority to geometric design, safety and drainage design of small culverts. Controlling criteria for geometric standards were identified which required exception approval, but it is not clear how deviations from other standards are to be handled.

### NEW PROCEDURES:

#### PART 1 - DEFINITIONS

*Design Standards* - The standards, specifications, procedures, guides and references listed herein that are acceptable for application in the geometric and structural design of Federal-aid projects.

*Controlling Criteria* - The specific minimum criteria and controls contained in the design standards for highway projects that are considered of primary importance for safety. Deviations from these controlling criteria require design exception approval.

*Design Exception Approval* - A process to justify, approve and document allowable deviations from controlling criteria.

*Specifications* - The directions, provisions and requirements contained in the contract documents for a specific construction project. Included are various proposal conditions, contract administration provisions, required construction methods and material specifications.

*Standard Specifications* - A published document that contains commonly used specifications developed for use as a reference for construction contract documents.

*Standard Plans* - A collection of plan details developed for use as a reference for construction contract documents. Included are standard abbreviations, symbols, design notes, design conditions and data, construction details, specifications, layouts, and measurement and payment details.

#### PART 2 - STATEWIDE DESIGN STANDARDS

Plans and specifications for Federal-aid highway projects shall provide for a facility that will adequately meet the existing and probable future traffic in a manner conducive to safety, durability and economy of maintenance.

The following statewide standards are acceptable for application in the design of Federal-aid projects off the NHS. Procedures to allow the use of certain local design standards as an acceptable alternative to these statewide standards are described in Part 3, "Local Design Standards."

##### 2.01 Geometric Standards

- (1) *New and Reconstruction Projects*. A Policy on Geometric Design of Highways and Streets, AASHTO 1990.
- (2) *Resurfacing, Restoration and Rehabilitation (3R)*. Minimum Standards for Geometric Design of Federal-aid Resurfacing, Restoration, and Rehabilitation (3R) Projects on Local Streets and Roads, Caltrans, October, 1988. (Note: These standards will be updated to metric in the new Local Assistance Procedures Manual.) The primary purpose of 3R projects is to preserve and extend the service life of existing facilities and enhance highway safety, normally, without major improvements to existing geometric features. However, every

attempt should be made to provide uniform geometric standards for a substantial length of roadway. Therefore, the work may include upgrading of geometric features, such as minor roadway widening, flattening curves, or improving sight distances and still be considered as 3R work.

### **2.02 Bikeway Standards**

For bikeway projects, Chapter 1000 of the Caltrans *Highway Design Manual* shall be used.

### **2.03 Pavement Structural Section**

- (1) Section 7-600 of the Caltrans *Highway Design Manual* or the Caltrans Flexible Pavement Structural Section Design Manual.
- (2) The Flexible Pavement Structural Section Design Guide for California Cities and Counties which is published by Caltrans in cooperation with the County Engineers Association of California and the League of California Cities.

### **2.04 Signs and Markings**

Informational, regulatory and warning signs, curb and pavement or other markings and traffic signals installed or placed on any project constructed with Federal funds shall conform with the "Traffic Manual" published by the California Department of Transportation.

The Federal Highway Administration (FHWA) has indicated that school crosswalks and other school markings should conform to the Manual on Uniform Traffic Control Devices (MUTCD) in the interests of national uniformity. However, they will not prohibit the use of the yellow school crosswalk markings required by California law. The FHWA will participate in the cost of the yellow school crosswalk markings. The MUTCD is available through the Government Printing Office in San Francisco (415) 512-2270.

Deviations from the "Mandatory Standards" as defined and indicated in the Caltrans *Traffic Manual* are not allowed.

### **2.05 Bridge Design Procedures**

All bridges shall be designed in accordance with the current edition of the Caltrans *Bridge Design Specifications Manual*. This manual reflects the requirements of the current edition of AASHTO Standard Specifications for Highway Bridges modified by Caltrans to incorporate California seismic design requirements. (See below for bridge railing standards.)

The following Caltrans publications are also available to assist local agencies with designing bridges.

- Bridge Design Practice Manual
- Bridge Design Details
- Bridge Design Aids
- Bridge Memo to Designers

### 2.06 Railroad Bridges

Design loadings and geometrics for bridges carrying railroads and clearances for highway bridges spanning railroads are shown in Caltrans *Bridge Design Specifications*.

### 2.07 Bridge Railing

Bridge railing shall be designed in accordance with the current addition of AASHTO's *Guide Specifications for Bridge Railings*. Although all deviations from accepted standards and procedures should be justified and documented in some manner, project-by-project deviations from the criteria in this publication do not require handling in accordance with design exception approval procedures.

