TABLE OF CONTENTS ~ BRIDGE SUPERSTRUCTURE DESIGN

5 Bridge Superstructure Design
5.1 General
5.1.1 Policy overview
5.1.2 Design information
5.1.3 Definitions
5.1.4 Abbreviations and notation
5.1.5 References

5 Bridge Superstructure Design

5.1 General

The series of articles under Section 5, Bridge Superstructure Design, is intended to fit together as a unit. As much as possible, cross references are used to avoid duplication.

5.1.1 Policy overview

In the Bridges and Structures Bureau, the design of typical highway bridges proceeds from Preliminary to Final Design Units. The Preliminary Design Unit selects the superstructure type based on bridge site information, available locations for substructure components, spans between substructure components, and criteria stated in *Bridge Design Manual* Section 3, Preliminary Design. In some cases, the Preliminary Bridge Design Unit also considers aesthetic criteria in Section 9, Aesthetic Design. A Final Design Unit then completes the structural design and detailing following the policies in Section 5, Bridge Superstructure Design, and Section 6, Bridge Substructure Design.

The Bureau interprets the basic AASHTO LRFD Specifications when designing superstructures, bearings, and additional components and specifies rules for detailing these components. This series of articles on superstructure components covers most typical designs but does not cover special bridge designs for signature bridges and long-span bridges.

In all cases, superstructure components need to be designed for vertical and lateral loads, strength, serviceability, and economy considering the entire bridge structure.

For typical highway bridge superstructures, the Bureau generally selects among four types: continuous concrete slab (CCS), pretensioned prestressed concrete beam (PPCB), continuous welded plate girder (CWPG), and rolled steel beam (RSB). In general CCS bridges are used for short spans up to 59 feet and total bridge lengths up to 150 feet or where minimum superstructure depth is required over short spans. PPCB bridges are used for longer spans to 155 feet. CWPG bridges are used for spans longer than 155 feet, where minimum superstructure depth is required, or where the horizontal alignment is sharply curved. Except for unusual conditions the Bureau limits bridge skew to 45 degrees.

Standard sheets and details and signed standard bridge plans that follow current policies are available for efficient design of the typical superstructures. In all cases, however, the standard sheets and standard bridge plans need to be supplemented with additional sheets to produce a complete plan set for a bridge project.

The Bureau has signed standard plans for a series of three-span CCS bridges that may be used for relatively simple alignments and site conditions. The standard CCS bridges, which are intended for stream and small valley crossings, have 40 and 44 foot roadway widths, lengths varying from 70 to 150 feet, and skews from 0 to 45 degrees.

The general availability of standard sheets and standard bridge plans for primary highway system projects is summarized in Table 5.1.1. All items listed in the table have roadway widths of at least 30 feet.

Table 5.1.1. Summary of standard sheets and signed standard bridge plan availability

Superstructure type	Number of spans	AASHTO live load and specification	
		Standard sheets	Signed standard plan sets
CCS, J40, and J44 series (1)	3	---	HL-93 LRFD
PPCB	---	HL-93 LRFD	---
CWPG	---	HL-93 LRFD	---

Table notes:

(1) The 24 and 30-foot wide bridges (not shown in the table) are generally intended only for county and city use.

The Bureau prefers jointless bridges and therefore, wherever practical, selects integral abutments and continuous construction at piers. In cases where expansion joints are necessary due to bridge length, the expansion joints are to be designed according to the guidelines in a subsequent article [BDM 5.8.3].

For bridge replacements with staged construction the designer needs to check the capacity of the new bridge and the existing bridge to handle staged traffic. Existing bridges with staged construction shall be able to carry all legal loads. Existing beam bridges with only two beams supporting staged traffic are of particular importance especially when the exterior beam is smaller than the interior beam. Rating of the existing bridge shall be based on the requirements in BDM 12.1.7.

5.1.2 Design information

Reserved

5.1.3 Definitions

Reserved

5.1.4 Abbreviations and notation

CCS, continuous concrete slab
CWPG, continuous welded plate girder
PPCB, pretensioned prestressed concrete beam
RSB, rolled steel beam

5.1.5 References

Reserved