Synthesis of Case Studies and Development of Video-Sharing Procedure
for Access Management Professionals

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Brigham Young University
in partial fulfillment of the requirements for the degree of
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ABSTRACT

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Access management is a practice used throughout the United States by cities and state departments of transportation to balance providing access to property with the safety needs of highway users. Research has demonstrated that uncontrolled sections of highway have higher crash rates than those where access is channelized and restricted. Research findings have been presented as case studies at annual conferences and written in reports for the National Cooperative Highway Research Program (NCHRP). The purpose of this project is to compare the findings from case study presentations with a formal NCHRP synthesis on access management in the vicinity of freeway interchanges. This report explores how research is implemented in real-world design to improve safety and performance. In an effort to improve the impact of these case studies, a training procedure was developed to teach access management professionals how to capture and share portions of their findings on social media platforms.

Keywords: access management, freeways, public outreach, raised medians, roundabouts
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1 INTRODUCTION

1.1 Overview

The Transportation Research Board (TRB) is an independent advisory organization to the U.S. Congress and federal transportation agencies. The board consults on a broad range of issues and policies related to transportation. The organization has over 200 committees that focus on individual aspects of transportation research (1). One of those, the Standing Committee on Access Management (AHB70), focuses on access management implementation and research.

According to TRB, access management is a coordinated approach to transportation and community design that limits how and where a motorized vehicle may enter or exit the roadway. By restricting conflict points where vehicles may collide with pedestrians, cyclists, and other motorists, access management enhances mobility, provides additional mode choices, and improves environmental quality. Access management is therefore a critical part of network and land use planning (2).

AHB70 has three subcommittees that focus on conferences, research, and outreach. The outreach subcommittee is tasked with making the large body of existing research available to transportation officials, engineers, and policymakers. In addition to written research documents, this body of work also consists of presentations given at numerous access management conferences that date back to 1993 (3). This body of work is a great resource but is currently difficult to access due to its format and challenges with the ability of search engines to access the
information. There is a desire to make these resources more readily available while also exploring the potential for a feedback loop between academic research that is prepared in formal reports and real-world implementation. Improving access to the presentations also improves access to case studies that help provide the tie between research and real-world implementation.

1.2 Problem Statement

The AHB70 outreach subcommittee wishes to improve accessibility to the hundreds of research presentations and materials that are posted on the committee’s website. These are currently stored in formats that are difficult for search engines to crawl, as they include portable document format (PDF) files and presentations. The presentations contain audio recordings stored in Adobe’s proprietary Flash format that cannot be understood by search engines. It is also reported that Adobe will discontinue Flash in 2020, leaving presentations inaccessible to nearly all computer and mobile devices (4). There is a need to create training materials to assist access management professionals on how to properly label and share presentations of their research and case study presentations onto a more lasting platform such as YouTube that is based on a common non-proprietary Hypertext Markup Language (HTML) standard. The procedure specifically focuses on creating short video clips (about 2-3 minutes) to share on social media platforms. These searchable clips would be linked to the full presentation and/or other documentation on the topic.

The AHB70 committee wishes to not only improve outreach, but to compare case studies of real-world access management principles with academic research. This research is based on reports conducted through the National Cooperative Highway Research Program (NCHRP). NCHRP Synthesis 332 evaluates access management in the vicinity of freeway interchanges (5). This project report will compare case studies stored in presentation form on the AHB70 website
related to access management in the vicinity of freeway interchanges to best practices recommended in the NCHRP synthesis report. Attributes specifically explored include access spacing, raised medians, roundabouts adjacent to freeway interchanges, and the relationship between land use and access.

1.3 Research Purpose and Scope

To achieve the goal of improving outreach and accessibility to a library of case study presentations stored on the AHB70 website, the following tasks were completed:

- Review access management case studies related to access management in the vicinity of freeway interchanges.
- Review access management best practices presented in the Access Management Manual and an NCHRP synthesis on access management in the vicinity of freeway interchanges.
- Compare the manual and the NCHRP synthesis with these case studies to see how real-world implementation is related to academic research presented in the synthesis and Access Management Manual.
- Capture short video segments from existing AHB70 presentations to post onto YouTube.
- Create a training document for posting AHB70 presentations to YouTube and making the videos searchable.
- Provide the final document to the AHB70 committee members and friends.

1.4 Organization of Report

This report is organized into six chapters. The first chapter presents the objective of this paper and the goals accomplished. The second chapter explores the emergence of access management practices in the United States. This chapter offers conflict reduction techniques
recommended in the TRB Access Management Manual. The third chapter summarizes research conducted for an NCHRP report about access management in the vicinity of interchanges. It offers recommendations to meet conflict reduction goals. The fourth chapter shares case studies presented at previous TRB Access Management conferences to explore real-world implementation of access management recommendations. The fifth chapter consists of a training procedure for access management professionals to share presentations on a video sharing website. The sixth chapter offers conclusions from this project.
2 BACKGROUND OF ACCESS MANAGEMENT

2.1 Overview

This chapter provides the history and background of access management. It explores the history of access management planning techniques in the United States during the 20th century. The chapter then summarizes methods described in the Access Management Manual (2) for managing access on roadways.

2.2 History of Access Management

Access management evolved in response to the safety issues caused by the popularity of the automobile. Early 20th-century transportation design methods typically involved purchasing strips of land to restrict entry to parkways, toll roads, and speedways that were designed to accommodate motor vehicle travel. After World War II, these techniques were formalized by the Eisenhower Interstate System’s minimum standards for construction and the emergence of access management planning. Suburbanization of arterial roadways that connected to interstate highways led to strip development. These strips of accesses generated busy and unsafe roadways that led to formalized access management policies. This section reviews the history of access management practices during three distinct eras: Pre-Interstate Era, Interstate Era, and Access Management Era.
2.2.1 Pre-Interstate System Era

Before the era of interstate highway construction in the mid-20th century, motor vehicle ownership was less common. In 1900, only 8,000 motor vehicles were registered in the United States. Mass production techniques ballooned this figure to over one million by 1913 and 10 million by 1922 (6). Proliferation of ownership led to an explosion in automobile traffic. This introduced new public safety concerns. The hobbyist era of 1900 saw only 26 motor-vehicle-related deaths that year. Fatalities grew to 5,000 in 1916, then to 20,000 deaths in 1925, and up to nearly 40,000 deaths per year just before the outbreak of World War II (7). City streets that had primarily served pedestrian traffic and horse-drawn carts faced new conflicts from these faster-moving vehicles.

The field of access management emerged as engineers and planners began to devise ways to separate non-motorized human traffic from automobile traffic. The Long Island Motor Parkway was the first access-controlled roadway and the first highway designed solely for motor vehicle use. A private developer constructed the 45-mile highway using private money. The highway cost $6 million dollars ($166 million in 2017 dollars). When the roadway opened to traffic in 1908, the company began collecting $2 per-use tolls ($55 in 2017 dollars) from motorists to recoup investment costs. Nine years later, in 1917, this price was reduced to just $1 ($20 in 2017 dollars, accounting for inflation). Grade separation was included to reduce driver slowdown and right-angle collisions (8). To prevent toll booth avoidance, barrier fences restricted parkway access to just a handful of locations. Figure 2-1 shows a sign banning bicyclists, pedestrians, and equestrians from the parkway.
Figure 2-1: A sign on the Long Island Motor Parkway banning non-motorized traffic (9).

Design elements of the Long Island Motor Parkway were incorporated into new public parkways constructed during the first half of the 20th century. In 1924, the city of New York opened a 19-mile public road called the Bronx River Parkway, that remains in use today. The roadway featured a 25 mile-per-hour (mph) speed limit (considered fast for its time), arched bridges to separate cross streets from the mainline parkway, and the first-of-its-kind median separation between directions of travel (10). A strip of park land was purchased along each side of the roadway to create a physical buffer that prevented private property owners from gaining direct access to the parkway (11). This reduced conflict points and made the road safer to use at higher speeds.

The design elements of the Long Island Motor Parkway and Bronx River Parkway were mirrored by other cities that constructed parkways. The Midway Pleasance in Chicago offered separated lanes for through traffic and local traffic. The Arroyo Seco Parkway in Los Angeles
accommodated full grade separation from downtown to the suburb of Pasadena. The Arroyo Seco Parkway featured curves that accommodated a 45 mph speed limit, the fastest speed allowed by California law at the time (I2). The Merritt Parkway in Connecticut offered arched bridges, roadside service areas, and separated driver rest areas that reduced the need for a motorist to ever exit the highway (I3). In 1902, the state of New Jersey authorized its counties to manage speedways (fast roads designed for buggy and automobile use). Statute stated that “no public streets or other highways shall cross or intersect the speedway at grade without consent of the county” (I4).

In 1906, the U.S. Supreme Court ruled to grant states legal power to authorize how and where private property owners can connect to state highways (I1). The ruling determined that access control along highways was a sovereign power of the states (I4). Other states, including New York and Rhode Island, began a practice of acquiring full access rights and required property owners to apply for permits to be granted access (I3, I4).

2.2.2 Interstate System Era

Roads serve two primary purposes: mobility and access. Mobility is a traveler’s ability to reach a destination within a constrained amount of time. Faster travel speeds allow a motorist to reach a larger market area in an equal amount of time. This requires design features such as straight roadways, gentle grades, banked curves (superelevation), and elimination of impeding traffic. Access is the traveler’s ability to participate in an economic activity, which generally means reaching a specific piece of real property. Access creates a node where the property connects to the roadway network. These nodes include highway ramps, intersections, and driveway accesses. New businesses may create new nodes along the roadway. Each node diminishes speed, as vehicles merge/turn to enter/exit the stream of through traffic. Therefore,
mobility and access are self-conflicting goals. A roadway designed for a high level of mobility does not serve access well, and vice-versa. This is reflected in the functional hierarchy of roadways.

A roadway functional hierarchy was developed after World War II by the U.S. Public Roads Administration (11). The policy classifies some roads for mobility (freeways, highways, parkways, and principal arterial roadways), and some roads for access (local streets, alleys, pedestrianized roadways, and driveways). All other roads (minor arterial roadways and collector streets) fall on a spectrum some place in between, as Figure 2-2 illustrates.