See Section 2.12, "Safety", for references and guidelines for bridge approach guardrail and other safety features.

### 2.08 Bridges to Remain in Place

When local agencies make highway improvements, they must often decide whether or not to upgrade existing bridges. If the structures are otherwise compatible with the new work, the following criteria should be used.

AASHTO's "A Policy on Geometric Design of Highways and Streets," 1990 (or current update), provides the criteria for minimum structural capacities and minimum roadway widths for bridges to remain in place (refer to the table "Minimum Structural Capacities and Minimum Roadway Widths for Bridges to Remain in Place"). This table is applicable only when no modifications are made to the superstructure (asphalt concrete blankets of 0.03 meter thickness or less, attachment of guardrails at bridge approaches, or deck seals are not considered superstructure modifications). When changes to the superstructure are required, refer to the table entitled, "Minimum Roadway Widths for New and Reconstructed Bridges."

The structure clear width (traveled way plus shoulders) should be determined in conformance with AASHTO standards.

Asphalt concrete thin blanket overlay projects (thickness of 0.03 meter or less) that cross structures without increasing the width of the approach roadway will not affect the geometric or design standards of the existing structure. Asphalt concrete thickness of over 0.075 meter and any significant increase in width of pavement of any thickness will require that the structure be reviewed to comply with all bridge design and geometric criteria. Asphalt concrete thickness greater than 0.03 meter but less than or equal to 0.075 meter and membrane deck seals should be considered on a case-by-case basis. Bridge rail height is one of the design criteria that needs to be checked with overlays between 0.03 and 0.075 meter.

All bridges within project limits or immediately adjacent to the project, should be provided with approach railings.

Timber structures may not be widened.

## **2.09 Design of Large Culverts**

See Chapter 8 of Caltrans *Local Programs Manual, Vol. I*.

## **2.10 Foundation Investigation for Design**

A foundation investigation and report by an Engineering Geologist or Civil Engineer specializing in soils engineering should be completed at all bridge and large culvert sites. This requirement may be disregarded if the engineer in responsible charge of design determines site conditions clearly indicate the report is unnecessary. This determination shall be documented in the project files. The local agency must waive this requirement on a project-by-project basis. This waiver must be signed by a California registered Civil Engineer and retained in the project files. (It should be noted that Federal funds shall not participate in any claims relating to inadequate foundation investigations.)

All reports shall contain recommendations by the Soils Engineer or Engineering Geologist for specific design considerations for the site (see Exhibit 08-2 in Caltrans *Local Programs Manual, Volume I*).

Where pile support is anticipated in design, specific attention is directed to the Caltrans Bridge Design Specifications, 4.3.3 - "Design Loads." The report should contain the data called for in 4.3.5 - Required Subsurface Investigations.

## **2.11 Drainage Design of Bridges and Culverts**

Drainage design of bridges and culverts shall be in accordance with Chapter 8 of Caltrans *Local Programs Manual, Volume I* as modified by the following:

- (1) The goal of hydraulic design for bridges and culverts is to convey surface and stream waters originating upstream of the drainage facility to the downstream side without causing objectionable backwater, excessive flow velocities or unduly affecting traffic safety. The hydraulic drainage design standards listed in *the Local Programs Manual* have been developed to accomplish this goal. However, state-of-the-art methods and procedures associated with the necessary hydrologic analysis required to determine the severity and probability of occurrence of flood events are inherently ambiguous. Therefore, the drainage criteria are provided for guidance only and are not intended to establish either legal or design standards which must be strictly adhered to. The local agency must use discretion in applying the drainage criteria in order to design the most cost effective drainage facility considering the importance of the transportation facility, safety, legal obligations, ease of maintenance and aesthetics. For example, the selection of a design flood with a lesser or greater peak discharge may be warranted and justified by economic analysis.

The exception to the above discussion is the evaluation of encroachments on the (100-year) base flood plain. Federal regulations (23 CFR 650.115) state that all such encroachments shall be evaluated to assess the costs and risks associated with the base flood ( $Q_{100}$ ) or overtopping flood whichever is greater.

- (2) A scour evaluation should be conducted for all bridges over water. The scour evaluation should include consideration of long term aggradation/degradation, contraction scour, local scour and lateral migration. The details of the scour evaluation shall be commensurate with the risk associated with the structure.

