ACCESS MANAGEMENT MANUAL

FIRST EDITION

iowadot.gov/traffic/Access-Management/Access-Management-Resources

MM1359 05/15/2024

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1. INTRODUCTION

1.1 Overview of the Iowa Access Management Manual

1.1.1 Authority

The Iowa Access Management Manual (Manual) provides specific guidance to the Iowa Department of Transportation (IDOT) for the implementation of access management on the state primary highway system, as provided in Iowa Administrative Code [761] Chapter 112, Primary Highway Access Control. Authority to manage access in the State of Iowa is granted to Iowa DOT under Iowa Code (IC) 306A.4 "Controlled Access Highways", which establishes that, "the Department is authorized to so design any controlled-access road and regulate, restrict, or prohibit access as to best serve the traffic for which such facility is intended,"; IC 318.8 which requires permits; IC 307.24, directing responsibility to maintain state primary highways, and 307A.2 Commission duties.

1.1.2 Purpose

The criteria established by this access management program are purposely established to address both public safety and the preservation of transportation efficiency.

Safety: Every access connection reduces not only travel efficiency, but also roadway safety to some degree. Access-related crashes are about 41 percent of all reported traffic crashes in Iowa (ISU, 2017). This results in personal injury and a loss of lives; while costing Iowa about one billion dollars annually in property damage, medical expenditures, lost wages and other direct costs (ISU, 2017).

Commerce: The state primary highway system is essential to the movement of people and goods in Iowa, which is critical to the economy. Managing access supports efficient and reliable highway operations, thereby supporting commerce and avoiding unexpected costs and disruption of the supply chain due to deterioration of traffic conditions. Transportation costs are a key component that businesses, especially industry, consider when looking for locations to establish new production facilities. Transportation costs add to the price of commodities at the point-of-sale thereby affecting the ability to compete domestically and globally.

1.1.3 Primary Highway Priority and Access Classification

The classification of Iowa primary highways according to their functional purpose is the foundation for the application of the access management criteria in this Manual and is further described in Chapter 2. The system of priority classifications for access management is in direct response to IC 306A.4 and guides Department decisions on the type and design of access to be provided to land abutting Iowa primary highways ensures that access is located and designed to preserve public safety and support the function and purpose of the highway, while ensuring that Iowa landowners will have reasonable access to their property from the system of public streets and highways.

1.1.4 Relationship to Iowa DOT Design Manual

The Iowa DOT Design Manual governs roadway and road design considerations and includes requirements for the location and design of access connections.

Engineering standards for the location and design of driveways, medians, median openings, auxiliary lanes and other appurtenances related to access connections can be found in the Design Manual. These design criteria and standards apply to roadway reconstruction projects, as well as access permitting decisions.

1.1.5 Administration of Access Requests

Iowa DOT administers requests for access to the primary highway system in each of six districts. Requests should be submitted online, via an electronic application portal. District engineering operations technicians (EOTs) assist applicants and process the permit requests. If the applicant cannot submit online, the EOT will provide assistance at the appropriate District Office.

Chapter 4 of the Manual explains how Iowa DOT administers requests for access to primary highways including the permit process and management of access control lines. The Manual helps to ensure consistent decision making for each access request.

An access permit application must be approved before work on a driveway may begin. The approval process may involve internal review by different Iowa DOT offices and require the submission of a traffic impact assessment. The District office will work with the applicant during the application process. Flexibility to accommodate unique site conditions is a consideration. Based on the access service provided and the operation and function of the highway, the Department will determine terms and conditions to be included in the permit as a condition of approval.

It is the goal of Iowa DOT to administer access requests quickly and efficiently, with the needs of the customer in mind.

1.1.6 Access Management Plans

Access Management Plans (AMPs) may be adopted by the Department in coordination with local governmental entities to provide for defined access control on any primary highway corridor, around freeway interchanges, and within municipalities (Sec.112.5(6). These plans are based on analysis using generally accepted professional practice standards. The resulting AMP provides corridor-specific guidance regarding management of access location and design, supporting roadway network, and traffic control features.

To prepare such plans, the Department works with the affected local governments to notify stakeholders, including abutting property owners and business proprietors. Upon adoption by the Department and the local government, the AMP will govern access permitting and roadway design determinations on the affected corridor. Detailed information of access management planning is provided in Chapter 5.

1.1.7 Local Government Coordination

Prior to approval of an access permit within municipal boundaries, the Iowa DOT will coordinate with local government staff to ensure that: a) the development application is acceptable to the local government, and b) the application undergoing review is consistent with that submitted to and undergoing review and approval by the local agency. Strategies for effective local government coordination in development review and permitting are provided in Chapter 5.

1.2 What is Access Management?

Access management is the coordinated planning, regulation, and design of access between roadways and adjacent land (TRB Access Management Manual, 2014). It includes the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. Access management also involves the appropriate location and spacing of traffic signals, the use of median treatments, and warrants for turn lanes.

The purposes of managing access to the Iowa primary highway system are threefold:

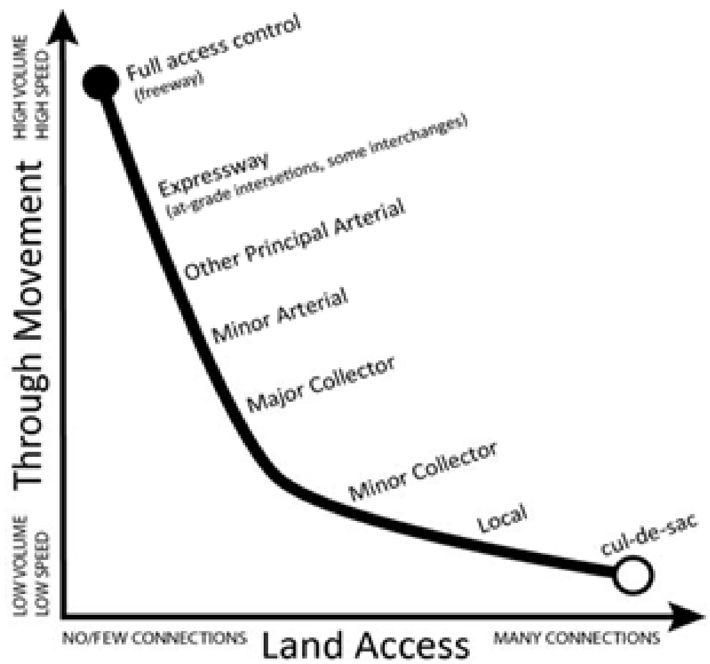
1. To provide vehicular access to land development along highways in a manner that preserves the safe and efficient movement of people and goods;
2. To increase the accessibility of development through effective local road network and site circulation planning; and
3. To ensure the transportation network, in particular the primary highway system, has the capacity to provide for the safe and efficient movement of people and goods.

The planned function of a roadway in terms of through movement and land access guides the determination of access levels. Arterial highways and other primary highways require a high level of access control to move vehicular traffic safely and efficiently over longer distances at desired operating speeds. Conversely, frequent,direct property access is provided on lower-speed local streets and other minor roads whose function is not long-distance travel, where traffic capacity is a minor concern, and where the lower speeds help mitigate the conflicts caused by frequent access connections. Furthermore, the reduced speeds ensure that pedestrians and bicyclists can circulate more safely with motor vehicles. This relationship is illustrated in Figure 1.

Public safety and the efficiency of travel on highways depend to a large extent upon the frequency and character of interruptions to traffic movement. These interruptions are primarily caused by vehicular movements to and from access connections to businesses, homes, and other development along the highway.

Access connections are a source of travel delay and a frequent location of traffic crashes.

Figure 1: Conceptual roadway functional hierarchy.



Source: TRB Access Management Manual, second ed., 2014.

To fully understand access management, it is helpful to understand the difference between access, accessibility, mobility, and through movement.

Access: A way or means of egress or ingress to a site by means of a driveway or street that connects to the network of public streets.

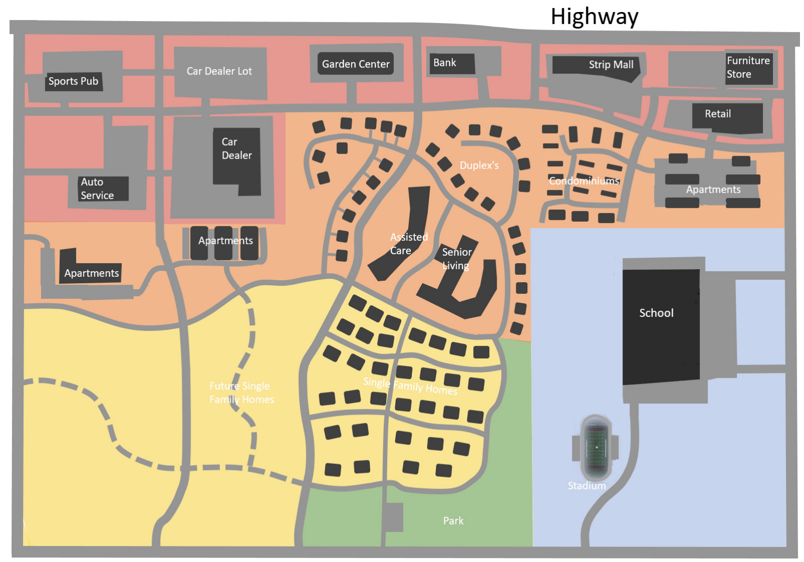
Accessibility: The measure of ease of reaching destinations within a particular travel radius, measured in terms of travel time or distance.

Mobility: The level of ease to move people and goods safely and efficiently by a variety of travel modes and paths and for the regional transportation system to support the cost-effective shipment of goods for economic prosperity.

Through Movement: The function of a major roadway allows longer distance travel at a relatively high average travel speed.

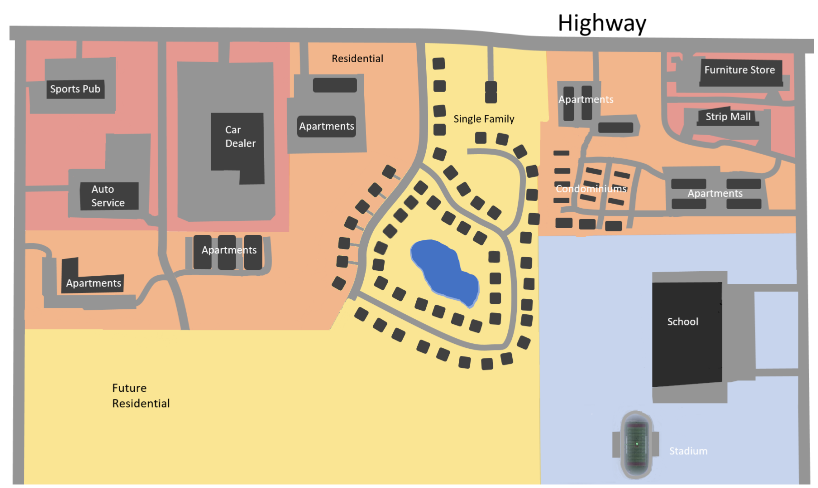
Consider the two scenarios in Figure 2. The top demonstrates how stand-alone developments with disconnected local streets direct trips to, and increase local traffic circulation on, a highway and result in more arterial conflict (access) points. The bottom half shows how organizing land uses onto a unified street network reduces highway conflicts and reduces the need for local circulation on the highway, while increasing internal accessibility of the developed area. The highway can then better accommodate through movement for long distance work trips and the shipment and delivery of goods, and the local network can provide better and safer accessibility between homes, businesses, and other activities.

Figure 2: Network connectivity improves accessibility and mobility, while reducing conflicts and congestion on major roadways.



PREFERRED

- Good local circulation
- Parallel local road distributor
- Fewer access conflicts on highway
- Local circulation to retail, school, neighbors without using the highway
- Supports safe walking, cycling



AVOID

- No parallel local streets
- Isolated lots
- More connections to highway
- Frequent left turns
- Adverse impacts to highway
- Must use highway to visit school or retail
- Impedes local walking, cycling

1.3 Importance of Access Management

1.3.1 Public Safety

Managing access to the primary highway system improves public safety. National research shows that crash rates increase as the number of access connections increases (NCHRP Report 420, 1999). The Federal Highway Administration reports that areas where effective access management policies have been implemented experience (FHWA- SA-12-006):

- A 5 to 23 percent reduction in all crashes along two-lane rural highways, and
- A 25 to 31 percent reduction in severe (injury/fatal) crashes along urban/suburban arterials.

In 2014, 322 people lost their lives in motor vehicle crashes on Iowa's highways. Nearly 80% of these fatal crashes were in rural areas, and about one quarter were at intersections or were intersection related.

- NHSTA Traffic Safety Facts, Iowa 2010-2014

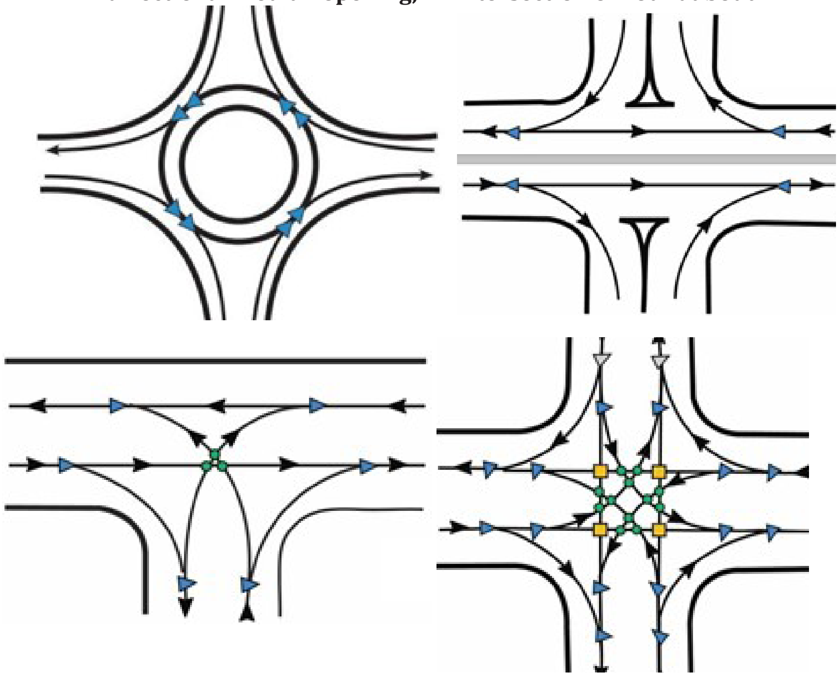
Various research studies have investigated issues related to the spacing of access on highways. A Virginia study using 186 road segments showed a pronounced eight- fold decrease in the crash rate when access spacing was increased from 0 to 984 ft. An increase from 295 ft to 590 ft resulted in a 50% decrease in the crash rate. A Florida study showed a marked improvement in traffic flow and a general decreasing trend in crash frequency as the distance to the first access point on a frontage road from the arterial increased from 200 to 600 feet.

Numerous access management safety studies on highway corridors throughout the nation have demonstrated that every access point increases the risk of crashes to some degree. For each access connection, the potential for a crash increase as:

1. The traffic volume of the access increases,
2. The traffic volume of the highway increases,
3. The speed of the roadway increases above 25 mph, and
4. The width of the highway (the distance the driver must travel to cross the highway or make a left turn) increases. As a result, these are the key considerations when evaluating applications for new highway access connections.

Intersection crash rates are ultimately related to the number and types of conflicts at intersections, including driveway intersections. Conflict points are locations where vehicle paths merge, diverge or cross during access maneuvers. Crashes involving crossing or left-turn maneuvers pose the greatest potential for serious injury or death and therefore reducing these conflicts is particularly critical. The number of conflicts varies by intersection type, as shown in Figure 3. Full movement intersections have the highest number of these conflict types.

Figure 3: Traffic conflict points at a four-way intersection compared to a directional median opening, 'T' intersection or roundabout.

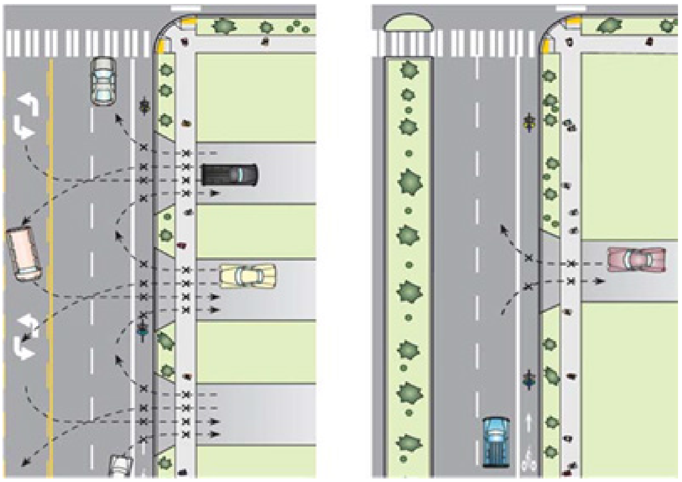


Adopted from the Minnesota DOT Traffic Safety Fundamentals Handbook - 2008

Figure 3 (cont.): Traffic conflict points at a four-way intersection compared to a directional median opening, 'T' intersection or roundabout.

Intersection Type	Type and number of traffic conflicts			
	Crossing	Turning	Merge/ Diverge	Total
Roundabout	0	0	8	8
Right-Turns Only	0	0	4	4
"T"-Intersection	0	3	6	9
4-leg Intersection	4	12	16	32

Figure 4: Separating conflict areas reduces driver workload and crash risk for all roadway users.



Source: TRB Access Management Manual, Second Ed. 2014

Medians and roundabout treatments greatly improve safety by eliminating left-turn and crossing conflicts. When compared to full movement intersections, roundabouts have been shown to reduce fatalities more than 90%, reduce injuries 76% and reduce all crashes by 35% (FHWA –SA-08-006). Medians have been shown to reduce crashes as much as 50%, with an average crash reduction of 35% (TRB, 2014). Improved access spacing combined with the use of nontraversable medians results in a safer, more predictable driving environment that reduces driver workload and the exposure of pedestrians and bicyclists to motor vehicle traffic, as shown in Figure 4.

Nontraversable medians benefit public safety and contribute to the operational efficiency and appearance of major roadways by:

1. Separating opposing traffic streams,
2. Controlling the location of left turns between major intersections,
3. Providing space for left-turning vehicles, allowing drivers time to maneuver out of the way of through traffic,
4. Providing a refuge for pedestrians that reduces the unprotected crossing distance and enables pedestrians to cross one traffic stream at a time (two-stage crossing), and
5. Providing space for landscaping, art, and other aesthetic treatments.

These features contribute to vehicle, pedestrian, and bicycle safety by reducing the potential for conflicts and crashes. Various studies have demonstrated the major safety benefits of median treatments, such as shown in Table 1 and Table 2. These differences are even more pronounced in rural areas, where speeds tend to be higher.

Table 1: Crash Rate by Median Treatment in Urban and Suburban Areas

Total Access Points Per Mile [a]	Crash Rate by Median Treatment		
	Undivided	Two-Way Left Turn Lane	Non-Traversable Median
⩽ 20	3.8	3.4	2.9
20.01-40	7.3	5.9	5.1
40.01-60	9.4	7.9	6.8
> 60	10.6	9.2	8.2

Table 2: Crash Rates by Median Treatment in Rural Areas

Total Access Points Per Mile [a]	Crash Rate by Median Treatment		
	Undivided	Two-Way Left Turn Lane	Non-Traversable Median
⩽ 15	2.5	1.0	0.9
15.01-30	3.6	1.3	1.2
> 30	4.6	1.7	1.5

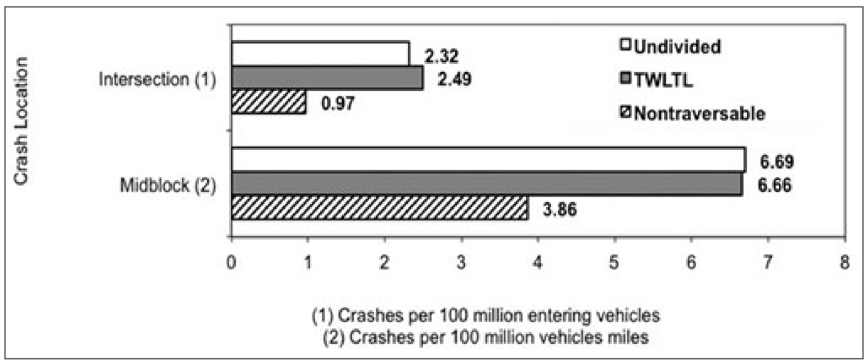
[a] Includes both signalized and unsignalized access points.

Source: NCHRP Report 420, as adapted

A 2020 access spacing study by the Virginia Transportation Research Council, sponsored by the Virginia DOT, concluded that on average, for every 457 vehicles per day increase in highway traffic, the crash rate will increase by 4% to 10% depending on the type of access points and analysis unit. For every 100-foot increase in spacing, the crash rate will decrease by 4% to 7%.

Pedestrian Safety Research also shows that pedestrians are nearly half as likely to be involved in a mid-block crash on roadways with a restrictive median. A study of pedestrian-vehicle crash experience on arterial roadways in Atlanta, Georgia; Phoenix, Arizona; and Los Angeles, California revealed that pedestrian-vehicle crash rates were much higher on undivided roadways or those with TWLTLs than on roadways with a nontraversable median (see **Figure 5**).

Figure 5: Pedestrian crash rates for suburban arterials.



Source: Bowman, Brian L., Robert L. Vecellio and Jun Miao. "Vehicle and Pedestrian Accident Models for Median Locations." Journal of Transportation Engineering-asce 121 (1995): 531-537.

1.4 Studies of Crash Data in Iowa

The safety relationship between access connections and vehicle crashes has been studied extensively. Studies in the 1940s and 1950s supported the decision to have full access control on the federal interstate system. In general, studies show that any new arterial access connection results in the deterioration of both the operational and safety performance of a highway. The magnitude of the adverse impacts varies based upon factors such as the traffic volumes of both the roadway and the access connection, as well as geometric design factors such as location, sight distance and turning radii. The reference section of this Manual lists some of the many research reports on access connection impacts.

In 1996 through 1999, Iowa State University lead the Access Management Research and Awareness Project. The project had four phases: review of national literature; original Iowa research on access safety, traffic operations and business vitality; outreach and education including a state conference; and the final phase included more case studies, outreach, a handbook and a toolkit of treatments. A total of 11 case studies were completed.

These case studies indicated that access management is a powerful tool for improving highway safety. All but one of the eight Phase II and III case studies led to an absolute reduction in highway crashes. All eight resulted in reductions in crash rates per million vehicle-miles of travel; the range of crash rate reductions was from 10 to 70 percent, with 40 percent being a typical reduction post-project. The most significant reductions in crashes occurred in terms of property damage only crashes, rear-end collisions, and broadside/left-turn collisions.

Perceived impacts of access management on adjacent commercial businesses and landowners are often major impediments to projects moving forward. The 1998 case studies showed that in fact access management projects are rather benign in terms of business impacts. Access managed corridors generally had lower rates of business turnover than other parts of their communities. They had more rapid growth in retail sales once projects were completed. Far more business owners, when surveyed, indicated that their sales had been stable or increased following project completion than reported sales losses.

Beginning in 2015, InTrans, the transportation research unit of Iowa State University was tasked by the Iowa DOT to look at three specific areas of access related safety performance using only Iowa data:

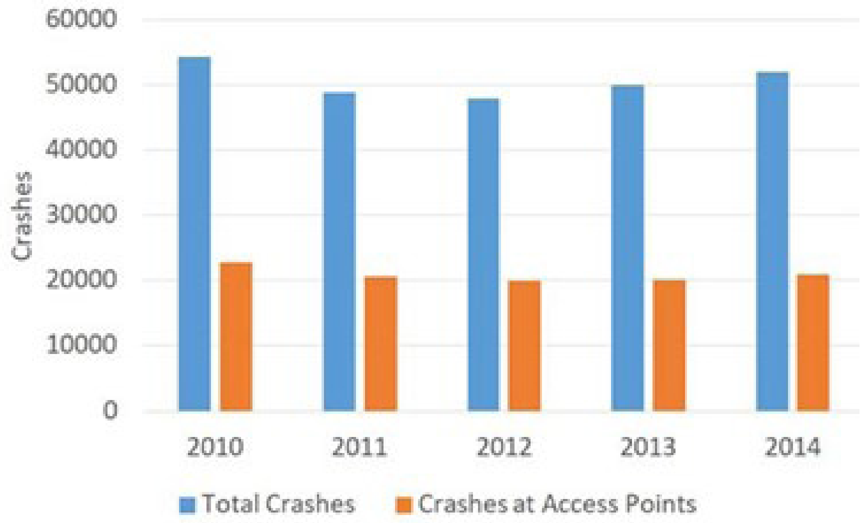
- How the highway crash rate changes as spacing between access connections changes;
- What are the crash rate influences of access connection spacing on a crossroad at an interchange;
- And how the crash rate changes on an expressway transition area.

In Iowa, a total of 253,093 crashes occurred in a five-year period from 2010 to 2014. Of these crashes, 104,434 (approximately 41 percent) occurred at intersections, driveways, or median openings, as shown in Figure 6. Using crash cost data from the National Safety Council (NSC), the estimated annual economic impact of traffic crashes at access points in Iowa were generally around one billion dollars per year. However, when accounting for other measures suggested by NSC, such as lost quality of life, these costs increase to nearly seven billion dollars per year (ISU 2017).

When analyzing access-related crash data at a disaggregate level, important relationships emerge between crash frequency and access point density. Figure 7 illustrates the relationship between crash frequency and access point frequency per-mile on IA 122 east of the I-35 interchange. As with other Iowa growth corridors studied by Iowa State University, it clearly demonstrates the direct relationship between crashes and access density.

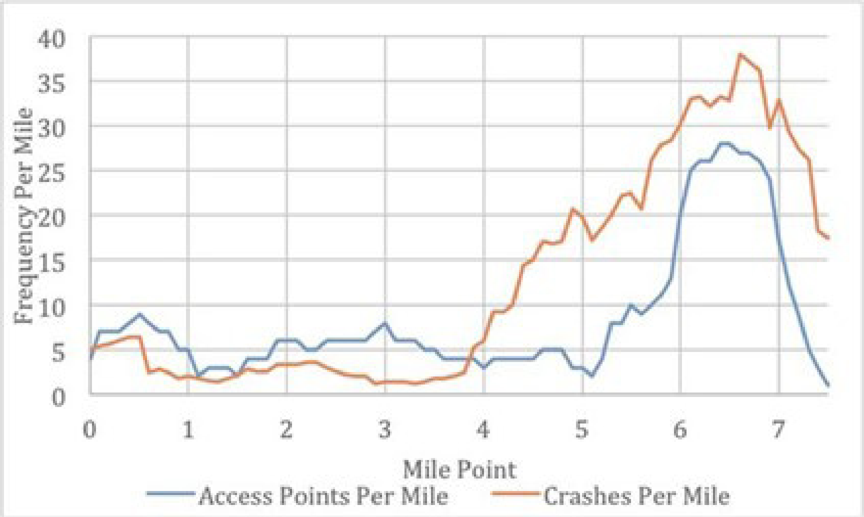
As a result of Iowa crash data studies, InTrans prepared two formal research papers and submitted them to the Transportation Research Board of the National Academy of Sciences where they were peer reviewed and chosen for publication in the Transportation Research Record. The results of both studies closely tracked the national and Iowa access management research published over the last few decades.

Figure 6: Total crashes and access-related crashes in Iowa between 2010 and 2014



Source: Iowa State University

Figure 7: Crashes and Access Density, IA 122, East of I-35 Interchange



Source: Iowa State University

FIRST INTRANS STUDY

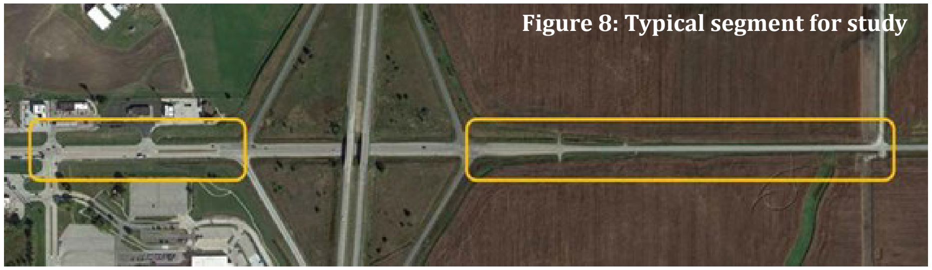
Access Separation at Interchanges: Examining Crash Rates on the Cross-Street and in the Transition Areas from Full to Partial Access Control

The purpose of this study was two-fold. First, examine how crash risk varies on interchange cross-street corridors based upon the distance at which the first access point is located relative to the ramp terminals. The second objective of the study was to examine how crash risk varies on expressways where transitions occur between full access control and partial access-controlled segments.

The research looked at crash reports from 380 interchanges and 724 arterial segments over a seven-year period. About 50% of access connections were commercial and residential driveways or farm roads. Roughly 12% of first access connections were signalized and the remainder were stop-controlled.

This aerial photo in Figure 8 shows the typical segments that were studied on interchange crossroads.

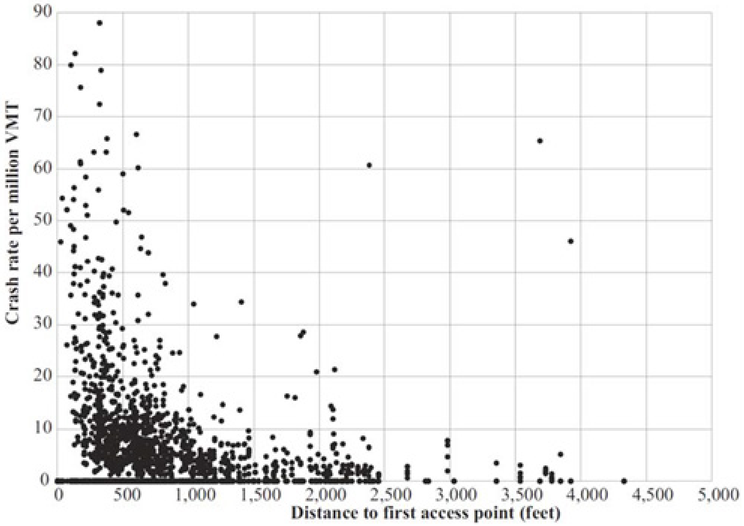
Figure 8: Typical segment for study



Only crashes from the bifurcation point to and including the first access connection were used. Collectively, the segments experienced an average of 1.23 crashes per year up to a maximum of 34 crashes per year.

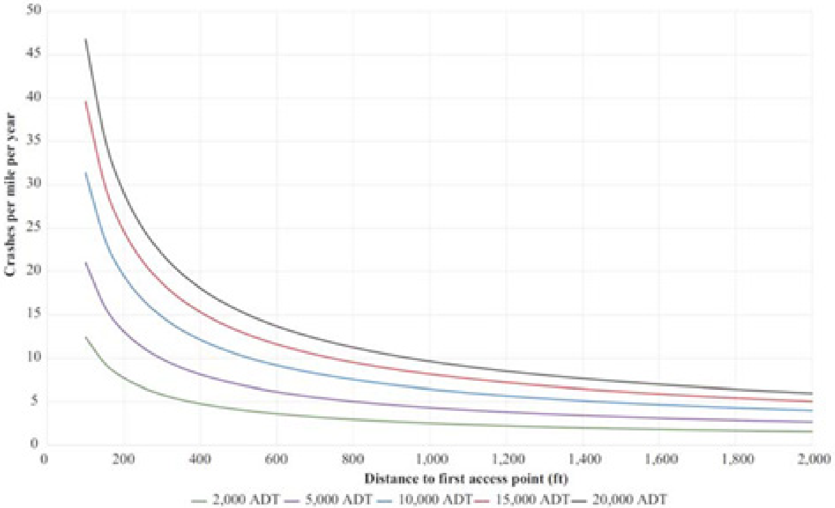
These figures illustrate two important factors: (1) the degree to which crash risk decreases the further an access point is located from the ramp; and (2) the impact of cross-street volume on crash risk. Ultimately, these results provide guidance as to appropriate distance thresholds for access connection location. This figure shows crash rates increase rapidly inside 600 feet. Beyond 600 feet, the crash rates continue to decrease with a more gradual decline occurring beyond 1,300 feet.

Figure 9: Crash rate per million VMT compared to the distance to the first access connection on the cross-street



Crash rate per million vehicle miles traveled compared to the distance from the ramp the bifurcation point to the first access connection on the crossroad.

Figure 10: How crash risk decreases



Following the crossroad study, a similar analysis was conducted for the expressway transition areas. This is where a motorist is traveling along an expressway through an interchange area providing a freeway type experience, and then arriving at a signalized or non-signalized intersection on the far side of the interchange.

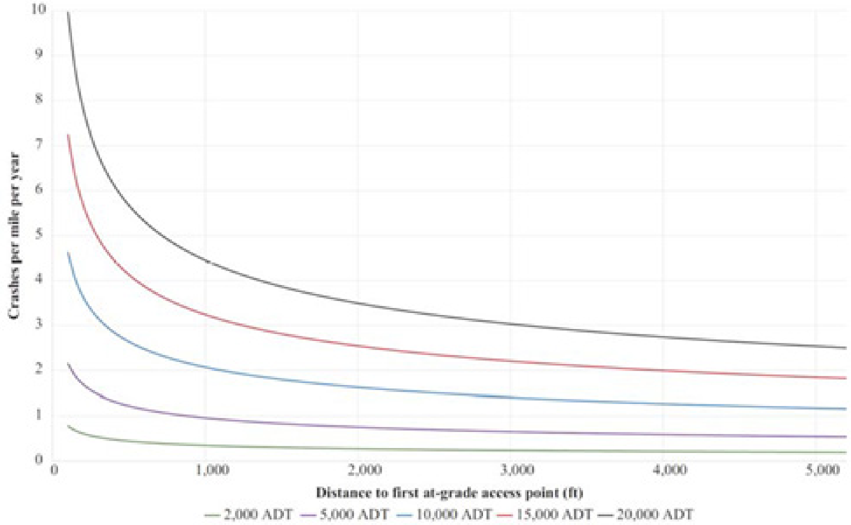
This analysis considered all of the freeway style interchange to expressway transition corridors in the research dataset. The goal of this analysis was to determine any correlation between highway crash rate and the distance to the first access point, as well as other factors that could impact the highway crash rate. These factors include whether the first access connection was a public road or a private driveway, as well as whether the median allowed left turns at the access connection.

These curves follow a similar trend to the cross-street dataset; however, the overall number of crashes is significantly lower given the higher design standards such as the use of left turn lanes and the relatively low traffic volumes of much of the Iowa multilane expressway network. The crash rate rapidly increases when the first access connection is under 2,000 feet for higher highway volumes. Crashes taper off but have not plateaued for volumes above 4,000 ADT until a distance beyond 4,000 feet.

The results also show that the presence of a signal at the first access connection is related to a higher crash rate. This is attributed to driver's low expectation of a traffic signal when driving on an expressway.

Figure 11: Typical study area between interchange and at-grade access

Figure 12: Correlation between highway crash rate and the distance to the first access point



Figures 8-12 source: Barrette, T. P., Warner, J., Thompson, P., & Savolainen, P. T. (2018). Access Separation at Interchanges: Examining Crash Rates on the Cross-Street and in the Transition Areas from Full to Partial Access Control. Transportation Research Record, 2672(17), 1–10. https://doi.org/10.1177/0361198118795668

Research was funded by Iowa DOT as part of this access management project.

SECOND INTRANS STUDY

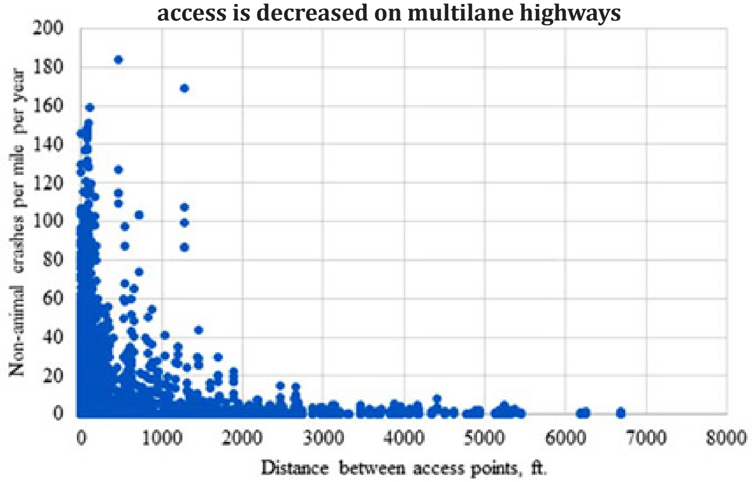
Examining Safety on Two-Lane and Multilane Highways in Consideration of Access Spacing

The purpose of this study was to provide a quantitative evaluation of how crash risk on multilane and two-lane highways varies with respect to the spacing of access connections. This was an extensive statewide analysis conducted that integrated traffic crash data with traffic volume, roadway segment, and access spacing information. Data was obtained from five years of crash reports for approximately 1,247 miles of multilane highway and 5,795 miles of two-lane highway all on the state system. Animal crashes were deleted.

As Figure 13 multi-lane highways illustrates, the greater the distance between consecutive access connections for all the segments studied, the lower the number of crashes per mile per year. The frequency of crashes decreased substantively as spacing was increased to 300 feet and, particularly to 600 feet. With spacing beyond 600 feet, crash rates continued to decrease but less pronounced as the figure below illustrates.

The access point spacing was computed as the segment length in feet divided by the total number of access points along the segment. In effect, the figure shows that as the per mile density of access connections increase, the crash frequency increases significantly.

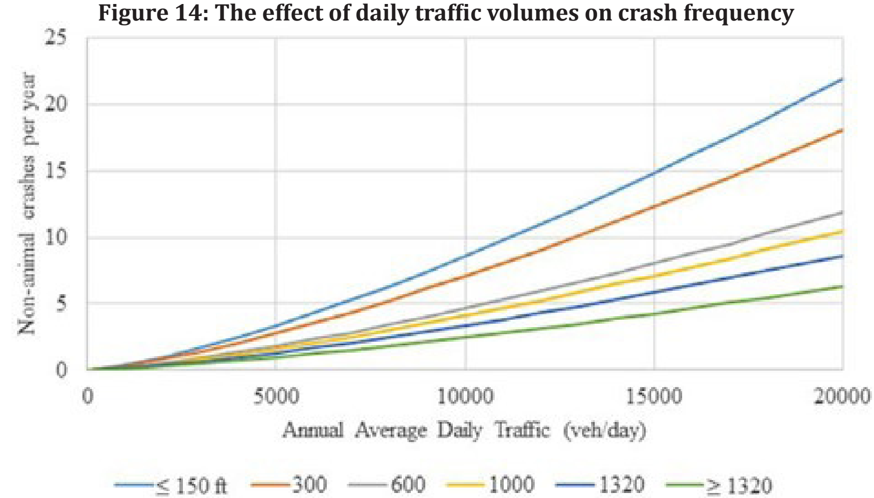
Figure 13: How crashes increase in frequency near when distance between access is decreased on multilane highways



This figure shows the effect of daily traffic volume and number of crashed compared to access connection spacing on undivided multilane roadways without traffic signals or main road stop control. These results show a marked increase in crashes as the access spacing is reduced below 600 feet for nearly all traffic volumes. Below an AADT of 5,000 vehicles per day, there is little difference in crashes for access spacing from 600 to 1,320 feet and more of a difference when looking at access spacing below 300 feet. The crash frequency becomes more pronounced as the roadway volume increases beyond 5,000 AADT.

A roadway segment with average access spacing between 1,000 and 1,320 feet would be expected to experience over 36% more crashes on average compared to a similar segment with access spacing greater than 1,320 feet. Segment averaging spacing under 150 feet should experience about 247% more crashes compared to segment with access spacing greater than 1,320 feet.

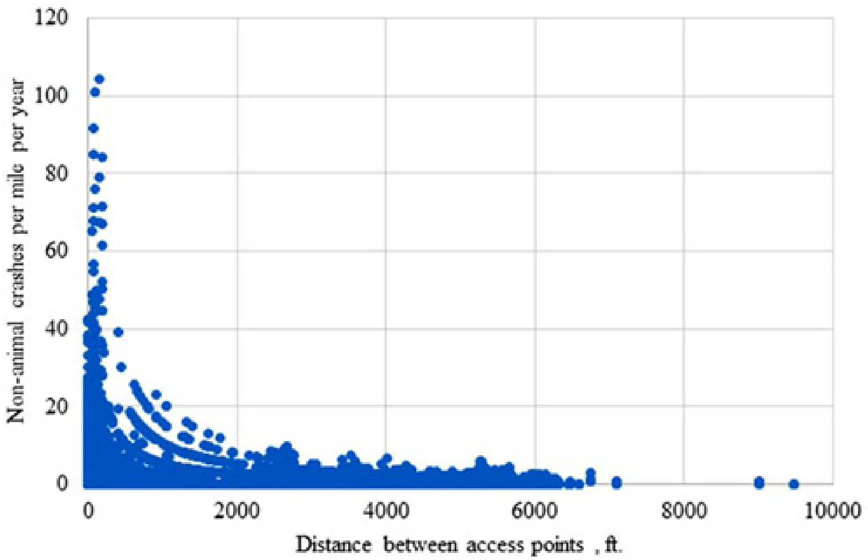
Figure 14: The effect of daily traffic volumes on crash frequency



For each signalized intersection, crashes in a multilane segment increased by 59% as compared to the average values shown in the above curves. Where segments included two traffic signals, the crash risk should double as compared to segments without signals.