![Figure 2-2: Relationship between roadway functional hierarchy and access (14).](image)

As a general in the U.S. Army in 1919, Dwight Eisenhower travelled with a transcontinental convoy from Washington, D.C. to San Francisco, California. He found the nation’s roads at the time to be “almost impassable to heavy vehicles” (15). The convoy struggled to make its way across low covered wooden bridges in the rural parts of eastern states
that “were too low to admit passage of high topped vehicles” (15). Troops found mountainous roads in Nevada that were “one succession of dust, ruts, pits, and holes” (15).

This experience left President Eisenhower acquiescent to signing a major spending bill: *The Federal-Aid Highway Act of 1956.* This bill authorized the construction of a National System of Interstate and Defense Highways. The design standards were left to the state highway officials to develop, so long as they were uniform, and would be “adequate to accommodate the types and volumes of traffic forecast for the year 1975” (16). In anticipation of future demand, these state officials determined that full access control must be required for every mile of the entire system (17). The legislation paid for 90 percent of the cost, giving states a generous resource to widely construct these limited-access highways in both rural and urban areas (13).

These new interstate highways linked large communities. As a new freeway passed through rural land, interchanges were constructed at country highways. This was a departure from traditional pre-war development that concentrated in downtowns or near transit stations (18). These interchanges became a highly-desirable location for new large-scale, auto-centric shopping centers. Cheap land provided opportunities for large parking lots, that combined with large new office and suburban housing developments, imposed new demand on the transportation network. For instance, Figure 2-3 shows the construction of Mission Valley Center in 1960. Rather than constructing in the center of the city, developers built on the outskirts of San Diego, California, in an area accessible because of the construction of Interstate 8 (19).
As roadways expanded across the nation, city and county leaders began charging developers a transportation impact fee, similar to utility impact fees that had been imposed for well over half a century. The idea behind it was to make development “pay its own way” for infrastructure it would require. In 1977, Broward County, Florida was the first community to require developers to pay an impact fee based on the amount of traffic their site would generate (20). The process of determining the fee provided an opportunity for community leaders to review proposed plans. The discussion provided a venue for city engineers and developers to collaborate on better access management to the site.

Formal access planning began to gradually emerge as state departments of transportation worked to protect operational performance of their highways. Such new rules were rarely listed under the name “access management.” For instance, the Bureau of Traffic Engineering for the state of Kansas first began to control access under a “driveway policy” manual that was published in 1952. An actual “access management policy” manual was not released until the
1980s and later evolved into a “corridor management policy” manual in 1997 (21). Other states followed suit.

In the 1960s, planners in a county south of the San Francisco Bay envisioned a network of higher-speed supplementary roadways. The county’s board of supervisors contracted with a consulting firm that drew up a network of expressways. These would be a step lower on the functional hierarchy than a typical freeway. For instance, the Central Expressway shown in Figure 2-4 uses a mixture of interchanges, signals, and right-in/right-out turns to limit access and improve mobility. Similar roadways were constructed, including the Capitol, Lawrence, Oregon, and Sunnyvale Expressways. These networked with the US-101 and Interstate 280 freeways to form a grid throughout the county. A $10 fee imposed on vehicle registrations paid for construction. Greenery strips adjacent to the roadway greatly reduced or eliminated driveways along these expressways. In addition, most cities passed ordinances banning all non-motorized use of the expressway, though the ban on bicyclists was lifted in 2003 (22). These highways were among the first enhanced arterial roadways built in the United States.

Figure 2-4: A combination of signals and interchanges on Central Expressway (23).
Also in the early 1960s, the owner of a body shop watched as the State Highway Commission of Wisconsin closed direct access to his business. The state was converting the existing rural highway into a limited-access freeway. He previously had driveways that connected to the busy highway. With these access management changes, customers now needed to travel down a frontage road that terminated at a cul-de-sac. The owner sued in court where he argued the change would have a negative effect on business and he was therefore due compensation. He felt the reduced access amounted to a “taking” of the use and enjoyment of his property. In Stefan v. State Highway, attorneys for the state of Wisconsin argued that the state was simply using police power to restrict access along a new freeway (24).

The Stefan v. State Highway case escalated to the U.S. Supreme Court in 1963 where the nature and scope of the right of access were considered. The court ruled that a complete denial of access would indeed amount to a taking that the state would have to compensate for. However, the court also saw that states and municipalities frequently control the nature of access to businesses everywhere. These methods include one-way streets, raised medians, restricting turns, speed limits, and weight restrictions. None of these restrictions the court saw as compensatory. Ultimately the court ruled that since the state provided “reasonable access” no compensation should occur. This ruling codified a state or municipality’s legal right to control access through police power (24).

2.2.3 Access Management Era

Additional court rulings have built off Stefan v. State Highway. These have determined that a property owner does not have the right to “absolute access” anywhere they wish. However, access management policies cannot leave property completely landlocked. A property
owner cannot seek compensation when access is relocated “[so] long as the government shows justifiable cause and least-impact” (14).

In 1981, Colorado was the first state to include comprehensive access management policies in its state highway code. The policy addressed safety and aesthetic concerns as well as offered statutes that would reduce travel delay (14). The legislation declared all state-owned highways as controlled-access highways, granting the state power to determine how and where land owners could access the highway (13).

The Colorado code addressed this issue of driveway proliferation, stating driveways are “a major contributor to highway accidents and the greatest single factor behind the functional deterioration of highways in this state” (14). The code warned that new accesses lead to new traffic signals that deteriorate speed and capacity and lead to congestion challenges (14). The intention was to consolidate driveways using access management technique as shown in Figure 2-5.

![Diagram of controlled and uncontrolled access](image)

Figure 2-5: Comparison of controlled and uncontrolled access (14).
Access connections create conflict points where vehicles can collide and friction points where vehicles are slow to exit and enter the roadway. Increasing the distance between access points, including cross streets and driveways, reduces these conflict and friction points. The result is an increase in safe operational speed of the corridor (25).

All states now have some form of legislation and/or administrative rule(s) that grant power to departments of transportation to restrict access (driveway cuts) based on the classification of the roadway (26). To serve as an example of these, Utah has an administrative rule stating that the Utah Department of Transportation (UDOT) “may” (not “shall”) issue grants of access, but only when the application complies with the policy. The administrative rule is granted authority from 12 state statutes. The rule defines access categories that are determined by speed limit, urban code, and general use. The rule further defines corridor agreements, no-access lines, and the general criteria for granting access and variances. Restrictions are set on right-of-way encroachments, such as vehicle storage and servicing, buildings, and advertisements (25).

In Utah, access categories range from 1 to 10 and vary in access permissiveness. For instance, a Category 1 is an interstate highway. In accordance with Federal Highway Administration (FHWA) requirements, the rule states that “all private direct access… is strictly prohibited” (25). The rule only lists one provision that grants temporary construction access to a freeway. The minimum spacing requirements decrease as the category number increases. These categories indicate when left-turn access may be provided and when the movement is restricted (25).

The statutes and administrative policies of states grant enforcement powers to ensure access management rules are imposed. UDOT has authority to impose fines for violations and,
where warranted, install physical barriers to prevent unlawful access. A variance may be extended when an applicant can demonstrate that an appropriate and necessary lower standard still meets public safety requirements (though UDOT has no legal obligation to extend a variance) (25).

Beyond simple access management policy, some states now create corridor management plans. In Florida, corridor management is a combination of access management and right-of-way preservation techniques. By state law, local communities must address deficiencies in the level of service (LOS) where travel slows and signals fail to accommodate the volume of traffic. The corridor plan works to anticipate future traffic growth and commercial development. A comprehensive plan shapes how the road will accommodate growth far into the future. With this plan, development impact fees can be deployed in a strategic way, rather than being spent piecemeal (27).

2.3 Methods of Access Management

Access management consists of techniques to reduce conflict that influence the design of new roadways and how they interact with adjacent properties. These are described in the Access Management Manual published by TRB (2). These include restricting access to a roadway, controlling where a driveway may connect with a roadway, protecting the intersection functional area, spacing traffic signals appropriately, adding auxiliary lanes, and installing raised medians. This section explores each of these techniques that help accomplish the goal of reducing conflict to improve operational efficiency and promote safety. These techniques include positive access control, driveway connections, intersection and interchange functional areas, spacing between signalized intersections, auxiliary lanes, two-way left-turn lanes, and raised medians.
2.3.1 Positive Access Control

States, counties, and cities have legal authority, called “police power,” to determine how traffic can travel on a roadway. This includes restricting turns, setting speed limits, and prohibiting truck travel. Police power can also be used to determine how and where a private property owner can be granted access to an adjacent roadway. No federal law completely governs access management. Specific policies vary from state to state (2).

Access management works to balance the requirements of safe through traffic by providing reasonable access for abutting property owners. On high-speed facilities, direct access is not possible, and alternative side access is offered instead. To prevent direct access, agencies use positive access control to physically prevent access. This may include the purchase of a strip of land adjacent to a highway that cannot be crossed. These are seen along the outer edges of freeway right of ways. An agency may also erect physical barriers to prevent access to a limited access highway. For example, Figure 2-6 shows a Jersey barrier (K-rail) preventing direct access to Bangerter Highway in West Valley City, Utah.

Most state agencies have created access-permitting processes. These may require property owners to conduct a transportation impact study to demonstrate how their access request does not negatively impact the adjacent transportation network. Where it does, the developer must make necessary improvements and/or pay impact fees to the local community. States use pre-established criteria to determine if they will grant or deny an access permit. The criteria generally include roadway functional classification, driveway traffic volume, and driveway design (2).
2.3.2 Driveway Connections

Where access management is practiced, the number of permitted driveway connections is typically a response to the functional classification of the roadway. Higher-speed roadways may not provide drivers adequate sight and stopping distance for frequent driveways. Motorists traveling along a corridor need adequate sight distance to see when a vehicle enters the corridor. Design factors include the adjacent road’s superelevation, visibility around horizontal curves, and adequate sight distance over crest vertical curves (2).

Where a driveway is permissible, the design of the driveway’s operation must be appropriate for the street it connects to. For instance, the speed vehicles enter and exit must be compatible with the speed limit of the connecting street. Pedestrians and bicyclists must be able to safely cross the driveway. Driveways need adequate storage space to prevent waiting vehicles (e.g., a popular fast food drive-through window) from spilling out onto the roadway. The design
must provide space for exiting vehicles to queue without blocking parking spaces (throat length). Simple and clear entry and exit signage helps direct traffic where to go. The shape of the driveway cut and the slope of the driveway are also considered in the design (2).

