



# Access Management

## Access Management: A Key to Safety and Mobility

Access management refers to the design, implementation, and management of entry and exit points (e.g., driveways) between roadways and adjacent properties. The use of access management techniques is designed to increase roadway capacity, manage congestion, and reduce crashes while serving land uses appropriately.<sup>1</sup>

Through the years, extensive investment for public roadway infrastructure has been made. This has largely involved public funds, but private monies also have contributed to rebuilding and enhancing the street system. During the past 30 years or more, the ability to increase roadway capacity has been increasingly difficult due to both economic and environmental constraints. Areas that do not practice effective access management face the potential for more rapid deterioration of the quality of traffic flow than those areas with a well thought out access management policy in place.

The thoughtful application of access management can have a variety of positive consequences, including the following:

- An increase in overall safety, reflected by the reduction in crashes.
- Fewer number of conflicts and potential hazards between vehicular, bicycle, and pedestrian movements.
- Less diversion of through traffic into abutting neighborhoods in an attempt to bypass added congestion.
- Smoother, more reliable, and potentially higher travel speeds for arterial traffic.
- Opportunities for more pleasing visual settings and improved image for businesses along the corridor.

The general principles of access management can be applied to a variety of urban, suburban, and rural environments. Key principles include roadway hierarchy, the functional area of an intersection, conflict points, access point and signal density, and driveway design.

## Roadway Hierarchy

A roadway hierarchy is based on the premise that different roads serve different functions within the transportation network. Freeways are at one end of the spectrum and are designed and constructed to accommodate large volumes of high-speed traffic with very little interference from traffic entering or leaving the roadway. At the other end of the spectrum, local/residential streets typically have very low traffic volumes and slow speeds while providing access to adjacent properties via separate driveways and/or on-street parking.

1. Transportation Research Board. *Access Management Manual*. National Academy of Sciences, Washington, DC, 2003.



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Within this hierarchy, public road intersections generally are of greater importance than individual driveways. Ideally, private driveways should connect to the lowest classification of roadway possible and with access limited to a local/residential street. Properties located at intersections with frontage to two roadways should access the one with lower travel speeds and traffic volumes. However, there are many cases where less than ideal conditions occur, and driveways connect to collectors and arterials.

### Functional Area of an Intersection

Intersections require motorists to make several simultaneous decisions to determine a safe and prudent way to proceed. An intersection can be defined by both physical and functional areas, as illustrated in Figure 1. The physical area of an intersection is limited in size and typically represents the space confined within the corners of the intersection.

The functional area of an intersection is that area beyond the physical intersection that comprises decision and maneuvering distance, plus any required vehicle storage length. The upstream area consists of distance for travel during a perception-reaction time, travel for maneuvering and deceleration, and queue storage. The downstream area includes the length of road downstream from the intersection needed to reduce conflicts between through traffic and vehicles entering and exiting a property.

Driveways located within the functional area may create too many conflict points within too small an area for motorists to safely negotiate. Limiting driveways within the functional area of an intersection helps reduce the number of decisions motorists face. The integrity of functional areas of intersections can be protected through corner clearance, driveway spacing, and intersection spacing requirements. Ideally, intersections should be spaced far enough apart so that functional areas do not overlap.

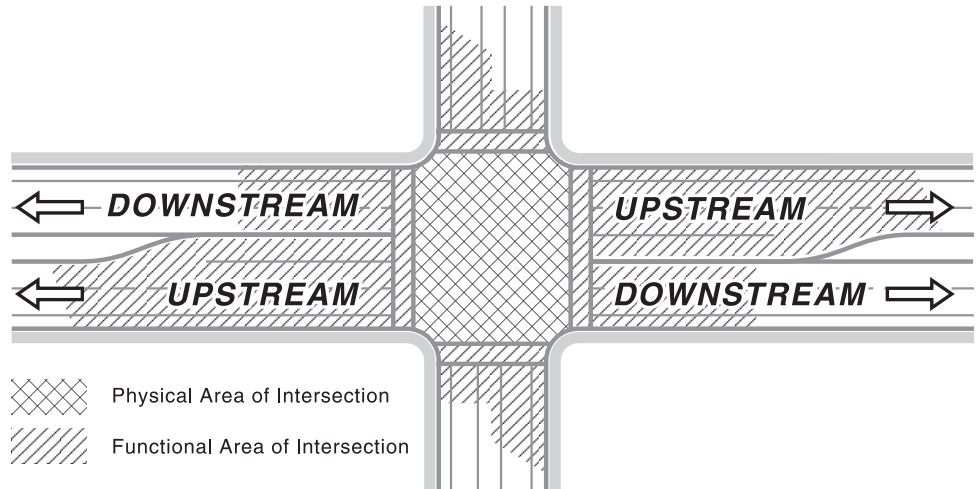


Figure 1: Physical and Functional Areas of an Intersection

### Driveway Location and Conflict Points

One of the key elements of access management is managing the potential conflict points that occur when streets and driveways intersect. These conflict points, particularly those involving left turns, manifest themselves as an increased risk for crashes.