Higher volume highways were more likely to have some access management. Among the segments studied, 82% included some type of restrictive median. Divided multilane highways experienced over 63% fewer crashes compared to undivided multilane highways. Medians reduce the number of available turning locations, particularly left turns.

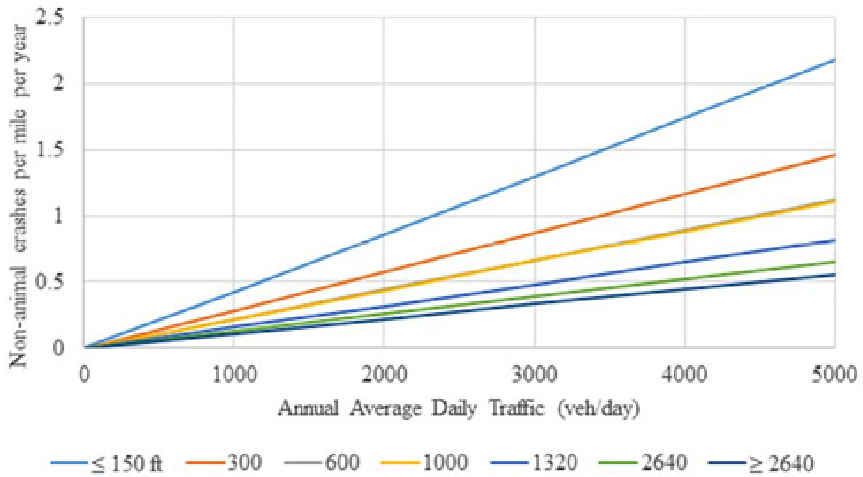
Figure 15: How crashes increase as access point separation decreases



On two-lane highways, the crash rates have a similar shape to multi-lane highways but have a lower crash frequency. For two-lane highways, access spacing distance was shown to have persistent effects at distances of up to 2,640 feet. As spacing distance was reduced, crashes increased by 17.2% for distances up to 1,320 ft.

Crashes were shown to increase by approximately 300% at the smallest spacing distance of 150 ft. or less.

Figure 16: The estimated number of crashes on two-lane highways



The graph above shows the estimated number of crashes for two-lane highways with respect to different ranges of access spacing and AADT. The shorter the access spacing the greater number of crashes which increase as highway volume increases. A 1% increase in AADT was associated with roughly a 1% increase in crashes. On average, for each signalized intersection the number of crashes in the segment were 275% higher than the above averages without the signal, and 37% higher for each additional stop-controlled intersection.

Based upon these results, to reduce crashes, a minimum spacing of 600 ft is recommended on low volume roads, and larger spacing is warranted on segments with or expected to accommodate higher levels of traffic.

Figures 13-16: Hamzeie, R., Megat-Johari, M.-U., Thompson, I., Barrette, T. P., Kirsch, T., & Savolainen, P. T. (2019). Examining Safety on Two-Lane and Multilane Highways in Consideration of Access Spacing. Transportation Research Record, 2673(11), 388–397. https://doi.org/10.1177/0361198119851725

Research was funded by Iowa DOT as part of this access management project.

1.5 Efficient Operations

Access management improves the efficient operation of the roadway system in relation to the following measures of efficiency: 1) fuel consumption and vehicle emissions, 2) travel time and delay, 3) speed differential between turning vehicles and following through traffic, and 4) roadway capacity. These measures of efficiency are interrelated.

Access management helps to preserve fuel, reduce emissions, and maintain average travel speeds by minimizing deceleration and acceleration within the traffic stream of major roadways.

Fuel Consumption and Vehicle Emissions: Conditions that enable drivers to travel a section of roadway at a constant speed minimize fuel consumption and emissions. Minimum automobile fuel consumption occurs at speeds of between about 30 mph and 65 mph. Fuel consumption increases rapidly as speeds decrease to less than 25 mph, and increases modestly up to 62 mph (Rakha and Ding, 2003). TRB Special Report 245 shows that minimum fuel consumption occurs at speeds between 30 and 45 mph and that fuel consumption increases rapidly at lower and higher speeds.

Deceleration followed by acceleration (a speed change cycle) increases fuel consumption compared to a constant cruise speed. This occurs frequently on arterial roadways in commercial areas as through vehicles decelerate in response to vehicles turning into or out of access connections and then accelerate back to speed. Research indicates that for every 1000 speed change cycles, breaking to a stop from 30 mph results in excess fuel consumption of 9.5 gallons, whereas a reduction in speed from 30 mph to 20 mph results in 3.0 gallons excess fuel consumption – a 6.5-gallon savings (Dale 1981). At an initial speed of 50 mph, reducing speed by 10 mph saves 12.5 gallons for every 1000 speed change cycles compared to breaking to a stop.

These consumption factors add up on a daily basis. One traffic signal on a 25,000 ADT arterial with a 5,000 ADT cross street averaging about 50 percent full stops, will result in excess fuel consumption of about 142 gallons per day, or about 52,000 gallons per year. On a route with higher large truck percentages even more fuel is used.

Deceleration and acceleration also increase carbon monoxide emissions to more than six times that when the passenger vehicle is operating at a constant cruise speed. TRB Special Report 245 (1995) indicates that minimal carbon monoxide (CO) and volatile organic (VOC)) emissions occur at speeds of between about 25 mph to 55 mph. Minimum oxides of nitrogen (NOx) occur at speeds approximately between 15 and 45 mph or between 25 and 40 mph, depending upon the model used. Rakha and Ding (2003) report a similar speed range for CO but a slightly lower range for VOC (20 to 50 mph) and NOx (10 to 30 mph). These fuel consumption and emission characteristics are important considerations in approving and locating traffic signals and in the provision of auxiliary lanes.

Travel Time and Delay: Conflict between vehicles turning off and onto a high- volume or high-speed roadway can cause considerable variation in average traffic speed within a short period of time. This adversely impacts urban bus transit service, goods movement and general public mobility. As presented in NCHRP Report 420 (1999), it is estimated that 10 unsignalized access connections per mile reduce speed by 2.5 mph and 40 connections per mile reduce speed by 10 mph (Table 3).

Table 3: Access Points and Free Flow Speed

Access points per mile	Reduction in free flow speed (mph)
0	0.0
10	2.5
20	5.0
30	7.5
40 or more	10.0

Source: Highway Capacity Manual, TRB 2010

Speed Differential: In addition to adversely impacting fuel consumption and emissions, research has long shown that crash potential increases dramatically as the difference in speed (speed differential) increases between vehicles in a traffic stream (Solomon, 1964). Figure 17 indicates that a vehicle traveling on an at-grade arterial at a speed of 35 mph slower than the average speed of the traffic stream is 90 times more likely to be involved in a crash than a vehicle traveling only 10 mph below the average speed. Figure 18 graphically illustrates the speed differential between a turning vehicle and following through traffic.

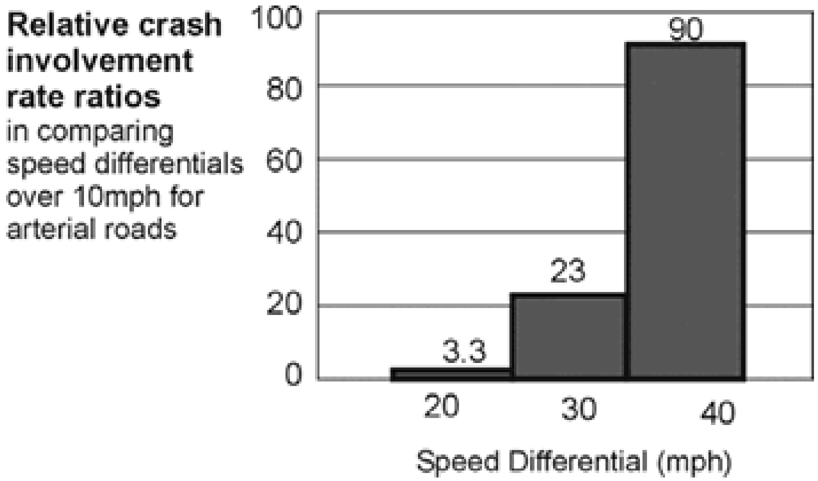
The efficiency of traffic operation on a roadway also decreases as the magnitude and frequency of the speed differential activity between turning vehicles and following through traffic increase. Turn lanes enable turning vehicles to leave a through traffic lane with less interference to following vehicles thereby improving both safety and operations.

Crash potential increases dramatically as speed differentials increase. Turn lanes are the most effective way to reduce the speed differential between turning vehicles and through traffic.

As shown in Figure 18, a 10-mph speed differential is relatively standard in roadway design for a left-turn lane. In figure 17, research shows that if the roadway design, such as at an access location, results in a 30-mph differential, it is 23 times more likely for a crash to occur.

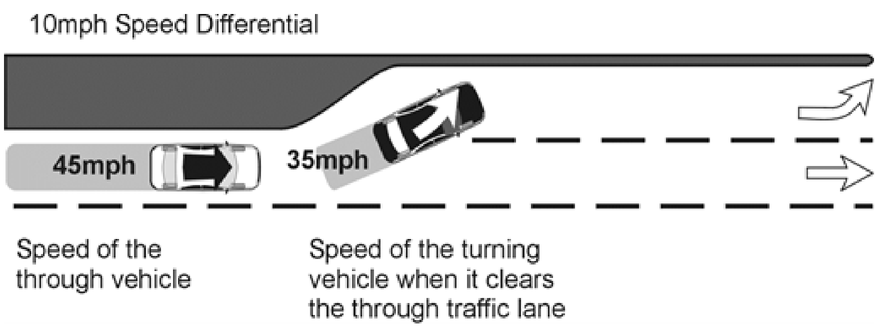
Roadway Capacity: Vehicles leaving a roadway can interfere with following through vehicles. The frequency of interference increases as turn volume increases and the number of through vehicles impacted increases as roadway volume increases. This results in reduced capacity on a major roadway and is why auxiliary lanes are an important access management treatment.

Figure 17: Effect of speed differential between turning vehicles and through traffic on crash potential



Source: David Soloman, "Accidents on Main Rural Highways Related to Speed, Driver, and Vehicle", Bureau of Public Roads, July 1964.

Figure 18. Illustration of a 10-mph speed differential between a turning vehicle and following through traffic.



Source: Florida DOT

1.6 Economic Importance of Access Management

A high-quality transportation system provides economic and social benefits by providing better accessibility to markets, employment, and community facilities at a lower cost. Both connectivity and the efficiency of travel are important.

Transportation efficiency is reduced when a highway has too many access connections and low transportation efficiency drives up costs – impacting both consumers and businesses. Transportation's role in economic development includes:

- Network effects—links more locations and increases the value and effectiveness of trade;
- Performance improvements—reduces cost and time of existing passenger and freight movements and keeps costs lower and more competitive at point of sale;
- Reliability—lowers the risk of unintended delay and scheduling failures and provides assurances of long-term, on-time performance and prevention of loss and damage, maintaining the value of the initial investments in production location and reliable distribution systems;
- Market size–adds to economies of scale in production, distribution, and consumption, increasing economic opportunity and growth; and
- Productivity—increases productivity gained from efficient travel times to a larger and more diverse base of needed production resources such as raw materials, parts, energy, and labor, and satisfies a broader market for more diverse outputs.

  The cost of highway travel for business has been a frequent topic of business media. Inefficient transportation of goods has direct costs in terms of wasted fuel, equipment costs, and labor. Indirect costs include air pollution and loss of time – time that could be better spent in productive activities.

Moreover, changes in travel time on different portions of the roadway network will result in unstable land use activity patterns (Stover and Koepke, 2002. pp1-13 to 1- 29). **Increases in travel time can explain why some commercial areas have deteriorated (resulting in declining property values) while others have prospered.** It can also help explain shifting economic relationships between small towns and urban centers.

1.6.1 Economic Issues in Iowa Related to Access Management

The economy in Iowa depends on efficient transportation services. Access management adds economic value by maintaining or improving travel efficiency and safety. Table 4 lists the major business sectors in Iowa according to their contribution to the Iowa gross domestic product in 2013. All sectors depend on efficient transportation services to some degree. The list on the left relies on the movement of raw and finished goods. Service industries are not as dependent on materials but do benefit from efficient transportation services (Iowa State Freight Plan, 2016). The goods-dependent industry sectors contributed $79.3 billion in GDP to Iowa's economy (46.7 percent), while the service industry sectors contributed $90.4 billion (53.3 percent) (2014 data).

Table 4: Goods-dependent and Service Industries

Goods-dependent Industries	Service Industries
Manufacturing	Finance, insurance, real estate
Agriculture and related	Government
Wholesale trade	Education, health care, social assistance
Retail trade	Professional and business services
Construction	Arts, entertainment, recreation, food
Utilities	Information
Mining	Other services

Goods-dependent industries of manufacturing, agricultural and wholesale trade rely heavily on freight and a highly managed road network is essential to the efficient and reliable movement of freight. In Iowa, freight moved by trucks is predicted to grow from about 360 million tons in 2010 to around 514 million tons by 2040 (Iowa State Freight Plan, 2016). Keeping transportation costs low by preserving the efficiency and reliability of freight movement in Iowa using access management techniques will support this important economic growth.

Companies are also increasingly looking at highway performance, long-term reliability, modal connectivity and levels of congestion when choosing where to locate or expand. Annually, about $207 billion in goods are shipped from sites in Iowa and another $199 billion in goods are shipped to sites in Iowa (Iowa State Freight Plan, 2016). Trucks carry 89% of the goods shipped in Iowa.

About 60% of vehicle miles traveled are on the Commercial and Industrial Network and other state (non-freeway) primary highways. (Freight Plan 2017).

Figure 19: Commodities in route to market

Delay can increase shipping and distribution costs proportionally; that is, a 10% increase in travel time along a corridor can increase shipping costs by up to 10% for that segment. The average cost for a semi-truck is $67.00 per hour. Adding a 10% delay adds $6.70 per truck per hour to the cost of each trip. Further, if the routes along which deliveries and distribution take place have high crash frequency, insurance companies can and do increase premiums. If shipping and distribution costs increase significantly, businesses with small margins can become unprofitable (TRB Access Management Manual, Second ed, 2014; American Transportation Research Institute, 2014).

A “supply chain” is the network between a company and its suppliers to produce and distribute a specific product. The supply chain represents the steps it takes to get the product or service from its raw form to the customer. Inefficient transportation in the supply chain links, results in increasing transportation costs which affects product pricing, production cycles, competitive position in the marketplace, and can make Iowa a less economically-efficient location for new economic ventures. It is estimated that between $900 million and $1.08 billion was expended transporting goods from Iowa to destinations in 2012. Reducing transportation costs for companies exporting products from Iowa is a vitally important goal of supply chain planning and optimization in the private sector. (2017 Iowa in Motion).

Regional E-commerce is growing and impacting market trends and freight movement on highways and streets. Many companies are working to optimize their delivery supply chains in order to get the products or services to the consumer as quickly and efficiently as possible. New distribution centers are being built in additional locations near large populations so products can be shipped from the closest distribution site as soon as an order is placed.

Access management is especially critical in transition areas such as in the vicinity of freeway interchanges where congestion can cause significant delay for trucks while entering or leaving the freeway or expressway, and on local arterial highways that link the distributor to the freeway system. As reported in the Iowa Transportation System Management and Operations (TSMO) Strategic Plan (2016): In Iowa, an extra $2 billion is spent annually on unanticipated transportation costs, including:

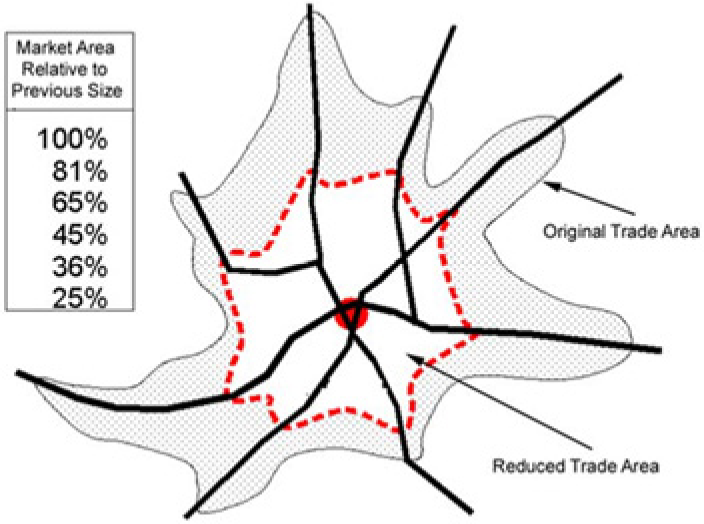
- $935 million from accelerated vehicle depreciation, additional repair costs, and increased fuel consumption and tire wear;
- $380 million due to lost time and wasted fuel from traffic congestion; and
- $654 million for the financial cost of traffic crashes, including insurance costs and lost household productivity.

1.6.2 Retail Sector

While all business sectors are important to the economy, access management is of particular benefit to retail businesses located on arterial roads. Access management is one way to preserve the market area of retail businesses by maintaining the efficient flow of traffic. Even a small change in travel time has a substantial impact on the primary market area of a business. For example, a 10% decrease in travel time will increase the market area by about 23%, whereas a 10% increase in travel time (e.g., a reduction in average speed from 40 mph to 36 mph) will reduce market area by about 19% (Stover and Koepke, 2002, pp. 1-9 to 1-13). These effects of travel speed reduction on retail market area are illustrated in Figure 20.

Figure 20: Effects of travel speed reduction on market area

Reduction in Average Speed	Market Area Relative to Previous Size
0%	100%
10%	81%
20%	65%
30%	45%
40%	36%
50%	25%



Source: Stover, V. and F. Koepke. Transportation and Land Development, 2nd edition, Institute of Transportation Engineers, (2002).

Higher traffic volume retailers like fast food restaurants, convenience stores, and drug stores typically seek out properties with direct arterial access. Access management is sometimes perceived to adversely affect these businesses by limiting the number of driveways, restricting direct left turns, or requiring the driveway to be on a secondary street. Some business owners express concern that potential customers will elect to go elsewhere resulting in reduced sales and property value. This concern has been the focus of several studies, the majority of which look at short-term changes in retail sales. Another important but less studied indicator is the change in property value over a longer period of time.

The TRB Access Management Manual (2014), reported on seven studies of the economic effects of access management on retail businesses:

1. Vargas and Gautam (1989) found that more than 70 percent of the businesses impacted by an access management project in Florida reported no change in property value, while 13 percent reported some increase in property value.

2. To assess the level of impact of access management on local businesses, Iowa researchers conducted a comprehensive study (Chao et al.1998). They evaluated sales tax data for the study areas and determined that sales along the associated corridors outpaced those of the overall community by 10 to 20 percent following the completion of adjacent access management projects. The business owner surveys further indicated that more than 85 percent of the businesses reported that their sales either remained the same or increased. Only five percent reported a decrease after the implementation of access management, although they did not identify any direct correlation between this decrease and the access management implementation. In general, the local businesses supported the access management projects.

3. The Florida Department of Transportation conducted a similar analysis (Stover 1998) of the impact of access management on economic vitality in Fort Lauderdale and Orlando. Approximately 62 percent of surveyed businesses reported no changes in business sales following the retrofit of a boulevard in Fort Lauderdale. A survey conducted in Orlando also found that 80 percent of the drivers believed that the road was safer with improved traffic flow. Approximately 60 percent of the drivers, however, did indicate that required U- turns were not convenient.

4. A study performed by Eisele and Frawley (1999) determined that land values along Texas corridors with access management projects stayed the same or increased. They found very few exceptions to this observation.

5. A study (Rees et al. 2000) of Kansas properties impacted by access changes determined that the majority of adjacent business remained the same after the access management project was completed, even for the businesses that had direct access before the project and access restricted to frontage roads following project completion.

6. Vu and Shankar (2006) evaluated 280 businesses along six State of Washington commercial corridors. They performed this analysis by issuing a survey to the local business. The survey focused on business use, business operation, access management, street environment, and corridor characteristics. They found that most businesses with shared driveways or traffic signals at their driveways had a positive perception of access management, while driveways with a right-in right-out configuration were perceived by the businesses to negatively impact patronage.

7. Preston et al. (2007) studied commercial property values adjacent to a major access management project in Minnesota and found that changes in access had little or no effect on property values. Local economy and the general location of the property were determined to be greater contributors to the value of properties. After a comprehensive analysis of population, changes in income, types of retail businesses, and retail sales from 1980-2000, Preston et al. further evaluated land values and business productivity and determined that the impacts of access management improvement projects were either neutral or positive for all business types.

A 1997 study in Iowa examined before and after business conditions on eight Iowa business corridors with access management improvements. Retail sales growth on corridors with completed access management projects was approximately twice that of communities in which the corridors were located. 48% growth on the corridor and 22% growth in the community. About 33% of businesses reported sales increases, 53% reported no change in sales and only 5% reported sales declines. *(Source: CTRE, Iowa State Univ (ISU) access management research and awareness program)*

A clear indication of the compatibility of access management and nontraversable medians and retail business is the number of miles and locations throughout the nation where retail businesses thrive along median-divided, access-managed highways. While the effects of access management on retail sales are understandably a concern, access management can provide a critical business benefit by expanding the potential customer base. Shorter travel times increase customer base. Reduced congestion allows higher roadway traffic volumes.

Any effects on retail activity must be balanced with the improved value of travel time for other transportation dependent businesses and the economic impacts and suffering caused by the significantly higher crash rates that occur when a nontraversable median is not in place.

1.6.3 Preservation of Infrastructure Investment

By ensuring a safe and efficient highway system, access management preserves the public investment in infrastructure. These benefits have been documented in a number of "before and after" case studies across the U.S. on corridors where transportation agencies have implemented access management techniques (see **Table 5**.). The projects involved installation of medians on undivided thoroughfares, as well as elimination or reconstruction of existing median openings. Data regarding crashes, traffic circulation, and traffic flow were collected to identify safety and operational effects.

Table 5: Benefits Reported in Selected Case Studies

Case Study		Reported Benefits	
Location	**Description of Improvements**	**Speeds**	**Safety**
Arapahoe Rd. Denver, CO and Parker Rd. Denver, CO (5.2 miles)	Access managed roads with physical medians, limited turns and ½ mi. traffic signal spacing	40 mph pm peak hour on highways compared to 15-20 mph on non-access managed arterials	4 to 7 crashes per million VMT compared to up to 13 on non-access managed arterials
Oakland Park Blvd., Ft. Lauderdale, Florida (2.2 miles)	Physical median extended across 17 unsignalized driveways	30% less delay	Crash rate declined 10%, injury rate declined 28%, and 30% fewer mid-block median maneuvers
Jimmy Carter Blvd., Atlanta, GA (3.0 miles)	TWLTLs on 4-lane road replaced by physical median, 6 through lanes, protected left-turn lanes	Speeds reportedly increased	32% drop in crashes with raised median, 40% drop in crash rate with barrier median
Memorial Dr., Atlanta, GA (4.3 miles)	TWLTLs on 6-lane road replaced by physical median and protected left turn lanes		40% drop in crashes and 37% drop in overall crash rate, 64% drop in left-turn crash rate
Route 47 Vineland, NJ (1.8 miles)	4 narrow lanes replaced by 2 through lanes plus protected left turn lane	PM peak hour speeds declined from 35 to 32 mph	39% decline in total crashes, 86% decline in left turn crashes
Route 130 New Jersey (4.3 miles)	Median openings closed and left turn lanes installed		45% decline in crash rate
Route 23 New Jersey (3.9 miles)	Jug handles built and road cut through 2 rotaries		34% decline in crashes

Source: Koepke and Levinson, 1993

2. ACCESS CLASSIFICATIONS & ACCESS RIGHTS

2.1 General Purpose and Application

Managing the level of access control based on primary highway functional purpose, traffic volumes, and public safety is the foundation of the Iowa access management program. The application of access management using a hierarchical access classification system has been proven to improve public safety, maintain or enhance the smooth flow of traffic, promote sustainable land use patterns, and help maintain roadway capacity.

A hierarchical access classification system allows engineering criteria to be applied according to the functional purpose and importance of the highway. It matches access location and design criteria to: a) the operating characteristics needed for the highway, b) roadway design features, c) current and future traffic volumes, and d) land use and other roadside conditions.

Every section of primary highway is assigned an access category and each category has a set of standards that guide decisions regarding the level of access to be provided to abutting land. This classification system of standards helps to guide access decisions, so they are consistent with the planned functional purpose and performance of the highway, while supporting the access needs of abutting land development.

When an access connection proposal is consistent with the criteria of the assigned access category and other requirements for location and design are met, then the access may be granted. If a proposed access is unable to meet the location and design requirements, then the proposed access connection should be denied unless unique conditions allow a variance to be approved and there is a necessity for the access connection.

Meeting the criteria of the access classification does not alleviate responsibility for proper engineering and design. Other engineering and safety criteria, such as sight-distance, must also be met by any proposed access to a primary highway.

In addition to adherence with requirements of the access category, direct local service and private access is generally prohibited to all structures and ramps on or connected to any primary highway. These are unique locations that require special attention to ensure their purpose and physical integrity are not compromised.

Access category criteria refer to "proof of necessity". This means proof is required in the application and department files that the access is necessary or indispensable to the property due to circumstances that cannot be sufficiently mitigated by other means. Proof of necessity refers to documents, data, maps and other information submitted to illustrate and verify the claim of necessity. This important criterion results from decades of safety research that establishes the fact that every access is to some degree a safety problem. This is explained in Chapter One. The Department will always seek the safest solution that provides reasonable access for each property.

The access categories often refer to "section lines" for access locations. Property in Iowa is generally divided into one-mile by one-mile squares called sections. Half sections occur at one-half mile, quarter sections at one-quarter mile, and one-eighth sections at 660 feet. As a result, public roads are often on a section line or fraction of a section, and ownerships often end at a section line or fractions thereof. By placing access connections at these locations, they are more likely to serve a public road and multiple ownerships, thereby reducing the need for more access connections to a primary highway.

112.6(3) Private access connections may only be considered when there is a reasonable necessity for the access and should be separated from other private access connections at a minimum distance equal to the sight distance at the posted speed. The burden of proving necessity is on the applicant.

2.1.1 Access Types

Access connections are distinguished by four private types, based on access traffic volume and purpose. This is done in part to recognize that busier access connections can have more significant adverse impacts on highway operation and safety and therefore must be managed and engineered more carefully than minor access connections that should only have a very minor impact on the highway. For any entrance additional permit terms and conditions may apply in some circumstances.

All entrance volumes are based on 20th year projections. These projections were developed using a simplified method by the Systems Planning Bureau solely for usage on access management related work. The 20th year design projections should be updated every 5 years. The purpose for considering a 20th year activity level for access that serves development is to help ensure that in granting the access, it is unlikely that traffic volumes at the access will exceed the design and engineering of the access or the permit and should accommodate traffic increases without the need to reconstruct the access within a 20-year time frame.

Type A are private access connections with traffic volumes equal to or more than 100 trips in a peak hour. Volumes are to be based on a 20th year projection or the build-out of the development, whichever is greater.

Type B are private access connections with traffic volumes between 11 and 99 trips in a peak hour. Volumes are to be based on a 20th year projection or the build-out of the development, whichever is greater. This is typical of multi-family land use, and small to medium businesses with fewer than 50 customers in the peak hour of the business.

Type C are private access connections with traffic volumes between one and 10 trips in a peak hour. This is typical of farmsteads, limited residential of perhaps seven to ten homes, or low volume commercial with fewer than 50 customers per day.

Type D are private access connections with an AADT of less than one per day. These are usually agricultural access to fields or to utility vaults. Less than one-per day means in an average year the access will experience less than 365 trips. Higher seasonal activity at the access, such as at harvest season, is expected, but not daily activity all year long. If there is daily access use, a type C applies. During busy access use, the permittee must exercise additional care.

Public intersections are those access connections to dedicated public roads and streets. These are public roads serving multiple properties that are part of the state, county, and municipal networks of public roads to ensure access and circulation for communities and regions of the state. The design of public intersections will use intersection design standards of the Iowa DOT Design Manual based on 20th year traffic volumes as well as any ADA and other travel mode accommodation.

Table 6 below lists all the entrance types their descriptions and where that particular entrance type is allowed to have full movements or limited movements depending on the category or scenario.

Table 6: Access Types

Entrance Type	General Description	Categories/Scenarios	Where Full Movement Allowed	Where Limited Movement Allowed
A	Type A are private access connections with traffic volumes equal to or more than 100 trips in a peak hour. Volumes are to be based on a 20th year projection or the build-out of the development, whichever is greater.	R-600	600 ft	600 ft
		R-S/N	No minimum spacing	No minimum spacing
		M-1000	1,000 ft minimum, 1,320 ft preferred	600 ft with restrictive median
		M-600	600 ft	600 ft
		M-300	300 ft	300 ft
		M-S/N	No minimum spacing	No minimum spacing
		Interchange Crossroad 20th year AADT>10,000	Minimum 1,000 ft from ramp bifurcation, 1,320 ft preferred	600 ft if restrictive median present and first full movement is a minimum of 1,200 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT >3,000 and <10,000	Minimum 1,000 ft from ramp bifurcation	Minimum 600 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT <3,000	Minimum 600 ft from ramp bifurcation	Minimum 600 ft from ramp bifurcation
B	Type B are private access connections with traffic volumes between 11 and 99 trips in a peak hour. Volumes are to be based on a 20th year projection or the build-out of the development, whichever is greater. This is typical of multi-family land use, and small to medium businesses with fewer than 50 customers in the peak hour of the business.	R-600	600 ft	600 ft
		R-S/N	No minimum spacing	No minimum spacing
		M-1000	1,000 ft minimum, 1,320 ft preferred	600 ft with restrictive median
		M-600	600 ft	600 ft
		M-300	300 ft	300 ft
		M-S/N	No minimum spacing	No minimum spacing
		Interchange Crossroad 20th year AADT>10,000	Minimum 1,000 ft from ramp bifurcation, 1,320 ft prefered	600 ft if restrictive median present and first full movement is a minimum of 1,200 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT >3,000 and <10,000	Minimum 1,000 ft from ramp bifurcation	Minimum 600 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT <3,000	Minimum 600 ft from ramp bifurcation	Minimum 600 ft from ramp bifurcation

Table 6: Access Types (cont.)

Entrance Type	General Description	Categories/Scenarios	Where Full Movement Allowed	Where Limited Movement Allowed
C	Type C are private access connections with traffic volumes between one and 10 trips in a peak hour. This is typical of farmsteads, limited residential of perhaps seven to ten homes, or low volume commercial with fewer than 50 customers per day.	R-600	600 ft	600 ft
		R-S/N	No minimum spacing	No minimum spacing
		M-1000	1,000 ft minimum, 1,320 ft preferred	600 ft with restrictive median
		M-600	600 ft	600 ft
		M-300	300 ft	300 ft
		M-S/N	No minimum spacing	No minimum spacing
		Interchange Crossroad 20th year AADT>10,000	Minimum 1,000 ft from ramp bifurcation, 1,320 ft preferred	600 ft if restrictive median present and first full movement is a minimum of 1,200 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT >3,000 and <10,000	Minimum 1,000 ft from ramp bifurcation	Minimum 600 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT <3,000	Minimum 600 ft from ramp bifurcation	Minimum 300 ft from ramp bifurcation
D	Type D are private access connections with an AADT of less than one per day. These are usually agricultural access to fields or to utility vaults. Less than one-per day means in an average year the access will experience less than 365 trips. Higher seasonal activity at the access, such as at harvest season, is expected, but not daily activity all year long. If there is daily access use, a type C applies. During busy access use, the permittee must exercise additional care. Additional permit terms and conditions may apply in some circumstances.	R-600	No minimum spacing	600 ft
		R-S/N	No minimum spacing	No minimum spacing
		M-1000	1,000 ft minimum, 1,320 ft preferred	600 ft with restrictive median
		M-600	600 ft	600 ft
		M-300	300 ft	300 ft
		M-S/N	No minimum spacing	No minimum spacing
		Interchange Crossroad 20th year AADT>10,000	Minimum 1,000 ft from ramp bifurcation, 1,320 ft preferred	600 ft if restrictive median present and first full movement is a minimum of 1,200 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT >3,000 and <10,000	Minimum 1,000 ft from ramp bifurcation	Minimum 600 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT <3,000	Minimum 300 ft from ramp bifurcation	Minimum 300 ft from ramp bifurcation

Table 6: Access Types (cont.)

Entrance Type	General Description	Categories/Scenarios	Where Full Movement Allowed	Where Limited Movement Allowed
Public Road Connection	Public intersections are those access connections to dedicated public roads and streets. These are public roads serving multiple properties that are part of the state, county, and municipal networks of public roads to ensure access and circulation for communities and regions of the state. The design of public intersections will use intersection design standards of the Iowa DOT Design Manual based on 20th year traffic volumes as well as any ADA and other travel mode accommodation.	E	with AMP	with AMP
		R-600	600 ft	600 ft
		R-S/N	No minimum spacing	No minimum spacing
		ME	with AMP	with AMP
		M-1000	1,000 ft minimum, 1,320 ft preferred	600 ft with restrictive median
		M-600	600 ft	600 ft
		M-300	300 ft	300 ft
		M-S/N	No minimum spacing	No minimum spacing
		E/ME Interchange	1,500 ft minimum, functional area preferred	1,500 ft minimum, functional area preferred
		Interchange Crossroad 20th year AADT>10,000	1,000 ft from ramp bifurcation, 1,320 ft prefered	600 ft if restrictive median present and first full movement is a minimum of 1,200 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT >3,000 and <10,000	1,000 ft from ramp bifurcation	600 ft from ramp bifurcation
		Interchange Crossroad 20th year AADT <3,000	600 ft from ramp bifurcation	600 ft from ramp bifurcation

2.1.2 Overview of the Access Category System

Of the nine categories of primary highways, five categories are within municipal boundaries due to a statutory requirement that municipal concurrent jurisdiction applies to access approvals pursuant to Iowa Code 306.4(4). This does not apply to freeways and interstates.

The access category designation is determined in advance based on joint discussions between central and district offices and references to the most recently approved 20th year design volume and Commercial Industrial Network maps. Designations within municipal boundaries are determined in a similar manner with municipal concurrence as necessary prior to a permitting decision. Municipal designations take into consideration more variables than simply volume and CIN maps, due to the nature of parcel density within municipalities and more complicated zoning. Municipal designations are a result of balancing mobility, safety, and capacity versus necessary access connections.

Category designations are provided on system maps published by the Department. Changes in a category require the approval of the District and central office. See section 2.11 for the category revision process.

In addition to the volume and other criteria, the choice for designation shall consider system continuity and preservation of traffic capacity and safety. For example, it is undesirable to have a lower access category in rural Iowa if the AADT drops below 3,000 only for a short distance, while the basic function of the road remains the same.

Table 7 below lists the access categories, their description, and where each entrance type is allowed within that category.

Table 7: Iowa DOT Primary Highway System Access Categories

Access Category	General Description	A	B	C	D	Public Road Connection
Interstate and Freeway (I/F)	Controlled-access multi-lane highways.	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Expressway (E)	Multi-lane divided primary highways outside of municipal boundaries where the department has acquired the associated access rights.	Not allowed	Not allowed	Not allowed	Not allowed	Only allowed with AMP
Rural 600 (R-600)	All primary highways on the Iowa Commercial Industrial Network or where the traffic volume will be equal to or exceed 3,000 AADT within 20 years.	Allowed at 600'	Allowed at 600'	Allowed at 600'	Allowed no minimum spacing	Allowed at 600' preferred at section lines
Rural Safety and Need (R- S/N)	Two-lane primary highways outside municipal boundaries that will not exceed 3,000 AADT within 20 years. This category includes frontage roads, service roads, and access ways.	Allowed no minimum spacing	Allowed no minimum spacing	Allowed no minimum spacing	Allowed no minimum spacing	Allowed no minimum spacing preferred at section lines

Table 7: Iowa DOT Primary Highway System Access Categories (cont.)

Access Category	General Description	A	B	C	D	Public Road Connection
Municipal Expressway (ME)	Non-freeway multi-lane primary highways inside municipal boundaries where arterial performance is necessary to provide high mobility and traffic capacity.	Not allowed	Not allowed	Not allowed	Not allowed	Only allowed with AMP
Municipal 1000 (M-1000)	Important regional and intra-city primary highways that are within a municipality, and where system continuity and preservation of a high level of mobility and through traffic capacity are considered a higher priority than access.	Allowed minimum 1,000' and preferred 1,320' and RI/RO allowed at 600' with restrictive median	Allowed minimum 1,000' and preferred 1,320' and RI/RO allowed at 600' with restrictive median	Allowed minimum 1,000' and preferred 1,320' and RI/RO allowed at 600' with restrictive median	Allowed minimum 1,000' and preferred 1,320' and RI/RO allowed at 600' with restrictive median	Allowed minimum 1,000' and preferred 1,320' and RI/RO allowed at 600' with restrictive median
Municipal 600 (M-600)	Primary highways in municipalities that have been determined to have a need to maintain a moderate level of mobility and through traffic capacity.	Allowed at 600'	Allowed at 600'	Allowed at 600'	Allowed at 600'	Allowed at 600' preferred at section lines
Municipal-300 (M-300)	Primary highways in municipalities where a lower level of mobility and through traffic capacity is acceptable.	Allowed at 300'	Allowed at 300'	Allowed at 300'	Allowed at 300'	Allowed at 300' preferred at section lines
Municipal Safety and Need (M-S/N)	Primary highways in municipalities where traffic mobility and capacity are a low priority and safety is a high priority. This category includes frontage roads, service roads, and access ways within a municipality.	Allowed no minimum spacing	"Allowed no minimum spacing"	"Allowed no minimum spacing"	"Allowed no minimum spacing"	Allowed no minimum spacing preferred at section lines

2.1.3 General Provisions for Access

To achieve access program primary goals and objectives, all access permitting decisions within each category will apply the following principles:

- Limit and consolidate direct access on primary highways when possible.
- Affirming that there is a need for the access.
- Topography and geometric constraints shall be considered if not correctable.
- Access connections shall be designed to minimize interference with through- traffic operations and may require the installation of turn lanes to mitigate traffic impacts and support the traffic demand generated at the access connection.
- Where a lower functional road is available, the access should connect to that road.
- Non-traversable medians should be used to manage access movements and minimize conflicts to through traffic.
- Promote uniform full movement intersection spacing to reduce travel delay and crash risk.
- In addition to access category criteria, access is prohibited without exception to all ramps and structures on or connected to any primary highway.

Existing legal entrances will not be required to be brought into conformity with the new administrative rules effective November 9, 2022.

All decisions regarding access to and from the primary highway system, including planning, permitting, roadway design, reconstruction/ modification, and right-of- way negotiation and acquisition, need to meet and be consistent with this access classification system.

Nonconforming, existing legal access to a primary highway will be allowed to remain, unless specific traffic operations and public safety problems are identified, or the access violates the terms and conditions of the original permit.

A significant change in the type or volume of traffic using the existing access connection will require the property owner to apply for a new permit. See Chapter 4 for the permitting process.

Private access operations and safety should not deteriorate over time. While an access connection to a driveway may be legal yet non-conforming with current standards, this does not relieve the property owner from responsibility to maintain safe conditions. A property owner is responsible for a safe access. If the property owner is aware of safety and operational concerns, they should close the access or contact the District office to determine if re-design or reconstruction of the access, or improvements such as signs, shoulders, and sight-distance may be necessary.

2.1.4 Roadway Reconstruction Projects

A publicly funded primary highway reconstruction project is not required to bring all existing access into full compliance with the current access category or designs. Such a project is required to improve access-related design elements to the extent reasonable within the limitation and scope of project design parameters and available public funds. Public projects have limited funds and it is important to prioritize highway improvements to achieve the highest benefit/cost ratio for the investment. Ultimately, the design and operation of the driveway is the responsibility of the owner.

Unnecessary access connections should be closed and multiple driveways should be consolidated by the project. If the roadway edge, curbs, or shoulders are reconstructed, access design should be upgraded to current standards. If the access provided by the project is new, it will be conveyed and recorded as a part of the project. A new access must meet the requirements of Rule IAC 761-112.

2.1.5 Access Rights

The Department has acquired access rights along certain sections of the primary highway system for the purposes of full access control. These rights are usually described in deeds and agreements completed when right-of-way was obtained from the abutting owner. Where access is controlled by deed, there is no right of direct access through the deeded section except at locations, if any, specified in the deed. Even if an access opening is mentioned in a deed or property settlement paperwork, a permit to have a driveway is still required. Any excavation, filling, alteration of any type, any construction activity or encroachment within the road requires a permit.