2.3.3 **Intersection and Interchange Functional Area**

Intersections between a highway ramp and a cross street require adequate merging and queuing space to function properly. This is called the intersection or interchange functional area. Permitting driveways or other connections within this space poses safety and performance issues for the intersection or interchange.

The downstream section of the intersection functional area must provide adequate space required for vehicles to safely merge and accelerate into traffic. The upstream section must provide adequate space for vehicles to stop for a red traffic signal and space to store vehicles waiting for the signal to change (i.e., queuing space). Vehicles preparing to make left or right turns need space to safely maneuver that is free from the interference of vehicles entering and exiting driveways. When these factors are taken into account, the upstream section requires greater length than the downstream section (2).

Access connections, such as driveways, should be located only within mid-block sections that are not intersection or interchange functional areas. Figure 2-7 shows a modern intersection in Rancho Cucamonga, California, that attempts to practice this; in particular, access driveways are located near the outer edges of the intersection functional area. When providing access within the functional area is unavoidable, mitigation factors make it safer. These include raised medians or splitter islands that limit turns to right-in/right-out only (2).
2.3.4 Spacing Between Signalized Intersections

A traffic signal spaced too close to an adjacent signal suffers performance and safety issues compared to one spaced appropriately for the speed and function of the roadway. Closely-spaced signals do not provide adequate time for vehicles to accelerate into traffic or safely brake when slowing for a turn. Close signals do not provide adequate merging distance, especially for drivers who are not familiar with the road (2). A busy downstream intersection may require
more storage space than the length of the entire block. This leads to upstream intersections becoming blocked as a result.

An example of inadequate storage is presented in Figure 2-8. The photo shows the queue for a frontage road traffic signal adjacent to the eastbound off-ramp for the California Route 91 freeway. The block between the two signals is less than 100 feet long. Storage requirements are so woefully inadequate that the vehicle queue extends the entire length of the off-ramp and onto the freeway itself. This reduces operational performance for the freeway and poses a serious safety problem. A vehicle stopped in a queue on a major urban freeway may have a high speed differential from the through traffic that could prove fatal.

![Figure 2-8: Queuing from inadequate storage backs onto a freeway ramp (23).](image-url)

Vehicles entering the crossroad from a freeway ramp generally enter the right side of the road. If the driver of the vehicle wishes to make a left turn, the driver must merge with traffic and then begin to diverge from traffic to complete the turn. If the crossroad is a multi-lane roadway, this maneuver may require several lane changes. There must be sufficient distance for a
driver to safely complete this maneuver. Inadequate weaving space may encourage risky driver behavior. Inadequate storage space may cause queues to back into the through travel lanes, impede the operational efficiency of the roadway, and pose safety concerns at the intersection (5).

Research from the Colorado Access Control Demonstration Project concluded that signals perform best when they are spaced at least one-quarter mile apart and postulated that they may function even better when spaced at least one-half mile apart. This reduces vehicle delay and provides separation from conflict points generated at each intersection. Where possible, uniform signal spacing improves traffic flow and reduces delay. This allows the window of green time to provide synchronization for traffic flowing in both directions of the street. Geography of the built and natural environments may make this difficult to accomplish (2).

2.3.5 Auxiliary Lanes

Auxiliary lanes are special lanes that allow traffic to travel at a speed much slower than the through traffic. As the speed difference between two vehicles increases, the severity of a collision also increases.

Turning lanes are a form of auxiliary lane that allow drivers to safely decelerate from the flow of traffic to make a left or right turn. Figure 2-9 shows how these lanes provide safety for travelers along US Highway 6 in Spanish Fork, Utah. Dedicated turning lanes remove vehicles that are slowing to turn left or right from the through lanes. Without a dedicated left-turn lane, turning vehicles must stop under a green signal to wait for an acceptable gap in oncoming traffic. These stopped vehicles may confuse drivers and lead to potentially severe rear-end crashes. A right-turning driver may find himself or herself stuck behind stopped through traffic. A dedicated
right-turn lane may allow him or her to complete a right turn during an acceptable gap of the red indication (2).

![Dedicated lanes that remove turning vehicles from through travel](image)

**Figure 2-9: Dedicated lanes that remove turning vehicles from through travel (23).**

Other forms of auxiliary lanes include acceleration lanes where vehicles enter the roadway and deceleration lanes where vehicles exit the roadway. These give traveling vehicles space required to safely match the speed of through traffic, that reduces the speed differential between vehicles while improving safety. Bus pullouts are a form of auxiliary lane that allows drivers to pick up passengers at stops without blocking the through travel lanes (2).

### 2.3.6 Raised Medians and Two-Way Left-Turn Lanes

Left turns are a traffic movement that causes more than two-thirds of all access-related collisions. To reduce crashes, access management techniques are used to control where and how
a vehicle can turn left. A street may have no median, a two-way left-turn lane (TWLTL), or a raised median (2).

A TWLTL is a 10-to-12-foot-wide lane placed between directions of travel. Lane striping indicates a no-passing zone for vehicles outside the TWLTL but indicates permissible passing for vehicles inside the TWLTL. Travelling in either direction is permissible inside this lane but is restricted exclusively to assisting left-turning traffic. This lane gives drivers space to diverge from a through lane to conduct a left turn off the roadway and offers a refuge for left-turning vehicles to re-enter the roadway. These TWLTLs are widespread and a relatively inexpensive technique used frequently on suburban four-lane and six-lane arterial roadways. TWLTLs increase capacity and allow users to experience less delay. By accommodating left turns, a TWLTL roadway accommodates strip development along the midblock, leading to an increase in driveways that is problematic to access management (2).

Figure 2-10: A two-way left-turn lane in Orem, Utah (23).
A non-traversable (or raised) median is a physical barrier that separates the two directions of travel along a roadway. Raised medians offer a safety benefit by greatly reducing the potential for a head-on collision. Restricting midblock left turns significantly reduces conflict points at each driveway, while also reducing conflict points for pedestrians and cyclists at each opening. However, a U-turn is required at a median break to access businesses on the opposing side of the street. Left-turn median openings provide limited space for deceleration and vehicle storage. Unlike a TWLTL, where storage space is theoretically unlimited, the raised median has a limited physical opening for storage, as Figure 2-11 displays. When the queued vehicles exceed the storage limit, they stack up into the through-travel lanes. However, when storage is adequate, these turning bays offer safer and better performance than a TWLTL. Additionally, raised medians can be landscaped, improving the aesthetics of a corridor (2).

Figure 2-11: A raised median in Ontario, California (23).
2.4 Summary

This chapter reviewed the history and background of access management in the United States during the 20th century. This included a review of the history of access management and methods recommended in the Access Management Manual. Access management emerged as a response to the increasing fatalities caused by conflicts between non-motorized and motorized traffic on roadways. This led to the construction of toll roads that restricted entry and only permitted motorized traffic. Design elements were mirrored by other major cities wishing to create safer corridors that accommodated regional mobility needs. Funding of the Interstate Highway System from the 1950s to the 1980s gave states financial means to impose strict new access management requirements along new interstate highways. These techniques trickled down to state highways, expressways, and other principal arterial roadways in driveway access policies.

Case law and state legislation formalized the right for a state to impose access management requirements. Many states now create comprehensive corridor management plans that measure operational performance, including access management plans for a horizon year (anticipated future traffic demand). This is accomplished using a variety of techniques, including positive access control, driveway connections, intersection and interchange functional areas, spacing between signalized intersections, auxiliary lanes, two-way left-turn lanes, and raised medians.
3 ACCESS MANAGEMENT IN THE VICINITY OF FREEWAY INTERCHANGES

3.1 Overview

The NCHRP coordinates research between state departments of transportation and other regional and local highway officials. Research is documented in reports with the goal of creating ready-to-implement solutions. The research is organized into six categories that include Administration, Traffic and Safety, Construction, Design, Environment, and Maintenance (28). Under the Traffic and Safety category, reports have been created by members of the Standing Committee on Access Management (AHB70) that address best practices in the field of research.

In the report NCHRP Synthesis 332, authors Butorac and Wen (5) observed and summarized access management practices in the vicinity of freeway interchanges. By definition, a freeway is completely access-restricted except for locations of on- and off-ramps. Freeways are therefore not subject to typical safety problems from right-angle driveway access points and intersecting roadways. States almost never permit access points on freeway ramps. This NCHRP report focused specially on access management along the crossroad to which freeway ramps connect. Each driveway or intersecting roadway acts as a node that introduces conflicting and slowing traffic. These nodes may behave detrimentally for through traffic on the crossroad, the operation of the ramp, and potentially the freeway itself. The report presents the results of a
questionnaire survey conducted of state departments of transportation to determine what practices the states used to create, implement, and enforce access management standards near freeways.

This chapter provides an overview of access management in the vicinity of freeways. Specifically, it reports findings from NCHRP Synthesis 332 regarding recommendations to help meet conflict-reduction goals for crossroads in the vicinity of freeway interchanges.

3.2 Report Findings from NCHRP Synthesis 332

A freeway interchange consists of a grade-separated structure that elevates or depresses the freeway from the crossroad. Ramps provide links between the crossroad and the freeway. These ramps connect to the crossroad using intersections or through the use of free-flowing merging/diverging sections. Intersections at freeway interchanges generate conflict points and therefore require the same access management considerations given to an intersection. Freeway ramps need adequate room to function properly, including sight distance, vehicle storage, merging/diverging space, weaving space, and acceleration/deceleration space (5).

The researchers for NCHRP Synthesis 332 took these factors into account when they surveyed 36 states to identify what each state did to determine minimum spacing requirements along the crossroad near a freeway ramp. The researchers surveyed personnel from several state departments of transportation to obtain information about the requirements for the nearest permitted access of any kind, including right-in/right-out access and unsignalized/signalized full access. The researchers also asked what techniques states employed to make their determination. Respondents from state agencies replied that they evaluated land use, roadway classification, interchange form, roadway cross section, design speed, traffic volume, downstream storage requirements, signal cycle length, cost, and jurisdiction. The methods states used to control
access included tools such as positive control, property acquisition, legislation, coordination with other governmental agencies, design, land use, and local regulations (5).

