Vol. 23/ No. 4/Winter 2010

Road TTAP Talk

What is Access Management?

"Access Management" is a term that most of you have probably heard, and you may even have a clear understanding of what it means for transportation planning and operations. However, many others may be unaware of access management, or worse, hold an inaccurate understanding of its intent or application. We hope to clear up some of these misconceptions by presenting you with information on access management and some of its most basic concepts.

Driveway turn restrictions, such as these on Chapman Highway in Knoxville, limit potential conflicts near signalized intersections (source: maps.bing.com)

We currently work in an environment where budgets are stagnant at best, and in most cases have been in decline over several years. Increases in material, labor, and right-of-way costs have further stressed these transportation budgets. While a sagging economy and rising fuel prices may have provided some limited short-term relief from increasing traffic demands, we still expect long-term growth in demand to continue into the foreseeable future. As budgets and priorities change, we are relying on operational improvements to increase or protect existing capacity on our roadways. While access management is not a cure for all of our ills, it is a valuable tool that can be used to help protect our transportation investment.

According to the Federal Highway Administration, access management is "the proactive management of vehicular access points to land parcels adjacent to all manner of roadways." The Transportation Research Board's *Access Management Manual* defines access management as:

> …the systematic control of location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. It also involves roadway design applications, such as median treatments and auxiliary lanes, and the appropriate spacing of signals.

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RoadTalk is a publication of the Tennessee Transportation Assistance Program (TTAP). TTAP is part of a nationwide Local Technical Assistance Program (LTAP) financed jointly by the Federal Highway Administration (FHWA) and Tennessee Department of Transportation (TDOT). Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation to local highway and transportation personnel.

The views, opinions, and recommendations contained within this newsletter are those of the authors and do not necessarily reflect the views of FHWA and TDOT.

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From the Director

One of the coldest winters in the past 100 years is nearly over, and spring is right around the corner. It's not a minute too soon for my tastes. Being originally from the deep south, I'm a big fan of the warmer months. At least we've not gotten a lot of snow in the Knoxville area, though that hasn't been the case in many of our neighboring counties. But let me shift from the weather to the business of transportation.

In this issue of *RoadTalk*, we're focusing on access management. I think this a topic well deserving of more consideration by roadway agencies. Let me explain my thoughts on the matter.

Roads are functionally classified as arterials, collectors, and locals. An arterial road provides mobility—moving large traffic volumes of traffic between major activity centers at moderate to high speeds. Local roads primarily provide access to property—homes, businesses, or schools; traffic volumes are small, speeds low, and distances relatively short. Collector streets gather traffic from local streets and channel it to arterials.

The objectives of mobility and land access are mutually exclusive. Design standards for arterials and local roads reflect the distinct differences in their functions. A road cannot perform both functions well and operate in a safe and efficient manner.

One of the greatest causes of operations problems with roads is the failure to control access. We riddle arterial roads with driveways, effectively turning them into local roads. We allow new signalized intersections along arterials at intervals that slow traffic and preclude efficient signal progressions. At the other end of the spectrum, we design local streets in a fashion that permits cut-through traffic, increasing volumes and speeds on these streets far beyond intended levels.

Failure to control access contributes to the premature obsolescence of roads and streets. Despite a widespread perception that access management means disallowing access, it really hinges on smart access practices that preserve the function of the road. Given the expense of road construction and the unpopularity of congestion and other operational problems, access management can have significant benefits for roadway agencies. So, I invite you to read on and see what we have to say. We also have a class on the subject, so look for that in the schedule.

As always, please feel free to contact TTAP for technical assistance, training, or information. We look forward to serving you.

The Importance of Access Location

adapted from the Transportation Research Board's Access Management Manual

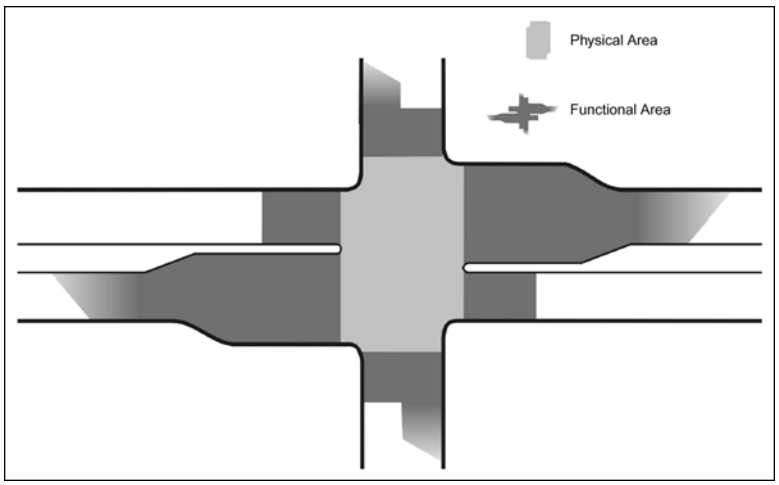
A critical consideration in the access management process is that of access location. The location of access points affects driver safety and roadway efficiency. Issues such as sight distance and roadway functional classification must be balanced with the property's owners access rights to produce the best possible outcome for all roadway users.

