



**October 2019**  
*Transportation*  
**SITE IMPACT**  
**HANDBOOK**



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# 1



## Introduction

### 1.1 Purpose of Handbook

The Florida Department of Transportation (FDOT) has developed these guidelines to assist FDOT staff in their review of developments. While this handbook is primarily for FDOT staff, it is available to local governments and other transportation partners to communicate FDOT’s guidance for reviewing various documents. The handbook is titled “Transportation Site Impact Handbook” to reflect the broader scope of work including local government comprehensive plans(LGCP), community planning responsibilities, and multimodal transportation – rather than simply traffic analysis. This handbook is designed to reflect legislative and other changes that have taken place over time.

The inclusion of Site Impact in this title is to differentiate from the Traffic Analysis Handbook also published by FDOT. For purposes of this document and in professional practice, the terms Transportation Impact Analysis and Site Impact Analysis both refer to the process of analyzing the multimodal impacts of development on the transportation system.

It is recommended that user verify with the Florida Department of Economic Opportunity (DEO), where the state land planning agency is located, for information

on future updates, which can be found at DEO's website, [www.floridajobs.org/community-planning-and-development](http://www.floridajobs.org/community-planning-and-development).

FDOT has developed an Applications Guide to serve as a companion document to the "Transportation Site Impact Handbook" (TSIH). This Applications Guide builds upon the guidance provided in the TSIH by providing *real-world* examples from *actual developments in Florida* to demonstrate the concepts discussed in the TSIH.

No two development projects are identical, and every traffic study must consider the unique context of each proposed project. Local agency requirements, neighboring land uses, existing and forecasted traffic congestion, the extent and quality of the surrounding multimodal network, and community priorities for the site and the transportation network all influence the traffic study and shape the land use decision-making process. Given these interrelated factors, thorough documentation of all assumptions and key decisions is critical to every traffic study.

<https://www.fdot.gov/planning/systems/documents/sm/default.shtm#sia>

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## 1.2 Background

### Transportation Impact Analysis –

An analysis that estimates and quantifies the specific transportation-related impacts of a development proposal

A major part of FDOT's role in community planning involves reviewing proposed developments, comprehensive plan amendments, land development code amendments, capital improvement budgets, provision of public facilities, proportionate share agreements, Evaluation and Appraisal Reviews (EAR) based amendments, and other local government actions that are identified for state review. Since these local government decisions provide the basis for development approvals, they often incorporate land use changes and impacts to the transportation network. As such, transportation impact analyses are conducted to evaluate how the transportation network would function once the proposed land use change or development takes place.

In accordance with Sections [163.3184](#) and [334.044 Florida Statutes \(F.S.\)](#), FDOT may comment and provide technical assistance on local government comprehensive plan and plan amendments that impact important state transportation resources and facilities.

Depending upon the anticipated impacts, several state and regional agencies will have inputs on these approvals. Significant impacts on regional or statewide transportation facilities are reviewed by FDOT's District Community Planning

staff to ensure that the target Level of Service (LOS) is achieved and maintained, where feasible.

FDOT's most recent Quality/ Level of Service Handbook provides guidance for incorporating transit considerations into the planning process and quantifying multimodal transportation network in the analysis of impacts.

FDOT Office of Policy Planning (OPP) coordinates with FDOT District Community Planning Coordinators and the State Land Planning Agency (SLPA) within the Department of Economic Opportunity (DEO) in developing policies, procedures, and guidelines to assist the Districts and other review agencies with the assessment of transportation impacts associated with growth and development. Increasing coordination between FDOT, SLPA, and local governments will be necessary as communities identify desirable growth patterns through strategic regional visioning efforts. To effectively protect and maintain the transportation network, all professionals will need to work cooperatively to respond to community planning issues, protect quality of life, and maximize the use of limited funding.

When conducting an analysis, professionals will need to be familiar with the following:

- Local and adjacent comprehensive plans, particularly, the Future Land Use, Transportation, and Capital Improvement Elements
- Metropolitan planning organization long-range transportation plans
- Transit development plans
- Transportation disadvantaged service plans
- Transportation demand management resources
- Commuter assistance programs
- Bicycle and pedestrian plans
- Mobility Fee
- Proposed comprehensive plan amendments
- The Community Planning Act [Chapter 163, Part II](#), as it allows for flexibility in how local governments approach concurrency. Local governments can still use concurrency exception areas, multi-modal transportation districts, urban design, or a combination to address mobility and funding needs.
- Existing large-scale developments such as Sector Plans, Development of Regional Impact as well as the potential impacts to the statewide and regional multimodal transportation network.

These documents will familiarize reviewers with the vision for the future land use and transportation system of the local government, as well as what regulatory systems are in place today.

### *1.2.1 Why is a Transportation Impact Analysis Needed?*

FDOT's role is to protect the integrity of the transportation system for the public and to minimize degradation of both the regional and local transportation networks. There are several additional reasons for FDOT to perform a transportation impact review:

- Provide public agencies with a mechanism for managing transportation impacts of land development within the context of metropolitan transportation planning (MPO), local government comprehensive planning (LGCP), and concurrency
- Provide applicants with recommendations for effective site transportation planning
- Establish a framework for the negotiation of mitigation measures for the impacts created by development
- Coordinate with local governments when a state facility will be impacted by a proposed development
- Promote multimodal transportation systems where appropriate

The transportation impact analysis review provided by FDOT can be instrumental in ensuring the protection of the state's important transportation system.

### *1.2.2 FDOT Reviewer's Role*

This handbook is intended to guide FDOT in reviewing LGCP elements, and land use approvals that may impact the State Highway System (SHS), facilities designated under the Strategic Intermodal System (SIS) and all components of SIS such as National Highway Systems (NHS) and SIS connectors. In addition, this handbook is intended to offer guidance to transportation partners at all levels of government to enhance coordination in the existing review processes.

To sustain a professional and constructive review process, FDOT reviewer comments should be:

- Professional
- Concise



- Provide suggested action by the applicant to address specific comments

Reference FDOT procedures, manuals and handbooks in the methodology agreement, where applicable, including any District procedures, Florida Statutes and Administrative Rules

FDOT reviews of LGCPs are focused on the relationship between transportation, land use, intergovernmental coordination, and capital improvements elements of the LGCP, as identified in [Chapter 163, Part II](#), F.S. FDOT reviewer should focus on impacts to important state transportation resources and facilities.

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## 1.3 About this Handbook

This handbook is designed as an electronic desktop reference for FDOT reviewers. Hyperlinks to other resources which address specific issues in greater detail are included throughout the handbook. The handbook has been organized in this manner to facilitate practical use. It consists of 3 Chapters and Appendices as follows:

[Chapter 1](#) – Introduction: This Chapter provides an overview of the Transportation Site Impact Handbook and summarizes the changes that has occurred since the last edition of the handbook.

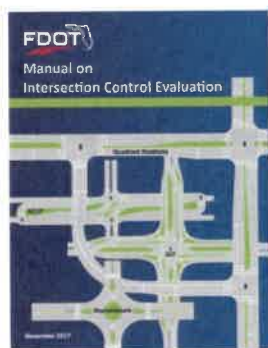
[Chapter 2](#) – The Transportation Impact Process: This Chapter discusses standard components for the completion of transportation impact analyses and reviews. Chapter 2 should be utilized in conjunction with other chapters that describe the various types of FDOT reviews.

[Chapter 3](#) – Mitigation: This Chapter provides information on mitigation processes and options for mitigating transportation impacts to the SHS.

[Appendix A](#) – Glossary

The Transportation Site Impact Handbook and many of the linked resources are available online. Given the changing nature of laws and professional practice, keeping the information within this handbook up to date has been an ambitious undertaking. The Transportation Site Impact Handbook will always be a work in progress with updates and clarifications being added as necessary.

## 1.4 Updates to this Handbook



Some major changes to this handbook include:

- References to *FDOT Florida Design Manual* (FDM, [Topic No. 625-000-002](#)) and FDM Chapter 115 Standard Plans and Standard Specifications.
- New Section 2.2.2 related to the evaluations of intersection alternatives summarizes important points associated with the Manual on Intersection Control Evaluation (Topic No. 750-010-003).
- FDOT's Topic No. 000-650-002 Context Sensitive Solutions is no longer available under FDOT Policies and Procedures. However, the Complete Streets Policy (Topic 000-625-017) are context-sensitive and incorporates all process and details related to the Context Sensitive Solutions.
- Chapters 3 and 4 from the past version of this handbook (2014) are not included. These chapters were related to the Local Government Comprehensive Plans and Developments of Regional Impact (DRI).
- Changes to the Development of Regional Impact (DRI) program. New DRI's are reviewed as State Coordinated Review comprehensive plan amendments and changes to previously approved DRIs are done solely at the local level.

### 1.4.1 State Transportation Facilities and Concurrency

Legislative changes to state law including revisions to [Chapters 163, Part II](#), (The Community Planning Act) and [380.06](#), (The Land and Water Act, Developments of Regional Impact) F.S., significantly transformed the landscape of community planning and transportation planning in Florida. As identified above, these changes have refocused the duties of FDOT, SLPA, and other reviewing agencies and reduced or expanded several governing provisions which impact decision-making and planning at the local level. Of these governing provisions, the elimination of the state requirement for transportation concurrency at the local level as well as changes to the application of level of service standards to target by FDOT and proportionate share mitigation has caused a reassessment of the identification, analysis, and mitigation of transportation impacts by proposed development.

The Florida Department of Transportation supports community planning through our statutorily mandated requirement to review local government comprehensive plans, amendments and changes to existing Development of Regional Impact. Our mandate is to identify, comment on, and recommend mitigation to ameliorate

impacts to transportation facilities of state importance. Direct any questions to The Office of Policy Planning or visit their website at:

<http://www.fdot.gov/planning/policy/GrowthManagement/>

It is essential for FDOT reviewer to understand the new role of the agency. As local governments now have more authority over planning decisions, FDOT and other reviewing agencies will take on a more collaborative role with local governments. In addition to providing technical assistance as requested, FDOT and reviewing agencies will focus on providing aid and guidance during identification and analysis, while focusing on mitigation measures for facilities of statewide significance.

# 2



## The Transportation Impact Process

### 2.1 Introduction

Throughout this chapter and in national practice, “transportation impact study” may also be referred to as “transportation impact analysis” or “traffic study.”

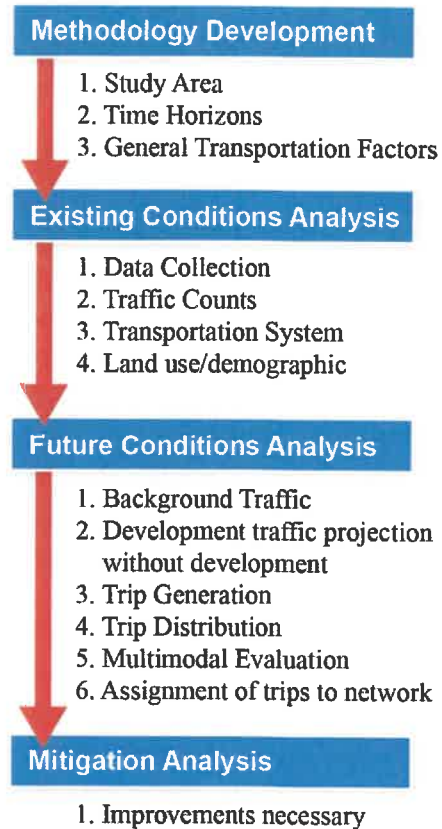
This chapter provides technical guidance for reviewing transportation impact studies. Emphasis is placed on providing guidance to allow for an understanding of regional variations rather than a one size fits all approach for the review of a transportation impact study. The objectives of a transportation impact study that a reviewer should be able to identify during their review should include the following:

- Assessment of the impacts of the proposed development on the transportation system
- Assessment of the need for improvements to achieve a safe and efficient transportation system to meet established target level of service
- Provision of a forum for stakeholder discussion
- Assessment of the needs of all reasonable users and modes impacted by the development

*Adapted from: Transportation Impact Analysis for Site Development, ITE 2005*

Transportation impact analyses should follow this general set of basic process:

*Exhibit 1*  
**Basic Framework  
of a Transportation  
Impact Analysis**



Typical traffic studies reviewed by FDOT are associated with:

- Corridor planning studies where developments will impact the roadway design and/or operations (medians, signals, turn lane analysis)
- Local Government Comprehensive Plan Amendments
- Local Concurrency reviews if applicable
- Access permit studies
- Courtesy reviews at the request of local governments for impacts to state facilities

As FDOT reviewers evaluate studies including those identified above, presentation of the summary of findings including any associated recommendations for mitigation, should be presented in a clear and concise manner.

## 2.1.1 Considerations for the Components of a Transportation Impact Study

The size, location, and type of development, as well as jurisdictional requirements, will influence the type and level of detail required for each component of the transportation impact study.

### Methodology Development

Methodology Development is an essential component in any transportation impact analysis. During this phase, the local government policies for traffic analysis play a very important role. This process should define the data, techniques, practices, and assumptions that will be used while preparing a transportation impact analysis. The parties should reach agreement regarding the data to be considered and the basic factors to be used in the study. Analyses of existing and future conditions should be based on the standards adopted by the local government. This component can be helpful to set the stage for integrating the consideration of transit and multimodal services into the analysis. Once a methodology has been defined and accepted, the technical analyses can begin.

### Existing Conditions

An Existing Conditions analysis is developed to assess current conditions and establish a basis for comparison to future conditions. In addition to the roadway network the study should analyze the transit network (not just the routes, but frequency and other measures of transit quality), bicycle, and pedestrian facilities.

### Future Conditions

Future year socioeconomic data development is driven by the MPOs based on their assessment of anticipated population growth within their boundaries. This may involve reaching out to local planning agencies and Regional Planning Councils (RPCs) to get a better sense of socioeconomic data growth.

MPOs work with local government land planners to develop model socioeconomic data. Any interim year data sets should be coordinated with the MPO to get their approval.

The future conditions analysis assesses the future impacts of a proposed development or amendment. Once the trips are assigned to the network, measures of effectiveness such as a Quality/Level of Service (Q/LOS) analysis are calculated. Anticipated multimodal services may be taken into consideration and reflected in the future condition transportation impact mitigation analysis.

The applicant may negotiate reduced vehicle impacts in exchange for including transit-oriented design consideration, for example.

## Mitigation

When a transportation impact analysis indicates that the transportation system will operate at an undesirable level of service as compared to the local adopted level of service (LOS) standards, mitigation measures to reduce transportation impacts should be undertaken. Mitigation can be in the form of enhancing operational efficiency, reducing demand or increasing system capacity. Mitigation can also reduce level of development or phase development impacts with capital improvements. Mitigation should be relative to the size of the transportation impact expected. When adverse transportation impacts are expected on Strategic Intermodal System (SIS) facilities, FDOT must work with local governments and other transportation agencies to identify and agree upon mitigation measures. This is important even when FDOT comments are only advisory.

## Importance of Multimodal Considerations

There are opportunities for including multimodal considerations at each stage of the transportation impact analysis. Some of the best references that both applicants and reviewers should be knowledgeable of regarding multimodal considerations include the latest editions of:

- [Transit Capacity and Quality of Service Manual, 3rd Edition \(TCQSM\)](#)
- [NCHRP Report 616 Multimodal Level of Service Analysis for Urban Streets](#)
- [Highway Capacity Manual](#)

## Checklists

The remainder of this chapter provides a more detailed discussion of each of the previously mentioned components in the transportation impact analysis process describing key study elements both applicants and reviewers should consider when preparing and reviewing a transportation impact analysis.

Summary of checklists for the overall site impact analysis process are provided in this handbook. These checklists can serve as a tool to help ensure that the site impact process is properly executed by both the applicant and the reviewer.

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## 2.2 Methodology Development

The Methodology Development process usually begins when the applicant (developer or other party) contacts the local government, Regional Planning Council (RPC), FDOT or other agency to discuss a proposed development. Many local governments have adopted official methods they require for development related traffic studies. Even if no formal process is required, it is good practice for

participating agencies to agree to a methodology before requesting the applicant to perform a transportation impact analysis.