Researchers found that states with “solid access management legislation” were most likely to meet conflict-reduction goals by overcoming impediments that led to poor access control. More than half of the respondents reported that their state deployed access management techniques on a new interchange project, and nearly half said they did so on an interchange retrofit project. The researchers also described a comprehensive access management training program in Oregon. The program educates the staff on key timelines, permitting criteria, the appeal process, and individual responsibilities so the staff understand the relationship between access management and the state’s highway plan (5).

Financial impacts were also evaluated by the researchers. They found businesses generally reported positive sales growth after access management changes were completed. On commercial corridors with good access management, the researchers reported that sales tax data outpaced similar corridors with poor access management by 10-20 percent. A survey of businesses showed that over 80 percent reported higher sales despite access reduction or changes. Only 5 percent indicated lower sales (5).

To promote the benefits of access management, including improved safety and operational benefits, the researchers recommended several access management design techniques to meet conflict-reduction goals. Among these were corner clearances and driveway spacing, service and frontage roads, and raised medians. Each of these is discussed in the following subsections.

3.2.1 Corner Clearance and Driveway Spacing

Freeway ramps and accesses (e.g., adjacent roadway intersections or busy retail driveways), need adequate space in between them to function properly. This corner clearance
can be determined by summing the space required for storage of turning vehicles, perception-reaction time, and weaving space (5).

Vehicles “weave” as they enter or exit a ramp. Travelers need adequate space to accelerate or decelerate to adjust their speed from the freeway ramp. Acceleration and deceleration times vary depending on the speed differential between the ramp and the crossroad. For instance, diamond interchanges have ramps that attach to the crossroad at nearly a right angle. Turns from these interchanges are completed at relatively slow speeds that increase required acceleration or deceleration space but reduce the amount of space required for weaving. On free-flowing ramps, such as cloverleaf ramps or flyovers, the ramps operate closer to the speed limit of the crossroad. These ramps require less acceleration or deceleration space, but this higher speed requires more merging and diverging space (5).

In practice, some states have set minimum spacing requirements to a blanket 100-foot minimum for an urban crossroad and 300 feet for a rural crossroad. These standards were established in the 1991 version of A Policy on Geometric Design of Highways and Streets (Green Book) (29). The Green Book is a publication that governs geometric requirements for highway design and is published by the American Association of State Highway Transportation Officials (AASHTO). The Green Book states that the type and importance of the arterial street should be considered and may lead to longer minimum spacing requirements. Based on the results of the survey regarding why that requirement was set, several state transportation officials replied that they had simply adopted the Green Book standard. The researchers further discovered there was “no underlying rationale” (5) for those standards, other than simply for it being published in the Green Book (5).
This older 100-foot/300-foot rule was reflected in a longstanding access management policy in Texas. From 1953 to 2003, the state permitted two driveways for nearly any commercial property with frontage exceeding 58 feet and permitted three when frontage exceeded 320 feet. The policy, shown in Figure 3-1, included almost no requirement for corner clearance. This led to a proliferation of driveways along Texas state highways with very short spacing between the driveway and an adjacent intersection (30).

![Figure 3-1: Texas access management policy from 1953-2003 (30).](image-url)
NCHRP Report 420, published in 1999, explored the actual minimum distances required for merging, weaving, and vehicle storage. From the research, it was determined that drivers needed at least 125 feet for perception-reaction distance, another 150-250 feet to safely complete lane transition, another 700-800 feet to weave across a two-lane arterial roadway, and another 50 feet per left-turn cycle (31). In ideal conditions, this would mean 1,320 feet (one-quarter of a mile) of uninterrupted traffic flow with no access points whatsoever. The authors of NCHRP Synthesis 332 chose to recommend this as an ideal standard.

To improve on the 100-foot/300-foot standard set in the Green Book, many states set newer, stricter, more detailed minimum spacing standards. The researchers discovered that state standards vary from “basically zero” in Connecticut and Kansas to 750 feet in Oregon. Although the report offers a more thorough national list of survey responses, Table 3-1 displays a selection of minimum distances set by a few western states.

<table>
<thead>
<tr>
<th>State Agency</th>
<th>Min. Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona Department of Transportation</td>
<td>660 ft</td>
</tr>
<tr>
<td>California Department of Transportation</td>
<td>415 ft</td>
</tr>
<tr>
<td>Colorado Department of Transportation</td>
<td>350 ft</td>
</tr>
<tr>
<td>Nebraska Department of Transportation</td>
<td>660 ft</td>
</tr>
<tr>
<td>Nevada Department of Transportation</td>
<td>300 ft</td>
</tr>
<tr>
<td>Oregon Department of Transportation</td>
<td>750 ft</td>
</tr>
<tr>
<td>Utah Department of Transportation</td>
<td>165 ft</td>
</tr>
<tr>
<td>Wyoming Department of Transportation</td>
<td>150 ft</td>
</tr>
</tbody>
</table>
Since NCHRP Synthesis 332 was published in 2004, other states have adopted access management handbooks and policies. Many have set new standards that are even more aggressive than what the survey results indicated. For example, Mississippi released its Access Management Handbook in 2008. The handbook established minimums of 750 feet for the first right turn and 1,760 feet for the first permitted left turn (32).

When these ideal corner clearances cannot be met, an access should be placed at a location as far from the intersection as possible. If the access is on a corner, the driveway should be moved to the lower-volume roadway. When changes to meet the minimum corner clearance requirements are not possible, the access may be converted to right-in/right-out only by using a raised median or a splitter island (33).

3.2.2 Service and Frontage Roads

A service road is any supplementary roadway that shifts access from the primary roadway to a safer, lower-volume roadway. Service roads include frontage roads, backage roads, and the adjacent local road network. NCHRP Synthesis 332 states that, when installed properly, this shift in access reduces conflict points and improves safety and operational performance. These supplementary roads act as collectors to consolidate many access points into fewer access points on the primary roadway (5).

A frontage road provides access to properties adjacent to a limited-access highway or freeway. These can be configured as one-way or two-way roads. On a two-way frontage road configuration, travel is permitted in either direction along the outer highway, but access is provided via interchanges along another cross street. Care must be taken to place frontage road intersections an acceptable distance away from freeway ramps, as the frontage road will meet at an intersection to create conflict points.
In a one-way frontage road configuration, travel is permitted only in the same direction as the adjacent side of the mainline highway. Slip ramps provide access to and from the frontage road. Access points along the frontage road must be designed with special care to address the influence area of freeway slip ramps. When the Texas Department of Transportation (TxDOT) adopted an access management manual in 2005, engineers developed access spacing standards that determined functional areas for slip ramps. The posted speed limit determines a minimum access spacing standard of 200 feet for 30 mph roads up to 425 feet for roads with posted speed limits above 50 mph (30).

Benefits of frontage road access spacing standards are eroded when drivers gain illegal access to and from the frontage road. Dirt trails, like the one shown in Figure 3-2, indicate that local drivers have gained unauthorized access to the frontage road from Interstate 35.

Figure 3-2: Unauthorized access path between freeway and frontage (23).
Two-way frontage roads may increase conflict points when they are constructed incorrectly. Figure 3-3 shows a local frontage road for Valley View Blvd. in Buena Park, California. The frontage road is used to collect traffic from residential driveways that would otherwise back out onto the seven-lane arterial street. However, at each location where an east-west street crosses Valley View Blvd., it also crosses the frontage roads. This results in non-signalized intersections immediately adjacent to the larger signalized intersection. This creates an additional 32 conflict points per side immediately adjacent to the existing conflict points at the larger signalized intersection. These frontage road intersections impede on intersection functional area space needed for the signalized intersection to operate effectively. For instance, in the lower example of Figure 3-3, a car turning right off Valley View Blvd. would conflict with a vehicle preparing to proceed straight through the stop sign at the frontage road.

In higher-volume conditions, these closely spaced intersections clog up and diminish safety and operational performance. In a case study similar to this Buena Park example, a parallel frontage road was constructed next to a major arterial near Detroit, Michigan. Orchard Lake Road had a frontage road that was just 20 feet from the main road. Over time, access points along the corridor showed an elevated crash rate. The street’s design was unpopular with the local community, who associated the term “access management” with the road’s poor design. The corridor was eventually retrofitted into a new configuration that eliminated the frontage road, installed a raised median, and used a network of 11 roundabouts to conduct U-turns to provide access to businesses on the opposing side of the street (34).
A very similar problem occurs on a closely-spaced backage roads. Santa Monica Blvd. in Beverly Hills, California, is a principal east-west seven-lane arterial roadway that travels through the city’s commercial district. No driveway accesses are permitted on the mainline roadway; however, a backage road immediately to the south, also named Santa Monica Blvd., provides plentiful access to parking lots and parking structures, as shown in Figure 3-4.
These intersections suffer from poor spacing, as cross streets create a series of nine very closely-spaced signalized intersections. Six of these are just 80 feet apart from one another. This minimal space leaves storage space for just three vehicles in between the two signals, though it is possible that engineers may address this issue by using coordinated signal timing. This is not possible with the stop-controlled frontage roads on Valley View Blvd. nor the ones that were along Orchard Lake Road.

3.2.3 Raised Medians

Researchers for NCHRP Report 420 discovered a crash reduction of 38 percent on suburban/urban roadways that were converted from undivided highways into ones with a TWLTL buffer. A roadway that was then converted from a TWLTL to a raised median saw the
fatal crash rate decline from 7.3 crashes per million vehicle-miles travelled (MVMT) to 5.2 crashes per MVMT, a reduction of 28 percent (31).

In a Dallas-area case study, a TWLTL on Cooper Street in the economic heart of Arlington, Texas, posed safety issues. Nearby Interstate 20 funneled crushing traffic volumes into the corridor. These drivers would attempt to access adjacent shopping centers using the TWLTL, which had turned into a “free for all.” Driveways were spaced in a haphazard manner that formed unsafe offsets. These led drivers who were travelling in one direction to block the TWLTL for those travelling in the opposing direction. These tangles emboldened some drivers to encroach into the opposing lanes to circumnavigate a vehicle stopped in the TWLTL. Such evasive maneuvers greatly increased the risk of head-on crashes. The vehicles stopped in the TWLTL would block other motorists from exiting driveways and from using the lane to accelerate and resume the flow of traffic. Drivers, such as the one shown in Figure 3-5, frequently attempted to enter the TWLTL in places that were too small for their car, increasing the risk of a right-angle crash (35).