Approximately 72% of the crashes at a driveway within the physical area of an intersection involve a left-turning vehicle.<sup>2</sup> Of these left-turn crashes, approximately 39% (28% of all crashes) are attributed to the ingress movement, 47% (34% of all crashes) are attributed to the egress movement conflicting with the near-side through movement, and 14% (10% of all crashes) are attributed to the egress movement merging with the far-side through movement.<sup>3</sup> This indicates that reducing or eliminating left turns

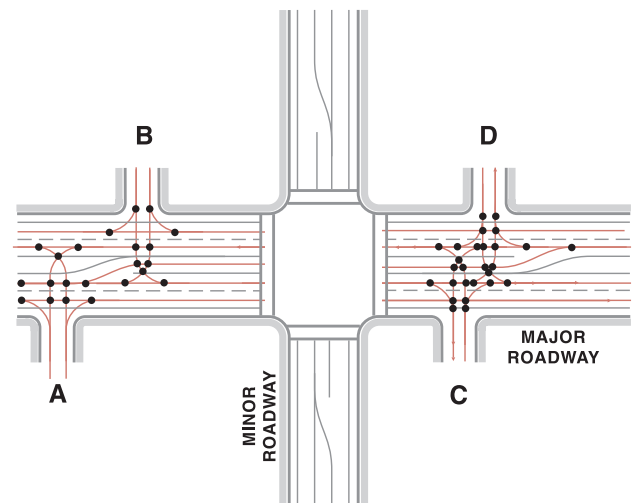


Figure 2: Potential Access Points to Serve Corner Properties at the Intersection of Two Public Roads

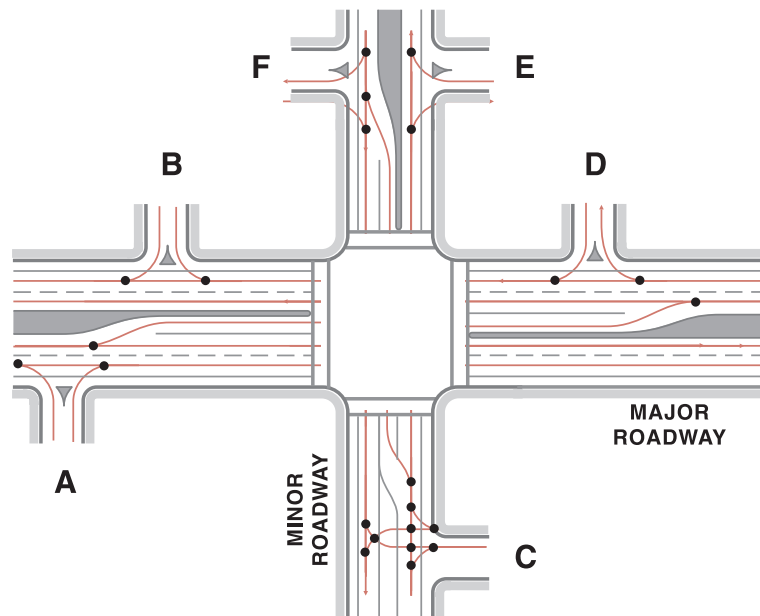
to or from driveways where possible enhances safety.

Figure 2 identifies common locations of existing driveways serving the four corner properties at the intersection of major and minor roadways. Because the major roadway typically has higher traffic volumes than the minor road, property owners often prefer to have access to the major road. As shown in Figure 2, direct, full-movement access to a major roadway can result in a high number of conflict points, especially if the driveway is close to another driveway on the opposite side of the road. In many cases, a driveway may also be located within the functional area of an intersection along a major road, and the driveways on one side of the street frequently are located without regard to driveways on the opposite side (e.g., A versus B, or C versus D).

2. Najm, W. G., J. D. Smith, and D. L. Smith. *Analysis of Crossing Path Crashes*. Report No. DOT-VNTSC-NHTSA-01-03. National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, DC, July 2001.

3. Ibid.

Figure 3 illustrates how the application of various access management techniques could reduce the number of conflict points in this situation. The addition of a raised median limits the access to Driveways A, B, and D to right-in/right-out movements only. The relocation of Driveway C as a full-movement access point on the minor roadway reduces the conflicts on the major roadway. Even with the additional access points at E and F, the total number of conflicts is significantly reduced.