Part of methodology development is for the applicable authorities to agree on the level of transportation analysis required and acceptable tools to use for this analysis. The use of various tools and their appropriate application is described throughout this chapter. In some cases the reader is referred to other FDOT publications which explain these tools in more detail.

Pursuant to revisions to Section [163.3184](#), F.S., Regional Planning Council (RPC) review and comments shall be limited to adverse impacts on regional resources or facilities identified in the strategic regional policy plan and extra jurisdictional impacts that would be inconsistent with the comprehensive plan of any affected local government within the region. A RPC may not review and comment on a proposed comprehensive plan amendment prepared by such council unless the plan amendment has been changed by the local government subsequent to the preparation of the plan amendment by the RPC.

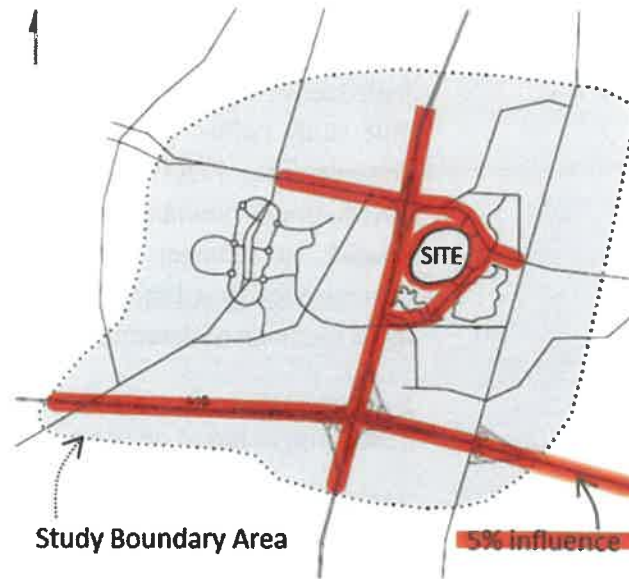
### 2.2.1 Study Area Requirements

Adjustments to the study area boundaries may be needed to account for site specific circumstances

The applicant and FDOT's reviewer should consult with the appropriate agencies to identify applicable policies and criteria in defining the study area because these policies vary. The study area is sometimes referred to as the "traffic impact area" or simply the "impact area." Local criteria for defining the study area typically involves a comparison of project traffic to thresholds of the percentage of the maximum service flow rate at an established LOS standard.



*Exhibit 2*  
**Example Study Area**



Many local governments have adopted procedures that prescribe the methodology used in defining the study area for traffic studies used to support comprehensive plan amendments or development concurrency reviews if applicable. FDOT reviewer should be familiar with the local ordinances and how they apply to the review process. Pursuant to Section [163.3184](#), F.S., comments from reviewing agencies, including FDOT, on plan amendments are limited to adverse impacts on important state resources and facilities and shall identify measures the local government may take to eliminate, reduce, or mitigate the adverse impacts. In general, FDOT is limited to issues within FDOT's jurisdiction as it relates to transportation facilities and resources for a particular site. FDOT reviewer may include technical guidance in their review.

### Distance from Site

Another method of establishing a study area for mitigation analysis is by defining as a given distance based on the number of trips generated by a development. For example, the study area will encompass a radius of 0.5 miles for developments generating 50 peak hour external trips. Some local governments have adopted a tiered approach to determining a study area.

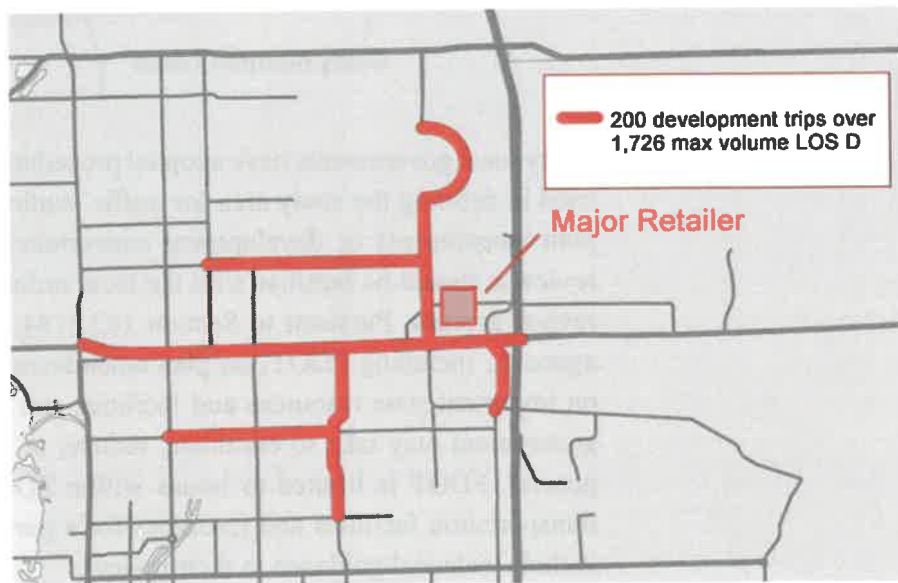
For example, a small-scale analysis might be required for developments generating between 50-100 trips with a study area radius of .5 miles, and a large-scale study might be required for developments of greater than 100 trips with a 3-mile study radius. Due to the potential for varying methodologies among local governments, FDOT reviewers should pay attention to trips that cross jurisdictional boundaries. Adjustments to the study area boundaries may be needed to account for site specific circumstances. The [Transportation Concurrency Best Practices Guidebook \(DCA 2007\)](#) has detailed descriptions of these methods of determining impact areas.

Exhibit 3 shows an example of the traffic impact area using a radius from the development based on trip generation.

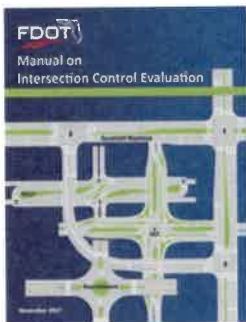
### Exhibit 3

#### Example of Traffic Impact Area or Study Area

Practices Guide, DCA 2007 (note DCA was disbanded in 2010 and the State Land Planning Agency is now housed in DEO)



## 2.2.2 Intersection Control Evaluation (ICE)



Intersections are designed points of conflict in all roadway systems. This includes U.S. and state highways, county roads, and local streets. All modes of traffic cross paths as they travel through or turn from one route to another. Where different paths separate, cross or join are known as conflict points, and these are always present at intersections. Limiting the number of conflict points at an intersection not only reduces the frequency and severity of crashes, but also improves the overall operation and mobility.

FDOT has developed the [Manual on Intersection Control Evaluation \(ICE\)](#) and related forms to facilitate objective evaluations of intersection alternatives. With

## Development Conditions that Require an ICE

the intent to promote innovative thinking and overcoming reluctance by looking at new options.

An ICE is required when:

- New signalization is proposed;
- Major reconstruction of an existing signalized intersection is proposed (e.g., adding a left-turn lane for any approach; adding an intersection leg);
- Changing a directional or bi-directional median opening to a full median opening;
- Driveway Connection permit applications for Category E, F, and G standard connection categories (defined by average daily trips thresholds in [Rule 14- 96.004](#), F.A.C.) add, remove, or modify a traffic signal; or
- District Design Engineer (DDE) and District Traffic Operations Engineer (DTOE) consider an ICE a good fit for the project.

FDOT encourages local agencies and counties to perform an ICE for projects they lead on locally maintained roadways, but ultimately it is the choice of the local jurisdiction.

## Relationship to the Strategic Highway Safety Plan

FDOT along with ten other state and federal agencies prepared a 2016 update to the Strategic Highway Safety Plan (SHSP). Intersection safety is one of 13 emphasis areas shown in the SHSP. The SHSP intersection emphasis area acknowledges the safety benefit of roundabouts and has a control strategy saying: Use traditional and alternative designs and technologies to reduce conflict risks such as innovative interchange designs, access management and roundabouts.

## Relationship to the Complete Streets

In September 2014, FDOT adopted the Statewide Complete Streets Policy ([Topic No. 000-625-017](#)). FDOT Complete Streets policy builds on flexibility and innovation to ensure that all state roadway projects are developed based on their context classifications. Intersections play an essential role in the roadway network and offer connections to different routes and facilities while providing necessary access to adjacent residential, commercial, and industrial developments. As a result, FDOT's Intersection Control Evaluation (ICE) procedure is a key component of the Department's Complete Streets implementation.

Intersections comprise a small portion of total road system mileage, but they account for a high percentage of all crashes, especially severe crashes producing

injuries and fatalities. Safety of all road users must be considered during intersection design.

Traditionally, the most common solutions to intersection challenges involved stop controlled, conventional signalization scenarios, or interchanges. Many of the performance metrics used to select between these common solutions focused on the movement of vehicles through the intersection. In recent years, several new or innovative intersection designs have been introduced across the United States. These “alternative” intersection control types are enhancing safety and improving operations, along with varying degrees of other benefits. This reimagining of geometric design and traffic control has improved the movement of people and vehicles across and through intersections. Alternative intersections including Roundabouts, Restricted Crossing U-Turn(RCUT), Displaced Left-Turn(DLT) and Median U-Turn(MUT) often consider community needs, transportation needs, and control strategies to achieve multiple objectives. This is consistent with FDOT Complete Streets Policy. Objective intersection control evaluations use performance-based criteria to determine the most viable control type for a project.

Adopting “performance based” policies for ICE creates a transparent and consistent approach for agencies to consider intersection alternatives based on metrics such as safety, operations, cost, and social, environmental and economic impacts. ICE is intended to be a data driven, performance-based framework to optimize the State’s investment and provide solutions that consider all users.

## Stages of ICE

### ICE has three stages:

**Stage 1:** Screening – completed during a project’s initial stage. FHWA’s Capacity Analysis for Planning of Junctions (CAP-X) is an operational analysis tool to evaluate selected types of innovative intersection designs. FDOT has expanded this tool for use in Florida. FHWA’s Safety Performance of Intersection Control Evaluations (SPICE) is a separate tool used for safety analysis.

**Stage 2:** Preliminary Control Strategy Assessment – completed following a project’s initial stage when more detailed information is available. SPICE is used for a more detailed safety analysis than in Stage 1. FDOT has developed default Synchro templates for operations analysis of certain types of alternative intersections. FDOT ICE Tool is a separate tool for benefit-cost analysis.

**Stage 3:** Detailed Control Strategy Assessment – completed prior to Preliminary Design/Phase I plans. Stage 3 analysis is not required for Project Development and Environment (PD&E) studies as this type analysis is a normal part of PD&E.

At the completion of each stage, the appropriate FDOT ICE form is completed and submitted to the DTOE and DDE.

FDOT Manual on Intersection Control Evaluation (ICE) and related forms and tools can be found at:

[http://www.fdot.gov/traffic/trafficservices/Intersection\\_Operations.shtm](http://www.fdot.gov/traffic/trafficservices/Intersection_Operations.shtm)

### 2.2.3 Time Horizons – Analysis Years

In general, the analysis years should include:

- The existing year
- The opening date of the proposed development
- Completion of major phases in a multi-year development

In some cases, it may be needed to consider:

- Long-range transportation plans or Local Government Comprehensive Plan (LGCP) horizons,
- Metropolitan Planning Organization (MPO) prepared Transportation Improvement Program horizons or other significant transportation network changes
- Corresponding local government's Transportation and Capital Improvement Elements (CIE)

Analysis years should be clearly defined in the report (i.e., “2010 Existing Conditions” instead of just “Existing Conditions”) and agreed to during the methodology process.

**Exhibit 4**  
**Suggested Study Horizons**

DOC

14-96  
Access Permits

<b>Local Government Comprehensive Plans</b>	Existing, short-term (5-year), and long-term (10-year minimum or greater) analyses are required for comprehensive plan elements. The short-term horizon is covered by the Plan's five-year schedule of capital improvements; the long-range horizon is a minimum of ten years but can be longer based on the local government's supporting data and analysis.
<b>Concurrency Reviews</b>	Typically, these developments occur in a single phase. Therefore, the anticipated opening year of the development assuming build out and full occupancy is the only horizon year required. Local government requirements should be reviewed.
<b>Access Permits</b>	Depends on the size and scope of the development. Many will be studied only for the opening year, and larger developments may have longer time horizons. For information on driveway connection permits, please refer to <a href="#">Rule 14-96, Florida Administrative Code</a> .

Under Section [163.3177](#), F.S., a comprehensive plan must be based on a planning period of at least 10 years with a Five-Year Schedule of Capital Improvements located within the CIE. Additional planning periods for specific plan components, elements, land use amendments, or projects are allowed. The Five-Year Schedule of Capital Improvements must identify facilities and any associated funding necessary to meet adopted LOS during a 5-year period; however, there is no requirement that the CIE prove the schedule is financially feasible. Listed facility improvements must be identified as “either funded or unfunded and given a level of priority for funding.”

Legislative changes in 2011 eliminated mandatory transportation concurrency requirement for local governments. Local governments may choose to repeal concurrency and establish other approaches such as mobility-fee based systems. Pursuant to Section [163.3180\(5\)\(h\)1.](#), F.S., local governments should consult with FDOT whenever a SIS facility is expected to be impacted by a comprehensive plan amendment. There are stipulations if a local government chooses to continue using transportation concurrency.

If a local government elects to repeal transportation concurrency, it is encouraged to adopt an alternative mobility funding system that uses one or more of the tools and techniques identified in section [163.3180\(5\)\(f\)](#), F.S.: Local governments are encouraged to develop tools and techniques to complement the application of transportation concurrency such as:

- Adoption of long-term strategies to facilitate development patterns that support multimodal solutions, including urban design, appropriate land use mixes, intensity and density

- Adoption of an area-wide level of service not dependent on any single road segment function
- Exempting or discounting impacts of locally desired development
- Assigning secondary priority to vehicle mobility and primary priority to ensuring a safe, comfortable, and attractive pedestrian environment with convenient interconnection to transit
- Establishing multimodal level of service standards that rely primarily on non-vehicular modes of transportation where existing or planned community design will provide adequate a level of mobility
- Reducing impact fees or local access fees to promote development within urban areas, multimodal transportation districts, and a balance of mixed-use development in certain areas for affordable or workforce housing

Mobility Fees relate to concurrency and multimodal fees relate to flexibility. Multimodal fees are seen in places like Orange County, and the Cities of Orlando, Oviedo, Casselberry, Tampa, and Sarasota. Cities such as Pasco County have a mobility fee. For more information on the Pasco County mobility fee visit the County's website at:

<http://www.pascocountyfl.net/index.aspx?NID=329>

FDOT has also produced a Guidebook on "Using Mobility Fees to Fund Transit Improvements" in November 2016, which can be found at:

<https://www.fdot.gov/transit/Pages/NewTransitPlanningandPolicy.shtm>

This guidebook helps local governments plan, develop, and implement a mobility fee program to fund local or regional transit and transit-supportive investments. It serves as a resource for local government in the early stages of considering mobility fees to those interested in improving an existing mobility fee program.

## 2.2.4 Travel Adjustment Factors

Transportation impact analyses are usually based on a peak-hour analysis. The analysis period should be related to the expected peaking patterns on the roadway and anticipated development traffic.

Selecting a proper time period to analyze is crucial for planning and designing transportation facilities. For example, the "K" factor is the ratio of the peak hour traffic volume being analyzed to the Annual Average Daily Traffic for a specific facility which is an important component in selecting a proper time period. Detailed discussion of the K factors and analysis period are found in the most recent [Quality/Level of Service \(QLOS\) Handbook](#).

The analysis period selected should be the period that has the highest combination of development and background traffic. This is referred to as the “peak hour”.

The selected analysis period should be clearly stated in the methodology. FDOT reviewer should check that appropriate factors have been applied to field collected data so that the appropriate analysis period is being used. Detailed information about the application of adjustment factors to collected traffic counts is found in most recent [Project Traffic Forecasting Handbook](#).