Engineers at TxDOT wished to install a raised median to reduce the amount of uncontrolled pavement and force drivers into a more predictable pattern of driver behavior. Raised medians force traffic to make left-turns and U-turns only at permitted locations. This adds traffic volume to left-turn lanes at adjacent traffic signals. More green time may be required to accommodate these cars, and that could diminish LOS at busy intersections. This control of left turns discourages “strip” development (where businesses fill an entire corridor with accesses, rather than only at corners). In places where strip development is present, a raised median converts access to right-in/right-out only, greatly reducing conflict points. Pedestrians can use raised medians for refuge while crossing the street, and raised medians also separate
opposing traffic, reducing head-on collisions (5). Storage must also be properly calculated as it is limited to the set storage bay by the raised median, as opposed to a TWLTL that has relatively unlimited storage. A concrete island in the center of the street poses a rigid barrier with which vehicles may collide and limits safe travel speed to approximately 45 mph. Emergency vehicles cannot pass stopped or queued through traffic as easily as they could on an undivided or TWLTL configuration (5). These concerns were addressed by TxDOT when they installed the raised median on Cooper Street. As a result, operational performance on the street improved, and the crash rate was reduced by 50 percent (35).

![Figure 3-5: Cooper Street TWLTL before raised median installation (35).](image)

Raised medians offer a significant reduction in fatal crashes; however, access to business must still be maintained. In a second case study, a team of urban planners studied the Eight Mile Road corridor near Detroit, Michigan. The planners drew up beautiful renderings and cross-
section drawings showing new raised medians along the entire corridor. Unfortunately, the team made no provisions to consider access for businesses on the opposing side of the street. As no access was provided, the plan drew major criticism and skepticism from business and property owners and was ultimately shelved. A few years later, when a team of engineers began to draw up access management plans, a skeptical community had flashbacks to the original raised median plan. The engineers worked with property owners to change left-turn driveway geometry, rather than eliminating access entirely, resulting in a positive outcome. By maintaining reasonable left-turn access, the community could benefit from continued economic activity while also enjoying the safety benefits that raised medians provide (34).

3.3 Summary

This section reviewed report findings from NCHRP Synthesis 332. The researchers determined that states with clear, strong access management legislation do the best at addressing access management issues and meeting goals to reduce conflict points along a corridor. For instance, it is likely that the Texas access management policies that were implemented over a decade ago contributed to the benefits observed in the raised median in the Cooper Street case study. When conflict points are reduced on crossroads in the vicinity of freeway interchanges, the operational and safety performance of the interchange are improved.

Several techniques help reduce conflict along a crossroad near a freeway interchange. Two of these are frontage roads and raised medians. A service road can reduce the number of access points along the major road. However, this benefit can be diminished when the service road is spaced very closely to the main road, as was the case in the Orchard Lake Road case study. A raised median can significantly reduce the number of fatal left-turn crashes along a
corridor. However, this may be unpopular with business owners on the opposing side of the street. Care must be taken to provide reasonable left-turn access.
4 CASE STUDIES OF IMPLEMENTATION

4.1 Overview

The TRB Standing Committee on Access Management (AHB70) has a library of case studies presented at previous meetings that share stories of the challenges and successes states have seen implementing access management on their roadways. This project offered an opportunity to review a few relevant case studies and explore how ideals discussed in NCHRP Synthesis 332 are (and are not) implemented in the real world.

This chapter reviews case studies of implementation and compares the results to research prepared in NCHRP Synthesis 332. Specifically, the chapter examines access management reviews, the relationship between access spacing and crash rate, interchange access management plans, roundabouts, the impact of access reduction on business, driveway consolidation, and comprehensive planning and public outreach.

4.2 Access Management Review

A state will generally review existing non-conforming private property accesses when there are major changes to a development site. Each state specifies specific rules when an access management review is warranted. For instance, the state of Virginia has set access management requirements that mandate a property owner upgrade non-compliant accesses when their property undergoes zoning changes, redevelopment that would increase traffic to and from the
site, maintenance issues, and high crash rates. Otherwise, changes generally occur when the state makes changes to its roadway.

In a case study in Stephens City, Virginia, a gas station had several driveways adjacent to an interchange ramp. As Figure 4-1 shows, the closest driveway access was less than 150 feet from the freeway on-ramp.

Figure 4-1: Closure of access closest to the freeway ramps (23)
The station prompted an access management review when the owners announced plans for a major remodel to their property, including adding new pumps and remodeling their store. The access spacing requirement for the state exceeded the total frontage of the gas station’s property. To fully meet this requirement, the Virginia Department of Transportation (VDOT) would have had to require the closure of all driveways along the crossroad. This would have caused adverse condemnation, as the property owner would no longer have reasonable access. VDOT instead approved a waiver where the property owner would agree to close the access that was closest to the freeway on-ramp, and add a splitter island to their remaining driveway, making it right-in/right-out only. These changes led to an overall improvement in access spacing for this site, even if it did not fully meet the state’s requirements nor the ideals established in NCHRP Report 420 (36).

In a second case study, VDOT wanted to retrofit access spacing on its own road near the junction of Interstate 81 and US-Alt Highway 220. As the aerial photograph in Figure 4-2 shows, spacing between ramps and a nearby frontage road was only 100 feet. This access management review occurred when VDOT observed a significantly high crash rate for the area. This close spacing was also diminishing performance at the signal with the frontage road. Inadequate vehicle storage at this signal caused traffic to queue onto the freeway ramps. As this was an access management problem with a publicly-owned road, the state paid for the access management improvements. The constraints of the built-up environment required VDOT to purchase an entire truck stop to acquire enough right-of-way to accommodate the redesigned interchange. This purchase pushed the cost of the project to over $50 million. Had proactive access management planning been in existence when the original freeway interchange was constructed, it likely would have saved the state millions of dollars (36).
4.3 Access Spacing and Crash Rate

Research conducted by VDOT verifies the questionability of the 100-foot urban/300-foot rural spacing rule set out in the Green Book. The origin of this requirement comes from a 1965 AASHTO design manual. Researchers at VDOT conducted an analysis of 100 randomly-selected crossroads near freeway interchanges. They compared access spacing distance to crash rates and then weighted their findings by traffic volume (37).

As Figure 4-3 illustrates, the results indicated a statistically-significant positive correlation between the closeness of an access with the freeway ramp and an increase in crashes (exceeding $1,000 in property or human cost). The crash rate is very high where the spacing is less than 300 feet. It becomes more manageable where spacing exceeds 300 feet. The crash rate continues to
decline another 40 percent until the spacing reaches one-quarter of a mile (1,320 feet), where the crash rate levels out (37).

Figure 4-3: Positive correlation between access spacing and crash rate (37).

Researchers concluded that there is no justification for the 100-foot urban spacing guideline, as the crash rate is very high regardless of whether the spacing is in an urban, suburban, or rural location. The researchers questioned the practice outlined in the Green Book of classifying interchanges as rural or urban. Most interchanges, including rural ones, develop highway commerce nearby, which creates a de facto mini-urban area. Researchers concluded that spacing should be no shorter than 300 feet and identified little benefit extending minimums beyond 1,320 feet (37). This matches the ideal set in NCHRP Synthesis 332.
4.4 Interchange Access Management Plan

To improve the access spacing adjacent to freeway interchanges, the state of Oregon launched a formal process called the Interchange Access Management Plan (IAMP). Legislation calls for the completion of an IAMP whenever a new interchange is constructed or an existing one is reconfigured. IAMPs set clear expectations for both government agencies and local developers so they know what to expect and are likely a product of the comprehensive training recommended in NCHRP Synthesis 332. An IAMP is helpful, as Oregon sets a strict crossroad spacing requirement of 1,320 feet between the interchange ramp and the first adjacent intersection (38).

In one case study, a partial cloverleaf freeway interchange in Medford, Oregon, had several driveways along a crossroad in close proximity to the Interstate 5 freeway ramps. The area was already developed on both sides of the street, making driveway consolidation or building a service road impractical. Rather than forcing huge changes on local property owners, the Oregon Department of Transportation (ODOT) constructed a new greenfield interchange to the south of the existing one. When the new interchange opened to traffic, ODOT removed the previous ramps to convert the old interchange into an overcrossing, as shown in Figure 4-4. This eliminated the need to change or remove access for existing businesses. The new interchange considered access management requirements in its design. With no impact on adjacent businesses, engineers provided an access management standard that nearly met the 1,320-foot ideal (38).

Another Oregon interchange used the IAMP process while undergoing renovations on the US-26 freeway west of Portland. The existing diamond interchange is in a semi-rural area with many existing accesses in close proximity to the interchange. ODOT made an agreement with
local city officials to create a small frontage road and re-route an existing road that intersected with the crossroad less than 400 feet from the interchange. The plan fell short of meeting the 1,320-foot requirement but still offered safety and operational improvements over the existing configuration. ODOT later insisted that improvements must meet the full requirement. This led to the agreement falling apart and the interchange being rebuilt in its existing configuration with no improvements implemented (38). This indicates that a formal process is useful but only if the process is flexible enough to adapt to constraints of a specific project. In this case study, the IAMP process proved too rigid.

Figure 4-4: Interchange relocation to a new greenfield location (23)
Other road agencies have implemented IAMPs into their guidelines or policies. The department of transportation for Abu Dhabi has used an IAMP on all new interchange projects that influence permitted access. In practice, Abu Dhabi has very strict access management standards with very few left turns permitted without signal control or roundabouts (39).

4.5 Roundabouts

Roundabouts offer a non-traditional way of reducing minimum spacing requirements adjacent to freeway ramps, explained by three reasons. First, roundabouts have tight geometric features that require drivers to travel relatively slowly to navigate yielding, circling around the center island, and diverging back into traffic. This reduces the speed differential between vehicles travelling straight and those turning. As vehicles enter and exit a roundabout, they travel at speeds slower than those typical of a traditional intersection. Therefore, minimum spacing requirements can be shorter (40).