Functional classification is a primary consideration in the access management process. Arterial highways are intended to move large amounts of traffic between locations. Local streets provide direct access to residences, businesses, and other land uses. Collectors serve as the bridge between the two extremes, gathering traffic from local streets and channeling these vehicles toward arteries. In general, the highest level of access is provided from local streets. Collectors still provide access, but at a lower level than for local streets. Arterial roadways should provide the lowest level of access to protect their role in accommodating high traffic volumes moving over longer distances. Problems arise when access and functional classification are not properly balanced.

Sight distance is another important aspect of access management. Without adequate sight distance, drivers cannot safely enter and exit the roadway at the access point. Stopping sight distance provides drivers with an opportunity to safely stop the vehicle for objects or other hazards in the roadway. Intersection sight distance allows drivers to safely enter and exit the roadway at the access point. Finally, decision sight distance allows drivers, especially those unfamiliar with the area, to locate land uses and access points and safely turn or maneuver to access these destinations. Recommended minimum sight distances are detailed in AASHTO's *A Policy on Geometric Design of Highways and Streets* (The Green Book). Access points should be located so that they maximize available sight distance. Landscaping, buildings, parking, and other features of the site should be placed to preserve this sight distance.

Driveways near an intersection should be located outside of the intersection's functional area. This functional area includes much more than the physical intersection itself. The upstream functional area includes the distance traveled during perception and reaction, deceleration distance for the driver to come to a stop, and the queue storage length. The downstream functional area should include at least the stopping sight distance, allowing drivers to safely clear the intersection before they react to potential hazards or conflicts.

Access located within the functional intersection area interferes with safe and efficient roadway and driveway operations. Such a location also results in inconvenience and excess delay to customers entering and leaving the site. In cases where access must be provided within the functional area, the following approaches may be used to minimize its adverse impacts: require that the access connection be located as far as possible from the intersection; limit movements to right in /right out; and limit the volume of traffic that may use the connection.



Comparison of physical and functional areas of an intersection (source: TRB Access Management Manual)

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In other words, access management provides a connection from the roadway to intersecting streets and adjacent land uses in a way that maximizes safety and efficiency for all road users. As a result, long-term property values and economic viability are enhanced for the surrounding development. Fuel consumption and vehicular emissions are reduced through improved traffic flow.

On the other hand, failure to properly manage roadway access may produce many undesirable effects, including:

- Increased vehicular crashes
- More collisions involving pedestrians and cyclists
- Accelerated Reduction in roadway capacity
- Unsightly commercial strip development
- Degradation of scenic landscapes
- More cut-through traffic in residential areas
- Increased commute times, fuel consumption, and vehicular emissions

In general, access management policies seek an appropriate level of property access for the roadway's functional classification. Arterial roadways carry the most traffic, often at the highest speeds. Access points to an arterial roadway should be kept to a minimum in order to preserve capacity and safety along the facility. Conversely, local roadways carry the lowest volumes at relatively low speeds, providing the best opportunity for direct property access.

These access management goals are accomplished through use of several concepts, including:

- *Limited direct access to major roadways*. Freeways and arterials should have the lowest levels of access. Frequent, direct access is more compatible with local and collector streets.
- *Intersection hierarchy*. Intersection design should reflect the classification of the intersecting roadways, providing an appropriate level of capacity and efficiency.
- *Traffic signal placement*. Long, uniform spacing of signals favors progression along the major roadway. Short or irregular spacing of signals may reduce capacity and increase delay.
- *Protection of functional area of intersections*. Limit or eliminate driveway connections in the functional area of intersections to improve operations and reduce conflict. The functional area includes locations where motorists are decelerating, queuing, or maneuvering in response to the intersection and its traffic control devices.
- *Reduction and separation of conflict areas*. Reducing the number of access points and increasing the spacing between these points simplifies the driving process, allowing motorists to focus their attention on a single conflict area rather than multiple, closely-spaced driveways and intersections.
- *Turning lanes*. The use of auxiliary turning lanes removes stopped and decelerating vehicles from through lanes.
- *Non-traversable medians*. Medians can be used to reduce the number of locations where left turns can be made to or from the roadway. Left turns can be routed to signalized intersections or accomplished via permitted U-turns.

