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COMPASS
COMMUNITY PLANNING ASSOCIATION
of Southwest Idaho

Access Management Toolkit

Report No. 16-2008

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Access Management Toolkit

Prepared by
Community Planning Association
of Southwest Idaho

Approved August 2007
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C O M P A S S

COMMUNITY PLANNING ASSOCIATION

of Southwest Idaho

Access Management
is the systematic control of the

- Location
- Spacing
- Design
- Operation
- Driveways
- Median Openings
- Interchanges
- Street Connections

along a roadway,

as well as roadway design applications
that affect access, such as

- Median Treatments
- Auxiliary Lanes
- Appropriate Separation
of Traffic Signals

Adapted from the *Access Management Manual*, 2003. Transportation Research Board, Washington, DC.

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GLOSSARY

AASHTO	American Association of State Highway and Transportation Officials <i>represents agencies from all 50 states and all modes of transportation, and publishes standards for highway construction and other materials</i>
AMPO	Association of Metropolitan Planning Organizations
COMPASS	Community Planning Association of Southwest Idaho, <i>the MPO for the Boise/Nampa urbanized areas</i>
FHWA	Federal Highway Administration, <i>a part of the USDOT</i>
FTA	Federal Transit Authority, <i>a part of the USDOT</i>
ITD	Idaho Transportation Department
ITE	Institute of Transportation Engineers, <i>an international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs</i>
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPO Metropolitan Planning Organization	Metropolitan Planning Organization, <i>the designated agency within a region to coordinate regional transportation planning and the distribution of federal funds for roadways and transit</i>
MUTCD	Manual of Uniform Traffic Control Devices, <i>published by the FHWA</i>
NCHRP	National Cooperative Highway Research Program, <i>administered by the TRB and supported by several organizations</i>
ROW	Right-of-Way
RTAC	Regional Technical Advisory Committee, <i>a standing committee and key advisory body to COMPASS</i>
TIS	Traffic Impact Study
TND	Traditional Neighborhood Design <i>includes a variety of housing types and land uses in a defined area and is served by a network of paths, streets, and lanes suitable for pedestrians and bicycles as well as vehicles</i>
TRB	Transportation Research Board of the National Academies, <i>a private, non-profit entity that promotes innovation and progress in transportation, and is supported in part by state and federal transportation agencies</i>
TWLTL	Two-way left-turn lane, <i>continuous center lane in a roadway, without a raised median, used for left turns from either direction</i>
USDOT	U. S. Department of Transportation

INITIATIVE

The principles of **Access Management** have been under-utilized on most of America's roadways. Our roadways, which are arguably our largest public investment, could very well be the most dangerous public facilities in the country.

While we constantly improve our streets and highways with better designs and safety features, **Access Management** tools and strategies are sometimes overlooked or overruled. This is unfortunate, since **Access Management** may provide the greatest opportunity to improve traffic safety and efficiency along new and existing roadways.

Safety

Research in the last 50 years has consistently shown that **Access Management** increases roadway safety. As outlined in the *Access Management Manual*¹ of the Transportation Research Board (TRB), the reduction of traffic conflict points, higher design standards for access points, and increased awareness/response time for drivers has improved safety on the nation's highways and arterials. Four key observations have come to the forefront:

- increasing the number of access points on a roadway will increase its crash rate
- roads with medians are safer than undivided roads, or roads with two-way left-turn lanes (TWLTL)
- it is safer for vehicles to make a U-turn and a right turn, than to make a direct left turn into or from a driveway
- medians also improve pedestrian safety

Implementation

Access Management reduces conflict points to promote safety and mobility. Most opportunities for removing conflict points lie in the consideration for turning movements to driveways, and in the frequency of, or separation between, streets crossing arterials and highways. This is accomplished through a variety of tools, including

- state and local laws
- policy
- highway operations
- long-range planning
- design

Ideally, it starts with long-range planning – at state, regional, or local levels – and is reflected in comprehensive plans, corridor plans, etc. See the checklist in Appendix A for ideas to help improve, or begin, a community **Access Management** program.

¹ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

See also *NCHRP Report 420: Impacts of Access Management Techniques*. Jerome Gluck, Herbert S. Levinson, Vergil Stover. 1999. National Cooperative Highway Research Program, Transportation Research Board. <<http://www.accessmanagement.info/pdf/420NCHRP.pdf>>

Greater detail is implemented through

- site design standards
- parking requirements
- established street hierarchy
- subdivision ordinances
- construction standards
- zoning ordinances
- joint operations and agreements

Last on this list, but of great importance, is interagency cooperation and coordination. Cooperation through memoranda of understanding (MOU) or agreement (MOA), or other special arrangements are vital between transportation agencies and local governments with land development authority.

Applicability

This toolkit is organized into seven sections. Some of the topics discussed may appear to have no relation to **Access Management**, such as *Increase Capacity of Existing Turn Lane*. Different methods are interrelated, and have different effects on the overall land use and transportation system. For instance, if opportunities for left turns are decreased by the closure of a median opening, demand would likely increase at another opening nearby. The second opening may need to be enhanced to accommodate the change in demand. Appendix B includes a matrix of the tools and their applicability for land regulating agencies/departments and transportation agencies/departments.

Disclaimer

Much of the content of this report is adapted from policy, codes, and practices applied in other states. The ordinances herein are provided for references and examples and do not constitute the provision of engineering or legal advice.

In adopting the various measures described in this Toolkit, each agency or entity should carefully consider the ordinance or policy language for conformity with current standards and best practices. All applicable state and local laws should be considered when implementing any of these actions. Many of the ordinances and policies in the Toolkit were included with the assumption that each city or county has adopted local comprehensive plans, zoning ordinances, land development regulations and other regulatory plans in accordance with Idaho State Code.

Origin

This Toolkit was prepared with funding assistance from the Federal Transit Administration's (FTA) *Innovation in Safety & Security* grant program. The *Innovation in Safety & Security* grant program is administered by the Association of Metropolitan Planning Organizations (AMPO).

Doherty & Associates was contracted to prepare the original document in 2007 for COMPASS. It was recommended for approval by the COMPASS Regional Technical Advisory Committee (RTAC) on June 27, 2007, and accepted by the COMPASS Board of Directors, August 20, 2007. Amendments were recommended for approval by RTAC on July 23, 2008, and received by the Board of Directors on August 18, 2008.

PLANNING TOOLS

Several opportunities exist in planning to improve safety and efficiency via **Access Management**. The following pages illustrate **Planning Tools** that can be used in the following areas:

- Update the Comprehensive Plan
- Cooperate in Regional Corridor/Access Management Plans
- Create Overlay District/Adopt Corridor Plan
- Adopt Regional Transportation Plan/Functional Classification
- Adopt Access Classification System

Additional planning measures can be taken, but are not detailed in this Toolkit.

Budget for Access Acquisition – Program into annual budget funds dedicated for ongoing efforts to acquire access rights, purchase ROW/preserve corridors, and close non-conforming access points.

Prioritization Process for Access Management – Include **Access Management** as a performance measure or criterion in funding and planning prioritization processes.

Designate the Access for Each Property – Corridor plans and other tools can designate consolidated access points before development occurs or before major improvements are made to the roadway.

Public Outreach – Provide educational materials and public involvement activities to describe benefits and principles of good **Access Management**.

² Photo: COMPASS 2005

Update the Comprehensive Plan

Description:

Access Management is a critical component of an effective Comprehensive Plan. The Comprehensive Plan can address such issues as land pattern, traffic flow, and the plan's relationship to **Access Management**. The plan should directly address **Access Management** in policy, and can be used as a mechanism to accomplish broader community goals.³ It should be introduced as a specific topic for community goals during the planning process, and policy alternatives should be prepared for consideration with the plan.

Policy Recommendations:

The comprehensive plan goals, policies, and strategies can directly affect safety and efficiency by addressing strip development and small lot development along the community's highway arterials, and including recommendations such as the following:⁴

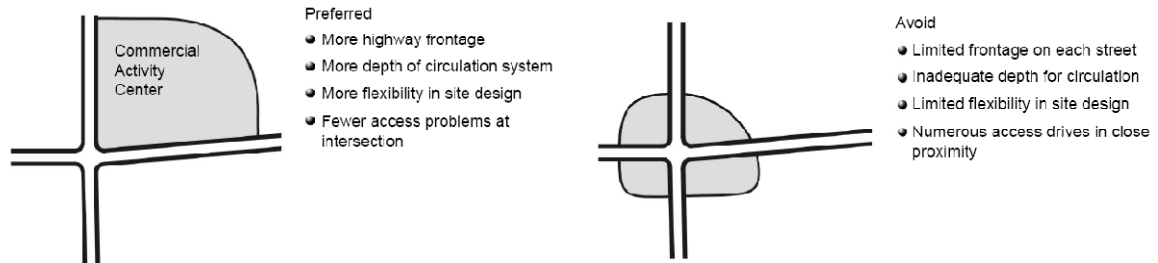
- Designate compact growth areas and limit the amount of development that can take place in rural areas along arterials.
- Prohibit a proliferation of single-lot, house-by-house development.
- Prohibit single-lot driveways (any use) along arterial and mobility corridors, in favor of other access alternatives.
- Establish guidelines that can be included in a local ordinance to ensure that arterial development will not significantly reduce traffic safety and traffic carrying capacity.⁵
- Prohibit commercial strip development along principal and minor arterials.
- Prohibit driveways as access points on arterials
 - Require access points to be public, through streets that also serve adjacent development.

³ NCHRP Report 548 *A Guidebook for Including Access Management in Transportation Planning*. David Rose, Jerry Gluck, Kristine Williams, Jeff Kramer. Transportation Research Board. 2005. Washington, DC.

⁴ "Iowa Access Management Handbook Chapter 5-Access Management and the Comprehensive Plan". Center for Transportation Research and Education, Iowa State University. October 2000. Iowa State University. 16 May 2007. <<http://www.ctre.iastate.edu/Research/access/amhandbook/chap5.pdf>>

⁵ See *Adopt Arterial Safety Standards* section.

- Develop regulations to require that development along the arterials be clustered or limited to certain areas.
 - Prohibit development that creates shallow parcels along arterial roadways and at arterial intersections.
 - Recommend that commercial nodes are consolidated, not fractured.⁶



- Require traffic impact analyses and site plans for all developments exceeding a certain threshold.
- For all land use plan changes exceeding a certain threshold, require complementary update to transportation and access management plans.
- Cooperate with neighboring jurisdictions to review transportation issues and develop a coordinated, regional approach to access management.

⁶ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

Cooperate in Regional Corridor/Access Management Plans

Description:

Because streets and highways cross jurisdictional boundaries, many transportation issues are regional in nature. There are also highways owned by the state and administered under state policy, independent of local jurisdictions.

ITD or a highway district, city, or county may initiate a corridor study on a regional or sub-regional scale. Transportation agencies and municipalities with land use authority should both participate in corridor studies and adopt the resulting:

- Corridor Plans/Preservation Studies
- Joint Transportation Access Plans
- Corridor or Highway Access Management Plans
- Regional/Sub-regional Plans and Transportation Plans

All jurisdictions should participate in regional plans and regional planning activities.

Agreements can also be formally adopted by multiple agencies and jurisdictions for joint implementation of corridor plans. An MOA or MOU is an important tool in implementing a corridor or regional plan.

Create Overlay District/Adopt Corridor Plan

Description:

One of the most effective tools in applying corridor standards is a corridor overlay district. Similar standards can be adopted with a corridor plan or map, but the overlay district can be more effective because it stays in the forefront during planning decisions and zoning actions.

An overlay district, or corridor plan, applies to parcels that are adjoining or within a certain distance from a roadway, usually an arterial or state highway. A corridor ordinance contains additional regulations that are over-riding, and in some cases, additive, to existing zoning regulations. They should involve standards governing access, visibility, and corridor aesthetics and provide standards for number and location of access points, inter-parcel connections, size and location of signs, and landscaping and buffer requirements. An overlay district or corridor map should incorporate the elements below.⁷

Policy/Ordinance Language:

Intent: The intent of the corridor map/overlay district is to enhance the safety, function, and capacity of designated highways. As major traffic routes, these highways represent significant community investments, and contribute to public health, safety, and welfare. They provide access to jobs and schools, facilitate delivery of emergency services, support the movement of goods and services, and enhance economic development. Furthermore, these corridors serve as first impressions of the community for visitors and the traveling public.

Access: The purpose of the corridor map/overlay district is to manage vehicular and non-vehicular access. To achieve this goal, all site plans should include an access plan drawn to the same scale as the site plan. These plans shall show the location and dimensions of all streets, driveways, crossovers, parking areas, access aisles, sidewalks, and any other relevant information. Access to the corridor should be provided by direct or indirect means, consistent with the following planning guidelines:

- minimal number of access points
- required corner clearance of driveways from intersecting streets
- minimum sight distances along the highway for the design speed
- internal street layout and connections to the maximum extent feasible
- shared access to the maximum extent feasible
- good pedestrian and bicycle access so as to minimize conflicts with vehicular traffic
- pedestrian circulation systems that connect uses within individual projects to adjacent parcels, transit routes, and activity centers

Infrastructure Requirements: Required improvements, the need for which is generated by the proposed development, are determined based on the traffic impact analyses (TIS). The developer shall be responsible for provision of the improvements.

⁷ *Project Development & Design Guide*. Massachusetts Highway Department. January 2006. Massachusetts Highway Department. 16 May 2007. <http://www.mhd.state.ma.us/downloads/designGuide/CH_15.pdf>

Setbacks: In order to preserve and enhance highway safety and efficiency, setbacks are often specified in the language of the corridor map/overlay district. Typically, setbacks are to remain free from all development, including buildings, parking areas, gas pumps, canopies, and similar structures and facilities. Where necessary to accommodate an approved circulation plan, access driveways are permitted within setbacks.

Setbacks can also be defined for the purposes of establishing streetscape improvements, or to provide for the future widening of a corridor when warranted.

Other Design Elements: To manage growth in a manner consistent with the intended traffic safety, operations, and corridor appearance objectives of the corridor map/overlay district, design guidance for a number of other physical elements of the corridor, such as signing, lighting, and landscaping, are worthwhile to consider.

Well planned and maintained signing, landscaping, and lighting will achieve several benefits in furtherance of this ordinance:

- preserve and enhance traffic operations
- enhance the pedestrian environment
- preserve and enhance the visual quality of designated corridors

Site plans that include a landscaping plan drawn to the same scale as the site plan, and that show the location, size, and description of all landscaping materials in relation to structures, parking areas, and driveways should be required.

Adopt Regional Transportation Plan/Functional Classification

Description:

Several standards for safety, **Access Management**, and ROW preservation are based on long-range plans and associated roadway functional classifications. Future transit investments are also part of a regional transportation plan.

To provide for consistency in various standards across a region and across jurisdictional boundaries, including **Access Management** policy, each entity/jurisdiction involved in transportation investment or land development should adopt the state and/or regional transportation plan and functional classification map as it affects the surrounding area.

Adopting the regional transportation plan and the functional classification map strengthens both the goals of the region and the standards of the individual jurisdiction. See also the following section: *Adopt Access Classification System*.

Ordinance/Resolution Language:

The entity/jurisdiction has an interest in the establishment of an effective and safe transportation system, expansion of transportation options, and the protection of air quality and other natural resources.

The entity/jurisdiction is authorized pursuant to Title 67, Chapter 65 of the Idaho Code, the Local Land Use Planning Act of 1975 Section §67-6508(i) to prepare, in coordination with other local jurisdictions having authority over the public highways and streets, an analysis of "...the general locations and widths of a system of major traffic thoroughfares and other traffic ways, and of streets and the recommended treatment thereof. This component may also make recommendations on building line setbacks, control of access, street naming and numberings..."

The transportation agency/metropolitan planning organization has prepared the regional long-range transportation plan and functional classification map, in cooperation with local governments within the region/county and has included the public in the planning process.

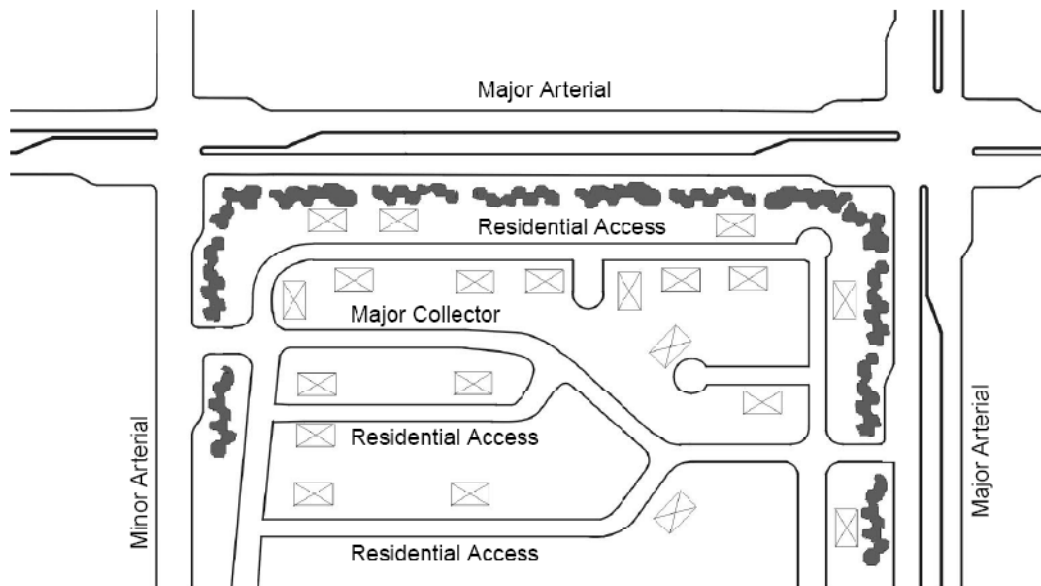
Therefore, be it resolved that the entity/jurisdiction approves the plan name/functional classification map as a guide to transportation and land development decisions and to integrate the goals and policies of the plan name into the land use and transportation policies of the entity/jurisdiction.

Adopt Access Classification System

Description:

If there is no regional long-range plan or functional classification system in effect (see previous section), a local hierarchy should be established. If a regional system is already in place, a complementary local ordinance will enhance **Access Management** efforts.

Functional Classification Example



Create an access decision process for the arterial and collector system that is aligned with the relevant transportation plan or comprehensive plan for the community. Ensure that each access decision is consistent with meeting the functional purpose of the roadway. Access category is the functional guidance on day-to-day access decisions affecting the performance of the roadway.

