LAND DEVELOPMENT AND ACCESS MANAGEMENT STRATEGIES FOR FLORIDA INTERCHANGE AREAS

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The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the State of Florida Department of Transportation.

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Freeways are heavily-traveled thoroughfares that allow us to quickly get from here to there. Freeway interchange areas have become important points for providing necessities and conveniences that aid in travel comfort. Americans thrive on convenience, and yet unmanaged access to highway-oriented services causes inconvenience and disrupts the very purpose of an interchange, which is to move traffic between the freeway and arterial. Advanced planning and access management can reduce traffic conflicts and create a balance between access and mobility needs. This report reviews issues and problems in managing interchange area development and sets forth strategies, for both state and local agencies, to improve planning and management of interchange areas.

THE IMPORTANCE OF INTERCHANGE AREAS

Interchanges frequently serve as gateways to communities. If an interchange area does not function smoothly, it can damage the economic vitality of nearby communities. Interchange areas also provide opportunities for economic development, due to the proximity of access to freeways. Economic development opportunities include:

- Residential development, allowing commuters to live in suburban areas while providing quick access to job centers.
- Office development, allowing easy access for commuters from a broad catchment area.
- Major retail uses, such as discount malls and big box retailers.
- Highway-oriented commercial, such as gas stations, restaurants, hotels, and tourist-oriented commercial for travelers.
- Industrial uses, which are compatible with the noise generated from the freeway.
- Tourist attractions and recreational facilities for accessibility to out-of-towners.
- Institutional or service-related uses such as schools, medical centers, churches, or government centers.
- Other public uses like a Park and Ride lot or land fill, which are removed from densely developed areas, yet convenient.

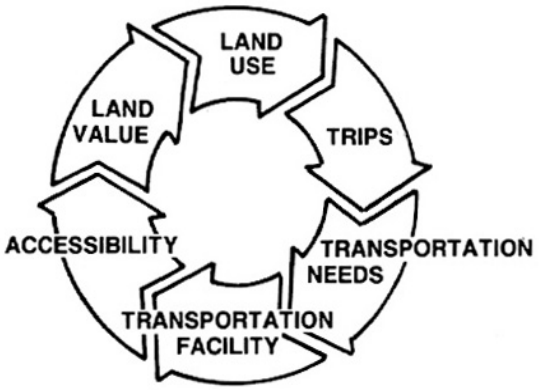
From a transportation perspective, interchanges are a vital link in the system. They provide access from surface streets to freeways and may be required to handle very high traffic volumes during peak travel periods. They are also a critical interface between the freeway and the surface street system, providing a transition from high speed travel to lower speeds.

ISSUES IN CURRENT PRACTICE

Land use changes can be rapid and intensive near interchange areas. If local governments provide for development in interchange areas without the necessary plans or regulations to manage access outcomes, the result is a proliferation of driveways near interchange ramps. In addition, major street intersections are often located too close to the ramp termini. A variety of transportation problems occur when driveways and intersections are too close to interchange ramps. Signalized intersections too close to ramp termini can cause heavy volumes of weaving traffic, complex traffic signal operations, accidents, congestion, and traffic backing up the ramps on to the main line.[1] Curb cuts and median openings near the ramp termini further compound these problems.

The Cycle of Obsolescence

The unplanned interaction between transportation and land use has been described as a "continuous cycle of obsolescence." The roadway provides accessibility, which increases land value and encourages development. Poorly planned development results in increased driveways, traffic conflicts, and congestion. When levels of service decrease, the roadway is improved, and the cycle is repeated. Access management helps to prevent obsolescence by preserving the safety and efficiency of a roadway or interchange area as development occurs.



In the absence of proper planning and design standards, land-use changes and transportation improvements can create a cycle of functional obsolescence. (*Source:* Highway Research Board)

Source: Stover, V.G. and Koepke, F.J. *Transportation and Land Development*, Institute of Transportation Engineers, NJ: Prentice Hall, 1988.

Perhaps if we thought differently about interchange areas, we could plan them more effectively. Bob Layton, Professor of Engineering at Oregon State University, asserts that "[t]he interchange area is an extension of the freeway... [It] presents conditions that are complex, unexpected and significantly different from other nearby surface street conditions."[2]

Too many choices in close proximity create confusion, causing drivers to make erratic movements, resulting in high, unsafe speed differentials between turning vehicles and other traffic. When planning interchange areas, it is important to

remember that many people who will exit from the freeway are unfamiliar with the area, and have a need or desire to utilize one or more of the services offered. Therefore, it is critical to create an uncluttered environment, with good signage and ease in accessibility. Restrictive medians, consolidated driveways, consolidated signage, and alternate access roads are measures that can be used to reduce driver confusion and promote safe and efficient traffic operations in interchange areas. Ideally, traffic entering and leaving a freeway should not compete with traffic entering and leaving a site.

Because interchanges invite development and traffic, it is essential to have regulations in place that address issues of compatibility and function. Access management plans and regulations help to preserve the safety and efficiency of interchange areas as development occurs. Although the need for improved access management is clear, the separation of state and local jurisdiction has made it difficult to accomplish. No single technique or governmental entity can achieve the desired results. Effective interchange area management requires a combination of techniques involving land use planning, zoning, subdivision regulation, signage, access management, and intergovernmental coordination.

A concern that often arises at the local level is that access controls could impede economic development. It is understandable that local governments are interested in increasing their tax base through development. What is often not understood is that not managing access can have long-term adverse impacts on both the transportation function *and* economic development potential of interchanges. For example, shared access roads open up more land for development on the interior of interchange areas, thereby increasing their development potential and allowing more efficient use of land. Access management plans and requirements can also help to discourage the division of roadway frontage into small lots with constrained development potential, and help to preserve larger parcels for higher quality development with good internal circulation and access design.

Another issue relates to varying opinions as to the appropriate spacing standard for access in the vicinity of interchanges. The current state-of-the-art on access separation distances from interchanges and related standards was summarized in *NCHRP Report 420: Impacts of Access Management Techniques*[3] and *Interchange Access Management Background Paper No.2.*[4]

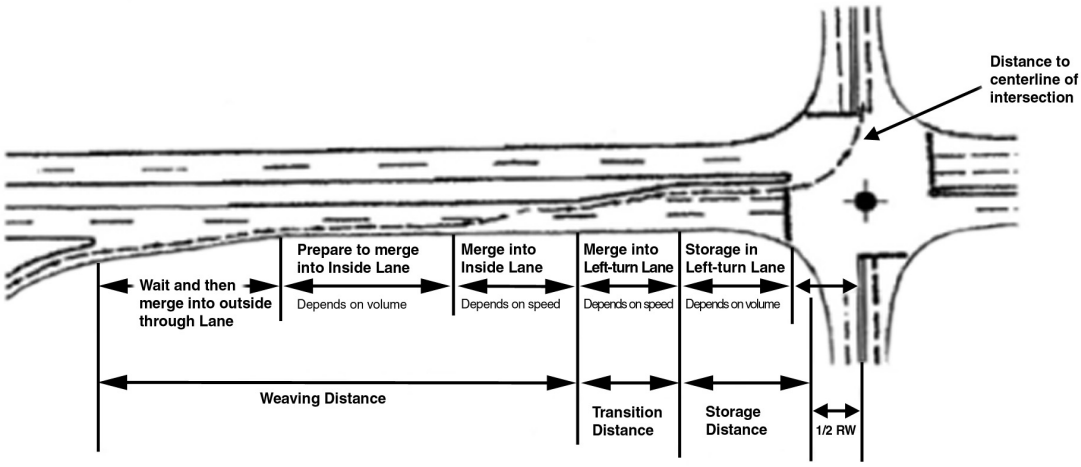
NCHRP 420 concluded that the separation distances in use by state agencies are often far less than the spacing needed to ensure good traffic signal progression and adequate weaving and storage for left turns. From this research it was concluded that separation distances from exit ramps should include those set forth below in Table 1. Figure 1 illustrates these separation requirements.

Table 1
Separation Distances from Interchange Exit Ramps

Weaving - moving across through lanes	800 feet on two lane arterials 1200 feet on four lane arterials 1600 feet on six lane arterials
Transition - moving into turn lane(s)	150 to 200 feet
Perception-reaction distance	100-150 feet
Storage	Adequate for volume without overflow into through lane (typically 200-300 ft. depending upon demand)
Distance to centerline of intersection	40-50 feet

Source: Guidelines adapted from NCHRP 420.[5]

Figure 1
Components of Access Separation Distances



Source: FDOT Median Handbook.[6]

Based on the analysis, Table 2 shows the suggested minimum access spacing standards for four lane cross routes at interchanges.

Table 2
Four-Lane Cross Routes

Access Type	Area Type		
	Fully Developed Urban (45 mph)	Suburban (45 mph)	Rural (55 mph)
First Access From Off-Ramp	750	990	1320
First Median	990	1320	1320
First Access Before On-Ramp	990	1320	1320
First Major Signalized Intersection	2640	2640	2640

Source: R. Layton.[7]

According to these findings, even in a fully developed, urban area, no access should be allowed on the crossroad for a distance of at least 750 feet from the end of the interchange ramp or speed change lane taper. Current FDOT standards allow the first access at 660 feet (when the speed is greater than 45 mph). If access is less than 660 feet, it should be confined to right turns in and out, which may require construction of a raised median.

LAND DEVELOPMENT AND ACCESS MANAGEMENT STRATEGIES

Access management in interchange areas can be accomplished through advance planning and a range of regulatory and non-regulatory techniques. It also requires cooperation with property owners, developers, and local governments. Regulatory methods require certain actions, while non-regulatory methods encourage or drive desired actions. Non-regulatory techniques are more subtle in their direction of development. They are often in the form of agreements or incentives. Using a broad range of powers is more likely to accomplish a desirable outcome, while obliging all affected parties. Below is an overview of the many techniques that may be applied to advance access management objectives.

Access Management Plans

Planning for interchange areas is similar to corridor development planning – it targets a specialized area and takes a comprehensive approach. Like a corridor plan, an interchange area plan is linked to the roadways and should concentrate on the interrelationship of land use and access. Because an interchange area shapes the perception of a community, an interchange area access management plan gives clear direction for development, provides organizational structure, and is the basis for achieving a positive, welcome perception of the community. A good plan will also prevent situations from occurring that will limit economic benefits to the community.

The first step in interchange area access management planning is determining the interchange area boundaries. The recommended boundary is ½ mile from the taper along cross streets, or to the first major signalized intersection. Elements that need to be evaluated to assure future access management include, but are not limited to:

- Site plans (encourage unified development such as shared signage, driveway and parking);
- Signage (control of billboards and advertisements);
- Highway and traffic (road function, access to adjacent land, evaluation of traffic generation versus benefits such as employment generation)
- Access control (minimizes conflicts)
- Street system (internal, frontage, backage, local, and crossroads)
- Setbacks (safety, future construction, aesthetics)
- Corner clearance
- Loading on premises (for pick-up, delivery, service, and emergency vehicles)[8]
- Consolidated signage
- Pedestrian circulation

It will also be necessary to assess existing conditions, such as:

- Property ownership and land division characteristics
- Lot frontage
- Access points
- Transportation characteristics

It is important to determine what types of development will be allowed, where development should be located and, perhaps the most important, planning a system of local roads to serve development. When developing a plan, some areas of caution to consider are:

- Incompatible land uses (especially in rural areas)
- Strip development
- Unattractive and cluttered buildout, including signage (causes confusion)
- Insufficient building setbacks (obscures vision and increases cost for road widening)
- Excessive number of access points
- Land uses that generate excessive traffic
- Inadequate off-street parking, loading space and delivery area.[9]

Land Development Regulations

No single land use control is enough to fulfill planning for interchange development and protection. It requires a combination of land use/zoning, subdivision and site plan regulations. Each control serves a separate function in the process, and incorporating several controls ensures the intended outcome of the plan. Types of regulations used will vary depending on location and environment – urban or rural, developed or undeveloped. Below are some useful regulatory techniques for managing interchange area development.