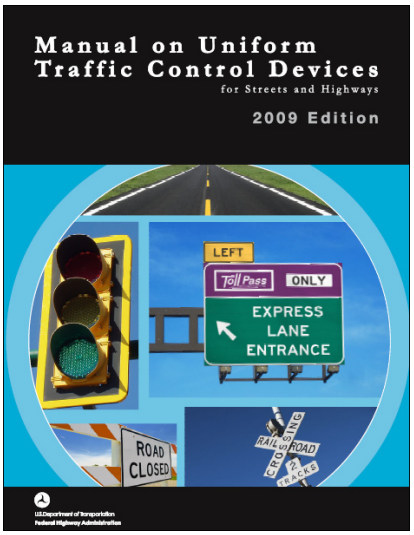
Applying access management techniques to existing businesses and homes can be a lengthy and controversial process. Home and business owners are concerned that a perceived loss of access may damage property values and reduce consumer traffic at the site. Access management is more easily implemented for new development, but there must be a plan in place to ensure that the individual pieces mesh together as the area is built out.

Access Management on the Web

- **FHWA Access Management Website: http://ops.fhwa.dot.gov/access_mgmt/index.htm**
- **TRB Access Management Committee: http://www.accessmanagement.info/**
- **Iowa Access Management Awareness Project:http://www.ctre.iastate.edu/Research/access/index.htm**
- **Florida DOT: http://www.dot.state.fl.us/planning/systems/sm/accman/**
- **Oregon DOT: http://www.oregon.gov/ODOT/HWY/ACCESSMGT/**
- **Virginia DOT: http://www.virginiadot.org/projects/accessmgt/**

Final Version of the 2009 MUTCD is Now Available!

On December 16, 2009, the Federal Highway Administration published the final rule on the 2009 Edition of the Manual on Uniform Traffic Control Devices. While the Tennessee Department of Transportation has up to two years to adopt this manual as the state's official standard for traffic control devices, the changes in the new MUTCD will take effect soon. The new manual contains a large number of changes, so be sure to take some time to review the MUTCD. TTAP will be offering workshops to discuss changes to the MUTCD later this year. To view the new MUTCD in its entirety and learn more about the changes to the manual, visit FHWA's MUTCD website at http://mutcd.fhwa.dot.gov



MUTCD History Website Traces the History of Traffic Control Devices in the United States

While reviewing FHWA's MUTCD website, we came across a link that caught our eye. Dr. Gene Hawkins of Texas A&M University has put together an extensive history of the Manual on Uniform Traffic Control Devices and its predecessors. Included on his site (http://crprofs.civil.tamu.edu/ghawkins?MUTCD-History.htm) are numerous papers, articles, and presentations on the subject, as well as complete electronic copies of every MUTCD dating back to the 1935 original. If you spend as much time consulting the MUTCD as we do, Dr. Hawkins' site is well worth a visit.

FHWA's New Sign Retroreflectivity Guidebook Available

TTAP still has many copies of FHWA's new Sign Retroreflectivity Guidebook available for distribution. This book and its accompanying CD-ROM contain a wealth of information on the new MUTCD sign retroreflectivity standards, nighttime visibility research, and methods available to assess and maintain sign performance. To request a copy, please contact us at 1-800-252-7623 or TTAP@utk.edu.

The Importance of Access Location, *continued from Page 3*

The selection process for access locations should also consider the relationship of access connections on opposite sides of the street. Closely spaced driveways on opposite sides of an undivided roadway result in jog maneuvers instead of separate and distinct left-turn and right-turn maneuvers. They can also result in conflicting left turns. Separating access connections results in their functioning as separate T-intersections (three-way intersections) that have relatively low crash potential. Unsignalized access connections that are directly opposite each other can also present a safety problem in the absence of a median of sufficient width to provide refuge for a crossing vehicle.

Many of these problems can be avoided or limited if they are identified early in the planning process. While an ideal solution to access-related conflicts cannot be achieved for every location, an awareness of these issues and a willingness to implement the best available treatment will help to create a better experience for all involved.

FOR THE LATEST WORKSHOP INFORMATION VISIT OUR WEBSITE AT CTR.UTK.EDU/TTAP

Access Spacing: Preparation through Separation

adapted from the Transportation Research Board's Access Management Manual

Access location plays an important role in the success of an access management, but it is not the only factor to consider. Another key component of access management is spacing. Each access point introduces delay and conflict to the roadway. Providing for adequate separation between these access points not only limits their numbers, but also helps to prevent a compounding of issues as vehicles interact at adjacent access points. Spacing should be considered for signalized intersections, streets, unsignalized access, and corner clearance.

