

Memorandum

To: ALL DISTRICT DIRECTORS

Date: January 31, 1995

and

File No. :

MR. J. ROBERTS, Director
Engineering Services

From: DEPARTMENT OF TRANSPORTATION
STATE AND LOCAL PROJECT DEVELOPMENT PROGRAM - OFFICE OF PROJECT PLANNING & DESIGN

Subject: Design Information Bulletin Number 77 - Interchange Spacing

PURPOSE

To provide supplemental guidance toward the development and conceptual (Project Study Report) approval of projects which propose to increase access to, or the capacity of California freeways.

BACKGROUND

This supplement to the existing procedures, guidelines, and design criteria used to initiate applicable projects has been developed to comply with the Stewardship Agreements (May 12, 1992) reached with the FHWA pursuant to the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).

Caltrans' acceptance of the maximum degree of authority made available to state transportation agencies is conditioned upon providing assurance to the FHWA that Caltrans-approved (exempt or certification acceptance) projects will be developed to meet federally required procedures and standards.

The guidance and criteria presented in this Design Information Bulletin have generally been in use since they were issued by the FHWA on March 17, 1989; however, they have never been fully incorporated into Caltrans' Project Development process.

DISTRIBUTION

It is recommended that copies of Design Information Bulletin Number 77 be distributed to all holders of the Highway Design Manual and Project Development Procedures Manual.

APPLICATION

Design Information Bulletin Number 77 shall be used in the development of Project Study Reports for the following transportation improvement proposals:

- new interchanges
- modification of existing interchanges involving access control revisions for new ramps or the relocation of existing ramps.
- projects to increase mainline capacity

Projects which involve access control revisions related only to ramp or local street widening (typically, ramp metering and signalization projects) are normally not subject to the requirements of this Design Information Bulletin.

IMPLEMENTATION

Effective February 13, 1995, all applicable projects shall conform to the guidance presented in Design Information Bulletin Number 77. The interchange spacing requirements shall apply to all projects which have not yet received environmental approval prior to the effective date.

The procedural and technical requirements presented in this Design Information Bulletin will be incorporated into future updates of the Highway Design Manual and the Project Development Procedures Manual as appropriate.



W. P. SMITH, Chief
Office of Project Planning
and Design



DESIGN INFORMATION BULLETIN NUMBER 77

California Department of Transportation
State and Local Project Development Program
Office of Project Planning and Design

INTERCHANGE SPACING

APPROVED BY:

A handwritten signature in black ink, appearing to read "DHB", written over a horizontal line.

**D. H. BENJAMIN, Manager
State and Local Project
Development Program**

January 31, 1995

I. GENERAL INFORMATION

A. Background

Caltrans is responsible for operating and maintaining all State highways to serve the State's heavily traveled rural and urban corridors, and to serve interregional traffic by connecting centers of commerce, industry, agriculture, mineral wealth and recreation.

California's freeways have been constructed with a large investment in the right to control access in order to ensure safety and operational integrity. In order to protect this investment, it is essential that all proposals for new or revised interchanges be carefully and completely evaluated for compliance with the design, safety, and operational standards established by the Department, and the Federal Highway Administration (FHWA).

Interchange location, or "spacing" relative to adjacent interchanges, is a design feature which is critical to the safe and efficient utilization of all freeways. Inadequate interchange spacing frequently creates a "bottleneck" which, in peak demand periods, often compromises safety and results in the under-utilization of freeway mainline capacity.

Conceptual approval of a new or revised freeway interchange proposal is a determination of the proposal's adequacy in meeting the design, safety, and operational standards of the Department and the FHWA. The Project Study Report (PSR) is used to justify and document this determination for both the FHWA and the Department.

B. Purpose

This Design Information Bulletin (DIB) has been developed to provide supplemental guidance toward the development and conceptual (PSR) approval of all projects which propose to revise or add freeway interchanges, and also certain projects which are designed to increase the mainline capacity of existing freeways.

The purpose then is to outline the procedures and project specific criteria used to determine whether a proposal meets the freeway design, safety, and operational standards established by the Department, and the FHWA.

C. Application

This DIB shall be used in the development of Project Study Reports for the following transportation improvement proposals:

- new interchanges
- modification of existing interchanges involving access control revisions for new ramps or the relocation of existing ramps
- projects to increase mainline capacity

Projects which involve freeway access control revisions related only to ramp or local street widening (typically, ramp metering and signalization projects) are normally not subject to the requirements of this DIB.

The interchange spacing requirements of this DIB apply to projects which have not yet received environmental approval prior to February 13, 1995.

Questions on the application of this DIB shall be decided by the Project Development Coordinator of the Office of Project Planning and Design.

D. Project Development Process

This DIB supplements the current procedures and "Guidelines" for the preparation of Project Study Reports (see the Project Development Procedures Manual).

Other requirements that may apply include:

- FHWA Conceptual Approval -- If the project involves an Interstate highway, Conceptual Approval from the FHWA is required; see section III.B, "CONCEPTUAL APPROVAL - Interstate Freeways" below and FHWA Procedure Memorandum D6104.
- California Transportation Commission (CTC) approval of new public road connections is a separate requirement of the project development process; see the Project Development Procedures Manual (PDPM) for additional information.

II. TECHNICAL AND PROCEDURAL INFORMATION

A. Interchange Spacing Requirements

The spacing of interchanges has a pronounced effect on the operation of freeways. In order to avoid or minimize the adverse impact of interchange related operational deficiencies (i.e., merging, weaving, etc.) on freeway capacity, minimum spacing criteria have been recommended by AASHTO and adopted by the FHWA. Caltrans has long recognized the criteria, and now

emphasizes their importance in the following mandatory interchange spacing standard:

The minimum spacing between interchanges shall be 1.5 km in urban areas, and 3.0 km in rural areas. The minimum spacing shall be 3.0 km between "freeway-to-freeway" and "local" interchanges.