Subdivision Regulations

Subdivision regulations are critical with regard to interchange areas. They can require dedication of land for road improvements, ensure proper street layout in relation to existing or planned roadways, require internal property access for residential development, and establish design principles and standards for lots, blocks, streets, public places, pedestrian ways, and utilities.

The subdivision review process should address a variety of issues, including:

- Proper placement of access in relation to the interchange ramp, sight distance requirements, and related considerations;
- Fronting units on residential access streets rather than major roadways; and
- Linking the pedestrian path system to buildings with parking areas, entrances to the development, open space, and other community facilities.

Zoning Regulations

Zoning regulations are important as they establish the allowable use of land, building setbacks, and lot dimensional requirements. Minimum lot frontage

standards should be higher on thoroughfares and near interchanges to allow for greater spacing between access points and interchange ramps (see Appendix A). Smaller lot frontages are appropriate where properties have frontage on internal subdivision roads or where there are other alternatives to direct, individual highway access. Wider and deeper parcels also increase flexibility of site and circulation design and provide a wider range of development opportunities than small or irregularly shaped lots.

Zoning regulations can also be applied in a variety of ways to advance interchange area access and development objectives. These include:

- Interchange Overlay District. Interchange zoning controls are added to the standard zoning requirements of the underlying district (commercial, residential, etc.). The property and any improvements thereon are subject to both the standard zoning regulations and the overlay restrictions. Overlay requirements may address any issues of concern, such as driveway spacing or consolidated access roads, and are often used to implement an access management plan.

- Interchange Zoning District. A separate zoning district specifically for those areas within the designated interchange area, having its own set of subdivision and development regulations.

- Planned Unit Development for Interchange Areas. Larger tracts are planned and developed as a functional unit, as opposed to standard zoning which regulates development on a lot-by-lot basis. A PUD process is oriented toward accomplishing site design that is more sensitive to the characteristics of an area. For interchange areas, they could be oriented toward accomplishing consolidated access and circulation systems. PUD controls are more flexible and are subject to a thorough investigation and review before approval is granted. Conditions for approval are specified prior to development.

- Special or Conditional Use Permits. Certain conditions must be found to exist prior to granting approval, and development must be compatible with the surrounding areas.

The Development of Regional Impact (DRI) process provides for more extensive review of proposed development projects that, because of their size, character, or location, have impacts that extend far beyond the development site. The DRI process is an opportunity to address impacts on the surrounding transportation system, including interchange areas. For interchange areas, they provide an opportunity to require a thorough assessment of site impacts and developer mitigation as a condition of approval. Such mitigation could include internalized access to outparcels, right turn lanes, consolidated access roads, and the like.

Conditions related to access and circulation can be established in various contexts where an agency has review and approval authority. An example (from a slightly different perspective) is when St. John's County sought a waiver from FDOT of the minimum level of service standards. FDOT recognized this as an opportunity and granted the petition, with the condition that the County would build a north-south corridor, parallel to I-95, to reduce the impact of local traffic on the interstate. FDOT further stipulated that the County would develop a corridor plan to incorporate access controls in the I-95 interchange areas and address a supporting road network. The County recognized that a parallel facility would open up land for accessibility and economic development, and thus agreed to the conditions. This is a great example of coordinating for a win-win solution.

Access Management Measures

Access management measures can be regulatory and non-regulatory. For example, separation distances on state roads are regulatory, while using raised medians rather than nonrestrictive medians is part of roadway design. Because FDOT has total authority over medians on state roads, medians are an effective way for FDOT to reduce traffic conflicts and encourage driveway consolidation. Medians are especially useful for retrofitting problem areas, as they can control left turns and reduce traffic conflicts in already developed areas.

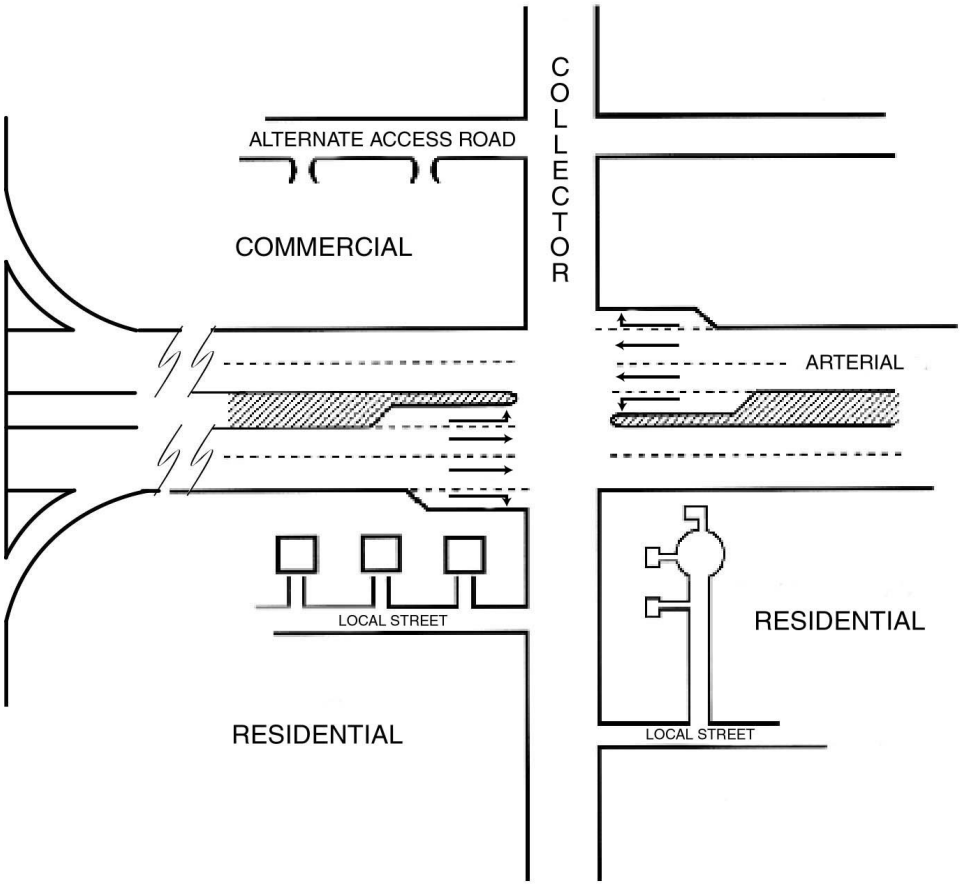
Access management measures include:

- Alternate Access Roads
- Access Separation Distances (Spacing Standards)
- Medians
- Joint and Cross Access Requirements
- Improved Driveway Design
- Acquisition of Access Rights

The most effective technique that can be used to preserve the function of interchange areas over the long term involves the provision of alternate access to the interchange area crossroad. This may be achieved by purchasing access rights or building an alternate access road. FDOT can also assist local governments by locating possible access connections, reviewing design of access systems, and providing training in access management and interchange preservation.

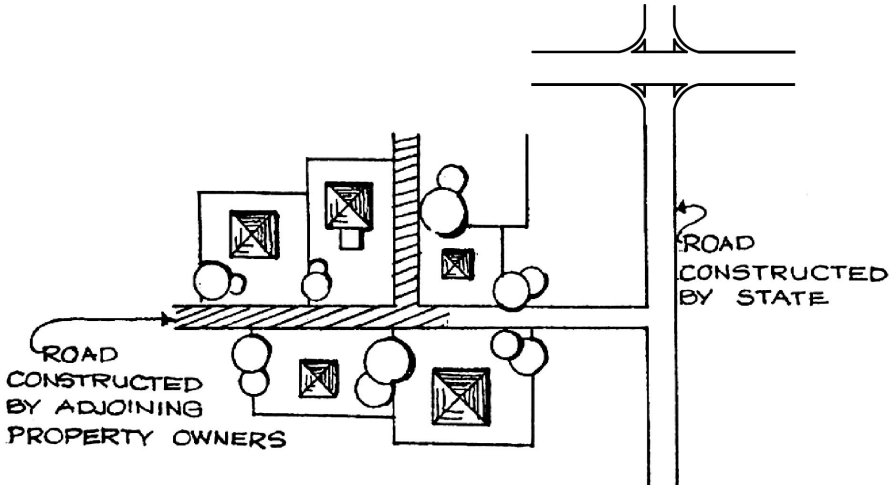
Alternate (frontage, backage or reverse frontage, or local) road systems provide additional property access, decrease direct access on arterial roads, and allow traffic from multiple parcels to be channeled through a single access point. A poorly located access road can harm the flow on the arterial road it was intended to protect. It is essential to consider how the alternate road will interface with the arterial road and to assure adequate corner clearance from any nearby intersection (Figure 2).

Figure 2
Alternate Access Concepts for Interchange Areas



Alternate access roads can be implemented through public and private contributions in a variety of ways. For example, developers could be required to set aside right-of-way needed for the alternate access road as a condition of development approval, and the local government could construct and maintain the road. In some cases, developers may construct a portion of the road. In other cases, a local government may opt to complete undeveloped segments of the road as an incentive for private participation (Figure 3).

Figure 3
Public and Private Construction of Access Roads



Source: Interchange Planning and Management Handbook[10]

One way state transportation agencies can promote the development of alternate access roads is to purchase access rights a certain distance from the interchange ramp. Some state transportation agencies also contribute to local road improvements where this would reduce safety and operational problems on a state highway. For example, Kansas Department of Transportation has a small budget designated for the purpose of off-system improvements, such as local street extensions, that would advance a corridor access management plan. Colorado DOT engages in targeted local street improvements during highway reconstruction projects to advance its access management program.

Medians help to reduce conflicts in interchange areas by restricting left turn and crossing movements. Median construction, or reconstruction to close median openings, can be used as an effective retrofit strategy in areas where driveway access and left turn movements is a problem. Additional measures can also help. NCHRP 420 suggests the following:

- Frontage roads along freeways can be better integrated with ramps at interchanges.

- Interchanges can be configured and modified to provide better accessibility to major developments or activity centers (i.e., ports, airports) and thereby avoid "double loading" arterials.

Driveway design is important to safety and efficiency of the roadway as well. Driveways may have adequate spacing, but if not designed correctly, can still cause back-up on the roadway. A driveway should have adequate right turn lanes, channelization, and a minimum throat length to accommodate on-site storage of queued vehicles without interfering with street traffic. Driveways should also be wide enough for entering vehicles not to encroach into the exiting lane. Two exit lanes should be provided and adequately marked when a through or left-turn is possible, alongside right-turning vehicles. This will help to keep traffic flowing.