**Exhibit 5**

**Typical Peak Hour Analysis Period for Various Types of Developments**

		Weekday Street Peak Hour		
Development		AM	PM	Other
<b>Residential</b>		X	X	
<b>Office</b>		X	X	
<b>Shopping Center</b>			X	(including freestanding Discount Superstores)
Intersection capacity			X	
Access Design			X	Saturday 11:00-15:00
<b>Restaurants</b>			X	11:00-13:00
Fast Food			X	
Dinner Trade			X	
<b>Industrial</b>		X	X	Industrial Plant shifts may precede typical commuter adjacent street peak hour
<b>Hotel/Motel</b>			X	
<b>Schools</b> Grade		X		14:30-15:30
High		X		14:30-15:30
College		X	X	
<b>Medical</b> Hospitals		X	X	6:30-8:00    14:30-15:30
Doctors' offices			X	9:00-10:00    16:00-18:00
<b>Convenience Markets/Gas</b>		X	X	
<b>Sports/Recreational</b>				Peak entry/exit of events

*Adapted From: ANALYSIS OF TRAFFIC IMPACT FOR NEW DEVELOPMENTS  
PAUL C. BOX, Skokie, Illinois Public Works Magazine: February 1981*

**Trip Generation and Adjustments**

Trip generation is the process by which the number and type of trips associated with a given land use is estimated. Trip generation may be the most critical element of the transportation impact analysis because it estimates the number of trips associated with a specific land use or development. An estimate of trip generation from the development using FDOT approved trip generation methods, such as the most current Institute of Transportation Engineer (ITE)'s *Trip Generation Manual*, is required in all analyses.



Due to the amount of guidance on the subject on trip generation, most of the trip generation guidance can be found in Chapter 2.4.

When adjustments are applied to lower the gross trip generation (for example internal capture percentages for mixed-use projects, transit oriented development, pass-by trip rates for retail land uses, etc.) they should be accompanied by sufficient logical justification and/or empirical data early in the process. This should be a major item of discussion during the Methodology Development phase.

### Use of “Manual Methods” and Travel Demand Forecasting Models for Future Conditions

Future conditions for impact assessments can be estimated using “manual methods,” travel demand forecasting models, or a combination of the two. For the purposes of this handbook, “Manual Methods” are those methods of trip generation NOT done with large-scale travel demand models, such as [Florida Standard Urban Transportation Model Structure \(FSUTMS\)](#). The most common examples of “Manual Methods” are trip generation estimation done using trip generation rates or equations, and background traffic growth calculation done using growth factors or adding known trips from other developments to the surrounding road system.

In addition to trip generation, trip distribution is needed to determine the travel patterns (origins and destinations) of the trips generated which is described in more detail under Chapter 2.6. The method to be used to project trip distribution will often depend on the size and scope of the project, as well as the availability of a travel demand model for the study area. The method to be used should be determined as early as possible in the process through coordination with FDOT and local agencies.

In many cases, a hybrid approach can be used that uses elements of both manual and model methods. For example, background conditions and trip generation might be estimated using manual methods while trip distribution and assignment might be based on large-scale model methods. In another example, if FDOT reviewer questions the distribution and assignment of trips generated by a development analyzed using a manual method, the component potentially could be compared with the results of an assignment made with a travel demand model.

### Other Major Committed Developments and Redevelopment

Major committed developments are developments that have an approved Development Order (DO) or an approved concurrency management certificate. These should be considered in the transportation impact analysis. These trips are known as “vested” or “committed” trips are those that have already been considered when analyzing for transportation deficiencies. While the

development associated with these trips may not be built yet the trips have been mitigated; thus, they should be handled as existing trips.

Pursuant to Section [163.3180](#), F.S., “the term “transportation deficiency” means a facility or facilities on which the target level-of-service is exceeded by the existing, committed/ vested trips, plus additional projected background trips from any source other than the development project under review, and trips that are forecast by established traffic standards, including traffic modeling, consistent with the [University of Florida's Bureau of Economic and Business Research](#) medium population projections. Additional projected background trips are to be coincident with the particular stage or phase of development under review.” For additional guidance, please see Sections [163.3177\(1\)\(f\)](#), [163.3180](#), F.S and [163.3184](#), F.S. Background trips should be discussed with the local government, as the methodology in calculating this can vary.

The traffic from these developments is part of the background traffic and is addressed in greater detail in Chapter 2.5. The way committed development will be accounted for in the analysis should be determined as early as possible in the process through coordination with FDOT and local agencies.

## Redevelopment Sites

How to account for previous traffic from site that is being redeveloped

If a new development is being proposed on a site that previously generated a significant amount of traffic, the reviewer should determine, in advance, the treatment of the traffic that was generated on that site.

In order to encourage in-fill development, some local governments and other agencies “discount” the older site developed traffic and treat it as part of the Background Traffic. This will depend on local government practices, and other considerations such as, the time the property was vacant and existing traffic conditions around the site.

### 2.2.5 Standard “K” Factors

The ratio of peak hour to Annual Average Daily Traffic (AADT) factor (K) is used in the Department's planning through design phases. It is one of the most critical factors in transportation analysis.

During peak travel hours, many Florida roadways are oversaturated or constrained meaning travel demand exceeds the capacity of the roadways. Using measured K factors for oversaturated roads distort how roadways should be planned and designed. Measured volumes simply cannot exceed a

roadway's capacity even during peak hours. Especially problematic is the determination of appropriate K values in large urbanized areas. For more information on standards K factors refer to the Project Traffic Forecasting Handbook.

<https://www.fdot.gov/planning/systems/programs/SM/ptf/default.shtm>

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## 2.3 Existing Conditions Analysis and Data Collection

The existing traffic information (year, adjustment factors regarding peak season, daily and peak hour traffic) should be discussed during the **Methodology Meeting** and accepted by the reviewing agencies before conducting traffic counts.

This analysis establishes a basis for comparison of the proposed development. The basic analysis should consist of identifying the operational and physical characteristics of the transportation system using professionally accepted practices. FDOT's guidelines for data collection found in the most current FDOT Quality/Level of Service Handbook, This Handbook also addresses measuring the quality of service for transit, and non-motorized travel.

### 2.3.1 Data Collection

Types of data generally required for the study area are discussed below and summarizes the data collection and existing conditions requirements.

#### Exhibit 6

#### Common Data Needs for Site Impact Analysis



### 2.3.2 Proposed Site Development Characteristics

The proposed land uses should be identified by intensity and characteristics consistent with most recent ITE's **Trip Generation Manual**

The proposed site development characteristics will identify the location of the proposed development, site boundaries and other site related characteristics. This information should be presented based on the following guidance:

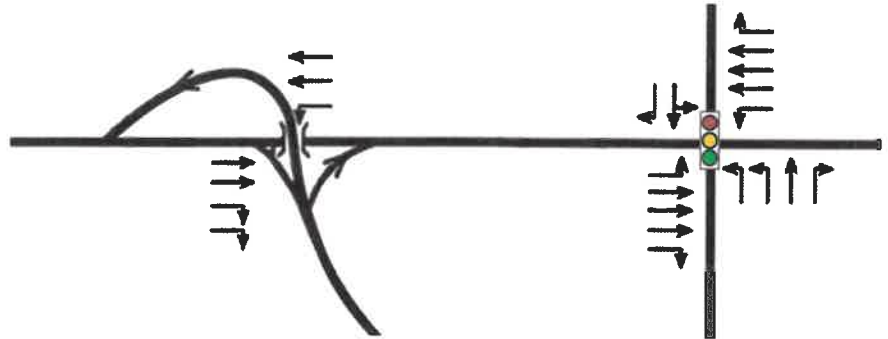
- A site plan or master plan should be provided that clearly indicates the location of proposed land uses, intensities, and internal roadways
- The proposed land uses should be identified by intensity and classification consistent with most recent ITE's Trip Generation Manual as much as possible
- The proposed traffic signals, median openings, major driveways and access locations serving the site should be identified
- The required study area or anticipated area of influence for the proposed development should be identified with site development characteristics

### 2.3.3 Existing Transportation System Data

#### Required Data

The existing transportation system data will include the physical and functional characteristics of the transportation system. Required data to be provided include:

- Geometric data such as the number of lanes, locations of intersections and signals (see example below)



- The access management classification and jurisdiction responsible for the facility (state, county or local) for all facilities within the area of influence
- The area type (rural, transitioning, urban or urbanized area)
- Identification of transit, bicycle, and pedestrian routes
- Crash information for all modes, including pedestrian crashes. This may point out problem areas for future remediation
- Identification of programmed improvements on state highways and significant regional, local (city or county) roads
- Transit facilities and services within the next three years or through each major phase of the proposed development
- Identification of planned improvements that are reported in the MPO long-range transportation plan
- Identification and review of multimodal information, data, and considerations with appropriate agencies

#### Data Considerations for Future Transit Service

When considering potential transit services, the density, diversity, and distance factors associated with a proposed development should all be considered. Specifically, transit needs should be assessed in the context of the types of housing, mixture of land uses, density and intensity of development, as well as walking distance to transit stops.



As the need for transit services is reviewed, the focus of the analysis should extend outward from development projects and activity nodes to consider the potential for modifying existing transit service.

The study area should not be restricted in terms of walking distance; rather the reviewer should consider, in consultation with the transit provider, whether it is desirable to extend service a modest distance to serve new development.

The Transit Development Plan (TDP) may be reviewed and the transit agency serving the area should be contacted to determine the current and committed service in the area.

Additional transit-related tools and resources are available in the Public Transit Office to assist reviewers.

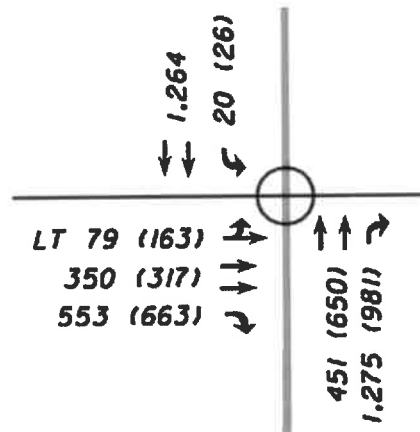
<https://www.fdot.gov/transit/Pages/NewTransitPlanningandPolicy.shtm>

### 2.3.4 Traffic Counts and other Transportation Data

Existing transportation demand data will include current and historical traffic volumes, turning movement counts, traffic characteristics such as peak and directional factors, ridership data, bicycle and pedestrian activity. All traffic analysis summaries and reports should clearly identify the specific year of analysis.

**Exhibit 7**  
**Example of Existing Intersection Counts**

*Numbers in parenthesis are PM Peak and without are AM Peak*



Where FDOT data is not available, the applicant is responsible for collecting data in accordance with review agency guidance and procedures. Data from

years when significant transportation network changes occurred or major phases of related developments were opened to traffic should be noted and possibly excluded if they could skew the trend analysis.

For a planning analysis of existing conditions, FDOT recommends calculating roadway traffic volumes and specific traffic factors based on 3-day counts. This would be 72-hours of consecutive counts taken within the time frame of Tuesday through Thursday in urbanized, transitioning and urban areas. For rural areas, 7-day counts are usually recommended. Weekend counts may be necessary for some developments (sport/recreational land use activities such as theme parks and stadiums).

For larger developments, the last five years of historical data should be collected (if available). FDOT's existing Annual Average Daily Traffic (AADT) counts, classification counts from the Traffic Characteristics Inventory (TCI) could be a prime source for historical traffic data.

This data is stored in the Traffic Characteristics Inventory (TCI) and Roadway Characteristics Inventory (RCI) databases maintained by FDOT.

FDOT Traffic Counts also available on-line at:

[www2.dot.state.fl.us/FloridaTrafficOnline/viewer.html](http://www2.dot.state.fl.us/FloridaTrafficOnline/viewer.html)

The sources for guidance on data collection and queue length refer to:

- [FDOT Quality/Level of Service Handbook](#)
- [FDOT Project Traffic Forecasting Handbook](#)
- [FDOT Design Manual Chapter 212](#)

### *2.3.5 Land Use and Demographic Data for Large-scale Models*

Land use and demographic data will include future land use classification, intensity, population, employment, comprehensive plan information. If a large-scale transportation model is used in the analysis, the transportation analysis zones (TAZ) representing the location of the proposed development should be identified. The socioeconomic data contained in the ZDATA files of the model should be verified for accuracy and reasonableness within the study area.

Pursuant to Section [163.3177\(1\)\(f\)3](#), F.S., demographic data for comprehensive plans must be based upon permanent and seasonal population estimates and projections, which shall either be those provided by the

University of Florida’s Bureau of Economic and Business Research (BEBR) or generated by the local government based upon a professionally acceptable methodology. For land use, local governments must provide a minimum population needed for land uses based upon BEBR midrange for a 10-year planning period. However, it must be more than just population projections and must provide adequate supply for real estate market. For areas designated as Areas of Critical State Concern, as defined under Section [380.05](#), F.S., associated administrative rules shall apply.

Other committed developments should also be identified within the area of influence. Also, document adopted amendments to the comprehensive plan or other development agreements. The extent of data required for other committed development should be agreed upon during the methodology meeting.

## Model Data Considerations

When considering the use of large-scale transportation model data, attention should be paid to the base year model validation within the area of influence of the development to be studied”.

## Level of Service Analysis

FDOT has adopted a level of service policy in 2017. The Policy statement is the following:

It is the Department’s intent to plan, design and operate the State Highway System at an acceptable level of service for the traveling public. The automobile mode target level of service for the State Highway System during peak travel hours are “D” in urbanized areas and “C” outside urbanized areas. The Department shall work with local governments to establish appropriate level of service targets for multimodal mobility and system design. The targets shall be responsive to all users, for context, roadway function, network design, and user safety. The complete policy can be found at:

PDF

Policy  
000-525-006-C

<https://www.fdot.gov/planning/systems/programs/sm/los/>

LOS determinations should be based on methodologies consistent with the most current [Highway Capacity Manual](#) , the most recent [FDOT Quality/Level of Service Handbook](#) or a methodology determined by FDOT as being comparable.

For existing conditions, Level of Service analysis should be performed along each segment of the roadway system identified in the methodology component within the area of influence. These facilities will include the major roadways and intersections within the study area.

Critical intersections for analysis may be identified based on the importance of the roadways or the volume of development traffic using the intersection. Although arterial facility LOS is stressed in highway LOS targets, detailed



analyses at selected intersections may be necessary to evaluate specific movements. Both facility LOS and intersection analysis are appropriate to determine impacts from proposed developments.

For interchange analysis, refer to the Interchange Access Request User's Guide and the Traffic Analysis Handbook. These are available at:

<http://www.fdot.gov/planning/systems/programs/sm/intjus/default.shtm>

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## 2.4 Trip Generation of the New Development

Trip generation is the process by which the number and type of trips associated with a given land use. Trip generation may be the most critical element of the transportation impact analysis reviewed by FDOT because it estimates the number of trips associated with a specific land use or development. An estimate of trip generation from the development using FDOT and professionally accepted methods should be required in impact studies even when the model method is used.

Adjustments to trip generation that are made to lower the gross trip generation (such as internal capture percentages for mixed-use projects, pass-by capture rates, etc.) should be accompanied by sufficient logical justification or empirical data early in the process. FDOT suggests this be a major item of discussion during Methodology Development and during the ongoing analysis.

### 2.4.1 Trip Generation Data

A trip end either begins or ends in the development

To understand trip generation, it is first necessary to define a trip end. For the purposes of this handbook, a trip end is a single or one-direction vehicle movement with either the origin or the destination (entering or exiting movement) inside the study site and one origin or destination external to the land use.

One of the most recognized and comprehensive compilations of trip databases available

To avoid confusion, all "trips" in this section of the handbook (regarding Manual Methods of Trip Generation) will be vehicle movements. The term "person-trips" will be used when the number of people traveling is referred to. Person trips are usually a term used in the model calculations of trip generation. For example, a family of four traveling from home to school would represent one vehicle trip and four person-trips.



Trip generation databases have been developed over time and can be used to estimate the number of trips associated with a given land use. One of the most recognized and comprehensive report of trip generation data available is the ITE's most current *Trip Generation Manual*. It is comprised of data collected nationally. A wide variety of land uses are represented in *The Trip Generation Manual*, though users should exercise judgment in selecting and applying trip rates for their situation. See Exhibit 8 for definition of terms such as independent variable, average rate, time period, etc.