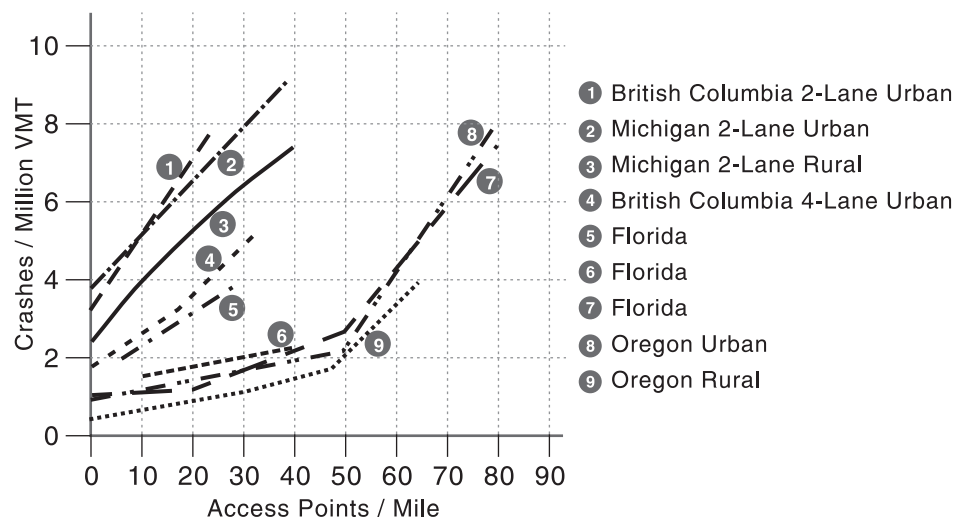
**Figure 3: Potential Access Arrangement to Reduce the Number of Conflict Points for Properties Located at the Intersection of Two Public Roads**

## Access Point Density

During the last 40 years, access point density (i.e., number of driveways per mile) has been studied on roadways that vary in geometry, operating speeds, and volumes. The results have consistently shown that “an increase in the number of access points translates into higher accident rates.”<sup>4</sup> Figure 4 shows this trend as identified under a variety of roadway conditions and environments across the United States and Canada. Research has shown that crash rates on roadways increase as the density of access points connecting to the roadway increase. Research in Iowa<sup>5</sup> and Utah<sup>6</sup> confirms these findings.

## Driveway Design

Driveway and site circulation must be adequately designed to ensure motorists are able to completely exit



**Figure 4: Effect of Access Point Density on Crash Rate**

4. Transportation Research Board. *Access Management Manual*. National Academy of Sciences, Washington, DC, 2003.
5. Iowa Department of Transportation and the Iowa Highway Research Board. *Access Management Awareness Program, Phase II Report*, the Iowa DOT Project TR-402 CTRE Management Project 97-1. Center for Transportation Research and Education (CTRE), Ames, IA, December 1997.
6. Schultz, G. G., C. G. Allen, and D. L. Eggett. *Crashes in the Vicinity of Major Crossroads*. Report No. UT-08.25. Research and Development Division, Utah Department of Transportation, December 2008.

the roadway without being impeded by other vehicles in the inbound lane. Key elements include the following:

- The driveway should have a clear design to positively guide both inbound and outbound vehicles. This minimizes oblique entry and exit angles and conflicts between inbound and outbound maneuvers.
- The driveway should have an adequate throat length to minimize the likelihood that on-site maneuvers will impede the driveway’s interface with the street.
- The driveway should only be as wide as needed to accommodate lane requirements and design vehicle as needed. Driveways that

are wider than necessary create additional conflicts for bicycles and pedestrians.

## Additional Issues

Below is a partial list of additional issues to consider when evaluating the safety impacts of permitting driveways near intersections. Further discussion of these principles can be found in the TRB *Access Management Manual* and the AASHTO *Policy on Geometric Design of Highways and Streets*.

- Existing and future traffic volumes.
- Existing and future lane configurations and traffic control.

- Type of median and driveway treatment to restrict turning movements.
- Operational performance of nearby intersections that may impact the driveway.
- Nearby upstream and/or downstream destinations or other closely spaced driveways that may result in a high number of lane changes in the vicinity of the intersection.
- Potential for driveways on opposite sides of the road where there is no median.
- Location of bus pull-outs and stops.
- Ability to mitigate intersection sight distance concerns.
- Property lot lines and ownership of parcels adjacent to the driveway (i.e., whether there exists any other access to the roadway by frontage, easement, or agreements)
- Legal requirements that guarantee property owners' right to a driveway to the major roadway even when they have alternate reasonable access to some other portion of the roadway system.

## Access Management Tools and Techniques

There are a number of other tools and techniques available to consider for use as part of an access management plan. They include both physical design techniques as well as policy related addressing land development and roadway design standards. Some examples of common and highly effective techniques:

- Consolidate and minimize left turn exits from driveways.
- Use a two-way center left-turn lane (in some applications).
- Use a raised center median.
- Encourage shared driveways for adjacent land parcels/developments.
- Provide interparcel circulation (ability to travel from one property to the next without entering the roadway).
- Create service roads for direct land access parallel to major arterial.
- Provide adequately designed turn and U-turn lanes.
- Provide roundabouts to facilitate median treatments and U-turns at key locations.

## Resources

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