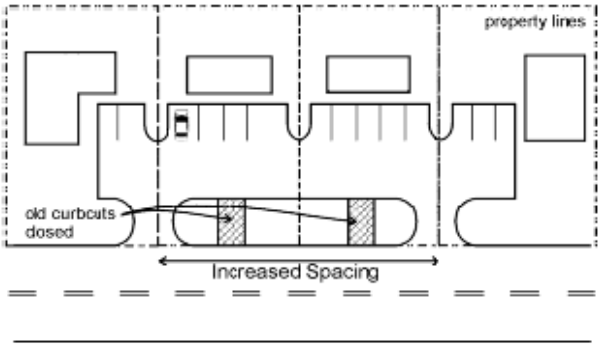
Redevelopment and nonconforming situations will also need to be addressed. Although most techniques are best when implemented prior to development, some can also be used for retrofit projects and/or redevelopment. Even if an area is not identified as a redevelopment area, a change in land use usually triggers a site plan review, at which time the adopted regulations will have an effect.

Prior to drafting regulations and policies, it will be necessary to decide how to deal with existing elements on a site that do not conform to the new standards. These situations may never meet minimum interchange management standards, but new regulations should specify opportunities for bringing those elements into conformance. Existing elements are allowed to remain, while measures are being taken to avoid further deterioration. Retrofit strategies include:

- Selectively reconstructing existing substandard driveways.
- Negotiating driveway closure, reconstruction, or relocation during roadway resurfacing or improvement.
- Requiring improvement of access during redevelopment or expansion of an existing use.
- Providing for joint and cross access with abutting properties (Figure 4).
- Issuing temporary access until adjoining properties are developed.

It will be necessary to review local policies that relate to the interchange management area to determine if they require any regulatory or policy changes. This may include plan amendments, updating policies and procedures, revising design standards, securing intergovernmental agreements, and so on.

Figure 4
Joint and Cross Access



It is much more difficult to retrofit or change an area that is already developed. Therefore, the critical time for instituting access management regulations for interchange areas is prior to building the interchange. Because the time period between programming dollars for purchase of right-of-way and completion of construction is so long, there is adequate opportunity for development of regulations for the interchange area. That is why interchange area access management should be specified in a development agreement for a new interchange during the Interchange Justification Report (IJR) process (*see section of the report addressing Interchange Request Development and Review Manual*).

Agreements and Resolutions

Development Agreements legally record the trade-offs between public benefits and development incentives. Agreements ensure that the terms for development are followed by all parties. Development agreements usually run with the use of the land; however, they can also run with the land, binding each successive owner.

Joint Development Agreements specify how public and private developers will each contribute to the development of strategic projects, and hinge on the public and private sectors each performing on schedule. These agreements are particularly important with regard to redevelopment efforts. Joint efforts are a good way for government agencies to demonstrate their commitment to access management and their willingness to assist in retrofitting for the benefit of the community.

Intergovernmental Agreements are binding contracts creating legal rights and obligations between parties. They convey the consent and mutual obligation to unite in a common purpose. This is the preferred method for intergovernmental coordination, as it is both legally binding and specific in its terms of the desired

course of action. Intergovernmental agreements work best when responsibilities, financial obligations, and procedures for review and management are detailed.

Memoranda of Understanding (MOU) are an effective way to clearly document the role of each agency in helping to implement a plan. An MOU sets forth goals, objectives, actions, deadlines and funding responsibility.

A *Resolution* is the formal expression of an opinion or the will of an official body. A resolution publicly declares the unilateral position of a governing body on a given policy matter at a point in time. Resolutions are not legally binding and are subject to change, particularly if the members of the elected body change.

Coordination

State agencies lack authority over the land development process, and local governments lack authority over access permitting decisions on state highways. Together, these factors make coordination difficult, but essential. State transportation agencies and local governments must coordinate closely and consider the effects of their decisions on the entire interchange area, if it is to work efficiently. Too often, state and local agencies act independently, leading to problems that actually undermine the functional integrity of the interchange. Because each agency has authority over a different part of the process, state and local governments can achieve far more through mutual cooperation than either agency could achieve alone.

Coordination is accomplished when parties responsible for interchange management decisions act in harmony. The goal is to make decisions that are consistent with each agency's standards. Ideally, coordination leads to compatible standards and procedures within and across government agencies. This makes it beneficial not only to the agencies involved, but also to the public and the developer or property owner whose financial investment is a stake.

Coordination between government agencies requires each agency to verify their level of commitment and agree upon their respective roles and responsibilities. This can be formally accomplished through Resolutions, Memoranda of Understanding, or Intergovernmental Agreements (explained above).

One way FDOT can encourage coordination is by working with local agencies to adopt procedures for advance notification of

Measures for State/Local Coordination in Interchange Management

- Formal Commitment
- Early communication on development requests that impact interchange areas
- Early involvement of FDOT in subdivision or site plan review
- Interchange management plans
- Consistent state and local standards
- Combined agency review of development

development activities within interchange areas. With this notification, the state could assist the local government in assessing and mitigating interchange impacts. In many cases, mitigation may take the form of access control. *Each district office of FDOT could arrange with local units of government to be notified on all matters that affect interchange areas within those jurisdictions.* Early state review of subdivision proposals helps ensure conformance with access management requirements and provides state agencies an opportunity to suggest changes prior to local plat approval, which may occur well in advance of a request for a driveway permit. The FDOT could then provide a formal response, as well as technical assistance.

Local governments can assist FDOT by attaching conditions to development approvals to require actions from the developer that support interchange management. This may include conditions that require unified access and circulation systems, alternative access roads, or joint and cross access.

Interchange management plans are another way to facilitate intergovernmental coordination and consistent decision-making within interchange areas. These plans are developed and implemented through a cooperative effort between the state and local governments. As individual developments occur, permits can be issued that conform to the plan, or permits outlining conditions can be issued so that the development will ultimately be in conformance. District FDOT representatives can encourage this process by providing technical assistance and support.

Another effective action is the development of a coordinated review process. This would help minimize inconsistencies between state and local permitting decisions. This could be achieved by structuring a tiered review. For larger projects, the first stage could consist of an informal meeting or telephone conference in which state transportation officials and local regulatory staff can discuss the proposed development concept. A preapplication meeting could then be scheduled where representatives of both agencies could be in attendance to advise the developer or property owner what is required to receive development approval. For smaller projects, early state and local communication might be sufficient.

After a preliminary site plan is drafted, it would be reviewed by both the state and local government to determine if additional changes or conditions are needed. When the plan meets with both state and local approval, the applicant would submit a final site plan for permit approvals.

There are many ways to achieve successful coordination. Although these coordination strategies are relatively straightforward, they can be difficult to achieve. Establishing a coordination procedure or protocol requires time, effort, and may raise philosophical differences – both within and across government agencies. Although it may take time to work out the details for each situation, improved coordination will accomplish rewarding results.

Other Techniques

Incentives

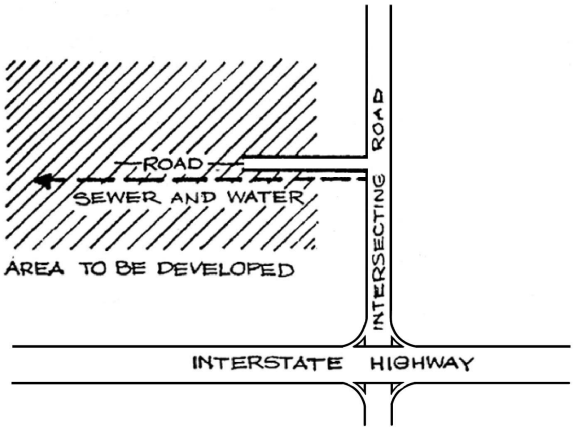
Incentives provide a benefit to an investor that is greater than the cost of receiving it. For example, in exchange for a site design that furthers access management, developers may be allowed to relax other requirements. Local governments may:

- Allow increased density or greater floor area ratio
- Lower impact fees
- Reduce setbacks
- Reduce taxes
- Provide greater flexibility in mitigation

Infrastructure Improvements

Public Facilities (roads and utilities) may be located in a way that directs development to desired areas (Figure 5). Developers should share in the cost of providing the infrastructure to accommodate additional traffic generated by their establishments. (See also, Alternate Roads section.)

Figure 5
Using Facilities to Direct Development



Source: Interchange Planning and Management Handbook[11]

Traffic Controls

Traffic controls include:

Intersection Channelization
Turn Restrictions
Medians
Signal Interconnection
Acceleration/Deceleration Lanes

These are part of the roadway design or signal coordination system and are accomplished by the transportation agency.

CASE STUDIES

Below are five case studies of issues and opportunities related to managing land development and access in interchange areas. Each illustrates various problems that may occur when land development and access are not adequately managed, the resulting costs of those outcomes, and any lessons learned. The fifth case study provides an example of how to accomplish improved access management during the development of an interchange area.

I-75 and State Road 52

This interchange is located approximately 30 miles northeast of downtown Tampa in Pasco County. It is served by a two-lane undivided roadway that accommodates a major truck service and travel plaza (Flying J) on the northeast quadrant of the interchange area. A smaller truck and travel center (Texaco) is located in the southeast quadrant of the interchange area.

The Flying J is the main attraction at this interchange. It has two separate entrances – one for automobiles and one for trucks. The main driveway is located approximately 300 feet from the northbound I-75 on-ramp. The entrance for trucks is located approximately 400 feet from the main entrance, 700 feet from the on-ramp. The main entrance accommodates twelve gas pumps for cars and three for recreational vehicles, along with a restaurant, store, and traveler services. The truck entrance has 14 gas pumps and a service area. The Texaco travel center in the southwest quadrant has eight gas pumps for cars and six for trucks.

Truck traffic at this interchange area is extremely heavy. Because the crash data for each of the five years from 1991 through 1995 demonstrated safety ratios greater than one, a safety study was performed in 1997. There was a total of 66 reported collisions during the period from January 1, 1994 through December 31, 1996. Accident history shows a trend involving vehicles exiting the ramps and trying to make left turns without sufficient gaps to allow completion of the move, and colliding with east-west through traffic on SR 52. The study noted 17 of the 66 accidents were at the northbound off-ramp with left-turning vehicles. This may be due, in part, to the bridge pillars that partially block the view. Signalization was recommended.

The study also noted that there is an insufficient turning radius for trucks entering the northbound on-ramp, making it necessary for them to utilize the grassy area in the middle island. These safety problems have prompted a Joint Participation Agreement between Pasco County and FDOT District Seven Traffic Operations for

an Interchange Modification Report (IMR) to implement recommendations from the study.

The potential for driveway access problems is also high in this area. Most of the land is undeveloped and many lots are narrow. (Six out of twelve undeveloped lots in the northwest quadrant for a distance of ½ mile are 50 to 125 feet wide.) Approval of any new access in this area must proceed with caution, especially in light of the heavy flow of truck traffic. In addition, at the southbound off-ramp, there are two driveways that intersect with the taper and two more drives at the end of the taper. Not only are there four driveways within 300 feet, but their location creates a hazardous situation. Access alternatives should be negotiated at the time of re-occupancy, if possible. Because Pasco County's Right-of-Way Use Permit Driveway Standards (rev. June 1998) for commercial driveways incorporate Chapters 14-96 and 14-97 of the FDOT Rules, the current situation would be considered non-conforming and re-occupancy should trigger a review. The only other commercial development in this quadrant is a Waffle House about 500 feet from the taper, across from Texaco.

The east and west side interchange ramps are approximately 300' apart, which could be a problem if development occurs without signalization at the ramps. Queuing on SR 52 to I-75 on-ramps may block left turns from I-75 off-ramps onto SR 52. The ramp volumes are heaviest at the northbound exit and southbound entrance, carrying more than twice as much traffic as the northerly ramps. This indicates that traffic is oriented to and from the south, or the Tampa urbanized area.