Second, a series of roundabouts along a corridor do not rely on green signal progression spacing like traditional signalized intersections do. Arrival and departure are random, rather than in platoons. Random departure does not require as much vehicle storage as traditional intersections do. A traditional intersection must store vehicles that arrive between green cycles. Roundabouts need to store only a few vehicles just long enough to accept a gap. By reducing the storage capacity required, the upstream intersection functional area shrinks. Beyond this small storage area that is shared with the splitter island, driveways may be able to operate safely within closer proximity to the roundabout than would be required in a typical intersection (40). Under a series of traditional signalized intersections, spacing works best when signalized intersections are spaced about one-quarter to one-half mile apart from each other. Roundabouts work well with spacing as close as 1/32 of a mile. This offers new opportunities in urban areas with tight
spacing or in the vicinity of freeway interchanges where frontage roads may sit fairly close to freeway ramps (41).

Third, roundabouts rely exclusively on merging and diverging sections. As Figure 4-5 shows, the configuration of a typical four-legged intersection has 32 conflict points, but this number is reduced to just eight conflict points in a roundabout (41). This eliminates (or at least greatly reduces) right-angle “T-bone” crashes at the intersection. Merging and diverging typically results in a less-serious collision than a right-angle crash, improving safety. The Insurance Institute for Highway Safety (IIHS) determined a 90 percent reduction in fatal crashes at roundabouts compared to their traditional counterparts (42).

![Figure 4-5: Conflict points at a roundabout vs. a traditional intersection (43).](image)

A series of case studies presented to a TRB conference in 2012 demonstrated how roundabouts offered increased access while maintaining mobility. One of the presenters at the conference, explained how switching through traffic from platoons to random arrivals caused the
slope of the access/mobility curve, shown previously in Figure 2-2, to get steeper and allow more access while maintaining mobility (40).

In a roundabout interchange case study, a city northwest of Detroit saw development of a 600,000-square-foot mixed-use retail development. The parcel sat adjacent to the US-23 freeway in Brighton, Michigan, next to an existing partial cloverleaf interchange. As shown in Figure 4-6, two-way frontage roads ran directly east and west of the freeway, with very little spacing between the western frontage road and the existing ramps. The proposed development was anticipated to generate high traffic volumes that would, on opening day, cause operational failure at the interchange and on the frontage road.

The developer conducted a traffic study that indicated that the only traditional solution that would adequately handle the traffic volume would be a full system-to-system interchange. This was impractical, as the developer did not want to cover the cost for such an expensive improvement (41). Another simulation indicated that a network of roundabouts would accommodate the increase in traffic. So significant was the anticipated change in traffic that an access management review was conducted for other businesses adjacent to the freeway.

Engineers worked to approve two roundabouts, a tough sell to the Michigan Department of Transportation, as such a configuration had not been done before in the state. One roundabout was proposed for the western freeway ramps, and another was proposed at the western frontage road. Roundabouts would not require adding left turning lanes to the roadway cross section, so the design eliminated the need to reconstruct the overpass over US-23. This meant the existing two-lane structure could remain, at great savings to the project. The proposed roundabouts sit just 85 feet apart from one another. Random arrivals at roundabouts help them function well as a
system, with reduced storage requirements when compared to a traditional signal. Access was also maintained to a gas station on the northwest corner of the frontage road (40).

Figure 4-6: Partial cloverleaf converted to series of roundabouts (23).

In another roundabout case study, a freeway interchange project at Huffman Road and State Highway 1 in Anchorage, Alaska, gave engineers the opportunity to evaluate existing
access along the corridor west of the freeway interchange. Several small businesses and a large supermarket relied on 11 access driveways within the study area. Engineers proposed installing a raised median to restrict left-turn access, including two local streets that would be converted to right-in/right-out only accesses. Businesses on the opposing side of the street worried about loss of business from customers exiting the freeway to shop. The design was changed to add four roundabouts, including a pair at the freeway ramps. This allowed traffic to use roundabouts to make convenient U-turns and access businesses on either side of the street with ease (40), as shown in Figure 4-7. This pleased local business owners and greatly reduced existing conflict points near the freeway interchange.

Figure 4-7: Left-turn access provided using a network of roundabouts (23).

Lower-volume roadways gain safety and operational benefits from roundabout installations, too. In another case study, a major big-box retailer wished to redevelop a commercial space in Monona, Wisconsin. In an access management review, the retail
development discovered it would lose its full access that was 250 feet south of the interchange, as shown in Figure 4-8 (41). The state would continue to grant right-in/right-out access, but this would not help customers who were entering the site from the freeway.

Figure 4-8: New roundabout providing U-turn access for retail development (23).
The next access point was a four-way stop another 250 feet further south. A traffic study indicated this intersection would need to be signalized to meet anticipated traffic demand. If a customer turned left here, this street did provide eventual access, but it meandered through an industrial park and was inconvenient. Engineers proposed installing a roundabout in-lieu of signalization. Not only did the roundabout accommodate the anticipated traffic, but it also offered equal priority for U-turns as it would any other movement. This allowed customers to make an easy U-turn and then turn right into the remaining right-in/right-out only driveway of the retail development (40).

A 135-foot-diameter roundabout was designed with a two-lane approach that offered a lane specifically for vehicles making left turns and U-turns. The entry to the roundabout was flared to better accommodate semi-trucks. These design considerations paired with the industrial park road made delivery access to loading docks at the retail development easier than it would have been under a traditional configuration (41).

In another roundabout interchange case study, a new greenfield development adjacent to Interstate 94 near Milwaukee, Wisconsin, was subjected to an access management review. The development would require reconstruction of the Sawyer Road diamond interchange. The site had a very close frontage road north of the westbound ramp. Developers proposed and constructed a series of four roundabouts that provided access to the new large mixed-use development. This gave a constructive way for the frontage roads, freeway ramps, an existing neighborhood, and the new development to all interact with one another without forming crippling traffic queues (40).

Roundabouts in series are still a relatively unorthodox solution to the problem. Like all roadway designs, these take years or decades to implement. This makes designs susceptible to
political whims of local community leaders. For example, the mayor of Forest Lake, Minnesota, was very supportive of new plans drawn up to modify freeway access to the cross street with a pair of roundabouts and use them in conjunction with five more new roundabouts at streets adjacent to the freeway. Before construction could begin, leadership in city hall changed. The new mayor was not supportive of the idea, and the project was shelved.

4.6 Business Impact of Access Reduction

Kellogg Drive (US-54) in Wichita, Kansas, was a major commercial arterial roadway lined with big box stores and strip malls. The area was economically vibrant and generated more traffic than the arterial road could accommodate. Around 2005, regional mobility needs led to converting this at-grade arterial into a freeway with one-way frontage roads on each side. The idea was to continue to provide access using the frontage road, as shown in Figure 4-9. Access to businesses would continue to be mostly where they previously had been, but traffic would now travel in just one direction (as the frontage roads were one-way). This required a driver to travel to the nearest freeway grade separation and make a U-turn to gain access to businesses on the opposite side.

The project was extremely expensive, costing over $10 million per mile. Construction was highly disruptive to the local community, and temporary access was extremely poor. The temporary and permanent impacts were more substantial than engineers and planners had anticipated. Nearly half of the retail space vacated shortly after access was changed. Some of the vacancies may have been due to the 2008 economic recession; however, the case study indicates that engineers may have unintentionally destroyed the cause of the problem (economic vibrancy) with their effort to fix the problem. At the time of the case study’s presentation in
2012, the economy had begun to improve, but several commercial properties remained vacant (44).

Figure 4-9: Arterial conversion into a freeway with one-way frontage roads (23).
This case study does not match the findings of NCHRP Synthesis 332, which showed that sales generally increase along corridors where access management techniques are implemented (5). In retrospect, consultants and engineers now believe that not enough attention was given to the community network at large. Streets parallel to this facility could have been widened. A robust network of local collector streets and parallel arterial roadways may have diverted traffic away from Kellogg Drive. Instead, engineers over relied on increasing mobility on Kellogg Drive, and as a result sacrificed local access needs for regional mobility goals (44).

Further east down the same highway is the growing community of Andover, Kansas. Community leaders and the department of transportation see a future where the problems that led to widening Kellogg Drive in Wichita will emerge in Andover in coming decades. The goal is to not repeat the same mistakes made on the previous widening. Recommendations for improvements to US-54 through Andover include providing more frequent north-south connections for pedestrians and bicyclists. In the Wichita segment, the center-running freeway forms superblocks. This creates segments over one-half mile long with no cross access. A customer without a car may be only a few hundred feet from a business, but may need to walk an hour or more to gain access (44).

4.7 Driveway Consolidation

The Alabama Department of Transportation (ALDOT) was evaluating the traffic impact study for the construction of a large retail development near a freeway interchange in Prattville. During this evaluation, the agency observed eight businesses downstream the interchange that used eight individual driveways to access their property. The closest access exceeded 300 feet from the nearest ramp, but all eight accesses still fell within the recommended minimum distance of 1,320 feet. ALDOT negotiated with these property owners to create cross access between
their businesses by using the service road technique from NCHRP Synthesis 332. This allowed ALDOT to reduce the number of driveways from eight to three, as shown in Figure 4-10.

![Before and After Diagram](image)

**Figure 4-10: Driveway consolidation via a private frontage road (23).**

Over time, one of the three accesses later changed to a right-in-only access, further reducing conflict points. The spacing between the closest freeway ramp and the most adjacent driveway remained the same. However, consolidation of driveways reduced the total number of conflict points in the one-quarter-mile space adjacent to the freeway ramps (45).

### 4.8 Comprehensive Planning and Public Outreach

Many communities choose to implement comprehensive access management plans. These influence the way future development and redevelopment interact with the transportation system.
The intent is to have city planning and zoning boards require good access management practices by determining where curb cuts can be placed. Good practices from the ground up prevent expensive retrofits later. A curb-cut and access management plan require not just technical analysis and strategies, but also local context and community input as well (46).

Such plans only work when there is local buy-in from the community. In one case study, the Connecticut Department of Transportation (ConnDOT) hired a private consulting firm to review the impacts for a proposed road improvement project. Research showed one neighborhood had very low public support for the project. ConnDOT chose to do the minimum amount of public involvement legally required, and proceeded with the hope that neighborhood’s concerns would eventually wane (46).