Where access control by deed exists, the abutting property owner may inquire with the Department about possible access location adjustments or other changes. Where exceptions or openings in a warranty deed exist, all access permitting procedures and standards must still be met. This applies to any existing or new access, reconstruction or change in access use. A permit is required to construct or modify an access connection or to significantly change the use of the access connection. At no time should a change in access use be allowed to exceed the design and engineering capacity of the existing access. Location should be an additional concern. Older access connection may have been allowed close to intersections that are now busy or signalized. The pre-determined opening may not have received a post project field review for sight distance and other necessary determinations. The traffic operations of the access relative to nearby intersections and other access connections must be a consideration in the evaluation for improvement.

No new access rights accrue, and no additional access shall be provided upon the splitting or dividing of existing parcels of land or contiguous parcels under the same ownership or controlling interest unless the proposed access complies with access category and design requirements and is permitted. Adjacent properties under common ownership or control, consolidated for development, or part of a phased development plan shall be considered one assembly and a unified access and circulation plan shall be established for the site.

No rights of access are conveyed when the department provides a new access connection or modifies an existing access connection.

The department has full authority regarding roadway design and operational modifications to the road and all access connections. An access permit does not grant any rights to specific traffic operations at the access. Any user of the access must obey all traffic laws once within the primary highway right-of-way. There is no property right to left turns at an access. How traffic is managed by roadway design and traffic control devices is entirely the authority of the department.

2.2 Interstate and Freeway (I/F)

2.2.1 Purpose and Function

This classification applies to all controlled-access arterial highways with full access control designed for uninterrupted, unimpeded high-speed traffic flow. All opposing traffic movements are separated by physical constraints such as grade separations and non-traversable median separators. These roadways have the capacity for high speed and relatively high traffic volumes over medium and long distances in an efficient and safe manner. A minimum traffic volume is not a prerequisite. Interstate highways and other primary highways with full control of access are typical of this classification. This priority applies to Interstate and state freeways, and those portions of a bypass and any other road sections where full control of access has been acquired.

2.2.2 Criteria for Granting of Access

Private direct access to a freeway is prohibited without exception. Access to category I/F shall be rigorously controlled and is limited to directional ramps. All ramps shall be suitably spaced and designed to provide the minimum differential between the speed of the through traffic stream and the speed of the merging or diverging vehicles. As speed differential increases, the risk of a crash and the impact on traffic flow increases. Increasing speed differential at exit and entrance ramps also reduces near lane capacity and frequently results in vehicles in the near lane needing to change lanes to accommodate a slower vehicle most often at a ramp entrance.

Any direct access for Department authorized construction activity shall be strictly controlled and within the authorized project construction zone in accordance with approved traffic control plans. Access, if necessary, for temporary purposes, should only occur within the construction zone.

To handle special encroachments, access onto freeway right-of-way may be permitted by special Department license or agreement if approved by the FHWA and the Director where such access will not connect to the main roadway, and may be for such purposes as bike and pedestrian paths, drainage, underpasses, overpasses, utilities and related public necessities which will not connect to or interfere with the main roadway, ramps, or cause any type of highway safety, operational, or design deficiencies.

2.2.3 Access Type and Design

Right turn deceleration tapers and full width deceleration lanes are required at all off-ramps. The length of the deceleration lane should be based on achieving low speed differential at point of departure from the through lane.

A portion of an on-ramp acceleration lane should be parallel and immediately adjacent to the traveled way of the freeway to facilitate safe merging maneuvers. Direct tapers should not be used. The parallel length beyond the gore nose should be no shorter than a standard calculated merge distance with allowance for the percentage of trucks. As freeway traffic density increases and there are limited gaps in through traffic, longer merge distance becomes more important.

Any other public facilities for travel modes such as public transportation stops, pedestrian crossings, multi-use paths and cycle lanes that may be within the right- of-way must be physically separated or there must be a physical barrier between the freeway roadway and the other facility.

Freeway ramps are an integral part of the freeway and are designed to provide a safe and operational transition between local streets and freeway speeds. Access connections on these ramps are strictly forbidden.

2.3 Expressway (E)

Expressways play an important role in Iowa. They are critical primary highway non- freeway links between communities and rural areas and are often primary feeder routes to freeways. These primary highways provide for interstate, interregional, intercity, and intracity travel needs. They support intra-state and interstate commerce for the Iowa Commercial Industrial Network. They are important for public safety in emergencies such as severe weather and for the regional movement of large vehicles moving commodities and other freight.

Access to these primary highways shall be designed to maintain the per-lane capacity for high-speed traffic volumes, smooth long-distance traffic flow, low crash rates, and operate in an efficient and safe manner.

Full control of access along property frontage with a minimum number of public access connections is typical of this classification. Expressway category highways should have a restrictive median with openings in the median only where necessary in accordance with 'E' access criteria.

A minimum traffic volume is not a prerequisite. Expressway function is to provide uninterrupted, high-speed and safe traffic flow between key destinations.

Direct access service to abutting land is subordinate to providing service to through traffic movements.

Expressway category should be applied to any multi-lane divided primary highway where access rights have been obtained. This designation is usually for four lane highways with partial access control where there are access openings for public streets and private access openings to property are very limited to the extent feasible. Such private access should be closed as soon as alternative access is available.

2.3.1 When to Allow Access to an Expressway

The standard for the spacing of public road connections is on one-mile intervals. One-half mile spacing may be allowed but is subject to turning restrictions if operational or safety problems may or do develop. A public intersection should tie into the secondary highway system on section and half-mile section lines. The location should serve as many properties and interests as possible to reduce the need for additional direct access to the roadway.

An access management plan is required to authorize a new public road connection.

Adjustments to the location of an intersection may be necessary due to topography, established property ownerships, unique physical limitations and/or unavoidable or pre-existing historical land use patterns and physical design constraints.

Traffic signals should be rare; however, if authorized, one-mile spacing is required. A traffic signal on an expressway should not be within one mile of an expressway interchange. No traffic signal location shall be authorized without the completion of an acceptable analysis of traffic signal system operation, design and safety as well as meeting MUTCD signal warrants.

Grade-separated intersections with ramp connections are recommended if the cross street has higher or is growing in traffic volumes.

All at-grade public intersections shall have both right and left turn lanes where turns are warranted. If an interchange, entry and exit ramps shall have speed change lanes. Deceleration length shall be sufficient such that the speed differential of a decelerating vehicle in the through lane need not be more than 10 mph. The queue storage distance for left-turn lanes will be provided based on 90-percentile or greater storage demand.

Any temporary direct access for construction activity must be within the authorized project construction zone and in accordance with approved traffic control plans.

No new private access shall be permitted across existing access control lines that has not already been authorized by a warranty deed or property settlement agreement. Private access shall not be otherwise permitted.

No new access connections will be permitted for utilities that have not been previously authorized.

Parking is not permitted on the roadway or roadside areas unless an emergency or at locations that are specifically identified and accommodated by the Department such as roadside historical sites.

No access should be allowed within the functional area of any intersection, ramp or interchange.

When direct private access must be provided that does not meet spacing requirements, it should not be considered permanent. The following term shall be included in the permit; “the access shall be closed when other reasonable access to a lower functional classification street or roadway is available and permitted”. The access permit may specify under what circumstances the closure will be required if known at the time of permitting.

"Limited movement connection" means that the access may be for right turns only or might include a median opening that allows a left-in turning maneuver but no left out turn.

Where local regulations require a secondary access to provide for emergency services, the Department will not allow the emergency access across an access control line. The owner will need to find another alternative.

2.4 Rural 600 (R-600)

2.4.1 Purpose and Function

This category applies to two-lane and multi-lane primary highways outside municipal boundaries that are on the most recently approved Iowa Commercial Industrial Network or where roadway traffic volume will be equal or greater than 3,000 AADT within 20 years.

These roads are to maintain the capacity for medium to high speeds in an efficient and safe manner. These roads are important in the movement of people and goods between communities and provide for long distance travel in many areas of the state where expressways are not available. Normally, capacity for traffic volumes should not be a problem. In access decisions, emphasis should be placed on access design, sight distance, spacing, maintaining roadway capacity and minimizing impacts to the roadway. Direct access service to abutting land is subordinate to providing service to through traffic movements.

2.4.2 When to Allow Access on R-600

Access types A, B and C may be permitted where the applicant can prove necessity and have a minimum spacing distance of 600 feet from other access connections.

Access type D should meet preferred sight distance and must meet minimum sight distance requirements. A change in the use of the field access type D, exceeding an AADT of one per day, will require that the access be closed or converted to a higher access type and meet spacing standards for the category.

An access connection should not be permitted within the functional area of any public road connection.

Public road connections should be located at survey section lines when feasible. Each full-movement location should serve as many properties and interests as possible to reduce the need for additional direct access to the primary highway. Preference shall be given to public road connections. Private access should not interfere with the permitting of public intersections and should not interfere with access to other nearby properties.

The spacing of all public intersections and other significant access connections that will be full movement is one-half mile intervals and based upon section lines where feasible. Future and current access connections that do not occur at the one-half mile may be restricted to right-turns-only if and when the road is reconstructed to multi-lane or an expressway facility.

If the access is full movement, the permitting of access does not ensure the access will remain full movement if the road is reconstructed to multi-lane, an expressway or an access management plan is implemented that calls for movement restrictions.

For residential property, if the property abuts or has access to a lower classification street or road by way of an internal street or road system or dedicated rights-of-way or easements, any access connection to the primary highway shall be considered as an additional access. Access shall not be granted if the parcel is a part of a subdivision or multi-use planned development with internal circulation or the parcel has cross-easements or other internal and shared access ways available.

When the access request cannot prove necessity or will not meet location or design standards the access should be denied.

2.5 Rural Safety and Need (R-S/N)

2.5.1 Purpose and Function

This category applies to two-lane primary highways outside municipal boundaries that will not exceed 3,000 AADT within the next 20 years. This category includes frontage roads, service roads, and access ways with no volume limitation. These are open roads with low traffic volumes. These roads do not provide for any significant regional travel needs but often serve as vital connections to higher functional class highways. Traffic capacity should not be a problem. In access decisions, emphasis should be placed on access design, sight distance, spacing and minimizing impacts to the roadway.

2.5.2 When to Allow Access on R-S/N

The recommended spacing of all intersecting public ways and other significant access connections that will be full movement is one-half mile intervals and based upon section lines where feasible. Public access connections that do not occur at the one-half mile may be restricted to right-turns-only in the future if the road is ever reconstructed to multi-lane or an expressway facility.

Location of intersections and private access shall consider topography, established property ownerships, unique physical limitations and or unavoidable or pre-existing historical land use patterns and physical design constraints with a reasonable attempt to achieve access spacing requirements and serve as many properties and interests as possible to reduce the need for additional direct access to the highway.

It is recommended for access connections on highways with speeds in excess of 40 mph, that access types A and B be separated by intervals of 600 feet and that access types C and D be separated by intervals of 300 feet. This spacing is to reduce overlapping turning conflicts, provide more time for driver decision making, reduce sight distance interference, and minimize the occurrence of higher speed differential.

Private access should be located so as not to interfere with the permitting of public intersections and should not interfere with access to nearby properties.

Access should not be allowed within the functional area of any public intersection.

Roadways that are frontage, service roads, or access ways, (collectively "SR"), should follow R-S/N requirements with the following exceptions. Because a "SR" function is not an arterial, property access has priority but may not cause traffic problems and may not compromise design and safety requirements.

When such a roadway (SR) has a junction with a primary highway with access control, access control may be extended from the primary highway connection along the SR radius and throat to help manage primary highway intersection operation and safety.

Frontage, service roads, or access ways, should have low posted speed limits to provide flexibility in design requirements, increase the margin of public safety and reduce the potential severity of crashes.

Additional access may be granted to an ownership where the additional access meets spacing criteria would not knowingly cause a hardship to an adjacent property or interfere with the operation of other roads.

If the frontage road proceeds into private property, the applicant may be required to provide a cul-de-sac or similar design function that will provide for the safe and convenient U-turns of vehicles within public right-of-way not wishing to enter the private property.

2.6 Municipal Expressway (ME)

2.6.1 Purpose and Function

Municipal Expressway (ME) category applies to non-freeway multi-lane primary highways inside municipal boundaries where arterial performance is necessary to provide high mobility and through traffic capacity. The department may have acquired access rights.

These are high priority highways where traffic demands are expected to grow and through traffic capacity and performance need to be preserved to the extent feasible. They usually provide for urban, intercity and intracity travel needs.

Direct access service to abutting land is subordinate to providing service to through traffic movements.

A non-traversable median with well-spaced, channelized median openings is recommended to reduce mid-block left-turn conflicts.

2.6.2 When to Allow Access on an ME

Access locations should be based on a defined access management plan that establishes access locations and allowable traffic operations and controls to maximize the through traffic efficiency, safety and capacity of the road.

In the absence of an access management plan, no private access shall be permitted that has not already been authorized. An access management plan is required to authorize a new public road connection, and which may be allowed if the public road is adopted and accepted as a street by the city.

In preparing an access management plan, access locations and designs included should not degrade the performance of the ME. A high degree of traffic through-put performance and safety should be the goal of the plan as this is the purpose of an ME.

When there is a reconstruction project, existing access connections that do not meet an adopted access plan should be closed, have restricted turning movements or otherwise modified to meet the plan or to improve their safety and operation. If the design or engineering for the access is not current, such as sight-distance deficiencies or within the influence area of an intersection, improvements should be made, relocation considered, and sight distance limitations be corrected.

Access may be restricted to right-in, right-out turns only or directional left-in only as access volumes increase. Non-traversable medians should be used between full movement intersections to manage access movements and minimize conflicts to through traffic.

Traffic signal locations may have half-mile spacing internals, one mile is desirable.

Location of public access connections shall be determined with consideration given to the municipal street system, topography, established property ownerships, unique physical limitations and or unavoidable or pre-existing historical land use patterns and physical design constraints with a reasonable attempt to achieve required intersection spacing.

Each access connection should serve as many properties and interests as possible to reduce the need for additional direct access to the road. In selecting locations for full movement intersections, preference shall be given to public ways.

If a proposed access meets some requirements but cannot meet design standards the access may be denied if absent the proposed access the property has reasonable alternate access available to the general street system.

Where the property abuts or has access to a lower classification street by way of an internal street system or dedicated rights-of-way or easements, any access to the ME shall be considered as an additional access (e.g., a residential lot within a subdivision where local internal residential streets are provided). Access shall not be granted if the parcel is a part of a subdivision or multi-use planned development with internal circulation or the parcel has cross-easements or other internal and shared access ways available. Necessity for access must be proven.

Where local regulations require a secondary access to provide for emergency services, access to the ME shall not be provided if an access control line is present.

Left turns at any access connection may be restricted if, in the determination of the Department or the local authority, the movement creates an unacceptable operational problem or safety hazard. Left turns shall be prohibited if a non- traversable median is already established and the proposed opening in the median does not provide the general public any significant benefits to road traffic operations and safety or would be counter to the purpose of the median construction.

2.7 Municipal-1000 (M-1000)

2.7.1 Purpose and Function

M-1000 category applies to important regional and intra-city primary highways that are within a municipality where joint jurisdiction applies. Designation of M-1000 includes system inter and intra-city network continuity and preservation of a high- level mobility and through traffic capacity within the municipality. These are priority highways where traffic demands are expected to grow, and capacity and performance need to be preserved to the extent feasible.

The department recommends the installation of restrictive medians between full movement intersections.

Direct access service to abutting land is subordinate to providing service to through traffic movements. In urban areas access management criteria must focus on both capacity and safety.

2.7.2 When to Allow Access on M-1000

The Department recommends the installation of restrictive medians between full movement intersections. Access locations may be based on a defined access management plan. In the absence of a plan, the following spacing criteria applies.

All access types are eligible for a full movement access connection at 1,320 feet (1/4 mile) locations based on section lines where feasible, and may be restricted to right- in, right-out turns or directional left-in-only as access volumes increase. Preference shall be given to public road connections.

A minimum spacing interval of 1,000 feet should only be permitted if there is a documented necessity.

Each full-movement location should serve as many properties and interests as possible to reduce the need for additional direct access to the road.

All access types are eligible for limited movement connections at minimum spacing intervals of 600 feet if a restrictive median is present.

A non-traversable median with well-spaced, channelized median openings is recommended to reduce mid-block left-turn conflicts.

No access connection should be allowed within the functional area of a public road connection.

Access may be restricted to right-in, right-out turns only or directional left-in only as access volumes increase.

If the proposed access cannot meet design standards the access may be denied if the property has reasonable alternate access available to local streets as part of the general street system.

Where the property abuts or has access to a lower classification street by way of an internal street system or dedicated rights-of-way or easements, any access to the primary highway shall be considered as an additional access (e.g., a residential lot within a subdivision where local internal residential streets are provided).

Left turns may be restricted if, in the determination of the Department or the local authority, the movement creates an unacceptable operational problem or safety hazard. Left turns shall be prohibited if a non-traversable median is already established and the proposed opening in the median does not provide the general public any significant benefits to primary highway traffic operations and safety or would be counter to the purpose of the median construction.

Where local regulations require a secondary access to provide for emergency services, the Department may allow an emergency access to the primary highway if it is not feasible that the emergency access be provided from a local street. Such an access shall not be open for non-emergency uses and shall be maintained by the permittee as a closed access except during emergencies.

2.8 Municipal-600 (M-600)

M-600 category applies to primary highways that have been determined to have a need to maintain a moderate level of mobility and through traffic capacity.

Standard spacing for all access types is 600 feet.

Because access location and design in urban areas require flexibility due to topography, historical land use, parcel frontage and existing development, it is recommended that posted speeds be at or below 35 mph for roadways designated Municipal-600 to increase the margin of public safety and reduce the potential severity of crashes. This also allows roadway design to be based on lower speeds resulting in shorter dimensions and more accommodating of urban conditions.

Allowing access and selecting access locations should be based on necessity and achieving sufficient sight distance between access connections.

The use of traffic signals should be limited.

No access should be allowed within the functional area of an intersection. If the access needs to be allowed, it should be as far from the intersection as feasible to reduce conflicts and maximize safety. Left turns should be restricted. Every effort should be made to keep the access beyond the intersection queue distance if a signal is present. Spacing between access connections should be sufficient to avoid queues from other access connections and protect nearby public intersection safety and operation.

2.9 Municipal-300 (M-300)

M-300 category applies to primary highways where a lower level of through traffic movement is acceptable.

There should be a necessity for the access. No more than one access per parcel should be permitted. Standard spacing for all access types is 300 feet.

Public intersection locations should be based on the municipal street plans. Adding a new public street connection should be approved by the municipality first.

The access shall not create a significant safety problem or significantly degrade traffic operation. The access should not cause a hardship to an adjacent property of interfere with the operation of the local street system. If the property has reasonable access to the side street, the access to the primary highway will be considered as an additional access.

The functional area of a signalized intersection should be avoided. At a minimum the distance of the estimated 95th percentile signal queue should be avoided. No left turns in or out should be permitted where the access will be within the signal queue distance.

Spacing between access connections should be sufficient to avoid access connection queues and protect intersection operation.

2.10 Municipal Safety and Need (M-S/N)

The municipal safety and need category applies to primary highways within municipalities where motor vehicle mobility and through traffic capacity is a low priority.

Granting of access and determining access connection locations shall be based on safety and need. Consideration for safety include sight distance, proximity of other access connections and their turning conflicts, and sufficient distance away from public intersections especially if signalized.

Spacing between access connections should be sufficient to avoid intersection queues and not interfere intersection operation. Spacing of 200 to 250 feet is recommended. Ideally access connections should be spaced so that the functional area does not overlap between them.

The access shall not create a significant safety problem or significantly degrade traffic operation. The access should not cause a hardship to an adjacent property of interfere with the operation of the local street system. If the property has reasonable access to the side street the access to the primary highway will be considered as an additional access.

No more than one access should be permitted unless there are on-site difficulties that cannot be resolved.

Turning movements may be restricted for safety and operational reasons.

Access location and design in urban areas requires flexibility due to topography, historical land use, parcel frontage and existing development. For this reason, and due to the presence of non-motorized travel modes, it is recommended that posted speeds be at or below 30 mph for roadways designated Municipal Safety and Need to increase the margin of public safety and reduce the potential severity of crashes. This also allows roadway design to be based on lower speeds resulting in shorter dimensions and greater accommodation of urban conditions.

State roadways within municipalities that are frontage, service roads, or access ways, (collectively “SR”), should follow M-S/N requirements with the following exceptions. Because a “SR” function is not an arterial, property access has priority but may not cause traffic problems and may not compromise design and safety requirements.

When such a roadway (SR) has a junction with a primary highway with access control, access control may be extended from the primary highway connection along the SR radius and throat to help manage primary highway intersection operation and safety.

Additional access may be permitted to an ownership where the additional access meets spacing criteria, is proven to be necessary, and would not knowingly cause a hardship to adjacent properties or interfere with the operation of other roads and streets.

If the frontage road proceeds into private property, the applicant may be required to provide a cul-de-sac or similar design function that will provide for the safe and convenient U-turns of vehicles within public right-of-way not wishing to enter the private property.

2.11 Category Revisions

From time to time it may be necessary to change an assigned access category due to changes in roadway conditions and traffic growth. Growth is not a reason to lower the category. Growth may be a reason to choose a higher functioning category so the highway can better accommodate increased demands. The revaluation of the category should be made carefully using the same safety and performance goals and in the same manner of the original assignment.

Certain segments of significant highways may be identified or scheduled for major improvements such as reconstruction from an expressway to a freeway or the reconstruction of an at-grade primary highway to a higher function and capacity due to significant or anticipated land development and traffic growth.

If an at-grade highway will be improved to accommodate traffic growth or safety considerations, the anticipated access category of the highway after the improvement is completed shall be applied. It is important that current access decisions protect the performance of the current highway for as long as possible pending reconstruction and that current access decisions not cause significant problems for the redesign and reconstruction process.

Either the District or Traffic and Safety Bureau can initiate discussions for a category revision. This discussion may be a meeting, or e-mail chain. The District shall draft a report surmising the reasoning for the revision, the name of the segment route, the start and end of the segment up for revision, the original segment category, and the proposed segment category. This report may look similar to a Staff Action. Once District staff and Traffic and Safety staff have reviewed the report the Assistant District Engineer or District Engineer and the Access Management Administrator or State Safety Engineer must sign the report to approve the revision. Once the report has both signatures the revision will go into effect immediately, and the Access Management Administrator will file the report, and send a copy to the GIS Coordinator to update the Access Category layer in ArcGIS.

2.11.1 Upgrading to Freeway

If the primary highway is identified for a future freeway or access-controlled expressway, new private access should be denied. An access management plan should be prepared to determine interchange locations and to assist in anticipating greater access controls along the interchange crossroads. The access plan should identify how local streets should be planned for local circulation and access. The plan should identify how current private access will be brought into conformity with the new access category.

Intersecting roads that will be future interchange locations should be managed to keep access connections away from future ramp intersections. To help with the transition, a corridor access management plan including an interchange access management plan should be completed as soon as possible.

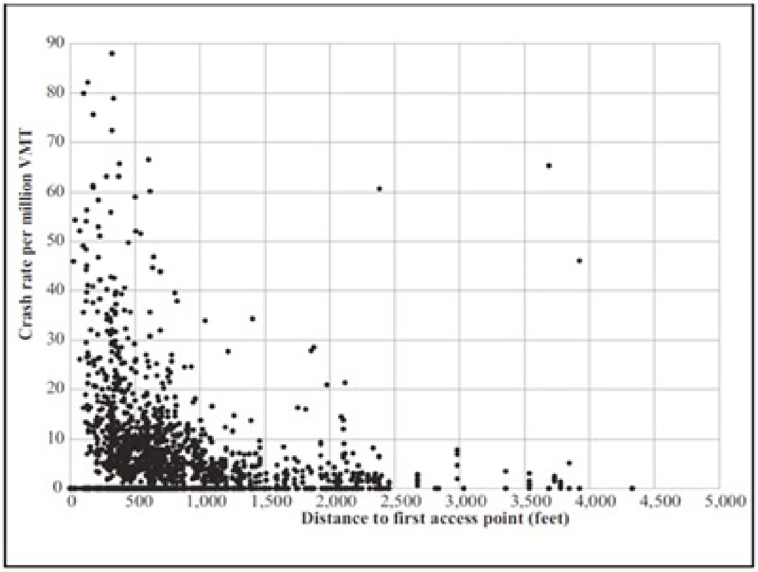
2.12 Interchange Area Access Control

Freeway and expressway interchanges represent significant capital investments. They are also valuable locations for development and as such, can be economic resources for communities. An interchange can offer a quick connection to an efficient freeway or expressway for long distance travel providing travel efficiency for commuters, freight haulers, commodities, and industry. For retailers, the proximity of the freeway provides a larger market area. The higher traffic volume associated with an interchange area is attractive to travel related businesses such as service stations, restaurants, hotels, and retail businesses.

When access and circulation near an interchange is not carefully managed, it can lead to congestion, excessive delay, capacity bottlenecks, a significant increase in crashes, and adversely affect development opportunities. It can also disrupt traffic flow on freeways and expressways, as well as connecting roadways, and result in the need for costly reconstruction projects (Land, 2002).

Crash research by Iowa State University (2017) shows a measurable increase in crashes in the last 2,000 feet approaching an interchange. This research is discussed in chapter 1 and the complete report is included in the appendix.

Figure 21 Crash rate per million VMT compared to the distance to the first access connection on the cross street



Source: Barrette, T. P., Warner, J., Thompson, P., & Savolainen, P. T. (2018). Access Separation at Interchanges: Examining Crash Rates on the Cross-Street and in the Transition Areas from Full to Partial Access Control. Transportation Research Record, 2672(17), 1–10. https://doi.org/10.1177/0361198118795668

Some drivers who exit a freeway and intend to use one or more of the services offered are unfamiliar with the area. Too many choices in close proximity to the interchange exit can create confusion, increasing the potential for sudden decisions, erratic movements, and crashes. An uncluttered environment, with consolidated signage, median controls, and unified access and circulation to development will reduce driver confusion and improve driver safety at these locations.

The best way to manage access and support development of the interchange area is through the provision of a connected street network. Internal streets support circulation in the developed area and open larger areas of the interchange quadrants to additional development. Limited access on the interchange crossroad protecting the long-term function of the interchange and highway thereby ensuring arterial capacity for greater development without increasing congestion and crash rates.

Figure 22: Interchange area with limited crossroad access, but with good local street circulation supporting retail developments (Mississippi)

2.12.1 Managing Access on Interchange Crossroads

The traffic influence area of an interchange can extend for at least a one-half mile radius. This area requires special attention for access management. Signalized intersections too close to interchange ramps can cause heavy volumes of weaving traffic, complex traffic signal operations, and traffic queues that impact mainline safety and operations (NCHRP Report 420, 1999). Driveway access and median openings near interchange ramps further compound these issues. (ISU 2017).

In addition to any interchange justification report and design plans, it is necessary to manage access connections along the main highway and along the crossroad to help maintain the performance and safety of the interchange functional area. New and reconstructed interchange projects shall be reviewed to see how access should best be managed, and a letter drafted to report findings and decisions.

2.12.2 Where to Permit Access on the Crossroad

The preferred strategy for interchange access management is to establish an interchange access management plan for the crossroad, as discussed in more detail in Chapter 5. Such a plan is particularly important if the interchange is within the jurisdiction or at the fringe of a growing city. If an access management plan is developed, it should be reasonably consistent with the following location and limitation criteria. In the absence of such a plan the assigned access category and the following access criterion will be applied to crossroads.

If the crossroad AADT is expected to exceed 10,000 in the 20th year, spacing to the first full movement access connection should be at least 1,320 feet as measured from the ramp bifurcation. A minimum of 1,000 feet may be allowed for a full movement intersection if there is a proven necessity. A restrictive median may be required between the ramps and the full movement intersection. If the first full movement intersection is at least 1,200 feet and a restrictive median is present and there is a necessity for the access, a right-in, right-out access may be permitted at a minimum of 600 feet from the ramp. If a functional area analysis is prepared, the ramp functional area should not overlap with the functional area of any access connection.

When the crossroad AADT will be between 3,000 and 10,000, within 20 years, the first full movement should be at least 1,000 feet away from the ramp. All access types may have a restricted connection if at least 600 feet away from the ramp bifurcation.

When the crossroad AADT will not exceed 3,000, within 20 years, public road connections and private access types A and B should be at least 600 feet away from the ramp. Types C and D should be at least 300 feet from the ramp and may be subject to operational restrictions.

All proposed access connections must also meet the requirements of the assigned access category if the crossroad is a primary highway. Proof of necessity is always a requirement. While the criterion of this section provides guidance for accommodating assess to development, it is important to remember that every access connection does to some degree diminish roadway safety and operations.

For any new interchange or interchange reconstruction, access control, access rights by deed, should be acquired and extend a minimum of 600 feet away from the ramp bifurcation. If the crossroad AADT will exceed 10,000, within 20 years, a minimum of 1,000 feet of access control is required.

When acquiring access rights as part of a highway project, the department may acquire access rights along highways that intersect the interchange crossroad near the ramps to protect the operation of the crossroad intersection. The access control should extend a distance of 150 feet from the near edge of the primary highway traveled way. The department may acquire more or less than 150 feet of access rights after considering the intersection functional area, traffic volumes, and other operational factors. Keeping side road access away from the primary intersection helps prevent side road access queues from spilling back to the main highway. Of particular concern would be if there is a left turn into a driveway immediately downstream from the intersection.

When reconstructing a two-lane highway near an interchange, left turns should either be accommodated with the addition of a median two-way-left-turn-lane, or turning movements controlled by a restrictive median depending on the traffic volumes, operational needs and prior crash history. Where feasible, the crossroad should include a restrictive median extending from the interchange to the first full movement intersection. When the crossroad volume will exceed 10,000 AADT, a restrictive median should be installed for at least 600 feet.

Figure 23: Access control near interchange ramps
Figure adopted from AASHTO GB 2018 figure 10.2

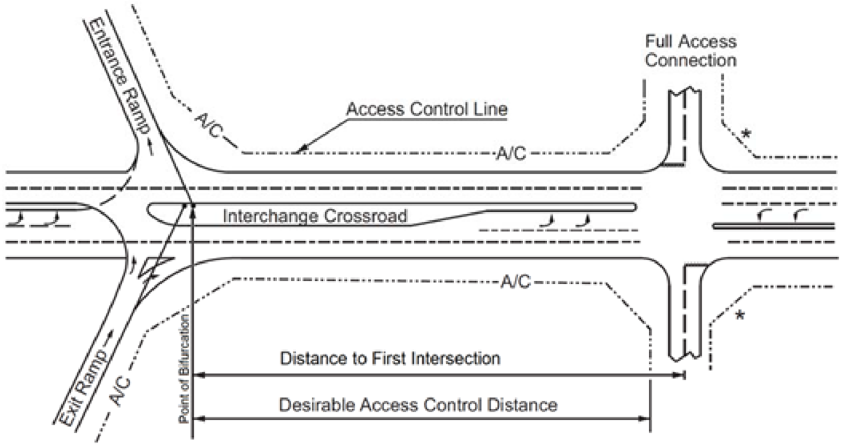
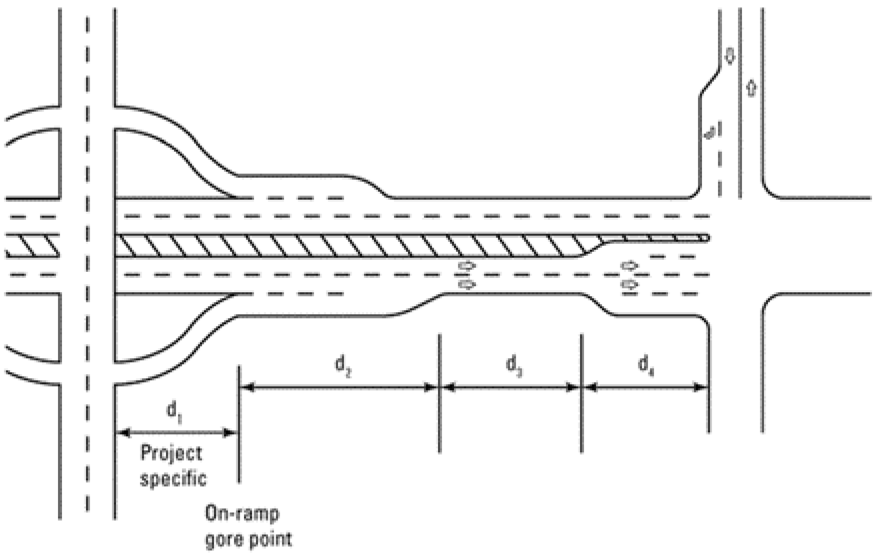


Figure 24. First access on an expressway.
See the Design Manual for further details.



Source: Adopted from the National Academies of Sciences, Engineering, and Medicine 2022. Access Management in the Vicinity of Interchanges, Volume 2: Research Overview. Washington, DC: The National Academies Press. https://doi.org/10.17226/26501.

2.12.3 Access to an Expressway prior or after an Interchange

When it is necessary to allow an at-grade access connection on an expressway near an interchange, the first access connection location will be determined by calculating the functional areas of the expressway ramp and the first at-grade access connection. The two functional areas shall not overlap. The functional area of the ramp will extend no less than 1,500 feet from the end of the taper (d3) on figure 24. The first access should be a public road connection. Access turning movements may be restricted for operational reasons.

As stated elsewhere, no access may be permitted across an access control line i.e. where the Department owns access rights. The access must also meet the access category location and spacing requirements. The first access may be located where the access category allows or where the access control line ends, whichever is greater.

	Activity
d_1	Distance from the crossroad to the painted nose of the on-ramp gore
d_2	Parallel distance to accelerate and weave into the outside traffic lane
d_3	Distance to weave from outside traffic lane into the inside traffic lane, and to anticipate conflicts approaching the intersection
d_4	Distance to transition into a left-turn deceleration lane and or to decelerate to a stop

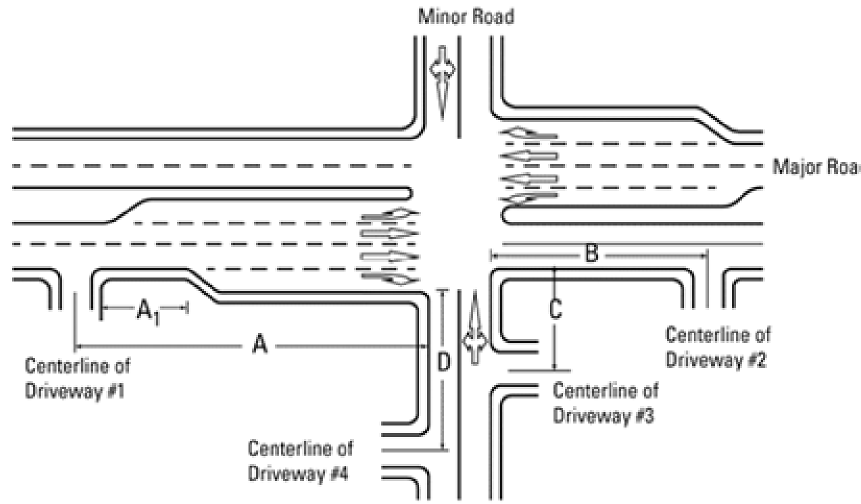
2.13 Access Near Highway Intersections

Public intersections on primary highways are important and are also often the location of higher congestion and crash frequency due to their level of traffic activity, greater driver workload, and frequent turning movements. The operation of an intersection is defined by the determination of the functional area. The functional area of an intersection extends both upstream and downstream from the physical intersection area and includes the cross street functional area (figure 25). No access connections should be allowed within this functional area. The procedure for determining upstream and downstream functional distance is provided in the Iowa DOT Design Manual. Access beyond the functional area remains subject to the requirements of the access category location standards.

The department may acquire access control along primary highways intersecting with another primary highway for a distance of 150 feet from the edge of the traveled way on highways that carry less than 3,000 AADT and up to 300 feet if the connecting highway AADT exceeds 3,000.

When access rights to an at-grade primary highway are acquired, the department may also acquire access rights along any intersecting municipal street or secondary road. Access control should extend for a distance of 150 feet from the near edge of the primary highway traveled way. The department may acquire more or less than 150 feet of access rights after considering the impact of access changes to adjacent properties, the intersection functional area, traffic volumes, intersection operation and safety factors.

Figure 25: Access connections near an intersection



Source: Adopted from Abu Dhabi Access Management Policy and Procedures, 2016

2.14 Access Management Plans in Relation to Access Categories

Access management plans, as separate documents or as part of a corridor study, provide a method to establish a unique plan tailored to the needs of the subject highway and access to the adjoining land use. The underlying access category, the long-term functional purpose and the predicted capacity demands on the corridor should be the primary guidance to determine the level of highway performance required to serve the area. These plans shall be based on an analysis using generally accepted professional practice standards and will apply corridor specific access management techniques and support network and traffic control features to help ensure long-term functional performance. See Chapter 5 for detailed guidance on Access Management Plans.

In a municipality, an access management plan will be developed in coordination with the local authority. In the adoption of such plans, the department shall work with the affected local governments to involve abutting property owners. After consideration of stakeholder and public input, the department shall, in cooperation with the affected local government, finalize and approve the access management plan which will then substitute for the access category priority classification and constitute advance municipal approval as long as any permit issued is in conformance with the approved access management plan (see also Section 5.1).

Examples of access plans and a table of contents for a typical access plan can be found in the appendix and will be updated every 5 years. The scope of the plan should be appropriate for the scope of the problem and the length of the highway segment within the plan. A plan should not be used simply to allow an access that would not be permitted by the access category. The purpose of access plans is to ensure both highway operational performance and public safety to the degree that is identified by the assigned category. An access plan should not degrade performance. It should be an effort to find the best solution to existing complex conditions that cannot be otherwise resolved by using access category criteria.

3. ACCESS LOCATION & DESIGN

3.1 Introduction

The primary source for access design standards is the Iowa DOT roadway design manual. This Chapter 3 of the AM Manual is a guide for on-site field reviews and can be used for analysis by both applicants and DOT staff.

Primary decision strategy: The location and design for each access connection must be carefully evaluated in order to determine a location with the least safety and traffic operational impact on the primary highway.

Major considerations in determining the proper location for an access connection are:

1. Compliance with access category location criteria;
2. Spacing from other connections to reduce turning and path overlaps;
3. Meeting or exceeding sight distance requirements;
4. Meeting functional intersection area spacing requirements;
5. Choosing a location that can accommodate the design of the access including access vertical profile and sufficient turn-lane length if right or left turn lanes are required;
6. Choosing a location where a driver on the roadway is able to identify the location and geometrics of an access connection before reaching the connection.

3.1.1 Application of Engineering and Design Criteria

The standards in the Iowa Design Manual are to be applied in the management of access connections. Where minimum design criteria are provided, minimum values shall be avoided unless there is a necessity for their use, as determined by an analysis of design, operation and safety trade offs. The use of minimum design means providing only a minimum of acceptable capacity, a minimum level of acceptable safety and a minimum mitigation of adverse impacts. The use of minimum standards also leaves little room for analysis errors, traffic growth or unanticipated changes. Therefore, minimum standards are to be avoided if feasible. If minimum standards cannot be met, the access should not be approved. If minimum stopping sight distance cannot be met, the permit shall not be approved.

Use of the public rights-of-way for access purposes shall not interfere with future reconstruction of the highway. Access design should prevent excessive use of the right-of-way when less use is feasible, such as not allowing a driveway to have a significant grade adjustment within the right-of-way when it is feasible to adjust the grade of the driveway beyond the right-of-way boundary.

Traffic volume calculations should be based on the 20th year AADT of the roadway and the build out of the property served. This helps to ensure that the engineering of the driveway design specified in the permit is not exceeded by growth in traffic volumes.

Speed, as discussed in this section, refers to the posted legal speed limit at the access location at the time of permit processing unless otherwise noted. The criteria provided herein and in the Design Manual may use a higher speed factor than the posted speed in order to maintain adequate roadway design speeds, which may be 5 to 10 mph greater than the posted speed. This creates a margin of safety on the assumption that a percentage of drivers are exceeding the speed limit.

3.1.2 Design Relationship to the Highway Access Classification System

The Design Manual does not address access categories. If the access category of the highway allows a direct access connection to the roadway, the location and design of that access shall be consistent with the requirements in the Design Manual. If a proposed access meets the requirements of the access category and is unable to comply with location and design criteria, including consideration of variances, the access permit should be denied.

The EOT conducting a plan and field review of a proposed or existing access may use this Chapter 3 for guidance. Should there be any questions or concerns, the EOT should consult a design engineer for application of the Design Manual.

3.2 Driveway Location and Sight Distance

The assigned access category provides location requirements but does not account for the topography of the road which might cause limitations for sight distance and have other constraints. It is important that sight distance requirements be met. After determining the location based on the access category, adjust the location left or right if necessary, to meet sight distance requirements. Spacing between access connections is secondary to sight distance. Just because an access meets spacing requirements does not mean that the access should be granted. If sight distance is not met, but spacing requirements are met then the permit would be denied.

Driveways must be located to provide all drivers with sufficient sight distance to safely operate their vehicles and avoid conflicts.

Stopping sight distance (SSD), is the distance needed for a vehicle to brake to a “hurried” stop. It is the limiting condition for a driver on the roadway. SSD consists of driver perception and reaction time and braking distance.