Finally, in the southwest quadrant of the interchange, there is a Master Planned Unit Development (MPUD) known as the Tampa Bay Golf & Tennis Club. The entrance to this development is located approximately 800' from the southbound on-ramp. The conditions for approval (originally in 1994) included specific stipulations for access management, such as internal circulation and limited access to SR 52.

Lessons Learned

- Do not allow property in an interchange area to be subdivided into narrow lots.
- Build the interchange anticipating the highest use and design it to accommodate same.
- PUDs offer one method of promoting consolidated access systems.

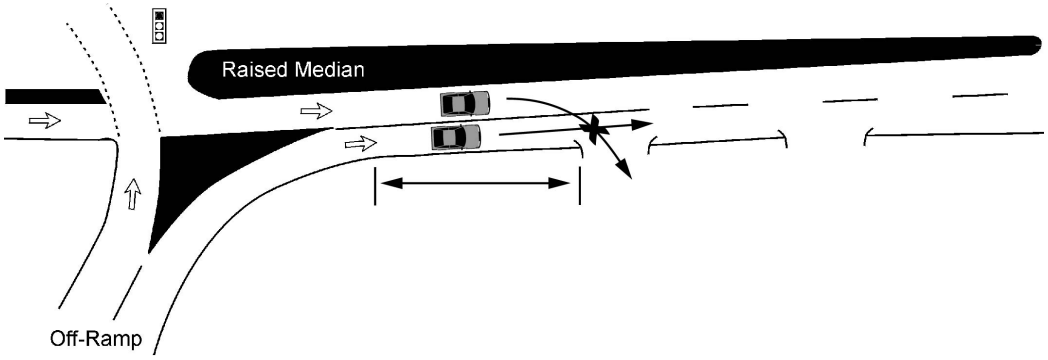
I-75 and State Road 54

Just ten years ago, this interchange was nearly undeveloped. In fact, 15 years ago, I-75 was not open south of I-275 (roughly 5 miles south of this interchange). As the Tampa urbanized area has expanded, so has this interchange area, which now has only a few undeveloped parcels within ½ mile of the ramps. These parcels are all located in the northeast quadrant of SR 54 and I-75, and at least one parcel is

undevelopable because of environmental constraints. This interchange is located 7 miles south of the SR 52 interchange, reviewed above. Traffic volumes west of I-75 are about 10% less than east of I-75 (20,400 and 22,500 AADT, respectively).

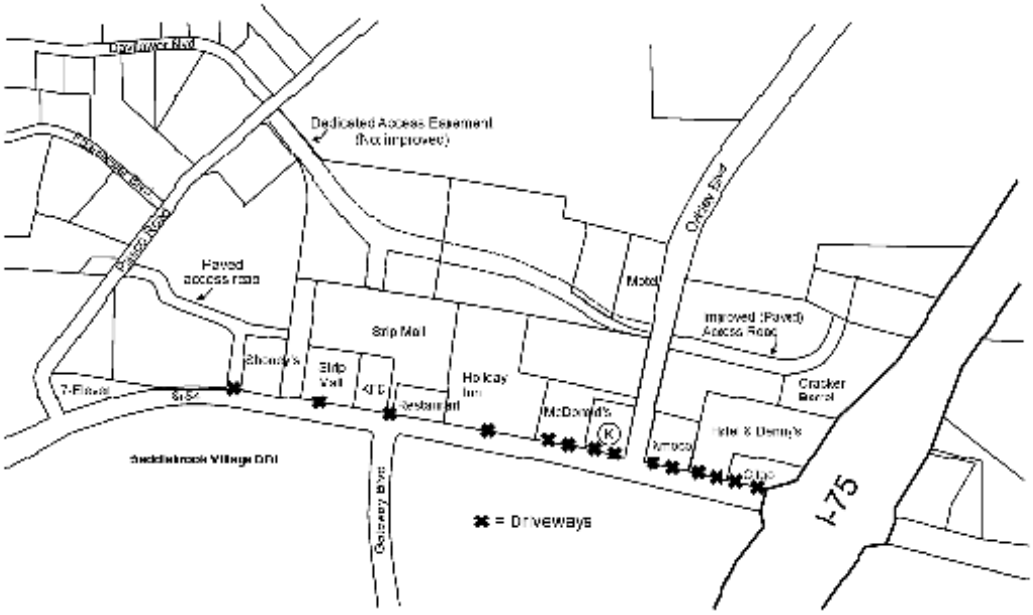
There are several hazardous situations present, which have contributed to the overall failure of this interchange. The Texaco station, located on the corner parcel of the southeast quadrant of the interchange, has a driveway that is approximately 125 feet from the end of the taper at the northbound off-ramp. Even under normal circumstances, this driveway is located too close to the off-ramp. In this case, it is especially dangerous because of the roadway design. Under the overpass, SR 54 has two through lanes (one in each direction). Instead of merging into the through lane, the right lane of the off-ramp heading east on SR 54 turns into its own through lane (see Figure 6). Not only does this create visual confusion, a person desiring to turn into the Texaco has to make a tight weave into the lane where traffic is accelerating onto the arterial, then slow down to make the turn, causing conflicts with a high-speed differential between turning vehicles and through traffic.

Figure 6
Traffic Conflict at SR 54 Interchange Off-Ramp



A similar situation is presented when heading west on SR 54 from the southbound off-ramp. The first driveway, located less than 25 feet from the end of the taper, is for a Citgo gas and food station. The roadway design is copied from the east side, with the off-ramp turning into its own through lane. Again, this creates confusion and difficulty for people turning into Citgo. In this northwest quadrant, there are ten driveways within 1100 feet of the taper; nearly every parcel has two driveways (see Figure 7). A restricted median separates east and westbound traffic for about 450 feet, followed by a painted median. The first access road is located approximately 630 feet from the taper, currently serving a Cracker Barrel Restaurant and a hotel.

Figure 7
Access Issues on SR 54 West of I-75



At one time, there was discussion between FDOT and Pasco County about building an access road to serve the interchange area. A recorded easement for ingress and egress is shown by the dotted line in Figure 7, but to date, it has not been improved. The arterial flow on SR 54 is now restricted. Cracker Barrel has constructed an access road to their facility, although no other properties have connected to it. Cracker Barrel is a good example of building off of the main line, as it certainly does not suffer from lack of business.

The intersection of CR 581 is located approximately 1200 feet from the northbound I-75 off-ramp (in the southeastern quadrant). CR 581 terminates at SR 54, which means all northbound traffic on CR 581 empties onto SR 54 (see Figure 8). Traffic volumes on SR 54 east and west of CR 581 are comparable (23,000 and 22,500 AADT, respectively).

In the northeast quadrant, there are six driveways within 630 feet of the on-ramp. Because the right lane is exclusive for on-ramp traffic, getting into and out of the driveways not only backs up the flow to the on-ramp, but causes conflict and weaving to and from the through lane.

Saddlebrook Development of Regional Impact (DRI) is a 2,500 acre mixed-use golf course community, located to the west and largely east of I-75, south of SR 54. The approved plan indicates 4,606 dwelling units, along with commercial, office, and light industrial uses. One entrance is on SR 54, west of I-75, serving the corporate (office) park. Two other entrances on CR 581 serve the bulk of the DRI.

CR 581 should be maintained as a T-intersection that runs southbound only. The interchange area would, most likely, be a complete failure if CR 581 were to extend to the north and create a full intersection. If the area were managed for only ¼ mile at this interchange, failure would still occur.

Lessons Learned

Numerous and closely spaced driveways are primary contributors to the congestion of this interchange area. The following actions could have prevented or alleviated the problems at this interchange:

- Minimum driveway spacing standards applied as set forth in Rule 14-96.
- Access road built in the existing dedicated easement and properties required to connect to access road, with no access on SR 54.
- Joint and cross access encouraged for compatible uses.
- Each parcel limited to one driveway.
- Agreement between Pasco County and FDOT to promote access management
- Build restrictive median prior to development of properties.
- Managing the area for only 1/4 mile would be insufficient to preserve its function.

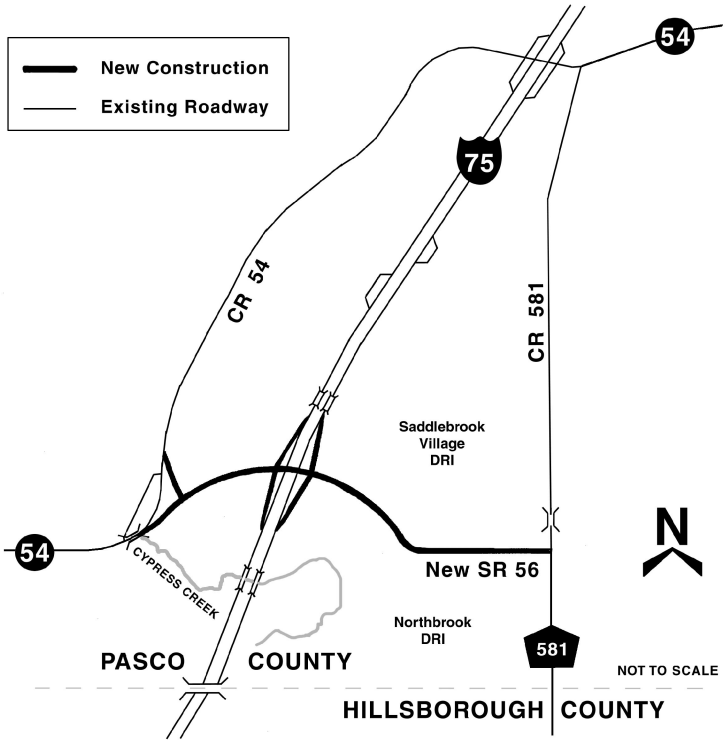
Some of the benefits derived from taking the above actions are:

- Access for properties located behind those fronting SR 54 would be improved, thereby increasing development potential, property values, and tax base.
- Free traffic flow would be encouraged on SR 54.
- Safer driving conditions (fewer conflicts and back-ups).
- Improved aesthetics means a better community image.
- Improved state and local government coordination and consistency.
- Restrictive medians built prior to development would encourage joint and cross access and allow the optimal location of consolidated access points.

I-75 and SR 56 (new) in Pasco County

This interchange is located approximately two miles south of the above-referenced interchange at I-75 and SR 54. The Interchange Justification Report (IJR), submitted in 1989, concluded that the SR 54 interchange would not be able to accommodate traffic generated from future growth in the area; thus, an alleviator was necessary. The SR 56 interchange is currently under construction, and includes a new east-west road which will connect SR 54 and CR 581. (See Figure 8.) It is anticipated that the project will be completed within two years.

Figure 8
Alignment of New SR 56



Pasco County experienced a 45 percent increase in population from 1980 to 1990 (from 194,000 to 281,000 respectively).[12] It has experienced economic development accordingly. Although the urbanization of this area warranted this interchange, it may have been deferred through improved planning and access management at the SR 54 interchange area, using the techniques described above.

More emphasis should be placed on access management during the IJR process. A capacity-focused IJR analysis does not address the issue of better operations through better access management. The IJR for SR 56 demonstrates this assertion, as it relied totally upon capacity analysis for its justification and alternatives. No mention was made with regard to what may have caused failure at the SR 54 interchange area. Fortunately, the new east-west road (SR 56) is carefully aligned between two DRIs – Saddlebrook on the north and Northwood on the south. These large scale developments provide fewer access connections, which will protect the capacity and traffic flow of this new interchange area.

Lessons Learned

- The IJR process should address access management and traffic flow, not just focus on simple capacity analysis.
- Whenever possible, work with large landowners to restrict the number of access points.