At a public hearing in a public school after hours, a neighborhood resident interrupted the engineering team’s presentation to loudly express his opposition to the project and dissatisfaction with ConnDOT’s inadequacy of discussing plans with the neighborhood. The man’s passion, combined with general dissatisfaction with ConnDOT, led to most of the 75 people in attendance loudly turning against the presenters. A local police officer working security ended the meeting and escorted ConnDOT employees and the consulting team off the premises for their own safety. After 15 years, the project had still not been completed (46).

To win public buy-in for an access management change or comprehensive plan, engineers also need to rely on local knowledge and input. They must address concerns that property owners and business owners may have about losing part of the usability of their business or property. Outreach gives engineers, consultants, and officials the opportunity to address concerns about the proposed changes (46).
Public buy-in requires gaining public consensus. This has been described as not making every affected community member happy, but rather coming up with a plan that everyone “can live with.” The public must see the vision for the project, understand the benefits of the proposed improvement(s), and feel comfortable with the impacts. Once they do, the public may automatically defend the project to the few remaining holdouts in the room (46).

To help the community reach this point, engineers must first listen well and hear what the affected individual or group’s concerns are. They must verbally acknowledge those concerns to help the person feel validated and respected. Only then should the team respectfully respond and address those concerns. If a person is persistently negative and monopolizing the meeting, the team must find a way to politely and gracefully move along. One approach for assuaging a concern is to offer to meet with the individual one-on-one to discuss it more in-depth (46).

Engineers must listen to local experience. In one case study, corridor improvements were proposed to Main Street (US-6) in Newtown, Connecticut. At the heart of the town’s most major intersection sits a flag pole that is over 100 feet tall, as shown in Figure 4-11. The pole impedes traffic movements in the intersection and is attached to the ground with no curbing or barriers to discourage a collision. Traffic must make abnormal movements to avoid the pole.

Previous consulting firms drew up plans that recommended relocating or removing the flagpole, which the community received in outrage. When a second consulting firm was brought in, public outreach almost universally warned against any plans to remove the flagpole (46). Research indicated that the flag has been in place at the intersection, in varying forms, for over a century. Past generations of town residents purposely placed the flag pole at the center of the road to signify where a church had once stood in 1790 (47). Armed with this new information, the consultants drew up new plans that left the flag pole alone. As a result, they found they were
successful in implementing their access management plan without significant public opposition. This was possible only through successful public involvement (46).

Figure 4-11: A flagpole at an intersection in Newtown, Connecticut (48).

Buy-in may require good local examples. Often, a community must see a problem occur locally and a solution deployed locally before they are willing to accept the idea; a successful solution in Denver, Colorado, may not ring true to a concerned motorist in Dallas, Texas. Pointing to success within the community, or in an adjacent city, offers better public acceptance (35).

Lastly, outreach to affected property owners is not the same as outreach to business owners. A consulting team once used a public property tax database to get addresses for stakeholders along an access management plan corridor. They sent out postcards notifying about public meeting dates and requesting input. Business owners, who were arguably more affected
by proposed changes, complained they had been left out of the process because they lease the space and do not show up on the public database (46).

4.9 Summary

This section surveyed case studies of real-world implementation of access management techniques. Specifically, the chapter examined what warrants an access management review, the correlation between access spacing and crash rate, interchange access management plans, roundabouts, the impact on business when access is reduced, driveway consolidation, and comprehensive planning and public outreach.

Crash rates are significantly higher when accesses are provided less than 300 feet from the closest freeway ramp. The crash rate continues to drop to 1,320 feet, an ideal distance recommended in NCHRP Synthesis 332. Nearly all the interchanges mentioned in this chapter fail to meet this ideal. The only case study to accomplish this was a new greenfield interchange that demonstrated how access management is easier to implement from the ground up than it is during a retrofit of an existing facility. Comprehensive access management plans help this occur, including programs like the state of Oregon’s IAMP.

When access cannot be moved farther away from the interchange, a raised median eliminates left turns and significantly improves access management near freeway ramps. A network of roundabouts offers convenient U-turns for traffic that needs to gain access to the opposing side of the street. Slower travel speeds through roundabouts allow business access closer to freeway ramps than would otherwise be safe with a traditional intersection. Random arrivals and departures of vehicles in roundabouts may accommodate traffic demands that a traditional intersection cannot accommodate.
Public involvement is important when implementing access management changes. A change that over-delivers on mobility at the expense of accessibility can significantly impact businesses adjacent to the freeway, as was the case in Kansas. Collaborative projects, such as the private service road in Alabama, demonstrate a way the state and private property owners can work together to achieve access management improvements. Being sensitive to local needs, such as the sentimental flag pole in Connecticut, can help win public support for access management changes.
5 DEVELOPMENT OF THE OUTREACH TRAINING DOCUMENT

5.1 Overview

Real-world implementation experiences shared in access management case studies are stored as recorded presentations on the Standing Committee on Access Management (AHB70) website. These cases hold the potential to assist other engineers and transportation officials in deploying best practices of access management in their jurisdictions. Currently these professionals may not even be aware of the case studies and are unable to find them using common web search engines. These presentations are stored in formats that are difficult for search engines to crawl. To address this concern, these presentations need to be shared in a new format that can be searched and shared on social media platforms. This chapter describes a procedure for creating sharable clips from these case studies that promises to increase and improve outreach.

This chapter serves as a video social media training document for access management professionals. This is a component of a three-point plan to increase awareness of access management best practices and improve outreach. This procedure helps with the first step, where a presenter snips a short portion of his or her recorded presentation and shares it on YouTube. These clips can then be shared on TRB’s social media platforms. An interested individual can then click backward from social media to YouTube and then click backward a
second time returning them to the original presentation. This chapter describes the development of the training procedure, explains the steps in that procedure, and then offers a summary.

5.2 Developing a Video-Capture Procedure

The TRB Standing Committee on Access Management (AHB70) has made a concerted effort to capture and archive presentations made at access management related conferences since 1993. Currently, the TRB AHB70 presenter’s PowerPoint document is stored with an audio recording that has been synced to the slides using an Adobe product called Presenter. Adobe Presenter relies on an engine called Adobe Flash. This product is incompatible with nearly all social media platforms and is not searchable by search engines. Furthermore, social media platforms are driven on content hyperlinks. Video-sharing websites offer these hyperlinks and require video files as input. As a result of these constraints, a simple procedure was needed to convert sections of presentations stored on Adobe Presenter into usable video files that could be uploaded and searched. This feature is not natively available on Adobe Presenter.

Through discussion with members of the AHB70 outreach subcommittee, it was determined that a product by TechSmith called SnagIt would offer easy-to-use video capture capability with native in-software ability to upload directly to several video-file storage vendors. The software bears a subscription fee that hopefully reduces the likelihood of the product disappearing and offers longevity to the procedure. SnagIt also offers technical support, functional consistency, and ease of use that are difficult to find on free products.

For video storage, the Google platform YouTube was selected by members of the AHB70 outreach subcommittee. YouTube is free and ubiquitous, and it offers fairly seamless integration with all major social media platforms.
5.3 Video-Capture Procedure

The video-capture procedure includes instructions about how to set up and configure the video-capture software, how to capture the video, and how to gain access to the upload account. The procedure also includes instructions about how to write metadata for the video and how to upload the file to a video-sharing web site. The procedure is presented in a step-by-step format for ease in achieving successful results.

5.3.1 SnagIt Configuration

a. Purchase and install the SnagIt software (www.techsmith.com) onto the user’s computer. This procedure may vary slightly between SnagIt 13 and SnagIt 2018 (or newer versions).

b. Open the software. On the left bar, select “All-in-One” mode, as shown in Figure 5-1.

c. Select “Video” mode. This switches SnagIt to a video capture mode, as illustrated in Figure 5-2.

![Figure 5-1: Mode selection in SnagIt.](image-url)
Figure 5-2: Selecting “video capture” mode in SnagIt.

d. Examine the recording settings:

- Set Preview in Editor to “On”
- Set Capture Cursor to “Off”
- Set Record Microphone to “Off”
- Set Record System Audio to “On”
- Set Selection to “Region”

When configured properly, SnagIt will appear as it does in Figure 5-2.

5.3.2 Video Capture

a. Open a web browser and navigate to the AHB70 Access Management website, http://www.accessmanagement.info. Search the website and locate a presentation from which to clip a portion. Where available, click the link at the bottom of the presentation description to open the Adobe Presenter player.

b. If the Adobe Presenter player opens, skip the following sub-steps, otherwise:

- Adobe Presenter runs on Adobe Flash. Modern web browsers are slowly phasing out support for Flash for security reasons. Flash can be enabled. The web
browser may provide a pop-up dialogue asking to allow or deny Flash from running. Click “allow.” If Adobe Presenter loads, please skip the remaining steps.

- In Google Chrome, this pop-up may not appear. If so, Flash must be enabled inside Chrome’s advanced settings menu, as shown in Figure 5-3. In Chrome’s address bar, type chrome://settings/content.

![Google Chrome settings to enable Adobe Flash.](image)

**Figure 5-3: Google Chrome settings to enable Adobe Flash.**

- Click on Flash. Turn on “Allow sites to run Flash.” Turn off “Ask first.”

(Note: This may pose a long-term security risk to your computer. A user should consider disabling Adobe Flash after he or she finishes capturing clips.)

c. Setting Capture Region:

- Cue the presentation to a point you wish to capture.
• Resize your browser window to be as large as reasonable, similar to that shown in Figure 5-4. A larger window size has more pixels and improves video capture quality.

![Image of selecting a region of the screen]

**Figure 5-4: Selecting a region of the screen to capture.**

• Select the specific slide you want to capture. Stop playback.

• On the SnagIt application, press the “Capture” button.

(Note: On your very first capture, SnagIt will offer a tutorial that will show the user how to select a region.)

• Select the presentation as a region, as shown in Figure 5-5.

