

## **SECTION 500 INTERCHANGES**

### **501 GENERAL**

The ability to accommodate high traffic volumes safely and efficiently through intersections depends on how intersecting traffic is handled. The greatest efficiency, safety, and capacity are attained when intersecting through traffic lanes are physically separated. An interchange does this with a combination of ramps and grade separations at the junction of two or more roadways. This reduces or eliminates traffic conflicts, improves safety, and increases traffic capacity. Crossing conflicts are eliminated by grade separations and turning conflicts are eliminated or minimized depending on the interchange configuration.

The selection and design of grade separations and interchanges is influenced by roadway classification, traffic volume, traffic composition, design speed, access control, signing requirements, economics, terrain, right-of-way, capacity and safety. Interchange types vary widely so each site should be studied and alternate concepts made to determine the appropriate layout.

### **502 INTERCHANGE WARRANTS**

Interchanges are very costly and should be used only where necessary. Interchanges should be considered based on the following warrants:

- Where intersecting traffic volumes are heavy.
- Where topography does not lend itself to the construction of an intersection.
- When making a connection to a freeway.
- For a roadway with access control between selected terminals.
- To eliminate a traffic bottleneck.
- To eliminate a hazardous at-grade intersection.
- When road-user benefits are substantial.

### **503 DESIGN CONSIDERATIONS**

Due to the complex nature of interchange design it is important to establish a set of consistent design parameters. Listed below are features which should be considered during the interchange design process.

- Provide consistent design features.
- Ramp exits shall be from the right.
- Ramp entrances shall be on the right.
- One exit per direction from main roadway.
- Ramp design speed beyond exit should preferably be one-half to two-thirds that of the roadway.
- Provide ramps for return or complementary traffic movements at same interchange.
- Use grades and slopes as flat as possible.
- Consider signing during geometric design.

### **504 INTERCHANGE TYPES**

This section includes examples of commonly used interchange configurations. See Chapter X of "A Policy on Geometric Design of Highways and Streets," AASHTO, 1994, for additional examples.

#### **504.01 THREE-LEG INTERCHANGE**

Three-leg interchanges have three intersecting legs. They usually consist of one or more roadway grade separations and one-way roadways for all traffic movements. Because future expansion is difficult, three-leg interchanges should only be used when one of the three legs is permanently terminated. Heavy traffic volume should be favored with more direct alignments, and lesser volumes can be looped. Skewed crossings are desirable because travel distance is less, the turning radius is flatter for the heavier left-turning volume and there is less angle of turn for both left turns.

Figure 500.01 illustrates several types of three leg interchanges.