I-4 and Lee Road (SR 423) in Orange County

This interchange is located in the Orlando urbanized area, 6 miles north of downtown. This location is being reviewed because of its mixture of challenges, beginning with a major intersection (Wymore Road) located a scant 110 feet east of the I-4 ramp tapers. This factor alone is responsible for most of the interchange failure, with particular stress and back-up onto the main line during peak hours. (See Figure 9.)

Compounding the challenge of the Wymore Road intersection are two developed parcels between I-4 and Wymore Road, one on the north side of Lee Road, and one on the south side. On the north side is a Mobil gas station, with a right-in-right-out driveway onto Lee Road (see ① in Figure 9), and another driveway on Wymore Road, north of Lee Road. Denny's restaurant is on the south side of Lee Road, and has a driveway located within 25 feet of the eastbound I-4 off-ramp. There is a "No Right Turn" sign into the driveway from Lee Road (see ② in Figure 9), to prevent conflicts between through and turning traffic on Lee Road. However, within ten minutes, six vehicles were observed using that driveway to enter the premises. Denny's has a full use driveway on Wymore Road, south of Lee Road.

Figure 9
Eastbound I-4 Off-Ramp Onto Eastbound Lee Road

Wymore Road existed as an arterial road long before the interstate was built. South of Lee Road, the east side of Wymore is lined with old homes (dating back to the early 1900's) that are primarily used (and zoned) for offices. Office buildings line the west side of Wymore, north and south of Lee Road, generating a fair amount of traffic. (The 1998 AADT for Wymore, north of Lee, is 15,300.) This section of Wymore Road is now used as a collector road to get to Eatonville (SR 438A).

Several years ago, raised medians were installed on Lee Road, east and west of I-4. This dramatically improved traffic flow by reducing the number of conflicts.

The west side of I-4 has been in a state of flux for the past ten years, with various properties being occupied and vacated on a regular cycle. As with the other case studies, several closely spaced driveways and limited joint and cross access contribute to the confusion. The southwest quadrant of this interchange has 23 connections for 13 parcels within ½ mile. There are three instances of cross-access (not consecutive), and two of joint access. The linear ½ mile of the north-west quadrant has 13 parcels, 20 connections, one cross-access and one shared driveway. (See Figure 10.) Three connections are located on the diverge lane heading eastbound, west of I-4 toward the I-4 southern (westbound) on-ramp.

Further compounding the function of this interchange is a parking space located at the corner of this on-ramp (see Figure 11 ① and Figure 12). These factors create a highly hazardous situation, particularly in light of the heavy traffic volume (1998 AADT of 51,000 on Lee Road west of I-4).

Lessons Learned

- Never build an interchange in close proximity to a crossroad.
- Apply minimum access spacing standards as set forth in Rule 14-96.
- Encourage joint and cross access for compatible uses .
- Limit each parcel to one driveway.
- Build restrictive median prior to development of properties.
- Too many driveways causes traffic problems and visual clutter.

Figure 10
Proliferation of Driveways on SR 423 West of I-4 Interchange

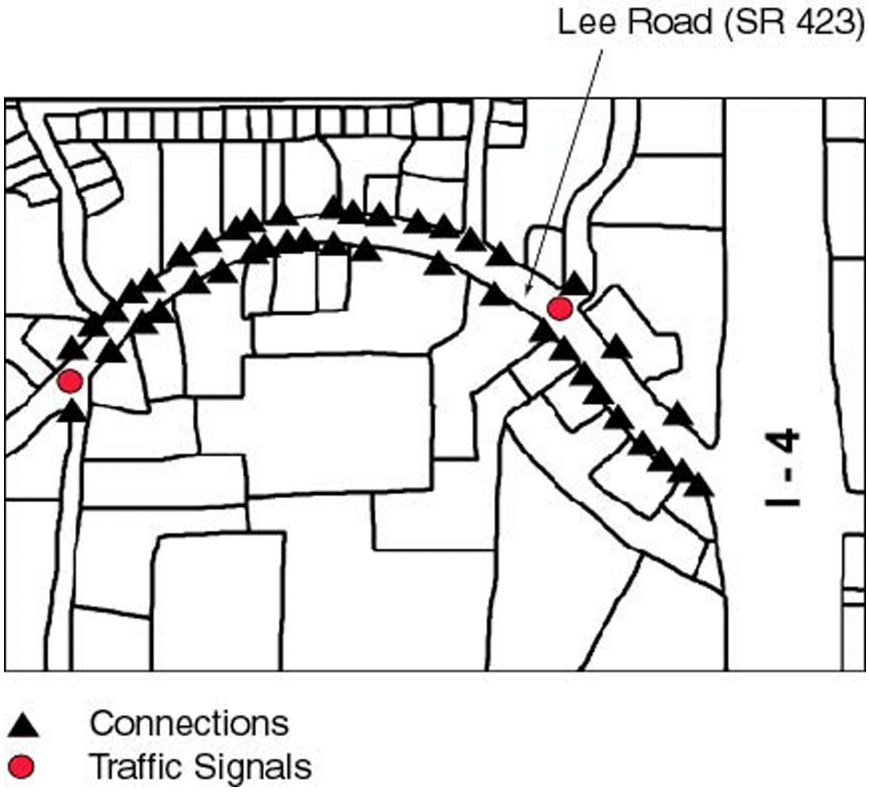


Figure 11
On-Ramp to Westbound I-4 from Eastbound SR 423

Figure 12
Parked Vehicle at Interchange On-Ramp

I-75 at Jones Loop Road

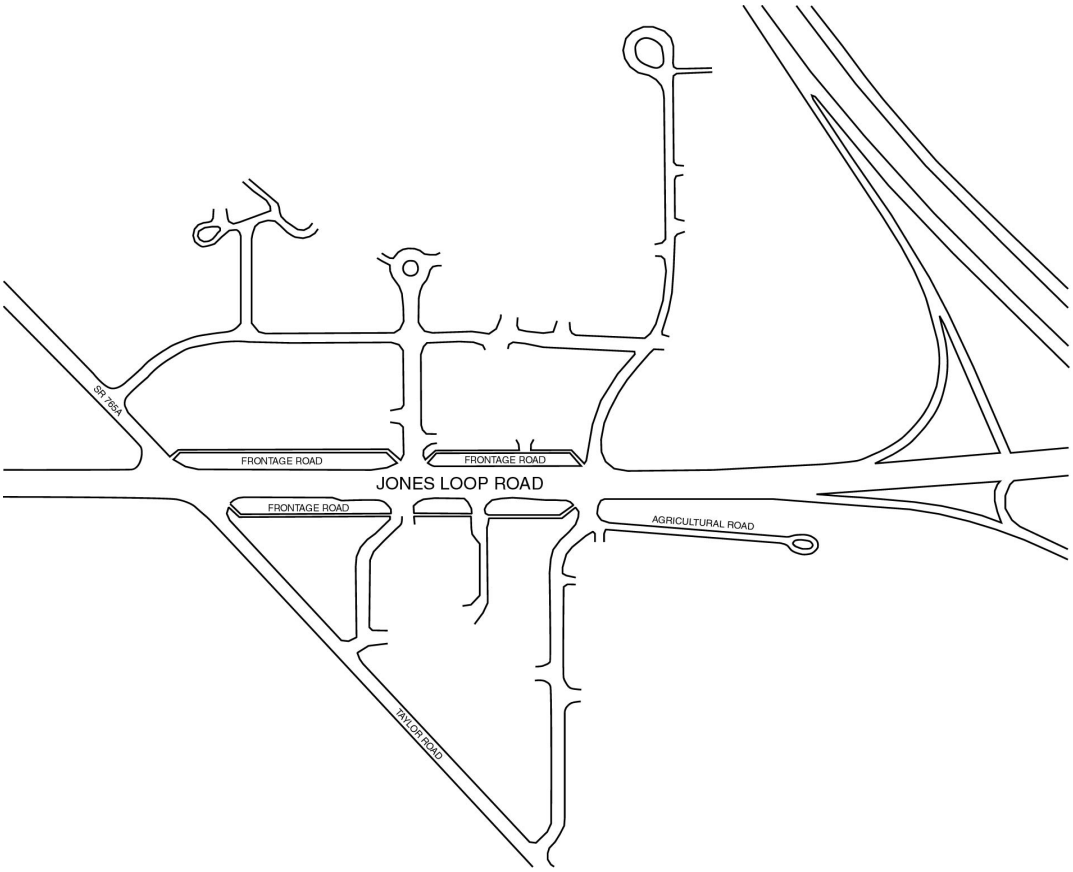
This interchange is located in Charlotte County near Punta Gorda. It is an example of how access roads can be used to direct development while preserving the safety and flow of the crossroad in the vicinity of an interchange. In this case, FDOT purchased access rights for roughly 600 feet, precipitating property access through alternate roads.

The access road, as shown in Figure 13, is a consolidated drive serving commercial development that includes a hotel, restaurant, and trucking facility and future mobile home park. Alternate access roads and interparcel access increase the potential for economic development, while channeling turning movements off the arterial so speed and flow on the arterial are maintained.

Figure 13
Internal Access Road Near Interchange

Taylor Road (SR 765A) crosses Jones Loop Road ½ mile from the west side of the interchange. Within that ½ mile, there are only three connection points to the north and three connection points on the south side of Jones Loop Road. Other access roads have been built that allow cross-connection and access to Taylor Road, without the necessity to re-enter Jones Loop Road (Figure 14).

Figure 14
Access and Local Road Network at Jones Loop Rd West of I-75



This interchange area has a characteristic that is common in rural areas: agricultural roads. These are small roads that provide access to agricultural properties. Sometimes they are unimproved, and sometimes they are improved. When an interchange is built, controversy arises over whether to maintain access to the agricultural roads or whether to deny its continued use. If the access remains, what typically happens is that the property is subdivided and the road provides access to the subdivided parcels. The problem is that these agricultural roads often provide access too close to the interchange ramp. When an alternate access road is located too close to the interchange, conflicts occur and flow is constricted.
In this case, the agricultural road remains open, as it serves agricultural land uses, and is located a sufficient distance from the I-75 on-ramp. The purchase of access rights extends up to the agricultural road, where it connects to Knights Drive, a local road.

Traffic around this interchange area is free flowing and aesthetically pleasing. The entire area surrounding Jones Loop Road west of I-75 is zoned commercial. This means that there is plenty of opportunity for growth, and the interchange will be able to accommodate it, while maintaining its integrity.

Lessons Learned

- Purchasing access rights is cost efficient and helps to preserve the functional integrity of the interchange.
- Cooperation with local government is necessary for preservation
- Alternate access roads support, rather than impede development.
- Alternate access helps to maintain flow on the arterial.
- Unified access to activity centers reduces visual clutter.
- Fewer connections means fewer choices for drivers, resulting in fewer driver decisions and conflicts.
- Length of managed area is ½ mile; less than that would be insufficient.

STATE POLICIES, PROCEDURES, AND LAWS

All local governments within the State of Florida must establish comprehensive plans and land development regulations according to Chapter 163, Florida Statutes (F.S.), and Chapter 9J-5, Florida Administrative Code (F.A.C.) (commonly referred to as the "Growth Management Act"). Florida's growth management legislation has been in place for 14 years, and the important connection between transportation and land use is finally being actively addressed. Neither transportation nor land use can be planned independently, if growth management is to be accomplished.

Access management is a stimulus for coordinating transportation planning and land use planning. The Florida Department of Transportation has had a comprehensive access management program in place since 1988. The program is implemented through Rule 14-96 (permitting) and Rule 14-97 (classification system and

standards), as well as through a design policy calling for raised medians on multilane roadways.

