

505 INTERCHANGE DESIGN PROCEDURES

General - Since interchanges are so costly, and a vital element of freeway capacity it is important that a well functioning, economic design be conceived. In general, alternative interchange schemes should be analyzed and several preferred alternatives should be selected based on geometry, capacity, signing, aesthetics, environmental compatibility, overall adaptability, route continuity, route uniformity, maintaining traffic during construction, suitability to stage construction, right-of-way requirements and the effect on the local road and roadway network.

From these preferred alternatives, preliminary plans, profiles and cost estimates should be prepared. Include costs for right-of way, construction, maintenance, and other appropriate items. Once this data has been prepared, the best interchange design concept can be selected.

506 INTERCHANGE DESIGN STANDARDS

An interchange consists of the through freeway, the ramps and the cross road. This section deals primarily with the interchange as a whole. Specific designs for ramps are discussed in the sections that follow.

Sight Distance - Stopping sight distance shall be the minimum sight distance provided on the respective roadways through an interchange and preferably longer. Decision sight distance shall be provided at exits. Sight distance requirements are discussed in Part 2, Section 300, Geometric Cross Section.

For minimum radius curves, the normal lateral clearance may not provide minimum stopping sight distance because piers, abutments and bridge rail limit horizontal sight distance. If a flatter curve cannot be used, the clearances should be increased to obtain the proper sight distance even though it is necessary to increase structure spans or widths.

Design Speed Considerations - In the design of interchanges it is important to provide vertical and horizontal alignment standards which are

consistent with the design speed for the roadways and driving conditions expected.

Spacing - Minimum interchange spacing is determined by weaving volumes, ability to sign, signal progression, and required lengths of speed change lanes. Interchange spacing has a pronounced effect on freeway operation. In general, minimum spacing shall be:

<i>Rural</i>	<i>Urban</i>
3.0 km	1.5 km

Uniformity - To the extent practicable all interchanges along a freeway should be uniform in geometric layout and general appearance. All entrance and exit ramps shall be on the right.

Signing and Marking - Signs, pavement striping, delineators and other markings should conform to the *Manual on Uniform Traffic Control Devices* (MUTCD).

Basic Number of Lanes - Design traffic volumes and a capacity analysis should be used to determine the basic number of roadway lanes and the minimum number of ramp lanes. The basic number of lanes should be established for a substantial length of freeway and should not be changed through pairs of interchanges.

Auxiliary Lanes - An auxiliary lane is defined as the portion of the roadway adjoining the travelled way for emergency stopping, speed change, turning, turning storage, weaving, truck climbing, and other purposes supplementary to through-traffic movement.

An auxiliary lane may be needed when:

- interchanges are closely spaced.
- the distance between the end of the taper on the entrance terminal and the beginning of the taper on the exit terminal is short.
- local frontage roads do not exist.
- necessary for lane balance.
- necessary for capacity requirements.
- necessary for weaving.

An auxiliary lane may be introduced as a single exclusive lane or in conjunction with a two-lane entrance. Auxiliary lanes may be dropped in a single or two-lane exit or carried to the physical gore nose before tapering into the through