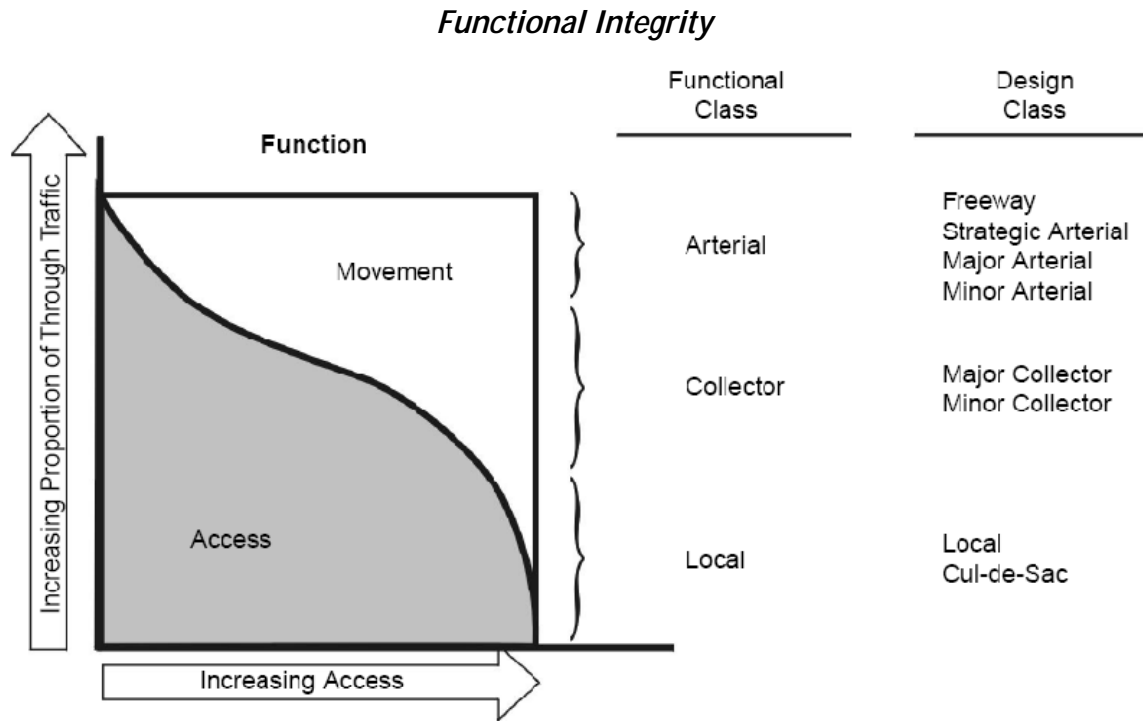
Some local ordinances will identify streets by name and class.⁸ The list may be limited to freeways and arterials, but may also include collector streets.

The street functional classification hierarchy is often in a table and should include:

- Classification
- Main Function - *traffic movement or land access (may indicate secondary function as well)*
- Characteristics - *speed limit, minimum intersection (or driveway) spacing, direct land access*

⁸ "Code: City of Orlando Florida: Sec. 61.212." [City of Orlando, Florida](http://www.municode.com/resources/gateway.asp?pid=13349&sid=9). 3 March 2008. City of Orlando. 10 July 2008. <<http://www.municode.com/resources/gateway.asp?pid=13349&sid=9>>

Direct land access should be descriptive, such as “Limited – access to major traffic generators only”. The table may also include setbacks, cross section type, number of lanes, etc. The references below offer differing examples: one of a simple hierarchy, the other a thorough code identifying streets by name.



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⁹ *Access Management Manual*. Access Management Committee of the Transportation Research Board, 2003. Washington, DC.

POLICIES AND REGULATIONS

Opportunities to improve safety and efficiency through regulations and policies are abundant. These **Access Management** techniques are particularly useful in the development review and access permitting processes:

- Update Zoning and Subdivision Ordinances
- Adopt Traffic Impact Study (TIS) Requirements
- Update Site Design/Access Permitting Process
- Establish MOA/MOU for Joint Permit Process
- Adopt Arterial Safety Standards
- Adopt Private Road Ordinance

Other policy and regulatory tools exist, but are not discussed in this Toolkit. This includes:

Designate Inappropriate/Extra Driveways as Non-Conforming Access Points

¹⁰ Photo: *Idaho Drivers Manual*, Idaho Department of Transportation. 2006

Update Zoning and Subdivision Ordinances

Description:

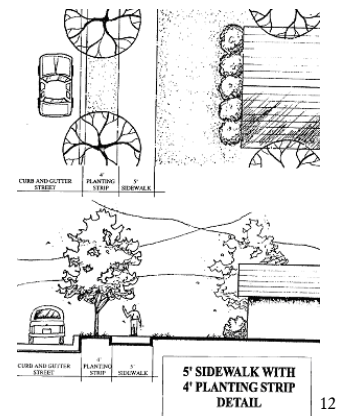
Review existing zoning and subdivision regulations in light of local corridor management objectives.

Consider modifications to:

- minimum lot sizes
- lot frontages
- setbacks
- lot width-to depth ratios
- cross-access or joint-access requirements for shared driveways
- site design standards¹¹

Within this document are suggested excerpts for inclusion in subdivision and zoning ordinances, mostly arranged on a topic-by-topic basis. Such changes to an ordinance would likely need to be replicated in more than one zoning/overlay district or land division process.

In other cases regulations need to be modified to fit the situation. For instance, if a highway right-of-way (ROW) does not have uniform width; setbacks and driveway throat depths should be measured from the street centerline instead of the parcel boundary.



¹¹ See *Update Site Design/Access Permitting Process* section.

¹² City of Nashville, Tennessee, Metro Planning Department. 23 June 2008.
<http://www.nashville.gov/mpc/planning_images/fig262B1_Dimensions.gif>

Adopt Traffic Impact Study (TIS) Requirements

Description:

A TIS is a study of the transportation needs and traffic impacts of a development project on the surrounding roadway system. Local regulations should indicate when a traffic impact analysis is required. Some situations that may require a TIS include:

- rezoning
- annexations
- development projects (any land use)
- land use plan changes
- comprehensive plan amendments

The TIS should also determine developer contributions to major roadway improvements.

Ordinance Language:

A TIS shall be required for all developments generating more than 1,000 average daily trips or 100 peak hour vehicle trips. The projected number of average daily trips shall be based on trip generation rates as defined by the most recent publication of the Institute of Transportation Engineers (ITE) “Trip Generation”¹³ or an acceptable substitute recognized by engineer/department. In addition, a traffic impact analysis may be required for developments generating fewer daily trips when it is determined by engineer/department that safety considerations warrant such analysis.¹⁴

The traffic impact analysis shall identify level of service impacts of the proposed development and should be used to determine necessary improvements to support the development. At a minimum, the impact analysis shall address the following:

- a) definition of pedestrian, bicycle, and motor vehicle access
- b) turn lane and access improvements
- c) internal site circulation
- d) shared access to adjacent sites
- e) impacts to intersections and median crossovers
- f) potential warrant for traffic signal/turn lane

¹³ See *Trip Generation, 7th Edition* and *Trip Generation Handbook, 2nd Edition*. Institute of Transportation Engineers. 2003, 2004. Institute of Transportation Engineers, Washington, DC.

¹⁴ *Project Development & Design Guide*. Massachusetts Highway Department. January 2006.

Massachusetts Highway Department. 16 May 2007.

< http://www.mhd.state.ma.us/downloads/designGuide/CH_15.pdf >

Update Site Design/Access Permitting Process

Description:

Exercise **Access Management** early in the development review process. The subdivision and site plan review process provides local governments and transportation agencies with the most effective opportunity for addressing access considerations and preventing access problems before they occur. This should be done as early as possible in the process, as builders and developers appreciate earlier feedback and are less amenable to revising the access plan later in the process or after the site plan or plat has been approved.

The checklist below was adapted from *The Subdivision and Site Plan Handbook*¹⁵ and the Florida DOT manual for **Access Management**¹⁶. Effective coordination between the Idaho Transportation Department (ITD), municipal government departments, and the applicable transportation agency is essential to ensure conformance with land division and **Access Management** requirements.

Some organizations find a good method to improving coordination is to ensure that an access permit or similar documents from the appropriate agencies (both land use and transportation) are required with the submittal of a building permit. See Appendix C for a sample decision tree/flow chart for an access permit process.

The review process below would be incorporated into the community's overall subdivision and site plan review process. A conceptual review, before submission of the preliminary site plan or plat, is also highly recommended. Communities should also set fees and develop the necessary forms and checklists to carry out the provisions of the policy.¹⁷

Ordinance Language:

Site Plan Review Procedures

- a) Applicants shall submit a preliminary site plan for review by department responsible. At a minimum, the site plan shall show:
 - i. Location of access point(s) on both sides of the road where applicable;
 - ii. Distances to neighboring constructed or approved access points, median openings, traffic signals, intersections, and other transportation features on both sides of the property;
 - iii. Number and direction of lanes to be constructed on the driveway plus striping plans;

¹⁵ *The Subdivision and Site Plan Handbook*. David Lisotkin and Carole Walker. 1989. Center for Urban Policy Research, Rutgers University, New Brunswick, NJ.

¹⁶ "Model Land Development & Subdivision Regulations That Support Access Management: for Florida Cities and Counties." Center for Urban Transportation Research, University of South Florida. University of South Florida. June 25 2008. < http://www.cutr.usf.edu/research/access_m/pdf/Land_Regs.pdf >

¹⁷ See also the following section on joint permitting processes for state and local coordination suggestions.

- iv. All planned transportation features (such as auxiliary lanes, signals, etc.);
 - v. Trip generation data or appropriate traffic studies;
 - vi. Parking and internal circulation plans;
 - vii. Plat map showing property lines, right-of-way, and ownership of abutting properties; and
 - viii. A detailed description of any requested deviation from standards, and the reason the deviation is requested.
- b) Subdivision and site plan review shall address the following access considerations:
- i. Is the road system designed to meet the projected traffic demand, and does the road network consist of hierarchy of roads designed according to function?
 - ii. Does the road network follow the natural topography and preserve natural features of the site as much as possible? Have alignments been planned so that grading requirements are minimized?
 - iii. Is access properly placed in relation to sight distance, driveway spacing, and other related considerations, including opportunities for joint and cross access? Are entry roads clearly visible from the major arterials?
 - iv. Do units front on residential access streets rather than major roadways?
 - v. Is automobile movement within the site provided without having to use the peripheral or arterial road network?
 - vi. Does the road system provide adequate access to buildings for residents, visitors, deliveries, transit vehicles, emergency vehicles, and garbage collection?
 - vii. Have the edges of the roadways been landscaped? If sidewalks are provided alongside the road, have they been set back sufficiently from the road, and has a landscaped planting strip between the road and the sidewalk been provided?
 - viii. Does the pedestrian path system link buildings with parking areas, entrances to the development, transit access, open space, and recreational and other community facilities?
- c) The city/county/district reserves the right to require traffic and safety analysis where safety is an issue or where significant problems already exist.
- d) After _____ days from filing the application, applicants must be notified by the department responsible if any additional information is needed to complete the application.
- e) Upon review of the access application, the department responsible may approve the access application, approve with conditions, or deny the application. This must be done within _____ days of receiving the complete application.

-
- f) Any application that involves access to the state highway system shall be reviewed by the Idaho Transportation Department (ITD) for conformance with state access management standards. Where the applicant requires access to the state system, and a zoning change, or subdivision or site plan review is also required, development review shall be coordinated with ITD, as follows:
- i. An access management/site plan review committee that includes representatives of *ITD traffic operations/planning*, the *streets department/highway district*, and the *land-use agency/planning department* shall review the application. The committee shall inform the developer what information will be required for access review. Information required of the applicant may vary depending upon the size and timing of the development, but shall at a minimum meet the requirements of this section.
 - ii. Upon review of the application, the access management review committee shall advise the *department(s) responsible* whether to approve the access application, approve with conditions, or deny the application.
- g) If the application is approved with conditions, the applicant shall resubmit the plan with the conditional changes made. The plan, with submitted changes, will be reviewed within _____ working days and approved or rejected. Second applications may only be rejected if conditional changes are not made.
- h) If the access permit is denied, the *department(s) responsible* shall provide an itemized letter detailing why the application has been rejected.
- i) All applicants whose application is approved, or approved with conditions, have *thirty (30)* days to accept the permit. Applicants whose permits are rejected or approved with conditions have *sixty (60)* days to appeal.

Establish MOA/MOU for Joint Permit Process

Description:

The previous sections outline processes and regulations that can be used to ensure better coordination between agencies and departments concerning land use and transportation. However, any process should have reciprocal procedures at other agencies or neighboring jurisdictions, and established agreements on operating procedures for stakeholders via a MOA or MOU.

The goal of coordination is to achieve valid, quick, and consistent decision among the involved agencies. For this reason coordination is a benefit not only to the agencies involved and the public, but also to the developer or property owner whose financial investment is at stake. Creating joint agreements between agencies can also bring separate processes into alignment for review and permitting without pitting differing entities or neighboring jurisdictions against each other.

Policies and Strategies

A joint review process should be implemented in each agency's individual review procedures, checklists, and ordinances where appropriate. The following strategies are suggested in the *Access Management Manual*.¹⁸ Although most of the coordination strategies are straightforward, they can be difficult to achieve.

Establishing new protocol requires time and effort and may raise internal and cross-agency philosophical differences.

INTERGOVERNMENTAL COORDINATION STRATEGIES FOR STATE AGENCIES

- *Designate* a point person in each state transportation agency or district office who will serve as the access management liaison to local governments with regard to connection permitting on state highways or agency standards. Furnish each local government with contact information for that individual and updates as to personnel changes so that the appropriate agency representative can be contacted.
- *Request and review* any locally adopted ordinances, plans, or amended zoning districts for potential conflicts or inconsistencies with those of the state so that local policies or requirements may be cross-referenced in the connection permit when appropriate.
- *Request* notification of any and all proposed development, plats, or redevelopment applications near or adjacent to a state highway, whether or not the development will require a connection permit.
- *Engage* in discussions and early, shared review of applications with the local government and developer.
- *Notify* the local government whenever a connection application is submitted for state approval within that jurisdiction.
- *Solicit* feedback from the local government on relevant circumstances surrounding the proposed development that is requesting a connection permit to the state highway.
- *Participate* in meetings, teleconferences, or other consistent methods of coordination.

¹⁸ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

INTERGOVERNMENTAL COORDINATION STRATEGIES FOR LOCAL GOVERNMENTS

- *Designate* a point person within each local government who will serve as the liaison to the state transportation agency on access management issues. Furnish the state transportation agency with contact information on this individual and any updates as personnel changes occur.
- *Notify* the appropriate state transportation agency representative whenever a development or plat application is submitted for local government approval that affects the state highway system.
- *Request* early notification by the state transportation agency of all connection permit applications within the local jurisdiction, when a connection to a state highway is being sought.
- *Solicit* feedback from the state transportation agency when preparing plans, ordinances, or overlay districts that incorporate access management requirements or that affect property access along state highways.
- *Forward* copies of these plans, ordinances, and zoning district regulations to the state transportation agency, following adoption, so that it can cross-reference permit applications against existing local government land development controls.
- *Engage* in discussions and early, shared review of applications with the state transportation agency and the developer.
- *Participate* in meetings, teleconferences, or other consistent methods of coordination on connection permitting and development issues.

*Measures for State and Local Coordination in Access Management*¹⁹

- Consistent state and local standards
- Early communication on development requests that affect state highways
- Early involvement of the state transportation agency in subdivision/site plan review
- Transmittable site plans for smaller developments
- Combined review committees for larger developments
- Teleconferencing
- Computerized permit tracking systems
- Corridor access management plans

¹⁹ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

Adopt Arterial Safety Standards

Description:

Arterial safety standards are chiefly enforced in the site design review process and the access permitting process. Arterial roadways have the distinction of serving two functions that are generally incompatible – long distance/high volume traffic movement and access to adjacent land uses and traffic generators. Adopting safety standards can assist in maintaining the public’s ability to travel safely and efficiently while still providing access to adjacent land.

Seven sample standards are included below²⁰; possible standards to adopt include:

- limited driveway access points, in favor of driveways on cross-streets and side streets
- driveway spacing/separation requirements
- commercial driveway standards with safe pedestrian crossings
- driveway design for speed and for peak weekday volumes
- agreements between properties for cross- or joint access
- requirements for acceleration/deceleration lanes or right-turn lanes
- driveway design for anticipated vehicles
- driveway/site design to accommodate queued vehicles
- driveway/site design to accommodate internal/off-street circulation
- safe and efficient pedestrian connections from development to transit access
- sight distance/visibility for vehicles entering/exiting roadway
- prohibit or reduce left-turn movements into/from driveways or minor cross-streets
- provide median openings for U-turn opportunities for small and large vehicles
- joint access permit process to ensure concurrent review and response between agencies
- prohibit signs/structures that unnecessarily distract drivers with bright/flashing lights, noise

Ordinance Language:

Intent: The purpose of this article is to serve the public interest by minimizing operational difficulties caused by the disparate arterial functions of long distance/high volume traffic movement and access to adjacent land use.

The regulations of this article strive to improve safety to the traveling public, as well as promote the efficient use of public thoroughfares, protect the public investment in long distance traffic carrying facilities, and to avoid future degradation of arterial street traffic capacity. Simultaneously, the regulations strive to protect the rights of abutting land owners to reasonable access.

Applicability: The regulations in this article apply to all principal and minor arterials as designated by the functional classification map/regional plan/corridor overlay district.

²⁰ “Model Zoning Ordinance – Arterial Street Access Regulations”. Tri-County Regional Planning Commission. 1984. Tri-County Regional Planning Commission, Lansing, Michigan. 26 June 2008. <<http://ntl.bts.gov/DOCS/mzo.html>>

Performance Standards: It shall be unlawful to construct or utilize any direct access driveway to an arterial street that does not meet the following criteria:

- a) Any driveway design utilized must allow an entering vehicle turning speed of 15 mph to help reduce interference with through street traffic.
- b) Driveway design and placement must be in harmony with internal circulation and parking design such that the entrance can absorb the maximum rate of inbound traffic during a normal weekday peak traffic period as determined by a competent traffic impact study (TIS).
- c) There must be sufficient on-site storage to accommodate at least three (3) queued vehicles waiting to park, or exit the roadway, without utilizing any portion of the street right-of-way or interfere with street traffic.²¹
- d) Provision for circulation between adjacent parcels should be provided through coordinated or joint parking systems and driveways, as specified in the zoning code/comprehensive plan.
- e) Driveway entrance must be able to accommodate all vehicle types having occasion to enter the site, including delivery vehicles.
- f) Driveway placement and site design must allow that loading and unloading activities will in no way hinder vehicle ingress or egress.
- g) Direct access driveway placement, landscaping, and signage must be situated so that an exiting vehicle has an unobstructed sight distance according to the following schedule:²²

Highway Design Speed MPH	Sight Distance FEET
30	200
35	225
40	275
45	325
50	350

²¹ See also *Adequate Driveway/Throat Length* section of this Toolkit.

²² "Model Zoning Ordinance - Arterial Street Access Regulations". Tri-County Regional Planning Commission. 1984. Tri-County Regional Planning Commission, Lansing, Michigan. 26 June 2008. <<http://ntl.bts.gov/DOCS/mzo.html>>

Adopt Private Road Ordinance

Description:

Unregulated private roads raise several problems. They may be inaccessible to emergency vehicles or large delivery trucks, placing public safety and private property at risk. Substandard roads deteriorate quickly and without a maintenance agreement, the local government may be called upon to maintain them. Buyers may not be aware of the maintenance issues associated with the road. Narrow rights-of-way may impede placement of utilities and private roads can exacerbate inefficient land development patterns.

Ordinance Language:

- a) Private roads may be permitted in accordance with the following general standards:²³
 - i. All private roads built in agency/jurisdiction shall be constructed to public specifications and have an easement of a minimum of sixty (60) feet in width.
 - ii. Private roads that by their existence invite the public in shall have all traffic control features, such as striping or markers, in conformance with the Manual of Uniform Traffic Control Devices (MUTCD).
 - iii. The minimum distance between private road outlets on a single side of a public road shall be 660 feet, or less where provided by access classification and standards for state roads and local thoroughfares.
 - iv. All properties served by the private road shall provide adequate access for emergency vehicles and shall conform to the approved local street numbering system.
 - v. All private roads shall be designated as such and will be required to have adequate signing indicating the road is a private road and not publicly maintained.
 - vi. All private roads shall have a posted speed limit not to exceed twenty (20) miles per hour.
 - vii. All private roads shall have adequate provisions for drainage and storm water runoff.
 - viii. A second access connection to a public road shall be required for private roads greater than 2,000 feet in length.