Compliance with the above interchange spacing requirements will be attained when the following physical criteria are satisfied:

| PHYSICAL FEATURE | REQUIRED SPACING | |
|--|------------------|---------------|
| | <u>1.5 km</u> | <u>3.0 km</u> |
| Minimum Weaving Length as defined in HDM Topic 504 | 600 m | 1500 m |
| Minimum distance between centerlines of adjacent intersecting roadways | 1.5 km | 3.0 km |

B. Exceptions to Interchange Spacing Requirements

Requests for exceptions to the above requirements must be made in writing in accordance with the current instructions for requesting approval of mandatory design standard exceptions (see July 27, 1994 memo by W. P. Smith), with necessary variations made to accommodate the unique information required to justify interchange spacing exceptions.

Not all sections of the Design Exception Fact Sheet outline are relevant to interchange spacing cases and, therefore, these may be omitted (if no other nonstandard feature is discussed). However, the information items listed in section "III.B" shall be addressed and incorporated into the Fact Sheet, preferably as an attachment. It is also preferred to cover all other nonstandard features in the same Fact Sheet.

Questions on the content and format of the written request for exception (i.e. Fact Sheet) shall be discussed with the Project Development Coordinator.

NOTE: If FHWA Conceptual Approval is required, use the Fact Sheet as part of the written request for approval.

C. Initial Screening of Proposals

Before investing significant effort toward Project Study Report (PSR) preparation, it is important to understand that the following conditions must be satisfied (where applicable) before a proposal for freeway interchange revision or addition will be considered for approval:

Interchange Justification (for new interchange proposals)

It is demonstrated that the existing interchanges and/or local roads and streets in the corridor can neither provide the necessary traffic service nor be improved to satisfactorily accommodate the design-year traffic demands.

Consideration of Alternatives

All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit, and High Occupancy Vehicle (HOV) facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

Interchange Spacing

The proposal must comply with the spacing requirements of the Highway Design Manual and this DIB. If not, design exception approval (see section II.B) for the proposed deviation must be requested and obtained before the project will be considered for conceptual (PSR) approval.

No Significant Adverse Impact

The proposed interchange does not have a significant adverse impact on the safety and operation of the highway facility based on an analysis of current and future traffic.

Connection to Public Road

The proposed interchange connects to a public road only and will provide all traffic movements.

Meets Local Planning

The proposal considers and is consistent with local and regional land use and transportation plans.

Coordination With Development

The request for a new or revised interchange generated by new or expanded development requires appropriate coordination between the development and related or otherwise required transportation system improvements.

III. CONCEPTUAL APPROVAL

Caltrans grants conceptual approval of applicable projects with the approval of the PSR.

PSR content requirements and additional requirements are described below:

A. PSR Content

The following items must be addressed under the appropriate sections of the PSR:

- Purpose of the project
- Description of existing and proposed interchanges, including:
 - Configuration (including adjacent interchanges)
 - Distances to and projected impacts on adjacent interchanges
 - Freeway mainline and crossroad traffic volumes (ADT and DHV) including turning movements for current year, implementation year, and design year (20 years from implementation year).
 - Number of mainline and crossroad lanes; include auxiliary lanes or collector distributor (C-D) roads
- Description of alternatives that have been considered; analysis to support the conclusion that the existing interchanges and/or local roads cannot handle the expected traffic, provide access, or be improved to do so, including cost effectiveness analysis.
- Accident data analysis
- Traffic and operational analysis for existing and proposed conditions; including an analysis of adjacent segments of the freeway as well as nearby existing and proposed interchanges. The results of operational analyses (with and without ramp meters) must demonstrate the adequacy of:

- freeway mainline capacity
 - freeway weaving *
 - ramp merging
 - freeway diverge *
 - ramp intersection capacity (and possibly other intersections)
 - crossroads and other local streets ability to effectively collect and distribute traffic from the new or revised interchange
- * Mainline through capacity is optimized when these freeway traffic movements operate at least one "level of service (LOS)" better than mainline LOS.

NOTE: Written approval for exceptions to interchange spacing requirements (see section II.B) must be obtained prior to completion and approval of the PSR.

B. Interstate Freeways

FHWA conceptual approval for new and revised interchange proposals shall be requested prior to Caltrans approval of the PSR.

FHWA conceptual approval shall be requested by letter addressed to the Division Administrator and shall be accompanied by 3 copies of the final draft PSR including any approved design exception Fact Sheets.

In order to facilitate the concept approval process, early and frequent consultation with FHWA representatives is encouraged prior to submitting the formal request for conceptual approval. Sections of the final draft PSR which are not relevant to the conceptual approval request may be omitted with the concurrence of the Project Development Coordinator.

See FHWA Procedure Memorandum D6104, dated March 17, 1989, for detailed information.

NOTE: Written approval for exceptions to interchange spacing requirements (see section II.B) must precede the request for FHWA conceptual approval.

C. Non-Interstate Freeways

Conceptual approval is granted with the approval of the PSR.

Project proposals affecting existing freeways must comply with the content requirements described above in section III.A; however, PSR's for new

freeways need not address many of the items which pertain to existing conditions. Therefore, for the latter case, the items required to be addressed in the PSR shall be determined in consultation with the Project Development Coordinator.

NOTE: Written approval for exceptions to interchange spacing requirements (see section II.B) must be obtained prior to completion and approval of the PSR.