**Source: Most current ITE *Trip Generation Manual***

<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/trip-generation-10th-edition-formats/>

*Exhibit 8 - ITE Trip Generation Manual Page Example*

**Shopping Center** Land Use

(820) ITE Land Use Code

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Vehicle Trip Ends vs: 1000 Sq. Ft. GLA Independent Variable

On a: Weekday, Time Period

Peak Hour of Adjacent Street Traffic,  
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban Sample Size

Number of Studies: 261

Average Size of Independent Variable: 1000 Sq. Ft. GLA Percent of total trips ends entering and exiting the site during indicated time period

Directional Distribution: 48% entering, 52% exiting

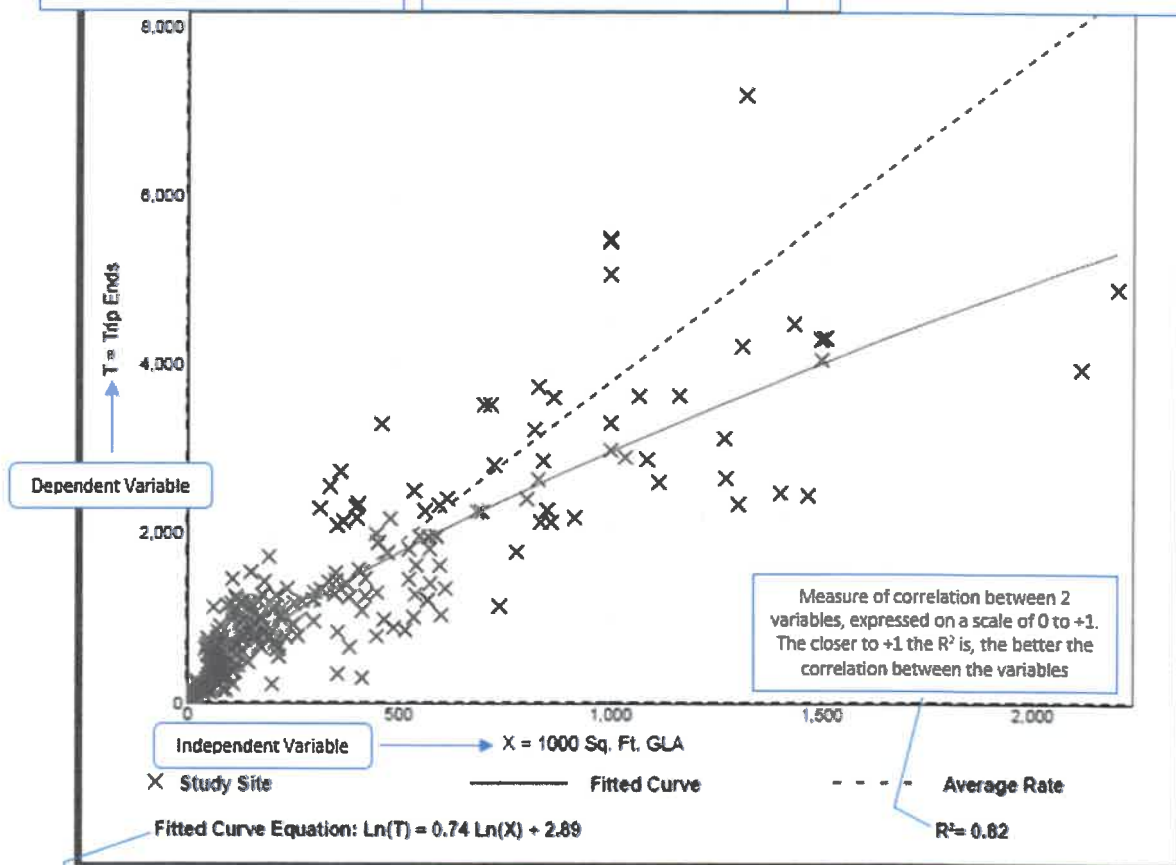
**Vehicle Trip Generation per 1000 Sq. Ft. GLA**

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

The weighted average number of vehicle or person trips entering or exiting a development site per one unit of the independent variable.

Minimum and maximum trip generation rates from the entire range of studies reported

The standard deviation estimates the difference among the trip generation rates in all studies for a land use and independent variable



Best fit regression equation; expresses the optimal mathematical relationship between two or more related variables. If the variables are related linearly, the equation will be:  $T=aX+b$ . In a non-linear relationship:  $\ln(T)=a\ln(x)+b$ .

## 2.4.2 Use of Trip Generation Rates or Equations

**ITE's Trip Generation Manual** provides guiding principles for selecting equations or average rates

The average rates provided in ITE's *Trip Generation Manual* are given, but you should look at the range of data selected and the number of sites sampled.

Trip generation equations are also provided in ITE's *The Trip Generation Manual* that can provide better estimates of trip generation under certain conditions. In general, the fitted equations tend to reflect a decreasing trip rate as building size increases. This is particularly true with large shopping centers and office developments.

Many of the land use categories in ITE's *The Trip Generation Manual* provide both an average trip rate and an equation to estimate the number of trips for that use. FDOT often applies the guidance in ITE's *Trip Generation Manual* for selecting regression equations or average rates. The ITE's *Trip Generation Manual* only provides equations where their national committee felt there was sufficient data. This does not always mean that the equation is always the best choice.

The most current volume of the ITE's *Trip Generation Handbook*, contains a detailed method for determining the choice of average rate or equation. However, sometimes a plainly numerical approach as suggested in the ITE's *Trip Generation Handbook* is inadequate. The professional will look at the size and type of development they are proposing and see where it "fits" in the graph provided. The professional should look at the number of similar size developments before recommending the trip generation method.

### Use Fitted Curve Equation when:

- A fitted curve equation is provided and the data plot has at least 20 data points

OR

- A fitted curve equation if provided, the curve has an  $R^2$  of at least 0.75, the fitted curve falls within data cluster, and the weighted standard deviation is more than 55 percent of the weighted average rate.

### Use Weighted Average Rate when:

- The data plot has at least three data points (and preferably, six or more);
- The  $R^2$  value for the fitted curve is less than 0.75 or no fitted curve equation is provided;
- The weighted standard deviation for the average rate is less than 55 percent of the weighted average rate;
- The weighted average rate is within data cluster in plot.

**Collect Local Data when:**

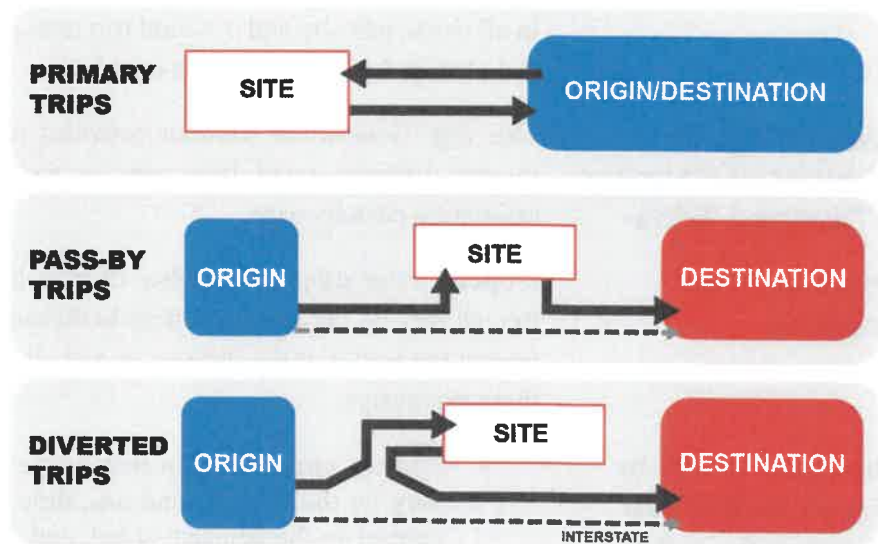
- Study site is not compatible with ITE Land Use Code definition;
- Data plot has only one or two data points (and preferably, when five or fewer);
- The weighted standard deviation for the average rate is greater than 55 percent of the weighted average rate;
- Independent variable value is not within range of data; or
- Neither weighted average rate line nor fitted curve is within data cluster at size of study site.

### 2.4.3 Trip Types

After the number of trips has been estimated, the type of trips should also be addressed. The most recent ITE *Trip Generation Manual* defines three basic types of trips generated by a development: primary, pass-by and diverted. Exhibit 9 illustrates the types of trips from the most recent ITE *Trip Generation Manual*.

#### Exhibit 9

Types of Trips  
Source: ITE



#### Primary Trips

**Primary trips** are trips made for the specific purpose of visiting the generator. The stop at the generator is the reason for the trip. Primary trips are new trips on the network.

#### Pass-by Trips

With pass-by trips, the total driveway volumes are not reduced.

**Pass-by trips** are trips that are currently on the roadway system and pass directly by a generator on the way to the primary destination. These trips are involved in a “trip chain” of destinations with neither the origin nor the destination of the primary trip being in the development. Pass-by trips can be convenience-oriented; for example, stopping to refuel a vehicle during a

commute from work. Pass-by trips are applied only to retail-oriented and some commercial land uses and would have traveled on the roadway adjacent to the retail land use even if the retail was not present.

### Diverted Trips

With diverted trips, the total driveway volumes are not reduced.

Diverted trips are counted as new trips where they travel on segments required to reach the site where they previously did not travel

**Diverted trips**, like pass-by trips, are not new to the system. However, diverted trips are now using a segment of the roadway system that they previously were not. Facilities that receive diverted trips may require analysis of the impacts of the development trips.

In most situations, no reduction is made for diverted trips because they tend to be difficult to account for. Reviewers may allow consideration of diverted trip impacts on a case-specific basis when there is a clear reason for doing so and the diversion can be reasonably estimated. For example, a reasonable case might be made for considering diverted trips in the analysis of a large commercial development proposed to be located adjacent to an Interstate interchange. If use of diverted trips were to be justified and supported by FDOT in a situation such as the example above, then the diverted trips would be treated similar to pass-by trips. However, their impact to the development access points and signals is important.

In all cases, pass-by and diverted trip rates should be justified by the applicant, and clearly documented in the analysis.

### Estimating the Number of Pass-by & Diverted Trips

The *Trip Generation Manual* provides pass-by and diverted trip data for several different retail land uses as well as guidance on the process for estimating pass-by trips.

### Pass-by Trip Impacts

Properly estimating the number of pass-by trips is important because even though they do not add extra trips to the surrounding roadway system, they do impact the traffic at the driveways and all the turning movements expected at these driveways.

The number of pass-by trips is calculated after accounting for internal trips

- The percentage of trips that can be classified as pass-by for a site will vary by the type of land use, time of day, type and volume of traffic carried on the adjacent street, and the size of development;
- Credit for pass-by trips is usually only allowed for retail and some commercial land uses such as fast-food restaurants with drive-through windows, service stations, and drive-in banks; and
- The number of pass-by trips is calculated after accounting for internal trips (Total Site Trip Generation – Internal Trips = External Trips; apply pass-by reduction to External Trips).

Pass-by rates should be approved by the lead reviewing agency

In all cases, pass-by rates should be justified by the applicant and approved by the reviewing agency. The pass-by trips estimated in the trip generation component are preliminary.

### 2.4.4 Explanation of the 10 Percent of the Adjacent Street Traffic

Final pass-by trips are estimated following trip assignment when the number of pass-by trips considered can be compared with the total traffic on the facility. Proper application of pass-by trips requires that the following check for a reasonableness or “common sense” check, involving a comparison of the number of pass-by trips and assuring that they do not exceed 10 percent of the peak hour two-way traffic on the adjacent street. Explanation is provided in the next section.

FDOT-approved methodology for determining the 10 percent reasonableness check divides the total pass-by trip reduction by the adjacent-street traffic volume. This process ensures the resulting pass-by volume is less than 10 percent of the adjacent street traffic. The calculation would become more complex when the development is served by more than one arterial roadway. Another consideration is the availability of median openings directly serving the property. This 10 percent value is a rule-of-thumb and not a statistically studied factor and should only be used as a measure of reasonableness.

Historically, some applicants and reviewers determined the maximum allowable pass-by trips by taking 10 percent of the adjacent-street traffic and allowing this number of trips to enter and then exit the retail development. FDOT does not accept this method because it results in up to 20 percent of adjacent street traffic to be subtracted from the base trip generation as pass-by trips.

#### Comparing ITE Pass-By Trips with FDOT guidance

(FDOT suggest that Pass-By Trips should be no more than 10% of adjacent street traffic)

For example, refer to the *Trip Generation Manual 10<sup>th</sup> Edition* and the *Trip Generation Handbook 3<sup>rd</sup> edition*. The information is based on Land Use Code (LUC) 820, Shopping Center on a weekday between 4 and 6 p.m.

**Example:** A 500,000 gross square foot (Sq.Ft.) of shopping center is proposed on a roadway that has 3000 peak hour two-way traffic.

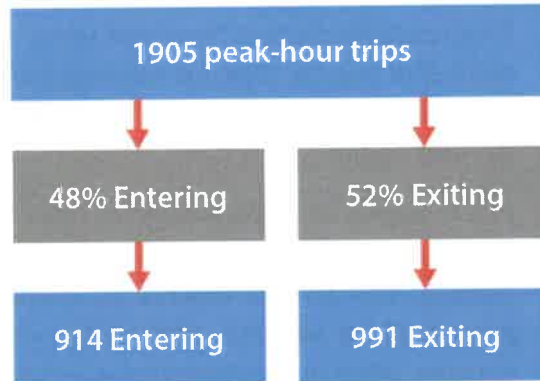
#### STEP 1 Calculate trips generated for the proposed development.

*The average rate for the LUC 820 is 3.81 (Exhibit #8)*

Square Feet	x	Average Rate	=	Peak Hour Trips Generated
500	x	3.81	=	1905 Peak Hour Trips Generated

**STEP 2** Calculate the directional distribution volumes.

*As shown in Exhibit #8, the Directional Distribution for this LUC is 48% entering and 52% exiting.*

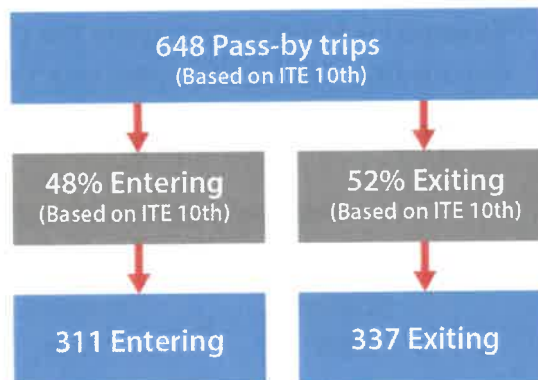


**STEP 3** Calculate the Pass-by trips reduction and its directional distribution.

*Based on ITE Trip Generation 3rd edition, the Average Pass-By Trips Percentage for the LUC 820 is 34% (Exhibit #10)*

$$\begin{array}{rclcl}
 \text{Peak Hour} & & & & \\
 \text{Trips} & \times & \text{Average Pass-By} & = & \text{Pass-By Trips} \\
 & & \text{Trips Percentage} & & \\
 \\ 
 1905 & \times & 34\% & = & 648 \text{ Pass-By Trips}
 \end{array}$$

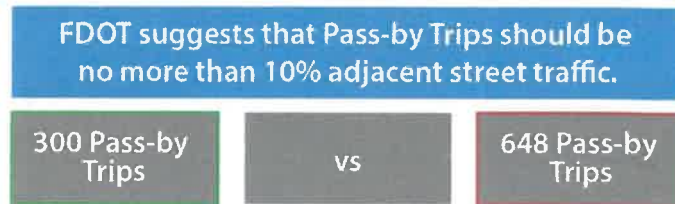
**DIRECTIONAL DISTRIBUTION**





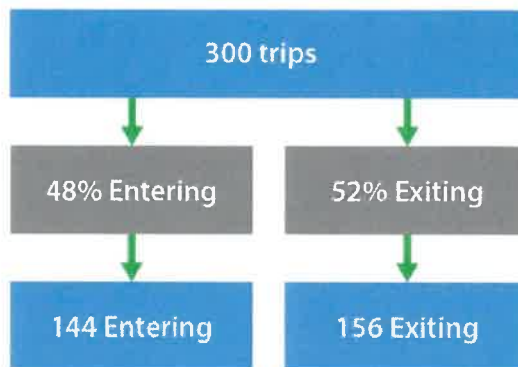
**STEP 4** Compare ITE's Pass-by Trips reduction vs FDOT's Pass-by Trips guidance.