²³ "Indiana Department of Transportation Access Management Guide". Urbitran Associates. 2006. Indiana Department of Transportation. 16 May 2007. <http://www.in.gov/indot/files/guide_total.pdf>

SUBDIVISION DESIGN/STREET PATTERN

The following pages discuss several concepts to improve the safety and efficiency of highways and arterial streets via subdivision design or street patterns:

- Connectivity
- Discourage Flag Lots
- Traditional Neighborhood Pattern
- Frontage or Service Roads
- Reverse Frontage Roads
- Minimum Corner/Curb Clearance – Residential
- Minimum Corner Clearance – Non-Residential
- Lot Width-to-Depth Ratios

Other designs, patterns, and tools may be used to improve **Access Management**, but are not discussed in detail in this document. For example:

Lot Frontage Dimensions – The width of lot frontage can determine the spacing between access points. Too small of frontage increases the density of driveways and decreases the response time for drivers between driveways. See also *Lot Width-to-Depth Ratios*.

Restrict Highway Access Points to Public Streets – Rather than allowing driveways onto principal arterials, access to a highway or arterial can be limited to public through streets only. Driveways would be allowed onto the side street/perpendicular roadway only. The side/perpendicular street should also provide through traffic for connectivity with other developments and land uses.

Connectivity

Description:

Local governments and districts must maintain a balance between improving accessibility and limiting through traffic in rural areas. These standards are designed to address both concerns. Properly used traffic calming measures are another means of minimizing the speed and volume of through traffic while maintaining connectivity.²⁵

Ordinance Language:

- a) The street system of a proposed subdivision shall be designed to coordinate with existing, proposed, and planned streets outside of the subdivision as provided in section of code.
- b) Wherever a proposed development abuts un-platted land or a future development phase of the same development, street stubs shall be provided as deemed necessary by the city/county/district to provide access to abutting properties or to logically extend the street system into the surrounding area. All street stubs shall be provided with temporary turn-around or cul-de-sac unless specifically exempted by the engineer/department, and the restoration and extension of the street shall be the responsibility of any future developer of the abutting land.
- c) Collector streets shall intersect with collector or arterial streets at safe and convenient locations.
- d) Sub collector and local residential access streets shall connect with surrounding streets to permit the convenient movement of traffic between residential neighborhoods or facilitate emergency access and evacuation, but such connections shall not be permitted where the effect would be to encourage the use of such streets by substantial through traffic.
- e) In addition to roadway connections, pedestrian connections shall be provided between adjacent subdivisions and properties wherever feasible. These pedestrian connections should include provisions for safe pedestrian travel along roadways, connections to transit, and across parking areas to buildings.²⁶

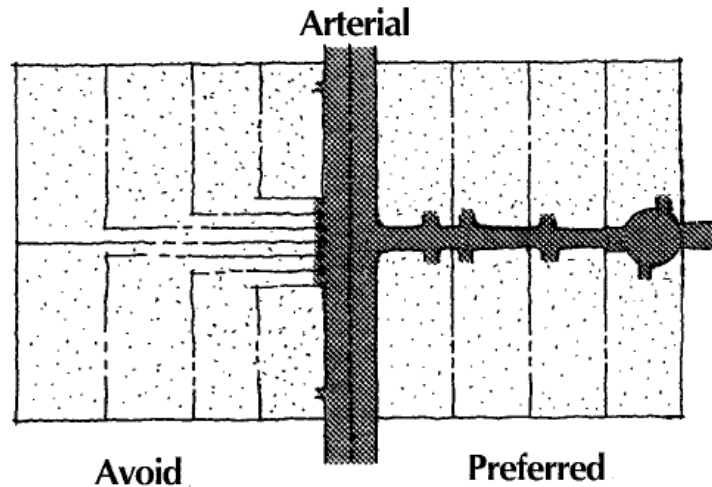
²⁵ "Kentucky Model Access Management Ordinance". Sweger, Brent A. September 2003. Division of Multimodal Programs, Kentucky Transportation Cabinet. 16 May, 2007
<http://www.accessmanagement.info/pdf/KY_Ordinance.pdf>

²⁶ See also *Alternative Modes of Travel* section of this Toolkit.

Discourage Flag Lots

Description:

Flag lots result in closely spaced driveways that undermine the safety and efficiency of arterials and highways.²⁷ Eventually, residents may petition for construction of a local public road passing the cost of providing a subdivision road onto the community. If flag lots are allowed, restrictions should be codified.²⁸



Ordinance Language:

- a) Flag lots shall not be permitted when their effect would be to increase the number of properties requiring direct and individual access connections to the State Highway System or other major thoroughfares.
- b) Flag lots may be permitted for residential development, when deemed necessary to achieve planning objectives, such as reducing direct access to thoroughfares, providing internal platted lots with access to a residential street, or preserving natural or historic resources, under the following conditions:
 - i. Flag lot driveways shall be separated by at least twice the minimum frontage requirement of that zoning district.
 - ii. The flag driveway shall have a minimum width of 20 feet and maximum width of 50 feet.
 - iii. In no instance shall flag lots constitute more than 10% of the total number of building sites in a recorded or unrecorded plat, or three lots or more, whichever is greater.
 - iv. The lot area occupied by the flag driveway shall not be counted as part of the required minimum lot area of that zoning district.
 - v. No more than one flag lot shall be permitted per private right-of-way or access easement.

²⁷ "Ten Ways to Manage Access in Your Community". Center for Urban Transportation Research. No date. University of South Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/Tenways.pdf>

²⁸ "Kentucky Model Access Management Ordinance". Sweger, Brent A. September 2003. Division of Multimodal Programs, Kentucky Transportation Cabinet. 16 May, 2007
<http://www.accessmanagement.info/pdf/KY_Ordinance.pdf>

Traditional Neighborhood Pattern

Description:

Traditional Neighborhood Design (TND) reduces traffic congestion and expands options for vehicular, pedestrian and bicycle access through an integrated network of narrow roadways. It results in a reduction in linear streets, incorporates traffic calming resources and allows on-street parking.

Ordinance Language:

- a) Street layout should exhibit a high degree of overall connectivity, with some allowances for topographic or wetlands conditions.
- b) Cul-de-sac are generally discouraged, but may be used in moderation.
- c) Maximum block length in the TND should not exceed 1,320 linear feet.
- d) Trees should be planted within the right-of-way between the sidewalk and the curb.
- e) Provision should be made for on-street parking.

General TND Street Design Guidelines²⁹

Street type	Traffic Lanes		Sidewalk	Buffer	Bike Lane	Parking(2)	Paved Sect. (3)	ROW
	No.	Width						
Village Center; Boulevard(4)	2 1	11' 11'	10' both sides 10' both sides	10' 10'	5' 5'	7' 7'	38' 27'	118' 96'
Major Street , 2-Way Major Street , 1-Way	2 1	11' 11'	8' both sides 8' both sides	10' 10'	5' both sides 5' one side	7' both sides 7' one side	50' 27'	88' 65'
Minor Street , 2-Way Minor Street , 1-Way	2 1	10' 10'	6' both sides 6' both sides	10' 10'	5' both sides 5' one side	7' both sides 7' one side	48' 26'	82' 60'
Local Street, 2-Way Local Street, 1-Way	N N	10' 10'	6' both sides 6' both sides	8' 8'	No No	7' both sides 7' one side	48' 26'	78' 56'
Alley, 2-Way Alley, 1-Way	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	20' 12'	25' 20'
Residential; Boulevard(4)	2 1	11' 11'	10' both sides 10' both sides	10' 10'	5' 5'	7' 7'	38' 27'	72' 61'
Major Street, 2-Way	2	11'	10' both sides	10'	5' both sides	7' both sides	50'	84'
Minor Street or Local Street	(5)		10' both sides 10' both sides	8' 8'	No No	7' both sides 7' one side	29'(6) 21'(7)	59' 51'
Alley	N/A	N/A	N/A	N/A	N/A	N/A	14'	20'

Notes: (see next page)

²⁹ "Ordinance Number 561: Roadway Design". Martin County Florida. No date. Martin County Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_martin_ord.pdf>

Notes: *(see table on previous page)*

- (1) Edge of sidewalk located 1' from right-of-way line
- (2) Parallel Parking
- (3) Paved section back-to-back of curbs; 2' curb and gutter section
- (4) Divided roadways separated by a raised median at least 18' wide
- (5) Traffic lanes are not designated by striping or lane lines
- (6) Only during periods where vehicles are parked on both sides. One vehicle at a time may pass.
- (7) Only during periods where vehicles are parked on one side.



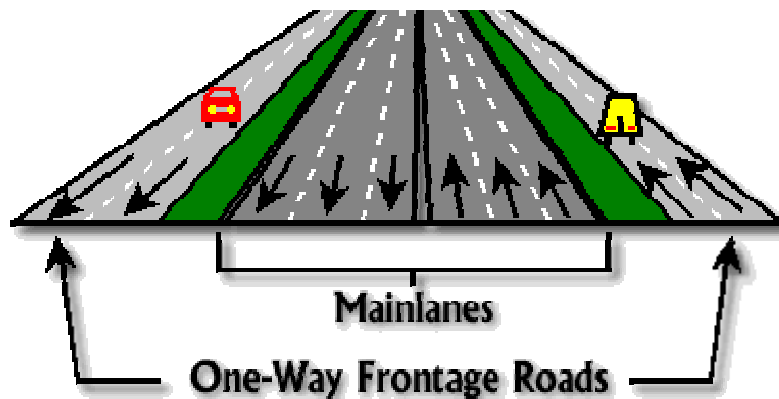
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³⁰ Photo: Don Matson 2005

Frontage or Service Roads

Description:

The purpose of frontage or service roads is to provide lower-speed access to commercial sites along a major roadway and to separate lower-speed business traffic from higher-speed through traffic. Connections of frontage or service roads to side streets or onto the highway must be well away from signalized intersections, so entering and exiting traffic doesn't conflict with traffic queuing at signals.



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Ordinance Language:

When a subdivision or other development is proposed that would abut an arterial, it shall be designed to provide through lots along the arterial with access from a frontage road or interior local road. Access rights of these lots to the arterial shall be dedicated to the agency and recorded with the deed. A berm or buffer yard may be required at the rear of through lots to buffer residences from traffic on the arterial. The berm or buffer yard shall not be located within the public right-of-way.³²

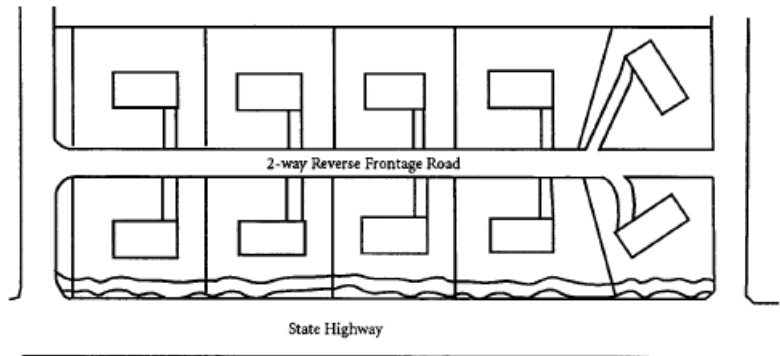
³¹ "I-35 Project Description". Interstate Highway 35 Web Site. 28 November 2006. Texas Department of Transportation, Waco District. 24 June 2008. <www.i35waco.com/description.shtml>

³² "Indiana Department of Transportation Access Management Guide". Urbitran Associates. 2006. Indiana Department of Transportation. 16 May 2007. <http://www.in.gov/indot/files/guide_total.pdf>

Reverse Frontage Roads

Description:

When land is subdivided for residential use, lots abutting the thoroughfare should not be allowed to obtain driveway connections on the thoroughfare. Instead, the subdivision should be designed so that lots obtain access from an interior street, also known as a reverse frontage street or backage road. Landscaping, berms, or other barriers may be provided at the rear of these properties to buffer them from the noise, debris, and traffic on the thoroughfare. This also reduces the potential for dangerous conflicts between high-speed traffic and residents and other drivers entering and exiting a driveway.



Similar treatments are appropriate for non-residential land uses along arterial roads as well.³³

Ordinance Language:

- a) Access to double frontage lots shall be required on the street with the lower functional classification.
- b) Reverse frontage access shall be provided at no cost to the city, highway district, county, or state in lieu of frontage access to all new residential and commercial developments with frontage on an arterial totaling ____ feet or less.
- c) Reverse frontage access shall be provided at no cost to the city, highway district, county, or state in lieu of frontage access on an arterial to all new residential and commercial developments having a total land development area of ____ acres or less.
- d) If a current collector has been identified by highway district or ITD for reclassification as an arterial within ____ calendar years, all future development shall adhere to the reverse frontage requirements stated here.
- e) Direct residential driveway access to individual one-family and two-family dwellings should be avoided from any arterial or industrial/commercial collector street.
- f) Residential corner lots shall obtain access from the street with the lowest functional classification, and access shall be placed as far from the intersection as possible to achieve the maximum available corner clearance.³⁴

³³ NCHRP Report 420: *Impacts of Access Management Techniques*. Jerome Gluck, Herbert S. Levinson, Vergil Stover. 1999. National Cooperative Highway Research Program, Transportation Research Board. 2 July 2008. <<http://www.accessmanagement.info/pdf/420NCHRP.pdf>>

- g) Access locations to subdivisions shall provide appropriate sight distance, driveway spacing, and include a review of related considerations.
- h) Reverse frontage lots shall be designed with an easement at least ten feet wide, to be dedicated along the lot lines abutting the traffic arterial or other disadvantageous uses, across which there shall be no right of access for the general public or adjoining property owners.³⁵
- i) A “reverse frontage lot” is a double frontage lot for which the boundary along one of the streets is established as the rear lot line, and over the rear of which is a utility easement. The rear lot line of the lot shall be that boundary abutting a primary arterial, railroad right-of-way or other disadvantageous use.

³⁴ “Staff Report.” Hernando County. 8 Oct. 2003. Hernando County, Florida. 16 May 2007.
<<http://www.co.hernando.fl.us/PLAN/archive/2003/h0343sr.pdf>>

³⁵ “Skamania County Code.” Skamania County. No Date. Skamania County, Washington. 16 May 2007.
<http://www.skamaniacounty.org/bpc/html/_DATA/TITLE17/Chapter_17_36__DESIGN_STANDARDS_/17_36_050_Reverse_frontage_lot.html>

Minimum Corner/Curb Clearance – Residential

Description:

In requiring minimum corner clearance, zoning and subdivision codes should also require adequate width for corner lots. The corner clearance requirement may vary by zoning district and street functional classification.

Inadequate setbacks cause vehicles to sprawl onto the street causing dangerous situations for pedestrian, bicyclists, and other vehicles.

The separation distance may need to be different based on the particular zoning district and minimum lot size. Some zoning ordinances will express the required driveway length as the required setback to the house or to the garage door.

Ordinance Language:

- a) On corner lots, residential driveways shall be set back a minimum distance of twenty-five (25) feet from any street intersection, measured from the closest point of the driveway approach to the closest right-of-way line of the intersecting street.
- b) Driveways leading to a residential garage or carport must be at least twenty-five (25) feet long, measured from the back of the sidewalk, or if there is no sidewalk, twenty-five (25) feet from the back of curb, to accommodate on-site vehicle parking and keep the sidewalk and roadway free from obstruction.

Minimum Corner Clearance – Non-Residential

Description:

Setting driveways and intersections reduces the provides more time and space merge safely across lanes. intersections and driveways clearance. Adequate corner assured by establishing a for corner lots. Conditional be imposed where adequate be obtained. This helps assure that corner properties do not experience access problems as traffic volumes grow.^{36,37}



connections back from number of conflicts and for vehicles to turn or This spacing between is known as corner clearance can also be larger minimum lot size land use limitations could corner clearance cannot

Driveways and median openings close to a major intersection create a situation where the driver must negotiate conflicts close to an area that has been designed to manage large volumes of traffic. This situation can lead to poor safety and operational conditions. Managing driveway spacing is essential on roads intended for higher speeds. At higher speeds, travelers have less time and space to react to the unexpected. Therefore, the minimum distance needed between driveways is greater as speed limits increase.

Ordinance Language:

- a) Corner clearance for connections shall meet or exceed the minimum connection spacing requirements for that roadway.³⁸
- b) New connections shall not be permitted within the functional area of an intersection or interchange as defined by the connection spacing standards of this code, unless:
 - i. No other reasonable access to the property is available, and
 - ii. The engineer/department determines that the connection does not create a safety or operational problem upon review of a site specific study of the proposed connection prepared by a registered engineer and submitted by the applicant.

³⁶ "Land Development and Access Management". Kristine M. Williams. No date. Center for Urban Transportation Research, University of South Florida. 16 May 2007.

< http://www.accessmanagement.info/AM06pdf/AM0609_Williams.pdf >

³⁷ "Model Land Development & Subdivision Regulations That Support Access Management: for Florida Cities and Counties." Center for Urban Transportation Research, University of South Florida. University of South Florida. June 25 2008. < http://www.cutr.usf.edu/research/access_m/pdf/Land_Regs.pdf >

³⁸ This functions only if a driveway/access spacing standard is also adopted.

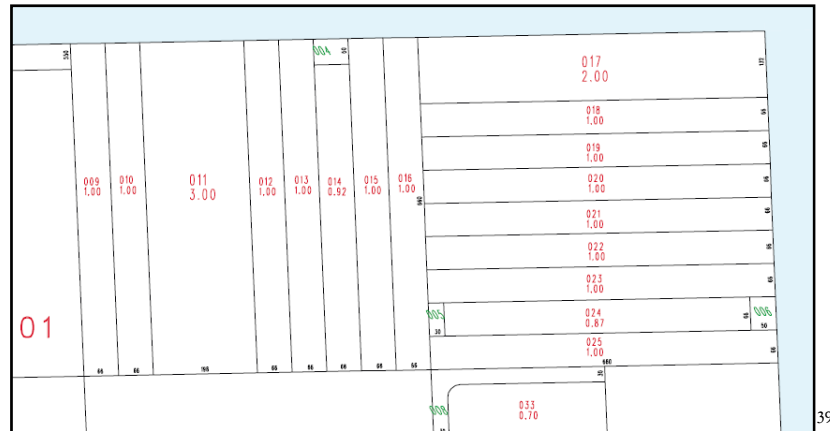
- c) Where no other alternatives exist, the engineer/department may allow construction of an access connection along the property line farthest from the intersection. In such cases, directional connections (i.e. right in/out, right in only, or right out only) may be required.
- d) In addition to the required minimum lot size, all corner lots shall be of adequate size to provide for required front yard setbacks and corner clearance on street frontage.

Lot Width-to-Depth Ratios

Description:

Prevent the creation of substandard “bowling alley” lots or irregularly shaped parcels. Narrow parcels along arterial roadways increase the need for individual driveways, and decrease the likelihood that alternative access arrangements will succeed.

What to avoid



Note: Historically some parcels were created with narrow frontage to eliminate exposure to “frontage” taxes or improvement assessments. To help reduce demand for long, narrow lots, assure that assessments in the community are distributed via more equitable processes.

Ordinance Language:

Proper subdivision design does not encourage the creation of irregularly shaped parcels.

- The depth of any lot or parcel shall not exceed 3 times its width (or 4 times its width in rural areas).⁴⁰
- New parcels must be created with an adequate building envelope/buildable area to accommodate zoning regulations.

³⁹ “Assessor Parcel Map 071266.” Clark County Assessor. No date. Clark County, NV. 2 July 2008. <<http://sandgate.co.clark.nv.us/servlet/ParcelMaps?instance=pcl7&parcel=071266>>

⁴⁰ “Indiana Department of Transportation Access Management Guide”. Urbitran Associates. 2006. Indiana Department of Transportation. 16 May 2007. <http://www.in.gov/indot/files/guide_total.pdf>

SITE DESIGN STANDARDS

A number of measures can be taken to improve roadway operations and **Access Management** and are discussed in the Toolkit.