The FHWA has developed Hydraulic Engineering Circular (HEC) #18, entitled "Evaluating Scour at Bridges" to aid in the proper development of the necessary scour evaluations. Calculations similar to those in HEC #18 may be used for evaluating scour at bridges. The scour evaluation should be done by an interdisciplinary team consisting of hydraulic, geotechnical and structural engineers. Bridges with scourable beds must withstand the effects of the  $Q_{100}$  flood without failure. HEC #20 entitled "Stream Stability at Highway Crossings" is another resource for evaluating stream stability at design locations.

- (3) Drainage design reports shall be prepared and retained in the local agency's permanent design files for the project as described under "Documentation" in Chapter 8 of Caltrans *Local Programs Manual, Volume I*. The reports will not be submitted for review and approval by Caltrans, except as described below:

- If a Location Hydraulic Study is required, it will be reviewed as part of the environmental approval process.
- If the project is funded by the HBRR program, the field review form including the structure data sheets must be submitted with the initial "Request for Authorization" (See LPP 95-07). If Caltrans has questions/concerns regarding program compliance at this time, the local agency may be requested to provide preliminary hydraulic studies to resolve these questions/concerns. The local agency may also be requested to provide hydraulic design reports if subsequent requests for funding exceed the level of funds reserved for the project.

### 2.12 Safety

The controlling criteria listed in Part 4, "Design Exception Approval Procedures," are considered to be of primary importance for highway safety, and deviations require design exception approval procedures.

The following publications have also been developed to aid the designer in improving highway safety. They are primarily informational or guidance in character and serve to assist local agencies in knowing the material considered to provide valuable information in attaining good design. Project-by-project deviations from the criteria in these publications do not require handling in accordance with design exception approval procedures.

- (1) Caltrans Traffic Manual.
- (2) Roadside Design Guide, 1995. Available September 1995 through AASHTO.
- (3) Designing Safer Roads, Special Report 214, Transportation Research Board.

All designers should be familiar with these documents. Although the principles contained are written primarily for high-speed highway facilities, consideration should be given to their application on other types of projects regardless of traffic volumes and design speed.

Evaluating accident records is an integral step in developing highway projects and often reveals problems requiring special attention and corrective action. Relative accident rates can influence the priorities of projects and ensure that project objectives and the scope of design are related to accident causes. In addition, it may be necessary to use a cost/benefit study and an investigation of accident experience to determine if the correction of an identified safety problem is cost effective. Significant safety problems, such as narrow bridges or culverts, railroad crossings or fixed objects which are not cost effective to correct, must be provided with suitable warning and traffic control devices. For example, no bridges may be left in place which have a width narrower than the approach roadway unless suitable signing, marking and parapet protection are provided.

### **2.13 Standard Plans**

- (1) The current edition of Caltrans Standard Plans.
- (2) The current edition of Standard Plans for Public Works Construction developed and promulgated by the American Public Works Association, Southern California Chapter, and the Associated General Contractors of California, Southern California Districts.

### **2.14 Standard Specifications**

- (1) The current edition of Caltrans Standard Specifications.
- (2) The current edition of the Standard Specifications for Public Works Construction (commonly referred to as "the Green Book"), written and promulgated by the American Public Works Association, Southern California Chapter, and the Associated General Contractors of California, Southern California Districts.

## **PART 3 - LOCAL DESIGN STANDARDS**

As discussed previously, plans and specifications for Federal-aid highway projects shall provide for a facility that will adequately meet the existing and probable future traffic in a manner conducive to safety, durability and economy of maintenance. Section 109, "Standards", of Title 23 of the U.S. Code also requires that projects shall be designed and constructed to conform to the particular needs of each locality.

Since statewide standards do not always meet the particular needs of each locality, local design standards that meet the following requirements will be allowed on Federal-aid projects off the NHS.

### **3.01 Local Geometric Standards**

Local geometric design standards that have been developed for use on locally funded new and reconstruction, or 3R projects, may be used if:

- (1) They have been approved by the County Board of Supervisors or the City Council, and
- (2) They have been signed, on behalf of the local agency, by the responsible person in charge who is a registered professional engineer licensed to practice civil engineering in the State of California. These standards must be signed by the City/County Public Works Director if he/she is a California registered Civil Engineer. If not, they may be signed by the City/County Engineer if registered. If the City/County Engineer is not registered, the

delegation can be made to the highest level engineer in the agency who is. The locally adopted design standards may be signed by a consultant on retainer as City/County Engineer if such individual is registered and is responsible directly to the Public Works Director.