Intersection sight distance (ISD), provides the driver in the access connection adequate view of traffic to perceive a sufficient gap in traffic to allow safety entering onto the highway. The driver at a driveway must be able to judge the speed and rate of closure of approaching vehicles and select an appropriate gap to execute the intended maneuver (e.g., turn onto or cross the roadway).

If the field measurements are less than the SSD and ISD distances, the access should be moved until both distances can be met. It there are difficulties, or the field measurements are marginal, the EOT will consult a Department design engineer.

Permits shall not be issued that include any design element, or allow any turning movements, or place the access where the stopping sight distance is not adequate to allow the safe movement of a motorist using or passing the access.

3.2.1 How to Determine Sight Distance in the Field

Stopping Sight Distance (SSD): the sight distance available to a driver on the roadway looking at a car in a driveway, should be determined as follows:

1. If the driveway exists, place an appropriate 42 inch high target on the driveway where a vehicle would be stopped 10 feet beyond the closest roadway lane – the ideal practice is to use an automobile. Do not use a taller one or vertical curves on the road may not be accurately accounted for unless only the lower portion of the vehicle is used. [Note. Driveway SSD uses a taller target. Roadway SSD uses a 2 ft target].
2. If there is no driveway, the target must be placed as can be best estimated allowing for the distance from the highway and importantly, the right elevation where the surface of the driveway would be in the future if approved.
3. Drive on the highway toward the target and begin measurement at the point the target becomes visible.
4. Record the distance when the driveway is reached.
5. Repeat the process approaching the driveway from the other direction if left turns are allowed.
6. The SSD line-of-sight must be continuous until the driveway is reached. If the highway grade exceeds three percent, grade adjustments must be made.
7. A longer SSD is necessary for a downgrade and a shorter distance for SSD in an upgrade.

Table 8: Factors for grade adjustments (AASHTO 2011 GB table 10-4)

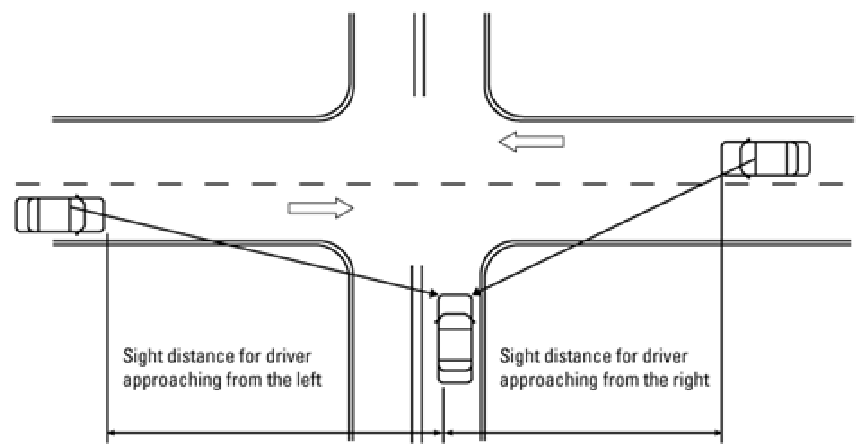
3% to 4.9% Upgrade, Use 0.9	3% to 4.9% Downgrade, Use 1.2
5% to 7% Upgrade, Use 0.8	5% to 7% Downgrade, Use 1.35

This field measurement technique is only a suggested technique. A field study must confirm that the available sight distance is equal to or greater than the preferred distances. If the sight distance will be close or below the preferred distance, the measurements must be accurate within a foot.

Determine the sight distance triangle to be included in the permit (see Chapter 3 of the Iowa DOT Design Manual). The sight distance triangle must be checked. There should be an open line of sight between two and five feet above ground. (top of ground cover to the bottom branches of any trees). If a median area, be sure to check the median for sight-distance obstructions. Once within the sight triangle, the driver should be able to see the vehicle in the driveway without significant obstructions interrupting the view at any time. Usually, narrow objects such as telephone poles, tree trunks and signs are not a problem. Look for parking spaces and other activity that may occur within the triangle. The purpose of sight distance triangle maintenance is to prevent subsequent obstructions in the sight triangle originally surveyed.

In Figure 26, the front of an ingress vehicle shall be considered to be 10 feet back from the outer edge of the travel lanes for SSD purposes.

Figure 26: Stopping sight distance (SSD) for access connections.



Source: Adopted from TRB Access Management Manual Transportation Research Board, 2003

An access connection should be located where the preferred stopping sight distance values can be achieved between a passenger car on the road and a vehicle positioned in the access connection waiting to enter the roadway as provided in the table below. The preferred SSD in table 8 provides an additional 0.5 seconds reaction time compared to minimum stopping sight distance (the time it takes to say the word 'stop'). If the distances measured in the field meet or exceed the tables below for preferred SSD and ISD values, the EOT can proceed.

The SSD Table assumes vehicles are traveling at or below the posted speed. If a car is traveling 5 mph over the 55-mph posted speed, an additional 75 ft of SSD is necessary, if 10 mph over, an additional 160 ft. Given the fact that a significant percent of drivers exceeds the speed limit, it is important to achieve the preferred values of the SSD table.

Table 9: Stopping Sight Distances for Driver on the Roadway

Posted Speed (mph)	Stopping Sight Distance (ft)	
	Preferred Distance	Minimum Distance
25		155
30	220	200
35	275	250
40	330	305
45	395	360
50	465	425
55	535	495
60	610	570
65	695	645
70	780	730

Source: AASHTO (2011) Section 3.2.2 Stopping Sight Distance, using 3.0 seconds for brake reaction time and table 3-3, decision sight distance. Brake reaction time includes perception and reaction but does not include braking distance which varies by vehicle type, weight and tire traction. (minimum values assume a 2.5 sec brake reaction time).

Intersection Sight Distance (ISD), the sight distance available to the driver at the access, can be determined in the field as follows:

1. Mark a vertical pole at 3.5 feet from its base and set it on the driveway. This represents the height of eye of a driver waiting at the access (see Figure 26). If the driveway does not exist, set the location and height of the pole for 3.5 feet above the estimated elevation of the proposed access surface.

2. Place the pole 14.5 feet from the edge of the traveled way at the proposed access (location A in figure 27). The observer uses the marked pole to position his/her eye at the proper height and location to represent the driver's eye at the driveway.

3. For simulating the approaching vehicle, use a target object, such as a traffic cone or box, which is the proper height (42 inches) to represent the height of an approaching vehicle. A second person moves the target object both left and the right from the access until the target object (as viewed by the observer at the access, whose eye is positioned at the location and height representing the driver's eye) disappears from view or is barely visible. The distance from the observer to where the location of the target object disappears from view is the ISD.

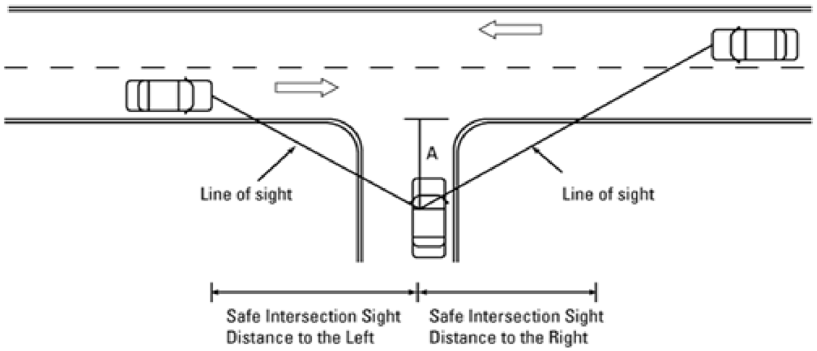
4. Absent a helper, place cones at the preferred distances left and right, wait for an approaching vehicles. The vehicle should be visible before reaching the cone.

5. Repeat the process for ISD to the left and to the right.

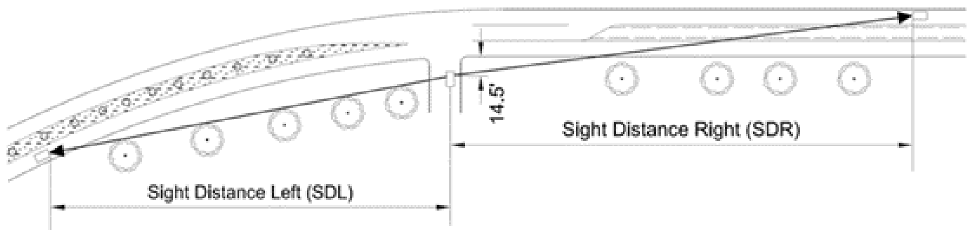
6. These methods are rough but should be sufficient to determine if the ISD is exceeded. If the distance observed is marginal, shift the access to improve ISD. Consult a design engineer to determine the available ISD more accurately. A permit should not be issued until it can be verified that both SSD and ISD are met.

   For ISD measurements, the figures below, the entering driver's eye is assumed to be 014.5 feet back from the traveled way.

Figure 27: Plan views of intersection sight distance.



Source: Adopted from TRB Access Management Manual Transportation Research Board, 2003



Source: Adopted from Koepke, F.J. and H.S. Levinson, NCHRP Report 348: Access Management Guidelines for Activity Centers, Transportation Research Board, National Research Council, Washington, D.C., 1992, 117pp AND

As shown in the figure above, determining ISD and the sight distance triangle can be more difficult when there is a horizontal curve.

Intersection sight distance (ISD), is illustrated in Figure 27. Table 8 provides values for the sight distance needed in both directions to provide a driver at a side street or access connection an opportunity to enter or cross a major roadway without causing a hazard or impeding the speed of approaching motorists. The distance values in the table below assume that approaching vehicles on the main highway may need to slow down about 10 mph to accommodate an entering passenger car as it accelerates. The table assumes approaching vehicles are not exceeding the speed limit.

Larger vehicles will cause greater slowing for through traffic when the entering ISD is marginal. If ISD is marginal and there will be frequent larger vehicles turning left, consulting a design engineer and limiting access volume of larger (slow moving) vehicles is advised.

Distances provided in the tables below are minimums using the AASHTO minimum time gap (gap acceptance in oncoming traffic). Grade must be between -3% and +3%. If greater than 3%, a grade adjustment factor shall be used. If the approach grade (grade of the access) exceeds 3%, or is not paved, additional ISD is necessary.

Crossing ISD is usually less that left turn ISD. If there is a unique situation consult a design engineer.

The values are from AASHTO 2011, Chapter 9, Case B. From stop on minor road. Consult a design engineer if you have a different situation. For these tables, a 3-lane road has 2 travel lanes with a center median area not exceeding 13 ft in width such as a TWLTL.

Intersection left turns from the highway (major road, AASHTO Case F), shall have the preferred SSD towards approaching vehicles at the posted speed of the highway.

Table 10: Minimum Intersection Sight Distances (ISD) for Driver at an Access Connection(1)

ISD in feet when the design vehicle is passenger car or light truck Driver eye height 3.5 ft. - Time gap 7.5 sec				
Posted Speed Limit	SD to right to make a left across 1 lane, a 2-lane road	SD to right to make a left across 2 lanes, a 3-lane road	SD to right to make a left across 3 lanes, 5-lane road	SD to left to make a right turn into closest lane, or a left turn
25	280	295	315	240
35	390	415	440	335
45	500	530	565	430
55	610	650	690	530
65	720	765	815	625

ISD in feet when the design vehicle is a single unit truck (SU, box truck) Driver Eye height 7.6 ft. - Time gap 9.5 sec				
Posted Speed Limit	B1. SD to Right to make a left across 1 lane, a 2-lane road	B1. SD to Right to make a left across 2 lanes, a 3-lane road	B1. SD to Right to make a left across 3 lanes, 5-lane road	B2. SD to Left to make a right turn into closest lane, or a left turn
25	350	375	405	315
35	490	525	565	440
45	630	675	725	565
55	770	825	885	690
65	910	975	1045	815

ISD in feet when the design vehicle is a combination truck (WB) Driver Eye height 7.6 ft. - Time gap 11.5 sec				
Posted Speed Limit	B1. SD to Right to make a left across 1 lane, a 2-lane road	B1. SD to Right to make a left across 2 lanes, a 3-lane road	B1. SD to Right to make a left across 3 lanes, 5-lane road	B2. SD to Left to make a right turn into closest lane, or a left turn
25	425	450	475	390
35	595	630	665	545
45	765	810	855	695
55	930	990	1045	850
65	1100	1170	1235	1005

The table below is provided to illustrate how much additional sight distance is recommended to accomplish the left turn maneuver if there is a 2.5 second increase in the time gap (drivers seeking a 10 sec gap acceptance), which is considered AASHTO's upper minimum limit based on field tests for gap acceptance.

ISD in feet when the design vehicle is passenger car or light truck. Driver eye height 3.5 ft. COMPARING AASHTO 7.5 Second Minimum distance, to (AASHTO 10.0 Second upper minimum)		
Posted Speed Limit	**SD to right to make a left across 1 lane, a 2-lane road**	**SD to right to make a left across 2 lanes, a 3-lane road**
25	280 (370)	295 (390)
35	390 (515)	415 (545)
45	500 (665)	530 (695)
55	610 (810)	650 (850)
65	720 (960)	765 (1005)

Source: Adapted from equations and tables in Section 9 of AASHTO A Policy on Geometric Design of Highways and Streets (2011).

3.2.2 Considerations for Correcting Sight Distance Deficiencies

If denial of the access is under consideration due to deficient sight distances, there are some alternatives to consider. These alternatives include:

a. Is it feasible to shift the access left or right to improve sight distance?

b. Investigate all options for alternative access.

c. Can the design of the site be changed in order to develop an access alternative that can meet or exceed minimum safety criteria?

d. For deficiencies at a vertical crest, right-turn lanes and left-turn lanes, both deceleration and acceleration might help. This may help with left turns from the roadway into the connection when the left is downstream from the crest. It will not help with left-turns out and will not help with left-turn-in prior to the crest.

e. Restrict movements to right-in/right-out only. Add both deceleration and acceleration right turn lanes if a vertical crest is on the left.

f. If SSD is met but not ISD, restrict the number and type of vehicles permitted to use the connection, such as no more than a total of ten autos entering and leaving within a 24-hour period and no trucks. Meeting SSD but failing to meet ISD means the frequency of SSD braking will increase, which is not desirable and therefore should be limited and included as a condition on the permit. Meeting SSD and not meeting ISD is a rare condition and also means SSD is marginal.

g. Are highway modifications such as changing the profile of the road or changing cut and fill slopes feasible?

h. Can obstructions in the sight distance triangle be removed?

Although spacing between access connections is a consideration, sight distance is primary and spacing to another access point is secondary. The alternative considerations above assume there is a necessity for the access. Absent a necessity for the access, the preferred sight distance requirements shall not be compromised.

3.3 Measuring Access Connection Spacing

When determining the distance between two access connections, the point of tangency (POT) with the roadway should be used where a radius is present, or the beginning of the curb cut. This distance captures the weaving and other traffic operational effects occurring between the accesses. More complex and wider access connections shall be measured from the beginning of the radii (POT) along the main roadway or between two points determined by the Department. On larger maps for general planning purposes, such as measuring the distance between well-spaced street intersections, the centerline of the access connection may be used.

3.3.1 Intersection Functional Area

The functional area of an intersection includes those areas upstream and downstream of the intersection as illustrated in Figure 28. The elements of functional area and distance pertain to private access connections, interchange ramps, and public street intersections. Maintaining sufficient spacing between access connections and avoiding access connections in the functional area of intersections are two fundamental design criteria of the access permitting program.

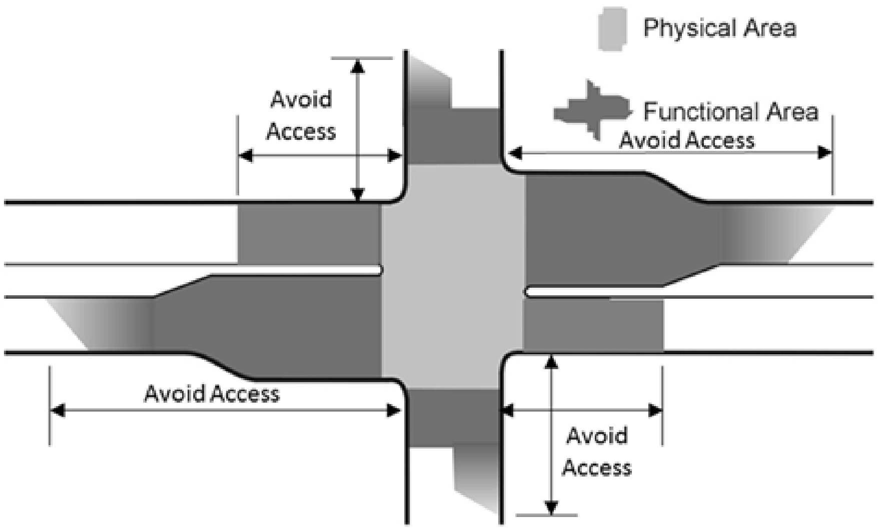
Movements that occur within the functional area include slowing, stopping, turning, queuing and often complex traffic maneuvers and as a result the potential for traffic conflicts and crashes is higher. ISU crash data research illustrates how crashes increase as access spacing diminishes (Figure 15). Access connections must be avoided in this functional intersection area to the extent feasible.

Many roadway segments and intersection areas currently have access connections too close to an existing intersection. This is a condition that should be corrected whenever there is an opportunity such as these properties redevelop, or by means of a public reconstruction project.

3.3.2 Determining the Functional area

For access connection requests for type A and B, if a traffic impact study is required, the study should determine the functional area. If the functional area determination is not included with the access permit application, an approximate determination can be made if traffic data and roadway design elements are known. The distance values of this section are in part the result of crash studies such as those discussed in section 1.3.1 and related figures consistently showing a sharp increase in crashes near intersections.

Figure 28: Functional area of an intersection where access should be avoided



Source: Florida DOT

3.3.3 How to Determine the Upstream Functional Distance

The upstream functional distance of an intersection with traffic approaching the intersection consists of three elements shown in Figure 29, and Figure 30:

d1 = distance traveled during the approaching driver's perception-reaction time

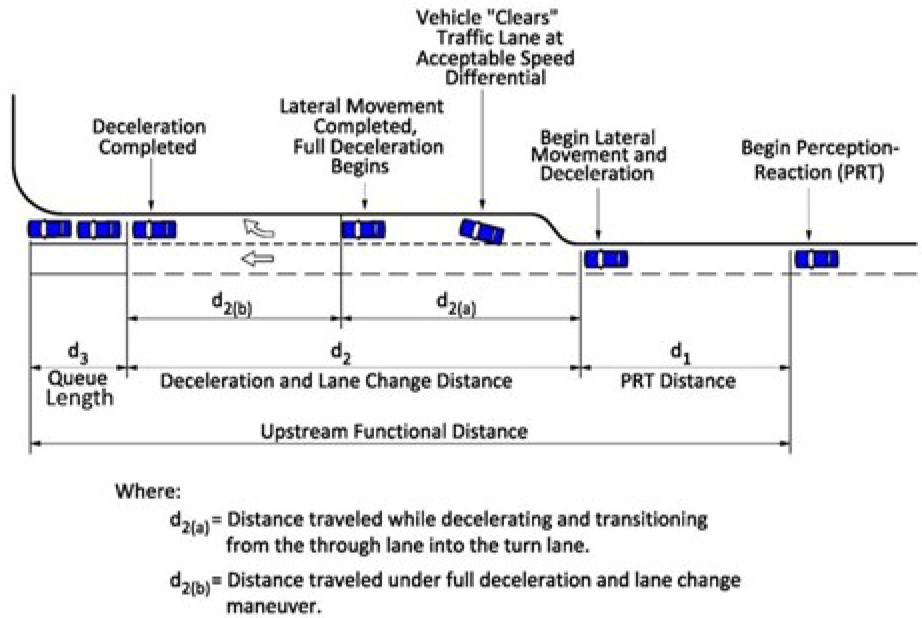
d2 = distance traveled during deceleration to a stop if that is necessary

d3 = queue storage length created by a stop condition or the queue activity occurring in a left or right turn lane

As noted in Figure 29 when turn lanes are present, the deceleration distance is comprised of two elements: d2(a), the distance traveled while the driver is moving from the through lane into the turn lane and decelerating and d2(b), the distance traveled while braking to a stop after completing the movement from the through lane into the turn lane.

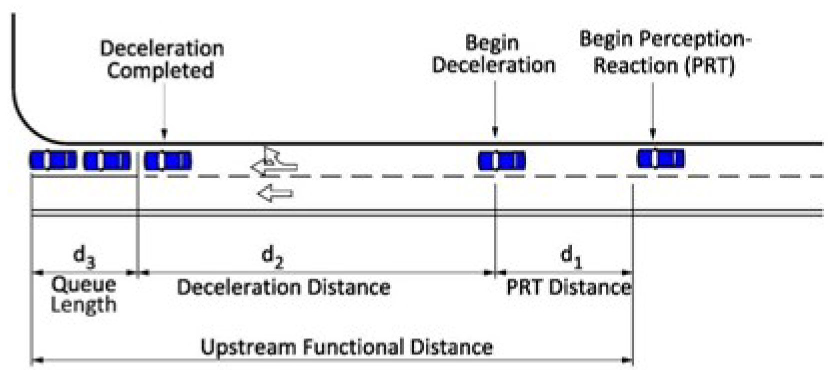
In Figure 30, without turn lanes, the functional area is somewhat shorter, but the impacts of another access in the functional area can be worse since there is no turn lane to separate turning vehicles and the access activity directly impacts a through lane.

Figure 29: Upstream functional intersection distance with turn lane



Source: TRB Access Management Manual, 2nd ed., 2014

Figure 30: Upstream functional distance without turn lane



Source: TRB Access Management Manual, 2nd ed, 2014.

Where: PRT = perception reaction time

Table 11: Upstream Table, showing Functional Distances Approaching an Intersection

Distance required for each element of the functional area					
Posted Speed	D1 Rural and complex urban	D1 non-complex urban	D2 No turn lane	D2 Turn lane on right or left	D3 Add estimated queue length
25	90	55	95	105	
30	110	65	135	150	
35	130	75	185	205	
40	145	90	240	265	
45	165	100	305	340	
50	185	110	375	410	
55	200	120	455	500	
60	220	130	540	580	
65	240	145	635	690	
70	255	155	735	780	

Source: TRB Access Management Manual, 2nd ed, 2014.

3.3.3.1 Upstream Functional Distance Calculations

The upstream functional distance is the sum of d1 and d2 and d3 (see Section 3.3.3). Sketching the distances on a draft diagram may be helpful.

The longest sum, and hence the upstream functional distance, will depend largely on the longest d3 queue distance. Whichever time period that results in the longest sum of d1, d2 and d3 is the upstream functional distance.

Where left-turn and right-turn lanes are provided and turn volume is relatively low, the longest queue may occur in a through lane at a signalized intersection. Where left turns and/or right turns are not provided, all queuing will occur in the through traffic lane. This applies to signalized intersections, stop-controlled intersections, and intersections where traffic on the major roadway does not stop.

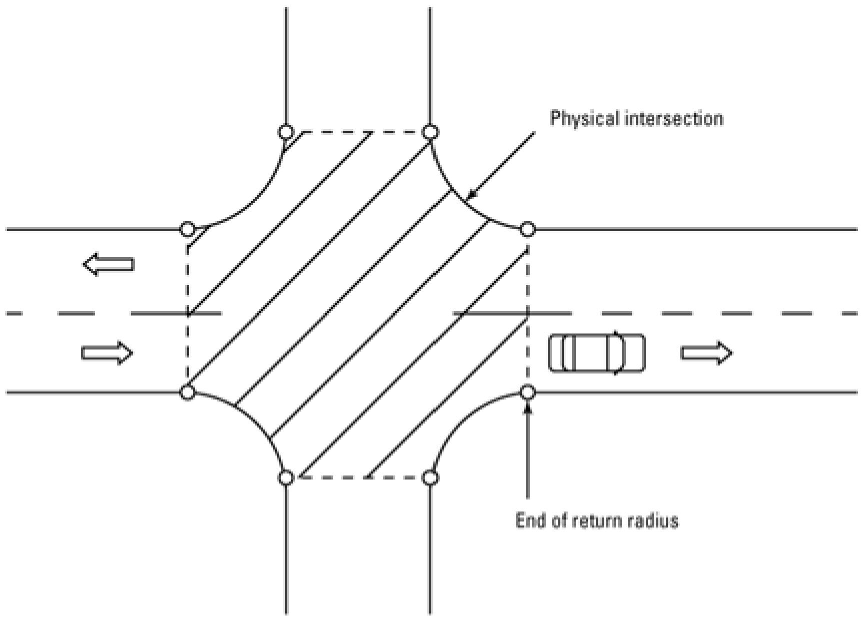
When neither a left-turn lane nor a right-turn lane is provided, turning vehicles will queue in the through lanes. This will result in queuing of through vehicles, as well as turning vehicles. Because the ability to make a left turn is a function of the opposing traffic, the queue length, and hence the upstream functional distance, may be seriously underestimated if opposing traffic is not accounted for. In the absence of a right-turn only lane, the upstream functional distance will likely be underestimated.

Left-turning vehicles, through movements, and right-turning vehicles are distributed randomly in the traffic stream. Therefore, there is no simple method of estimating queue length when turns are made from a through lane. Field observations are helpful. Running several iterations of a simulation model to obtain the 80th, 90th or some other selected percentage estimate of queue length is the only means of obtaining a realistic estimate of queue length to determine upstream functional distance. Be sure to use 20th year traffic volume projections.

3.3.4 Downstream Functional Distance on a Major Roadway

A vehicle is considered to have "cleared" an intersection when the rear of the vehicle has passed the limits of the physical intersection, as illustrated in Figure 31.

Figure 31: Illustration of when a vehicle has cleared an intersection



Source: Iowa State University

Downstream functional distance on a major roadway must be sufficient to enable drivers to evaluate the downstream situation after clearing an intersection. This includes ascertaining downstream traffic conditions such as traffic slowing, changing traffic lanes, turning left or right into driveways, or turning onto the roadway from an access connection as well as pedestrians, bicycles, transit stops or other activity occurring on or adjacent to the roadway. There should be sufficient distance and visibility to enable drivers to locate the downstream access connection they might be seeking.

Ideally, downstream functional distance would be sufficient sight distance that would allow for a speed, path or direction change as shown in the AASHTO Greenbook, 2011 edition, page 3-7, Table 3.3, speed/path/direction change, avoidance maneuvers C (rural), D (suburban) and E (urban). This is a longer distance, but it helps reduce hard braking and stopping immediately downstream from an intersection when drivers may not be anticipating congestion.

Preferred stopping sight distance values in Table 11 enables a driver to brake to a stop in response to conflicting traffic situations on, or adjacent, to the roadway. It is recommended that SSD be used as the minimum downstream functional distance.

The following table illustrates the use of decision sight distances based on speed and context conditions (AASHTO).

Table 12: Decision Sight Distance for Avoidance Maneuvers

Design Speed (MPH	Decision Sight Distance in Feet				
	Avoidance Maneuver Type				
	A	B	C	D	E
30	220	490	450	535	620
35	275	590	525	625	720
40	330	690	600	715	825
45	395	800	675	800	930
50	465	910	750	890	1030
55	535	1030	865	980	1135
60	610	1150	990	1125	1280
65	695	1275	1050	1220	1365
70	780	1410	1105	1275	1445
75	875	1545	1180	1365	1545
80	970	1685	1260	1455	1650

Source: TRB Access Management Manual, 2nd ed, 2014.

- Avoidance Maneuver A: Stop on rural road—t = 3.0 s
- Avoidance Maneuver B: Stop on urban road—t = 9.1 s
- Avoidance Maneuver C: Speed/path/direction change on rural road—t varies between 10.2 and 11.2 s
- Avoidance Maneuver D: Speed/path/direction change on suburban road—t varies between 12.1 and 12.9 s
- Avoidance Maneuver E: Speed/path/direction change on urban road—t varies between 14.0 and 14.5 s
- The variable 't' refers to the pre-maneuver time and includes braking seconds in types A and B. As an example, Maneuver A with t=3.0 seconds, includes 2.5 seconds from stopping sight distance and adds only 0.5 seconds.
- Pre-maneuver time allows the driver additional time to detect and recognize the situation, identify alternative maneuvers, and initiate a response.

When the downstream distance to the first access connection is less than the SSD, conditions of the access permit should consider limits to the type and number of ingress/egress maneuvers permitted in a 60-minute interval and within a 24-hour period to lessen safety and operational impacts. This is especially a concern if left turns will occur within the SSD. If the requested access is deemed not necessary the permit should be denied, but if it is deemed necessary consideration should first be given to moving the location of the requested access.

Where an acceleration lane is used leaving the intersection, the downstream distance should be the length of the acceleration lane plus a distance traveled at the posted speed limit for a period of not less than five seconds.

3.3.5 Functional Area - Access in Proximity to an Intersection

Figure 32 illustrates the location of driveways upstream and downstream (driveways #1 and #2) of an intersection. It also illustrates the location of driveways on the minor cross-roadway of a lower classification (driveways #3 and #4). The text below the figure explains the rationale for minimum spacing from the intersection. If the intersection is a junction of two major roadways, the distances A and B apply to both roadways.

Each clearance segment, A, B, C and, D, has different issues. The following considerations should be applied to each access point proposed near an intersection, as shown in Figure 32.

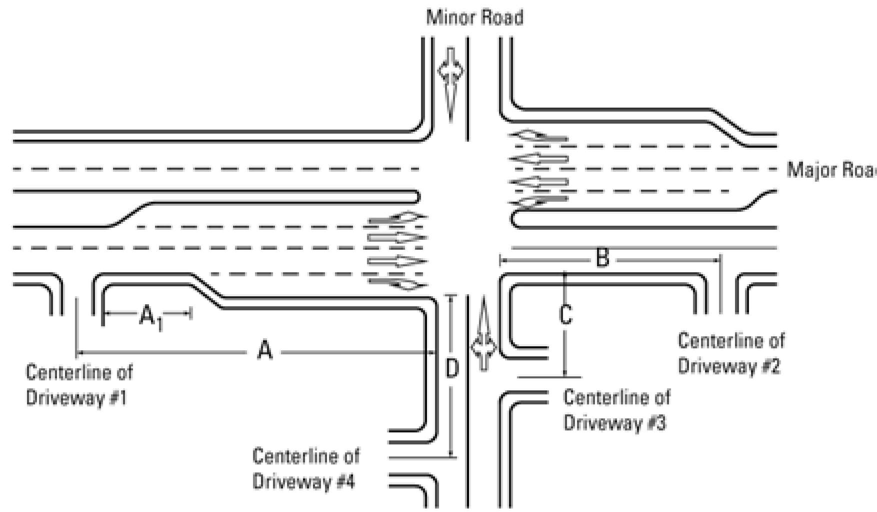
Driveway #1, distance A: The upstream distance 'A' can be calculated using the upstream functional area factors. The driveway should be located upstream at a minimum of the beginning of the turn lane taper to visually separate the driveway from the turn lane. The distance A1, should be equal to the stopping sight distance given the posted speed.

Driveway #2, distance B: A driveway downstream of an intersection should be spaced at a distance 'B' that allows the driver to clear the intersection before having to react to a vehicle entering or exiting driveway #2. This distance should be a minimum of SSD (column A of Table 12). For the preferred distances use column B for urban and C for rural.

Driveway #3, distance C: Distance C must exceed the longest queue on the approach to the intersection if left turns into the driveway are permitted. If distance C is less than the longest queue, then a barrier should be installed on the crossroad to prevent left turn attempts through the approach queue. If too short the left turn into #3 will cause a queue backing into the intersection.

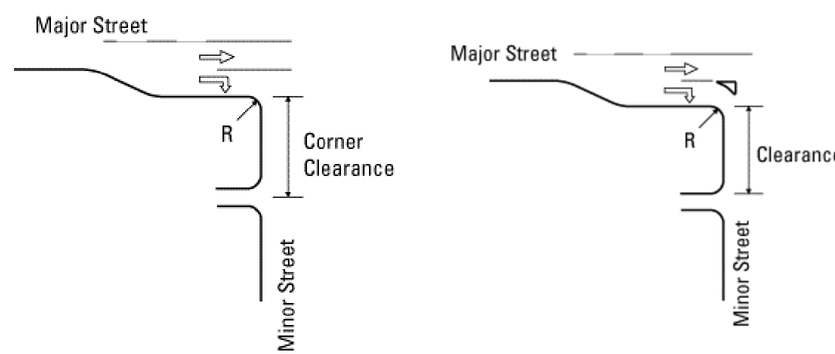
Driveway #4, distance D: The distance from the edge of pavement of the major roadway to the near edge of the driveway on a minor road should be sufficient to enable a driver to clear the intersection before having to respond to movements at driveway #4. The minimum downstream distance to Driveway #4 should be column A of Table 12

Figure 32: Functional intersection area as a determinant of driveway location



Source: Adopted from Abu Dhabi Access Management Policy and Procedures, 2016

Figure 33: Recommended minimum downstream clearance at a channelized intersection on a minor crossroad



Source: Transportation and Land Development, ITE, 2002.

for the benefit of the through motorist on the minor road. Minimum corner clearance is a function of the radius illustrated in Figure 33. The minimum corner clearance distances given in Road Table should be used only on a minor street/collector where DSD-Stop cannot be achieved because of prevailing local conditions.

Distance C and distance D, as illustrated in Figure 32, apply on a minor roadway at its junction with a major roadway. When two major roadways intersect, the upstream distance A and the downstream distance B apply to both roadways.

Maintaining good spacing is best for operation and safety. However, urbanized areas commonly have existing situations where achieving proper spacing distances are not feasible. When faced with a restrictive distance, the longest distance is the best. However, in some situations, other design constraints may be present, such as limited pedestrian and transit accommodation, restricted radius and restricted access throat length or width.

An appropriate balance should be achieved, and trade-offs should be summarized in a table and weighted according to preferences. An assessment of potential conflicts and their severity should be completed to determine mitigation strategies and best solutions. The permittee is responsible for all costs associated with mitigation of even a restrictive median.

Table 13: Recommended Minimum Downstream Corner Clearance on Minor Road

Unchannelized Intersection	
Radius (feet)	Corner Clearance
⩽30 35-40	⩾220 ⩾275
Channelized Intersection	
Radius (feet)	Corner Clearance (feet)
50	200
75	230
100	275

Source: Adopted from TRB Access Managment Manual 2nd Edition, 2014

3.3.6 When Access Cannot be Avoided Within the Functional Area

While it is desirable to avoid access within the functional area, this is not always possible in developed areas. Where the property frontage is within the functional intersection area and alternative access is not available, or cannot be provided at reasonable cost, it may be necessary to permit an access connection. Situations where it may be necessary to locate a connection within the functional area include:

a) No other reasonable access to the property is available, b) ownership limits, or c) topographic conditions preclude locating the access beyond the upstream or downstream functional distance.

In such cases, including the following conditions in the access permit can minimize the adverse impacts of the connection:

1. Require that the access connection be located as far as possible from the intersection;
2. Limit movements to right-in/right-out by provision of a non-traversable median or installation of flexible pylons;
3. Check to see if turn lanes are warranted, and require them if they are;
4. Specify the maximum volume entering and leaving the driveway in the one-hour peak and in a 24-hour period; and
5. Require the closure of the access connection if and when alternative access becomes available.

3.4 Other Design Issues

3.4.1 Auxiliary Lanes

Auxiliary turn lanes can reduce crash frequency, increase through traffic capacity, reduce travel delay, provide better conditions for turning vehicles and preserve public safety by providing a protected location for drivers to complete a turning maneuver or to accelerate into higher speed traffic. The reduction of speed differential between turning and through vehicles one of the primary reasons for crash reduction.

Design criteria for auxiliary turn lanes can be found in the design manual:

1. Left-turn deceleration lanes
2. Right-turn deceleration lanes
3. Acceleration lanes

When an auxiliary turn lane is required by the Department as an element of an access permit it shall be constructed at the expense of the applicant. Any additional right-of-way needed to provide the auxiliary lane shall be deeded in fee simple to the Department.

When Deceleration Lanes are Required

The Design Manual has warrants and design standards for turn lanes. Left-turn lanes are required for turning volumes as low as 5 in the peak hour. Left turns from a primary highway are of particular concern as the turning vehicle may need to come to a full stop in a through while waiting for a gap in on-coming traffic. At speeds above 25 mph this becomes a dangerous condition for rear-end collisions with the degree of safely based entirely on SSD and the responsibility of all drivers following to be observant and ready to come to a full stop.

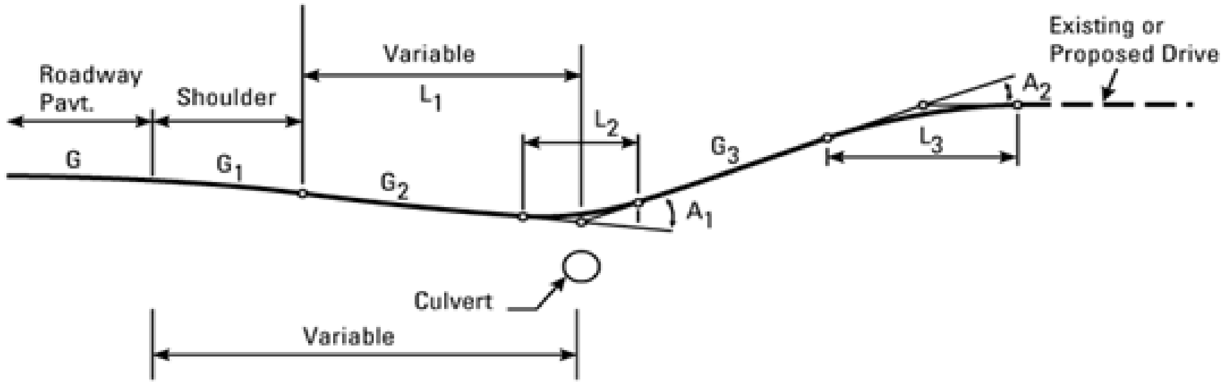
3.4.2 Driveway Profile

Driveway grade is important in that it impacts drainage and in part determines the speed at which vehicles leave the roadway to enter the driveway. A vehicle must slow down for a steeper driveway. Abrupt changes in grade require slower ingress speeds in part to prevent hitting the bottom of the vehicle against the pavement.

The Design Manual allows grades to 10%. However, grades less than 5% are preferred. Figure 34 illustrates a typical profile. The Design Manual has various profile designs and associated values. General considerations when designing a driveway profile include the following:

1. The preferred driveway profile is to match the downgrade cross-section profile of the roadway at 1.5 to 2 percent downgrade for no less than the length of the driveway design vehicle.
2. An abrupt change in grade should not occur near the edge of the traveled way that will cause vehicles exiting or entering the roadway to travel extremely slowly, thereby increasing the exposure to through vehicles on the roadway.
3. A change in grade of 2% or greater should be designed with a vertical curve.
4. On a highway with parallel drainage ditches, the driveway apron should have the same cross slope as the shoulder with a low point above the culvert under the driveway.
5. A driveway constructed by a private party may not increase the grade within the right of way as accommodating the additional grade will likely make future roadway widening more costly.
6. Maximum grade, maximum change in grade, and length of vertical curve should consider the following: a) driveway type, b) driveway ADT, c) roadway classification, speed, and volume, and d) driveway design vehicle characteristics.

Figure 34: Illustration of a driveway profile



Source: Transportation and Land Development, ITE, 2002, and FLDOT Driveway Information Guide, 2008

3.4.3 Driveway Angle

Driveways should intersect with the roadway at an angle of, or very close to 90°. As the angle decreases from 90° the intersection area increases, Exposure time increases when a vehicle must make an ingress right-turn at an angle of more than 90°, and the likelihood increases that a vehicle making an ingress right-turn of more than 90° will encroach upon the opposing lane of a 2-lane roadway or the adjacent lane of a multi-lane roadway.

The centerline of the driveway apron must be perpendicular to the centerline of the roadway. The apron length perpendicular to the roadway centerline shall be at least 20 ft in length.

3.4.4 Throat Length and On-Site Traffic Management

Traffic operations on the site served by a driveway may not cause traffic operation difficulties and safety problems on the primary highway. This is of particular concern with driveway types A and B. On-site traffic operations shall not cause queues to extend into the roadway right-of-way. The access throat length must be sufficient to ensure the smooth flow of vehicles off the roadway and into the property. It is totally unacceptable for a driveway related queue to interfere with traffic on the traveled way.

An access will be evaluated to ensure that driveways are designed with adequate capacity for entering and exiting vehicles. Parking is not allowed along a driveway.

If there is a sidewalk along the roadway, there shall also be a safe pathway, such as a sidewalk, extending from the roadway sidewalk into the business for non-motorized users (pedestrians, bicyclists, etc.). Without a separate path, non-motorized users are forced to use any available area and may use the driveway. This could be dangerous, especially for sites that have frequent vehicles entering and exiting.

At a minimum, throat length shall be sufficient so that an entering vehicle clears the sidewalk before having to stop and wait for the unparking vehicle or other activity to clear the driveway throat. The Design Manual provides throat length criteria.