- Alternative Modes of Travel
- Consolidate Driveways/Limit Driveways per Parcel
- Cross Access
- Shared Access
- Adequate Driveway/Throat Length
- Drive-Through Queues
- Driveway Turnarounds
- Provide Adequate Sight Clearance

Other opportunities include:

Locate Access Opposite Signalized 3-Way Intersection – Where feasible, locate a private residential or commercial access opposite a signalized 3-way intersection. Existing signals shall be modified to incorporate traffic from the access into the signal phasing plan, similar to a fourth approach leg to the intersection.

⁴¹ Photo: Parametrix 2004

Alternative Modes of Travel

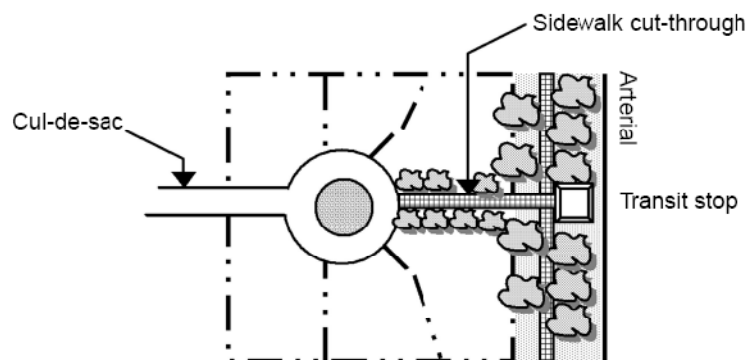
Description:

Almost all **Access Management** designs and operational strategies impact all users of the transportation system, including transit vehicles, pedestrians and bicyclists. In general, pedestrians and bicyclists need to be considered where they cross major streets and driveways, and both should be accommodated for access to transit. Where vehicles cross significant pedestrian traffic or bicycle facilities, the design should accommodate vehicles at lower speeds. Some general principles of accommodating pedestrians at the driveway minimize higher speed vehicle/pedestrian conflicts and prevent driveway slopes from encroaching into the sidewalk. Slopes may present a problem for compliance with the Americans with Disabilities Act.

The following strategies promote safe alternative transportation. Additional standards can be adopted for bike racks at industrial and public land uses – see article d, below. Bike racks can be included in parking standards, and can be offered as an incentive to reduce vehicle parking requirements.

Ordinance Language:

- a) Opportunities for bicycle/pedestrian mobility shall be enhanced through site design strategies and bicycle/pedestrian access ways that seek to shorten walking distances and increase accessibility between neighborhoods, schools, transit access points, and recreation areas, community centers, shopping areas or employment center as follows:⁴²
 - i. Sidewalks connecting residential developments to the sidewalk system of surrounding roadways.



- ii. Bicycle/pedestrian ways connecting residential developments and or nearby schools, neighborhood community centers, churches, parks, commercial and office developments, transit access points, or other compatible land uses.⁴³

⁴² "Ordinance Number 561: Roadway Design". Martin County Florida. No date. Martin County Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_martin_ord.pdf>

⁴³ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

- iii An accessible route within the boundary of a site shall be provided to meet the requirements of the Americans with Disabilities Act.
- b) Where the decision making body determines that a bicycle/pedestrian connection is desirable from a subdivision to schools, parks, playgrounds, transit, or other roads or facilities and that such access is not conveniently provided by sidewalks adjacent to the streets, the developer may be required to reserve an unobstructed easement to provide such access.
- c) Commercial development should be designed to support bicycle and pedestrian mobility in accordance with the following:
 - i. Safe and convenient pedestrian ways should be provided between parking areas and from the building entrance to surrounding streets, transit routes, external sidewalks and development out parcels. Pedestrian ways may be constructed of paver blocks, concrete, or other suitable materials. Pedestrian ways that traverse parking areas should include reflective striping.
 - ii. Pedestrian circulation should be provided between abutting commercial properties through the use of walkways and similar pedestrian-oriented facilities.
 - iii. Pedestrian facilities may be incorporated into the required landscape buffer.
- d) Bicycle and pedestrian amenities, such as benches, water fountains, or bicycle racks, should be provided for commercial developments of 5,000 square feet or more of gross floor area in accordance with the following schedule:
 - i. Bicycle racks must be of the inverted “u” type, or of a design or other structure approved by permitting department, and accommodate at least four (4) bicycles each.
 - ii. Bicycle racks should be located within fifty (50) feet of the main entrance of the primary building.

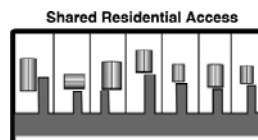
<i>Gross Floor Area of Project</i>	<i>Required Bicycle or Pedestrian Facility⁴⁴</i>
5,000 – 10,000 square feet	1 bike rack
10,001 – 50,000 square feet	1 bike rack, 1 bench
50,001 – 100,000 square feet	2 bike racks, 2 benches
> 100,000 square feet	4 bike racks, 4 benches, 1 outdoor water fountain

⁴⁴ “Ordinance Number 561: Roadway Design”. Martin County Florida. No date. Martin County Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_martin_ord.pdf>

Consolidate Driveways/Limit Driveways per Parcel

Description:

Internal connections between neighboring properties allow vehicles to circulate between businesses or residences without having to re-enter the major roadway. Joint and cross access requirements in land development code can help to assure connections between major developments, as well as between smaller businesses along a corridor.⁴⁵



Avoid
 • Multiple lots with individual access connection to the adjacent streets.



Encourage
 • Internal collector type facilities to reduce conflicts on adjacent streets.

Ordinance Matrixes:

These tables offer two possible standards. The first is based on the number of driveways per parcel, the other on a more complex standards system based on classification⁴⁶.

Number of Driveways per Parcel

Number of driveways	Situation
1	Parcels (without cross- or joint access)
2	Parcels with lot frontage 300 to 600 feet
3	Parcels with lot frontage that exceeds 600 feet

Access Classification System Standards						
Functional Classification	Medians*	Connection Spacing (feet)		Median Opening Spacing (feet)		Signal Spacing
		>45 mph**	≤45 mph**	Directional	Full Opening	
Arterials	Restrictive w/Service Roads	1320	660	1320	2640	2640
	Restrictive	660	440	1320	2640	2640
	Non-Restrictive	660	440	n/a	n/a	2640
Collectors	Restrictive	440	245	660	2640/ 1320	2640/ 1320
	Non-Restrictive	440	245	n/a	n/a	1320
Highly Urbanized Areas	Both Median Types	125		330	660	1320

* "Restrictive" physically prevents vehicle movements, "non-restrictive" allows turning at any point.

** Posted speed limit

⁴⁵ "Policy on Street and Driveway Access to North Carolina Highways". Division of Highways. July 2003. North Carolina Department of Transportation. 24 June 2008.

<<http://www.ncdot.org/doh/preconstruct/altern/value/manuals/pos.pdf>>

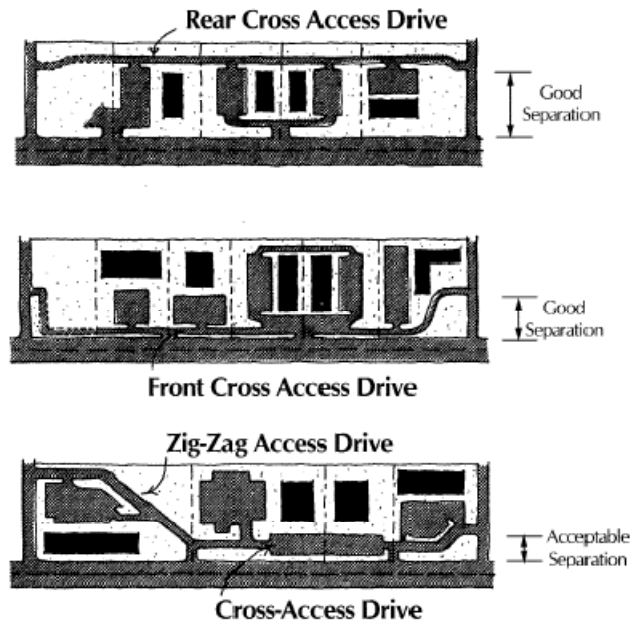
⁴⁶ See *Accomplishing Access Management on the FIHS: The US 27 Corridor in Ocala/Marion County*. Center for Urban Transportation Research. 2002. University of South Florida. 20 June 2008.

<http://www.cutr.usf.edu/research/access_m/pdf/US%2027%20Corridor%20Plan.pdf>

Cross Access

Description:

Adjacent shopping centers or office parks are often not connected by a service drive and sidewalk. As a result, customers who wish to shop in both centers, or visit both sites, must exit the parking lot of one, travel a short distance on a major thoroughfare, and then access the next site. A cross access drive reduces traffic on the major thoroughfare and reduces safety hazards.⁴⁷ This in turn, can have positive business benefits by providing easy access to one site from another.



Ordinance Language:

- a) Adjacent commercial or office properties classified as major traffic generators (i.e. shopping plazas, office parks), shall provide a cross access drive and pedestrian access to allow circulation between sites.
- b) A system of joint use driveways and cross access easements shall be established wherever feasible along the frontage and/or between parking areas and the building site shall incorporate the following:
 - i. A continuous service drive or cross access corridor extending the entire length of each block served to provide for driveway separation consistent with the access management classification system and standards.
 - ii. A design speed of 10 mph and sufficient width to accommodate two-way travel aisles designed to accommodate automobiles, service vehicles, and loading vehicles;
 - iii. Stub-outs and other design features to make it visually obvious that the abutting properties may be tied in to provide cross-access via a service drive;
 - iv. A unified access and circulation system plan that includes coordinated or shared parking areas is encouraged wherever feasible.
- c) The availability and use of shared parking areas shall be permitted as a reduction in required parking spaces if peak demand periods for proposed land uses do not occur at the same time periods.

⁴⁷ "Ten Ways to Manage Access in Your Community". Center for Urban Transportation Research. No date. University of South Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/Tenways.pdf>

- d) The permitting department may reduce required separation distance of access points where they prove impractical, provided all of the following requirements are met:
- i. Joint access driveways and cross access easements are provided wherever feasible in accordance with this section.
 - ii. The site plan incorporates a unified access and circulation system in accordance with this section.
 - iii. The property owner shall enter a written agreement with the city/county/district, and recorded with the deed, that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway.
- e) The permitting department may modify or waive the requirements of this section where the characteristics or layout of abutting properties would make development of a unified or shared access and circulation system impractical.
- f) Pursuant to this section, property owners shall:
- i. Record an easement with the deed allowing cross access to and from other properties served by the joint use driveways and cross access or service drive.
 - ii. Record an agreement with the deed that remaining access rights along the thoroughfare will be dedicated to the city/county/district and pre-existing driveways will be closed and eliminated after construction of the joint-use driveway.
 - iii. Record a joint maintenance agreement with the deed defining maintenance responsibilities of property owners.⁴⁸

⁴⁸ "Model Land Development & Subdivision Regulations That Support Access Management: for Florida Cities and Counties." Center for Urban Transportation Research, University of South Florida. University of South Florida. June 25 2008. < http://www.cutr.usf.edu/research/access_m/pdf/Land_Regs.pdf >

Shared Access

Description:

The practice of sharing driveways and providing cross parcel access has two benefits. The first minimizes the number of driveways on the arterial road. The second provides cross access between properties, broadening the access choices for the driver. If a group of smaller developments share access, the driver needing to turn left across heavy volumes can usually find an access that is signalized, allowing safer left turns. Having good cross parcel access also maximizes the number of well designed un-signalized driveways that have good visibility and are located in such a way to take advantage of sufficient gaps in traffic from a nearby signal.

Joint driveways and cross access especially help the small corner lots and out parcels. On small corner parcels, left-turn accessibility is a problem due to the fact that the left turns conflict with the functional area of the intersection.

Interconnected developments give customers and deliveries more options, especially for safe left turns. It is easier to provide cross and joint access if it is planned at the beginning of a development process. At that time the designer will have the ability to layout access systems and allow good separation between these accesses.

Many local governments have already addressed these issues in their land development regulations by providing requirements for joint and cross access with large neighboring developments and small corner out parcels. There are some challenges associated with joint and cross access in retrofit situations. In these situations you are usually dealing with a group of small shallow land parcels where joint access has never been considered in the past. One of the major problems associated with producing new joint and cross access is that the cross access points between parcels may be too close to the shared driveway on the street frontage.

Note that *shared* access points often result in mutual *cross* access agreements between property owners. Therefore, this ordinance sample refers to both *shared* and *cross* access.

Ordinance Language:

- a) A joint private access easement may be required between adjacent lots fronting on arterial and collector streets in order to minimize the total number of access points along those streets and to facilitate traffic flow between lots. The location and dimensions of said easement shall be determined by the engineer/department.⁴⁹
- b) Private cross access easements may be required across any lot fronting on an arterial or collector street in order to minimize the number of access points and facilitate access between

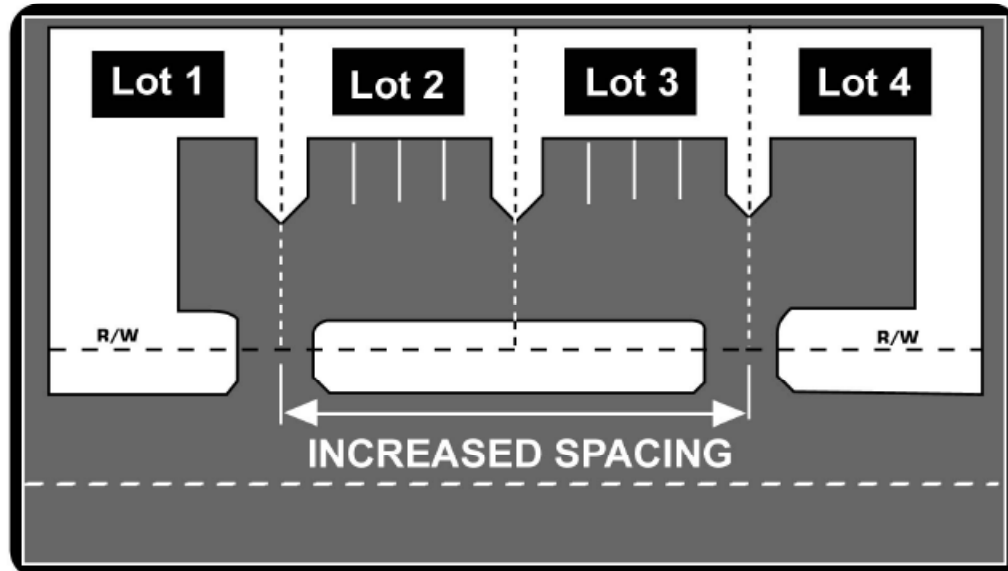
⁴⁹ "Model Land Development & Subdivision Regulations That Support Access Management: for Florida Cities and Counties." Center for Urban Transportation Research, University of South Florida. University of South Florida. June 25 2008. < http://www.cutr.usf.edu/research/access_m/pdf/Land_Regs.pdf >

and across individual lots. The location and dimension of said easement shall be determined by the engineer/department.

- i. Subdivisions with frontage on the state highway system shall be designed into shared access points to and from the highway. Normally a maximum of two accesses shall be allowed regardless of the number of lots or businesses served.
- ii. Direct access to individual one and two family dwellings shall be prohibited on the state highway system and arterial roadways.
- iii. Subdivisions on a single residential access street ending in a cul-de-sac with no other access point shall not exceed 25 lots or dwelling units.

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Encourage Joint & Cross Access

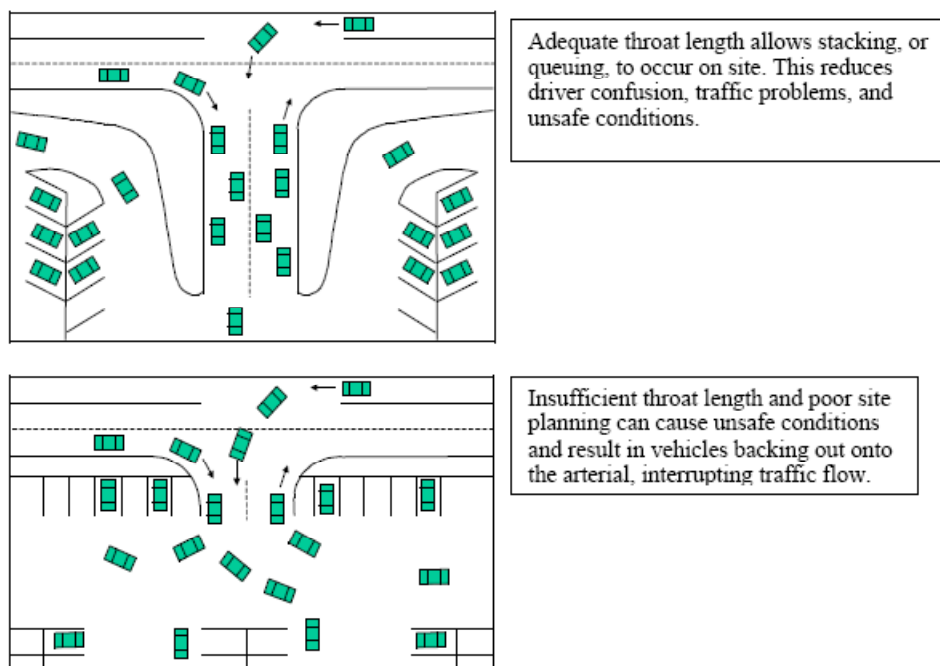


⁵⁰ “Policy on Street and Driveway Access to North Carolina Highways”. Division of Highways. July 2003. North Carolina Department of Transportation. 24 June 2008. <<http://www.ncdot.org/doh/preconstruct/altern/value/manuals/pos.pdf> >

Adequate Driveway/Throat Length

Description:

When a vehicle leaves a roadway and enters a driveway, it should be able to do so without affecting traffic on the roadway. An important tool is to have an uninterrupted area for the vehicle to traverse before encountering any conflict points. Driveways with greater traffic volumes should be designed like a major roadway to allow the deceleration and transition from the roadway to the parking area. If a driveway is too short, traffic in the parking area easily backs up traffic onto the roadway.



Inadequate driveway or throat length is a common problem with smaller commercial sites, and is associated with poor site design or circulation plans on larger parcels. Most commercial developments do not include a driveway of two or three car length, leading to some chaotic and unsafe situations (see illustration above).⁵¹ Ordinance language for driveway requirements may include a statement and table (see Ordinance Language on following page). Standards may be based on street functional class, leasable square footage, driveway width (lanes), or on some combination of these and other measures, with the required length expressed in feet and/or in vehicles (number of car lengths). Two examples are included, and either can be used as a “first estimate” for various developments, with final determinations based on a traffic impact study.

Driveway length requirements are complementary to other site standards and goals of cities and counties. Most municipalities encourage commercial properties to be designed with parking on the

⁵¹ “Common Access Management Treatments”. Iowa State University Center for Transportation Research and Education. October 2000. Iowa State University. 24 June 2008.
<<http://www.ctre.iastate.edu/Research/access/toolkit/23.pdf>>

side or rear of the building. By moving a building closer to the street a longer driveway may be accommodated next to the building.

Ordinance Language:

Driveways shall be built to have sufficient length and size for all vehicular queuing, maneuvering, and parking, etc. to be carried out completely on site and outside of the public right-of-way.