*The Adjacent Street Traffic is 3000.*



*Since 648 > 10% of the adjacent street traffic, the Pass-by trips should be 300.*

**STEP 5** Calculate the directional distribution based on the 300 Pass-by trips.



*Exhibit 10 - Trip Generation Handbook 3rd Edition-  
Pass-By Trips Land Use Code 820*

**Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period  
Land Use Code 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
237	W. Windsor Twp, NJ	Winter 1988/89	—	4:00–6:00 p.m.	48	—	—	52	—	48,000	Booz Allen & Hamilton
242	Willow Grove, PA	Winter 1988/89	—	4:00–6:00 p.m.	37	—	—	63	—	28,000	McMahon Associates
297	Whitehall, PA	Winter 1988/89	—	4:00–6:00 p.m.	33	—	—	67	—	28,000	Orth-Rodgers & Assoc. Inc.
360	Broward City, FL	Winter 1988/89	—	4:00–6:00 p.m.	44	—	—	56	—	73,000	McMahon Associates
370	Pittsburgh, PA	Winter 1988/89	—	4:00–6:00 p.m.	19	—	—	81	—	33,000	Wilbur Smith
150	Portland, OR	—	519	4:00–6:00 p.m.	68	6	26	32	—	25,000	Kittelson and Associates
150	Portland, OR	—	655	4:00–6:00 p.m.	65	7	28	35	—	30,000	Kittelson and Associates
760	Calgary, Alberta	Oct.–Dec. 1987	15,436	4:00–6:00 p.m.	20	39	41	80	—	—	City of Calgary DOT
178	Bordentown, NJ	Apr. 1989	154	2:00–6:00 p.m.	35	—	—	65	—	37,980	Raymond Keyes Assoc.
144	Manselapan, NJ	July 1990	176	3:30–6:15 p.m.	32	44	24	68	—	68,347	Raymond Keyes Assoc.
549	Natick, MA	Feb. 1989	—	4:45–5:45 p.m.	33	26	41	67	—	48,782	Raymond Keyes Assoc.

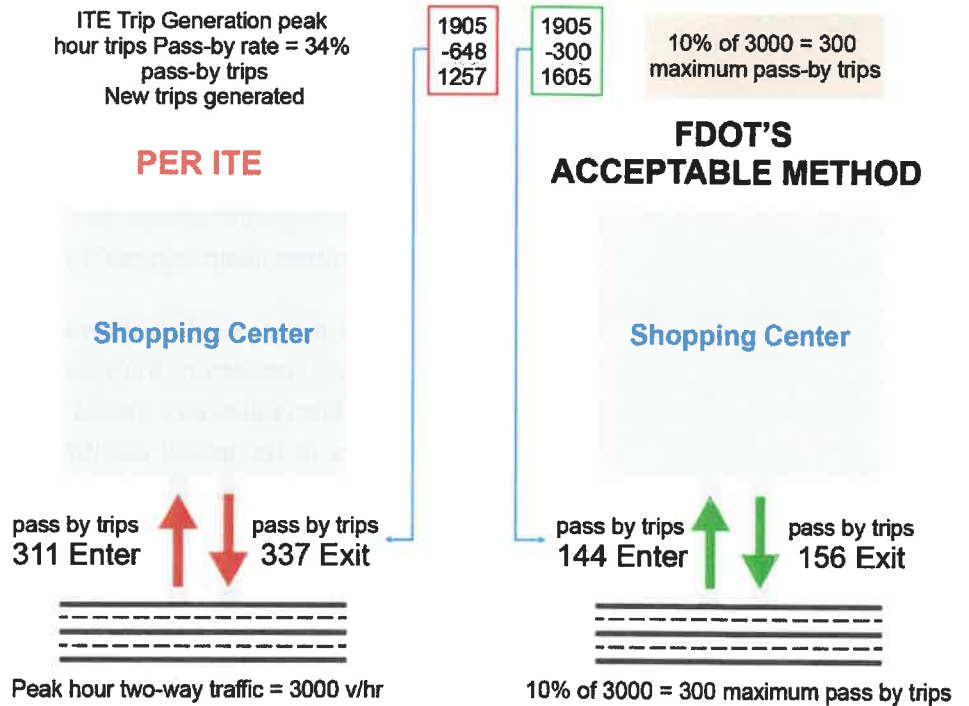
Average Pass-By Trip Percentage: 34

“—” means no data were provided

*Exhibit 11*  
**Application of  
 10 Percent  
 Pass-by Trips**

# 10% Pass - by Trip Example

for a Shopping Center  
 Peak Hour two way traffic on adjacent street = 300 v/hr



## Adjust pass by trips to equal 300

Pass-by trips are assigned to the development's driveways based on local knowledge of expected trip patterns and traffic volumes. When considering pass-by trips, the distribution of driveway volumes may change and be related to the street traffic. The analysis of pass-by trips should occur in two steps:

First, determine the number of new trips and pass-by trips for the site, then assign the pass-by trips in proportion to the street traffic and the driveways, and then assign the new trips in accordance with standard trip distribution procedures. Once the number of pass-by trips is determined, their assignment should be prepared in a way that reflects local travel patterns.

The following section requires some knowledge of large-scale regional transportation planning models. In Florida, the modeling framework is the Florida Standard Urban Transportation Model Structure (FSUTMS). This section will be using technical terms related to regional transportation modeling. For more information on FSUTMS, see Chapter 2.5.4 and the FSUTMS website.

## Pass-by Trip Assignment

## 2.4.5 Development Trips and Model Volumes

### Model Method of Analysis for Trip Generation

The model method of site impact analysis typically uses an adopted regional travel demand model for development generated trips. Model trip generation estimations of the site being studied should be adjusted to match estimations from ITE's *Trip Generation Manual* or other approved method. Trip generation should be calculated off line using ITE's *Trip Generation Manual* or other approved method. Model trip generation estimations should be adjusted to match estimations from ITE's *Trip Generation Manual* or field data. The following summarizes the steps required to estimate trip distribution and internal capture using regional travel demand models:

1. **Develop a new transportation analysis zone (TAZ)** for the development and provide connectors from this zone's "centroid" to the transportation network. The connectors should be coded consistently with other centroid connectors in the model (facility type, area type and number of lanes). The connections should be made to a facility that is appropriate to the intensity and type of land uses associated with the development and is consistent with the preliminary site access plan. Residential and nonresidential land uses should be modeled in separate TAZs unless they will be in a single mixed-used site. Socioeconomic data consistent with the development program should be coded within ZDATA 1 and ZDATA 2 files.
2. **Conduct initial model run to:**
  - Obtain initial person trip generation outputs to extract the trip purpose percentages.
  - Extract total vehicle trips from the development zones using the O-D matrix output.
3. **Estimate site trip generation by using ITE's *Trip Generation Manual*.** Although preliminary estimates of pass-by and diverted traffic may be estimated using information contained in ITE's *Trip Generation Manual*, pass-by and diverted trips cannot be calculated when using the model method and may therefore be ignored until post-processing model outputs. The model identifies development trips on the network. The subsequent pass-by analysis after modeling is complete determines which of those trips are primary (new) trips and which are pass-by trips.
4. **Compare vehicle trip generation obtained manually to the large-scale transportation planning model.** If the model-generated trips for any given land use is less than the ITE-generated trips, the total external site trip generation obtained using the planning model should be adjusted until convergence occurs with manually estimated trip generation using the

Model trip generation estimations of the site being studied should be adjusted to match estimations from ITE's *Trip Generation Manual* or other approved method

following methodology. Identify any difference in vehicle trips between manual and model calculations.

- Convert vehicle trip difference to person trips by using vehicle occupancy factors coded within the model.
- Insert person trip difference values in the ZDATA3 file. Trip purpose percentages obtained from Step 2 should be assigned to person trips entered into the ZDATA3 file.
- Rerun the model and repeat Steps 2 through 4 until convergence is obtained between the manual and model vehicle trip values.

Later iterations may be required to reach a level of convergence that satisfies the lead reviewing agency. Model-generated vehicle trips for the project should be greater than or equal to the manually generated trips (typically no more than 5 percent greater). A table comparing the trip generation based on ITE's *Trip Generation Manual* and the model-generated trips should be provided for each development TAZ.

Any reductions that encourage transit usage such as transit oriented design (TOD) should be negotiated later during the mitigation process.

5. Estimate internal capture using the guidelines contained in ITE's *Trip Generation Handbook* or other mutually agreed method.

With FDOT approval, model intrazonal trips can be used to replicate internal capture analysis performed in accordance with ITE-recommended procedures. Internal capture should be negotiated based on specific design criteria such as the appropriate mix of specific land uses, the quality of connections between the land uses (particularly pedestrian connections), the density of the proposed development, and the relative difficulty of accessing alternative off-site destinations. The model does not allow input in the first two criteria. (Industrial, commercial, and service employment inputs in the model are not specific enough.) Models, therefore, should not be the primary determinant of the internal capture percentage. The inclusion of intrazonal trips (trips that never leave a project TAZ) in internal capture estimations are subject to approval by FDOT.

6. If trips are anticipated to have an origin or destination external to the model's study area, ZDATA4 files should be adjusted. For instructions on distributing See Chapter 2.5.4.

Internal capture should be negotiated based on specific design criteria such as the appropriate mix of specific land uses, the quality of connections between the land uses (particularly pedestrian connections), the density of the proposed development, and the relative difficulty of accessing alternative off-site

destinations. The model does not allow input in the first two criteria. (Industrial, commercial, and service employment inputs in the model are not specific enough.) Models, therefore, should not be the primary determinant of the internal capture percentage.

### 2.4.6 ITE Limitations

Florida's unique demographic makeup and the influence of tourism on travel in Florida may require variances from these national averages for certain land use types.

While offering the most comprehensive national trip database available, the Trip Generation Manual does not offer data for all situations. Some of the key limitations of The Trip Generation Manual include:

The plots presented in the Trip Generation Manual cover only the range of independent variables for which data are available. Caution should be used if the development that is being reviewed is greater than the ranges provided in the ITE Land Use codes. Therefor professional judgment is required.

### Special or Unusual Generators

The reasoning and data used should be documented and approved by FDOT prior to use.

When a proposed development cannot be adequately described by the most recent ITE Trip Generation Manual, or recent recognized research, new trip generation data collection may be required. Judgment may be used to recommend trip generation characteristics that are appropriate for the development. However, the reasoning and data used to support these estimates should be documented and approved prior to use. Examples of special or unusual generators include unique places not well represented by data contained in ITE's Trip Generation Manual like outdoor flea markets, theme parks, and venues with special events. If new data is to be collected, the method for its collection (number of sites, days of data collection, location of sites, etc.) should be thoroughly discussed and agreed upon with the reviewers.

### Alternatives to ITE Trip Generation Data

Local trip data should be collected in accordance with ITE's Trip Generation Manual

Given these limitations, it is sometimes necessary to adjust trip rates to reflect documented local conditions and/or develop additional trip generation procedures. First, a review should be conducted to determine if other applicable data is available. Trade publications such as ITE Journal, university studies, government studies, and studies by other recognized parties are made available from time to time and often serve as an interim guidance until incorporated into a future edition of *The ITE Trip Generation Manual*.

Lacking any published data, a common alternative to using data from ITE's *Trip Generation Manual* is to collect data from other developments of similar use and size. Local trip data should be collected in accordance with ITE's Trip Generation Manual Handbook.

### 2.4.7 Internal Capture Rates for Multi Use Developments

Estimating an internal capture rate for a mixed-use development is often one of the most debated and challenging steps in the overall site transportation impact assessment process. Internal capture rates vary by the mix of land uses, size, and location context. Location context consists of factors such as remoteness, presence of competing retail, and job destinations.

Because there are so many factors, FDOT cannot recommend just one method or one set of internalization factors to be used for all mixed-use developments. Research done in the past provides guidance on the best way to estimate internal capture. Whatever is the chosen method will need to be discussed and agreed to by the people and agencies involved in the analysis.

#### **The Importance of the latest FDOT Research on Internal Capture**

The most recent research done by FDOT shows that the internalization rates will vary greatly depending on the type of mixed use development is being studied. FDOT studied multi-use developments in suburban areas, and those in dense transit oriented areas. The research shows that the factors you would use, let's say between on-site residential and on-site retail would be very different in a true transit oriented, tightly integrated development than a mixed-use development which is auto oriented, single family residential oriented, and has a standard shopping center at its entrance.

FDOT study, *Trip Internalization in Multi Use Developments*” BDK84 977-10, is can be found at:

<https://www.fdot.gov/planning/systems/documents/sm/default.shtm#sia>



#### **National Cooperative Highway Research Program (NCHRP) Report 684 Enhancing Internal Trip Capture Estimation for Mixed-Use Developments**

In 2011, the National Cooperative Highway Research Program (NCHRP) completed a study on enhancing trip internalization estimates especially for modern emerging land uses served by transit and well-integrated land uses. In addition to the original ITE land uses such as residential, retail, and office, the NCHRP has added restaurant, cinema, and hotel.

**Exhibit 12**  
**Internal Capture**  
**Example**  
**Input**  
**NCHRP 684 Excel**

NCHRP 684 Internal Trip Capture Estimation Tool						
Project Name:			Organization:			
Project Location:			Performed By:			
Scenario Description:			Date:			
Analysis Year:			Checked By:			
Analysis Period:			Date:			
All Street Peak Hour						
Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITELUCs	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses <sup>1</sup>				0	0	0
Total				0	0	0
Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorist	Veh. Occ.	% Transit	% Non-Motorist
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses <sup>1</sup>						
Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
Office	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
Table 4-A: Internal Person-Trip Origin-Destination Matrix <sup>2</sup>						
Origin (From)	Destination (To)					
Office	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
Table 5-A: Computations Summary						
Category	Total	Entering	Exiting			
All Person-Trips	0	0	0			
Internal Capture Percentage	0%	0%	0%			
External Vehicle-Trips <sup>3</sup>	0	0	0			
External Transit-Trips <sup>4</sup>	0	0	0			
External Non-Motorist Trips <sup>5</sup>	0	0	0			
Table 6-A: Internal Trip Capture Percentages by Land Use						
Land Use	Entering Trips	Exiting Trips				
Office	N/A	N/A				
Retail	N/A	N/A				
Restaurant	N/A	N/A				
Cinema/Entertainment	N/A	N/A				
Residential	N/A	N/A				
Hotel	N/A	N/A				

<sup>1</sup>Land Use Codes (LUCs) from Trip Generation Information Report, published by the Institute of Transportation Engineers.  
<sup>2</sup>Total estimate for all other land uses at mixed-use developments are not subject to internal trip capture computations in this estimate.  
<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.  
<sup>4</sup>Person-Trips.  
<sup>5</sup>Indicates computation that has been rounded to the nearest whole number.  
 Estimation Tool developed by the Texas Transportation Institute.

**Exhibit 13**  
**Internal Capture**  
**Example**  
**Output**  
**NCHRP 684 Excel**

Project Name:		0				
Analysis Period:		All Street Peak Hour				
Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (a) Entering Trips			Table 7-A (b) Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips <sup>1</sup>	Veh. Occ.	Vehicle-Trips	Person-Trips <sup>1</sup>
Office	100	0	0	100	0	0
Retail	100	0	0	100	0	0
Restaurant	100	0	0	100	0	0
Cinema/Entertainment	100	0	0	100	0	0
Residential	100	0	0	100	0	0
Hotel	100	0	0	100	0	0
Table 8-A (a): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
Office	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
Table 8-A (b): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
Office	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
Table 9-A (a): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode <sup>2</sup>		
	Internal	External	Total	Vehicles <sup>3</sup>	Transit <sup>4</sup>	Non-Motorist <sup>5</sup>
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>1</sup>	0	0	0	0	0	0
Table 9-A (b): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode <sup>2</sup>		
	Internal	External	Total	Vehicles <sup>3</sup>	Transit <sup>4</sup>	Non-Motorist <sup>5</sup>
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>1</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.  
<sup>2</sup>Person-Trips.  
<sup>3</sup>Total estimate for all other land uses at mixed-use developments are not subject to internal trip capture computations in this estimate.  
<sup>4</sup>Indicates computation that has been rounded to the nearest whole number.