Depending on access volume, throat length can be between 30 and 250 feet and major developments may require more than 300 feet.

3.4.5 Gates

If a gate is used on a private street, driveway or field entrance, or with any method of control that restricts the entry of vehicles, sufficient driveway length should be provided to accommodate the queuing of vehicles waiting at the gate to enter the site. The longest vehicle using the gate should be clear of the roadway when the gate is closed. If significant topographical features make this requirement infeasible, providing a wide shoulder for temporary standing while the gate is operated may be permitted or required. Refer to the Design Manual for more information.

For a single family or very low volume driveway, the gate shall be set back a minimum distance of the greater of the Right-of-Way line, 25 feet, or the length of the design vehicle plus 5 ft from the nearest edge of either a travel lane, paved shoulder, or sidewalk.

If there is a parking ticket dispenser or similar operation, parking ticket distribution and vehicle entry into the site and parking rates (finding a parking space) must be quick and efficient and match the peak arrival rate so that the arrival queue does not back up onto the main road. A multi-lane entrance and multi-gates may be necessary.

In the event it becomes necessary to cut or remove any right-of-way fence, such as the installation of a gate, the posts on either side of the access opening shall be securely braced with an approved end posts according to department specifications before the fence is cut to prevent any slacking of the remaining fence.

3.4.6 Drainage at an access connection

The permittee is responsible for access related drainage structures which will become an integral part of the existing drainage system. During field review for drainage conditions determine if a standard side drain will be sufficient? Will the access increase flow rates and quantity to the highway?

The highway drainage controls are designed to serve the drainage needs of adjoining properties and the highway based on the basin conditions at the time of the acquisition and design of the highway. The department will not accept higher water flow rates to be discharged to the highway.

Special drainage devices such as retention ponds and flow restrictors are not allowed in the primary highway right-of-way.

The type, size, and condition of the drainage structures provided by the permittee shall meet the requirements of the department in unincorporated areas and the requirements of both the department and the municipality in incorporated areas. The design and construction of drainage structures for access shall not adversely impact the primary highway right-of-way, a storm sewer system or drainage-way.

The construction of an access shall not adversely impact the stability of the primary highway subgrade, nor shall it cause water to flow under or across the roadway pavement or pond on the shoulders or in the ditch or result in erosion within the highway right-of-way.

3.4.7 Traffic Signals

Traffic signals have safety and operational impacts on the roadway network, which is why they are a concern in access management decisions. Recent studies in Iowa indicate that a traffic signal can add over 50% more crashes on a multilane highway. Traffic signals are primarily provided at intersections to allow left-turn and crossing maneuvers to be made to and from an approach road. However, this is done at the expense of the efficiency and safety of the primary highway. When a signal goes red, all highway traffic must come to a stop. This delays through travel as the side road traffic is accommodated. In addition, and most always due to driver error, crashes occur. Studies have shown that it is rare for a new traffic signal to reduce the number of crashes. It will, however, often reduce left-turn and crossing crashes, which tend to be the most severe. As a result, traffic signals are carefully regulated by state and federal standards and should be kept to the minimum feasible. Too many traffic signals choke mobility and increase crash frequency.

In addition, energy consumption increases by about 20% for every additional stop per mile. An arterial with a posted speed of 35 mph and one-quarter mile spacing of traffic signals, results in greater energy consumption per mile increases than the same arterial with uniform one-half mile spacing of traffic signals. Traffic signals will increase the use of energy as traffic slows, stops and accelerates at the signal.

Energy use is also increased when vehicles entering and exiting access connections cause through traffic to slow or stop.

Traffic signals and their installation are regulated by the federal Manual on Uniform Traffic Control Devices (MUTCD) [23 CFR § 655.603]. Nothing in IAC 761-112 or this Manual is intended or shall be interpreted as requiring the Department to authorize a traffic signal or left-turn movement at any location. No traffic signal shall be authorized without the completion of an analysis of traffic signal system operation, design, and safety as well as compliance with MUTCD signal warrants. When a traffic signal or operations study is required, the study shall include the information, data and analysis requirements in this Manual.

A recent national strategy to manage intersections is called "Intersection Control Evaluation", or ICE. This strategy has now been adopted by many states but is not yet adopted by Iowa. If and when it is adopted, it will be the primary determination process for intersection design and control. Iowa is already approving or considering alternative intersection control and design types including roundabouts, diverging diamond interchanges (DDI), median U-turns (MUT), Restricted Crossing U-turn (RCUT) and displaced left turn (DLT) design solutions to achieve higher capacities and safety at key intersections. ICE procedures help determine the best intersection control for a given situation.

4. ADMINISTRATION & PERMITTING

4.1 General requirements and Permit Responsibilities

The Access Rules contain the legal requirements for permitting access. What is provided here is an expanded explanation of the process along with supporting information. If there are any discrepancies between the two documents, the Access Rules, IAC 761-112, shall be followed.

Written permission from the Iowa DOT is required as a matter of law for any construction activity on a primary highway (Iowa Code 318). No construction or significant maintenance activity shall begin until a permit has been issued by the department. Driving to or from a property at a location that is not authorized is a violation of IC 318 and IAC 761-112.9. All access activity to or from highway right- of-way must only occur at an authorized access location. Violations may result in enforcement actions pursuant to IC 318.8 and 318.12.

The department is not obligated to permit or approve any access connection, traffic control feature or device or any other site related improvement that has been specified by a local agency development approval process separate from the Department's permitting and approval process.

The traffic activity at every access connection creates a degree of traffic conflict on the highway. The purpose of permit terms and conditions is to help mitigate these conflicts which can result in crashes with injuries. Over 10 percent of traffic crashes in Iowa occur at driveways. Each driveway shall be located, designed and constructed to minimize crash risks. Permit terms and conditions and the access design and engineering are based on the type of vehicles using the driveway, the traffic activity in the driveway and the design of the highway. Knowing the use of the property helps determine traffic activity.

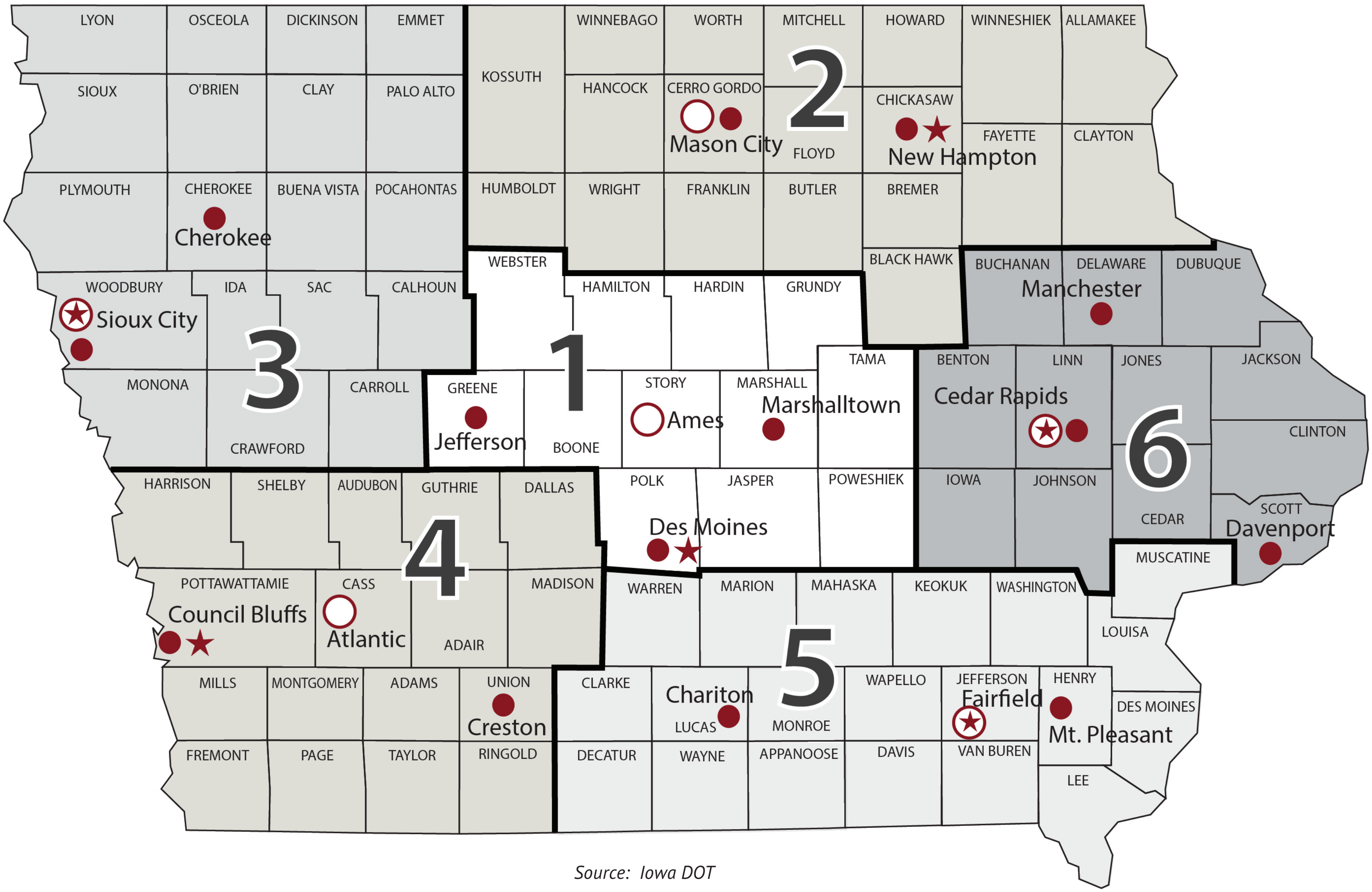
When there is an increase in use of a driveway, a new access permit application is required. A change in access use includes a change in predominant vehicle types using the access or an increase in traffic volumes, or if the use exceeds the design and engineering limitations of the current access design. The application will result in a field review where it can be determined if the location, design and use of the access is reasonable and safe or if modifications are necessary.

The term 'grandfathered' may apply to an existing older driveway, but a change in access use beyond historical use is not protected by claims of 'grandfathered'. The change in use requirement applies to all access connections even if they have existed for decades. The primary concern is how the change in use might increase the risk of crashes at the driveway location. If the property owner desires to change from the historical established use of the access, or to a use not authorized by the terms and conditions of an existing access permit, a new permit is required. This permitting process is to help reduce crash risks for driveway users and those on the highway.

When issued, the terms and conditions of an access permit are binding upon the applicant, the property owner and all assigns, successors-in-interest, heirs and occupants. The owner should provide a copy of the current access permit to a subsequent owner. Should an assign, successor-in-interest, heir and future occupant not accept the terms and conditions of an existing permit, they shall apply for a new access permit or a permit to close the access. A new owner may request a copy of an existing permit from the department. If the new owner plans a change in property use that will result in a change in access activity, a new permit is necessary. If the new owner simply wishes to have an access permit in their name, an application is required if a copy of the original permit is not in the current EPS.

Figure 35: Iowa DOT districts and offices.

Iowa DOT District Office ● Resident Construction Office ★ District Operations Manager Office



Source: Iowa DOT

When a permit is issued, the department does not warrant the safety or engineering of the access or assume any responsibility or liability. A property owner not wanting to assume responsibility for the access or its requirements may apply for access removal. The EOT will specify 'removal' in the EPS application. Such removal shall be at applicant's expense unless agreement is made for removal during a public highway project. Anytime the property owner believes their access connection needs improvements, it is the owner's responsibility to initiate an access permit application.

An access permit is simply a state license giving permission to use and maintain an access connection in state right-of-way. A permit grants no property rights or interests in state right-of-way. As a permit it can be revoked for cause. See section 4.7.

When there is a publicly funded highway project, the department may make improvements to existing access connections, however it is not required that the department bring a legal access into full compliance with current access standards, but only to the extent reasonable within the project limitations and scope. Where there are multiple accesses to the same ownership, the department may consolidate existing access connections during a highway project to bring access conditions closer to compliance with current standards. This requires a right-if-way process.

The department has full authority regarding roadway design and operational modifications to the highway and all access connections. An access permit does not grant any rights to specific traffic operations at the access. Any user of the access must obey all traffic laws once within the highway right-of-way. There is no right to left turns at an access. How traffic is managed by roadway design and traffic control devices is entirely the authority of the department.

When a driveway operates poorly and causes congestion or queues on the highway, the property owner has the responsibility to improve the driveway and access connection operation. Liability for such traffic problems rests on the owner. If poor conditions are chronic, the Department may require access improvements. Driveway operation causing unsafe conditions must be corrected.

4.2 Permitting Process

The permitting process has four phases—application, review, approval, and construction. No construction activity may begin in state right-of-way without a fully executed permit.

It is the responsibility of the applicant to comply with local ordinances and obtain any other local permits, utility permits or other local or state agency approvals that may be required for their development.

4.2.1 Division Offices and Roles

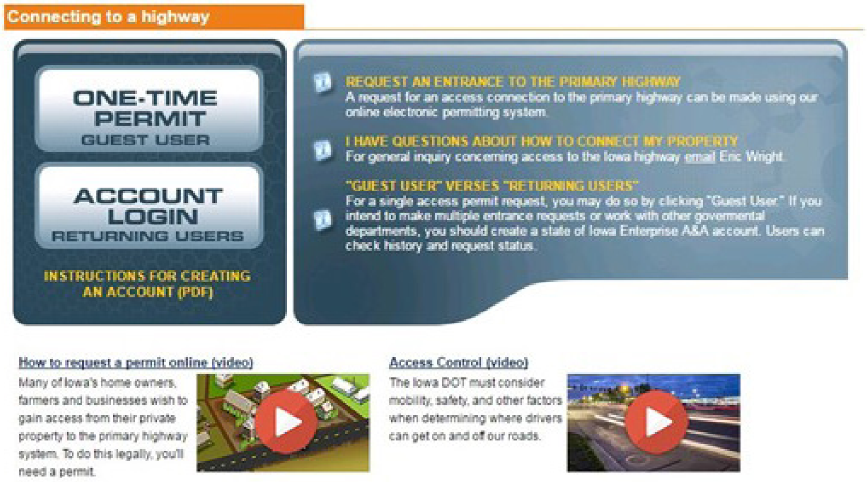
Requests for access connections to primary highways are processed by the six Iowa DOT district offices. A map of the six districts is provided in Figure 35. Each district has designated staff, commonly known as engineering operations technicians or EOT's, to assist applicants and review and process applications. Visit the Iowa DOT website at this link for a current list of district permit contacts: iowadot.gov/traffic/Access-Management/Contact-Us.

4.2.2 General Permit Application Process

Applicants for an access permit should do so online via the Iowa DOT electronic application portal (see Figure 36) of the Electronic Permit System (EPS). The portal may be accessed at https://secure.iowadot.gov/eps/. Specific instructions are provided on the web site. If the applicant cannot use the EPS, application information and forms may also be obtained directly from any District office. Any paper applications will be uploaded into the EPS by the district EOT. An email is generated upon submission that confirms receipt of the application and informs the applicant who will be handling the permit request.

The applicant may be the property owner or the property owner's authorized representative, such as a lessee or consultant engineer. The property owner is ultimately responsible for the access. If the applicant is not the property owner, the applicant must have the property owner's consent to alter the property access. The property owner or owner's legal agent will be required to sign the permit and be fully responsible for meeting the terms and conditions of the permit.

Figure 36: Iowa DOT electronic access permit application portal



The District EOT assigned to the access request will contact the applicant usually within five business days to set up a phone or on-site appointment to discuss the application and explain the permitting process and answer any questions. The department approval process may include internal department review by different offices depending on site conditions and proposed access use.

If the access will be within the boundaries of a municipality, the department access requirements must be met and it is required to have municipal concurrence. It is recommended that the developer and permit applicant provide the department the opportunity to review site and development plans at the earliest opportunity. Any proposed access must meet department access requirements regardless of prior municipal and local agency approvals.

Applicants must identify the nature of the access request (e.g., residential, commercial, agricultural), its proposed location and use and provide supporting documentation related to the type and use of the access connection.

A separate access application and permit is required for each access connection. In preparing the application and in discussion with department representatives, any intentional misrepresentation of existing or future conditions or providing false information shall be considered sufficient grounds for denial of a permit, and if discovered after permitting, the revocation of the permit.

The applicant is responsible for providing all necessary application materials. Additionally, department may find it necessary to request additional information from the applicant. Each application should prove the necessity for permitting a direct access to the primary highway and the lack of a safer alternative. Application materials shall normally include:

- Location and design plans required to describe the proposed access.
- Local jurisdiction (county or municipality)
- Current use and proposed use of the property.
- Describe why there is a necessity for access to the primary highway.
- Parcel map or subdivision map.
- Current access to the property and possible access alternatives.
- For access types A and B and public intersections, the department may require a traffic impact analysis. Such traffic impact analysis shall be prepared by a professional engineer licensed in Iowa at the cost of the applicant. The analysis will address all traffic activity and impacts at and near the proposed access connection (See Appendix for TIA Guidelines).

4.2.3 Permit Review and Processing (overview)

Upon receipt of an application, the district EOT will begin processing the application using the electronic permitting system. The department will apply the criteria as required by this Manual including access type, access category, location, design, public safety and traffic operations.

While the EOT is the primary contact and responsible for application processing, the EOT will seek as necessary information, reviews and comments from experts within the department. If within a municipality the EOT will seek information from the municipality regarding development plans and local approvals. Should the permit be issued, municipal concurrence is required.

The department may issue an access permit with terms and conditions, or deny the application if it fails to meet the requirements of the Manual or IAC 761-112. The district EOT will notify the applicant of the determination.

The department will not act on an application it deems incomplete. The applicant will be notified what is incomplete and given the opportunity to amend the application.

Upon mutual agreement by the department and applicant, the department may suspend or extend the process period. The applicant may also withdraw the application by notifying the EOT. The department will not hold open an application on the EPS system for more than one year when waiting for the applicant to submit more information. The applicant can re-apply when they are better prepared to submit more information.

When all documentation has been received from the applicant and Department internal review is complete, the District EOT will do one of the following: (a) approve the application for an access permit as requested, (b) approve the application for an access permit with modifications such as location and design, or (c) deny the request for an access permit. If the request must be denied, a letter will be sent to the applicant indicating why the access request cannot be approved.

If a permit will be issued, the Department will determine terms and conditions to be placed on the permit. A terms and conditions letter is then sent to the applicant in advance. The applicant must respond to the offered terms and conditions letter. The applicant can respond electronically by scanning a signed print version or send in a signed letter to formally acknowledge and accept all the terms and conditions of the access permit. The applicant needs to contact the District EOT if it is necessary to discuss the terms and conditions.

The access connection permit is issued electronically or by mail after applicant acceptance of the terms and conditions. The access connection decision is generally issued within 30 business days from the time the application is complete. **The access permit must be approved, accepted by the permittee and issued before work may begin.** Any work in the right-of-way without a permit is illegal and creates a significant civil liability for the property owner and anyone associated with the non-permitted work activity.

4.2.4 Liability Insurance

Crashes in highway construction zones do occur. Contractors hired to construct an access connection may be required to certify that they have insurance in place for general liability depending upon the permit type. It is recommended that the permittee and property owner have liability insurance coverage for any access connection to the property for as long as the access exists.

4.3 Roles and Responsibilities in Permit Processing

4.3.1 Field Review

When the EOT receives a permit application a field review will be conducted. Within the electronic permit system (EPS) is a checklist that explains the data to collect based on the nature of the permit application. A printable Entrance Field Review Checklist that EOT's can use on site can be found in the Appendix. During the field review, it is recommended that the applicant appear at the site and verify the precise location of the requested access. If the applicant is unable to meet the EOT at the site to determine the precise location of the requested access they will need to mark the location accordingly. A sight distance review is done by the EOT at the location. Additional information can be found in the department's design manual. The sight distance values must be met. The EOT may determine that a proposed access connection must be relocated to correct or improve sight distance deficiencies or other issues such as spacing.

During application review the EOT will determine if the applicant must prepare a traffic impact analysis (TIA) for the proposed access (See Appendix). If so, the EOT should provide the applicant with a TIA or TIL guidance document for preparation. The applicant is required to hire a licensed professional engineer to complete the study unless the applicant is a licensed professional engineer.

A review of an access application should address the following. There should be agreement between actual conditions and those shown on any plans. Any discrepancies should be noted.

- Topography generally. Horizontal and vertical curves along the roadway and between the roadway and the right-of-way line.
- Optional take photographs.
- Can the property be served by a secondary access such as a county road or local street?
- Does the entrance meet spacing requirements?
- Does the entrance meet site distance requirements?
- Is there a crash history?
- Has the department acquired access rights?
- Existing drainage conditions, including side drain and grades towards the roadway.
- Will the site generate new drainage flows to the highway?
- What is the ditch depth?
- Nearby driveways and intersections. (Distance? Volumes? Access types?)
- Existing and proposed design elements such as shoulder, surface type, width, radii width, grade, angle, curb, gutter, and soil.
- Roadway cross section width and lanes.
- How many conflict points are there and where?
- Distance from travel lane edge to ROW line?
- Is there pedestrian accommodation such as sidewalk?
- Are there any other paths such as bicycle accommodation, cattle crossing, or trails?
- Intended usage of access.
- Are there any signs nearby, traffic control, or ect. nearby?
- Speed limit in each direction.
- Has the applicant contacted One Call?
- Are there any survey monuments which may be affected?

- Any other permanent structures (wells, CBC, vaults, guard rails, fences) which may be affected?
- Where will the driveway go? (Topo of access profile, grade into property)
- Where is the ROW line?
- Will there be a gate? How far back from the roadway?
- Width of opening through fence?
- Anything that would interfere with the free flow of vehicles off the highway?
- Public intersections require stop signs.
- Driveways do not require stop signs. IC 321.353 requires drivers entering from a driveway or private road to stop immediately prior to entering the highway and yield the right-of-way to all vehicles.
- Where will access related traffic control signs, if any, be put?
- Roadway and access side slopes, before and after?
- Is there a better access location given the topography of the highway?
- Is there a better access location for roadway safety?
- Sight distance? Check SSD, ISD, and Sight Triangle control.
- Look for alternative local access to a county road or city street.
- What is the condition of the alternative road?
- Types A and B. Are signal warrants possible?
- Can better on-site circulation reduce the need for a signal?
- Are there cross-access agreements? (Connections between ownerships)
- On-site access easements? (Shared circulation within shopping center)
- Will the business have a queue (such as a drive-up window)?
- Will there be a gate to enter the property, or ticket booths into a parking lot or parking structure?

Environmental considerations:

- Any possibility of hazardous fluids or other materials flowing from the site to the highway?
- Will cuts be required into a hillside within the right of way?
- Will trenching be required.
- Will there be any change in highway drainage direction, flow rates or velocity?

4.3.2 Office and Department Review

All application documents including the larger plans and reports are submitted to the EPS online site using the internal review tab. If review assistance is needed from the Department subject matter experts or others in review of the access permit request, the EOT should attach the necessary documents to the permit system and send them to the appropriate department experts.

The EOT or any department staff may inspect the access during the application phase. The EOT will be the normal contact with the applicant.

If the access complies with Department requirements the EOT may inform the applicant and process the final terms and conditions letter for permit approval.

If a design variance is needed, and the applicant was not aware, the applicant should then be informed of the need for a variance and asked to document proof of necessity for both the access and the need for design variance. (Section 4.4).

Upon completion of the internal review and the District determination regarding the variance, the permit application goes back to the EOT to do the documentation for approval or denial of the variance and access permit. **If a variance is approved**, the findings and any related terms and conditions are included with the permit.

The proposed terms and conditions email is sent to inform the applicant. The applicant is asked to acknowledge acceptance of the terms and conditions, sign the form, and send it back electronically to the EOT. The EOT can then check the box that the acceptance of terms and conditions has been received and the permit can be issued either via email, mail, or both.

It is important that the permit specifically mention the approved variance. The permittee needs to know before signing the permit that a variance was necessary.

If the proposed access cannot meet access requirements including consideration of a variance, then a tab in the electronic permit system will be activated to request review by the Assistant District Engineer.

After a complete review, if the access does not comply with Department requirements, the application shall be denied. The district will provide the applicant a written explanation of the decision.

Prior to denial of a permit, the district needs to determine if the denial may cause the property not to have reasonable access. The need for convenient direct access is not a consideration to determine reasonableness and access necessity when the highway is functionally classified as an arterial or collector.

If the district determines and documents that a denial of direct access to the primary highway will cause a substantial impairment of property access, the driveway may be permitted if a safe design can be achieved. Typical examples would be where driveway design requirements can be met but there is a failure to meet access spacing or access category requirements.

If safety impacts cannot be mitigated such as the location being below minimum SSD values and the issuance of a permit would create a dangerous condition, the access must be denied. The denial letter will describe fully the safety concerns of the district. Denial may create a situation where the owner can claim property access rights have been denied. However, neither the owner or the department may allow a private access connection that is dangerous to users of the access and the public on the roadway. Ultimately, engineering judgment will be used to determine whether or not the access is approved or denied.

When a driveway is allowed by such impairment determination and if the driveway does not meet departmental location standards, then the driveway shall be considered conditional and shall continue only until such time that other reasonable access to a lower functional class street or highway is available to the parcel. All available access design techniques shall be used to minimize the safety and traffic operations impact of the driveway.

4.3.2.1 Requests for Assistance from Subject Matter Experts

The second tab in the electronic permit system allows the EOT to request input from Department subject matter experts on safety, geometrics, operations, drainage and other issues. For example, if the site is in an area that may be subject to drainage problems, or has difficult to determine topography, the EOT will attach the proposed site plan and submit it to the drainage engineer for advice. Any advice or requirements from internal experts should then be passed to the applicant or their consultant who should address the requirement. The subject matter experts should distinguish between what should be required on a permit and what is advisory to the applicant.

4.3.2.2 Traffic Impact Analysis

Appendix B provides uniform guidelines for preparing a traffic impact analysis. The purpose of a traffic impact analysis is to evaluate the effects of a proposed development on the surrounding transportation network, the ability to get traffic safely and efficiently onto and off of a site, and the need for off-site mitigation of traffic impacts.

Under normal conditions, when a Type A or B access has been requested a traffic impact analysis must be provided by the applicant. Depending on conditions and access activity, the EOT will determine if a TIS or TIL is necessary. The EOT will provided the applicant with guidance from the Appendix. Permission to waive a TIA must be granted by the Assistant District Engineer. The Department may request an impact analysis for lower volume accesses if the affected roadway is nearing capacity or for other operational or safety reasons.

The completed TIA/TIL must be submitted by the applicant to the application system (EPS). The EOT then forwards the report to the department design engineer, geometric section, and planning offices to evaluate and determine the need for and design of any turn lanes or other mitigation. Any requirements requested by department staff are incorporated into the terms and conditions.

4.3.3 Documentation of Findings and Conclusions

The EOT is responsible to ensure that all documents and emails generated during the application and permitting process are placed in the EPS. At the end of the process, whether a denial or permit, the EOT needs to confirm that all materials are posted to the EPS. After the final audit by the EOT is complete and noted, the EPS system will archive the access permit in permanent Department records.

4.3.4 Preparing the Permit

The ACCESS PERMIT template in the EPS serves as a permit form for access permits. The first page includes the name of the permittee, details the location and allowable access uses and any unique requirements, terms and conditions the District may choose to include. The second page provides standard permit terms and conditions (aka 'boilerplate'). Additional terms and conditions and attachments may be included as necessary and those that may be unique to the site and access activity.

Guidance from the department Design Manual such as standard design illustrations and specifications may be attached as part of the electronic permit package and usually listed on page one of the permit. All parts of the Permit, the forms and attachments are considered part of the issued permit so they can be enforced if necessary. These should be attached by checking the boxes in EPS upon permit issuance.

4.3.4.1 Terms and Conditions

Terms and conditions of access permits shall be included in the electronic permit. They will consist of "standard terms and conditions", which is basically boilerplate that is not modified and standard for most permits, and "special terms and conditions" which are those unique for the specific permit.

Terms and conditions on a permit need to be accurate and clearly stated.

> *"Terms and conditions" is the common term for government permits. We are dropping the use of the term "boilerplate". The term "standard terms and conditions" is a more accurate title. "Boilerplate" has acquired a negative connotation as a bunch of requirements thrown onto the permit with little thought for their application. It is important that the permittee read both special and standard terms and conditions and not ignore the 'boilerplate".*
>
> *The term 'stipulation' will no longer be used. "**Stipulation**" is a legal term used to refer to an agreement made between opposing parties during the course of legal proceedings.*
>
> "**Terms and conditions**"*; General and special arrangements, provisions, requirements, rules, specifications, and standards that form an integral part of an agreement or contract.*

4.3.4.2 Terms and Conditions on Permits

Terms and conditions are to be added to the permit to specify requirements placed on the permittee to install and use the access connection. These terms and conditions may address:

1. Driveway activity including volume and vehicle type. This should be the maximum number of vehicles per hour or per day and vehicle type and frequency of use by large vehicles. For access types A and B, the volume should be based on the application and T.I.A.. For types C and D, the allowed volume base on the application and the access category.
2. Accurate access connection location (MP and Station).
3. List the type and size of the land use served as this the basis of the access type assignment. (Examples: Multi-family residential, 24 units. 1,200 sq ft convenience store with eight gas serving locations (8 pumps). Shopping center with 200,000 sq ft of leasable floor area).
4. Driveway design basics (throat width, radius, throat length and a plan view).
5. Driveway profile (change in grade between the roadway cross-slope and the right of way line including the driveway apron, landing length, vertical curves for the length of the driveway.
6. Restriction on any turn movements (such as allowing right-in/right-out only).
7. Changes necessary to the roadway such as adding auxiliary turn lanes.
8. Phasing of installations, such as requiring a restrictive median or a traffic signal when warrants are met.
9. Is the access considered a temporary access until alternative access becomes available?
10. Future closing and removal of the access when alternative access becomes available.
11. Location of signage, pavement markings and lighting.
12. Drainage treatments.
13. Construction materials.
14. Pavement design specifications.
15. The number of days within which the property owner must complete construction of the access.
16. Any access use conditions or limitations that need to be imposed such as operating hours.
17. Traffic control required during construction (traffic control plan).
18. Any required plans to be incorporated into the permit by reference.

4.3.5 Utility and Emergency Response Access Connections

A Type D access permit may be issued for access to utility vaults, boxes, valves and other utility maintenance locations when the AADT will be less than one trip per day. The access design and terms should be unique for utility maintenance, discourage public use and shall not be open for general use. A condition of the permit will be to require the removal of the access when it is determined it is no longer needed.

When a land use or residential subdivision requires by local fire and safety regulations a secondary (backup) access for emergency services, the terms and conditions of the permit must specify requirements and use limited to emergency services. Secondary emergency may be permitted on all categories except for Interstate/freeway (I/F), Expressway (E), Municipal Expressway (ME), and across controlled-access lines.

The access permit terms and conditions and design should be unique and sufficient for fire apparatus but discourage the public and not be open for general use. A condition of the permit will be to require the removal of the access when it is determined the fire access is no longer needed. A hidden supportive substructure can be used.

Such emergency access may be permitted only if it is not feasible to provide the emergency access to a secondary roadway. A written explanation with references to local standards from an appropriate government safety official shall be included with the application and added to the EPS information. The access shall not be open for non-emergency uses and shall be maintained by the permittee as a closed access except during emergencies.

4.3.6 Change in Use or Modification of an Existing Driveway

From time to time, a change in the anticipated use of an existing driveway or access connection may exceed the original design or terms and conditions of the access permit. In some cases, an applicant may request the change or modification. When such a change in use occurs, a new permit must be applied for and approved by the Department. A change in predominant vehicular types using an entrance or an increase in traffic volumes that differs from the historical use is considered a change in access use.

The new permit should require the driveway to meet current Rule requirements. This is for the protection of the property owner and the driveway users. If the driveway remains a necessity, but cannot be improved to meet all current standards, all feasible improvements should be made. The need to increase the use of the access does not relieve the property owner from safety improvements to accommodate the change in access use. However, it can be important to get as many safety and operational improvements feasible. Issuing a permit to limit use is an option if a higher use activity cannot be sufficiently mitigated for impacts.

As mentioned at section 4.1, increasing the historical use of an old driveway is not protected by claims of “grandfathered use”. To the extent the access activity of the original access is known, or certainly the activity as of 1956, any increase beyond historical in access activity requires a new permit and meeting current access design and location requirements.

4.3.7 Temporary Permits

A temporary permit provides approval for access with a specified time limit, upon which the permit expires and access must be closed and the area restored to no less than its original condition. A typical temporary access is for short-term, non- reoccurring construction-related activity.

Use of a temporary permit after the expiration date is unlawful. The district may pursue the continued use as a violation under IAC 761-112.9 and IC 318. The EOT should contact the permittee to determine why the access has not been closed. If the EOT determines that a short extension is appropriate and the permittee will accept the extension, the EOT will send a letter with the new date and shall include the justification of the extension. If appropriate, the EOT may add additional terms and conditions pertinent to the extension. Absent cooperation of the permittee, actions pursuant to IAC 761-112.9 and IC 318 must proceed.

A permit is not necessary for very temporary emergency conditions if at the direction of state or local safety officials. The district will monitor safety and operations while the access is in use. Access activity should be managed by a uniformed enforcement officer or a temporary traffic control zone established.

When a temporary access is allowed it is subject to any special and pertinent terms and conditions as may be determined by the Department.

a. The location of the temporary access shall comply with all safety and sight distance requirements.

b. Temporary access shall be authorized only for a determinable period of time. The expiration date will be indicated on the permit.

c. The applicant is responsible for all costs incurred, including removal of the access and restoration of the right-of-way.

d. If outside an authorized construction zone, temporary access to the interstate highway system requires the concurrence of the Iowa DOT Director and the Federal Highway Administration.

e. An application for temporary access is not needed if the temporary access is for a short term department construction or maintenance project, it is shown on the approved project plans, and has been approved previously by the department and, when required, the Federal Highway Administration.

All new temporary permits shall expire 24 months from their date of issue unless a date providing for a shorter duration is specified. When the permittee wishes to reestablish the access, the standard application process shall be followed. Continued use of an access that has an expired permit shall be considered illegal access.

Temporary highway project related access does not require a permit if the access is within a construction zone and incorporated into the traffic control plans. Highway project related access outside the construction zone requires a permit. All project related access will be closed by the end of the project unless an application is submitted and the access is authorized to remain by the issuance of a new access permit.

The design of a temporary access shall be based on its activity. The location and design should not compromise the safety of the highway. All vehicles attempting to exit the highway should be able to do so in a safe and expeditious manner.

An alternative to improvements is treating the access as a construction zone with full construction zone traffic control or the use of uniformed enforcement officers as long as the access is open. This alternative must be tightly controlled and only for a very short period. For traffic control the MUTCD must be followed.

Maintenance of the driveway is the responsibility of the permittee. The access shall be maintained so that neither water nor debris will flow onto the roadway. Any debris on the roadway caused by access operation or weather shall be removed immediately. Any debris in the non-traveled portion of the highway will be removed daily.

Drainage systems within the highway shall not be altered or impeded and returned to no less than its original utility. Any damage to the highway caused by drainage flows shall be repaired immediately.

Before the term of the permit expires, the permittee shall completely remove the temporary access and related modifications and restore the site to no less than its original condition. Some improvements may be allowed to remain if directed or approved by the Department.

4.4 Variances

4.4.1 General

Some flexibility may be needed in the application of access location and design criteria and other requirements in the Manual when unique conditions and circumstances exist at a particular location. To provide this flexibility, variances from certain requirements may be authorized pursuant to the following procedures, analysis and documentation. Variances are authorized decisions within the Manual to manage unique site-specific conditions and engineering. On the assumption that most variances will reduce the margin of public safety, no variance may be authorized without proof of necessity for the access. When an applicant is the proponent of a variance, that applicant has the burden of persuasion.

It is unlawful to decrease public safety when a safer alternative that provides reasonable access is available. Determining necessity for access will consider property rights of the individual but shall not compromise public safety without proving necessity and the lack of a safer, reasonable alternative for access.

Variances are authorized decisions within the rule to manage site-specific conditions and engineering.

4.4.2 Permit Variance Review

If an applicant needs to seek a variance, the request shall be submitted as an attachment or addendum to the permit application. The burden of justifying the variance and providing analysis of the effects of the variance are on the applicant. If the need for a variance is not determined until the final design phase of the permit process, a request for a variance shall be submitted at the earliest possible opportunity.

The Department may approve a variance from requirements or waive a requirement of the Manual by approving a variance if:

- It is necessary to accommodate an exceptional and undue hardship on the applicant and there is no reasonable alternative, and
- There is a necessity of access to issue the permit, and
- As a result, the permit will meet acceptable standards of practice for engineering, operation, and safety, and
- The Department determines approval of the variance considers the function and safety of the roadway, adopted design practices, and the intent and purposes of Rule 761-112 (IAC).

Issues that may be considered include topography (e.g., ditch, waterway, other significant physical barriers), existing property ownerships, unique geometric considerations, safety concerns or other unique conditions of the site.

Each proposed variance shall detail the necessity for the variance and include documentation to support such reasons. The request shall include an engineering analysis if requested by the Department.

Separate variance requests may be necessary where more than one variance is necessary and where the variances may be approved in whole or in part.

Variances require the approval of either the District Engineer, the Director or their designee. If the variance is approved and the remainder of the application is in order and meets remaining Manual criteria, a permit may be issued. The reasons for granting the variance and references to the specific standards of practice shall be clearly stated in writing and included in the Department EPS record.

4.4.3 If A Variance is Approved

Restrictions on the use of the connection may be imposed as necessary to keep potential safety problems to a minimum. By the terms and conditions of the permit, the permittee may be required to improve, modify, eliminate, or correct the condition(s) giving rise to the variance when it becomes evident that the reason for the variance no longer exists.

The conditions that required a variance may end. Examples might be a new secondary street available; an otherwise land-locked owner obtains an easement providing secondary access, roadway geometry is improved. A variance should not be considered permanent for the life of the access. When the reasons for the variance are eliminated and there is an opportunity to meet full access standards modifications should be made to improve safety and traffic operations.

Site conditions that required a variance can be highly variable. In the issuance of a permit with a variance, the EOT should consider the following requirements in an effort to protect public safety as well as accommodating the necessity for the access:

- The documentation for the variance will provide a complete and specific explanation regarding the reasons for variance approval
- The reasons should be narrow, so the approval of the variance is unique to the specific site.
- The Department may place any condition on the access permit that the Department finds desirable to protect the public health, safety, and welfare.
- A variance may be considered temporary unless it would be impracticable to bring the access into compliance with access standards in the future.
- A temporary permit may be issued if the conditions requiring the variance will end within two years.
- If a temporary variance is granted, it will be specifically noted as to when or under what conditions the variance expires.
- Any related conditions such as improvements or restrictions that apply upon variance expiration will be included on the permit.

At the discretion of the Department, a variance allowing an existing access may be reviewed and revoked if the agency finds the factors set out to necessitate or justify the variance no longer exist. If the variance is revoked, the permittee must bring the access into compliance with current requirements. A new permit is required if construction on the highway is necessary.

4.5 Management of Appeals

4.5.1 Objections to Department Decisions

While in the course of processing an application, it becomes apparent that the applicant objects to what appears will be the district's decision to deny a permit or place terms and conditions on a permit which will be unacceptable to the applicant, the EOT should appraise themselves fully regarding the concerns of the applicant. It is helpful, should the applicant file a formal appeal, to have documented the information from the applicant and summarize the District's opinions on the applicant's issues. The objective is transparency of information and opinions for both applicant and the Department regarding on site conditions and the requirements of Manual.

An appeal may not be filed prior to an official and completed action by the District (EOT), such as offering a permit for signature, or having informed the applicant of denial in writing. Formal appeals must be based on a competed district action that is documented and available for applicant review.

If the EOT is aware that an appeal may be filed, the District Engineer will be kept informed. The District may work with the applicant to find solutions but may not interfere in any way or delay the filing of an appeal.

"Appellant" means the person(s) who submit an appeal to the Department. Appellants may only include the applicant, permittee or property owner. The district should be sure the current owner is aware of any appeal proceedings.

4.5.2 Appeal of an Access Decision

Should the applicant or permittee (appellant) object to the denial of a permit application by the district or object to any of the terms or conditions of a permit placed therein by the district, the appellant has a right to appeal the decision. When the terms and conditions on a permit are not acceptable to the applicant, the permit is deemed denied.

- The appeal shall be submitted to the appropriate District Engineer at the local district office of the department. This is the office where the original application was processed.
- An appeal must be submitted within 60 days of receipt of the District's written decision.
- The submitted appeal shall include reasons for the request and may include changes, revisions or conditions that would be acceptable to the appellants.

The District Engineer shall issue a written decision to the applicant or permittee within 60 days of receipt of the appeal.

If the property owner's objection is due to access modifications during a highway project and the department is acquiring property, the objections to access modification should be processed through the acquisition process in coordination with the district EOT for permitting.

Any appeal by the applicant or permittee of action by a local authority shall be filed with the local authority and be consistent with the appeal procedures of the local authority.