Standards Table Example A: Square Footage

Recommended Minimum Driveway Length for Major Entrance⁵²

Retail Land Use	Driveway Length (in feet)
Any major development entrance with 4 or more total lanes in the driveway	> 300' based on traffic study
Large shopping centers (> 150,000 sq. ft. gross leasable floor area)	250'
Community shopping centers (100,000 – 150,000 sq. ft.)	150'
Smaller centers/single commercial development	50'

Standards Table Example B: Driveway Width (# of Lanes)

Minimum Driveway Throat Length at Major Access⁵³

Number of Egress Lanes	Minimum Throat Length (in feet)
2	75'
3	200'
4	300'

⁵² “Driveway Handbook”. Systems Planning Office, Florida Department of Transportation. March 2005. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Driveway_Handbook.pdf>

⁵³ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

Drive-Through Queues

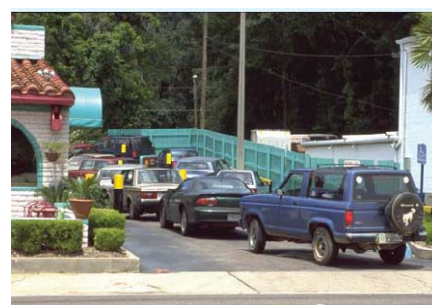
Description:

In determining on-site design, including driveway length, knowledge of the expected queue of drive through traffic is important.⁵⁴ These queues should be stored away from the area of the driveway used for driveway length. Larger site sizes for modern service stations, convenience markets and the stand alone drug stores with drive through prescription service will assure that these distances are provided for newer development.⁵⁵

Ordinance Language:

Drive-up windows require a permit pursuant to the requirements of this section and subject to the following conditions:⁵⁶

- a) For drive-up windows with a single point of service or multiple points of service that do not share a combined aisle, counting the space at the point of service, there shall be provided a minimum aisle capacity of five (5) car lengths in each queue. For drive-up windows with multiple points of service that share a combined aisle, counting the space at the point of service, the longest aisle shall have a minimum queue capacity of five (5) car lengths. The point of service shall be considered the first point in the forward vehicle flow at which a product consumer places a request for the service provided on-site. This includes menu boards where consumers communicate with on site employees through electronic communication or direct person to person service. No queue capacity for a drive up window shall block any parking space or driveway regardless of the length of said queue. For the purposes of measuring, the queue capacity a typical car length shall be considered nineteen (19)/twenty (20) feet in length.
- b) The permitting department shall review all requests for drive-up window permits for proper circulation and interaction with the adjacent street(s), and may require additional queue capacity if warranted by the particular use and site design.



This queue is blocking street traffic and additional customers

⁵⁴ "Ten Ways to Manage Access in Your Community". Center for Urban Transportation Research. No date. University of South Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/Tenways.pdf> >

⁵⁵ "Policy on Street and Driveway Access to North Carolina Highways". Division of Highways. July 2003. North Carolina Department of Transportation. 24 June 2008. <<http://www.ncdot.org/doh/preconstruct/altern/value/manuals/pos.pdf> >

⁵⁶ "Stillwater City Code". City of Stillwater Oklahoma. No date. City of Stillwater Oklahoma. 16 May 2007. <<http://www.municode.com/resources/gateway.asp?pid=11610&sid=36> >

Driveway Turnarounds

Description:

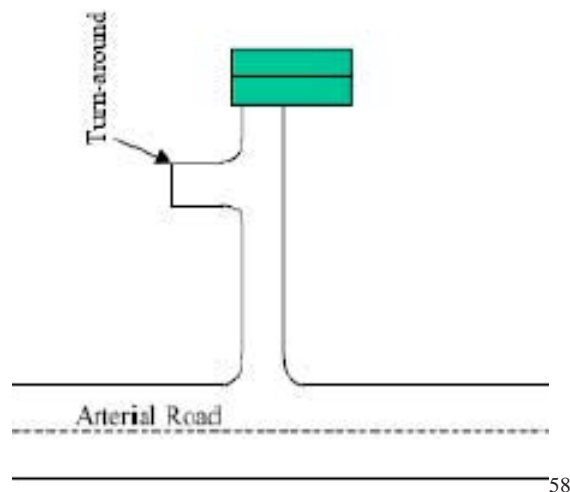
Driveways should not be built to force vehicles to back out directly into arterial roadways, nor into most collectors. Constructing garage and carport turnarounds is one way to accommodate the vehicle entering the roadway. If new construction occurs on small lots with individual access to an arterial or collector street, it should be required to include a driveway that allows automobiles to turn around before entering traffic.

Note that zoning and subdivision ordinances ideally have greater setbacks for residential buildings on moderate or high traffic roadways, or have a build-to line established in for commercial uses in urban areas. Ensure that required setbacks and required turnarounds are compatible with each other in code.

Ordinance Language:

All driveways on arterial or collector streets shall have turn-around areas with a diameter of not less than forty-five (45) feet or a hammerhead turn-around area approved by the engineer/department and meets code requirements. Turn-around may also be accommodated via loop driveway or in parking or loading area.⁵⁷

- a) Circular driveways, which have two street entrances, are not encouraged.



⁵⁷ “Subdivision Ordinance #97-06” City of Carey, ID. June 1997. City of Carey, Idaho. 16 May 2007. <http://www.cityofcarey.com/index.asp?Type=B_LIST&SEC=%7B2789556D-BA8A-4F3A-A787-FA35B6467EF6%7D>

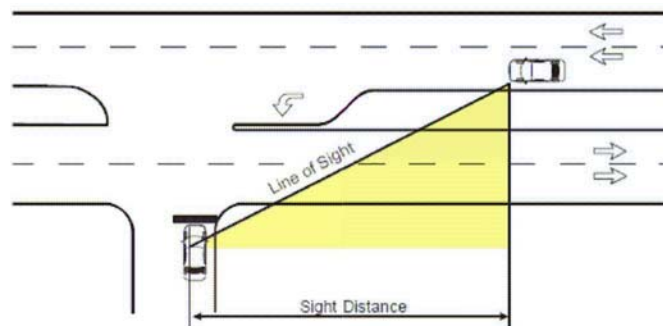
⁵⁸ “Example Access Management Ordinance for a City”. Center for Transportation Research and Education, Iowa State University. October 2000. Iowa State University. 16 May 2007. <<http://www.ctre.iastate.edu/Research/access/amhandbook/index.htm>>

Provide Adequate Sight Clearance

Description:

Lie intersections, driveways must also be located and unobstructed to provide sufficient sight distance for drivers to safely operate their vehicles. Intersection sight distance requirements vary, depending on the design speed of the roadway to be entered, and assumes a passenger car can turn right or left without being overtaken by an approaching vehicle.

Municipal ordinances range from complex formulas for uncontrolled intersections, down to simple restrictions on structures, fences, and landscaping at driveways. See below for an example of a simple sight zone ordinance for non-residential driveways.



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Line of sight can also be affected by horizontal and vertical curves, and should be considered in the site/driveway design.

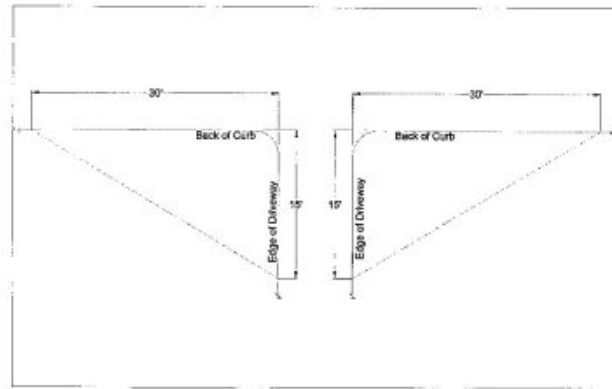
Ordinance Language:

Multi-Family And Nonresidential Driveways: Sight zone triangles must be maintained for each driveway serving a multi-family or nonresidential development, including commercial or industrial properties and public facilities, protecting the visibility and safety of motorists, bicyclists, and pedestrians.

- a) The sight zone triangle must be maintained between a point fifteen feet (15') behind the curb at the edge of the driveway alignment and thirty feet (30') along the curb away from the driveway alignment in each direction. See exhibit below.
- b) Within the sight zone triangle, no wall, fence, sign or earthwork shall be built and no hedge, shrub or other plant shall be permitted to grow higher than thirty inches (30") above grade. One tree trunk may be permitted to grow within a driveway sight triangle; provided, that all branches are pruned seven feet (7') above the ground. Public safety and utility devices less than twelve inches (12") in diameter, such as street lights, are exempt from these standards.

⁵⁹ "Driveway Handbook". Systems Planning Office, Florida Department of Transportation. March 2005. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Driveway_Handbook.pdf>

- c) The *planner/engineer* may grant an administrative variance for driveway sight zones on smaller commercial properties and public facilities in the downtown central business and neighborhood commercial zoning districts if conditions on the parcel make these regulations impractical.



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⁶⁰ “Mesquite Municipal Code”. City of Mesquite Nevada, 2005. City of Mesquite Nevada. 27 June 2008.
<<http://66.113.195.234/NV/Mesquite/index.htm>>

DRIVEWAY OPERATIONS

Improving the function of driveways through construction and site design standards can improve safety and efficiency of the roadway. This section discussing the following tools:

- General Driveway Regulations
- Quality Driveway Construction
- Adequate Driveway Width/Curb Return Radii
- Angle of Driveway
- Driveway Grade
- Install Traffic Islands to Control Turns at Access Points
- Install Driveway Left-Turn Bay

Although not included in this Toolkit, there are other measures to improve driveway operations.

Define Ingress/Egress Lanes of Commercial Driveways

Designate Driveways for One-Way Ingress or Egress – When retrofitting a linear or strip parking lot, consider designating one driveway for egress, one for ingress.

⁶¹ Photo COMPASS 2005

General Driveway Regulations

Description:

In addition to driveway spacing and location requirements, design standards are also helpful. Driveway standards assure that driveways have an adequate design so vehicles can easily turn onto the site. Standards also need to address the depth of the driveway area. Where driveways are too shallow, vehicles are sometimes obstructed from entering the site causing others behind them to wait in through lanes. This blocks traffic and increases the potential for rear-end collisions.⁶²

Ordinance Language:⁶³

- a) It shall be unlawful for any person to cut, break, or remove any curb along a street except as herein authorized.
- b) It shall be unlawful for any person to construct, alter, or extend, or permit or cause to be constructed, altered, or extended any driveway approach which can be used only as a parking space or area between the curb and private property.
- c) This section shall be deemed to be supplemental to other sections regulating the use of public property, and in case of conflict, this section shall govern.
- d) Adequate sight distance shall be provided for a passenger motor vehicle making a left or right turn exiting from a driveway. This determination shall be made by the city engineer.
- e) The specifications and guidelines set forth in this ordinance are to be applied to all roadways and properties that abut these roadways within the city, unless otherwise indicated.
- f) As determined by engineer, engineering judgment shall override the recommended dimensions set forth in this policy if warranted by specific traffic conditions.

⁶² "Ten Ways to Manage Access in Your Community". Center for Urban Transportation Research. No date. University of South Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/Tenways.pdf> >

⁶³ "Example Access Management Ordinance for a City". Center for Transportation Research and Education, Iowa State University. October 2000. Iowa State University. 16 May 2007. <<http://www.ctre.iastate.edu/Research/access/amhandbook/index.htm> >

Quality Driveway Construction

Description:

Driveways on arterial streets, and non-residential driveways on collector streets, should be designed and built to minimize their negative effects on safety or through traffic. General driveway standards may be adopted (below), as well as higher commercial standards for non-residential land uses and for driveways on arterials.

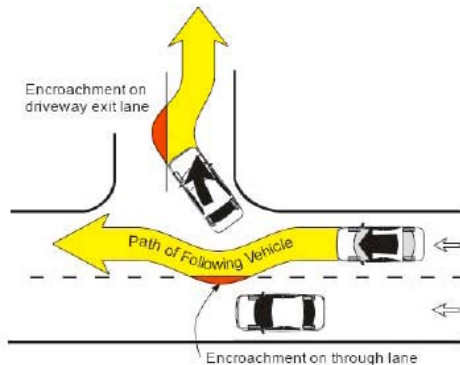
Ordinance Language:

No driveway, whether maintained for commercial or private use shall be so constructed or graded as to leave a step, sharp depression, or other obstruction in the sidewalk. The grade shall be as near as possible to that of the adjoining sidewalk. It shall be unlawful for the surface finish of any driveway where the same crosses the sidewalk to be constructed of such materials as to render it slippery or hazardous for pedestrians or to have the grade of the sidewalk other than level.⁶⁴

⁶⁴ "Driveway Construction." Village of Orland Hills Code of Ordinances. 2007. Village of Orland Hills, Illinois. 16 May 2007. <<http://www.orlandhills.org/pdf/DrivewayOrdinance.pdf>>

Adequate Driveway Width/Curb Return Radii

Description:



The turn radius of a radial return driveway refers to the extent that the edge of a driveway is “rounded” to permit easier entry and exit by turning vehicles.⁶⁵ A larger radius results in easier entrance or exit movements for vehicles. The driveway movement can be performed at a higher speed and without encroachment into other roadway and driveway lanes. This reduces interference with the traffic on the major roadway but at the same time may produce larger openings that can hinder pedestrians.

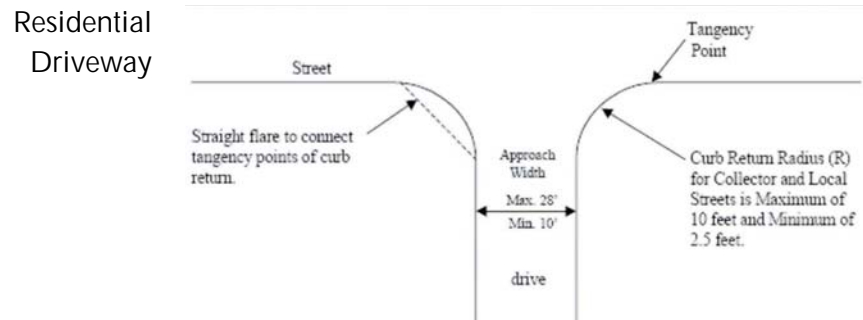
Ordinance Language:

- a) All driveways shall meet the city/county/district standard specifications for street construction and construction standards.
- b) Curb cuts for driveways shall not be permitted in the curb return of an intersection.
- c) The curb return radii for driveways intersecting at right angles with the roadway and without a deceleration lane shall be as follows:⁶⁶
 - i. Curb return radii for residential (single family and duplex) driveways located on local or collector streets shall be between 2.5 feet and 10.0 feet as shown in Figure A3. Flare type residential driveways must also adhere to these dimensional criteria. Residential driveways located on arterial streets must adhere to the specifications set forth in 3 ii).
 - ii. Curb return radii for commercial and multi-family driveways shall vary between fifteen feet (15') and thirty feet (30').
 - iii. Curb return radii for driveway types not included in (i) or (ii) above shall be determined by engineer.

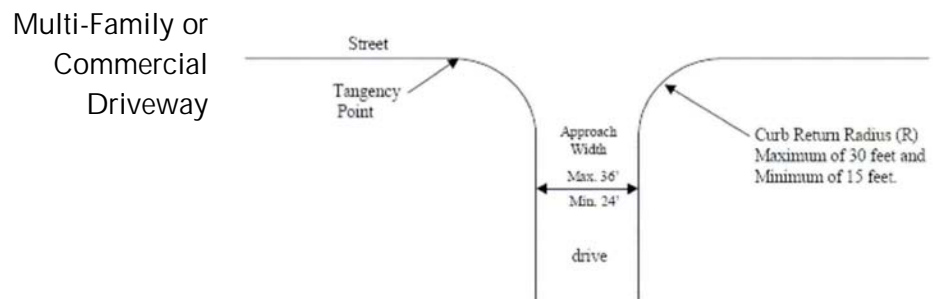
⁶⁵ “Driveway Handbook”. Systems Planning Office, Florida Department of Transportation. March 2005. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Driveway_Handbook.pdf>
See also sections of this Toolkit discussing driveway traffic islands and sight clearance.

⁶⁶ “Example Access Management Ordinance for a City”. Center for Transportation Research and Education, Iowa State University. October 2000. Iowa State University. 16 May 2007.
<<http://www.ctre.iastate.edu/Research/access/amhandbook/index.htm>>

- iv. The maximum width of residential driveway approach, shown below, and measured at the property line, shall not exceed twenty-eight feet (28') in width, while the minimum width shall not be less than ten feet (10') in width.



- d) The maximum width of a commercial and multi-family driveway approach for two-way operation, shown below, shall not exceed thirty-six feet (36') except that the city engineer may issue permits for driveway approaches greater than thirty-six feet (36') in width on major streets to handle special traffic conditions. The minimum width of commercial and multifamily driveway approach for two-way operation shall not be less than twenty-four feet (24').



- e) The combination of two driveways for residential circular drives shall not exceed twenty-eight feet (28').⁷ The angle of driveway approach shall be approximately ninety degrees (90°) for two (2) way drives and between forty-five degrees (45°) and ninety degrees (90°) degrees for one way drives.

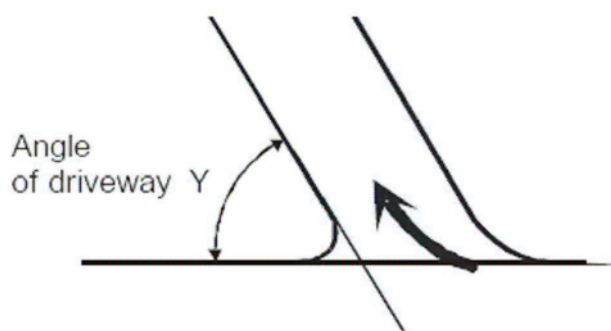
Angle of Driveway

Description:

For safety and economy, driveways should generally be at or nearly at right angles to the main road. Driveways intersecting at acute angles need extensive turning roadway areas and tend to limit visibility, particularly for drivers of trucks. When a truck turns on an obtuse angle, the driver has blind areas on the right side of the vehicle. Acute-angle driveways increase the exposure time for the vehicles crossing the main traffic flow.

Ordinance Language:

- a) The angle of driveway approach shall be approximately ninety (90) degrees for two (2) way drives and between seventy-five (75) and ninety (90) degrees for one way drives.
- b) Normally, the center line of that part of an entrance lying within the right-of-way shall be at a right angle to the center line of the primary highway for a minimum distance of 32 feet from the near edge of the highway pavement.
- c) An entrance established for two-way operation for a service station or other development where two access points are authorized shall be seventy-five (75) to ninety (90) degrees to the center line of the primary highway.
- d) On a divided primary highway where two access locations are authorized for one-way operation, the “ingress” may be forty-five (45) to sixty (60) degrees to the center line of the primary highway and the “egress” may be sixty (60) to ninety (90) degrees to center line of the highway.⁶⁷



⁶⁷ “Common Access Management Treatments”. Iowa State University Center for Transportation Research and Education. October 2000. Iowa State University. 24 June 2008.
<<http://www.ctre.iastate.edu/Research/access/toolkit/11.pdf>>

Driveway Grade

Description:

Driveway grade is important because turning vehicles must slow down to enter a driveway. The steeper the driveway, the greater the reduction in speed required to prevent hitting the bottom of the vehicle. Vehicles entering and leaving driveways that have abrupt changes in grade must travel at extremely low speeds. For those entering the driveway, the possibility of rear-end collision on the public street is increased and following traffic must slow down for right turn vehicles. Exiting vehicles and those turning left into the driveway must wait for larger gaps in traffic, and thus hazards may become greater. Another concern in driveway grade is the visibility of the driveway. Sometimes a downgrade of a driveway, together with roadway super-elevation, especially on a horizontal curve, can lead to sight distance problems. The highest practical grades are 8%, to as high as 14% in some references, for low volume driveways, and 5% for higher volume driveways.