Intergovernmental coordination is essential to successful administration of the state's access management program. Some local governments have included access management requirements in their land development codes to support access management on state highways and are implementing access management on roadways under local jurisdiction.[13] Many communities, however, continue to allow access problems to occur along major roadways and in the vicinity of freeway interchanges. When a local government does not provide adequate measures to preserve interchange areas, it affects local, regional, and statewide interests. Yet because of institutional differences, intergovernmental coordination and access management is often difficult to achieve. Therefore, it may be beneficial to address this issue through legislation, state policies, and rules. This section sets forth recommended changes in state policy and law to promote coordinated and consistent action in managing access in interchange areas.

Chapter 163, F.S.

Florida's Growth Management Act provides an effective means of strengthening local access management and intergovernmental coordination practices. Below are proposed changes to Chapter 163, F.S. that would facilitate improved management of interchange area access and intergovernmental coordination. (Italicized portions indicate proposed additional language.)

Section 3177, Required and optional elements of comprehensive plan; studies and surveys, paragraph (6)(b):

> A traffic circulation element consisting of the types, locations, and extent of existing and proposed major thoroughfares and transportation routes, including bicycle and pedestrian ways, *and freeway interchanges.*

Section 3177(6)(j) states, in part,

> For each unit of local government within an urbanized area. . .a transportation element. . .shall address the following issues:

Add new subparagraph:

> *10. Access management measures to protect the operation and safety of transportation corridors, with attention to designated Florida Intrastate Highway System facilities and freeway interchange areas.*

Section 3177(11)(c):

> ...local government comprehensive plans and implementing land development regulations shall provide strategies which maximize the use of existing facilities and services through *interchange area plans*, *access management*, redevelopment, urban infill development, and other strategies for urban revitalization.

When a local government does not provide adequate measures to preserve interchange areas, it affects local, regional, and statewide interests. For this reason, Florida legislation should require all local governments to incorporate state access management standards (FDOT Rule 14-97) into their land development regulations as they pertain to state highways. This would help prevent local governments from approving development that violates state access standards on state highways and would create the leverage necessary for joint cooperation.

Section 3202, Land development regulations, paragraph (2) states:

> Local land development regulations shall contain specific and detailed provisions necessary or desirable to implement the adopted comprehensive plan and shall as a minimum:

Proposed new subparagraph:

> *(i) Include access management measures to protect the operation and safety of transportation corridors, with attention to designated Florida Intrastate Highway System facilities and interchange areas. For state roads, the local land development regulations shall incorporate the adopted access management standards of the Florida Department of Transportation (FDOT Administrative Rules, Chapter 14-97).*

Rule 9J-5 and 9J-24, F.A.C.

The Department of Community Affairs (DCA) reviews all comprehensive plans, plan amendments and land development regulations for consistency with local, regional, and state plans. If a government has any part of its jurisdiction within a Metropolitan Planning Organization (MPO) it must include a Transportation Element in its plan. It is logical to include a requirement for interchange areas here. One phrase could be added (italicized portion) to Section 019(4)(c).

> The [transportation] element shall contain one or more policies for each objective which addresses implementation activities for the:
>
> * * *
>
> 2. Control of the connections and access points of driveways and roads to roadways, *with highest priority given to freeway interchange areas and FIHS facilities*.

Rule 9J-5.015, Intergovernmental Coordination Element, requires identification of "local resources and facilities outside the local government's jurisdiction. . .which could be significantly impacted by development located inside the local government's jurisdiction," and to develop coordination efforts for same (subparagraph(4)(a)1.a). An interchange is a facility that fits this definition. Therefore, interchange areas require intergovernmental coordination and should be included in the State Comprehensive Plan and Strategic Regional Policy Plan. This would cause interchange areas to be addressed in the local comprehensive plans as areas of "significant impact" and would trigger a demonstration of intergovernmental compatibility (subparagraph(4)(a)4).

All proposed plans are transmitted to FDOT for review and comment. Short of DCA requiring local governments to address interchange areas as having a "significant impact," FDOT, in its written review comments, could ask for interchange areas to be identified as such and seek coordination through intergovernmental agreements or other means identified in 9J-5. FDOT District offices need to be actively involved in all comprehensive planning efforts within their boundaries (including land development regulations and plan amendments), by providing assistance, direction, and intergovernmental coordination.

FDOT Rules 14-96 and 14-97

Chapter 14-97 sets forth the adopted access classification system and standards for the state highway system, and Chapter 14-96 describes the connection permit application process and procedures. These rules set forth standards, while allowing flexibility to adapt the standards as needed. This is important, because there are innumerable situations presented at each site. Because these standards are flexible, it is best to set them high.

The current body of literature suggests varying degrees of access separation at interchanges, according to the extent of urbanization and whether the crossroads are two or four lane facilities. While this may work in other states, Florida's rapidly-increasing population and its booming tourism can turn a rural interchange area into a development frenzy in a few short years. If development and future roadway expansion are not anticipated, problems will result. High standards provide an environment for economic activity to flourish, while maintaining a safe and efficient flow of traffic. For these reasons, it is suggested that a high standard for

distance separation be established and that deviations be approved only under constrained conditions or in unique circumstances.

The latest research on spacing in the vicinity of interchanges suggests that managing a ½ mile area is critical to the long term function of highway interchanges.[14] The cases studied for this project support the suggested standard of ½ mile, based on the following:

- Development in interchange areas has a higher density within ½ mile
- Commercial zoning and land use is generally provided within ½ mile
- Failure of the interchange area occurs within ½ mile (and often beyond ¼ mile)

The standard set forth in FDOT Rule 14-97.003(1)(j) for interchange areas is as follows:

> Connections and median openings on a controlled access facility located up to ¼ mile from an interchange area or up to the first intersection with an arterial road, whichever distance is less, shall be regulated to protect the safety and operational efficiency of the limited access facility and the interchange area...

It is suggested that the area of regulation be increased to ½ mile. The proposed rule increase to ½ mile is not meant to be rigid, but for use as a general guideline. Physical characteristics, opportunities, and limitations vary, such as environmental constraints, natural resources or barriers, and other roads and/or transportation considerations.

The term "area of special concern" is used in the Interchange Request Development and Review Manual (§3.2.4) and refers to the area within ¼ mile of the interchange. For the same reasons stated above, this area should be expanded to ½ mile. In addition, to provide consistency, the term "area of special concern" should also be included and defined in Rule 14-96 and 14-97.

Where an interchange exits onto a state road, FDOT has authority for permitting access. In order to achieve its goals and preserve the functional integrity of its roadway system, Rule 14-96.007(5) allows FDOT to attach conditions to the Notice of Intent to Permit. Conditions specify what the developer needs to do before receiving an access permit. These conditions might include allowing only one access point and stipulating that it is located at a point that would create the least conflict. This option is one way FDOT can ensure development cooperation in preserving the interchange area. (For further discussion on methods and techniques, see Planning and Development section.)

With respect to connection permits, Chapter 14-96.003(2) states that "all applicants. . . are *strongly encouraged* to request a pre-application meeting," (emphasis added). This rule might *require* a pre-application conference when the request is for access to a roadway within an area of special concern (i.e., interchange area). This would initiate early involvement in carrying out interchange management techniques.

Chapter 14-96.007(4), sets forth criteria for determination of reasonable access. History substantiates that when insufficient access management measures are applied in areas surrounding interchanges, the result is a constricted flow of traffic and spillback onto the main line. For this reason, FDOT should advise in this section that reasonable access will be construed more stringently for access requests in interchange areas. To continue a pattern of liberal access permitting around these areas "would jeopardize the safety of the public" and "have a negative impact upon the characteristics of the highway," as stated in the rule (§§007(4)(a)2 and 007(4)(c)2).

As shown earlier, NCHRP 420 and the interchange spacing analysis conducted for Oregon suggest a minimum spacing of 750 feet from the ramp taper. It is possible, however, to achieve high functioning interchange areas at lessor spacing of about 660 feet with a restrictive median. This is demonstrated in the model case example from Punta Gorda, set forth earlier in this report. The key is to hold the existing standard firmly and consistently, exercising caution for approval of any deviation. Variances from the 660 feet should be approved only if the applicant can prove unmitigating circumstances, and if FDOT is certain that it will not jeopardize safety or operations. In some cases, however, it may be prudent for FDOT to purchase access rights in order to preserve the integrity of the interchange area.

Interchange Request Development and Review Manual

Florida Department of Transportation (FDOT) has the responsibility of reviewing applications for new interchanges and modifications to interchanges. The *Interchange Request Development and Review Manual* ("Manual") provides the basis for the application and its review. This responsibility affords FDOT an opportunity to ensure that interchange areas do not become a weak link in the transition to and from a limited access highway.

The Interchange Justification Report (IJR) and Interchange Modification Report (IMR) process consists of three basic areas: (1) consistency with plans; (2) technical analysis; and (3) financial feasibility. Although the Manual contains information about what is necessary in all three areas, the greatest emphasis is on technical capacity analysis, demonstrating the ability of an interchange area to handle traffic demand. The technical analysis includes modeling, level of service, and other ways to demonstrate available capacity over a 20 year period.

However, capacity and level of service do not always equal effective movement for the intended purpose of the roadway, and estimates may fall short of actual conditions. History reveals that when development around interchanges takes place without incorporating high standards of access management, the interchange area has a relatively short operational lifespan of safety and efficiency. An analysis may demonstrate sufficient capacity, but when build-out occurs without incorporating access management practices, flow will eventually be disrupted, which can lead to failure of the interchange. In order to preserve interchange areas, it is essential to look at capacity and quality of traffic flow. This means placing more emphasis on access management during the IJR/IMR process.

The IJR/IMR requires alternative analysis, but again, the emphasis is clearly on capacity/traffic operations. This leads the applicant to believe that showing available capacity and need provides sufficient grounds for application approval, and that reviewing alternatives is merely procedural.

The IMR/IJR process sets forth a minimum distance from the ramp to the first driveway and first median opening. Consolidated driveways, access roads, and distance to closest roads/driveways are not directly addressed, although reference is given to FDOT Rules, Chapter 14-97.003, which contains access management standards. However, because this Manual gives policy direction to applicants, these standards should be incorporated, for convenience.

As mentioned above, FDOT should also increase the interchange "area of special concern" (§3.2.4) from ¼ mile to ½ mile to insure long-term preservation. (See section entitled "FDOT Administrative Rules 14-96 and 14-97.")

The IMR/IJR review supports coordination with local and regional governments. Submission of an interchange proposal is a good opportunity to work with the applicant, community, and affected agencies to seek ways for the development to be mutually beneficial while protecting concerns such as land use, economic development, accessibility, transportation, safety, aesthetics, and so on. As a condition of interchange approval, FDOT should require written agreements to implement access management measures. Since an intergovernmental agreement is binding, this is the only way to ensure the protection of interchange areas. Zoning regulations and supportive policies are important, but subject to change.

It is still important, however, for FDOT to work with local governments and share sample policies and regulations for access management and land use. To achieve the greatest cooperation, it is important that negotiations for access management measures begin at the initial interest meeting and continue throughout the IRJ/IMR process. Early involvement with local governments would also provide an opportunity for FDOT to lend technical assistance in establishing specific access management regulations and design strategies for interchange areas.

