## Case Studies – Case 2

### Case 2

#### Background

The second case study is centered on the intersection of two U.S. highways at the edge of one of Iowa's smaller metropolitan areas. The location is also within one of the community's major commercial areas. The two highways at the center of this case study meet at a partial cloverleaf interchange with major intersections approximately ¼ mile to both the north and south, as shown in Figure 2.

#### Roadway and Land Use Characteristics

At this interchange, the north ramp terminal is signalized, as are the intersections just to the north and to the south. Traffic volumes on the east-west U.S. highway range from approximately 20,700 vehicles per day (VPD) west of the interchange to nearly 26,000 VPD to the east. Volumes on the north-south U.S. highway vary from approximately 20,600 VPD south of the interchange to approximately 25,600 VPD between the interchange and the next intersection, which is with a local minor arterial, to the north. Volumes on this highway north of the east-west minor arterial are approximately 23,000 VPD. Volumes on the local minor arterial vary from approximately 7,800 VPD west of the intersection to less than 1,000 VPD to the east. The east-west highway is a grade-separated freeway design throughout the study area. The north-south highway is an at-grade four-lane divided facility in the vicinity of the interchange, but changes to a two-lane facility approximately ½ mile to the south and to a five-lane (four-lane plus a center two-way left-turn lane) facility about ¼ mile north of the interchange. The east-west highway has a posted speed limit of 65 mph. The north-south highway is posted at 40 mph around the interchange but changes to 35 mph about ½ mile north of the interchange. As shown in Figure 2, a variety of land uses has developed and continue to develop around this interchange. These uses include several auto dealerships, a hotel, several sit-down and fast-food restaurants, big box retailers, gas station/convenience stores, a movie theater, various strip-development retailers, banks, and office space.

#### Access Characteristics

Access is well-managed throughout much of this area. The east-west highway is a freeway design and, by definition, is completely access-controlled. The four-lane divided southern leg is well-managed, with access limited to intersections and a few right-in, right-out only accesses more than ¼ mile from the interchange. The southern leg does taper to a two-lane roadway as it transitions to primarily residential development and has more access points over ½ mile from the interchange. The northern leg of this case study intersection is an example of both good and poor access management. The west side of the high-volume north leg is well-managed. All development north of the interchange and south of the minor arterial accesses onto the east-west minor arterial, which is a good practice.
Figure 2. Case Study 2
Access to development in the northwest quadrant of the study area north of the minor arterial—which includes several restaurants, small offices, big box retail, and a movie theater—is very well-managed. Access to this development is provided onto the minor arterial approximately 400 feet west of the intersection with the north-south major arterial and at a signalized access more than 1,100 feet north of this same intersection and nearly 2,400 feet north of the interchange. Backage roads and cross access between parcels provides internal circulation for the variety of land uses in this area. In contrast, access along the east side of this portion of the major arterial is poorly managed, with a total of nine accesses along the same traveled way served by the single access on the west side. These access points are located at distances approximately 200, 350, 500, 675, 800, 900, 1,100 (the signalized access/intersection), 1,400, and 1,600 feet north of the intersection with the east-west minor arterial. In addition, very little internal circulation or cross access is provided for development on this east side.

Observations

Access is relatively well-managed throughout most of the second case study location, with the east side of the north leg as a notable exception. This area continues to grow as a local and regional commercial activity center. As a result, traffic volumes on the roadways discussed in this case study will most likely continue to rise significantly in coming years. Other planned development and transportation improvements in the adjacent areas also indicate that this trend will continue. Therefore, as the character of the local area changes, additional management of access may likely be necessary, especially along the north leg where the access density is high. Based on development trends and traffic-volume growth, a raised median may be necessary along this leg in the near future. Future development in this and adjacent areas may also increase traffic on the east-west minor arterial, calling for additional applications of access management along this roadway.

In summary, positive applications of access management in and around this case study location include the following:

- Use of grade separation at the intersection of two major highways;
- Use of raised medians near the interchange and to the south to delineate lanes and eliminate left turns;
- Use of two-way left-turn lanes to remove left turns from the traffic stream on the north leg, although this stretch may be reaching its functional limits;
- Restriction of all driveway accesses along the west side of the high-volume north leg;
- Use of protected left turns and turn lanes at signalized intersections on the high-volume north and south legs;
- Elimination of direct access from the majority of the south leg;
- Consolidation of access for land uses on the west side of the north leg into a minimal number of access points; and
Use of backage roads and cross access between land uses to improve internal traffic circulation for the development in the northwest portion of the study area and ultimately remove traffic from the high-volume north leg.

Although well-managed in some areas, there are needed areas of improvement at this site. Negatives for this case study, as well as possible remedies, include the following:

− Very high driveway density on the east side of the north leg, north of the east-west minor arterial—drive-ways on the east side of the road could be consolidated and/or cross access used to connect properties and businesses in this area;

− The first access drive/frontage east of the intersection of the minor arterial and major arterial is very close to the intersection—alternative access could be provided farther east or left turns could be restricted at this point;

− Access density along the minor arterial is relatively high and could become problematic if traffic increases—driveways could be consolidated and/or cross access used to connect properties and businesses in this area; and

− The north leg is nearing its capacity and its traffic volumes are increasing. Although two-way left-turn lanes are an effective access management technique, they become less safe as volumes increase to around 20,000 VPD.

In summary, this case study demonstrates both good and poor access management practice. An analysis of crash data shows few access-related crashes throughout most of the study area, but the north leg does show significantly more access-related crashes. This problem on the north leg further indicates a problem with a combination of high access density and a treatment reaching its functional limits. Therefore, improvements can and will likely need to be made as traffic volumes increase with any future development.