Ordinance Language:

Guidelines for Change in Driveway Grade⁶⁹

Roadway Class	Desirable Change in Grade	Maximum Change in Grade
Major Arterial	< 3%	5%
Minor Arterial	< 4%	6%
Collector	< 5%	6%
Local Street	< 6%	8%

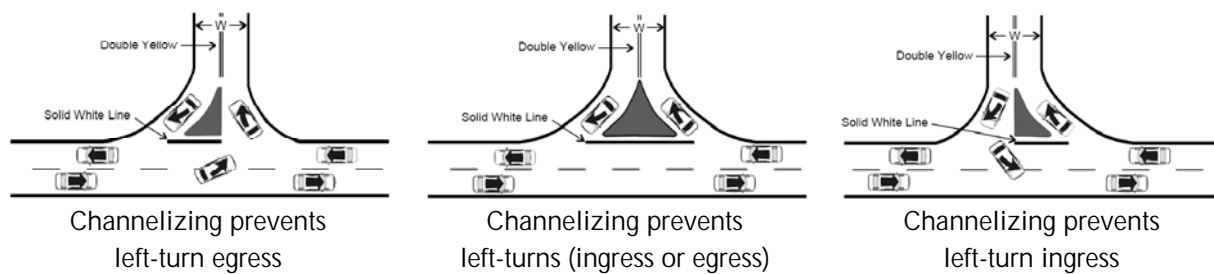
⁶⁸ “Driveway Handbook”. Systems Planning Office, Florida Department of Transportation. March 2005. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Driveway_Handbook.pdf>

⁶⁹ “Common Access Management Treatments”. Iowa State University Center for Transportation Research and Education. October 2000. Iowa State University. 24 June 2008. <<http://www.ctre.iastate.edu/Research/access/toolkit/11.pdf>>

Install Traffic Islands to Control Turns at Access Points

Description:

If the prohibition of left turns is desirable, the best way to do it is through the use of restrictive medians. Where median space is not available consider flexible traffic posts in the main road to discourage left turns. Channelized islands, often called “pork-chops,” can be useful on roadways with medians and the pork-chop is only there to guide the driver to the allowed movement. The pork-chop design might also be useful on an undivided roadway where the driveway is so close to an intersection that the left turn would be unsafe at any time.⁷⁰



These channelization features can be a useful “message” to the driver where medians are in place to prevent left turns. Unfortunately, where these features are added to try and prevent left turns by themselves, they are usually failures. Observations of many of these show very little compliance to their intended purpose. They may in fact prevent vehicles from quickly entering the driveway, thereby causing problems. Where there are no medians, experts recommend avoid using driveway pork chop channelization to prevent in-bound left turns.

Divisional or channelization islands are recommended at driveways where:

- a large pavement area may confuse drivers
- right in/right out driveway where movements may be unclear
- traffic over 4,000 vehicles per day is expected.
- the driveway is expected to be signalized in the future
- the driveway has 2 or more entrance lanes

Ordinance Language:

Channelization or use of directional islands should be considered near major intersections of arterial streets and other heavily congested locations. The speed differential in different lanes and the visibility

⁷⁰ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

See also sections herein discussing driveway width/radii, defining ingress/egress lanes, and sight distances.

obstruction caused by the stopped vehicles themselves commonly result in higher accident rates. Those areas experiencing accident patterns which can be prevented by channelization should be considered.

- a) Channelization should extend back from the intersection to a point where it is less likely that traffic queues will form from the peak hour traffic signal operation. This reduces the likelihood of drivers entering or exiting a driveway or street trying to cross multiple traffic lanes.
- b) Channelization islands should be at least 6 feet wide across from driveways or streets where access is restricted. They can be at little as 4 feet where the probability of crossing them is low. The greater width is more visible to drivers, can provide a pedestrian refuge, and allows for signs to further reinforce the restriction of movement. The maximum recommended width is 16 feet.⁷¹
- c) Wherever possible, the channelization island should end a minimum of 50-feet from the nearest driveway to prevent wrong-way movements for driveway access or egress. The channelization island should end about 20 feet ahead of the intersection crosswalk. This reduces the likelihood of it being struck by a vehicle turning left from the cross-street.
- d) If possible, the island should be set back 1 to 2 feet from the edge of the travel lane, depending on the lane width and approach speed.
- e) The curb face of channelizing islands shall be painted with reflective paint. Yellow is for islands separating traffic traveling in opposite directions, and white is used for islands separating traffic traveling in the same direction.
- f) Signing or markers may be needed depending on the location and design of the island.
 - i. At a minimum, signs or markers shall be installed on median islands remote to other islands and on the first island of a series of islands along a roadway.
 - ii. Markers should be installed within one foot of the nose of the island.
 - iii. Markers shall be installed at all locations where signs are installed.
 - iv. Signs should be installed 6 to 10 feet from the nose of island to avoid being hit.
 - v. Signs should not be installed on islands narrower than four feet curb face-to-curb face.

⁷¹ "Driveway Handbook". Systems Planning Office, Florida Department of Transportation, March 2005. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Driveway_Handbook.pdf>

Install Driveway Left-Turn Bay

Description:

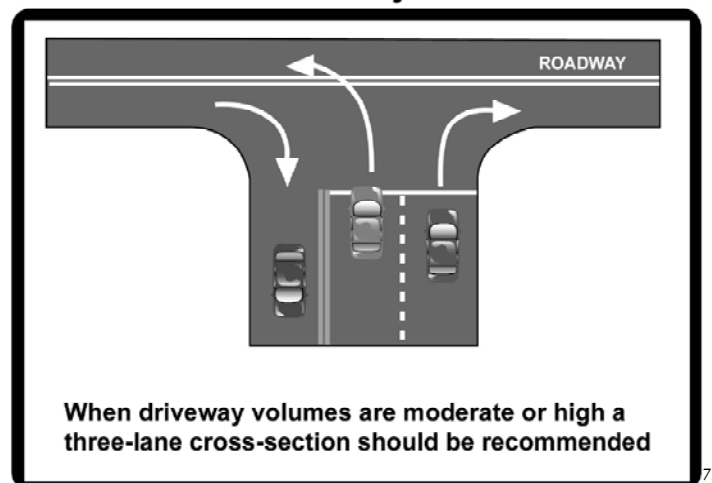
Where left-turns exiting the driveway are permitted, separate left-turn and right-turn lanes should be considered on commercial driveways. Even a small number of left-turns will cause substantial delay to right-turns out when the driveway has a single lane exit. This driveway layout is most needed where expected driveway volumes exceed 600 daily. They may also be beneficial as low as 300 daily trips traffic depending on the character of the exiting traffic.⁷²

Policy Language:

On a multilane roadway with a median whenever a driveway is directly served by a median opening, a left-turn lane should be available. This provides for the safest left-turns into the driveway. On a two-lane roadway protected left-turn lanes should be considered at any location serving the public, especially on curves and where posted speeds are 45 mph or higher.

Turn lanes must include adequate length for the storage of traffic waiting to turn. This is also called turn lane queue length. Where a specific queue study does not exist, a minimum of a 100 feet queue length is required to satisfy four turning automobiles in an urban/suburban area, and a fifty (50) feet queue length to satisfy two turning automobiles in a rural area.

3 Lanes At Major Drives



⁷² *Florida Median Handbook*. Florida Department of Transportation. January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

⁷³ "Policy on Street and Driveway Access to North Carolina Highways". *Division of Highways*. July 2003. North Carolina Department of Transportation. 24 June 2008.

<<http://www.ncdot.org/doh/preconstruct/altern/value/manuals/pos.pdf>>

ROADWAY FUNCTION

A number of measures can be taken to improve roadway operations and **Access Management** and are discussed in the Toolkit.

- Uniform/Maximum Signal Spacing
- Driveway Spacing and Separation
- Acquire Access Rights
- Install Right-Turn Deceleration Lane
- Install Right-Turn Acceleration Lane
- Extra Driveway Area for U-turns (Flare-out)
- Prevent Uncontrolled Access on Property Frontage
- Prohibit On-Street Parking

Other opportunities include:

Construct a Bypass – Corridors can become corrupted with excessive access points and fail to safely accommodate traffic demand. In some cases the costs to improve a corridor, including the costs of consolidating or closing access points, outweigh the costs of building or connecting a new bypass route with access controls in place.

Convert Parallel Streets to a One-Way Pair/Couplet

Lane Treatments/Striping – Channelization of traffic movements has proven to be effective in managing traffic demand. It can also improve safety at access/conflict points.

Provide Signing and Visual Cues of Access Points – Increasing driver awareness of conflict points can reduce crashes. Recommendations for the type and location of signs and other control devices at median opening, driveways, and intersections are include in the MUTCD.

Speed Limit Modification – If access points cannot be consolidated or improved to meet safety and security goals, the speed limit may be reduced to improve the situation.

⁷⁴ Photo COMPASS 2005

Uniform/Maximum Signal Spacing

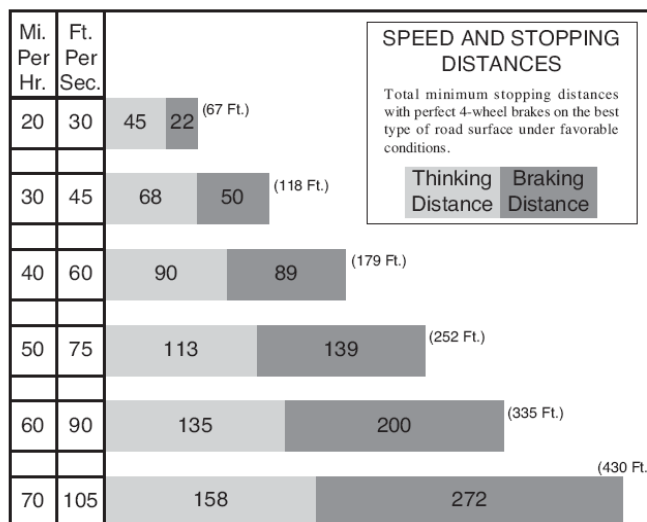
Description:

Planning ahead for long and uniform signal spacing enhances the ability to coordinate signals and to ensure continuous movement of traffic at the desired speed. Failure to carefully locate access connections or median openings that later become signalized, can cause substantial increases in arterial travel times. In addition, poor signal placement may lead to delays that cannot be overcome by computerized signal timing systems.

Driveway Spacing and Separation

Description:

Driveway spacing standards limit the number of driveways on a roadway by mandating a minimum separation distance between driveways. This reduces the potential for collisions as travelers enter or exit the roadway and encourages sharing of access, where appropriate. Driveway spacing at intersections and corners should provide adequate sight distance and response times and permit adequate stacking space. Driveway spacing on non-classified arterials and collectors may be tied to the posted speed limit, with the minimum distance between driveways greater as speed limits increase. Stopping distances and response times help illustrate the need for maximum driveway separation (right).⁷⁵



The method used to regulate driveway spacing does, however, vary widely across local governments. Some jurisdictions tie driveway spacing to functional classification rather than speed limit, and others provide variable spacing depending upon the land use intensity of the site served and that of adjacent sites. Two standard sets are included below: one relates to speed limit – if the road is not classified – while the other is based on functional classification.

Ordinance Language:

- a) Separation between access connections on all collectors and arterials under local jurisdiction that have not been assigned an access classification shall be based upon the posted speed limit in accordance with the following table:

Driveway Spacing for Non-Classified Roadways⁷⁶

Posted Speed Limit (MPH)	Driveway Spacing (feet)
< 35	125
36-45	245
> 45	440*

* Ideally any road having a speed limit over 45 mph should be given an access management classification.

⁷⁵ *Idaho Drivers Manual*, Idaho Department of Transportation. 2006.

⁷⁶ “Model Land Development & Subdivision Regulations That Support Access Management: for Florida Cities and Counties.” Center for Urban Transportation Research, University of South Florida. University of South Florida. June 25 2008. < http://www.cutr.usf.edu/research/access_m/pdf/Land_Regs.pdf >

- b) Separation between access connections on all collectors and arterials under local jurisdiction that have been assigned a functional classification shall be based upon the function and access class in accordance with the following table:

Driveway Spacing for Classified Roadways⁷⁷

Functional Class of Roadway	Undivided Roadway	Divided Roadway		
		Full Median Opening	Right-In/Right-Out Only	Directional Median Opening*
Strategic Arterial**	not applicable**	2640'	typically not permitted	typically not permitted
Principal Arterial	2,640'	2,640'	1,320	1,320
Minor Arterial	660'	1,320'	330'	660'
Collector	330'	not applicable – medians typically not used		
Local Road	100'			
* Usually designed for left turns or U-turns.				
** Strategic or mobility arterials are divided with a non-traversable median.				

- c) Driveway spacing shall be measured from the closest edge of the pavement to the next closest edge of the pavement. The projected future edge of the pavement of the intersecting road shall be used in measuring corner clearance, where widening, relocation, or other improvement is indicated in an adopted local thoroughfare plan or five year transportation plan of the metropolitan planning organization.
- d) The permitting department may reduce the connection spacing requirements in situations where they prove impractical, but in no case shall the permitted spacing be less than 80% of the applicable standard.
- e) If the connection spacing of this code cannot be achieved, then a system of joint use driveways and cross access easements may be required.
- f) Variation from these standards shall be permitted at the discretion of the commission/council where the effect would be to enhance the safety or operation of the roadway. Examples might include a pair of one-way driveways in lieu of a two-way driveway, or alignment of median openings with existing access connections. Applicants may be required to submit a study prepared by a registered engineer to assist the city/county/district in determining whether the proposed change would exceed roadway safety or operational benefits of the prescribed standard.⁷⁸

⁷⁷ *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC.

⁷⁸ See also the sections herein on corner clearance requirements for residential and non-residential land uses.

Acquire Access Rights

Description:

Acquiring access rights is a method of retrofitting existing developments that have excessive curb cuts onto arterial roadways. Such points should be designated as “non-conforming” in **Access Management** plans. The negative impacts of non-conforming properties may be substantial and create safety hazards, increase congestion, reduce property values, degrade the environment, and undermine community character. The sample ordinance below can be useful in the closure or consolidation of existing access points when certain conditions occur.⁷⁹

The Transportation Research Board’s synthesis on access rights discusses various practices and issues around the country and classifies the findings into three groups: acquisition, management, and disposal of access rights.⁸⁰ The report also noted that several courts have remarked it can be difficult to separate actions between eminent domain, which are compensable, and regulations under police power, which are not compensable. Acquisition of access rights is best done during “entitlement” processes.

Ordinance Language:

- a) Permitted access connections in place as of *(date of adoption)* that do not conform with the standards herein shall be designated as nonconforming features and shall be brought into compliance with applicable standards under the following conditions:
 - i. when new access connection permits are requested
 - ii. substantial enlargements or improvements
 - iii. significant change in trip generation; or
 - iv. as roadway improvements allow.
- b) If the principal activity on a property with nonconforming access features is discontinued for a consecutive period of 180/365 days, or discontinued for any period of time without a present intention of resuming that activity, then that property must thereafter be brought into conformity with all applicable connection spacing and design requirements, unless otherwise exempted by the permitting authority. For uses that are vacant or discontinued upon the effective date of this code, the 180/365 day period begins on the effective date of this code.

⁷⁹ “Access Management Model Ordinance” Southwest Missouri Council of Governments. June 2006. SWMCOG Southwest Missouri Council of Governments, Springfield, Missouri. 16 May, 2007.

<http://smcog.missouristate.edu/transportation/Documents/AccessManagement/Section_17.pdf>

⁸⁰ *NCHRP Synthesis 351 Access Rights: A Synthesis of Highway Practice*. Del Huntington, Jerilyn Wren. 2005. Transportation Research Board. Washington, DC.

Install Right-Turn Deceleration Lane

Description:

Exclusive right-turn lanes are useful where a combination of high roadway speeds and high right turn volumes into a driveway are expected. If properly built, they remove the turning vehicle from the through lanes, thereby decreasing the operational impact of right-turn vehicles on the through traffic. To turn into a driveway, trucks and other large vehicles need to slow down considerably. This can cause considerable disruption for the through movement traffic behind the truck or bus. Even when the width, radius, and angle of the driveway are adequate for the truck movement, consider the benefits of also constructing an exclusive right-turn lane to serve the traffic demand.⁸¹

Policy Language:

A separate right-turn lane should be considered when the right-turn volume exceeds 300 vehicles per hour and the adjacent through lanes also exceed 300 vehicles per lane. Therefore, only fairly large developments, such as a medium-sized or larger shopping center, would warrant a right- turn lane. On lower-volume driveways in areas with limited ROW, tapers may be used to help remove turning vehicles from the roadway more quickly.⁸²



⁸¹ "Driveway Handbook". Systems Planning Office, Florida Department of Transportation. March 2005. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Driveway_Handbook.pdf>

⁸² "City of Conway Zoning Ordinance." Castin & Associates. September 1994. City of Conway, AR. 16 May 2007. <www.conwayplanning.org/pdfs_and_docs/ord/Zon_ord.pdf>

Install Right-Turn Acceleration Lane

Description:

Acceleration lanes are not always desirable at stop-controlled intersections where entering drivers can wait for an opportunity to merge without disrupting through traffic. Acceleration lanes are advantageous on roads without stop control and on all high-volume roads even with stop control where openings between vehicles in the peak-hour traffic streams are infrequent and short.

Dedicated left and right-turn lanes are needed in situations where traffic volumes and speeds are relatively high and conflicts are likely to develop at public road intersections and driveways between through and turning traffic. Auxiliary lanes are an asset in promoting safety and improved traffic flow in such situations.

Right-turn acceleration lanes allow entering vehicles (those that have turned right from a driveway or minor public road onto the major route) to accelerate before entering the through-traffic flow. Acceleration lanes are to be considered on roadway segments, intersections and driveways with high traffic volumes where speed differential could result in unacceptable conflicts and/or delay. Acceleration lanes may also be appropriate where crash experience indicates a problem with right turning, entering vehicles. The right-turn acceleration lane is to be sufficiently long to allow safe and efficient merge maneuvers. The design length, tapers and other features of right-turn acceleration lanes are to be guided by a traffic study.⁸³

Care should be taken to reduce conflicts between bicycles and vehicles in a right-turn acceleration lane.

Ordinance Language:

Requirements for Acceleration Lane for Right Turning Vehicles:

- a) A right-turn acceleration lane and taper for right turning acceleration movements is required for any access at which the projected peak hour right-turning volume is greater than 50 vehicles per hour and the posted speed on the roadway is greater than 40 mph.
- b) A right-turn acceleration lane and taper may be required at an access point under any one of the following conditions:
 - i. A high traffic volume on the highway and lack of gaps in traffic make use of an acceleration lane necessary for vehicles to enter and merge with the highway traffic flow.
 - ii. The access location has/will have a high percentage of trucks using it.

⁸³ "Auxiliary Acceleration and Turning Lanes." Missouri Department of Transportation. 29 Dec. 2006. Missouri Department of Transportation. 16 May 2007. <http://epg.modot.org/index.php?title=940.9_Auxiliary_Acceleration_and_Turning_Lanes>

- iii. Site specific conditions create the necessity for an acceleration lane for public safety or traffic operations, as determined by a TIS or by the engineer.
- c) A right-turn acceleration lane and taper may also be required at signalized intersections if a free right-turn lane is needed to maintain an appropriate level of service.
- d) The taper length will be included within the required acceleration length.^{84,85}

⁸⁴ "Discussion Paper No. 11." Transportation Research Institute Oregon State University. May 1996. Oregon Department of Transportation. 16 May 2007.