## 2.4.8 Community Capture: Internal Capture for New Towns

### The Rationale for Community Capture

The ITE-recommended method for analyzing internal capture is based on a very small sample of conventional suburban mixed-use developments intended to be part of the fabric of an urban region. Typical internal capture percentages reflect the limited opportunity for overall trip-making to be satisfied within the proposed development boundaries. For example, if a development contains residential and retail components, the on-site residents would have relatively few trips satisfied onsite (by visiting other on-site residents and shopping—or in some cases, working—at the adjacent retail center). Many more of the residential trips generated would travel off-site for work, education, recreation, personal business, medical needs, additional shopping, and many other purposes.

### Where May Community Capture Be Applied?

From time to time a vast development encompassing an entire new town is proposed. Examples of new towns in Florida include The Villages, Babcock Ranch, and Palm Coast. These new towns are not intended merely to be bedroom communities for nearby larger cities. They are designed to be home and workplace for residents numbering in the tens of thousands, with a wide range of housing types and housing values, and encompassing all the urban services and jobs of a self-contained city. These services include offices, industrial parks, shopping centers, hospitals, schools, places of worship, public parks, entertainment, government facilities, and civic space. They are truly self-contained communities, usually located a distance away from other established urban areas, further reinforcing their self-sufficiency. (Large mixed-use developments adjacent to a larger city have no reason to be self-contained, because there is no reason to duplicate hospitals and other urban services that already exist in the adjacent city, for example.)



In these specialized cases of comprehensive new towns, it becomes impractical to apply ITE internal-capture analysis methods due to an overwhelming number of land uses and the self-contained nature of the development. Internal capture rates for an entire city can be radically higher than typical multi-use development capture rates. Florida DOT, therefore, has begun studying this phenomenon of what they are calling “community capture.” (See the document in the left margin and visit the Florida Department of Transportation web page: <https://www.fdot.gov/planning/systems/documents/sm/default.shtm#sia>)

While “community capture” and “internal capture” are different, some of the research and applications associated with internal capture may apply to community capture.

Section [163.3164\(32\)](#), F.S., defines “New town” as an “urban activity center and community designated on the future land use map of sufficient size, population, and land use composition to support a variety of economic and social activities consistent with an urban area designation. New towns shall include basic economic activities; all major land use categories, except for agricultural and industrial; and a centrally provided full range of public facilities and services that demonstrate internal trip capture.” These communities may be separated by travel-time, design, or distance from other major land use concentrations. They provide a wide range of internal services, which may satisfy a significant portion of their needs within the community.

New towns may have several town centers or villages, which embrace connectivity within, and between, each center and village with a transportation system of multiple modes, including pedestrian paths, bicycle facilities, and shuttles.

### Numerical Factors for Community Capture

Because each free-standing community will have unique characteristics, FDOT will not recommend minimum or maximum values for community capture. Reasonable analysis of proposed developments will be used and will be verified by substantial and ongoing monitoring programs. Ideally, after further study, agreement in the professional community should occur on some ranges and measurement criteria. However, because this is an emerging topic, many of the early estimates will be negotiated based on professional judgment and verified with substantial and detailed monitoring agreements. If negotiated both parties should present substantiating assumptions.

### Justification of Community Capture Values

The justification will need to include summaries showing the numbers and percentages of trips served within the proposed development. For example, depending on the development, it could read like this,

*“X % of the entering shopping trips expected in the PM peak hour make up Y% of the total exiting shopping trips from homes within the community.”*

Additionally, there must be information provided in sufficient detail to clearly support and explain the process used to determine a proposed community capture value. This analysis should be done for each phase, with an agreed upon monitoring program.

### Commitment to Traffic Monitoring

While the detailed needs of the traffic monitoring program will be determined through the traffic study process, elements such as origin and destination studies, trip generation studies, and an evaluation of land use mixes in the development and the surrounding community will usually be included in the

## The Factors Impacting Community Capture

monitoring program. Monitoring will probably be necessary before the development enters a new phase. If appropriate, trip characteristic assumptions and impact mitigation requirements will be revised based on the monitoring.

Community capture will go beyond internal capture, accounting for the unique trip making aspects of a large, self-standing development with a balanced mix of uses such as a new community or town. The concept focuses on:

**Land Use Characteristics:** A balance of land uses where form and function result in trips being satisfied within the development must exist for significant community capture to occur. Some of these factors are:

- **Income-Compatible Uses:** Residential and employment centers should be income-compatible so residents have ample employment opportunities in the community. Employment centers should attract a significant amount of the workforce from within the community.
- **Type of Community:** Is this a community planned for all age groups with job opportunities, or is it a retirement community? Is the new community primarily recreational? These issues can have an important impact on community capture.
- **Community Design:** The design features of the community can affect both the number of external vehicle trips, as well as the internal trips using major roadways. For example, a well-designed development with good internal connectivity will make it more convenient for trips to stay on site. By providing alternative connections internal to the site, the number of vehicle trips needing to use a major roadway to traverse the site can be reduced. Internal capture is facilitated by a high level of connectivity and short travel distances between complementary land uses.

**Development Maturity:** The project's fullest community capture may not occur until the complementary land uses mature. This may occur late in the development program and may depend on the quantity and balance between complementary land uses. However, each phase or increment must mitigate the cumulative impacts to the regional network resulting from the current phase or increment and previously approved phases or increments.

**Location Context:** The location context of large, mixed-use developments may impact community capture in the following ways:

- **Remote Locations:** For a remote location with a balance of complementary land uses, high trip capture may occur. For the trips

not captured on site, longer external trip lengths will result because there would be few opportunities for trips to end near the site.

- **Competing External Opportunities:** If there were ample nearby destinations (shopping, jobs, or entertainment) outside of the community, the community capture rate would likely be lower. For example, if a mixed-use development is located near other large developments, the community capture rate may be reduced.
- **Trip Generation of Isolated Communities:** Discussion is ongoing regarding the trip generation characteristics of isolated communities. One assumption proposed is if a community is isolated, and a trip cannot be satisfied on site, some discretionary trips are less likely to occur. While not making a trip can be an option for some trips, such as shopping, it is not an option for work-related trips, which have the highest impact during peak hours.

**Multimodal Elements** (Encouragement of transit, walking, and cycling): The provisions of on-site transit circulators and integrated systems of bicycle, golf cart, and pedestrian paths may have an impact on vehicle trip generation and vehicle trip capture. Such amenities make it easier for trips to remain on site and may reduce the need for vehicle trips to occur.

### Using large-scale transportation models to estimate community capture

Current Florida travel demand models (FSUTMS) do not contain sufficient detail to predict internal capture, and are therefore not appropriate tools to be used as the primary determinant of community capture values.

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## 2.5 Projecting Future Conditions

### 2.5.1 Projecting Future Background Traffic

Future Background Traffic serves as the base condition in determining the impacts of development on the transportation system in future years. Background traffic is comprised of two elements:

- The expected increase from overall growth in through traffic (traffic movements through the study area that do not have an origin or destination in the study area)
- Traffic from other developments in the study area (other than the project being analyzed). For example, major committed developments defined as developments that have an approved development order or

concurrency management certificate should be included in background traffic

Future Background (non-site) Traffic is typically estimated using one of three methods based on local area needs and conditions:

- 1) **Growth rate/trend methods** relying on historic trends. The growth rate (trends) and build-up methods are often referred to as “manual”, even if done with a computer. This method is typically appropriate in applications for:
  - Small projects that will be built within one or two years
  - Areas with at least five years of data showing stable growth and expected to remain stable
- 2) **Build-up methods** that use specific development information. This method is typically appropriate in applications for:
  - Areas experiencing moderate growth
  - Areas where multiple projects will be developed during the same period
  - Project horizon years of 5 years or less
  - Locations where there is thorough documentation of development approvals
- 3) **Model methods** involve the use of a large-scale travel demand model, such as FSUTMS. Model methods are typically appropriate in applications for:
  - High growth areas
  - Large regional projects that may have multiple build-out phases
  - Locations where there is sufficient information available to calibrate the model to current and future conditions

*Special Note on  
Using Large-scale  
Transportation Models*

Modeling is a complex practice involving knowledge, experience, and understanding of the geographic area. The following discussion is meant to provide broad guidance. The practices in your area may vary. All modeling decisions should be made with regular contact with the transportation modeling staff of the appropriate FDOT District.

Considerations for selecting the appropriate method for a given situation include; the type of development project, the development within the study area, available data, horizon year, and agency requirements. It is possible that the applicant may be requested to document growth assumptions using more than one method. For example, rates based on using the growth rate (trends) method and the model method may be requested so that comparisons can be made.

## 2.5.2 The Growth Rate/Trend Method for Projecting Background Traffic

### Growth Rate/Trends Method

Growth rates based on trends are the most basic approach to developing future growth projections

These methods are typically performed using trend or growth rate analysis of historic traffic data. The process of adding vested development traffic into background traffic is known as the “Build-up Method” and is described in further detail below.

The Growth Rate/Trends Method is the most basic approach for developing future growth projections, because the growth rate method reflects historical trends. The estimates using this approach will be dependent upon how the historical trend reflects the horizon year traffic. Traffic volumes should be used in developing growth trends and should be based on at least five years of data. However, care should be exercised in using data beyond five years as the results may over-emphasize past trends. For example, an area that has remained rural for many years may have recently changed to a “booming” growth area. In this case, the use of many past year counts will significantly under-predict future traffic. Note also that peak hour growth patterns do not necessarily follow daily traffic growth patterns.

The ITE’s Transportation Impact Analysis for Site Development has this caution:

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*The growth rate method is often insensitive to localized changes. It should not be used in cases where other extensive nearby development will occur during the study period, or where growth rates are unstable. Sizable errors could develop. Furthermore, growth in average daily traffic does not always parallel growth in peak-hour traffic, and most historical data are for average daily traffic. This method should also not be used where substantial transportation system changes (infrastructure changes) will alter traffic patterns within the study area, unless an accurate redistribution step is included.*

---

### Growth Rate/Trend Analysis Techniques

When using either traffic growth/change or a related demographic characteristic for forecasting background traffic, the following steps should be followed:

- Identify the data that is required based on the study area and the sources of relevant data
- Obtain the historic traffic-count data for the existing location(s) or demographic data
- Perform a growth trend analysis using one of three growth forms identified below and plot the patterns of traffic growth rates for the existing location(s)

Growth rate trend analysis is the method of fitting a mathematical curve that will adequately describe a trend in data for projection purposes. Three growth forms are used for site impact analysis:

1. linear
2. exponential
3. decaying exponential

Further details and an example application of each of these methods are presented in the following sections.

### FDOT Trends Spreadsheet Program



Estimates future traffic based on the historical data collected by FDOT.

FDOT developed and maintains a software analysis tool that can be used to prepare trend analysis. [Traffic Trends Analysis Tool](#) is an Excel-based tool that allows an analyst to use the Florida Traffic Information count database, select a traffic count station data set (from a database of count locations organized by County), and then prepare future trend analysis. The software allows for a comparison of results using all three growth techniques. The automated analysis process provides the analyst with opportunities to select the range of historic data to be included and consider multiple future projection years.

### Example Application of Trend Analysis and the Trends Spreadsheet

*Exhibit 14*  
**Historical Volumes (Seminole County site 0040)**

Year	Volume (AADT)
1998	21,000
1999	21,500
2000	19,000
2001	21,500
2002	25,500
2003	25,000
2004	25,000
2005	21,500
2006	23,000
2007	25,000

The following example is provided to illustrate the use of the three based models for forecasting traffic volumes on a roadway (US 17/92) in Seminole County. Information regarding the applicability of the three growth trend techniques is also presented. Exhibit 14 summarizes the historical AADT on the roadway facility.

## Linear Growth

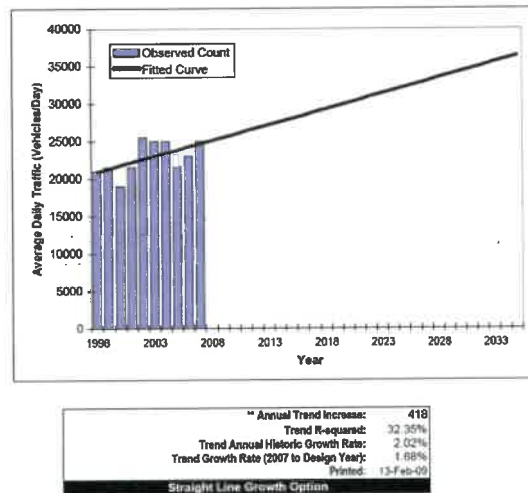
Linear growth assumes a constant amount of growth in each year and does not consider a capacity restraint

Linear growth predicts the future traffic based on a straight line developed from historic traffic growth. This model assumes a constant amount of growth in each year and does not consider a capacity restraint.

### Exhibit 15

### Linear Growth Projects Using Traffic Trends

Traffic Trends- V3.0



Year	Traffic (ADT/AADT)	
	Count	Trend
1998	21000	20900
1999	21500	21300
2000	19000	21800
2001	21500	22200
2002	25500	22800
2003	25000	23000
2004	25000	23400
2005	21500	23800
2006	23000	24300
2007	25000	24700
2008 Opening Year Trend		
2008	N/A	25500
2016 Mid-Year Trend		
2016	N/A	28400
2026 Design Year Trend		
2026	N/A	32900
TRANSPLAN Forecast/Trends		

\*Azle-Adjusted

Using the Seminole County example data, the results of the linear growth rate estimated an average growth of 418 vehicles per year as shown in Exhibit 15. The software allows users to select three analysis horizon years per evaluation run. In this example, an opening year of 2009 was evaluated along with a mid-year of 2016, and a long-term horizon of 2026.

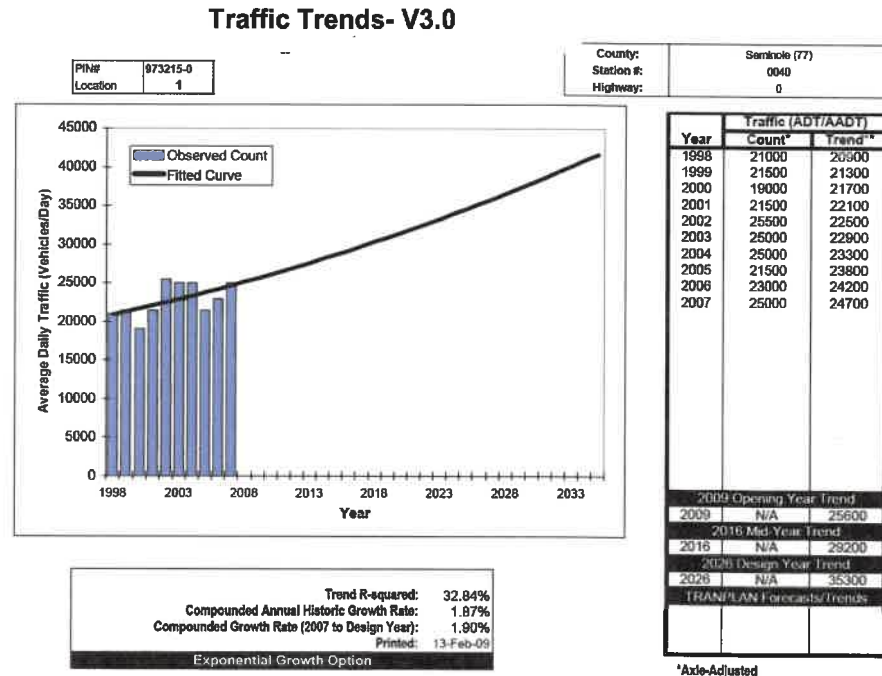


## Exponential Growth

Exponential growth is most applicable where there is rapid growth and capacity available.