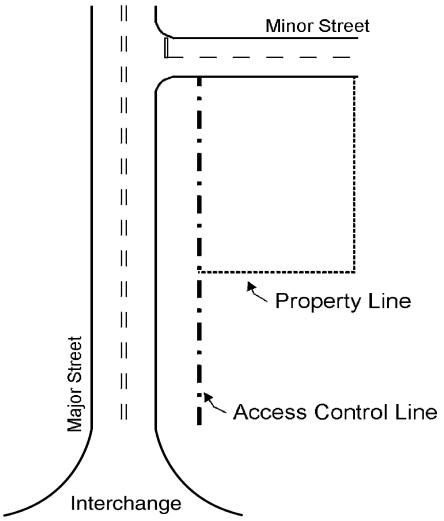
In reviewing applications for new or modified interchanges, FDOT has the authority to grant or deny an application. The application process gives FDOT the necessary leverage to secure access management measures at the time of application. This should be standard procedure for both justifications and modifications. In other words, if FDOT places importance on securing interchange areas, it should make every attempt to negotiate access management as part of the approval process. Most local governments are willing to cooperate with FDOT requests or conditions for approval, because even without development within the immediate area, an interchange strengthens the local economy by increased accessibility. This means that FDOT should use every option available to gain local assistance in preserving interchange areas. New interchanges should not be built when the crossroad connection is less than 1320 feet or where no parallel roadway facilities are available to provide for local trip needs.

Many interchanges exit onto roadways under local jurisdiction, where local governments have sole responsibility for permitting access. In these instances, local governments can be and sometimes are more restrictive than FDOT in assuring well designed access systems in these areas. However, this can also present complications in areas that lack attention to access management. Local elected officials may respond to development pressure and seek to increase the tax base by permitting development with little consideration of access issues. This is why binding agreements or the purchase of access rights a certain distance form the interchange ramp may be necessary. This is also why it is critical for local planning agencies and FDOT to work together.

FDOT has responsibility for administering public funds for projects. During the local prioritization process, there is pressure to fund as many projects as possible. It is difficult to choose to spend more money on one project now, but the long term effects could actually mean that more projects will get funded later. For example, if, in addition to the standard interchange project, FDOT included the purchase of access rights, the cost would be small compared to what it will cost in a few years to widen the road. Without the widening project competing for other project dollars, more projects can be funded. FDOT also has a responsibility to take necessary interventions to preserve the long term functioning of interchange areas.

Some ways that FDOT can ensure longevity of interchange areas include purchasing access rights (Figure 15), building an alternate access road, or building an alternate access point to direct future access roads. FDOT can also require local government to adopt an access management plan for interchange areas as a condition of interchange approval and assist local governments by identifying preferred access locations and providing guidance in drafting land development regulations that incorporate access management and preserve the function of the interchange. Sample regulations are provided for this purpose in Appendix A.

Figure 15
Acquisition of Access Rights



Joint Exercise of Powers

A central challenge of coordination is the separation of authority over transportation and development issues. One solution is to consolidate authority under a single entity. In 1949, the California legislature enacted a statute called the Joint Exercise of Powers Act for that purpose. The Act enables two or more agencies to combine powers under a joint authority. The resulting authority has access to any of the powers of the representative agencies. Therefore, an authority established to manage interchange areas could become a special purpose public entity with the powers of transportation and land use planning, implementation, and operations. This type of authority offers powers to local public and private entities, independence, and a high degree of permanence. A written agreement governs operations and specifies the terms and conditions for decision-making. (A few other states that have adopted similar laws enabling joint exercise of powers are Minnesota, Oregon and Arizona.)

Florida allows joint exercise of powers under a joint planning agreement. This is only valid for local governments and only for the purpose of joining together to achieve growth management planning objectives across municipal or unincorporated boundaries. A joint exercise of powers law, as indicated above, would allow any and all public agencies to join together for one purpose. This might result in an authority made up of representatives from FDOT, local governments, and the MPO and/or RPC.

SUMMARY AND RECOMMENDATIONS

Interchanges affect land use, land values, development, employment opportunities, travel patterns, and taxes, in turn affecting local and state governments, private citizens, landowners, motorists, and other taxpayers. Therefore, everyone has a stake in improved management of interchange areas. Local governments may have the greatest control over initiating and maintaining interchange area management; the greatest benefits may also be received at the local level.

Two basic opportunities exist for improved management of interchange area development. Local governments would benefit from the development of access management plans and regulations for interchange area access that address local street systems, access separation distances, and vehicular and pedestrian interconnection of interchange area development. The Florida Department of Transportation would benefit from greater attention to access management in the interchange justification review process.

Florida has been experiencing rapid population and development growth, and the Bureau of Economic and Business Research projects that this trend will continue.[15] Since Florida is already feeling the effects of growth on its transportation system, it would be prudent to actively pursue regulations and strategies that would reduce congestion and the rate of needed capacity improvements. Strengthening rules and regulations that support access management is probably the most effective step toward preserving interchange areas. In that regard, several additions to state regulations are recommended:

Chapter 163, F.S.

1. Local governments should be required to incorporate state access management regulations into their land development regulations for state highways in their jurisdiction.

2. Chapter 163 of the Florida Statutes should incorporate specific language regarding access management in interchange areas, as provided on pages 28 and 29 of this report.

Rule 9J-5, F.A.C.

1. Identify interchange areas and FIHS facilities as a priority for controlling connections and access points.

2. Since an interchange area fits the definition of a facility located "outside the local government's jurisdiction . . . significantly impacted by development located inside the local government's jurisdiction," all interchange areas should be identified in the Intergovernmental Coordination Element of local

comprehensive plans, along with a demonstration of how intergovernmental compatibility will be achieved.

3. Even without a rule change, FDOT could seek intergovernmental coordination of interchange areas through written comment during review of a plan (or plan update).

FDOT Rules 14-96 and 14-97

1. In general, FDOT should provide more specific direction and higher minimum standards in its rules. This places the burden on the developer to prove why a deviation from the rules, as set forth, should be allowed. It also gives clear direction to a developer before the permitting process begins.

2. Increase the area for regulating minimum connections and median openings to ½ mile from an interchange area, because:

   a. Development in interchange areas has a higher density within ½ mile

   b. Commercial zoning and land use is generally allowed within ½ mile

   a. Failure of the interchange area occurs within ½ mile (and often beyond ¼ mile)

3. Include the term "area of special concern" in these rules (as seen in the Interchange Request Development and Review Manual) and use it to refer to the area within ½ mile of the interchange area.

4. Even without an increase to ½ mile for regulating minimum connections, it is important to apply the current ¼ mile standard firmly and consistently.

5. On state roads within an interchange area, FDOT can exercise the option to attach conditions to its Notice of Intent to Permit, in order to ensure developer cooperation in preserving the functional integrity of the area.

6. When a request is made for a connection permit within an interchange area, FDOT should require a pre-application conference, rather than allowing an option for the conference. This initiates early involvement in carrying out interchange management techniques.

7. In Chapter 14-96.007, advise that "reasonable access" will be more stringently applied for access requests in interchange areas. This is in accordance with not permitting access that "would jeopardize the safety of the public" and "have a negative impact upon the characteristics of the highway."

8. Variances from the 660 feet should be approved only if the applicant can prove unmitigating circumstances, and if FDOT is certain that it will not jeopardize safety or operations.

Interchange Request Development and Review Manual

1. Place more emphasis on access management during the IJR/IMR process, showing capacity and quality of traffic flow. Currently, the IJR places an emphasis on technical analysis, demonstrating the ability of an interchange area to handle traffic demand.

2. Rather than demonstrating procedural analysis of capacity alternatives in the IJR, direct the applicant to demonstrate analyses of alternatives using access management measures.

3. Incorporate access management standards from Chapter 14-97 into the Manual for convenience. The recommended higher levels of access separation in interchange areas should be used where new interchanges are proposed.

4. Prior to approving an IJR/IMR, secure written agreements from local governments to implement access management measures, and assist local governments with sample policies and zoning regulations to aid in preservation of interchange areas.

5. Do not approve a new interchange when cross street connection is less than 1320 feet, or where no parallel roadway facilities are available to provide for local trip needs.

6. If necessary, include the acquisition of access rights in new interchange projects. It will pay for itself by putting off (or alleviating) the necessity for road widening.

7. Work with local governments to develop specific plans for interchange areas, including building alternate access roads. FDOT may construct alternate access points to direct future access roads.

8. Each district office of FDOT should arrange with local units of government to be notified on all matters that affect interchange areas within those jurisdictions.

Other Legislative Actions

1. Institute a Joint Exercise of Powers law which enables two or more agencies to combine powers under a joint authority. The resulting authority has access to any of the powers of the representative agencies.

2. Allow the regulation of access by FDOT to be extended to include ½ mile from an interchange, when the crossroad is under local jurisdiction.

Local Government Planning and Development Actions

Key measures that should be taken at the local level include:

1. Establish regulations and design requirements for service roads and/or driveway consolidation and parcel interconnection to accommodate the traffic circulation and access needs of future development in interchange areas.

2. Consider developing an access management plan for interchange areas with associated regulations.

3. Consider developing a special zoning or overlay district for planned highway-oriented development at interchanges that implements the service road and shared access concept and establishes requirements for pedestrian interconnections (see Appendix A).

4. Take immediate measures to prevent thoroughfare frontage in interchange areas from being incrementally subdivided into small lot frontages and strip development.

Using any and all resources available is paramount to preserving Florida's interchange areas and, ultimately, preserving the safety and quality of life in Florida. Transportation is the backbone of our economy, and exercising access management measures in our interchange areas is like a wellness plan that keeps them running smoothly.

ENDNOTES

[1] Feeney, K, et al. "Interchanges and Frontage Roads: Concepts and Case Studies," Proceedings of the 3rd National Conference on Access Management, Fort Lauderdale, Florida, October 1998.

[2] Layton, R. "Rationale for Interchange Area Access Management Standards," unpublished, November 17, 1999.

[3] J. Gluck, H. Levinson, V. Stover, Impacts of Access Management Techniques, National Cooperative Highway Research Program Report 420, Transportation Research Board, Washington DC: National Academy Press, 1998.

[4] Layton, R. "Interchange Access Management Background Paper No. 2," prepared for the Oregon Department of Transportation, August 1996.

[5] Gluck, J., Levinson, H.S. and Stover, V. Impacts of Access Management Techniques, *op. cit.*

[6] Median Handbook, Florida Department of Transportation.

[7] Layton, R. "Interchange Access Management Background Paper No. 2," *op cit.*

[8] A Guide for Interchange Area Planning in Wisconsin, State of Wisconsin, Department of Transportation, Division of Planning and Budget, Sept. 1985.

[9] A Guide for Interchange Area Planning in Wisconsin, *op. cit.*

[10] Virginia Polytechnic Institute and State University, The Interchange Planning and Management Handbook, Interstate 81 Corridor Council: July 1991.

[11] Virginia Polytechnic Institute and State University, The Interchange Planning and Management Handbook, *op. cit.*

[12] 1991 Florida Statistical Abstract, Bureau of Economic and Business Research, College of Business Administration, University of Florida, Gainesville, 1991.

[13] The number of municipalities engaged in access management continues to grow and there are numerous examples across the country, ranging from small communities to large urban counties. A few examples in Florida include the City of Orlando, City of Pensacola, Martin County, Lee County, Broward County, Okaloosa County, and Osceola County.

[14] Layton, R. "Interchange Access Management Background paper No. 2," *op cit.*

[15] 1998 Florida Statistical Abstract, Bureau of Economic and Business Research, College of Business Administration, University of Florida, Gainesville, 1998.