### 3.02 Local Pavement Structural Section Design Methods

Local agencies may use the same pavement structural section design methods or standards used for their locally funded projects.

### 3.03 Local Standard Plans

Local agencies may use their own standard plans that have been developed for use on locally funded projects. The standard plans shall be signed (with registration number) by the local agency's responsible person in charge who must be registered in California in the professional field for the kind of plans they are signing. Bridge structure details included in local standard plans shall meet Caltrans' bridge design standards.

If the local agency wishes structures-review assistance from Caltrans, then Caltrans Standard Plans must be used for the structures portion of the project.

### 3.04 Local Standard Specifications

Local agencies may use their own standard specifications that have been developed for use on locally funded projects.

Bridge construction methods and materials specifications included in local standard specifications shall meet the bridge design requirements of the Caltrans *Bridge Design Specifications* and other standards defined herein.

The use of local standard specifications is subject to the condition that in the event any conflict arises between the local standard specifications and the Local Assistance procedures listed herein, or other applicable Local Assistance procedures, the Local Assistance procedures shall apply.

## PART 4 - DESIGN EXCEPTION APPROVAL PROCEDURES

### 4.01 Highway and Bridge Standards

Although all deviations from accepted standards and procedures should be justified and documented in some manner, the design exception approval procedures described below are only required for deviations from the following controlling criteria for highways and bridges:

Design Speed	Cross Slope
Lane and Shoulder Width	Superelevation
Horizontal and Vertical Alignment	Vertical and Horizontal Clearance
Grade	Bridge Width
Stopping Sight Distance	

Deviations from the controlling criteria for bridge structural capacity will not be allowed.

Deviations from bridge design details in the bridge design manuals and publications referenced herein will be allowed as long as they do not impact the structural capacity.

The controlling criteria for bridge width, vertical and horizontal under clearances, and approach roadway alignment are among the factors that are rated during each biennial bridge inspection. (Further explanation of these rating factors can be found in the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges.) Design exceptions that would result in construction of a new bridge with Federal funds that would be deficient will not be allowed.

### **4.02 Bikeways**

Deviations from the "Mandatory Standards", as defined and indicated in the *Caltrans Highway Design Manual*, require approval in accordance with the design exception approval procedures described below.

### **4.03 Approval Procedures**

Approval for design exceptions shall be signed by the Public Works Director or the person to whom approval authority has been delegated. The person with approval authority must be a registered Civil Engineer in the State of California. Additional procedures concerning documentation requirements and delegation of this approval authority shall be in accordance with LPP 94-11.

### **4.04 Administering Agency-State Master Agreement**

An updated Administering Agency-State Master Agreement has been prepared to reflect the new provisions of ISTEA, LPP 95-07 and these new procedures. As workload allows, the Office of Local Programs will initiate the new agreement with all agencies involved in implementation of Federal-aid projects. First priority will be to implement an updated agreement for all new Federal-aid projects and for new phases of current projects. In the interim, program supplements referencing pre-ISTEA Master Agreements will incorporate appropriate special covenants to cover the new procedures.

The updated Master Agreement or Program Supplement incorporating the appropriate special covenants, must be executed by the Local Agency and Caltrans before any project utilizing local design standards is advertised for bids. Local agencies planning to proceed with local design standards should request preparation of the new Master Agreement or Program Supplement far enough in advance of the estimated advertisement to allow time for both agencies to execute the agreement.

**4.05 Revised PS&E Certification Form**

The PS&E Certification form (Exhibit E, Attachment 7 of LPP 95-07) is currently being updated to agree with these and other new procedures and will be included in the new Local Assistance Procedures Manual. Until the new manual is released, the following revisions should be made to the form:

- (1) Under "Geometric Design Standards":

If locally approved geometric design standards have been used, indicate "Local Standards" and the date of the required approvals.

If the project does not change the existing geometrics, add the statement "Does not apply."

- (2) Under "Controlling Criteria Checklist":

Delete the "Design Criteria Not Met" checkbox and the "Design Exception Approval Date" line for Structural Capacity. (Exceptions are not allowed.)

Delete the notation "For AASHTO Standards Only." (Other standards may apply.)

- (3) Replace the "Bridge Design Standards" section with the following:

**Bridge Design Procedures** (check appropriate box)

All bridges have been designed in accordance with the current edition of Caltrans *Bridge Design Specifications Manual*.

Yes            Does not apply (Bridge construction not included in project.)  
           

- (4) Under "Standard Plans":

Add checkbox for "Standard Plans for Public Works Construction."