Exponential growth predicts the future traffic based on a percentage of growth from the previous year. This model is most applicable where there is rapid growth and capacity available.

**Exhibit 16**  
**Exponential Growth Projects Using Traffic Trends**



## Decaying Exponential Growth

Decaying Exponential Growth is used to project future traffic in areas with a declining rate of growth over the analysis period. This model form is recommended for site impact analysis in more built out areas.

Decaying Exponential Growth is used to project future traffic in areas with a declining rate of growth over the analysis period.

### Exhibit 17

#### Decaying Exponential Growth Projects Using Traffic Trends

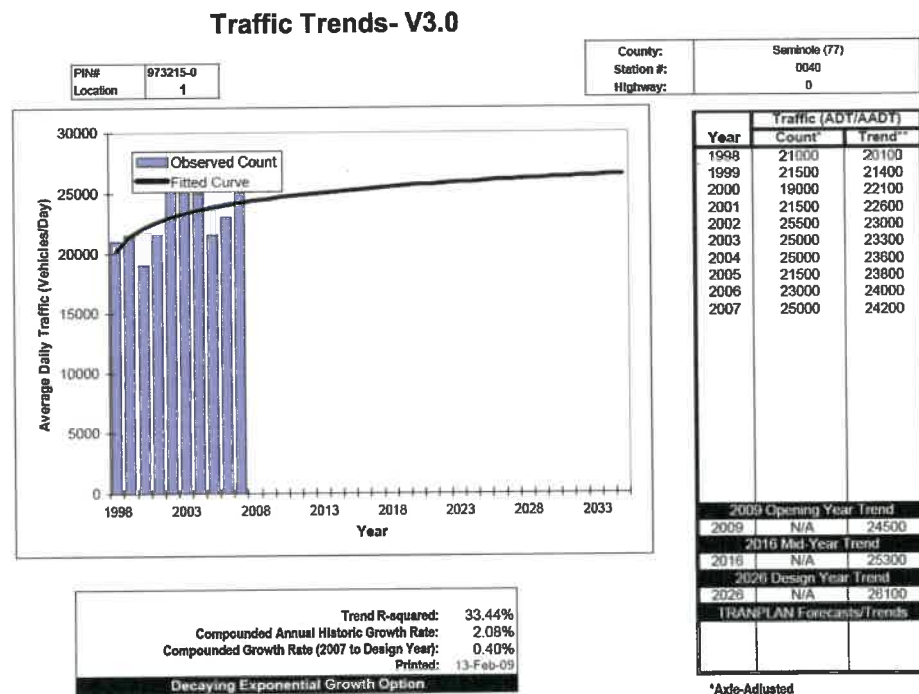


Exhibit 17 illustrates application of a decaying exponential growth project to the Seminole County data.

### What if the Background Traffic Has Declined?

If an area has a decline in traffic, the probable cause must be determined. Analysis should be done to decide if the decline is a long-term trend. Some local governments and other agencies use a minimum growth rate guide. In these cases, FDOT reviewer must join the discussion with all parties to arrive at an acceptable agreement.

Since 2006 the United States has seen some decreases in traffic on some facilities. This leads us to the situation when some professionals argue a zero-growth rate to be used for future background traffic. Traffic can fall for a few

reasons such as; the addition of a reliever roadway; or declining economic activity as seen from 2006 through 2012.

Note the figure from the Federal Highway Administration (FHWA) shows the drop and plateau in between the years of 2008-2012.

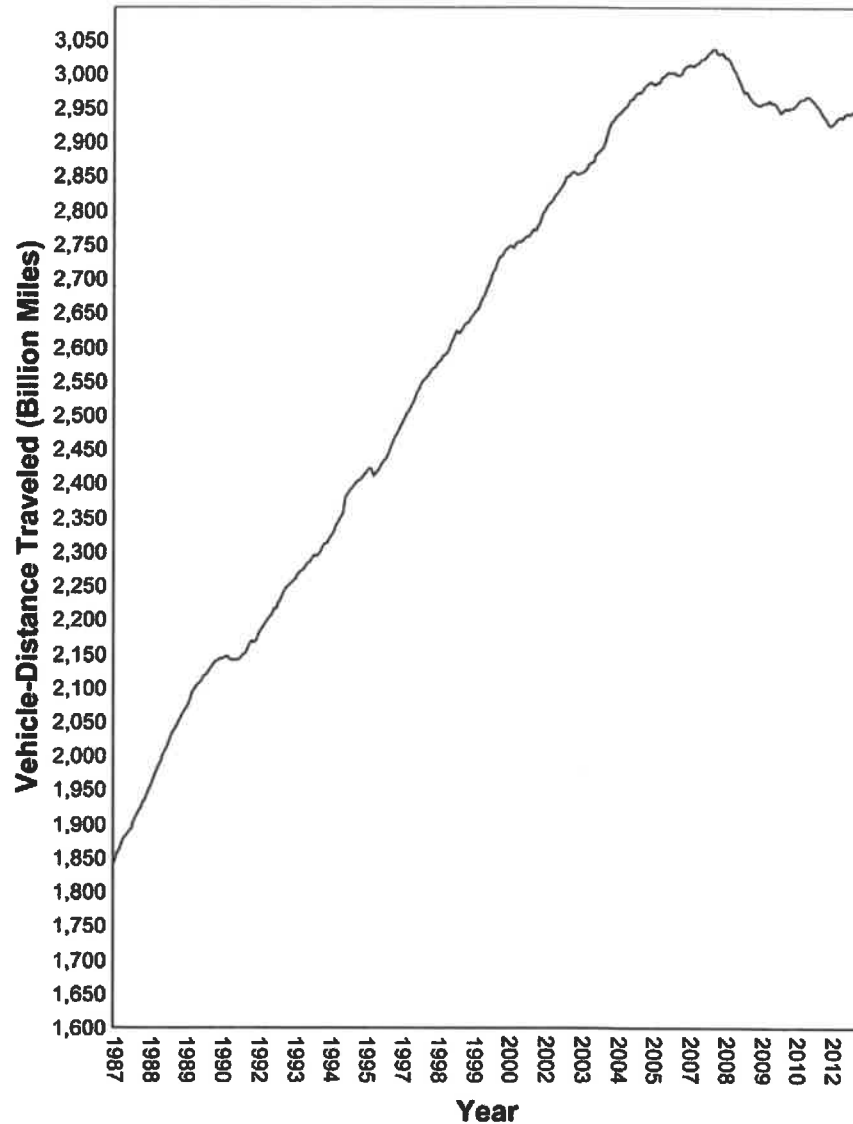
*Exhibit 18*

**Nov. 2012 Traffic Volume Trends**

WEB

FHWA Travel Monitoring

Federal Highway Administration  
Office of Highway Policy Information  
Travel Monitoring



Source: [http://www.fhwa.dot.gov/policyinformation/travel\\_monitoring/tvt.cfm](http://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm)

When a smaller than usually used growth rate is suggested, there should be some discussion of the underlying low, or zero, growth rate. There should also be multiple indications to support this low, zero, or negative growth.

### 2.5.3 Build-Up Method

The build-up method =  
vested developments  
+ background  
through traffic

The build-up method of traffic involves the identification of the trips associated with approved developments in the study area, assigning those trips to the study area transportation system, and then adding the background through traffic. The build-up method of projecting background traffic is appropriate when other area developments are proposed that will affect local area traffic patterns during the same horizon period.

Considerations for using the build-up method are outlined below.

#### Assess impacts of committed system improvements

- Work with local and state agency staff to identify a subarea
- Identify committed transportation projects and probable travel pattern changes within the subarea.

#### Identify and add approved development traffic

- Confirm committed projects and phasing within the subarea with local and state agency staff
- Obtain trip assignment associated with approved projects (desirably including documentation of trip generation, trip distribution, and trip assignment)

Check for reasonableness

Double counting of development generated trips may occur when estimating the other background traffic. Checks for reasonableness should be made. If the build-up method is used, a lower traffic growth rate than a direct trend analysis may be used. Manual methods such as the build-up method should be discouraged if a viable travel demand model is available. The method is included in this discussion because there are times when no model is available and it is sometimes useful to perform a manual method as a “quick and dirty” check of model results. This manual method, however, requires many subjective assumptions, and therefore requires close cooperation and negotiation between the applicant and reviewer. The growth rate, for example, is determined from historical traffic trends, but must be adjusted, especially on roadways closer to the proposed development and the development to some degree can reasonably be assumed to be a part of, rather than an addition to, those growth trends.

### 2.5.4 Model Methods Using FSUTMS to Distribute Trips for Developments

FDOT and some regional agencies typically maintain travel demand models that incorporate large planning areas. These models are typically calibrated to a base year and include a long-term future horizon year for the corresponding

transportation system. Travel demand models can be used to assist in the identification of traffic patterns and needs associated with site development.

The model method of transportation impact analysis typically uses an MPO-adopted regional travel demand model to forecast. There are two general methods for using a FSUTMS model for distributing and assigning ITE-generated trips during a traffic impact analysis: the special generator method and the link volume factor method.

Note: In the examples below, care can be taken to avoid over estimating internal trips, as the model's trip tables already provide some intra-zonal trips.

### Special Generator Method:

Develop a new transportation analysis zone (TAZ) or set of zones for the development and code in connectors from the new zone centroids to the transportation network.



- Connection points should be consistent with the preliminary site access plan
- Code socioeconomic data consistent with the development program into the model's ZONEDATA file
- Identify appropriate ITE vehicle trip rate(s) and estimate site trip generation manually using *ITE's Trip Generation Manual*
- Identify appropriate trip purposes for commercial properties based on prevailing land use type (e.g., shopping center would be predominantly home-based shopping trips)
- Identify reasonable auto occupancy rates for each trip purposes. Look for consistency with the pre-established model parameters. Apply auto occupancy rates to ITE trips by purpose to calculate person trips and sum for residential and non-residential uses in each development TAZ
  - 1) Enter person trips by zone and trip purpose into SPECGEN file
  - 2) Set up model to execute using script files that isolate development trips from other background trips
  - 3) Conduct initial model run with a select link analysis on all centroids for zones comprising the project to
  - 4) Obtain initial vehicle trip distribution patterns of site-generated trips
  - 5) Compare vehicle trip generation obtained manually and with the planning model
  - 6) If the model-derived number of vehicle trips is less than the manual calculation for any given land use, the total external site trip generation obtained using the planning model should be adjusted until the modeled number of trips is greater than or equal to the manually estimated trip (most likely for non-residential uses)

- Identify any difference in vehicle trips between manual and model calculations
  - Adjust number of trips in SPECGEN file by a similar ratio
  - Rerun the model
  - Identify any remaining difference in vehicle trips between manual and model calculations
  - Continue steps 3 and 4 until model calculations **are greater than or equal to** manual calculations
- 7) Convert site-generated trips to PM peak period or other, as directed by local concurrency ordinances
  - 8) Estimate internal capture using the previously approved methods
  - 9) Adjust trips to commercial properties on site to account for agreed upon pass-by trip percentages

## Link Volume Factor Method

Develop a new transportation analysis zone (TAZ) or set of zones for the development and code in connectors from the new zone centroids to the transportation network. Connection points should be consistent with the preliminary site access plan.

- 1) Code socioeconomic data consistent with the development program within the ZONEDATA file (e.g., single-family homes in development = single-family dwelling units in FSUTMS). For land use types not found in the ZONEDATA file, use rates for land use types that are comparable to FSUTMS land uses and acceptable to review agencies (Example land use conversion rates are shown in Exhibit 19)
- 2) Take supplemental demographic data (persons per dwelling units, percent automobile ownership, percent of dwelling units vacant, etc.) from zones in the ZONEDATA file that contain land use and population characteristics that are expected to be similar to the character of the project site (Example land use conversion rates are shown in Exhibit 19)
- 3) Set up model to execute using script files that isolate development trips from other background trips (Selected Link Analysis on centroids)
- 4) Identify cordon line around the proposed development
- 5) Estimate internal capture using the previously approved methods
- 6) Calculate the total number of external trips (i.e., those crossing the proposed development cordon line)
- 7) Calculate the percent distribution of external project trips (link distribution percentages) by dividing the number of project trips on each link of the network by the total number of external project trips
- 8) Identify appropriate ITE vehicle trip rate(s) and estimate site trip generation manually using ITE's Trip Generation

- 9) Factor the total number of ITE external project trips by the link distribution percentages calculated earlier for each link in the loaded network
- 10) Resulting ITE trips times link distribution percentages can be plotted link by link
- 11) Adjust trips to commercial properties on site to account for agreed upon pass-by trip percentages
- 12) Factor the total number of ITE external trips (with Internal Capture and Pass by subtracted) by the link distribution percentages)

**Exhibit 19**

**Land Use  
Conversion Rates  
for Traffic Impact  
Assessments**

Land Use	Conversion Rate*
Single-Family Dwelling Unit	3 persons per DU
Multi-Family Dwelling Unit	2 persons per DU
Office	4 service employees per 1,000 sq ft
Hospital	3 service employees per 1,000 sq ft
Retail <200k sq ft	2 - 3 commercial employees per 1,000 sq ft
Large Retail	1.5 - 2 commercial employees per 1,000 sq ft
Industrial	2 industrial employees per 1,000 sq ft
Warehousing	1 industrial employee per 1,000 sq ft
Hotel	.5 - 1 service employee per room

\*This data is a compilation of "Rules of Thumb" and calculations using the ITE *Trip Generation Manual*. These conversion rates should only be considered when local data, FDOT District guidance or more specific knowledge is not available.

Justification and documentation of all adjustments to the model generated distribution should be included in the traffic analysis.

Model methods are commonly used with manual assignment processes when determining distribution percentages of vehicles. A blended methodology (using manual adjustments to model trip assignments) should be approved by FDOT or another reviewing agency prior to use.

Manual trip distribution results and model outputs can be compared to provide reasonableness checks. Model methods may be used to determine an initial trip distribution and then manual adjustments may be made based on professional judgment and familiarity with the transportation network. Justification and documentation of all adjustments to the model generated distribution should be included in the traffic analysis. The model adjustments must be documented and approved by FDOT.

Understand the model's strengths and limitations

It is essential that the model user has a thorough understanding of a given model's analysis strengths and limitations so that model output can be properly interpreted and used.

## 2.6 Trip Distribution

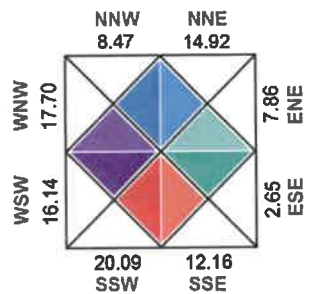
Another component in the site impact analysis is trip distribution. The purpose of trip distribution is to determine the final destination and origin transportation analysis zones of the traffic studied in the impact analysis.

Trip distribution can be estimated using several different methodologies reflecting either large-scale model or manual methods. FDOT and any participating local review agencies should approve of the trip distribution methodology selected.

Trip distribution should be summarized in a figure that clearly shows the distribution of external trips from the site.

Whether a manual or large-scale modeling method is used, trip distribution should be performed in each analysis year and documented and summarized in a figure that illustrates the percentage of total site trip generation. The figure should clearly show that the distribution of external trips from the site adds up to 100%.