<http://www.oregon.gov/ODOT/HWY/ACCESSMGT/docs/RightTurnLanes.pdf> >

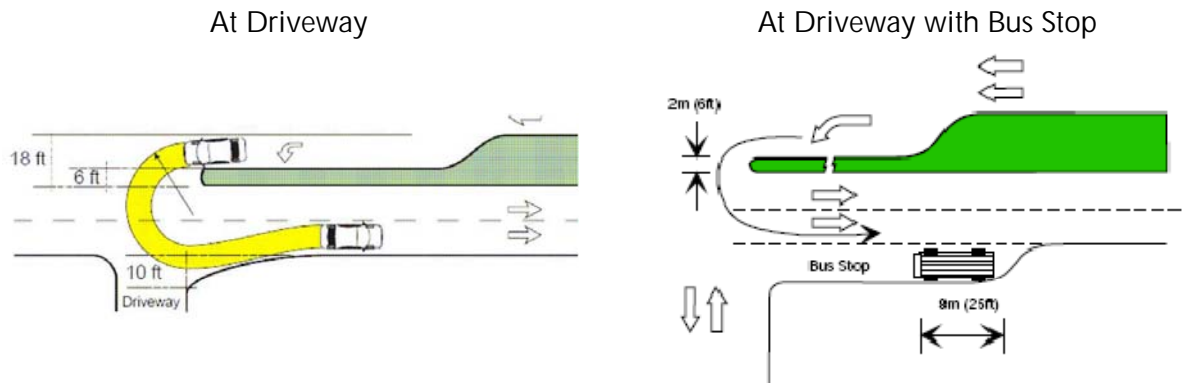
⁸⁵ "State Highway Access Code." Volume 2, Code of Colorado Regulations 601-1. 2002. State of Colorado. 23 June, 2008. <http://www.dot.state.co.us/rules/601_1_AccessCode_Mar2002.pdf>

Extra Driveway Area for U-turns (Flare-out)

Description:

It is sometimes necessary to provide extra pavement at a driveway or to allow easier U-turns at a median opening. This is also important for large vehicles making U-turns, and in the application of Median U-turn corridors or high volume U-turn intersections.⁸⁶

Two Examples of a U-Turn Flare-Out



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Ordinance Language:

Extra driveway pavement shall be provided at all median openings where u-turns are permitted if the overall width of the opposing traffic lanes is less than ____ feet.

⁸⁶ See FHWA-HRT-04-91 *Signalized Intersections: Informational Guide, Chapter 10: Alternative Intersection Treatments: 10.2.2 Median U-Turn Crossover*. August 2004. Turner-Fairbank Highway Research Center. Federal Highway Administration. 1 July 2008. <<http://www.tfhrc.gov/safety/pubs/04091/10.htm#1022>>

See also *High Volume Intersection Study, Vol. 1: Innovative Intersections: Overview and Implementation Guidelines*. COMPASS. April 2008.

⁸⁷ *Florida Median Handbook*. Florida Department of Transportation. January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

Prevent Uncontrolled Access on Property Frontage

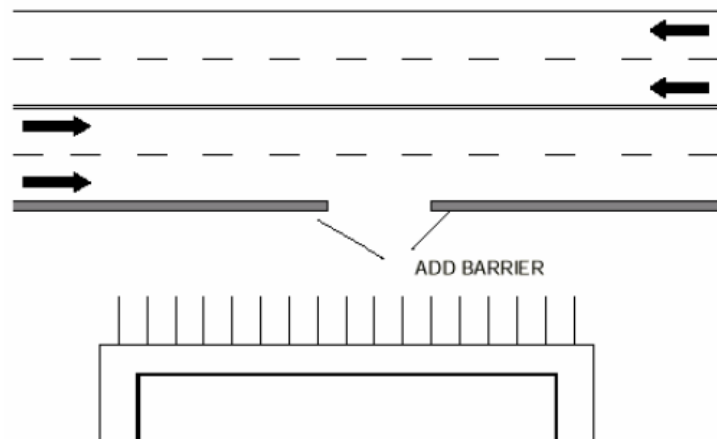
Description:

In some strip commercial developments and other businesses near a roadway, parking areas were not physically separated from the adjacent roadway. As a result, the driveway openings are not defined.

The installation of a barrier (such as a landscaping strip, guard rail, or curbing) between the edge of a roadway and the parking area can narrow the access connection and reduce the conflict area.⁸⁸

Benefits:

- Defines driveways and improves driveway visibility
- Reduces number of conflicting movement locations
- Makes walking easier and safer for pedestrians, and allows for sidewalks



⁸⁸ "Road Design Manual". Office of Road Design, State of South Dakota. South Dakota Department of Transportation. 25 June 2008. <<http://www.sddot.com/pe/roaddesign/docs/rdmanual/rdmch17.pdf>>

Prohibit On-Street Parking

Description:

On-street parking is inappropriate under most conditions on arterial roadways, as well as on most collectors.

Ordinance Language:

- a) On-street parking shall be prohibited at all times on all arterial or major collector roadways.
- b) On-street parking shall be prohibited at all times on any collector roadway when the traffic volume exceeds ____ vehicles per hour per lane.



MEDIAN ALTERNATIVES

This section focuses on various methods to use medians – another key to the safety and efficiency of **Access Management**. Topics in this section include:

- Install Left-Turn Lane
- Increase Capacity of Existing Turn Lane
- Deceleration and Left-Turn Lanes
- Install Continuous Two-Way Left-Turn Lane (TWLTL)
- Install Raised/Non-Traversable Median
- Construct Directional Median Opening
- Align Median Openings
- Avoid Median Openings Across Turn Lanes
- Close Median Opening

⁸⁹ Photo: Don Matson 2008

Install Left-Turn Lane

Description:

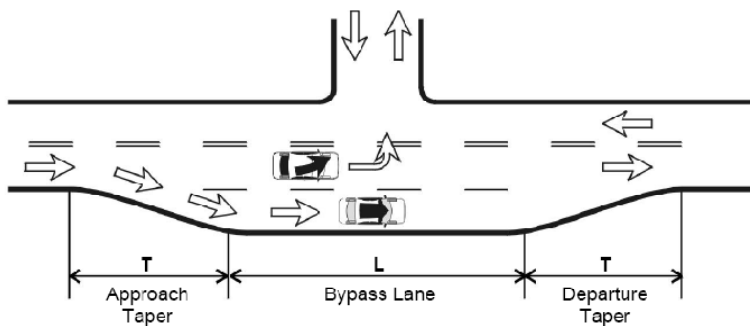
A left-turn bay or lane may be warranted when arterial traffic reaches a specified threshold. The construction of a left-turn lane on a heavily traveled arterial can reduce the conflict and delay that occur when through vehicles turn left across traffic. A left-turn lane can also reduce conflicts that occur when cars behind the turning vehicle have to slow down,



stop, or pass on the right of the turning vehicle. The left-turn lane separates the turning vehicle from through traffic and provides a storage area where a number of left turning vehicles can wait to make a turn. Left turns can also be controlled through median strips that allow left turns at certain controlled points.^{90,91}

An interim option to a left-turn bay at a three-way intersection is a shoulder bypass lane. A shoulder bypass allows a through vehicle to safely travel around a vehicle that has stopped to make a left turn, rather than passing on the road shoulder. These may be appropriate on a lower-volume roadway and

are best used as a temporary solution until an isolated left-turn bay can be built.⁹²



Optional Shoulder Bypass Lane

⁹⁰ "Example Access Management Ordinance for a City". Center for Transportation Research and Education, Iowa State University. October 2000. Iowa State University. 16 May 2007.

<<http://www.ctre.iastate.edu/Research/access/amhandbook/index.htm>>

⁹¹ "Tribal Transportation Programs: White Mountain Apache Tribe". Federal Highway Administration Office of Planning, Environment, and Realty (HEP). May 2006. Federal Highway Administration. 11 July 2008.

<<http://www.fhwa.dot.gov/hep/tribaltrans/whitemtn.htm>>

⁹² *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003.

Increase Capacity of Existing Turn Lane

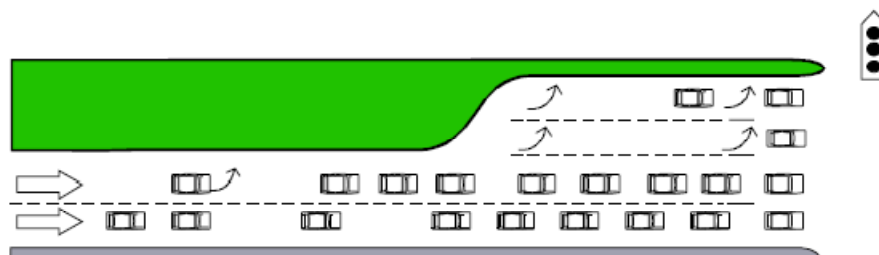
Description:

As discussed in this Toolkit, consolidating turning movements is essential for safety and efficiency. However, as existing turning movements are consolidated at fewer locations, there may be insufficient length/capacity in the remaining left-turn bays.

If there is insufficient capacity in the left turn bay, turning vehicles may not be able to enter the turning queue and will come to a stop in a travel lane. When that happens, vehicles attempting to pass straight through the intersection are essentially waiting for the left-turn queue, creating an unsafe situation. A similar issue is discussed on the following page.

At other locations a long queue of vehicles waiting to go straight through a signalized intersection may block left-turning vehicles from entering the turning queue, as shown in the illustration below. Shorter dual left-turn lanes are more prone to this problem.⁹³

Prior to closing left-turn options on a roadway, street departments and highway agencies should ensure that there is adequate capacity in the existing turn bays that remain.



⁹³ *Florida Median Handbook*. Florida Department of Transportation. January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

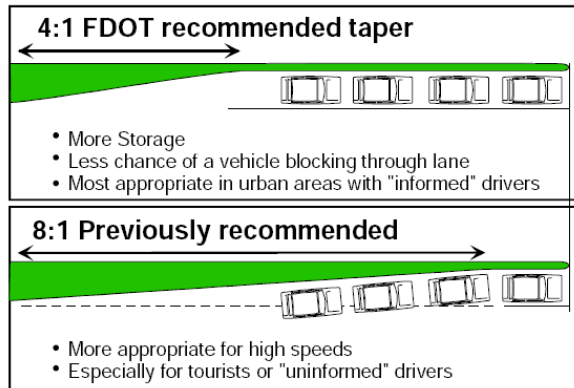
Deceleration and Left-Turn Lanes

Description:

Design standards for left-turn lanes are available from several sources most base their rate of taper on approach speed; the faster the speed, the longer the taper. The taper is the portion of the median opening that begins the transition to the turn lane.

The Florida Department of Transportation (FDOT) offers standards for the design of left-turn lanes, with an index that dictates the use of a 4:1 ratio for bay tapers on all multilane divided facilities regardless of speed⁹⁴. This may be an abrupt transition area, however, most urban areas will benefit from a longer storage area. Urban speeds are generally lower which lessens the need for gradual tapers.

See also *Increase Capacity of Existing Turn Lane* on the previous page.



⁹⁴ *Florida Median Handbook*. Florida Department of Transportation. January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

Install Continuous Two-Way Left-Turn Lane (TWLTL)

Description:

A continuous TWLTL provides the most alternatives for vehicles to cross a median. This roadway treatment provides accessibility when there are numerous curb cuts on an existing corridor.

A TWLTL in the center of a roadway is safer than having no turning lane, but it not as safe as a median with directional openings. Care should be taken to select the most appropriate option for any road segment.

In general a TWLTL functions well for roadways with moderate traffic volumes (up to about 25,000 vehicles per day) and have many commercial driveways and a high percentage of turning movements.^{95,96} They can also work well where there are multiple driveways but a low percentage of turning volumes, like a major collector or minor arterial traversing a residential area.

TWLTLs are less effective in high-volume situations, and much more so in an area with commercial driveways too close together. Driveway spacing and density still need to be well-managed. The center turn lane is also not recommended where there are more than two travel lanes in either direction.



⁹⁵ “FHWA-HRT-08-046 Safety Evaluation of Center Two-Way Left-Turn Lanes on Two-Lane Roads.” Turner-Fairbank Highway Research Center, March 2008. Federal Highway Administration, 24 June 2008.

<<http://www.tfhrc.gov/safety/pubs/08046/index.htm>>

⁹⁶ “Common Access Management Treatments”. Iowa State University Center for Transportation Research and Education, October 2000. Iowa State University, 24 June 2008.

<<http://www.ctre.iastate.edu/Research/access/toolkit/15.pdf>>

Install Raised/Non-Traversable Median

Description:

One of the most effective measures to improve safety on a roadway is to install a non-traversable median. Raised or grassy medians in the center of a road separate opposing lanes of traffic and restrict



turning and crossing movements. Studies show that thoroughfares with raised medians are safer than those with undivided thoroughfares or center TWLTLs.^{97,98}

Medians provide a refuge for pedestrians as they cross thoroughfares and are known to reduce pedestrian-related crashes.⁹⁹ They can also be landscaped as part of a corridor beautification program.

See also *Close Median Opening* and *Construct Directional Median Opening* sections in this Toolkit.

⁹⁷ "Safe Access is Good for Business". Federal Highway Administration. August 2006. Washington, DC.

⁹⁸ "Iowa Access Management Handbook Chapter 3-Defining Access Management". Center for Transportation Research and Education, Iowa State University. October 2000. Iowa State University. 16 May 2007. <<http://www.ctre.iastate.edu/Research/access/amhandbook/chap3.pdf>>

⁹⁹ "Four-Lane Divided vs Five-Lane Section". North Carolina Department of Transportation. No date. North Carolina Department of Transportation. 11 July 2008. <<http://www.ncdot.org/doh/preconstruct/traffic/conference/reports/am2.pdf>>

Construct Directional Median Opening

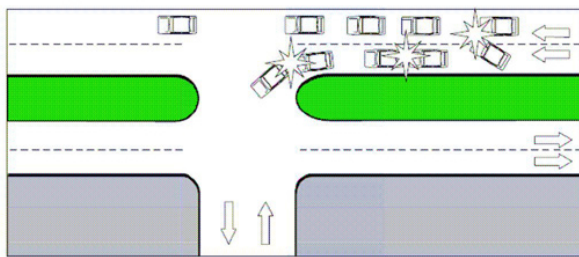
Description:

One way to limit the number of conflict points is through the design of directional median openings. A “directional” median opening serving a side street is an optional design which greatly reduces the conflict points by limiting the number of turning movements allowed.



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Potential crash problems when left-turn is made from the through traffic lane



Another alternative, the “bullet nose” median opening (shown at left), requires a vehicle to make a left turn from a through traffic lane interfering with the through traffic. This results in a high potential for rear-end crashes between following vehicles, and the potential for crashes from following vehicles changing lanes.

Ordinance Language:

All multilane facilities shall be designed with a raised or restrictive median except four-lane sections with design speeds of 40 mph or less. Median openings shall be designed with turning bays for appropriate turning movements. Facilities having design speeds of 40 mph or less are to include sections of raised or restrictive median for enhancing vehicular and pedestrian safety, improvement of traffic efficiency, and attainment of the standards of the highway.¹⁰¹

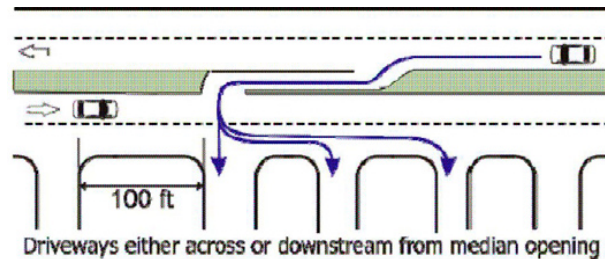
¹⁰⁰ Photo: Don Matson 2008

¹⁰¹ *Florida Median Handbook*. Florida Department of Transportation, January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

Align Median Openings

Description:

Driveways should be located directly opposite, or downstream, from a median opening as illustrated. Where it cannot be directly across from an opening, driveway access should be located more than 100 feet upstream from the median opening to prevent wrong way maneuvers.¹⁰²



The following standards are based on an arterial/collector system that follows (square mile) section lines and quarter-section lines.¹⁰³

Ordinance Language:

- a) New median openings or turn bays shall be allowed to provide access to a city street or to provide access to a private development only where the opening or turn bay can be constructed to satisfy the design standards set forth in this article.
 - i. Median openings shall not be located at intervals closer than four hundred fifty (450) feet measured center to center of openings. This distance may be decreased to a minimum of three hundred (300) feet where the median opening is designed to physically prohibit left turn egress onto the divided roadway from a side street or development and the opening is not closer than four hundred fifty (450) feet to the section corner, quarter section corner or a signalized intersection, measured center to center of openings.
 - ii. No more than four median openings shall be permitted within the one-half mile distance between the section corner and the quarter section corner, including the opening located at the quarter section corner.
 - iii. In no case shall median openings be located within the taper or storage area for another median opening or intersection.
- b) Where a new median opening is proposed for construction, a turn bay shall also be constructed unless the opening is designed to physically prohibit left turns from the divided roadway.

¹⁰² *Florida Median Handbook*. Florida Department of Transportation, January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

¹⁰³ "City of Lawton Codes." *City of Lawton Oklahoma*. 2006. City of Lawton Oklahoma. 16 May 2007. <http://www.cityof.lawton.ok.us/CityCode/Lawton_City_Code/Chapter_20/3/303.html>

- c) Access shall not be allowed unless minimum design standards are met. The minimum standards are as follows:
- i. Length of median openings shall be a minimum of the approaching travel way width plus eight feet or as calculated based upon the AASHTO design vehicle appropriate for the facility.
 - ii. If the median width is less than eighteen (18) feet, an opening shall not be allowed.
 - iii. If the allowed speed limit is not greater than forty (40) mph the minimum transition length into a left turn bay shall be a one hundred twenty (120) foot reverse parabola and the minimum storage length shall be sixty (60) feet. If the allowed speed limit is greater than forty (40) mph the minimum transition length shall be a two hundred (200) foot reverse parabola and the minimum storage length shall be one hundred (100) feet. The minimum storage length on major arterials and highways shall be one hundred twenty (120) feet.
 - iv. The minimum distance from face of curb to face of curb on the median at a turn bay shall be six feet.
 - v. The minimum desirable lane width for a turn bay shall be twelve (12) feet with a minimum allowable width of ten (10) feet to maintain a minimum median width of six (6) feet adjacent to the turn bay for sign maintenance.
 - vi. Pavement surfacing type shall be matched to the surrounding street paving currently in place. Soil testing shall be required as directed by the engineer. The minimum cross-section for construction shall be eight inches of 3500 psi portland cement concrete placed over six inches of econo-crete, and six inches of prepared subgrade compacted to ninety five percent (95%) standard proctor density. An asphalt section consisting of a minimum of twelve (12) inches of type "B" asphalt concrete placed over six inches of type "A" aggregate base compacted to 100% standard proctor density, and six inches of prepared subgrade compacted to ninety five percent (95%) standard proctor density will also be acceptable.
 - vii. Median openings and/or turn bays requested on a state or federal highway shall conform to standards and specifications of the appropriate agencies.
 - viii. Final location and alignment of median openings/turn bays shall be as established by the traffic engineer.
- d) If a roadway project is pending or under construction at the time of approval of a request for a median opening or turn bay, the approved median opening or turn bay shall be constructed to the standards for the approved or completed roadway; however, in no case shall construction standards be less than standards set forth above, and the person requesting the change shall pay any and all costs required to make the improvement. The person or party requesting the

median opening or turn bay, if approved, shall pay to the city the estimated costs associated with design and installation of the median opening prior to the construction of same. If the estimate is insufficient to cover said costs the requesting party shall pay to the city any additional sums. If the estimated costs exceed the actual cost the overage shall be paid on completion of the project to the requesting person or party.