4.5.3 Processing an Appeal to the District

Upon receipt of an appeal, the District will gather a complete record for District Engineer review. The Access Management Engineer will be notified and provided a copy of the appeal. If the appeal is premature, prior to final action by the District, or if after the 60 days the Administrative Rule period allows, the appeal shall be rejected and the appellant notified.

4.5.4 Negotiations with the District

Upon receiving the appeal, the district may consider any information provided by the appeal and any requested revisions by the appellant and discuss this information with the appellant. If agreement is reached, the district may, with the approval of the local authority if a municipality, issue a permit containing the agreed upon conditions, or require that the applicant submit a new application for the Department's reconsideration if the original application is not consistent with the negotiated access decision.

4.5.5 Rendering a Decision by the District

In rendering a decision to affirm or reverse the initial district decision, the District Engineer shall review the application record, field information, engineering reviews, local agency documents, discuss the situation with staff, and any other matters relevant to the initial decision. A site review is recommended. The district decision on the appeal must be within the limits of the IAC 761-112 chapter rules and adopted Department policies.

The decision must address all reasons for the district decision. The decision will be in writing and fully inform the appellant and the permit record, and ultimately the review of the Director, the complete basis for the decision. The District may not be able to add any additional materials or justifications at a later date. The applicant must be fully informed of all known factors, data and engineering opinions regarding the district decision.

The appellant has 60 days from the date of the District's written decision to submit an appeal to the Director.

4.5.6 Appeal to the Director of Transportation

Upon receipt of the district decision, if the district decision is not acceptable to the applicant or permittee, an appeal can be made to the Director of Transportation. This appeal shall not be made until the district engineer has issued the district decision. The appeal shall include reasons for the request and may include revisions or conditions that would be acceptable to the appellant.

The appeal shall be made within 60 days of the district appeal decision. The appeal shall be submitted to Access Management Engineer, Traffic and Safety Bureau, Iowa Department of Transportation, 800 Lincoln Way, Ames, Iowa 50010.

The entire permitting record will be made available to the Director. The Director shall issue a written decision within 60 days of receipt of the appeal. The decision shall include an explanation of how the relevant evidence in the record supports the decision. The Director's decision is final agency action.

4.6 Access Construction and Inspection

4.6.1 General

No construction related activity within state right-of-way will begin until an access permit has been issued by the District. When an access permit is issued, construction must commence within one year of the permit issue date. After one-year, absent a request for an extension, the permit will be deemed to be expired and no longer valid for construction.

If it is necessary to delay construction, a time extension up to one year may be granted if requested prior to permit expiration. No more than two one-year extensions may be granted under any circumstances. A request for an extension shall be submitted to the district EOT listed on the permit, or the current EOT in charge of the area. The request should state the reasons why the extension is necessary, when construction is anticipated, and include the permit number, highway number and mile-point reference. Extension approvals shall be in writing (this includes email). If within a municipality, approval of the municipality may be required. The EOT will determine if conditions at the site remain the same and there is no reason to deny the request for extension.

After permit expiration where no construction has commenced, a new permit application is required. The permit record shall be updated to show the access under the original permit was not built. If, at a later date, the applicant wishes to continue, a new EPS record will be started and a reference to the first application will be noted.

The construction of the access as required by the terms and conditions of the permit shall be completed at the expense of the permittee.

Under no circumstances shall the construction or reconstruction of a driveway by a private interest interfere with the completion of a public highway construction project. No work shall be completed in an active construction project zone unless pre-approved by the Department. The private interest shall coordinate work with Department.

4.6.2 Financial Security and Insurance During Construction

Where the permit requires the reconstruction of an existing roadway open to travel, the Department may require the permittee or permittee's contractor to post a bond, establish an escrow account, or in some other manner provide financial security to ensure completion of the work within the highway. The security shall be sufficient to cover any repair or reconstruction of the access work area to a standard comparable with conditions prior to the initiation of access construction and to the extent necessary to ensure public safety as determined by the Department. Where extensive reconstruction of the highway is necessary the Department may require the use of a Department prequalified contractor. Costs and expenses for repair of the work area may be against the property owner absent sufficient financial security available to the department.

For the protection of the traveling public, the permittee or contractor may be required by the Department to hold comprehensive general liability and property damage insurance naming the Department as an additional insured during the period of access construction in state right-of-way. Insurance is always recommended when construction activity will involve changes to the traveled lanes of the roadway, or if traffic control on the highway is necessary during access construction.

4.6.3 Construction Activity

Once under construction there will be a sustained construction effort and the access shall be completed in an expeditious and safe manner. The permit allows up to 30 days from initiation of construction within the highway right-of-way unless otherwise stated on the access permit. The permittee or contractor should be prepared to quickly complete construction without delays. A construction time extension not to exceed 30 working days may be requested from the individual or office specified on the permit.

If the permittee finds it necessary to make construction modifications, the EOT noted on the permit must be notified and approve. Any materials removed from the highway right-of-way will be disposed of only as directed by the Department.

The access connection will be built according to the Department Standard Specifications for Highway and Bridge Construction. To ensure specification compliance, the Department may require the testing of materials used in construction. This is typically when the permit requires construction of a portion of the state highway and meeting specifications for materials and installation are as important as during a normal highway project. When so required, test results shall be provided to the Department. All materials used in the construction of the access within the highway right-of-way become public property.

The EOT or any department staff may inspect the access during the construction phase. The EOT will be the normal contact with the permittee. The EOT or any authorized Department staff may order the immediate suspension of access connection construction when the work is not in compliance with the permit or hazardous safety conditions are present.

For access permit construction involving the reconstruction of any part of the roadway, the Department may require the permittee to hire an Iowa registered professional engineer to affirm to the best of the engineer's knowledge and belief that the construction is in substantial compliance with the permit and department specifications.

Non-compliance with the access permit during construction is sufficient cause for shutting down construction or use of the access connection. The cost of any work required by the Department, including access closure, removal of non-complying construction, or providing for highway safety, will be assessed against the property owner.

In the event an access connection was constructed but does not conform to permit specifications, the permittee will be notified and is required to bring the access into conformance with the permit. Reconstruction or improvement of the access may be required. Refer to the enforcement and violation section 4.7 for procedures if the violation persists.

Any damage to the primary highway, its appurtenances (drainage, signs, fences, landscaping) or any utility beyond that which is allowed in the permit shall be repaired immediately at the direction of the affected owner. All costs associated with repair or relocation will be borne by the permittee. If a survey monument or marker is modified or damaged, repair and replacement shall be done at the direction of the owner of the monument.

The relocation, removal or modification of any traffic control device or other Department signs and appurtenances shall be accomplished by the permittee without cost to the department and at the direction of the department.

Installation of traffic control features or devices as required by the permit does not create any type of private interest in such features. Traffic control features and devices in the right-of-way, such as traffic signals, channelizing islands, medians, median openings, and turn lanes are operational and safety characteristics of the highway and are not means of private access. The Department may install, remove, or modify any traffic control feature or device in the right-of-way it deems necessary to accommodate and promote traffic safety or efficient traffic operations.

If any construction element of the permitted access fails within three years following construction, the permittee shall be responsible for all repairs. Failure to make such repairs may result in suspension of the permit and closure of the access. It is recommended that the permittee include this responsibility in any construction contract.

4.6.4 Traffic Control During Construction

The district may require pre-approval of all aspects of construction phasing and traffic control where access construction will affect on-going traffic operation and safety. The district may restrict work on or immediately adjacent to the highway and require control lane closure periods. Every effort shall be made to minimize the closure periods of any travel lanes. Work in the right-of-way will normally not be allowed on holidays, at night, during peak traffic hours and during adverse weather conditions.

The permittee shall provide construction traffic control and related traffic control devices at all times during access construction in conformance with the Federal M.U.T.C.D. and as required by the Department Standard Road Plans, Traffic Control Series. The Department may require the submittal of a traffic control plan for review and approval in advance of construction.

4.6.5 Utility Impacts

A Department utility permit shall be obtained for any utility work within highway right-of-way. The relocation, removal or repair of any traffic control device or public or private utilities shall be accomplished by the permittee without cost to the Department and at the direction of the district or utility owner. The permittee is responsible for the repair of any utility damaged in the course of access construction, reconstruction or repair.

4.6.6 Inspection of Construction

After access construction is complete, the EOT should field check the access connection to ensure that it has been built in conformance with the permit. Types A and B access should be inspected during construction and upon completion. All accesses shall be inspected within 11 months after permit issuance. The EOT should verify the components, location and existence of the access connection. If the access is not yet built, the permit period can be extended or the EOT may cancel the permit and require reapplication. If everything was done in compliance, then the permit “finalized” tab is activated in the electronic permit system and is archived in the EPS. Whether issued or denied, all materials and information is archived. If a denial occurred, the records of the application and all internally produced information may be needed in any subsequent appeal process.

If the access was not constructed in conformance with the permit, then the EOT will generate a letter and email the applicant that construction was inspected and that certain conditions must be rectified. Typical issues include improper grading of side slopes. If the issues are serious, the EOT will discuss the situation with the Assistant District Engineer. It may be necessary to take more formal action.

Failure to adhere to the terms and conditions of the permit is a violation of access IAC 761–112.9 and may be a violation of IC 306A and 318. The District will follow the requirements of IAC 761-112.9. See Manual section 4.7 for guidance.

4.7 Enforcement, Violations and Fines

It is the responsibility of the property owner to ensure that the access is not in violation of the rules or the terms and conditions of a permit. Failure to abide by all permit terms and conditions shall be sufficient cause for the department to initiate action to suspend or revoke the permit and close the access.

If the department determines that an access is constructed or used in violation of the terms and conditions of the permit the department will notify the permittee of record and the property owner. The notification will detail the violation and will include what must occur to correct the violation and invite the permittee and property owner to contact the District office.

A violation of the permit terms and conditions shall be considered a violation of IC 318.3. If after 20 days the permittee has not responded or is not proceeding to correct the violation(s), the department may summarily suspend the access permit and order closure of the access by notifying the permittee of record and the property owner. Continued use of the access after suspension is prohibited.

When a legal access is constructed or used in violation of the rules or the terms and conditions of the permit and its continued use presents an immediate threat to public health, welfare or safety, the department may summarily [immediately] suspend the access permit and order immediate closure of the access or any correction of physical conditions that pose the hazard. If the property or permittee do not act immediately, the department may proceed with closure or repairs to address the hazard using department forces and may assess all costs against the owner.

Even if there is a clear permit violation, private property has access rights so care must be taken when action to close an access is necessitated. Prior to suspension or closure, the district will determine if the property has other access available. If the property does not have alternate access, the district should consider the temporary impacts of closure as a factor in the decision to suspend the permit or physically close the access connection.

The department may install barriers across or remove any access connection that is determined by the department to be illegal. Costs of access removal, including fees and costs or expenses as may arise out of any action brought by the department to ensure the removal, shall be assessed against the property owner. Should the owner fail to pay such fees, costs or expenses within 30 days after assessment, the department may commence an action to collect.

When an apparently legal access connection where the department has no permit on file to enforce, if the access activity grows beyond its historical use and the activity exceeds the design limits of the access, it may be considered an access violation. This is especially true where a private access is the source of chronic safety problems. The district should notify the property owner of the concerns and ask the owner to submit an application to improve or close the access. Where documented safety and traffic operation problems exist, the district can proceed with suspension of access use or closure of the access after affording the property owner the opportunity to improve the access and address the safety concerns.

Iowa statutes at IC 318.8 applies to violations. "A person shall not excavate, fill, or make a physical change within a highway right-of-way without obtaining a permit from the applicable highway authority." At IC 318.6, obstructions are considered a public nuisance and is punishable as provided in IC 657. The law includes a requirement that the department has a duty under IC 318.4 to cause all obstructions in the highway right-of-way to be removed.

In the case of a violation regarding legal access to private property, the department will notify the permittee or property owner regarding the department's appeal process, section 4.5.

4.8 Use and Maintenance of Access

4.8.1 Use of Access

It is the responsibility of the property owner and permittee to ensure that the use of the access is not in violation of access permit terms and conditions. The terms and conditions of any permit are binding upon all assigns, successors-in-interest, heirs and occupants. **It is the responsibility of the seller to notify the buyer of access permit terms and conditions.** If needed, a copy of the original permit can be obtained from the Department.

Failure to abide by all permit terms and conditions shall be sufficient cause for the Department to initiate action to suspend or revoke the permit and close the access.

If any significant changes are made or will be made in the use of the property that will affect access operation, traffic volume and or vehicle type, the permittee or property owner shall contact the Department to determine if a new access permit and modifications to the access are required in response to the change in use.

It is recommended that the property owner maintain sufficient liability insurance should a tort claim name the property owner as a result of a crash related to the use or maintenance of the access. Regular property liability insurance may or may not include the portion of the access connection that is in state right-of-way.

4.8.2 Maintenance of Access

The property owner and permittee of any subsequent owners and occupants of the site served by the access are responsible for maintaining the access in good repair at all times including the removal or clearance of debris, snow or ice even though deposited on the access in the course of Department maintenance operations. The department is not responsible for the removal of debris, snow or ice on the access connection including debris deposited by the department during maintenance operations. Snow shall not be pushed from the access connection or driveway onto the road or roadway.

Where the access connection has a paved surface, the property owner and occupants are responsible for maintaining the access connection from the paved edge of the roadway to the right-of-way line. Where the access connection does not have a paved surface, the property owner and occupants are responsible for maintaining the access from the outer shoulder line of the roadway to the right-of- way line.

Drainage structures located along the highway for highway purposes are maintained by the department. This includes the typical side drain culvert under an access connection. In some situations, the permit requires a concrete box culvert or a bridge to be constructed by the property owner specifically for the access to the property. Such culverts and bridges shall be maintained by the property owner.

Where access box culverts and bridges are necessary, the permit should mention permittee maintenance requirements.

4.9 Department Initiated Access Changes

The Department, when necessary for the improved safety and operation of the highway, may rebuild, modify, remove, or relocate any access connection or redesign the highway including access related auxiliary lanes, median design and allowable turning movements. The permittee and or current property owner will be notified of the change. Changes in roadway design that may affect access turning movements and operation does not require an access permit modification as an access permit confers no private rights to the permittee regarding the control of highway design or traffic operation even when that design affects access turning movements.

4.10 Management of Access Control Lines

Where the Department has acquired access rights along a highway for the purposes of access control, no right of direct access is afforded through the deeded section except at locations, if any, specified by the Department. Property owners may inquire with the district about relocation of an access or other changes. Regardless of any agreements, exceptions or openings in an access deed, no access may be constructed at any location without first applying for an access permit and meeting all applicable requirements. This applies to any existing or new access, reconstruction, or change in access use. A permit is required to construct or modify an access connection or to significantly change the use of the access connection.

4.10.1 Predetermined Access Locations

The practice of establishing predetermined access (PDA) locations during highway project design and property acquisition has been discontinued. The districts will address previous PDA commitments as follows: Upon request by a property owner where the existence of a PDA is documented, the Department will determine if the entrance shall be built at the expense of the property owner. The entrance shall be constructed as a standard Type D field entrance with a granular surface unless specifically addressed in the right-of-way acquisition or condemnation documents. The access connection must be processed using the EPS.

Any additional cost associated with increased entrance width, entrance paving or highway modifications to accommodate the entrance shall be the responsibility of the property owner. To establish an access connection beyond the scope of the original PDA, the property owner is subject to all the requirements of the current access standards. The property owner is responsible for the cost of altering or relocating the entrance once completed by the Department.

If the PDA location is determined by field review to fail to meet minimum Type D access requirements, the District should work with the property owner to determine a better location for the access. A PDA-based access permit is required to meet sight distance requirements. Documentation of any access changes should be noted in the property settlement documentation for future reference.

Any land use beyond a Type D access should be brought into conformance with the current access regulations and is subject to current engineering standards.

5. PLANNING & COORDINATION

5.1 Importance of Access Management Planning in Growing Areas

The goal of access management planning is to maintain or improve the safety, efficiency and operation of the primary highway as traffic and access demands increase. Growth should not reduce roadway performance. If anything, growth requires even better roadway planning and performance management to accommodate increased traffic without reducing local and regional mobility and increasing transportation costs. The safety-related benefits of access management planning are significant. Applying access management techniques to existing corridors reduces access-related crashes as soon as the plan is implemented. The benefits of managing access are presented in Chapter One.

There are several strategies for access management planning. It is presumed that the assigned access category will normally be sufficient to provide the criteria needed to make good access decisions along each highway. However, in growing and already congested areas it may be desirable or necessary to create a unique access plan based on a comprehensive study of a corridor or an interchange crossroad. This is called an Access Management Plan (AMP). Once approved using a 28E Agreement it replaces the assigned access category for permitting decisions. Less formal access planning may also be used, but less formal plans are not substitutes for the assigned access category. The type of access management planning may vary depending on the scope determined to be reasonable and necessary to address the particular highway corridor conditions.

An access plan provides long-term guidance rather than relying on occasional and individual piecemeal permitting decisions as new development is proposed. An AMP can be prepared for any length of corridor or an interchange crossroad. The scope of each access plan may vary depending on what is determined necessary by the parties of the agreement to manage current and predicted future highway conditions and local land use. Informal plans might include access planning and application of access design techniques within a department reconstruction project. The project plan may simply be an effort to improve the conformance of the highway to the current access category assignment. Long range transportation plans such as those by metropolitan planning organizations may also incorporate access management strategies.

AMPs are not to be used to lower the standards of corridor access, but to use a comprehensive study to create a more accurate and context sensitive plan which still achieves the performance level necessary for the identified route to be successful and correctly support the community and regional transportation plans.

Successful management of access and the associated reduction in roadway conflicts has been shown to result 20 to 40 percent improvements in capacity. Such capacity improvements have spinoff effects, such as extending the useful life of the highway, allowing greater capacity to accommodate abutting development, decreasing travel times, and minimizing the need for the widening the highway. Furthermore, when congestion occurs, travel costs increase impacting the economy while traffic bottlenecks discourage continued growth. Access must be most carefully managed anywhere growth is occurring, typically on the fringes of urban areas, along key urban corridors and around interchanges.

An AMP could be initiated for a corridor that is suffering congestion, experiencing higher than average multi-vehicle crash rates, and is not performing well. An AMP can be an element of a larger corridor study, part of a re-design engineering study, or incorporated into a construction project. Since access is the single most important roadway design element besides the number of lanes that impacts capacity and performance, AMPs should be used with every roadway redesign project unless it is determined that the access category assignment is sufficient guidance for the designers.

Access management plans are typically implemented through a combination of developer improvements managed by access permits and public roadway improvement projects.

A formal AMP consists of text, plans and maps describing all current and future access connections and a signed 28E Agreement. An access study report will be completed as a basis for the AMP but a study report is not the AMP and is not attached to the 28E Agreement. The AMP and 28E Agreement should be clear and concise documents written in directive language and present only the conclusions to which all parties agree. The access study report is kept for future reference.

Allowing access within an Access Management Plan.

Once approved, all subsequent decisions made by the 28E Agreement parties will be consistent with the adopted AMP. An AMP is a plan not an engineering document. Department permits for construction and use of the access connection are still required. Since an AMP cannot anticipate all future scenarios, some flexibility should be provided in the adopted AMP. Other limitations may be necessary at the time of permitting due to unanticipated higher traffic activity or unexpected engineering difficulties.

The AMP will usually indicate the location and type of access at each connection and may provide some design information. It will be necessary to use the Access and Design Manuals to determine the design details and confirm operational and safety elements. Unanticipated site conditions, such as limiting stopping or intersection sight distance or grades may require adjustments in location and design of the access connection for engineering reasons.

5.1.1 Goals of an Access Management Plan

- Provide solutions to existing congestion, safety and traffic circulation problems
- Provide an action plan to reduce crashes.
- Identify the long-term function, economic potential, and character of a transportation corridor as it provides for regional as well as local needs.
- Provide reasonable access to adjacent properties while maintaining safe and efficient traffic flow on the highway (does not necessarily mean direct access to the highway).
- Provide developers with a stable and detailed plan that can be relied upon as a basis for development decisions.
- Reduce conflicts in traffic including vehicle to vehicle and between vehicles and other modes such as pedestrian and cyclists.
- Provide a framework for planning and location of future access points.
- Provide an action plan for implementation of AMP recommendations
- Extend the life cycle, the functional life, of the highway, and if included, the local roadways.
- Achieve an adopted plan that has the strength of a binding and cooperative intergovernmental agreement.
- Promote intergovernmental coordination to achieve consistency on access decisions.
- Facilitate administration of access permitting.
- Meet the intended functional performance goals of each highway.
- Help coordinate land development and traffic circulation.
- The plan should achieve the optimum balance between state and local transportation planning objectives, preserve and support the current and future functional integrity of the highway, and be unique to the local context and existing conditions.

5.1.2 Administrative Benefits of Access Management Plans

While the direct benefits of access management plans are the primary goals of an AMP – a decrease in the number and severity of crashes, improved traffic operations, more roadway capacity, having an adopted plan also offers additional administrative and planning benefits.

- The AMP provides a textual and visual map to guide and coordinate the myriad of day-to-day decisions made by many agencies and individuals regarding land development, infrastructure projects, multi-modal planning, design and other improvements.
- It improves intergovernmental coordination and consistency in transportation and land use planning and broader stakeholder involvement.
- The AMP creates more predictable long-range functional performance, more reliable level of service, making long range planning more predictable as well as identifying where future local streets will have junctions with the main road.
- These plans can be used to define the roles and responsibilities of all involved agencies and land owners.
- It gives property owners guidance for sharing access between two adjacent lots, consolidating access points for contiguous lots, and obtaining alternative access via collector streets, local streets, and frontage roads or backage roads.
- It can lead to a higher density of development from the improved road capacity resulting from better traffic management. This can translate into higher land values.
- Facilitates the administration of access regulations and the issuance of driveway permits.
- A developer can use the plan to establish permissible access points during site planning and can be assured that access permits will be forthcoming where access conforms to the plan.
- Joint planning between state and local agencies, as well as broader stakeholder involvement, can lead to opportunities for partnering on implementation, mitigation, or cost sharing. As an example, a local jurisdiction adopting a zoning overlay specifically for a highway corridor that is critically necessary for the area.
- Property owners, developers and businesses benefit from greater clarity of public intentions regarding the location and timing of roadway improvements and any policies and standards that will apply to the corridor. This allows developers to plan projects and site improvements that are compatible with public plans for the corridor.

5.2 Preparing Access Management Agreements

5.2.1 Initiating an Access Management Plan

Either the DOT or local authority at their individual discretion may initiate the AMP process for a corridor or interchange area. The agency initiating will normally take the lead providing project management, professional services and funding. It is also reasonable to place the burden of AMP preparation on a developer when the necessity of the AMP is directly linked to development impacts. Oversight and leadership of a privately initiated access study must be provided by the lead public agency.

The level of detail for the AMP study should be determined by a preliminary review of the proposed study area by the initiating agency prior to preparing the scope of the AMP project. Evaluate the corridor using readily available information sources and supplemented with at least one field visit. The purpose of this initial assessment and field visit will be to help prioritize the project for funding, determine project management capacity and to make the initial determination of project scope. Initial review should determine if the existing access management category is sufficient and of an AMP is desirable. After the preliminary review, set the scope of the project and proceed.

An option is for the lead agency to enter into a memorandum of understanding (MOU) with the key contributing agencies with jurisdiction over anticipated key elements of the AMP. The MOU should specify the issues to be addressed by the AMP and define the anticipated process including the AMP work program, schedule, and funding. This option is useful if the AMP will be within a municipality.

The department and local authority should closely coordinate throughout the plan preparation process. A project team is recommended. For large projects with several jurisdictions, an interagency technical advisory committee (TAC) is recommended consisting of affected local agencies responsible for any other transportation modes, infrastructure such as utilities, emergency services, schools, health agencies and interested elected officials.

AMPs are typically developed for select sections of high-priority corridors, around freeway interchanges, within municipalities and high growth corridors, but can be used on any roadway segment in need. Each plan will apply access management techniques, identify acceptable traffic control features, and establish the necessary operational restrictions to ensure the long-term functional performance and safety of the highway. The scope of each access plan may vary depending on what is determined necessary by the parties of the agreement to manage current and predicted future highway conditions and local land use.

Highway projects and corridor plans may include access management techniques and improvements to bring a section of highway into conformance with its current access category, without adopting an AMP, simply by using the typical project related department stakeholder and right of way involvement processes. This does not constitute a formal access agreement, nor is one necessary to implement project driven access techniques with the assigned access category.

Highway projects and corridor plans may include access management techniques and improvements to bring a section of highway into conformance with its current access category without adopting an access management plan and agreement.

5.2.2 Adoption of Access Management Agreements

To apply an access management plan within a municipality, it must be adopted by joint agreement for planning and concurrent jurisdiction regarding access permits in accordance with Iowa Code 306.4(4) [concurrent jurisdiction] and 306A.7 [planning agreements].

The adopted AMP agreement will include a 28E Agreement adoption document (resolution with signatures) and exhibits that include all access management elements agreed upon by the Department and local agencies usually in the form of text and illustrations. After adoption, if there are any disputes or issues not addressed by the agreement, the Department's Access Management Manual and the Design Manual will provide guidance. An example of an intergovernmental agreement is provided in the Appendix.

The AMP should identify:

- How the requirements of the assigned access category will be implemented using text or map or both,
- Identify locations or procedures for locations of all public intersections,
- Agreed-upon full-movement intersections and traffic signal locations,
- Standards for the location or spacing of private connections and all other access connections,
- How the agreement will be implemented,
- Process for planning coordination between local agency and the department,
- Land use management criteria and processes by the local agency in the form of ordinances and resolutions, and
- How the original agreement may be amended or vacated if necessary.

At least one advertised public workshop shall be held during the study and development phase of the plan. A public hearing must be held by local elected officials in order for the local agency to enter into the joint agreement with the Department. All property owners of record abutting the primary highway within the plan limits should be notified by the Department or the local authority of the proposed plan and afforded the opportunity to submit any information, data and agreements regarding the proposed plan in writing or verbally.

The plan must receive the approval of both the department and the appropriate local authority to become effective. This approval shall be in the form of a 28E Agreement first signed by the local authority and then Director of the Department. Where an AMP/28E Agreement is in effect, all action taken in regard to access shall be in conformance with the plan and current access rules (IAC 761-112).

5.2.3 Process to Amend an Existing Access Management Plan

From time to time it may be desirable or necessary to modify a previously adopted AMP. The original AMP study will be used as a basis for the assessment of the modification along with any necessary data collection and analysis to update the earlier AMP study. Either the Department or the municipality may initiate the process and studies and prepare the proposed amendment language and supporting materials for the updated AMP. When agreement to modify the original plan is reached, the amendment is adopted by all parties to the original AMP agreement and it is attached to the original AMP and distributed to parties. Any research and documentation prepared to support the amendment shall be attached to the original AMP Study and made available with all other AMP documents.

If it is necessary to significantly modify a single access connection location, the reasons for the shift and any other adjustments shall be documented for the permit record. It is assumed that both the DOT and the local agency will be made aware of the necessity of the modification in the course of standard land use and permitting procedures.

5.2.4 Development of Access Management Plans (process)

In cooperation with local agencies, identify the beginning and ending points for the access management plan. These points can change in the future if determined appropriate based on the access study. The actual study area will be larger, extending beyond the ending points and on both sides of the corridor to determine approaching traffic volumes and local traffic circulation routes.

Prior to commencing the AMP development effort, the scope of work needs to be defined. This includes the studies required, the road segment or network to be studied, the level of detail, stakeholder involvement, and the finalization adoption process necessary to establish a binding agreement. The study needs to consider corridor conditions for the next twenty years or longer.

An important part of a formal AMP is the commitment of the local authority to adopt appropriate zoning and subdivision standards to support the AMP. Example include corridor overlay zoning and access management strategies and standards within subdivision regulations.

For plans that are larger, significant in scope, with higher development costs, a memorandum of understanding, (MOU) at the beginning of the project, is recommended to identify and define the process, policy issues, mutual intentions, overall goals, assign responsibilities and determine financial resources and commitments.

In preparing such plans, roadway design, traffic capacity, public safety and access characteristics will be evaluated using professionally accepted methods and standards.

Please refer to the Appendix for additional guidance.

The first task is data collection and preparation of the material in maps, figures, illustrations, tables and text. There are three primary goals in data collection: 1) traffic generation and circulation patterns, 2) the current quality of transportation service including safety and mobility, and 3) sufficient information to determine traffic activity (all modes) now and in the future.

A general process for developing an access plan may include the following:

There is no commitment for the AMP until the 28E Agreement is ready for signature. While unlikely, the study for the AMP might indicate other alternatives. While an adopted AMP is important to achieve joint cooperation, it is not a requirement. Sometimes a draft AMP provides sufficient guidance for a reconstruction project. But absent adoption, the assigned access category applies to each access permitting decision on the corridor.

Process list:

1. Select the segment for the plan.
2. Consider preparing an interagency memorandum of understanding (MOU)
3. Conduct the study. The access study analysis involves many of the same steps for a major transportation impact study including modeling, review of alternatives, and recommendations for improved roadway design.
4. Discuss the study and arrive at conclusion's regarding the preferred access plan.
5. Prepare a draft AMP. Discuss, arrive at a consensus
6. Prepare the 28E Agreement. Local agency legal counsel may require review.
7. Adopt the AMP with text and illustrations attached.
8. Plan on reviewing the AMP, typically every five years, to assess the impacts of any changing land use or transportation conditions on access and circulation needs. Renewal is not necessary, but review can lead to improving the AMP based on newer information.

Final steps include providing copies to any unit of government that will make access-related decisions along the corridor and provide internal copies to the appropriate District personnel, including roadway design. The AMP must be easily available to any property owner along the plan. Recording the plan in local records may be an option.

All adopted access management plans will be sent to the GIS Coordinator after signature to be uploaded to the correct corridor in ArcGIS.

5.3 Strategies and Techniques Applied by Access Management Plans

Within the practice of access management, there is a large range of techniques that can be applied by an access management plan. The TRB Access Management Manual (2014) has all known access management techniques. Within several techniques there is a range of engineering values that can be adjusted to fit the context that the situation requires. The access plan may include median treatments, signal location choices, turn lanes, site access connections and circulation, land use, and improvements to the supporting local street network.

An AMP should get to the specifics of access locations, determine actions, solutions, funding, timing. There should be public and stakeholder input. Corridor and individual access related alternatives are developed. Solutions should include site specific design recommendations along with impacts and benefits of each location solution. All travel modes must be considered.

Budgeting is a form of long-range planning. Once corridor access management- related improvements are prioritized, budgeting planning can fund improvements at a set amount each budget cycle.

As part of an AMP, local community planning can address routine local circulation needs like travel to and from schools and parks and access to grocery stores and other community services. Such travel circulation planning can and should be done with the intent of avoiding the need to travel on higher volume, higher speed primary highways for local travel.

5.3.1 Interchange Access Management Plans

Freeway and expressway interchanges represent a significant capital investment and their operation and safety is very important for both local and regional mobility. Each interchange has an immediate traffic operation influence area, most extending to about one-mile radius from the interchange. Chapter One illustrates how crashes can rapidly increase in the last half-mile prior to ramp termini. An AMP with the local agency is strongly recommended to help protect the long-term functional integrity of the interchange area to the level intended by the public funds invested in the interchange improvement.

An interchange AMP is a transportation and land use plan to balance and manage transportation and land use decisions in an interchange influence area. It is an important tool in protecting the function of the major road (freeway or expressway) and the interchange crossroad as well as the supporting local street network. A good AMP will help support and maximize nearby development while ensuring that development site plans and local street circulation access connections do not have adverse impacts on the interchange crossroad, its capacity, safety and operation.

An interchange AMP requires some additional descriptions and guidance compared to the corridor AMP. An interchange AMP should be established in advance for any new interchange or significant modification to an existing interchange or when either agency has a concern regarding the need to act in advance to protect a particular existing interchange as adjacent lands develop.

The AMP should ensure that the local street network is interconnected and integrated with the interchange crossroad to take full advantage of the economic opportunities the interchange offers while ensuring that both systems operate safely and efficiently. Interchanges are valuable to local land use. The higher traffic volume associated with an interchange area is attractive to businesses such as traffic services, food, and retail businesses. An interchange offers a quick connection to an efficient freeway or expressway for long distance travel, and for retail users, the proximity of the interchange represents a larger market area.

It is best that all new interchanges or major reconstruction of an existing interchanges include an AMP for the interchange area during project development. At the very least an intersection functional area analysis for each access connection is required. If the crossroad is not a primary highway, the functional analysis will determine distance along the crossroad extending from the ramp termini where the Department should acquire access rights.

If the crossroad is a primary highway, an intersection functional area analysis is required as well as meeting the requirements of IAC 761-112 for interchange access. Absent an approved AMP for an interchange crossroad, the new interchange or modification project should not advance.

The interchange AMP needs more detail than a corridor AMP for at least the 1,400 feet each side of the ramp termini. Include schematics for the location of all current and future access locations, public and private, anticipated traffic patterns, identification of full movement intersections, auxiliary lanes, selected intersection controls such as traffic signals or roundabouts, signing and striping; the full control of access rights where necessary; and any other controls that will help ensure the continued long-term protection of the functional integrity of the interchange area.

The design of the plan should be developed using desirable level standards of traffic operation planning and roadway design standards where feasible. Frontage roads and other accesses which are closer to ramp termini than the spacing standards recommend, should be either relocated, closed, or turning movements restricted as soon as conditions allow.

On the crossroad, application of access control by deed shall be determined based upon the intersection functional area beyond the beginning of the ramp taper or intersection.

In the absence of any plan or access control by deed, and where at all feasible, a highway project should install a restrictive median extending from the ramps to the first full movement intersection with a local street. If feasible, the acquisition of access rights shall extend along the crossroad to the first full movement intersection.

5.3.2 Interchange Type Selection

The AMP study will normally assume the interchange type will not be changed. However, there are now many innovative interchange designs. In the case of a new interchange an AMP study may help evaluate and determine the best type of interchange to install. The interchange type selected can have a significant influence on crossroad access management, road operation and design and therefore the immediate land use alternatives. The selected interchange type will determine to some degree the capacity of the crossroad through the interchange area and the design and capacity of the turn lanes and ramp intersections. The selection will also determine the amount of right of way required.

As an example. The approach and departure speeds at a typical diamond design may be 35 to 55 mph. The intersection functional distance can be quite long based on these speeds. If the ramp termini have roundabout control, approach and departure speeds are more like 25 to 35 resulting in shorter functional distances for nearby access spacing.

5.3.3 Access on Side Roads Near Intersections

Intersections are defined in part by the determination of their functional area. The functional area of an intersection extends both upstream and downstream from the physical intersection area and includes the cross street. No access should be allowed within this functional area and should also meet spacing standards - whichever is greater. The procedure for determining upstream and downstream functional distance is provided in subsection 3.3.

5.4 Signal Location and Spacing

Traffic signals are a necessary traffic control feature at some intersections. However, they cause delay in travel, they reduce roadway traffic capacity, they are expensive to install and maintain, by causing stopping, idling and acceleration they contribute to air pollution, and due mostly to driver behavior are locations where about 50% of all crashes occur and about 25% of all injuries. Signals have a relative higher crash rate than non-signalized intersections – primarily due to the constant cycle of red lights on the main and higher volume roadway. Due to these factors, the management of traffic signal is very important to manage costs, crash rates and roadway capacity.

Intersections that are signalized or may be in the future, should be located to provide for efficient traffic progression over a wide range of speeds and cycle lengths. Long and uniform spacing of signalized intersections on major roadways allow signal timing plans that efficiently accommodate changing traffic conditions over time and during peak and off-peak periods (Access Management Manual, 2014, pp. 355-363; Stover and Koepke, 2002, pp. 4-23 - 4-36).

Progression at reasonable speeds can be achieved at short signal spacing, such as ¼ mile, only when traffic volumes are very low so that short cycles (60 seconds or less) can be used. As arterial and cross-street street traffic volumes increase, longer cycle lengths must be used to increase capacity. Cycle lengths of 90 to 120 seconds are commonly used on urban arterials during peak periods in developed urban areas. In a corridor, the cycle length at the most critical intersections will govern the cycle length for the entire system. The future cycle length must be considered in selecting a signalized intersection spacing pattern that will provide efficient progression at desired speeds and high traffic volumes.

A uniform 2,640 foot (one-half mile) spacing provides the greatest flexibility to achieve efficient traffic progression with the least delay. As cross street traffic demands in an urban area increase, the cycle length must increase and so do travel speeds. When an urban signalized corridor has signals at 110 second cycle, ¼ mile spacing requires 16 mph progression, 1/3 mile requires 22 mph progression and ½ mile requires 33 mph progression. It is easy to see have speeds drop as signal spacing is reduced. Irregular spacing usually causes one or more signals not to maintain the progression or the capacity of the progression. This decreases corridor capacity, adds delay and lowers average travel speeds.

It is not possible to achieve signal progression for more than a few intersections when there is irregular spacing. Short and/or irregular traffic signal intervals result in limited progression efficiency (excessive stops and delay), increased fuel consumption, higher vehicular emissions and reduced throughput capacity. These are all adverse impacts for urban areas looking for greater arterial efficiencies and reduced travel times.

As traffic signals are added, traffic safety is also compromised. For example, research has shown that on 4-lane roadways with a continuous two-way left turn lane, the crash rate increases at all levels of increased traffic signal density (Access Management Manual, 2014). For additional information on signal spacing and crash rates, see V. G. Stover, “Signal Spacing: A Technical Memorandum, “Center for Urban Transportation, October 2007.

5.4.1 Signal Review and Approval

To maintain public safety and progression efficiency on major highways, the Department needs to achieve a uniform 2640-foot spacing on all highways designated as Expressway, (E and ME), and principal and rural highways (M-1000, M-600 and R-600). The Department may consider a traffic signal location that deviates from this 2640-foot spacing where the progression efficiency (progression band width divided by the cycle length) is not less than 50% in the peak hours and not less than 45% in off-peak hours. As the efficiency drops, the throughput capacity of the corridor and each signal drops.

The Department will specify the conditions and procedures to be used in performing the analysis to demonstrate that the above stated progression efficiencies can be obtained, including, but not limited to, the following:

1. The roadway segment analysis will be at least two miles in length. This segment will include existing signalized locations as well as locations that may be considered for signalization at some future date.
2. The combinations of cycle length and progression speed to be achieved in the AM peak, mid-day, PM peak and off-peak periods with which the progression efficiencies are to be obtained. This shall include 45 mph with a 60 second cycle for mid-day and other off-peak periods and 30 mph with a 120 second cycle in peak periods and other combinations prescribed by the Department.
3. Traffic volumes, both present and future.
4. The signal system model to be used in performing the analyses.
5. Other considerations or conditions that the Department finds appropriate to the specific situation such as longer crossing times for pedestrians.

5.4.2 Application of Roundabouts for Intersection Control

Roundabouts as an alternative to traffic signals are becoming a more acceptable method to control intersections. They are significantly safer than traffic signal- controlled intersections and will normally reduce severe injury crashes by over 90% in comparison.

They provide excellent operational performance and capacity. They have a significant advantage over traffic signals in that uniform spacing is not required. Because roundabouts are much safer than traffic signals, there are no warrants that must be met before a roundabout is authorized. Traffic signal hardware, control technology and equipment maintenance are eliminated. Because of costs and design controls, roundabouts should not be numerous, but can be used at any intersection where left turns and crossing maneuvers need control and safer operations. For more information, review “Roundabouts: An Informational Guide”, Second Edition, 2010. NCHRP Report 672: Transportation Research Board of the National Academies, Washington D.C.

5.5 Local Government Coordination

5.5.1 Importance of Coordination

Coordination of land development and access management is important to the local government, Department and the applicant for site development and access permits. Periodic communication among staff and clear coordination procedures prevents misunderstandings and ensure permit applications are not unnecessarily delayed.

Access management also supports many community planning and zoning objectives. As noted in Chapter 1, consideration of access management in community planning and zoning helps to advance economic development, public safety, and the quality of the built environment. The goal of the Department is to help avoid safety and operational issues on the highway that can adversely impact both the development and the community. This section offers guidance on how such coordination can be achieved. A good reference: Incorporating Roadway Access Management into Local Ordinances, Kristine M. Williams, National Academies of Sciences, Engineering, and Medicine 2020, Washington, DC: The National Academies Press. https://doi.org/10.17226/25750.

5.5.2 Coordination in Planning and Zoning

Below are specific ways that local governments can coordinate community planning and zoning with the Department's access management program. Direct benefits include more efficient highways, reduced travel times, fewer crashes and greater development density.