APPENDIX A

Section ___: Interchange Overlay District

A. Purpose and Intent

The purpose of this section is to preserve the development potential of interchange areas and to assure that property access in the vicinity of interchanges is located and designed in a manner that preserves the traffic functions of the interchange. Specific purposes are as follows:

1. To preserve the safe and efficient operation of traffic on the interchange crossroad and the interchange.

2. To preserve and enhance development options in interchange areas by maximizing overall accessibility of properties and capacity of the transportation system.

3. To ensure adequate weaving and maneuver distance between the first signalized intersection and the expressway ramp.

4. To prohibit access connections to interchange crossroads that would interfere with traffic operations at interchange ramps.

5. To enhance mobility by assuring that interchange areas provide for pedestrian circulation.

B. Applicability

The requirements of this section shall apply to the area extending ½ mile along the crossroad from the end of the taper of the interchange ramp, or up to the first signalized intersection, whichever is less. This area shall be designated on the zoning map as an "interchange overlay district." The requirements of this section shall apply to new interchanges as well as existing interchanges, recognizing that some flexibility will be needed to accommodate existing development and access characteristics, as provided in Section E(3).

C. Intersection Separation from Ramp

When new interchanges are located within the [name of local government] or when new roadways are constructed within existing interchange areas, the first signalized intersection shall be separated from the interchange ramps by ½ mile to provide adequate traffic operations in the interchange area. In situations where this proves impractical, the intersection must be separated from the ramp taper to the maximum extent feasible, but in no case shall this distance be less than ¼ mile.

D. Minimum Lot Frontage and Depth

The minimum lot frontage requirement for all properties with frontage on a crossroad within the interchange area shall be 660 feet. The minimum lot depth shall be at least twice the width, but no greater than four times the width. The intent of this section is to preserve opportunities for design of effective access and circulation systems for properties in interchange areas and to avoid the creation of small lot frontages with access constraints. The frontage requirement shall not apply to properties that only obtain access from an interior road.

E. Interchange Area Access

1. Local access roads shall be used for direct access to property within interchange areas. These roads shall be designed to connect to more than one other roadway, wherever feasible, to enhance the overall accessibility of the developed area. The following access requirements shall also apply:

    a. The distance to the first access connection from the ramp taper shall be consistent with FDOT requirements for state highways, or at least 660 feet on roadways under local jurisdiction, and should be right-in/right-out only. This distance shall be measured from the end of the ramp taper for that quadrant of the interchange.

    b. The minimum distance to the first full median opening shall be at least ¼ mile, as measured from the end of the taper of the egress ramp.

2. Where properties are under the same ownership or consolidated for the purposes of development, a road shall be constructed by the developer. Where the road will serve properties under separate ownership, a method will be established to apportion the costs of initiating and constructing the road. Local access roads shall be designed and paved in accordance with public road standards and shall be maintained by the [*name of local government*].

3. It is recognized that some flexibility may be needed in implementing access spacing standards, given the specific characteristics of an interchange area and the special access needs or constraints that might exist within already developed areas, except as provided in Section E(4). Property access may be provided at less than the minimum connection spacing, where the following conditions occur:

    a. No other reasonable access to the property is available, including, but not limited to, side street access, local road access, or joint and cross access with adjacent properties, <u>and</u>

    b. The connection does not create a potential safety or operational problem on the crossroad or the interchange, as determined by the Florida Department of Transportation and the [local engineer] upon review of a site specific study of the proposed connection prepared by the applicant's registered engineer.

4. The access spacing requirements for crossroad intersections, connections, and median openings shall be met in all interchange areas involving a new interchange or new crossroad. Where the spacing cannot be met the new interchange or crossroad shall not be considered.

F. Pedestrian Mobility

Circulation systems for development in the interchange area shall be designed to support pedestrian mobility. Pedestrian circulation systems shall be continuous and designed to connect adjacent properties to each other and to external sidewalks along the interchange area crossroads. Pedestrian ways may be constructed of paver blocks, concrete, or other suitable materials and may be incorporated into the landscape buffer. Pedestrian ways that traverse parking areas should be clearly demarcated. Pedestrian accessibility across interchange area crossroads shall be further supported through the use of medians.

ANNOTATED BIBLIOGRAPHY

Bishop, K. *Designing Urban Corridors*, Planning Advisory Service, American Planning Association, 418, September 1989.

A review of design elements and strategies for developing corridors and corridor plans, including land use, site planning and preservation.

Brindle, Ray. *Arterial Road Access Management: Source Document*, ARRB Transport Research Ltd. Research Report No. 271, 1995.

This report reviews activities associated with the management of access to properties adjacent to arterial roads. It argues that design considerations need not mean compromising either traffic or amenity objectives.

Crowley, J. *Roadside Protection: Newfoundland's Protected Road Zoning Program*, Journal of the American Planning Association, Winter 1991, 85-92.

Summary of Newfoundland's program of land use controls along major highways to protect roadside beauty and ensure traffic safety without severely restricting convenience of highway services and other appropriate roadside developments.

Feeney, K., Michel, R., Levinson, H. and Gluck, J. *Interchanges and Frontage Roads Concepts and Case Studies*, Proceedings of the 3rd National Conference on Access Management, October 1998.

Five of nine case studies are reviewed as part of NCHRP 3-52. The case studies analyze access separation distances and interchange spacing practices in Florida, New Jersey, Ohio, Virginia, and Washington. Guidelines for access spacing requirements are given, along with access management implications of the existing interchange systems in these five areas.

Florida Department of Transportation Systems Planning Office Presentation, *Interchange Proposal Process,* February 1995.

This presentation summarizes the contents of an application for a new or modified interchange and the process for review and approval of same. Rules and policies affecting the process are also addressed.

Florida Department of Transportation, Interchange Request Development and Review Manual, February 1998.

Details state policy and procedure for interchange requests. It supplies information for an applicant to understand the entire process, from pre-application to final decision-making, and provides an understanding of each entity's roles and responsibilities.

Gluck, J., Levinson, H.S. and Stover, V. *Impacts of Access Management Techniques*, National Cooperative Highway Research Program Report 420, Transportation Research Board, Wash. D.C.: National Academy Press, 1999.

This report classifies access management techniques and presents methods for estimating the safety and operational effects of the different techniques. This report is useful to those developing access guidelines and policy and those analyzing specific access situations.

Heydel, T. and Neuman, T. *Access Management Planning for Long Range Interchange Reconstruction – I-94 South Corridor in Southeastern Wisconsin*, Proceedings of the 3rd National Conference on Access Management, October 1998.

Paper and corresponding case study highlights the issues involved with developing an access management plan for interchanges in two adjacent counties (Racine and Kenosha) in Wisconsin. Schematics provide an overview of the existing conditions and future layout of planned interchanges.

Interstate 81 Corridor Council, The Interchange Planning and Management Handbook, July 1991.

The I-81 Corridor Council was created in 1989 to strengthen relationships between corridor communities and develop a regional strategic corridor plan. Part of their efforts was the development of a handbook which serves as a guide to localities for merging interchange development with their comprehensive planning process.

Krzeminski, R., *Access Management Approval of New Interchanges and Interchange Modification*, Proceedings of the 3rd National Conference on Access Management, October 1998.

A summary of current issues, procedures, and state policy requirements for new or modified interchanges in Florida, with a focus on the implications of access management. Interchange request procedures are linked to the state land planning goals and objectives, including justification criteria for a new or modified interchange that considers land use, environmental, and multimodal factors.

Layton, R., *Interchange Access Management, Background Paper #2,* Oregon Department of Transportation, August 1996.

Draft interchange management policy that was prepared by the Oregon Department of Transportation. The focus is interchange management within the context of access management. It is intended to provide direction for the planning, design and management of interchanges, particularly where they connect to crossroads.

Layton, R., Stover, V., and Huntington, D. *Interchange Access Management, Discussion Paper No. 2,* prepared for the Oregon Department of Transportation, Salem, Oregon, by the Transportation Research Institute, presented at the 3rd National Conference on Access Management, October 1998.

Summary of strategies for effective management, design, operation, and control of interchanges and the surrounding areas. Identifies and defines the factors and criteria that affect the spacing and location of intersections and approaches in the vicinity of interchanges. Recommended standards for location and spacing are included.

Levinson, H. and Demosthenes, P. *Access Separation Distances at Interchanges,* Final Report for NCHRP 3-52, Transportation Research Board, National Research Council, February 1998.

Guidelines and practices for access management treatments that establish separation distances at interchanges, and for those that provide individual property access through the installation of frontage roads. The paper addresses current practices and policies and draws on case studies from around the country.

Khuwaja, M., *Interchange Approval on the Freeways of Florida;* Florida Department of Transportation Systems Planning Office Presentation, February 1998.

The focus of this presentation is on the conditions that precede submittal of an Interchange Justification Report (IJR) or an Interchange Modification Report (IMR) in Florida. In keeping with federal policy guidelines, an IJR/IMR must meet required conditions.

Rhees, S. *Zoning the Interchange*, Zoning News, American Planning Association, December 1993.

Overview of five cases briefly examines how each one dealt with managing interchange areas.

U.S. Department of Transportation, Federal Highway Administration, *Guidelines for Providing Access to Transportation Systems*, January 1993.

This is an update to "Access Management for Streets and Highways," prepared by the FHWA in 1982. This report provides a comprehensive overview of all aspects of access management, including a description of access techniques, applying and evaluating access management plans, and illustrating facility design elements.

Wilbur Smith Associates, *Recommended Land Use Regulations*, Access Management Program for Sullivan Avenue/Buckland Road Corridor, Town of South Windsor, Connecticut.

This technical memorandum sets forth proposed regulatory guidelines for improving access management in South Windsor, focusing on te Sullivan Avenue and Buckland Road corridor. It describes existing state and local regulations, presents basic objectives and principles of access management, and identifies specific regulatory guidelines that should be adopted for this corridor.

Williams, K. and Sokolow, G. Model Land Development & Subdivision Regulations that Support Access Management, for Florida Cities and Counties, Center for Urban Transportation Research, January 1994.

This report provides model ordinance language for cities or counties wishing to incorporate access management and other regulatory techniques into their local land development codes. Commentary is provided for guidance in interpreting the model language and to identify issues associated with some of the regulatory standards. Local governments are encouraged to modify the standards to fit local conditions and administrative practices.

Wisconsin Department of Transportation, Division of Planning & Budget, in cooperation with U.S. Department of Transportation and Federal Highway Administration, A Guide for Interchange Area Planning in Wisconsin, September 1985.

A guide that builds upon earlier reports published by the Wisconsin DOT which highlight the Department's experiences in interchange planning and zoning. It discusses problems which can accompany uncontrolled growth in highway interchange areas. It recommends sources of assistance and methods available to guide planners and engineers in their efforts to achieve a balance between economic growth and safety and efficiency of the highway system.

REGULATIONS

Florida Administrative Code
Chapter 9J-5, Rules of the [Florida] Department of Community Affairs, *Minimum Criteria for Review of Local Government Comprehensive Plans and Plan Amendments and Determinations of Compliance*

Chapter 9J-24, Rules of the [Florida] Department of Community Affairs, *Criteria for Determining Consistency of Land Development Regulations*, July 1989.

Florida Statutes
Chapter 163, Part II, *County and Municipal Planning and Land Development Regulation*, 1998.

Rules of the Florida Department of Transportation
Chapter 14-96, *State Highway System Connection Permits, Administrative Process*.

Chapter 14-97, *State Highway System Access Management Classification System and Standards*.