- e) If the requesting person or party is to construct the median opening or turn bay, the procedures and requirements for construction and public dedication of median openings and turn bays shall be as provided for in chapter/article of this code.
- f) Construction and materials shall be in accordance with the latest revisions of the standard specifications for highway construction as prepared by agency.¹⁰⁴
- g) Median openings shall not be permitted on any road with ____ or more lanes of traffic at the location in question.
- h) Bullet-nose type median openings shall not be permitted for new median openings. Existing bullet-nose type median openings should be redesigned for left-turning vehicle storage or should be closed. Median openings shall be designed to allow for the deceleration of left-turning traffic outside of the thru travel lanes and shall be designed to prevent queues of left-turning traffic from extending into the thru travel lane(s); median openings shall be spaced to accommodate fully-developed left-turn bays in both directions.
- i) On arterial roadways, median opening frequencies shall not exceed one per ____ linear feet of roadway. On collector roadways, median opening frequencies shall not exceed one per ____ linear feet of roadway.
- j) U-turns at unsignalized median openings shall not be permitted when the traffic volume exceeds ____ vehicles per hour per lane.¹⁰⁵

¹⁰⁴ *Standard Specifications for Highway Construction – 2004*. Idaho Transportation Department. January 2008. ITD. 1 July 2008 <http://itd.idaho.gov/manuals/Online_Manuals/Spec_04/Spec_04.htm >

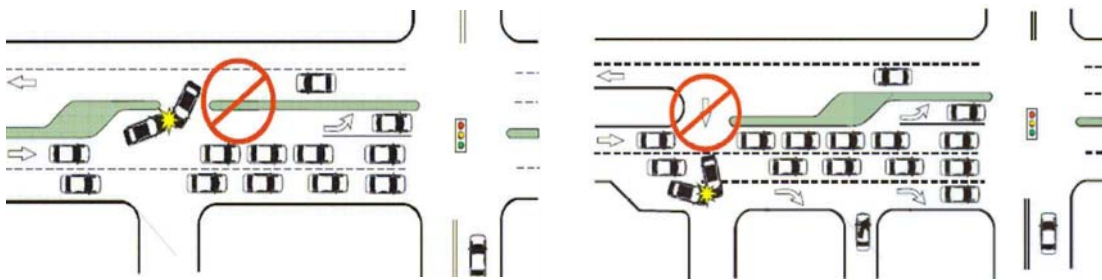
¹⁰⁵ See also *FHWA-HRT-04-91 Signalized Intersections: Informational Guide, Chapter 10: Alternative Intersection Treatments: 10.2.2 Median U-Turn Crossover*. August 2004. Turner-Fairbank Highway Research Center. Federal Highway Administration. 1 July 2008. <<http://www.tfhrc.gov/safety/pubs/04091/10.htm#1022> >

Avoid Median Openings Across Turn Lanes

Description:

Due to the danger of queues building up across a median opening, turning lanes must also be avoided in median openings (see previous section).

Driveways should never be located where it is necessary for left turning vehicles to cross an intersection's left-turn lane or right-turn lane.¹⁰⁶



Avoid median openings across left-turn lane

Avoid median openings across right-turn lane

Adding to the problem with crossing turn lanes is that when these queues build, “good Samaritans” might allow the left turner through only to crash with a vehicle moving freely in the separate right-turn lane.

¹⁰⁶ *Florida Median Handbook*. Florida Department of Transportation, January 1997. State of Florida. 16 May 2007. <http://www.accessmanagement.info/pdf/FL_Median_Handbook.pdf>

Close Median Opening

Description:

One reason a road with no median, or an open median, is less safe than a road with a closed median is that a driver who is turning left from a driveway or minor street must be able to ensure that the traffic is clear from two directions in multiple lanes. When this is not quite possible, drivers will sometimes pause in a traffic lane, or use a TWLTL in the middle of the road, while attempting to merge into traffic. Such maneuvers can lead to serious crashes and become more frequent as traffic volumes increase.¹⁰⁷



A TWLTL or bi-directional median must also accommodate both acceleration and deceleration movements. This also decreases safety as through volumes or turning volumes increase.

Closing a median or median opening will cause turning movements to shift to another location. Care should be taken to ensure adequate capacity and access are provided to accommodate this change. Ensure that the diversion to another turning location that is caused by the closure will not create another safety problem or congestion.^{108,109}

See also *Install Raised/Non-Traversable Median* and *Construct Directional Median Opening* sections of this Toolkit.

Ordinance Language:

Median openings shall be closed when traffic volumes exceed levels of safety.

- a) Median openings on the major street shall be closed to left-turning or cut-through traffic entering the major street from the street with the lower classification when traffic volumes on the major street exceed ____ vehicles per hour per lane.
- b) Median openings on the major street shall be closed to left-turning traffic exiting the major street when traffic volumes on that street exceed ____ vehicles per hour per lane or when traffic volumes exceed ____ vehicles per hour and the median opening is within ____ feet of an at-grade signalized intersection.

¹⁰⁷ Photo: Don Matson 2008

¹⁰⁸ *NCHRP Report 500, Volume 12: A Guide for Reducing Collisions at Signalized Intersections*. Nicholas D. Antonucci, Kelly K. Hardy, Kevin L. Slack, 2004. Transportation Research Board. 14 July 2008. <http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_500v12.pdf>

¹⁰⁹ *NCHRP Report 420: Impacts of Access Management Techniques*. Jerome Gluck, Herbert S. Levinson, Vergil Stover, 1999. National Cooperative Highway Research Program, Transportation Research Board. 2 July 2008. <<http://www.accessmanagement.info/pdf/420NCHRP.pdf>>

REFERENCES AND RESOURCES

As noted throughout the document, there are numerous tools available in print and on the internet. The reference and resources described on the following pages are of particular value for a quality **Access Management** program.

All ordinance samples, photos, and illustrations herein are available on the internet, except as noted in the body of the document. All internet-sourced materials are either in the public domain or created and intended for public/non-profit use.

ACCESS MANAGEMENT MANUAL



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¹¹⁰ Cover illustration from *Access Management Manual*, 2003. TRB, Washington, DC.



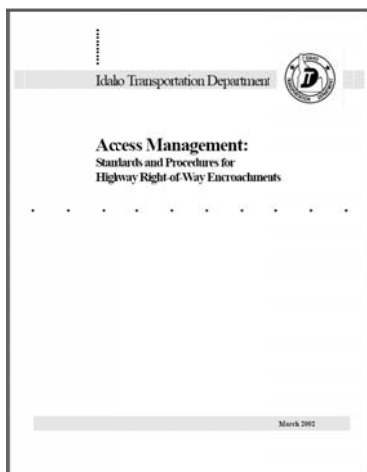
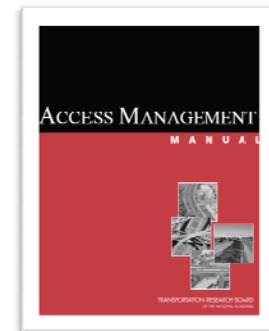
The National Transportation Library is an online service of the USDOT Research and Innovative Technology Administration (RITA). The library houses numerous sample ordinances, academic studies, and local, regional, state, and federal government publications.

< <http://ntl.bts.gov> >

The library includes regional networking opportunities, statistical data, and links with university transportation research centers around the country.

The Access Management Manual is a good comprehensive resource for state and local agencies interested in access management. It includes helpful information on a host of topics, as well as quality illustrations, references to numerous studies and reports, model statutes, policy examples, and case studies.

From the TRB Committee on Access Management, 2003. The manual is copyrighted, and is available for purchase online.



ITD's Access Management Standards and Procedures is also useful for Idaho municipalities and highway districts when evaluating development projects along the state highway system. It includes descriptions of the different access classes and policies, and outlines the approval process for access permits.

Go to <www.itd.idaho.gov>, click on <highways>. Under Traffic Services, click on <ITD Access Management Standards and Procedures>

ITD Access Control for Segments of the State Highway System, another document on the web under ITD Traffic Services, is a database of state highways and their applicable access policy classification.



*The TRB sponsors the **Access Management Website**, an excellent resource for agencies interested in Access Management.*

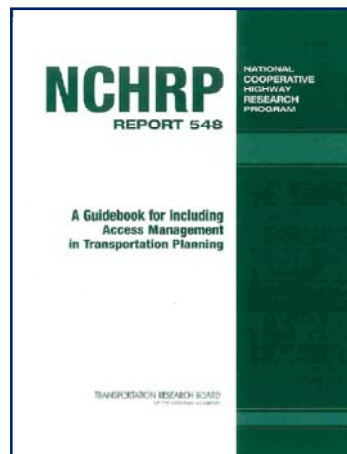
*It includes information on conferences and training, and links to numerous publications suited to a variety of readers. The **Access Management Manual** can be purchased there, and brochures can be downloaded and printed for public outreach.*

< www.accessmanagement.info >

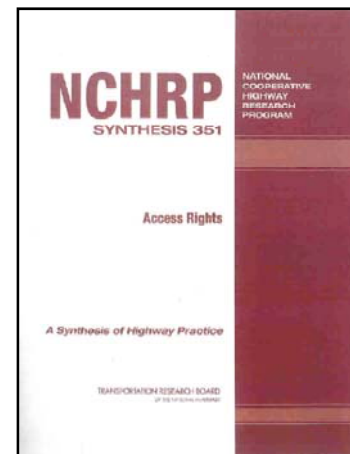
The National Cooperative Highway Research Program (NCHRP) has published several reports on Access Management, three are referenced in this document and are noted here. Reports from NCHRP are available from the TRB Business Office online at <www.national-academies.org/trb/bookstore>.



Report 420
Impacts of Access Management Techniques
 1999



Report 548
A Guidebook for Including Access Management in Transportation Planning
 2005



Synthesis 351
Access Rights: A Synthesis of Highway Practice
 2005

APPENDIX A: EVALUATION CHECKLIST

Evaluation Checklist for Access Management Programs

1. Does your local comprehensive plan include goals, objectives, and policies that support access management?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
2. Does your comprehensive plan or major thoroughfare plan classify roadways according to function and level of access control?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
3. Does your local land development code include a statement of purpose and intent that supports access management?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
4. Do your plan and land development code discourage commercial strip development on major thoroughfares?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
5. Do your plan and code promote activity centers with unified access?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
6. Does your land development code include regulations for driveway spacing, sight distance, and corner clearance?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
7. Do you restrict the number of driveways per lot or parcel on arterials?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
8. Are minimum lot frontage requirements higher along thoroughfares?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
9. Are new developments encouraged or required to provide interparcel connections and joint access?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
10. Do you treat properties under the same ownership or those consolidated for development as one property for the purposes of access control?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
11. Does your land development code include a review process for minor subdivisions or lot splits?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
12. Does your land development code include restrictions on flag lots?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
13. Does your land development code include standards for lot width-to-depth?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
14. Do you regulate design, construction, and maintenance of private roads?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
15. Do your local subdivision regulations include reverse frontage requirements for residential lots along arterials and collectors?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
16. Do you encourage shared residential access drives for small subdivisions?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
17. Do you encourage new development to continue or interconnect with the surrounding street system?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
18. Do your driveway design standards address the following:			
Driveway throat length?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
Driveway flare or radius?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
Driveway width?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly
19. Do you have a procedure for coordinating with the state transportation agency on access permitting?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Partly

Checklist developed as part of the Florida DOT “Land Development and Access Management Short Course” by CUTR, 1996. Reproduced from *Access Management Manual*. Access Management Committee of the Transportation Research Board. 2003. Washington, DC

APPENDIX B: TOOLKIT APPLICATION MATRIX

This matrix lists each of the items listed in the Toolkit, noting which discussions include ordinance or policy language, and which topics are most applicable to land use/development regulators and to transportation agencies/departments.

Access Management Tool	Page #	Sample		Agency(s)	
		Ordinance	Policy	Land Use	Transp
Planning Tools					
<i>Budget for Access Acquisition</i>	3				×
<i>Prioritization Process for Access Management</i>	3			×	×
<i>Designate the Access for each Property</i>	3			×	×
<i>Public Outreach</i>	3			×	×
Update the Comprehensive Plan	4		×	×	×
Cooperate in Regional Corridor/Access Management Plans	6			×	×
Create Overlay District/Adopt Corridor Plan	7	×	×	×	×
Adopt Regional Transportation Plan/ Functional Classification	9	×	×	×	×
Adopt Access Classification System	10		×	×	×
Policies and Regulations					
<i>Designate Inappropriate/Extra Driveways as Non-Conforming</i>	12			×	×
Update Zoning and Subdivision Ordinances	13			×	
Adopt Traffic Impact Study (TIS) Requirements	14	×		×	×
Update Site Design/Access Permitting Process	15	×		×	×
Establish MOA/MOU for Joint Permit Process	18		×	×	×
Adopt Arterial Safety Standards	20	×		×	×
Adopt Private Road Ordinance	22	×		×	×
Subdivision Design/Street Pattern					
<i>Lot Frontage Dimensions</i>	23			×	
<i>Restrict Highway Access Points to Public Streets</i>	23			×	×
Connectivity	24	×		×	×
Discourage Flag Lots	25	×		×	
Traditional Neighborhood Street Pattern	26	×		×	×
Frontage or Service Roads	28	×		×	×
Reverse Frontage Roads	29	×		×	×
Minimum Corner/Curb Clearance – Residential	31	×		×	×
Minimum Corner Clearance – Non-Residential	32	×		×	×
Lot Width-to-Depth Ratios	34	×		×	
Site Design Standards					
<i>Locate Access Opposite Signalized 3-Way Intersection</i>	35			×	×
Alternative Modes of Travel	36	×		×	×

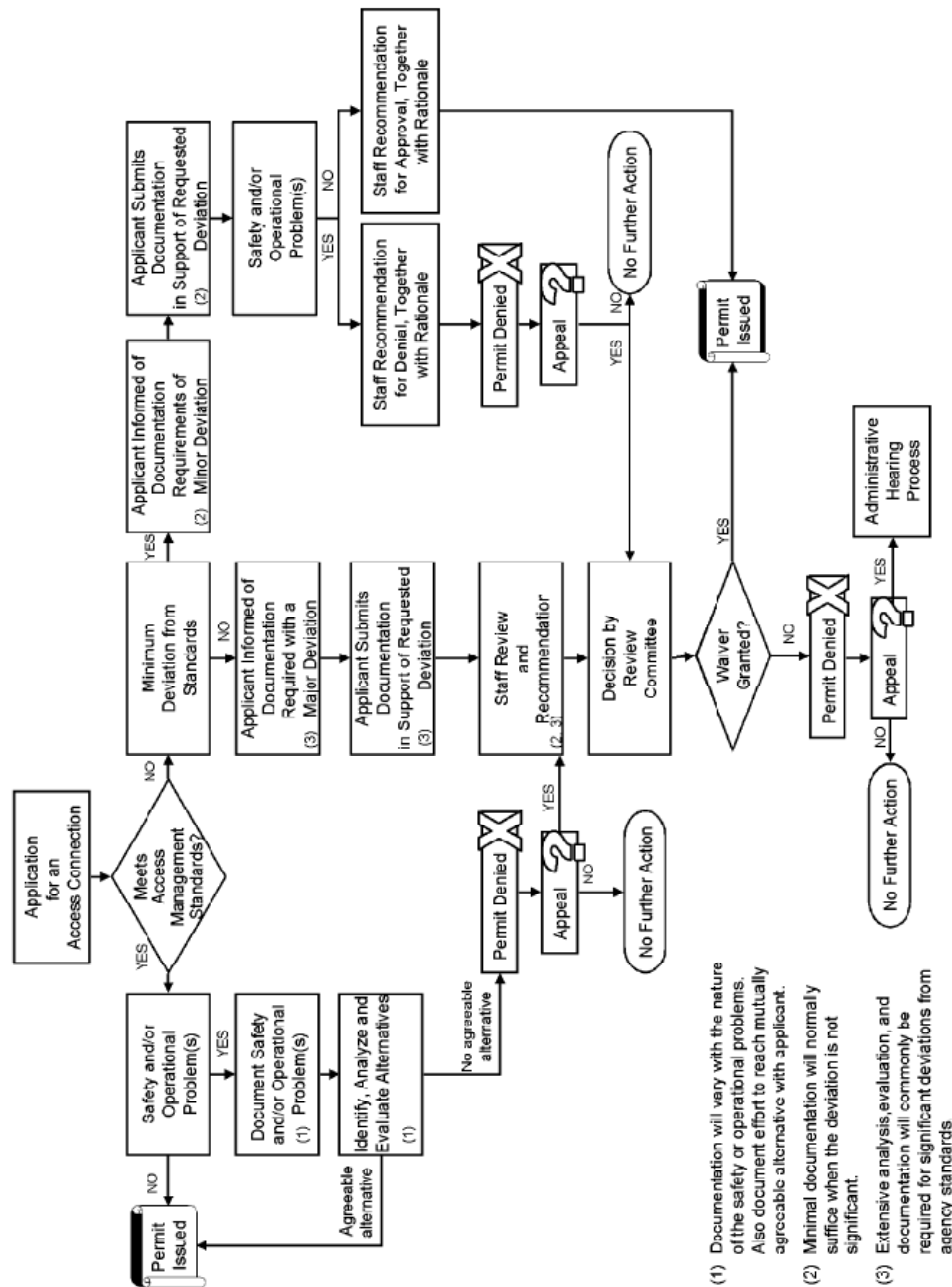
(continued)

Application Matrix (continued)

Access Management Tool	Page #	Sample		Agency(s)	
		Ordinance	Policy	Land Use	Transp
Site Design Standards (continued)					
Consolidate Driveways/Limit Driveways per Parcel	38	x		x	x
Cross Access	39	x		x	x
Shared Access	41	x		x	x
Adequate Driveway/Throat Length	43	x		x	x
Drive-Through Queues	45	x		x	x
Driveway Turnarounds	46	x		x	x
Provide Adequate Sight Clearance	47	x		x	
Driveway Operations					
<i>Define Ingress/Egress Lanes of Commercial Driveway</i>	49			x	x
<i>Designate Driveways for One-Way Ingress or Egress</i>	49				x
General Driveway Regulations	50	x		x	x
Quality Driveway Construction	51	x		x	x
Adequate Driveway Width/Curb Return Radii	52	x			x
Angle of Driveway	54	x		x	x
Driveway Grade	55	x		x	x
Install Traffic Islands to Control Turns at Access Points	56	x		x	x
Install Driveway Left-Turn Bay	58		x		x
Roadway Function					
<i>Construct a Bypass</i>	59			x	x
<i>Convert Parallel Streets to a One-Way Pair/Couplet</i>	59			x	x
<i>Lane Treatments/Striping</i>	59				x
<i>Provide Signing and Visual Cues of Access Points</i>	59				x
<i>Speed Limit Modification</i>	59			x	x
Uniform/Maximum Signal Spacing	60			x	x
Driveway Spacing and Separation	61	x		x	x
Acquire Access Rights	63	x		x	x
Install Right-Turn Deceleration Lane	64		x		x
Install Right-Turn Acceleration Lane	65	x			x
Extra Driveway Area for U-turns (Flare-out)	67	x			x
Prevent Uncontrolled Access on Property Frontage	68				x
Prohibit On-Street Parking	69	x			x
Median Alternatives					
Install Left-Turn Lane	71				x
Increase Capacity of Existing Turn Lane	72				x
Deceleration and Left-Turn Lanes	73				x
Install Continuous Two-Way Left-Turn Lane (TWLTL)	74				x
Install Raised/Non-Traversable Median	75			x	x
Construct Directional Median Opening	76	x			x
Align Median Openings	77	x			x
Avoid Median Openings Across Turn Lanes	80				x
Close Median Opening	81	x			x

APPENDIX C: ACCESS PERMIT FLOW CHART

**Flow Chart/Decision Tree
for Evaluation of Access Permit Application**



Flow chart developed as part of the National Highway Institute course “133078 Access Management, Location and Design,” by S&K Transportation Consultants, 2000. Reproduced from *Access Management Manual*. Access Management Committee of the Transportation Research Board, 2003. Washington, DC.