1. Promote organization of land uses into activity centers, rather than in a strip pattern along highways.
   - Local circulation can occur safely within the center and reduce in-and-out activity on the primary highway;
   - Activity centers can be designed with supporting local and collector streets, or unified access and circulation systems that create fewer conflict points and opportunities to locate access farther from roadway intersections;
   - The activity center can be connected to residential areas via local networks, making shops and services more accessible to pedestrians, bicyclists, and drivers and reducing short local trips on high-speed highways that can lead to serious crashes or congestion.
2. Establish a street or service road plan to provide improved traffic circulation for development. Implement the plan through subdivision and development requirements, as well as capital improvement plans and programs.
3. Consider enacting the policies to ensure that access and circulation are properly designed, such as those suggested in the TRB Access Management Manual (2014):
4. Properties under the same ownership, consolidated for development, or part of phased development plans should be considered one property for the purposes of access management and local circulation. Access points from the highway to such developments should be the minimum necessary to provide reasonable access to the site.
5. Strip lots on primary highway frontage that direct most, or all, access to the highway should be prohibited in all new development proposals, including rezoning and subdivision actions. For existing strips, effort should be made to reduce access impacts through cross access easements, shared access and improved street network development.
6. Access to the primary highway system should be limited in accordance with the assigned access category. No new or additional access connections should be permitted for properties that are created as the result of parcel or lot splits. The subdivision and site plan process should ensure shared access not additional access – as each additional reduces highway safety.
7. New residential subdivisions should include an internal street layout that connects to the streets of surrounding developments where available to accommodate travel demand between adjacent neighborhoods, without the need to direct access to the primary highway system.
8. Develop a corridor access management plan with a joint intergovernmental agreement for the primary highway to better coordinate overall development, street network and access planning with the Department.

5.5.3 Coordination in Plat and Development Review

When the Department is aware of a new subdivision, rezoning or other development request that may involve highway access, working with local agencies and developers can avoid access permitting location and design problems. Local agencies should establish a process for early notification of the Department regarding any subdivision, rezoning or other development abutting a primary highway. Consider requiring these applicants to send a copy of their plat, rezoning, or development application to the Department access permitting EOT in the District for review and comment, regardless of whether an access permit is requested. Early notification allows the Department to provide a formal response that addresses the need for access connections or related improvements, as well as technical assistance to local government staff during subdivision or site plan review.

5.5.4 Coordination in Permitting

Below are suggested methods to achieve effective coordination in access permitting for development requests that involve access to a primary highway:

1. Establish local access management policies and procedures that are compatible with those of the Department for access to the primary highway system. Permit applications can then be processed efficiently and with less need for further specific coordination.

2. Involve the Department early in review of large or complex driveway permit applications and contact the Department with questions relative to primary highway access for any application. Department staff are available to assist local agencies with permit review and comments.

3. Withhold building permits, and site plan approvals or certificate of occupancy until the applicant provides clear evidence that the Department has found the proposed access to be acceptable. This helps ensure that local development approvals are not requiring the compromise of department engineering and access management standards.

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GLOSSARY

Glossary

This is an informational glossary pertaining to the management of access to and from highways. The definitions contained in the access rules, IAC 761-112 are controlling should there be any variation between this glossary and the legal definitions at subrule 112.2, or in the Iowa Code transportation chapters.

Abutting property means developed or developable property that shares a boundary with a public way right-of-way.

Acceleration lane means speed-change lane, including tapered areas, that enables a vehicle entering a roadway to increase its speed in a special lane to a rate that enables it to merge with traffic in the through lanes.

Access means a way or means of egress or ingress to a highway.

Access category means one of a system of primary highway classification levels for regulating access that is used to assign access management criteria to highways segments according to their importance and functional purpose in the state primary highway system.

Access Connection means any location of ingress or egress from or to a highway. It is the physical connection between the edge of the traveled way and the abutting property and is exclusive of the roadway and median. Where two public roadways intersect, the road of lower classification shall be considered the access connection.

Alternative access means an access location other than the one in consideration. It usually refers to an access connection or possible connection to a roadway of lower functional classification.

Annual Average Daily Traffic (AADT) means the total daily traffic volume passing a point or segment of a highway in both directions over the period of a year, divided by the number of days in the year (365). It includes both weekday and weekend traffic volumes. Average Daily Traffic (ADT) has a different meaning.

Applicant means any person, corporation, entity or agency applying for a permit or other form of permission.

Arterial means a through highway. Most state primary highways are arterials. These are major roadways at the access connections to which vehicular traffic from intersecting lesser highways are controlled by traffic control devices or are otherwise required by law to stop before entering or crossing the same.

Average Daily Traffic (ADT) means the average 24-hour volume, being the total volume during a stated period divided by the number of days in that period. Normally, this would be periodic daily traffic volumes over several days, not adjusted for days of the week or seasons of the year unless so stated.

Bandwidth means the time in elapsed seconds between the passing of the first and last possible vehicle in a group of vehicles moving at the design speed through a progressive traffic signal system. It is a quantitative measurement of the through traffic capacity of a signal progression system; the greater the percentage of bandwidth, the higher the roadway capacity.

Barrier curb means a raised vertical faced curb 6 inches to 9 inches high. Curbs are placed at the edge of the roadway to prevent vehicles from encroaching onto the roadside area. Barrier curbs may also be placed somewhere between the parking areas or internal driving areas and the highway to prevent vehicles from accessing the highway at locations that are not permitted and to help direct vehicles to the proper access locations.

Barrier means an obstruction placed to prevent vehicle access to a particular area.

Base course means the layer or layers of specified or selected material of designed thickness placed on a subbase or sub grade to support a surface course of a road.

Capacity means the maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions.

Channelization means the separation or regulation of conflicting traffic movements into separate paths of travel through the use of traffic islands, pavement markings, or other forms of delineation.

Clear zone means the roadside border area, starting at the edge of the traveled way, available for use by errant vehicles.

Clearance means the unobstructed horizontal or vertical space from the edge of the traveled way to a roadside object or feature.

Conflict means a traffic event in the path of travel that causes a driver to take evasive action to avoid collision with another vehicle, usually designated by a braking application or evasive lane change.

Conflict point means an area where intersecting traffic paths either merge, diverge, or cross. Traffic may include motor vehicles, cyclists and pedestrians.

Contested case means a proceeding including permitting decisions in which the legal rights, duties or privileges of a party are required by law to be determined by the Department after an opportunity for an evidentiary hearing.

Controlled-access highway means [in general], a highway designed for through traffic, and over, from or to which owners or occupants of abutting land or other persons have no right or easement or only a controlled right of easement or access, by reason of the fact that their property abuts upon such controlled-access facility or for any other reason [IC 306A.2]. A “fully” controlled-access highway is one where there may be no direct private access and all access connections will consist of one-way directional ramps.

Corner clearance means the distance from an intersection of a public or private road to the nearest access connection, measured from the closest edge of the pavement of the intersecting road to the closest edge of the pavement of the connection along the traveled way.

Countermeasure means an activity or initiative to prevent, neutralize, or correct a specific safety problem.

Crash means for the purposes of surface transportation, a vehicular collision with an obstacle or another vehicle. (‘Accident’ is no longer used as it presumes to some degree why the crash occurred.) ‘Collision’ is similar to ’crash’, however ‘crash’ is the nationally preferred term. Crash refers to the entire event.

Cross access means an easement or service drive providing vehicular access between two or more contiguous sites so the driver does not need to reenter the public street system.

Cross section means a profile perpendicular to the centerline of the road or access connection. It describes the entire position and number of travel lanes, median, shoulders, curbs, gutters, and sidewalks, along with the structural side slopes.

Cross slope means the transverse slope and/or super-elevation described by the roadway section geometry. It is the slope measured perpendicular to the direction of travel.

Crown means the shape of a tangent roadway cross section with a high point in the middle and a cross slope downward toward both edges.

Curb cut means an opening along a barrier curb line where the curb is lowered even with the roadway and vehicles may enter or leave the roadway. It is the depressed section of curbing to provide access to the abutting property. The most common type of private access connection in urban areas.

Deceleration lane means a speed-change lane, including tapered areas, that enables a turning vehicle to exit a through lane and slow to a safe speed or stop prior to completing its turn.

Decision sight distance means the distance needed for a driver to detect an unexpected or otherwise difficult-to-perceive information source or condition in a roadway environment, recognize the condition or potential threat, select an appropriate speed and task, and initiate and complete a maneuver, as compared to stopping sight distance which assumes the driver's choices are limited to quickly slowing and braking prior to other actions.

Delay means the additional time experienced by a driver, passenger, or pedestrian, during travel between origin to destination or additional time spent at a particular point in travel such as waiting for a traffic signal to turn green, compared to the amount of time it would have taken at the posted speed limit if there were no interference in travel (free-flow).

Department means the Iowa Department of Transportation.

Design speed means a selected vehicle speed used to determine the various geometric design features of the roadway.

Design vehicle means a vehicle, with representative weight, dimensions, and operating characteristics used to establish road design controls for the highway or access connection.

Design year means 20 years following the opening year or year the project is open to traffic (Office of Systems Planning, Iowa Department of Transportation 2013).

Distracted driving means any activity that could divert a person's attention away from the primary task of driving. Typically, this includes activities such as texting, talking on a phone, or operating any other device in the vehicle that causes the driver to look away from driving tasks. Distraction includes taking your eyes off the road, taking one of both hands off the wheel to do something, or taking your mind off driving. The National Safety Council reports that cell phone use while driving leads to 1.6 million crashes each year. Nearly 390,000 injuries occur each year from accidents caused by texting while driving.

Directional distribution means the directional split of traffic during the peak or design hour, commonly expressed as a percentage in the peak and off-peak flow directions (American Association of State Highway Transportation Officials).

Directional median opening means opening in a restrictive median that provides for specific traffic movements and physically restricts other movements.

Director means the director of the Iowa Department of Transportation. [IC 307.7(1)]

Divided highway means a roadway on which traffic traveling in opposite directions is physically separated by a restrictive median.

Driver workload means the complexity and type of perceptions, evaluations and decisions that a driver must make to operate a vehicle in a specific physical and traffic environment.

Driveway means that portion of an access beginning at the edge of the highway (public right-of-way) and extending into the parcel of land.

Driveway "apron" is not used in this Manual. In comparison, it means the access connection area not the driveway.

Driveway return radius means the circular pavement transition at the entrance of a driveway that facilitates vehicle turning movements.

Easement means a right-of-way granted, but not dedicated, for specific and limited use of private land and within which the owner of the property shall not erect any permanent structures that would interfere with passage on the easement.

Egress means the exit of vehicular traffic from abutting property or intersecting minor roadway to the main roadway.

Emergency vehicle means vehicles of public agencies such as the fire, police, ambulances, and authorized privately owned vehicles, acting in the event of an emergency.

Encroachment means any use of, intrusion upon, or construction of improvement within the public right-of-way by any person or entity other than the agency of jurisdiction for any purpose, temporary or fixed, other than travel.

Entrance means the physical connection between a highway and abutting property or an intersecting local public road or street. Use of the terms ‘access connection’ and ‘driveway’ are preferred as ‘entrance’ is not a term used in Iowa highway related statutes.

Fatality rate means the ratio of the number of fatal injuries suffered in motor vehicle related traffic crashes to the number of motor vehicle miles traveled (VMT) (expressed in 100 million VMT) in a calendar year.

Field access means an access connection to undeveloped or agricultural property that has an AADT of less than one vehicle per day.

Freeway means a divided arterial highway with limited access and designed for the unimpeded flow of motor-vehicle traffic volumes.

Frontage road means a lower function roadway auxiliary to and usually located alongside and parallel to an arterial roadway for the purpose of maintaining local road continuity, providing access to abutting properties and eliminating private access connections to the arterial roadway.

Fully controlled access highway: see controlled-access highway.

Functional area means that area upstream or downstream of an intersection where intersection operation and conflicts significantly influence driver behavior and vehicle operations. It includes both decision and maneuvering distances. The functional area of an intersection is a calculated value based on the intersection's geometrics, posted speed limit, traffic volume, type of traffic control used, and perception-reaction-time values determined by the American Association of State Highway and Transportation Officials.

Geometric design means the dimensions and relationships of such roadway features as alignments, profiles, grades, sight distances, clearances, and slopes. It does not include structural design, which is concerned with thickness, composition of materials, and load-carrying capacity.

Gradient means the rate or percentage change in slope, either ascending or descending, from or along the highway. It is measured along the centerline of the roadway or access connection.

Gross vehicle weight (GVW) means the total weight of the vehicle when loaded. This includes the weight of the vehicle itself (and the cargo that is loaded within that vehicle. For planning and permitting purposes, it is usually assumed that the vehicle carries its maximum allowable cargo weight.

Hazardous material means a substance that could cause injury or death; or damage or pollute land, air, or water. This includes substances that are ignitable, corrosive, toxic, explosive, or reactive.

Highway means the entire width between property lines of every way or place of whatever nature when any part thereof is open to the use of the public, as a matter of right, for purposes of vehicular traffic. The term “road” has the same meaning (IC 306.3(8).

Highway Safety Plan (HSP) means the document that the State submits each fiscal year as its application for highway safety grants, which describes the State’s performance targets, the strategies and projects the State plans to implement, and the resources from all sources the State plans to use to achieve its highway safety performance targets.

Horizontal curve means a curve in the plan or horizontal alignment of a roadway.

Illegal access connection means an access connection for which a valid permit has not been issued. This does not include connections in existence prior to adoption of access regulations in about 1950 (aka "grandfathered" connections).

Ingress means to leave the roadway and enter the abutting property or intersecting roadway.

Interchange means a system of interconnecting ramp roadways usually in conjunction with one or more grade separations, providing for the movement of traffic between two or more roadways on different levels. The structures and the ramps and related appurtenances are considered part of the interchange. A System Interchange is an interchange between two freeways or fully controlled-access expressways.

Interparcel circulation means the ability of vehicular traffic to circulate between adjacent parcels without reentering a public roadway.

Intersection means the junction of two travel ways. While technically for engineering and traffic operations, a driveway connection on a highway is a junction of travel ways, intersection for the purposes of this Manual means the junction of two public ways.

Intersection sight distance means the distance along the through street that, from the perspective of a driver waiting at an access connection, provides the driver with a sufficient line of sight left and right to select an appropriate moment to safety enter or cross the major road.

Island means a raised traffic control device used to separate, channelize or direct traffic in order to facilitate the safe and orderly movement of vehicles. An island may be a raised area that provides a physical barrier to channel traffic movements or a painted area.

Joint use (access connection) means a single access point connecting two or more contiguous parcels to a public roadway and may include parcels in different ownership.

Landlocked means a lot or parcel of land without legal access to any public way.

Lane means the portion of a roadway for the movement of a single line of vehicles.

Level of Service (LOS) means a qualitative measure describing operational conditions within a traffic stream based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience (American Association of State Highway Transportation Officials).

Liability means the legal responsibility for one's acts or omissions especially for the costs or damages for bodily injury or property damage. A permit establishes a legal duty on the permittee. Failure in meeting the obligations of the permit is a breach of this duty.

License means written permission, in the form of an agreement or permit issued under the law. A license is not permanent and is revocable. A license grants no property rights.

Licensing means the agency process respecting the grant, denial, renewal, revocation, suspension, annulment, withdrawal, or amendment of a license or permit.

Line of sight means a direct line of uninterrupted view between a driver and an object of interest or a view ahead of the driver in the direction of travel.

Local authority means every county, municipal, and other local board or body having authority to adopt local police regulations under the laws of this state.

Major road (major street) means the road normally carrying the higher volume of vehicular traffic. Generally used to distinguish between a lesser road or minor road and the more important road at an intersection.

Manual on Uniform Traffic Control Devices (MUTCD) means the federal regulatory Manual on Uniform Traffic Control Devices. It is recognized as the standard for all traffic control devices, signs and markings installed on any public way, street, or road open to public travel.

May means there is a choice of selections, or perhaps a choice to act or not act, based on the guidance provided. Known information and conditions must be applied in making the choice based on the rule and access management manual. The choice is not entirely optional or entirely discretionary. In making a choice when the term ‘may’ is used in text, discretion shall have a basis in criteria and program guidance and location circumstances.

Median means that portion of a roadway separating the opposing traffic flows. The width is measured between the inside edge of opposing traveled ways. A median may include left turn lanes. Medians may be depressed, raised or flush. A depressed or raised median is also referred to a restrictive or non-traversable median.

Median opening means an opening in an otherwise non-traversable median that provides for crossing and turning traffic.

Merge means the process by which two separate traffic streams moving in the same direction combine or unite to form a single stream such as traffic on a freeway on- ramp merging with traffic already on the freeway.

Minor road or lesser road means the road normally carrying the lower volume of traffic and controlled by stop signs at a two-way stop-controlled intersection.

Motor vehicle means a vehicle that is self-propelled. It includes automobiles, trucks, buses, motorcycles and motorized bicycles.

Motorist means the driver of a motor vehicle.

Necessity means the access is required or indispensable to the property due to circumstances that cannot be sufficiently mitigated by other means. Proof of necessity may be established by documents, data, maps and other information submitted to illustrate and verify the claim of necessity.

Noncompliance means failure to comply with a standard, law, regulation, governmental order, permit terms and conditions or an agreement.

Noncompliant access connection means an access connection for which a permit has been issued but that is not in conformance with the terms and conditions stated in the permit.

Non-recoverable slope means a slope that is considered traversable by a vehicle but on which the errant vehicle will continue on to the bottom.

Opening year means the year the project or access connection is scheduled to be open to traffic (Office of Systems Planning, Iowa Department of Transportation).

Operating speed (or prevailing speed) means the speed at which drivers are observed operating their vehicles during free-flow conditions.

Party means each person or agency named or admitted as a party or properly seeking and entitled as of right to be admitted as a party.

Pass-by trips means trips that would have traveled on a street adjacent to a retail land use even if the retail land use was not present.

Passenger car equivalent means the number of passenger cars displaced by a single large truck.

Pavement markings means markings set into the surface of, applied upon, or attached to the pavement for the purpose of regulating, warning, or guiding traffic. Also referred to as markings or traffic markings.

Pavement means the top or wear surface layer of a roadway used for the movement of vehicles.

Pavement structure means the cross section of the roadbed or access connection usually consisting of a sub base or existing ground, an aggregate base (AB) course, with a top or wear course of asphaltic concrete (AC) pavement or Portland cement concrete (PCC) pavement. The overall thickness of the structure may vary from 4 to 17 inches depending on existing soil conditions and the anticipated volume and weight of traffic.

Peak hour means the 60-min period during a 24-hour period in which the largest number of vehicles passes over a selected section of a roadway or access connection depending on the context. The peak hour is often presented in 15-minute intervals.

Performance measures means indicators of how well the transportation system or a segment of highway is performing with regard to such measurable attributes as average running speed, reliability of travel, and crash rates.

Permit (access) means a revocable license granting permission to construct and use an access connection and encroach on highway the right-of-way of the issuing authority. It includes the face of the permit form and all attachments.

Person means for the purpose of this rule and the permitting of highway access, every natural person, corporation, association, firm, partnership, trust, limited liability company or other non-governmental entity established by law.

Posted speed limit means the speed limit determined by law or regulation and displayed on Speed Limit signs.

Predetermined access location means a future location of access reserved for the adjacent property at the time access rights are acquired.

Primary highway or “primary road”, and “primary highway system” means those roads and streets both inside and outside the boundaries of municipalities which are under department jurisdiction.

Private road or "driveway" means every way or place in private ownership and used for vehicular travel by the owner and those having express or implied permission from the owner but not by other persons. [IC 321.1(54)]. Legally, a private road is a driveway, however, it has all the appearance of a public road intersection and is therefore designed similar to a public road, yet it is regulated as a private access connection and driveway.

Profile means a graph that has elevation as its vertical axis. The horizontal axis is distance measured along the centerline or other horizontal reference line including crest and sag curves and the straight grade lines connecting them.

Protected turn means a left or right turn allowed by a signal at an intersection at which the signal simultaneously prohibits any opposing or conflicting traffic movement.

Public intersection means the junction of two public roads.

Public way means an area open for public travel as a matter of right such as a road, street, or highway. It includes the appurtenances of all travel modes including bike paths, sidewalks, and transit. It does not include utilities even if they exist within the right of way.

Queue means a line of vehicles waiting to take an action, such as waiting at a traffic signal, turning left from the highway into an access, waiting at an access prior to entering a highway or waiting in a line at a drive-up window.

Ramp means a special lane, usually a short section of one-way roadway, which provides an access connection between two roads to enter or exit a major highway; also called entrance ramp, highway ramp, loop or collector-distributor road.

Resurfacing means placing of one or more new pavement courses on an existing roadway surface.

Reverse curve means a section of road alignment consisting of two arcs curving in opposite directions and having a common tangent point or being joined by short transition curve. A taper into a turn-lane may use a reverse curve design.

Right-of-way (ROW) means the entire width between the boundaries of a strip of land occupied or intended to be occupied by a road, sidewalk, crosswalk, railroad, electric transmission line, oil or gas pipeline, water line, sanitary storm sewer, or other similar uses.

Right-of-way line means the boundary line between the land acquired for or dedicated to public road use and the adjacent property.

Right-turn only (RTO) means an access point where left turns are not allowed or legally possible. Typically, this is an access point opposite a nontraversable median.

Road means the same as ‘highway’. It includes the entire area between the right of way lines.

Road work zone means the portion of a highway which is identified by posted signs as the site of construction, maintenance, survey, or utility work. The zone starts upon meeting the first sign identifying the zone and continues until a posted or moving sign indicates that the work zone has ended.

Roadside means that area between the outside shoulder edge of the roadway and the right of way limits. May also mean the area between two roadways when the roadways are well separated and landscaped such as a freeway median area.

Roadway means that portion of any road that is improved, designed, or ordinarily used for vehicular travel. It includes the roadbed and surface pavements necessary to support traffic loads. It includes the shoulder if a shoulder is present and the shoulder is prepared for vehicles. It includes auxiliary lanes. It is exclusive of the sidewalk, curb, berm, barrier or unprepared shoulder. It is exclusive of that portion of a roadway designated for exclusive use of bicycles, human-powered vehicles, pedestrians or transit vehicles. In the event that a road or highway includes two or more separate roadways, "roadway" refers to any such roadway separately but not to all such roadways collectively. A divided highway has two or more roadways.

Roundabout means a circular intersection with yield control at entry where all traffic travels in a counterclockwise direction around a central island.

Rural means an area that is not urbanized. These areas have a low population density, and typically much of the land is devoted to agriculture or open space. It includes isolated developed properties, but not communities.

Rural road means a roadway characterized by lower volumes, higher speeds, few turning conflicts and very few pedestrians.

Service life means the period of time that the infrastructure element, vehicle, or equipment is expected to be in operation with regular maintenance but without replacement or reconstruction.

Service road means a public way, access way, road or street auxiliary to and usually located alongside and parallel to a primary highway for maintaining local road continuity and for providing driveway access to property. Also referred to as a frontage road.

Shall means a requirement, an obligation that must be accomplished. No exceptions will be granted absent specific authorization from the department such as a variance.

Should is meant to be less strong than ‘shall’ for the purposes of the Manual. The use of ‘should’ is to allow a degree of discretion based on site conditions which cannot be anticipated by rules and standardized criteria, without using the more formal process of permit or permit waiver approvals. It means an obligation when there is no substantive reason not to fulfill the obligation. If the obligation is not to be accomplished, there must be documented and substantive conditions and circumstances for not accomplishing the obligation. If there is no substantive reason why the action is not taken or the engineering value not used, then it shall be accomplished.

Shoulder means the portion of the roadway contiguous with the roadway for accommodation of disabled vehicles, for emergency use, and for the lateral support of roadway subbase, base and surface courses of the pavement structure.

Sidewalk means that portion of a street between the travelled way and the adjacent property lines intended for the use of pedestrians.

Sight distance means the distance visible to the driver of a vehicle when the view is unobstructed by traffic. It is measured along the normal travel path of a roadway from the eye of the driver to a specified location and height above or near the roadway.

Sight triangle means a specified area adjacent to an access connection that must be clear of obstructions that might block a driver's view of potentially conflicting vehicles. The view across the sight triangle must be available to both the driver on the main road and the egressing driver at the access connection so that sight distance requirements are met. Generally, and absent any crest vertical slopes, landscaping height should not exceed three feet within the sight triangle.

Signalization means a traffic control signal. When used in a predictive (future) sense, it means an access location that is predicted to meet any of the warrants for a traffic signal as defined by the MUTCD.

Single unit vehicle means a vehicle having a single frame and an overall length of greater than 19 feet with two or three axles. Generally, these are vehicles include delivery trucks, haul vehicles, camping and recreational vehicles, and motor homes.

Slope means the inclination of a surface with respect to the horizontal, expressed as rise or fall in a certain longitudinal distance, expressed as a ratio or percentage compared to a level grade. Slopes may be categorized as positive or negative and as parallel, cross or side slopes in relation to the direction of traffic.

Specifications means a compilation of provisions and requirements for the performance of prescribed work. The Department publishes the Standard Specifications for Highway and Bridge Construction.

Speed change lane means a separate auxiliary lane including the taper for the purpose of enabling a vehicle entering or leaving a roadway to increase or decrease its speed to a rate at which it can more safely merge or diverge with through traffic. Acceleration and deceleration lanes are speed change lanes.

Speed means a rate of motion expressed as distance per unit of time.

> **85th-Percentile Speed** means the speed at or below which 85 percentage of the motor vehicles travel.
>
> **Operating Speed** means a speed at which a typical vehicle or the overall traffic operates. Operating speed might be further defined with values such as the average, pace, or 85th-percentile speeds.
>
> **Average Speed** means the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.
>
> **Design Speed** means a selected speed used to determine the various geometric design features of a roadway.

Stopping sight distance means the distance required by a driver of a vehicle traveling at a given speed to bring the vehicle to a stop after an object on the roadway becomes visible. It includes the distance traveled during driver perception and reaction times and the vehicle braking distance to a full stop. Calculations provided by tables assume the driver is going the posted speed limit and the vehicle has no braking system deficiencies.

Storage lane length means the length of a portion of an auxiliary lane required to store the number of vehicles likely to accumulate in the lane during a peak hour period of the lane.

Street means the entire width between property lines of every way or place of whatever nature when any part thereof is open to the use of the public, as a matter of right, for purposes of vehicular traffic. Street is normally used to define a local road within a municipality.

Study area means the portion(s) of the transportation system, which is directly affected by the planned development, to be included within the scope of the TIA analysis.

Super elevation means a cross slope on a curved pavement selected so as to compensate for centrifugal forces assisting a vehicle to maintain a circular path within its lane at a selected speed. It is not desirable to locate an access entrance along a portion of highway with a super elevation.

Surface course means one or more layers of a pavement structure designed to accommodate the traffic load, the top layer of which resists skidding, traffic abrasion, and the disintegrating effects of climate. The top layer is sometimes referred to as Wearing Course.

Taper means the widening of pavement to allow the redirection and transition of vehicles around or into an auxiliary lane. There are two different types of taper rates. Redirect tapers necessary for the redirection of vehicles along the traveled way which assumes no change in vehicle travel speed, and transition tapers for auxiliary lanes that allow the turning vehicle to transition from or to the traveled way, to or from an auxiliary lane and assume a change in travel speed.

Throat length means the distance along the centerline of an access, usually a driveway, to the first on-site location at which a driver might slow or stop make a right or a left turn, park, use a gate or ticket dispenser. On roadways with a curb and gutter, the throat length is measured from the face of the curb. On roadways without a curb and gutter, the throat length is measured from the edge of the roadway shoulder.

Throat width (driveway width) means the distance from edge to edge of a driveway measured behind the end of any radius or taper.

Through highway means a major roadway at the entrances to which vehicular traffic from intersecting lesser highways or accesses is required by law to stop before entering or crossing the same. An 'arterial' highway is a through highway. [IC 321.1(81)].

Traffic means the movement of all travel modes including, pedestrians, and transit, vehicles and other conveyances of any type through an area or along a defined route such as a highway either singly or together while using any highway for purposes of travel. In traffic code at IC 321.1(84): "Traffic" means pedestrians, ridden or herded animals, vehicles, streetcars, and other conveyances either singly or together while using any highway for purposes of travel.

Traffic-control device means any and all official signs, signals, markings, and devices placed or erected by the state or local authority for the purpose of regulating, warning, or guiding traffic.

Traffic impact means the effect of site traffic on highway operations, traffic and safety.

Traffic Impact Analysis (TIA) means a traffic engineering study, which determines the potential traffic impacts of a proposed traffic generator. A complete analysis includes an estimation of future traffic with and without the proposed generator, analysis to traffic impacts, and recommended roadway improvements, which may be necessary to accommodate the expected traffic.

Traffic Impact Letter (TIL) means a TIA that requires limited analysis and documentation based on forecasted traffic that is below a defined traffic threshold. (Office of Systems Planning, Iowa Department of Transportation)

Traffic Impact Study (TIS) means a TIA that requires more comprehensive analysis and documentation based on forecasted traffic that is above a defined traffic threshold. (Office of Systems Planning, Iowa Department of Transportation)

Traveled way means the portion of a roadway for the through movement of vehicles, exclusive of the shoulders, berms, gutters, auxiliary turn lanes, sidewalks, and on-street parking.

Trip means a single or one-directional vehicle movement. A vehicle leaving the roadway and entering a property is one trip. Later when the vehicle leaves the property it is a second trip.

Trip distribution means the allocation of the site-generated traffic among all possible approach and departure routes.

Trip generation means the estimation of the number of origins from and destinations to a site resulting from the land-use activity on that site.

Truck means every motor vehicle designed primarily for carrying commodities such as livestock, merchandise, material or freight of any kind, or over nine persons as passengers.

Turn lane means an auxiliary lane to allow vehicles to either slow down, perhaps stop (decelerate) in anticipation of a right or left turn from the roadway, or to speed up (accelerate) after entering to more closely match the speed to traffic on the roadway.

Turning radius means the radius of the path that a vehicle takes during a turn.

Two-way left-turn lane (TWLTL) means a continuous bi-directional single lane located between opposing traffic flows that provides a refuge area from which vehicles may complete a left turn from a roadway.

Variance means the issuing authority's intentional permission to either reduce or eliminate a specific design requirement.

Vehicle means every device in, upon, or by which any person or property is or may be transported or drawn upon a highway. In Iowa, "vehicle" does not include human propelled devices. [See IC 321.1(90)]

Waiver means the government agency's intentional permission to relinquish a rule requirement.

Warrant means the criteria by which the need for a safety treatment or roadway improvement can be determined.

Weight, Gross weight, means the empty weight of a vehicle plus the maximum load to be carried by the vehicle. "Unladen weight" means the weight of a vehicle or vehicle combination without load. "Gross vehicle weight rating" means the weight specified by the manufacturer as the loaded weight of a single vehicle.

Will means a requirement, an obligation in future tense. Must be read in context.

Working day means any day that the permittee or construction crew can perform a normal day of work exclusive of delays which result from inclement weather, labor disputes and material shortages. It does not include weekends and legal holidays.

APPENDIX A: REFERENCES

Appendix A: References

1. Comprehensive Resource Manuals for Access Management
2. Iowa Safety and Access Management Studies
3. Iowa Resource Materials and Links
4. National Design Resources
5. National Safety and Economic Studies in Access management
6. Other national studies related to Access Management

Websites With Access Management Materials

The Access Management Committee of the Transportation Research Board (division of the National Academies of Science, Engineering and Medicine), has a website with an extensive collection of over 40 years of access management publications.

https://www.accessmanagement.info/committee

The most recent National Cooperative Highway Research Program publications regarding highway research are available here:

https://nap.nationalacademies.org/author/NCHRP/transportation-research-board/national-cooperative-highway-research-program

The US Federal Highway Administration maintains an extensive website of highway information. Corridor Access Management:

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InTrans

Within Iowa State University, The Institute for Transportation is a hub of local, regional, and national transportation-focused research, education, workforce development, and technology transfer. InTrans administers 15 centers and programs, and several other distinct research specialties, and a variety of technology transfer and professional education initiatives.

https://intrans.iastate.edu/

CTRE

The Center for Transportation Research and Education is housed at and administered by Iowa State University's Institute for Transportation (InTrans). CTRE performs transportation-related research, outreach, and educational activities in four major areas: safety, asset management, operations, and planning.

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APPENDIX B: TIA GUIDELINES

Guidelines for
Traffic Impact Analysis

Prepared By:
Systems Planning Bureau

January 2023

IOWA DOT

Table of Contents

I. Introduction

Assessing operational impacts from a permitted access connection is imperative when managing the primary highway system. Moreover, access management is vital to ensuring that a safe and efficient road system is maintained. Therefore, the following guidance and requirements have been documented to provide a clear understanding of the operational impacts from moderate to high volume commercial access connections. Although traffic volumes are a key factor, the Iowa Department of Transportation (DOT) may request an impact analysis for lower volume accesses if the highway has been determined, at the sole discretion of the DOT, to be nearing capacity.

The purpose of this document is to establish uniform guidelines for preparing a traffic impact analysis. The DOT requires a traffic impact analysis for all Type “A” and “B” access permits.

II. Purpose of Traffic Impact Analysis

The purpose of the traffic impact analysis is to identify system and immediate area impacts associated with a proposed development. Identification of impacts and appropriate mitigation measures allows the DOT to assess the existing and future highway system’s safety, performance, maintenance, and capacity needs.

The Traffic Impact Analysis guidelines will:

1. Provide information to the applicant on initial information needed and specific traffic impact documentation required.
2. Ensure consistency in the preparation of traffic impact analysis information.
3. Define the acceptable format for the required traffic impact analysis.
4. Create a clear understanding of the impacts resulting from the proposed access to the primary highway system.

III. Initial Applicant Submittal

When requesting a commercial access to the primary highway system, the requestor **must.**

1. Identify the location (primary highway number and orientation) of the proposed access.
2. Identify the proposed land use that will be served by the proposed commercial access.
3. Provide the total leasable square footage of the commercial development (Full Build-out).
4. Characterize vehicle types that will use the entrance. Give the percent of cars, single unit trucks, and combination unit trucks. Include information on directionality and background growth.

This information will be used to estimate the future traffic demands based on the development size and land use. The DOT will use this traffic estimate to evaluate operational concerns.

IV. Level of Traffic Impact Analysis

Based on traffic volumes, there are two traffic impact analysis levels: Traffic Impact Letter (TIL) or Traffic Impact Study (TIS).

Specific threshold criteria have been defined for each level of traffic impact. Threshold criteria were developed to avoid placing an undue burden on development with moderate traffic impact, while ensuring that large developments with significant impacts are thoroughly evaluated. The district staff will determine the traffic impact analysis level based on preliminary data supplied by the applicant and potential impact on the primary highway system.

TRAFFIC VOLUME	TRAFFIC IMPACT LETTER (TIL)	TRAFFIC IMPACT STUDY (TIS)
AADT (Annual Average Daily Traffic)	Less than or equal to 500 trips	Greater than 500 trips
Peak Hour Volume	Less than or equal to 100 trips	Greater than 100 trips

A TIS may also be required when considered necessary by the DOT due to the nature of the proposed land use development and potential impact on the Primary Highway System.

V. Traffic Impact Analysis Submittal

As a result of the initial information submitted, the district staff will inform the applicant which level of analysis will be required. Therefore, the applicant will be responsible for delivery of acceptable traffic impact documentation. The traffic impact analysis should be authored by an individual or entity demonstrating the capability to analyze mobility, conduct traffic engineering, and produce design elements. Coordination between the analysis and proposed site design is essential. The traffic impact analysis **must** be completed and sealed by a Professional Engineer licensed in the State of Iowa. The applicant, via their professional engineer, will submit the proposed entrance design and the required traffic impact analysis to the appropriate district office. A functional area analysis is required for Traffic Impact Studies.

VI. Traffic Impact Letter (TIL)

A. Purpose of the Traffic Impact Letter
The purpose of a Traffic Impact Letter (TIL) is to give the DOT vital information regarding potential impacts associated with developments along the Primary Highway system.

A traffic impact letter is intended to:
1. Document whether the access request meets the requirements of the TIL process.
2. Analyze location and access connection(s) necessary to minimize traffic impacts.
3. Recommend the need for any improvements to the adjacent and nearby roadway system to maintain a level of service and safety comparable or better than existing conditions.
4. Protect the function of the highway system while providing appropriate and necessary access to the proposed development.

B. Traffic Impact Letter Requirements
A traffic impact letter should include, in PDF format, information for the reviewer to understand the operation and impacts of the development, including but not limited to:
1. Study area description.
   a. Show the study area boundary. A recommendation in determining the study area boundary is to carry the analysis out at least as far as the nearest major intersection(s) or desirably, to points on the system where the influence of the proposed improvement is no longer discernible.
2. A description of the proposed land use.
3. A trip generation table of the proposed development.
   a. Use equations or rates available in the latest edition of the ITE Trip Generation manual.
4. A turning movement diagram for peak hour and design hour traffic volumes for each access location for both opening and design year.
5. Conclusion
   a. Describe the impact of the proposed development on the surrounding area and roadway system.
   b. Discuss any significant impacts the proposed development might have on the primary highway being accessed (e.g. safety, LOS).

VII. Traffic Impact Study (TIS)

A. Purpose of the Traffic Impact Study
The purpose of a Traffic Impact Study (TIS) is to identify system and immediate area impacts associated with a proposed development accessing the Primary Highway System.

A traffic impact study is intended to:
1. Document whether the access request meets the requirements of the Traffic Impact Study process.
2. Analyze location, spacing, and design of the access connection(s) necessary to minimize traffic issues.
3. Analyze operational impacts on the highway for both day of opening and the design year. Analysis for peak

hour or design hour is required. Analysis for intermediate time frames between the program year and design year may also be required.

4. Recommend the need for any improvements to the adjacent and nearby roadway system to maintain safety, a level of service comparable or better than existing conditions, and to protect the function of the highway system while providing appropriate and necessary access to the proposed development.
5. Assure that the internal traffic circulation of the proposed development is designed to provide safe and efficient access to and from the adjacent roadway system without creating congestion on the primary roadway.
6. Analyze the proposed development to ensure transportation impacts to the traveling public are minimized.

B. Traffic Impact Study Format

A traffic impact study should be submitted to the DOT in a PDF format and should follow the outline below. Please note that all assumptions should be noted where made.

1. EXECUTIVE SUMMARY, CONCLUSIONS & RECOMMENDATIONS
2. INTRODUCTION
3. ANALYSIS OF EXISTING CONDITIONS
4. PROPOSED DEVELOPMENT
5. ANALYSIS OF FUTURE CONDITIONS
6. CONCLUSIONS & RECOMMENDATIONS
7. APPENDICES

C. Traffic Impact Study Requirements

The traffic impact study **must** incorporate, at a minimum, traffic engineering principles and standards as presented in the Iowa Access Management Manual, Department standards, and National practices. When preparing a traffic impact study within a metropolitan planning area the development of traffic forecasts **must** be coordinated with the Metropolitan Planning Organization staff and the MPO travel demand model.

When preparing a traffic impact study, consider the items listed below and include those that are applicable:

1. Study Area Description
    - a. Show the site location and include the intersection(s) of the proposed site access drives and any intersections or interchanges impacted.
    - b. Show the study area boundary. A recommendation in determining the study area boundary is to carry the analysis out at least as far as the nearest major intersection(s) or desirably, to points on the system where the influence of the proposed improvement is no longer discernible.
2. Proposed Land Use
    - a. Include an explanation of the proposed land use and how the land use will impact the area including a site plan (preferably engineer civil site plan).
    - b. Identify physical concerns relating to the area, site, and specific access points.
    - c. Identify any critical restrictions due to terrain, adjacent land use, zoning requirements, etc.
3. Forecast Years
    - a. Document and include all phases of development for:
        - I. The opening year (opening day of project)
        - II. The design year (twenty years after opening day).
4. Analysis Period
    - a. For the opening and design years, analyze site and adjacent road traffic (including turning movements) for:
        - I. Weekday A.M. peak hours
        - II. Weekday P.M. peak hours
        - III. Weekday AADT

Weekend generation rates might be required depending on the nature of the proposed land use development (e.g., churches and shopping malls). Contact district staff at the DOT to determine if the proposed land use development would require a weekend traffic analysis.

5. Data Collection
    - a. Include AADT volumes and turning movement counts for current year (or latest year collected by the Iowa DOT), opening year, and design year.
        - I. Include the traffic growth rate and discuss the assumptions used.

II. Discuss traffic characteristics (vehicle mix, % make-up, and any special vehicle requirements).

b. Describe site and adjacent roadway and intersection geometries.

c. Identify traffic control devices including traffic signals and regulatory signs.

d. Include traffic crash data.

e. Include traffic modeling results, such as from MPO models, where applicable.

6. Trip Generation

a. Use equations or rates available in the latest edition of the ITE Trip Generation manual, or, if applicable, rates based on business knowledge.

7. Trip Distribution and Assignment

a. Document separately the distribution and assignment of existing, site, background, and future traffic volumes.

I. Discuss trip/vehicle make-up and any vehicles that require special routing (e.g., vehicles with special weight, length and/or width restrictions).

II. Discuss trip reduction strategies and pass-by trips.

III. Discuss directional distribution of site-generated traffic.

IV. Discuss assignment of non-site related traffic (existing, background and future). Document both existing and committed development, and when appropriate other background planned development traffic. Discuss assignment of total future non-site traffic for the design year.

8. Capacity Analysis

a. Include LOS analysis results at all intersections for:

I. The existing traffic conditions

II. The future traffic conditions without the proposed development in the program and design years

III. The future traffic conditions with the proposed development in the program and design years

IV. Capacity Analysis will be completed in accordance with the latest edition of the “Highway Capacity Manual”.

9. Traffic Signal Impacts

For existing traffic signals:

a. Identify the impact on the operations of the existing traffic signals.

b. Complete an operational/capacity analysis of the intersection using opening day traffic volumes to determine necessary changes to the traffic signals, timing, phasing, etc.

c. Provide conceptual plan sheets indicating the changes to the existing traffic signals.