Closely spaced or irregularly spaced traffic signals on arterial roadways result in frequent stops, unnecessary delay, increased fuel consumption, excessive vehicular emissions, and high crash rates. Effective two-way progression is difficult to achieve and intersection functional areas can overlap when there is insufficient separation between signals. The Colorado Access Demonstration Project concluded that increasing signal spacing from ¼ mile to ½ mile reduced delay by 60% and travel times by 50%. The project also concluded that a four-lane divided roadway with ½-mile signal spacing has the same traffic capacity as a six-lane divided roadway with ¼-mile signal spacing. Other studies have shown that total crashes and crash rates increase as traffic signal spacing decreases.

Signal timing interacts with signal spacing to influence progression speed, travel time, and delay. Long signal cycle lengths reduce lost time and increase intersection capacity, but at the cost of increased intersection delay. Longer cycle times also support lower progression speeds when compared to shorter cycle lengths at the same signal spacing.

In locations where it is necessary to deviate from established signal spacing patterns, progression speed can be preserved by devoting more green time to the major street. As the deviation from the planned spacing increases, the green time on the major street must be proportionally increased to maintain traffic flow.

Spacing of arterial roadways is another important consideration in access spacing. Even with ideal signal spacing, the intersection of major arterial with major arterial at consecutive signalized intersections can adversely impact traffic flow. This spacing also limits opportunity to preserve the functional hierarchy of roadways, with local streets feeding into collectors that link to arteries.

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The Turkey Creek development in Knoxville and Farragut utilizes many access management techniques, including well-spaced signalized intersections and median crossings, right in / right out control for minor driveways, and sufficient corner clearance (source: maps.bing.com)

Free Web-based Work Zone Training Available

Reprinted in part from FOCUS, January/February 2010, "Traffic Maintenance Online Training Courses Debut", page 6.

The National Highway Institute (NHI) has several self-paced Web-based courses available. NHI, in partnership with the Federal Highway Administration (FHWA) and the Transportation Curriculum Coordination Council (TCCC), has made two new courses available. Christopher Newman of FHWA states, "The new Traffic Maintenance courses are a user-friendly training tool for work site traffic supervisors and technicians or engineers responsible for work zone traffic control. Because they are online, the courses are ideal for those in need of immediate training or information."

This Web-based system allows you to access the course at your convenience and provides a bookmarking feature. The feature allows you the opportunity to leave the program and return to your "stopping place". Following completion, certificates are then downloadable and printable for your proof of completion. After completing the courses, "participants will be able to describe how to create clear, organized traffic control plans; identify acceptable temporary traffic control devices; and determine good and bad flagging techniques."

TCCC Maintenance of Traffic for Technicians
(Course No. FHWA-NHI-380098)

This training presents information about the placement of, field maintenance required for, and inspection of traffic control devices. In addition, drafting work zone traffic control plans and flagging are discussed. This training was prepared by TCCC and NHI to introduce maintenance of temporary traffic control for technicians.

TCCC Maintenance of Traffic for Supervisors
(Course No. FHWA-NHI-380099)

This training focuses on the design of a traffic control plan and will examine the importance of operating and implementing traffic control in work zones. The supervisor-level course is divided into five modules:

1. Fundamental Principles of Temporary Traffic Control Zones
2. Temporary Traffic Control Devices
3. Traffic Control Zones
4. Transportation Management Plans
5. Flagger Operations

To access these and other free web-based training sessions, visit the NHI Online Catalog at :

http://www.nhi.fhwa.dot.gov/training/brows_catalog.aspx

or contact:

Christopher Newman at FHWA (202-366-2023 or christopher.newman@fhwa.dot.gov

Access Spacing, *continued from Page 6*

Unsignalized access conditions, whether they are secondary streets or private driveways, also affect traffic flow as vehicles enter and exit the major roadway. A number of issues must be considered when determining the proper spacing for these access points, including: safety, sight distance, functional area, turning conflicts and overlaps, and egress capacity. Right-turn conflict overlaps occur when drivers must monitor vehicles from more than one access point at a time. As speed increases, the minimum spacing required between driveways to prevent this overlap increases. Egress capacity is influenced by the physical design of the access, through street volume and availability of gaps between vehicles, and traffic from upstream access points. In general, egress capacity increases with access spacing.

Corner clearance considers the intersection's functional area, influence distance, stopping sight distance, right-turn conflict overlap, and distance traveled during the driver's perception-reaction time. While ideal corner clearance is frequently difficult to attain, access points should generally be placed as far as possible from the intersection to minimize traffic conflicts, turn overlaps, and other adverse effects.

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TALK TO TTAP

We are always looking for your comments, ideas and suggestions to help make the TTAP Program more useful to you. Please fill out and fax the form below to TTAP at (865) 974-3889 or mail to TTAP; Suite 309 Conference Center Building, Knoxville, TN 37996-4133.

1. Please send me more information on the following articles mentioned in this newsletter.

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2. Please list any additional training workshops you would be interested in attending.

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3. Please list topics for videos you would like TTAP to obtain.

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