(Note: Please take care to ensure only the presentation appears within the bounds of the capture region. Avoid encroaching onto presentation controls below the selection or the outline to the right.)
d. Begin Recording:

- With the region now selected, press to begin capture. SnagIt will countdown from 3 seconds, as shown in Figure 5-6, giving you time to prepare to press play.
- Allow the presentation to play through without any computer interruption.
  (Note: Slides frequently do not automatically advance. As each slide ends, be prepared to press the “next slide” arrow below or click the next slide in the outline to the right.)

e. At the end of the clip, the user may wish to capture, press stop on SnagIt.

f. SnagIt Editor will open, as shown in Figure 5-7.

- Review the presentation for quality. If the user is dissatisfied with the capture, close SnagIt Editor and repeat the capture process.
Figure 5-6: Capture region begins recording countdown.

Figure 5-7: SnagIt Editor opens for review.
5.3.3 File Upload

a. Be Granted Editor Access:

- A moderator of the TRB AHB70 channel will need to add the user as an editor. Contact the AHB70 Committee Communication Coordinator [fbroen@teachamerica.com] before beginning this procedure to ask for editor access.

- You will receive an email from YouTube granting you access, as shown in Figure 5-8.

![Email invitation for YouTube editor access](image)

**Figure 5-8: Email invitation for YouTube editor access.**

- Click “Accept invitation.” This will open a web browser tab connected to a Google account. Complete any remaining steps. This will link your email address with permission to upload videos to YouTube.

(Note: If the user does not already have a Google/Gmail account, he or she should follow the on-screen prompts to create one. At the end of the account creation process, the user will be given the opportunity to “become a member of TRB Access Management.”)
Once the editor grants permission for the user’s associated email account, SnagIt Editor lets you effortlessly post your clip to the “Access Management AHB70” channel on YouTube directly from the app. On your first use of SnagIt Editor, you will need to sign into the channel.

b. Sign into YouTube:

- Click the button, located at the upper-right corner of SnagIt Editor.
  
  A drop-down menu will appear with sharing options.

- Click the icon to the right of the YouTube option.

- A drop-down menu will appear. Select “Account.”

- A dialog box that looks like the one shown in Figure 5-9 will appear and prompt the user to sign in. Click “Sign in.”

![Figure 5-9: Sign into YouTube inside SnagIt.](image)

- This will open a tab in your web browser.

- A Google sign-in page will appear.

- Press the “Use Another Account” button.

- Log in using email credentials (Gmail/Google account credentials).

- Google will ask the user to select an account. The user should select the one with his or her name.
• The user should enter his or her email password.

• Google will ask a “brand” to log into. Select the following, as shown in Figure 5-10.

![Image of TRB Access Management profile badge](image)

**Figure 5-10: Account profile badge for TRB Access Management.**

• Click ![ALLOW button](image) to grant SnagIt permission to “Manage your YouTube Account,” as shown in Figure 5-11.

![Image of YouTube permission management dialog box](image)

**Figure 5-11: YouTube account permissions management dialog box.**
• Return to the SnagIt application. Press “Close” on the dialog box, as shown in Figure 5-12.

![YouTube Output](image)

Figure 5-12: SnagIt account dialog box for YouTube credentials.

### 5.3.4 Metadata Creation

a. Share content with YouTube:

   • In SnagIt Editor, click the **Share** button in the upper-right corner.
   
   • Select “YouTube.”
   
   • SnagIt Editor will open a “YouTube Output” window, as depicted in Figure 5-13. Enter the metadata (title, description, web search tags) for the video here.

   (Note: Metadata is the most important step of the media process. It may feel menial; however, metadata are the only attribute YouTube’s search algorithm can use to direct viewers to your clip amongst all of the other videos.)

b. Metadata:

   • Providing metadata is an important opportunity to grab a viewer’s interest.
   
   • Metadata appears in social media (Facebook, Twitter, etc.) shares.
• The user should ask: “What’s in it for me?”

• Why and how is this attribute of access management important to a person’s day-to-day life? If the user would not care about it, then a viewer of the video will most certainly not care about it.

c. Formatting guidelines:

  • Title in title case (words that are four letters in length or longer are capitalized).

  • Something short and specific that grabs attention.

  • Description in sentence/paragraph case.

    (Note: Do not press enter while typing the description. This will not create a hard carriage return, but rather will click the “Upload” button.)

  • Plan on 2-3 short sentences that include the presenter’s name. Include a link to the original presentation in the description.

  • Tags are keywords and not case sensitive. Separate the tags with commas.

5.3.5 Upload to YouTube

a. Press the “Upload” button.

b. SnagIt Editor will display the upload progress in a bar in its upper-right corner, like the one shown in Figure 5-14.

(Note: Upload time varies depending on the length of the clip and internet connection speed.)
Figure 5-13: SnagIt metadata configuration window.
c. Review on YouTube:

- When pressing “Upload” on SnagIt Editor’s YouTube Output window, the application copies the URL (web address) of your video to your computer’s clipboard.
- Open a new internet browser tab.
- Paste the URL into the address bar.
- Review the video for quality.

(Note: An uploaded video that has a problem can be deleted by the AHB70 Committee Communication Coordinator [fbroen@teachamerica.com].)

5.4 Summary

This chapter described the development of a video-sharing training document prepared for the TRB Standing Committee on Access Management. This chapter outlined the development of the video-capture procedure and then explained the steps of that procedure. This procedure was presented to the committee at the January 2018 annual conference in Washington, D.C. Feedback was collected from those in attendance. Additionally, at the request of the committee’s chairman, a group of seven volunteer beta testers were given a copy of the video-capture procedure and asked to evaluate it. This included granting beta testers editor access to
the TRB Access Management channel on YouTube. To date the procedure has worked smoothly, and additional content is being added successfully to the YouTube channel. The final results of the procedure will be presented at the 12th National Conference on Access Management in the summer of 2018.
6 CONCLUSION

6.1 Overview

This project report discussed the purpose and need for a training document and a comparison of research to case studies. It introduced the topic of the project and offered a background on the history of access management and common methods to control access along a roadway recommended in the Access Management Manual. The report discussed conflict-reduction techniques presented in NCHRP Synthesis 332, a report focused on access management in the vicinity of freeway interchanges. It then compared the NCHRP synthesis with real-world case studies presented at past TRB conferences. A step-by-step procedure was developed to explain how to share clips of these case studies on a video-sharing website.

6.2 Lessons Learned

Access management is a practice that works to balance the economic access demands a corridor serves with the regional mobility goals and safety needs of those using the corridor. It achieves this through the use of a variety of techniques to reduce conflict points along a roadway. NCHRP Synthesis 332 recommends very strict spacing guidelines that case studies seem to indicate do offer significant safety and operational benefits when followed. Conflict-reduction goals would have been met more easily if knowledge of best practices for access management existed in the 1950s to 1980s when freeways were under greenfield construction.
This simply is not the case today, as one presenter from VDOT candidly points out in his presentation where he rhetorically asks, “How many greenfield interchanges do you construct each year?” (36). Not many such interchanges are constructed, as most current projects are retrofits. Comprehensive access management planning helps ensure that future projects will be built to acceptable access management standards, though this requires buy-in from the public. Public coordination is key to future access management implementation.

The case studies presented in this research report are a case for optimism. Minimums and corner clearances are important considerations that departments of transportation consider during a freeway interchange realignment or when an adjacent property owner make changes that invoke an access management review. Of all the case studies reviewed, the only case study that did not result in substantial access management improvements was the example along US-26 in Oregon where ODOT lost community support. In every other case study explored, interchanges appeared to be in much better compliance with the recommendations of the NCHRP report than they were before.

Roundabouts were also evaluated in the research and found to be a tool that offer many access management benefits, despite the intersection type being seemingly inconsistent with higher speeds typical of freeway interchanges. Roundabouts appear to switch through traffic from platoons to random arrivals that reduce storage space needed at freeway entries and at adjacent intersections. Slower travel speeds mean access drives can be placed more closely than otherwise possible at a traditional intersection.

However, the case studies tended to include situations where the crossroad served only as a major node adjacent to the freeway interchange, perhaps mostly to serve highway commerce and adjacent retail. These crossroads were generally reduced to smaller collector or local streets
within a mile or two of the interchange. It may be possible that a network of roundabouts would be a bad choice on major principal arterials that intersect with the freeway, especially when the crossroad is a high-speed facility.

The NCHRP Synthesis 332 speaks very little about access management impacts for other users of the road, particularly bicycle and pedestrian traffic. Access management, when done incorrectly, can impose a level of inconvenience that reduces the accessible region for a particular group of customers. Motorized traffic was forced to drive miles out of their way to access a crossing in the case study of the Wichita arterial-to-freeway retrofit. This may have contributed to failing commercial property. Likewise, many innovative designs for helping vehicles enter and exit freeways could complicate access for bicyclists and pedestrians. In areas where those modes make up a measurable amount of travel, extra consideration should be taken so that they are not inconvenienced.

Coordination with property owners appears to be a key tool in achieving a successful retrofit. For instance, in the case of driveway consolidation in Alabama, the state was able to implement a frontage road that cut the number of driveways in half. This frontage road was not a typical state-built public facility, but rather a coordinated effort to provide robust cross-access between five different parcels. This sort of public buy-in indicates the value of working with local communities, property owners, and business owners to “sell” the concept of access management early, rather than forcing it and fighting it out in court. This will likely mean agreeing to access management changes that are not ideal, but ones that the state, local community, and property owners can “live with.” As is the case with the Newton, Connecticut, flagpole, at times a community may assign sentimental value to something that does not fit with engineering best practice.
Much of our national freeway network was constructed during the 1950s to 1980s. This infrastructure will reach the end of its usable life soon. The future replacement of these interchanges gives states, communities, and adjacent property owners a once-in-a-generation opportunity to implement newer, better, safer crossroads in the vicinity of interchanges that reconfigure access to promote safety and operational efficiency.

6.3 Summary

Access management techniques provide no public benefit until they are implemented on real-world roadways, intersections, and interchanges. State legislation and policies provide a framework for departments of transportation and cities to gradually reform the transportation network into one with reduced conflict and improved safety. As each community’s needs vary and each access is unique, the practice works more as an art form than an inflexible science. Case studies from other transportation professionals provide valuable strategies and techniques for implementation on other projects. The goal of this report was to demonstrate the link between case studies and professional research. The hope is that, by training access management professionals how to share portions of their presentations on YouTube and social media, the impact of each presentation will increase. This will lead to better access management practices globally and ultimately lead to safer roadways.
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