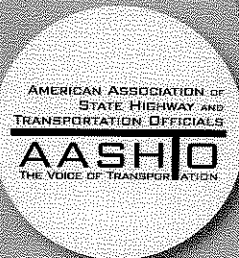


A Policy on  
**Geometric  
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**2011**  
6th Edition



elements of design including alignment and profile, sight distance, medians and median openings, provision for right- and left-turn lanes, islands, and other physical elements.

## 9.2 GENERAL DESIGN CONSIDERATIONS AND OBJECTIVES

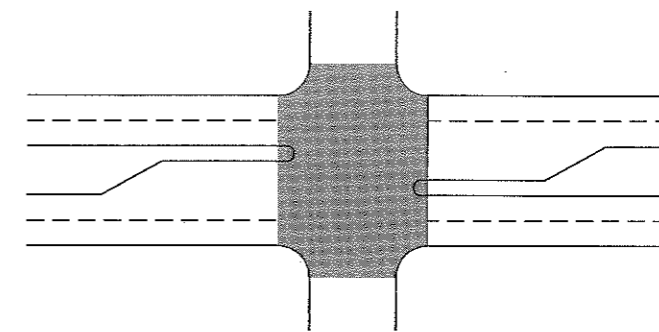
### 9.2.1 Characteristics of Intersections

An intersection includes the areas needed for all modes of travel: pedestrian, bicycle, passenger vehicle, truck, and transit. Thus, the intersection design addresses not only the roadway pavement, but the adjacent sidewalks and pedestrian ramps. The intersection encompasses all auxiliary lanes, medians, and islands not included in the typical roadway cross-section of the intersecting roadways. Intersections are a key feature of roadway design in four respects:

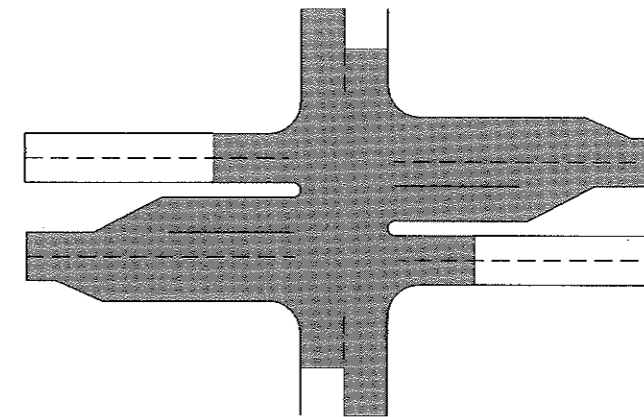
- **Focus of activity**—The land near intersections often contains a concentration of travel destinations.
- **Conflicting movements**—Pedestrian crossings and bicycle and motor vehicle turning and crossing movements occur at intersections.
- **Traffic control**—Movement of users is assigned through traffic control devices such as yield signs, stop signs, and traffic signals. Traffic control often results in delay to users traveling along the intersecting roadways.
- **Capacity**—In many cases, traffic control at intersections limits the capacity of the intersecting roadways, defined as the number of users that can be accommodated within a given time period.

### 9.2.2 Intersection Functional Area

An intersection is defined by both its functional and physical areas (9), as illustrated in Figure 9-1. The functional area of an intersection extends both upstream and downstream from the physical intersection area and includes any auxiliary lanes and their associated channelization.



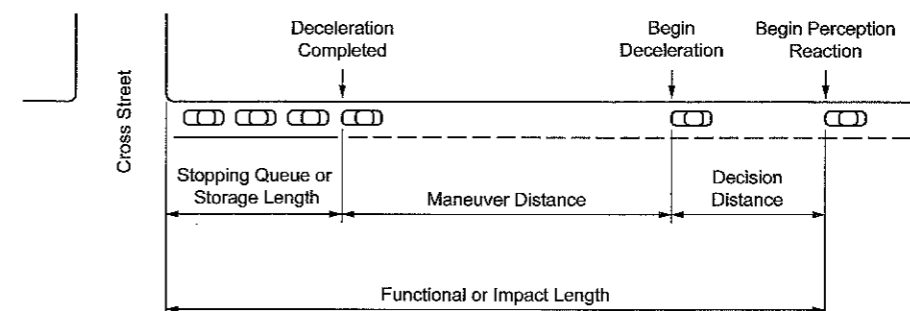
Defined by Physical Area



Defined by Functional Intersection Area

**Figure 9-1. Physical and Functional Intersection Area**

The functional area on the approach to an intersection or driveway consists of three basic elements: (1) perception-reaction decision distance, (2) maneuver distance, and (3) queue-storage distance. These elements are shown in Figure 9-2. The distance traveled during the perception-reaction time will depend upon vehicle speed, driver alertness, and driver familiarity with the location. Where there is a left- or right-turn lane, the maneuver distance includes the length needed for both braking and lane changing. In the absence of turn lanes, it involves braking to a comfortable stop. The storage length should be sufficient to accommodate the longest queue expected most of the time.



**Figure 9-2. Elements of the Functional Area of an Intersection**

Ideally, driveways should not be located within the functional area of an intersection, as described above and shown in Figure 9-1, or in the influence area of an adjacent driveway.

### 9.2.3 Design Objectives

The main objective of intersection design is to facilitate the convenience, ease, and comfort of people traversing the intersection while enhancing the efficient movement of passenger cars, buses, trucks, bicycles, and pedestrians. Intersection design should be fitted closely to the natural transitional paths and operating characteristics of its users.

Four basic elements should be considered in intersection design:

1. Human Factors
  - Driving habits
  - Ability of drivers to make decisions
  - Driver expectancy
  - Decision and reaction time
  - Conformance to natural paths of movement
  - Pedestrian use and habits
  - Bicycle traffic use and habits
2. Traffic Considerations
  - Classification of each intersecting roadway
  - Design and actual capacities
  - Design-hour turning movements
  - Size and operating characteristics of vehicle
  - Variety of movements (diverging, merging, weaving, and crossing)
  - Vehicle speeds
  - Transit involvement
  - Crash experience
  - Bicycle movements
  - Pedestrian movements
3. Physical Elements
  - Character and use of abutting property