For proposed traffic signals:

a. Complete a Traffic Signal Warrant analysis of the intersection using opening day and design year traffic volumes to determine if the signal warrants are met. Complete a capacity analysis to determine which traffic control provides the best intersection operations.

b. If traffic signals are proposed, provide Traffic Signal drawings (including the location of traffic signals and signs).

c. If signals and warrants are satisfied for the design year, but not the opening year, an estimate of when signals will be warranted must be provided.

Analysis of the need for Traffic Signals will be completed in accordance with the latest edition of the “Manual on Uniform Traffic Control Devices”.

10. Geometrics

a. Include acceleration, deceleration and weaving lanes, and traffic control features (number of lanes, lane lengths and widths, alignment, etc.). Include off-system features as related to site plan and access point(s).

b. If required, Queuing Analysis must be conducted for all turn lanes and ramp termini under stop and/or signal control within the study area.

11. Functional Area Analysis

a. Include a functional area analysis for all public intersections and proposed access connections.

b. Identify any overlapping functional areas and/or acceptable gaps.

12. Right-of-Way Access
    a. Identify right-of-way, geometric boundaries, and physical conflicts.
13. Crash and Traffic Safety Analysis
    a. Discuss the history/conditions of the existing vs. proposed development and document how the level of safety may change.
14. Design and Mitigation
    a. Identify operational concerns and mitigation measures to ensure safe and efficient operations. If applicable, this should include pedestrian/bicycle danger mitigation.
    b. If needed for clarification, include scaled schematic drawings illustrating alignment, number of lanes, lane widths, signing, and pavement markings. If traffic signal modifications are proposed, also include signal phasing, signal head locations, and lane markings.
15. Conclusion
    a. Describe the impact of the proposed development on the surrounding area and roadway system.
    b. Discuss any significant findings from the applicable items of the Traffic Impact Study Requirements (e.g., safety, LOS)
    c. Engineering judgment must have a basis in the data and analysis, explain the reasoning (all statements must be supported by the data provided in the report).
    d. Describe the type of access permit that is being requested.
16. Recommendation
    a. Discuss recommended changes to the existing roadway system due to the planned development, including benefits or mitigated effects of changes.

VIII. Glossary of Terms, Abbreviations and Acronyms

Access – For the purposes of this these guidelines, an access is any entrance or exit point to a primary highway (Office of Systems Planning, Iowa Department of Transportation).

Access management – Measures regulating access to streets, roads, and highways from public roads and private driveways (iowadot.gov/glossary, accessed 8/5/22).

Annual Average Daily Traffic (AADT) – The total volume passing a point or segment of a highway facility in both directions for one year, divided by the number of days in the year (iowadot.gov/glossary, accessed 8/5/22).

Capacity – The maximum number of vehicles (vehicle capacity) or passengers (person capacity) that can pass over a given section of roadway or transit line in one or both directions during a given period of time under prevailing roadway and traffic conditions (iowadot.gov/glossary, accessed 8/5/22).

Decision sight distance – The distance required for a driver to detect an unexpected or otherwise difficult-to-perceive information source or hazard in a roadway environment that may be visually cluttered, recognize the hazard or its threat potential, select an appropriate speed and path, and initiate and complete the required safety maneuver safely and efficiently. (iowadot.gov/glossary, accessed 8/5/22).

Design year – 20 years following the opening year or year the project is open to traffic (Systems Planning Bureau, Iowa Department of Transportation 2013).

Development traffic – Estimated traffic volumes generated by a proposed development (Wisconsin Department of Transportation).

Directional distribution – The directional split of traffic during the peak or design hour, commonly expressed as a percentage in the peak and off-peak flow directions (American Association of State Highway Transportation Officials).

Functional Area - Includes any area upstream or downstream of an intersection where intersection operation and conflicts significantly influence driver behavior and vehicle operations. The functional area of an intersection is a calculated value based on the intersection's geometrics, posted speed limit, traffic volume, type of traffic control used and perception-reaction-time values determined by the American Association of State Highway and Transportation Officials. (Iowa DOT Access Management Manual)

Highway Capacity Manual (HCM) – A manual published by the Transportation Research Board as a means of standardizing the techniques used to evaluate the quality of service provided by various transportation facilities (McRae, Bloomberg and Muldoon).

Institute of Transportation Engineers (ITE) – An international educational and scientific association of transportation professionals. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development, and management for all transportation modes (McRae, Bloomberg and Muldoon).

Intersection sight distance (ISD) – The unobstructed view of an entire (at-grade) intersection and sufficient lengths of the intersecting highway to permit control of the vehicle to avoid collisions during through and turning movements (iowadot.gov/glossary, accessed 8/5/22).

Level of service (LOS) – A qualitative measure describing operational conditions within a traffic stream, based upon service measures, such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience; LOS A represents completely free flow of traffic allowing traffic to maneuver unimpeded; LOS F represents a complete breakdown in traffic flow resulting in stop and go travel; LOS is typically calculated based upon peak-hour conditions. (iowadot.gov/glossary, accessed 8/5/22).

Opening year – The year the project is scheduled to be open to traffic (Systems Planning Bureau, Iowa Department of Transportation).

Pass-by trips – Trips, currently on the roadway system, which make an intermediate stop at a generator (i.e., the development under study) with direct access to the roadway network that is adjacent to the original travel route between the origin and primary destination. Pass-by trips do not include trips that divert from their original travel path non-adjacent to the site (i.e., diverted trips) (Wisconsin Department of Transportation 2021).

Peak hour – That hour during which the maximum amount of travel occurs. It may be specified as the morning peak hour or the afternoon or evening peak hour (American Association of State Highway Transportation Officials)

Primary highway – A road or street designated as a “primary road” in accordance with Iowa Code 306.3(6). This definition includes primary road extensions in cities and primary roads under construction (Systems Planning Bureau, Iowa Department of Transportation).

Queuing – A stacking of vehicles waiting to be serviced and/or processed (Systems Planning Bureau, Iowa Department of Transportation).

Sight distance – The length of highway visible to the driver (iowadot.gov/glossary, accessed 8/5/22).

Stopping sight distance – The sight distance required to permit drivers to see an obstacle soon enough to stop for it under a defined set of reasonable worst-case conditions, without depending upon speed, gradient, road surface and tire conditions, and assumptions about the perception-reaction time of the driver (iowadot.gov/glossary, accessed 8/5/22).

Study area – A geographic area selected and defined at the outset of engineering or environmental evaluations, which is sufficiently adequate in size to address all pertinent project matters occurring within it (iowadot.gov/glossary, accessed 8/5/22).

Traffic impact – The effect of development traffic on highway operations and safety (Wisconsin Department of Transportation 2021).

Traffic Impact Analysis (TIA) – An engineering study that determines the potential impacts the expected traffic of a proposed traffic generator will have on the surrounding roadway network. The study includes a recommendation of roadway improvements that may be necessary to accommodate the additional traffic. A complete analysis includes an estimation of future traffic with and without the proposed generator, analysis of traffic impacts, and recommended roadway improvements which may be necessary to accommodate the expected traffic. (Wisconsin Department of Transportation 2021).

Traffic Impact Letter (TIL) – A TIA that requires limited analysis and documentation based on forecasted traffic that is below a defined traffic threshold (Systems Planning Bureau, Iowa Department of Transportation)

Traffic Impact Study (TIS) – A TIA that requires more comprehensive analysis and documentation based on forecasted traffic that is above a defined traffic threshold (Systems Planning Bureau, Iowa Department of Transportation).

Trip distribution – The allocation of the trips generated by the proposed development between all potential approach and departure routes (Wisconsin Department of Transportation 2021).

Trip generation – The estimation of the number of trips generated to and from a site resulting from the land-use activity on that site (Wisconsin Department of Transportation 2021).

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Appendix A - Traffic Impact Letter Template

[Insert Title of Traffic Impact Letter]

Prepared by:

[Insert Preparers Name]

Prepared for:

[Insert Entity Name]

Submitted to:
Iowa DOT
[Insert Additional Names]

[Insert Date]

[Insert Engineering Certification Seal]

1) INTRODUCTION
2) ANALYSIS OF EXISTING CONDITIONS

Provide a text description of current site conditions. Include a description of the site location and the surrounding areas.

3) PROPOSED DEVELOPMENT

Provide a text description of the future commercial development. Include proposed land uses and how the development will impact the area.

4) ANALYSIS OF FUTURE CONDITIONS

- TRIP GENERATION

  Utilize the most current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual to estimate daily and peak hour trip volumes originating from and destined to the proposed development. Show trip generation rates for weekday, AM and PM Peak Hour in tables for opening year and design year.

- TRIP DISTRIBUTION

  In a diagram, show the movement distribution (rounded to the nearest 5) at each intersection and access location within the development area.

5) CONCLUSIONS & RECOMMENDATIONS

Summarize existing and future conditions and discuss the proposed development’s impacts. Identify any significant impacts and recommend mitigation along with the effectiveness of the mitigation.

Appendix B - Traffic Impact Letter Checklist

Following is a checklist based on the guidelines provided by the ITE and the Iowa DOT's Guidelines for Traffic Impact Analysis. The purpose of the checklist is to see whether the preparer has provided all the information that the Iowa DOT requires. It should also be used as a format for the report by the developer to make the process consistent and quick to review.

Name of Project:	[ ]	**Checked By:**	[ ]
Location:	[ ]	**Prepared By:**	[ ]
Owner/Developer:	[ ]	**Date:**	[ ]

	Yes	**No**
Is the report stamped by a licensed professional with expertise in traffic engineering?	☐	☐

Project Information

1 - INTRODUCTION	**Yes**	**No**	**N/A**
Does this section include:			
a) The reason for the traffic impact letter	☐	☐	☐
2 - ANALYSIS OF EXISTING CONDITIONS			
Does this section include:			
a. Location, including MPO if applicable	☐	☐	☐
b. Study area boundary	☐	☐	☐
3 - PROPOSED DEVELOPMENT			
Does this section include:			
a. Description of future commercial development and site plan	☐	☐	☐
b. Type of proposed land uses	☐	☐	☐
c. Proposed impacts to the area	☐	☐	☐
4 - ANALYSIS OF FUTURE CONDITIONS			
Does this section include:			
a) ITE Trip Generation Rates for:			
• Opening year	☐	☐	☐
• Design year	☐	☐	☐
Does **each** analysis year include:			
- Land Use	☐	☐	☐
- Land Use Code #	☐	☐	☐
- Land Use Quantity	☐	☐	☐
- Unit of Measurement	☐	☐	☐
- Weekday	☐	☐	☐
- AM Peak Hour with entering and exiting volumes	☐	☐	☐
- PM Peak Hour with entering and exiting volumes	☐	☐	☐
b) Trip Distribution for AM and PM peak hour traffic for:			
• Opening year	☐	☐	☐
• Design year	☐	☐	☐
Does each analysis year include:			
- Turning Movement Diagrams	☐	☐	☐

5 - CONCLUSIONS & RECOMMENDATIONS

Does this section include:

a. Summary of the proposed project	☐	☐	☐
b. Discussion of development impacts	☐	☐	☐
c. Recommendation for mitigation measures	☐	☐	☐

Appendix C - Traffic Impact Study Template

[Insert Title of Traffic Impact Study]

Prepared by:
[Insert Preparers Name]

Prepared for:
[Insert Entity Name]

Submitted to:
Iowa DOT
[Insert Additional Names]

[Insert Date]

[Insert Engineering Certification Seal]

1) EXECUTIVE SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Provide a description of the development, site location, including MPO if applicable, and study area (including a site map). Briefly describe the purpose of the analysis, principal findings, conclusions, and recommendations.

2) INTRODUCTION
3) ANALYSIS OF EXISTING CONDITIONS

Provide a text description of current site conditions. Include the existing land use, zoning classification, and a description of the site location and the surrounding areas.
Include a text description and graphic showing the existing lane configurations and traffic control devices in the study area.

- TRAFFIC DATA

Include a graphic showing the current AADT, AM peak hour and PM peak hour based on Iowa DOT traffic counts. Raw traffic volumes will not be accepted for use in traffic analysis.
Include the % truck traffic on all routes.
Identify and justify the annual growth rate to be used for future traffic analysis.

- CRASH HISTORY

Provide a description of crash data for the past 10 years. Include a crash data table by intersection.

4) PROPOSED DEVELOPMENT

Provide a text description of the future commercial development and detailed site plan. Include proposed land uses, street and driveway improvements for opening year and design year. Identify percent developed at each analysis year.

5) ANALYSIS OF FUTURE CONDITIONS

- TRIP GENERATION

Utilize the most current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual to estimate daily and peak hour trip volumes originating from and destined to the proposed development.
Show trip generation rates for weekday, AM and PM Peak Hour in tables for each analysis year. Each table must identify the land use by ITE code and name, the quantity estimated, the unit of measurement and the number entering and exiting.

- TRIP DISTRIBUTION

  The analysis should use available transportation models in conjunction with input from local jurisdictions and current Transportation Plans to estimate traffic distribution patterns.
  Show trip distribution and assignment on a turning movement diagram as trips (rounded to the nearest 5) at each significant intersection and access within the area of the development.

- TURN LANE WARRANTS

  Refer to Chapter 6 - Geometric Design of Intersections from the Office of Design's Design Manual to determine turn lane warrants based on peak hour traffic data.
  Include a turn lane warrant table summarizing when each intersection is expected to warrant turn lanes.

- FUNCTIONAL AREA ANALYSIS

  Utilize established methodologies from the Iowa DOT Access Management Manual to determine upstream and downstream distances of all proposed and public accesses.
  Include diagrams of functional area gaps and overlaps.

- CAPACITY ANALYSIS

  Utilize the established methodologies of the current Highway Capacity Manual to analyze the capacity of all intersections and roadway segments.
  Perform capacity analysis for AM and PM peak hours for each analysis year.
  Include a capacity analysis LOS table summarizing the critical movement results for each analysis year.
  Include the effects of queuing and blocking on intersection operations.

6) CONCLUSIONS & RECOMMENDATIONS

Summarize existing and future conditions and discuss the proposed development's impacts. Identify any operational or safety deficiencies and recommend mitigation measures.
Summarize how the proposed development complies with all operational and safety standards.

7) APPENDICES

Planning Analysis Output
- Traffic Signal Warrants
- Traffic Capacity Analysis

Planning Analysis Input
A summary of traffic analysis variable inputs must be provided. Any traffic impact study submitted without
an input summary will not be accepted by the Department.

Appendix D - Traffic Impact Study Checklist

Following is a checklist based on the guidelines provided by the ITE and the Iowa DOT's Guidelines for Traffic Impact Analysis. The purpose of the checklist is to see whether the preparer has provided all the information that the Iowa DOT requires. It should also be used as a format for the report by the developer to make the process consistent and quick to review.

Name of Project:	[ ]	**Checked By:**	[ ]
Location:	[ ]	**Prepared By:**	[ ]
Owner/Developer:	[ ]	**Date:**	[ ]

	Yes	No
Is the report stamped by a licensed professional with expertise in traffic engineering?	☐	☐

Project Information

1 - EXECUTIVE SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Does this section include:	Yes	No	N/A
a. Description of the development	☐	☐	☐
b. Site location (MPO, if applicable) including detailed site plan	☐	☐	☐
c. Purpose of analysis	☐	☐	☐
d. Principle findings	☐	☐	☐
e. Conclusions and recommendations	☐	☐	☐

2 - INTRODUCTION

Does this section include:			
a. The reason for the traffic impact study	☐	☐	☐

3 - ANALYSIS OF EXISTING CONDITIONS

Does this section include:			
a. Location	☐	☐	☐
b. Study area boundary	☐	☐	☐
c. Existing land use and zoning			
d. Map showing all accesses and intersections identified by:			
○ Controlled with signals	☐	☐	☐
○ Controlled with stop signs	☐	☐	☐
○ Uncontrolled	☐	☐	☐
e. Posted speed limit	☐	☐	☐
f. Street Classification and station number	☐	☐	☐
g. Sidewalk(s)	☐	☐	☐
h. Sight Distance	☐	☐	☐
i. Traffic Signals	☐	☐	☐
j. Existing level of service (LOS)	☐	☐	☐
k. Number of Thru Lanes	☐	☐	☐
l. Number of Turning Lanes	☐	☐	☐
m. Medians	☐	☐	☐
n. Traffic Data including:	☐	☐	☐
o. Growth rate	☐	☐	☐
○ Current AADT, AM & PM peak hour volumes	☐	☐	☐
○ Existing turning movements at intersections	☐	☐	☐
○ Truck % on all routes	☐	☐	☐
Has the growth rate assumption been:	☐	☐	☐
− Justified	☐	☐	☐

− Documented
p. Crash data for past 10 years ☐ ☐ ☐

4 - PROPOSED DEVELOPMENT

Does this section include:

a. Description of future commercial development	☐	☐	☐
b. Type of proposed land uses	☐	☐	☐
c. Proposed impacts to the area	☐	☐	☐
d. Site plan including all proposed intersections and accesses	☐	☐	☐
e. Phasing plan for:			
o Opening year	☐	☐	☐
o Design year	☐	☐	☐
f. Physical concerns or restrictions identified	☐	☐	☐

5 - ANALYSIS OF FUTURE CONDITIONS

Does this section include:

a. ITE Trip Generation Rates for:			
o Opening year	☐	☐	☐
o Design year	☐	☐	☐
Does **each** analysis year include:			
- Land Use	☐	☐	☐
- Land Use Code #	☐	☐	☐
- Land Use Quantity	☐	☐	☐
- Unit of Measurement	☐	☐	☐
- Weekday	☐	☐	☐
- AM Peak Hour with entering and exiting volumes	☐	☐	☐
- PM Peak Hour with entering and exiting volumes	☐	☐	☐
b. Trip Distribution for AM and PM peak hour traffic for:			
o Opening year	☐	☐	☐
o Design year	☐	☐	☐
Does **each** analysis year include:			
- Turning Movement Diagrams	☐	☐	☐
- Method used to determine directional distribution	☐	☐	☐
- Site generated turning movements	☐	☐	☐
- Percent mix of vehicles including trucks	☐	☐	☐
- Pass by trip assumptions	☐	☐	☐
- Non-site related traffic	☐	☐	☐
c. Turn lane warrants evaluated for:			
o Storage capacity	☐	☐	☐
o Length	☐	☐	☐
Does each include:			
- Turn lane warrant table	☐	☐	☐
d. Capacity Analysis evaluated for:			
o Level of Service (LOS) for:			
- Opening year	☐	☐	☐
- Design year	☐	☐	☐
o LOS deficiencies identified and document	☐	☐	☐
e. Geometrics evaluated for:			
o Acceleration lanes	☐	☐	☐
o Deceleration lanes	☐	☐	☐
o Weaving lanes	☐	☐	☐
o Queuing analysis	☐	☐	☐
f. Functional Area Analysis			
o Upstream Distance for public intersections	☐	☐	☐
o Downstream Distance for public intersections	☐	☐	☐

- Upstream Distance for proposed accesses ☐ ☐ ☐
- Downstream Distance for proposed accesses ☐ ☐ ☐
- Gap and overlap diagrams ☐ ☐ ☐

g. Traffic signal warrants evaluated for:
- Compliance with MUTCD ☐ ☐ ☐

h. Sight distance ☐ ☐ ☐

i. ROW access
- Is dedication of ROW proposed? ☐ ☐ ☐
- Is the new ROW identified? ☐ ☐ ☐
- Does the new ROW meet DOT standards? ☐ ☐ ☐

j. Description of methodologies used in analyses ☐ ☐ ☐

6 - CONCLUSIONS & RECOMMENDATIONS

Does this section include:

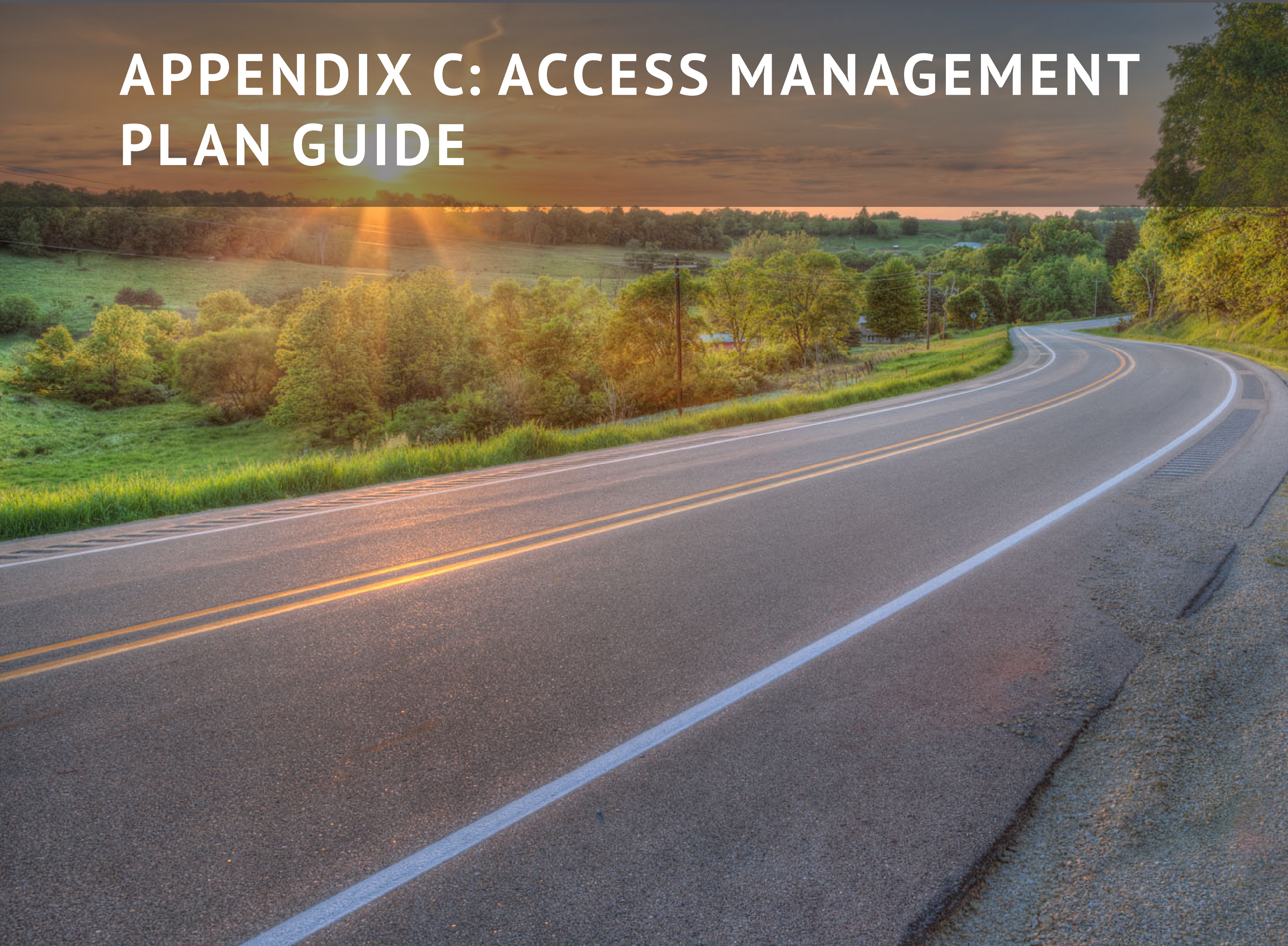
a. Summary of the proposed project ☐ ☐ ☐
b. Discussion of development impacts ☐ ☐ ☐
c. Identification of all deficiencies and conflicts ☐ ☐ ☐
d. Recommendation for mitigation measures ☐ ☐ ☐

7 - APPENDICES

Does this section include:

a. Planning level Traffic Signal Warrants ☐ ☐ ☐
b. Capacity Analysis software reports ☐ ☐ ☐
c. Traffic Analysis Inputs used in all software programs ☐ ☐ ☐

APPENDIX C: ACCESS MANAGEMENT PLAN GUIDE



AUTHORITY

Access Management Plans are authorized by Access Control Rules, IAC 761-112. In addition, IC 306A.7 allows transportation planning agreements between agencies and IC 306.4(4) requires concurrent jurisdiction for access approvals within a municipality. Please be familiar with both this rule and chapter five of the Access Management Manual (AMM). Be sure all your related processes, any RFPs, contracts, studies, and process decisions are in compliance with these primary documents.

STEPS

1. Assuming you have already determined a need for the AMP, designate the Access Management Plan (AMP) corridor, including beginning and ending points. Do this working in cooperation with local jurisdiction(s) and Department staff.

2. Consider entering into an interagency memorandum of understanding (MOU) before the project starts. If the size and complexity of the corridor and anticipated plan is significant in scope and development costs, a MOU may be helpful to identify and define the process, policy issues, mutual intentions, the study area, overall goals of the plan, assign responsibilities and determine financial commitments. The scope of the MOU will depend on the source(s) and amount of funding. If the AMP is developer initiated, and MOU should be completed.

3. Conduct an access management plan study. The final document in the process will be a 28E Agreement which adopts as Exhibit A, the Access Management Plan which is a detailed schedule of access locations, types and other details, and Exhibit B, a map illustration of the exhibit A. To support the 28E-AMP document, a detailed study is necessary. During the study, meetings are held and agencies and participants determine the future vision of the corridor and its performance needs and expectations. The process requirements of the AMM are identified and completed. Alternatives are developed. The best alternatives are selected, and the final descriptive exhibit(s) A and B are prepared.

   The AM study should include a highway (corridor) performance analysis on the selected alternative as a base to compare as-built performance, and perhaps later AMP amendments, to the base decision and initial vision. The study is basically a corridor level traffic impact analysis looking at land use, trip generation, long and short-term traffic issues, mobility of all travel modes, measures of performance, current and future highway design, and public safety. The study should contain a record of the entire process including public workshops, hearing notices, notification to property owners, mailing lists, meeting notes or minutes, local government resolutions - whatever is needed to document that appropriate process and public involvement requirements have been completed.

4. The access management plan study is not an attachment to the 28E Agreement but must be available for review. This allows the study to be independent from the AMP and to develop a range of alternatives and access control strategies and related comparative discussions. The study provides the basis and analysis to support the AMP. The AMP is the conclusion of the study and contains only the plan elements to be adopted by the 28E Agreement, not the study itself. The study does not require the approval of the local authority or the Department. But the study must be sufficient in information to be the basis of all elements in the AMP. The AMP should not have any content that is not discussed and analyzed in the study.

5. Consider an implementation plan. Absent an implementation plan, the default is to allow the AMP to be implemented over time as public projects are funded and as private development makes improvements. However, a prioritized capital improvement plan and tentative schedule can be developed. The plan may contain immediate rapid response elements, longer range major capital improvements, and private sector based anticipated improvements. Implementation commitments may not be included in the 28E-AMP as public capital improvement projects require a separate authorization commitment process in accordance with other statutes.

6. Prepare the Intergovernmental Agreement and final Access Management Plan. The 28E-AMP plan must be specific and written in directive language. It will be the basis for regulating the access rights of abutting private property owners. It will also be the legal basis for the authorization of streets connecting to the major highway. It must be consistent with the access management plan study. Following final reviews of the AMP by local and Department staff (including the Access Management Administrator), the 28E is usually scheduled for adoption hearing before the local elected officials. Local officials will need to act to adopt the 28E-AMP by ordinance or resolution.

7. Obtain signatures on the 28E Agreement. Local officials sign first. The originals then go to the Department District office for DE concurrence along with the final edition of the Study. Assuming the District finds the 28E Agreement/AMP acceptable, a memo is prepared to document that all requirements have been met and the District Engineer recommends approval by the Director. The originals are sent along with the final access management plan study to the Department Access Management Administrator who prepares a packet to obtain the signature of the Director. The adopted 28E Agreement/AMP must be easily available to any member of the public seeking a copy. The AM study must be archived but it is not required to be posted.

Summary of Steps for Access Management Plan Development

May 2020

1. Read Rule and Manual information on AMPs.
2. Determine the initial plan limits in coordination with locals and Department.
3. Conduct a study (use consultant if necessary). Use provided AMP Study Table of Contents and the sample scope of work for content guidance.
4. Have public workshops.
5. Complete an AM Study Report, include all documentation.
6. Prepare 28E Agreement-AMP exhibits A and B.
7. Prepare an 28E Agreement which will adopt exhibits >A= and >B=.
8. The draft 28E Agreement is reviewed by all parties, their legal counsel and HQ Access Manager.
9. Hard copies are prepared for signature. One for each party, and two for the Department – (1 at Traffic and Safety Bureau and 1 at District)
10. The local government must act in their official adoption capacity by resolution or ordinance before signing the 28E Agreement and adopting the AMP exhibits.
11. After the local officials sign all originals, the originals go to the Access Management Administrator.
12. The Department Access Management Administrator certifies that all requirements are met and prepares a packet to obtain the signature of the Director.
13. After signature, the hard copies are distributed, and a PDF edition is entered into the EPS and posted on Department website available to the public.
14. The date of the Director’s signature is the effective date of the AMP.

Access Management Plan Strategies

Several strategies can be used to manage access where development is either planned or development pressures are occurring. These do not require an adopted access management plan. Consider the following access management techniques for improved roadway performance and public safety:

1. Provide an adequate network of local and collector roadways and promote internal connections between land uses to reduce the need for driveway access on the primary highway and allow local vehicles and other travel modes to circulate within neighborhoods and activity centers rather than on the arterial system.
2. Plan the location of traffic signals to support smooth signal coordination and efficient traffic progression;
3. Local governments should take action to avoid division of highway frontage into lots with no alternative access to secondary streets;
4. Use median treatments to limit the exposure of through traffic to left-turning vehicles and to provide a refuge for pedestrians as they cross several lanes;
5. Provide left-turn lanes at all intersections and median openings so drivers can wait safely to complete a turn and turning vehicles do not delay through traffic movements;
6. Design access connections to minimize conflicts and support the smooth entry and exit of vehicles;
7. Provide right-turn lanes at all intersections and higher volume driveways (types A and B) so drivers can decelerate and enter the site or minor roadway without impeding through traffic movements;
8. Limit and separate driveways and other access connections on major roadways to reduce the number of potential conflicts and provide drivers with the time necessary to handle conflicts that do occur;
9. Restrict or close driveways in the vicinity of intersections to reduce conflicts between driveway and intersection traffic operations;
10. Local ordinances should include certain requirements within zoning, building, and site development standards that support access management strategies; and
11. There could be a zoning overlay district that only applies to the highway corridor. The overlay district would emphasize internal and cross circulation, and proof of necessity for each highway access.

The preferred option where intensive levels of development are occurring and existing access conditions are not acceptable is to adopt and implement an access management plan for the corridor. The plan should apply the above-mentioned techniques. In particular, it should identify locations where signals are desired, integrate a non-traversable median with turn lanes at median openings and signalized intersections, and provide for the development of a supporting street network for local access and circulation.

DRAFT - SCOPE of AM STUDY, TASKS, DELIVERABLES

Model Scope - if you are anticipating having a consultant prepare a study and the AMP, consider the attached scope of work an example. The example is for a larger AMP - your needs may differ. Be efficient in identifying the specific conditions and needs of the corridor and the scope of information and processes necessary to come to a conclusion and establish a good AMP.

Summary of Steps for AM Study

- Gather information (data, maps, ownerships, roadway conditions, crash reports. etc.)
- Do a traffic and corridor analysis, current and future conditions.
- Determine area circulation plan, current and future local system plan.
- Do a no-28E Agreement alternative, what will be the results if only the assigned access category
- Meet with people to determine needs, plans, expectations, and local factual information.
- Do at draft AMP including alternatives at certain locations as necessary.
- Apply state-of-the-practice access management techniques to determine possible solutions and complete the AM study analysis.
- The final report includes a draft AMP intended to be an attachment to an 28E Agreement
- Using the Study, prepare the final AMP.

Sample. Table of Contents for an Access Management Plan Study Report

The depth of research and analysis for each AMP will vary with each corridor. The objective is the same: Establishing a firm basis for the selection and application of access techniques to achieve public purposes of roadway functional performance and safety. Some suggestions in this sample TOC may not be appropriate in all cases and others, unique to the corridor, should be added. Primary purpose of the TOC is to serve as a topic reminder and provide a concept for the report on the study.

EXECUTIVE SUMMARY

2 pages should be the maximum

1.0 INTRODUCTION

1.1 Study Area and Project Background

1.2 Goals, objectives of study, vision for corridor; reason for the AMP.

1.3 The need to improve the corridor, like an EIS, establish purpose and need.

1.4 Project coordination, how it was accomplished, project team? Technical Advisory Committee (TAC)? meetings, participants, A summary

1.5 Public Involvement. Summary of activity

2.0 ACCESS MANAGEMENT – BENEFITS, PRINCIPLES & TECHNIQUES

Chapter goal: Why and how AMP can improve conditions in study area. (Overview)

2.1 Access Management Benefits

- Crash reduction, capacity increase, reduced travel time
- Cost of congestion, cost of crashes, travel time, delay cost
- Economic benefits – mobility, efficiency, reduced travel time for all business sectors

2.2 Guiding Principles. Why AM works

- Limit the number of direct access points to major roadways
- Reducing conflict points and conflict severity reduction
- Functional area of intersections
- Spacing of major access connections
- Minimize locations where vehicles merge, split, or cross
- Provide a supporting local street network & circulation system

2.3 Techniques by types (summarize strategies, techniques applicable to study area.

- Elimination, Consolidation of access and increase in site and network circulation
- Movement limitations (reduce lefts)
- Improved design of access connections (width, radius, throat, location)

3.0 EXISTING CONDITIONS

(Goal: information to determine current traffic and access circulation conditions)

3.1 Base map of each segment to record conditions, aerial and ground photos manageable segments are usually 8.5x11 (ArcView compatible data)

3.2 Current performance of highway (summary). Functional characteristics

3.3 Land Use and traffic circulation Characteristics

- Zoning, ownerships, current use along corridor.
- Key industries in the area, major trip attractors using corridor
- Available secondary network supporting land use and growth (Determine how development is currently served)

3.4 Roadway Characteristics (base maps, distances

- Traffic controls (signals, spacing, roundabouts, turn lanes)
- Conflict points, summarize. (map them, their movement types in appendix)
- Identify access connections with problems (congestion, safety, design)
- Conditions of all travel modes (sidewalks, bike lanes, and the lack of)

3.5 Right-of-Way

- Determine widths, irregularities, permanent easements.
- Specifically, any limitations for improvements, C/A controls if any

3.6 Access Category

- Do current access conditions fit the assigned access category?

3.7 Existing Access Inventory

- Each access connection, deficiencies, what it serves, volume range
- Locations that qualify NOW for improved access designs (left turn-lane?)
- Permits and historical (no permit record)
- Any messy access authorization issues

3.8 Crash History

- Summary. Analysis of crash history, rates, comparisons to other roads.
- Cost of crashes, #of injuries, PDO, Fatalities.
- Intersection hot spots. Illustrations, discussion.
- Driveways that are hot spots, illustrations, discussion
- Crash types related to the lack of AM (overall corridor or by segment)
- Crash types related to missing AM features (lack of left turn bay)

3.9 Existing Traffic Operations

- Volumes, speed zones
- Level of service at significant, important, intersections
- Turning movement hot spots, congestion locations

3.10 Conditions Summary and opinions on current issues

4.0 PUBLIC INVOLVEMENT PROCESS AND RESULTS

- Discussion and Summarize here, put supporting materials in appendix.

5.0 FUTURE TRAFFIC CONDITIONS

5.1 Anticipated Land use and growth

- Anticipated Traffic Growth
- Anticipated increases in access connection volumes
- Future signals and other left turns that cannot be closed, restricted

5.2 Planned Development that will use the corridor

5.3 Future Traffic Operations

- 20th year projections (mid-year if important, & 30th or 40th yrs if important)
- Anticipated future roadway design and traffic controls at left turns
- Future traffic conditions if access is not managed
- Future traffic conditions if access is managed

6.0 ACCESS PLAN DEVELOPMENT, EVALUATION, APPLICATION OF AM TECHNIQUES

6.1 Process (how current and future conditions determined AM solutions)

- Step One – Methodology &Compatibility
- Step Two – Development of the Access Plan

- Step Three – Refine the Access Plan
- Step Four – Evaluation

6.2 Evaluation Results

- How application of AMP will affect future conditions and performance
- Recommended access management strategies and techniques per map segment.
- Includes illustrations, discussion, conclusions, alternatives.

6.3 If access in not managed (no AMP, just access category management)

- Difference in crash totals, 5 yrs, 20 yrs.
- Costs to society
- Costs of roadway improvement to compensate for access congestion

7.0 PLAN RECOMMENDATIONS

7.1 Present and discuss proposed Access Plan. Discuss 28E Agreement

7.2 Other Recommended Improvements (highway project improvements)

8.0 IMPLEMENTATION

8.1 Next steps

8.2 A schedule or priority listing of public capital improvements, est. cost, if any

8.3 Anticipated improvements using access permit (developer driven)

8.4 Actions by local agency (zoning, subdivision standards) APPENDIXES. List of Acronyms, Glossary

LIST OF TABLES

Conflict point table (definitions, illustration)

Table 1 Summary of Existing Access Locations by Highway Segments Table 2 Existing Average Daily Traffic overall and by segment

Table 3 Intersection Level of Service Criteria (definition set)

Table 4 Arterial Segment Level of Service performance by segment Table 5 Summary of Accident Data by segment and crash type

Table 6 Comparison of 20th year prediction to Existing Average Daily Traffic

LIST OF FIGURES

1. Study Area (vicinity map)
2. Study Area (corridor map)
3. Access Study Process (flow chart)

4. Why AM figures, the curve, ISU figures, others from AM chapter 1.
5. Access Related Crash Types and severity.
6. Function area diagram typical, and for interchange ramps
7. Ground and aerial photos of existing conditions
8. Existing Access Locations Segment one, each connection numbered
9. Existing Access Locations Segment two, each connection numbered
10. Existing Access Locations Segment Three, each connection numbered
11. Existing Intersection and Arterial Level of Service (AM Peak Hour) (selected)
12. Existing Intersection and Arterial Level of Service (PM Peak Hour) (selected)
13. Figures for chapter 4. Public participation, table, comments
14. 20th yr, No-Action Intersection and Arterial Level of Service (AM Peak Hour)
15. 20th yr, No-Action Intersection and Arterial Level of Service (PM Peak Hour)
16. Recommended Access Connections and AMP Segment One
17. Recommended Access Connections and AMP Segment Two
18. Recommended Access Connections and AMP Segment Three
19. Traffic Conditions (20th year) after ACP Implementation (AM Peak Hour)
20. Traffic Conditions (20th year) after ACP Implementation (PM Peak Hour)

LIST OF APPENDICES

Appendix A Existing Roadway/Access Configuration

Appendix B Public involvement. Outreach notices, brochures, workshop summaries, mailing lists, attendance, dates. Websites, pages, social media outreach, web bases responses, public comments from all sources.

Appendix C Recommended future Roadway Access Configuration Appendix D Access Management Plan (AMP) with tables and maps

Appendix E Draft Intergovernmental Agreement, text and signature lines Appendix F Property Information. Parcel maps, zoning,

Appendix G Traffic counts along corridor

Appendix H Turning Movement Counts for select access connections Appendix I Accident Data (spreadsheet perhaps, tables)

Appendix J First Public Open House Materials and summary Appendix K Second Public Open House Materials and summary

Appendix L Conceptual roadway design improvements for select locations

Appendix M References for further research and national research studies supporting the AMP selection of access techniques.

OTHER REPORTING ISSUE. Digital maps need to be compatible with IOWA DOT GIS systems to allow post project map integration.

APPENDIX D: FIELD REVIEW AND INSPECTION WORKSHEETS

Entrance Permit Field Review Checklist

Entrance Permit Request # ___________ Route #________ Completed By: ______________________________

Date _____________ Category__________________________________

Name of Applicant if other than the owner ____

Name of Owner of record ____

Address of applicant ____

Applicant Phone Number __________________________________

Request Type Usage Circle One: Residential Field Commercial Public Temporary Utility

Location of proposed entrance: Station ________________ Mile Post _________________

Location of existing property lines: Station ________________ Mile Post _________________

Station ________________ Mile Post _________________

Section ______________________ Township ____________________ Range ______________________

Type of entrance Circle all that apply: Single Joint A B C D

Were access rights previously acquired? Circle One: Yes No

If circled yes to the question above where? Sta.______________________ to Sta. ________________________,

Sta. ______________ to Sta. ______________, Sta. ______________________ to Sta. ________________________

Location of existing entrances: Sta. _________________, Sta. _________________, Sta. __________________

Sight distance in each direction ____

Circle one for each. Existing curb and gutter: Yes No Proposed curb and gutter: Yes No

Distance to closest access in each direction ____

Depth of Ditch _________________________

Drainage pipe diameter ________________________________ Length ____________________________________

Top width of entrance ______________________ Radius ______________________

Type of surface _________________ Posted speed limit ___________

Circle all that apply. Allowed movements: Left-in Left-out Right-in Right-out

Additional Notes:

____

____

____

____

____

____

____

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