**Exhibit 20**  
**Major Directions of Trip Distribution from site**



### Major Directions Decided

To/From	To/From	To/From	To/From
NORTH	EAST	SOUTH	WEST
23.39%	10.51%	32.25%	33.84%

Source: KHA from a traffic study of a Miami Wal-Mart Circa 2005

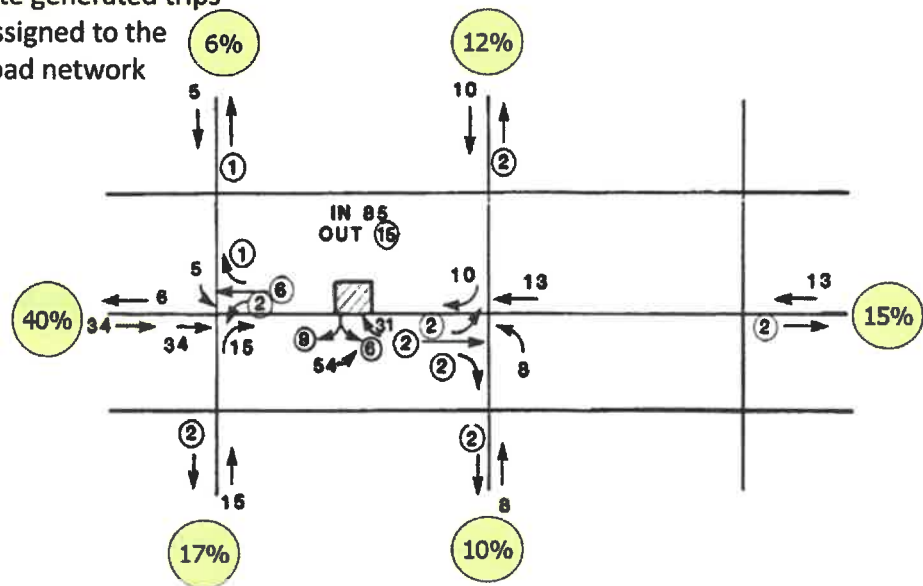
### 2.6.1 Different Types of Manual Methods for Trip Distribution

Manual methods of trip distribution provide the analyst with a basic understanding of the travel patterns and market areas associated with the development. When performing manual methods of traffic distribution, good judgment is essential to conduct a proper evaluation. Key assumptions should be clearly documented for the reviewers. Exhibit 21 provides a visual example of the manual distribution method.



**Exhibit 21****Manual Distribution  
Example**

Site generated trips  
assigned to the  
road network



The manual distribution and assignment of trips

Source: *Site Impact Evaluation Handbook – FHWA 1985*

### Analogy Method/Origin- Destination Studies

The analogy method derives the trip distribution of a proposed development based on existing data collected at sites that are similar to the subject development. Typically, traffic count and turning movement data are used in the analogy method. Other data sources include conducting a license plate origin-destination survey or a driver response survey, summarizing traveler home zip codes (for employment centers), or using other methods defining distribution of travelers to and from the site. Applications of the analogy method include (*ITE: Transportation and Land Development 2<sup>nd</sup> Edition, p. 54*):

- Fast-food restaurants where a competing establishment is near the site
- Service stations where traffic volumes on the adjacent streets are similar to those forecasted at the site
- Motel sites near an existing motel
- Residential developments on the fringe of an urban area
- Sites to be developed in residential use where the tract is one of the few vacant parcels in a developed area
- Occupied buildings located in an office complex being developed by phases adapted from the ITE Transportation and Land Development.

## 2.7 Mode Split/Alternative Travel Forecasts

Mode split is the process of estimating the number of travelers between zones that are anticipated to use modes other than automobiles in transportation impact analysis. This process estimates how many people travel to and from a site by auto, transit, and other modes such as by bicycle or walking. **In some cases, the mode split portion of the typical four-step modeling process will not be sufficient for corridor or site-specific transit forecasting.**

For example, a Transit Oriented Development (TOD) is an area that requires special modal study based on more detailed considerations.

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*The level of analysis will be made in coordination with FDOT and local agencies, including transit providers*

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### Transit Mode Split Assessment Methods

The applicant should provide justification on any transit, bicycle, or pedestrian adjustment reducing vehicle trips. The justification will usually consist of a special study prepared to better understand the impact of existing or proposed transit service, levels of walking and bicycling and necessary commitments to needed infrastructure, or funding to support the existing or planned transit service in the area.

### The Transit Boardings Estimation Tool (TBEST)

FDOT's Transit Office has developed the transit analysis tool TBEST (The Transit Boardings Estimation and Simulation Tool) that may be used in transit assessments.



This tool is a comprehensive transit analysis and ridership forecasting model that is capable of simulating transit travel demand while accounting for factors such as sidewalk coverage, network connectivity, bus headways, transfers, time-of-day variations, and route competition. The tool simulates transit ridership in a way that allows it to provide detailed information regarding ridership estimates at individual stops. The tool can also be used to obtain route level, segment level, location-based, or system level measures through the stop-level outputs. By simulating ridership at the level of the individual stop, the model can provide a strong framework for modeling transit ridership.

More detailed information about TBEST and its use can be reviewed on-line at [TBEST.ORG](http://TBEST.ORG).

The use of TBEST for impact assessments should be discussed by the applicant and review agencies (including transit agencies) and a clear methodology should be defined. It is recognized that TBEST may not be applicable in all cases. The tool provides users with a specialized transit planning model to supplement or to replace the use of the more standard travel tools.

## 2.8 Trip Assignment

Trip distribution and assignment are two related but distinct activities

Trip assignment involves determining the amount of traffic that will use each route on the roadway network. Trip assignment determines the number of site-generated turning and through movements at each intersection, as well as the roadway segment of the study area network.

Trip distribution and assignment are two related but distinct activities. Trip distribution determines where trips wish to go. Assignment is when the trips are placed on the network to reach their desired destination.



Project Traffic  
Forecasting

The products of the assignment component are traffic volumes appropriate for use in the analysis of operating conditions. It is important to note that traffic factors will usually need to be applied to both field collected data and model derived volumes. For example, Model Output Conversion Factors (MOCF) by FDOT are used to convert Peak Season Weekday Average Daily Traffic (PSWADT) volumes assigned by travel demand forecasting models to estimated AADT volumes. Even when using FDOT approved adjustments, care must be taken to see if the output is reasonable. A full description of the MOCF as well as other adjustments can be found in the [Project Traffic Forecasting Handbook](#).

### 2.8.1 General Considerations

Several important general considerations are involved in preparing trip assignment. These considerations are highlighted below, followed by detailed discussion of specific modeling techniques and analysis procedures.

Trip assignment should begin by identifying multiple paths between origins and destinations. The potential for using these paths can then be evaluated on a comparative basis using the following considerations:

- Driver tendencies and local patterns in developing logical travel routes.
  - For example, drivers often will use the first convenient driveway they reach to access a site with multiple driveways.
  - Driver characteristics reflecting the proposed land use (will drivers tend to use back roads/local connections or are they new to the area and will tend towards major travel routes that are well signed).

- The design of the internal circulation systems and the location of residential land uses;
  - The outbound trips tend to be more evenly distributed among multiple exits than the inbound trips;
- Available roadway capacities
  - Identify known capacity constraints and assess how constraints may impact alternative evaluation/routing.
  - Turn movement capacity and restrictions; particularly for left-turns.
- Relative travel times.
  - The proposed land use may impact driver needs and tendencies – for example, the differences between a daily commute trip and a recreational tourist exploration trip.
  - Horizon years and corresponding conditions at the time.
  - Planned improvements or network changes could result in changes to trip assignment compared to current conditions or
  - when evaluating multiple horizon years.
  - Travel paths may vary by time of day.
- Assignment percentages typically apply to two-way trips (arriving and departing).
  - While generally oriented the same way, individual routes may defer to reflect multiple access and egress options and turn movements will likely be different or reversed between an entering and exiting trip.
  - One-way streets may influence assignment patterns.
- The presence of on/off ramps at interchanges.
  - Pass-by trips enter from adjacent streets and typically exit to the same street to continue their original path.

### 2.8.2 Manual Methods of Trip Assignment

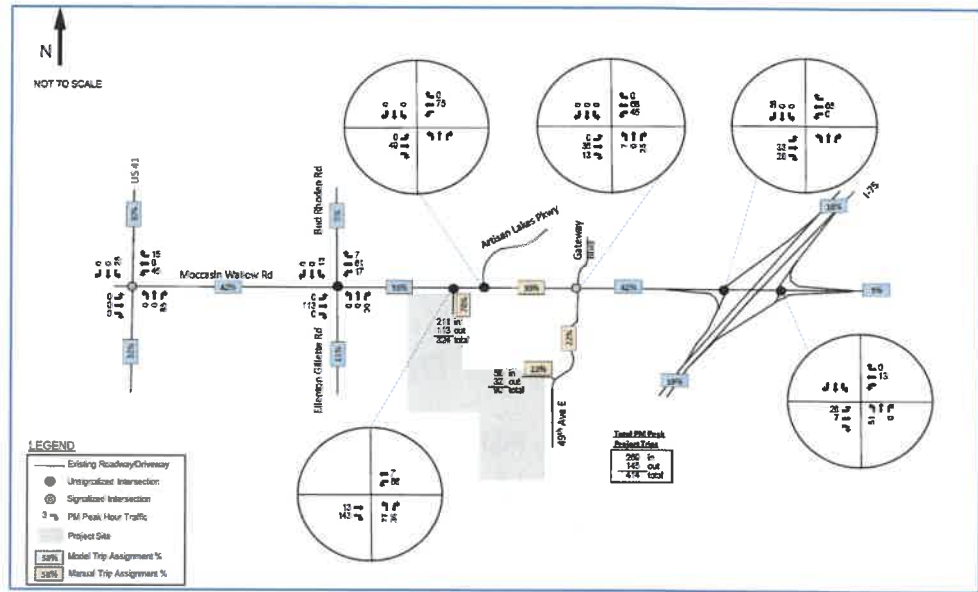
If the access plan is modified, the assignment process may have to be repeated until a logical assignment is achieved for the network.

Manual trip assignment often assigns site traffic based on existing or anticipated future turning and through movement percentages. The assignment may reduce site volumes along roadway segments using attenuation factors (see Chapter 2.2.3) to account for “intervening opportunities” for the trip to end. In simple terms, this means trips may be added and subtracted to the roadway network between major intersections and corridors to reflect local area origins and destinations. Manual assignments for each analysis period should be made for

each analysis year. Multiple paths should be assigned between origins and destinations based on experience and judgment to achieve realistic estimates.

The assignment process may be performed numerous times during a typical analysis based on the number of site access and internal circulation alternatives and traffic impact mitigation alternatives considered. If the access plan is modified during subsequent reviews or permitting, the assignment process may have to be repeated and alternative site access and circulation plans considered until a logical assignment is achieved for the network.

**Exhibit 22**  
**Manual Assignment**  
**Example**



Source: Manatee County Project PDR 16 -03-(Z)(P), Approved November 30, 2016

**Recommended Procedure for Manual Trip Assignment When Pass-by Trips are Present**

Pass-by trips in the network should be analyzed carefully. The following procedure is based, in part, on the recommendations of ITE’s *Transportation Impact Analyses for Site Development* when pass-by trips are involved in the assignment.

- 1) Apply the trip reduction factors for internal capture and pass-by traffic, and then assign volumes to each roadway segment. Illustrate in a map the assignment of development trips and provide a corresponding table.
- 2) In addition to estimating a normal distribution, estimate a trip distribution for pass-by and diverted trips.

Perform separate trip assignments using the individual distribution patterns for primary, pass-by and diverted trips. Pass-by trips and diverted trips should be evaluated carefully considering the location of the driveway and the total traffic on the adjacent roadway links. The assignment should consider the unique turn movement patterns of pass-by and diverted trips and should account for the

subtraction of existing turn movements related to the pass-by trips that are no longer made.

- For example, a pass-by trip assignment might require that an eastbound through trip be removed and replaced with an eastbound right-turn and companion northbound right-turn at a site driveway.
- Diverted trips are not subtracted from the roadways and access points they are added to. They are new trips on the roads they divert to.

Applicants should assign trips to the network such that the primary, pass-by and diverted trips are distinguishable and can be easily reviewed.

- 1) Consider the effects of traffic diversion by existing traffic to other facilities as result of the site-generated traffic, if appropriate.
- 2) Check the assignment for reasonableness. Generally, pass-by traffic should not exceed 10 percent of traffic on adjacent streets. For an explanation of the 10 percent of adjacent street traffic for pass-by traffic, see Chapter 2.4.4.

### 2.8.3 Traffic Attenuation with Manual Traffic Assignment

No more than 10 percent of trips should attenuate per segment

As the distance that traffic from a specific site travels, the number of those site generated trips drop. The trips drop (or attenuate) because as longer distance is traveled, more and more people reach their final destinations. In order to reflect this reality in a manual traffic assignment, it is necessary to use something called traffic attenuation. It determines what percentages of trips are satisfied at various distances from the originating site. In evaluating trip assignment alternatives, a commonly used guideline by FDOT is that no more than 10 percent of trips should dissipate (or attenuate) per study segment of roadway unless there is a cross street or some major land use that could attract a large number of trips from the usual flow.

Another method for establishing traffic attenuation is the use of the trip length frequency curves of the urban area or a similar area. These may be available as part of an area's large-scale transportation model.

Exhibit 23

Traffic Attenuation Example

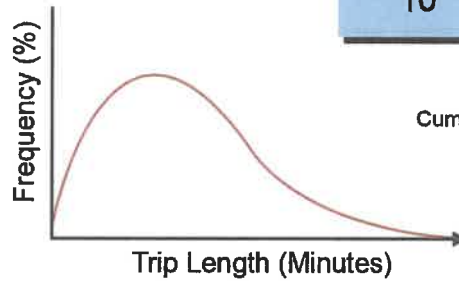
**Trip Attenuation Method**

**Assumed:**

18 mph = Avg. speed w/delay  
 18 mph x 1/60 = 0.3 mi./min.

Note: The lower the assumed speed is, the shorter the trips will be!

Minutes	%	Miles
2	%	0.6
4	15	1.2
6	30	1.8
10	50	3.0



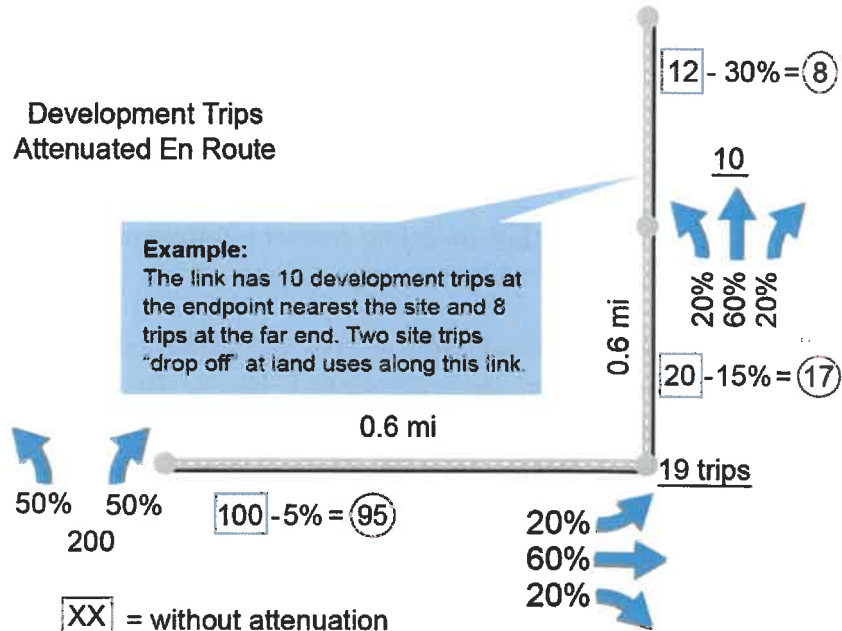
Cumulative

Convert minutes of travel to miles of travel (typically using 18-30 miles per hour)

Development Trips Attenuated En Route

**Example:**

The link has 10 development trips at the endpoint nearest the site and 8 trips at the far end. Two site trips "drop off" at land uses along this link.



XX = without attenuation

XX = attenuated (at link endpoint)

XX = attenuated (at link beginning)

### 2.8.4 Model Methods of Trip Assignment

Large-scale travel demand models such as FSUTMS use a capacity restrained routine, known as user equilibrium, to perform the final highway assignment. The model decreases speeds on congested roadways and shifts traffic between routes after each iteration of the assignment until equilibrium is achieved. At that point, all trips in the model area have found the least congested, shortest-time path to their destination such that no other adjustment can be made to traffic without increasing travel times.

#### Selected Zone Analysis

The preferred technique is the Selected Zone Analysis tool

The preferred technique for transportation impact analysis trip assignment is called selected zone analysis. Selected zone analysis allows for review of network-wide trip assignment associated with a single or multiple Transportation Analysis Zone(s) (TAZ).

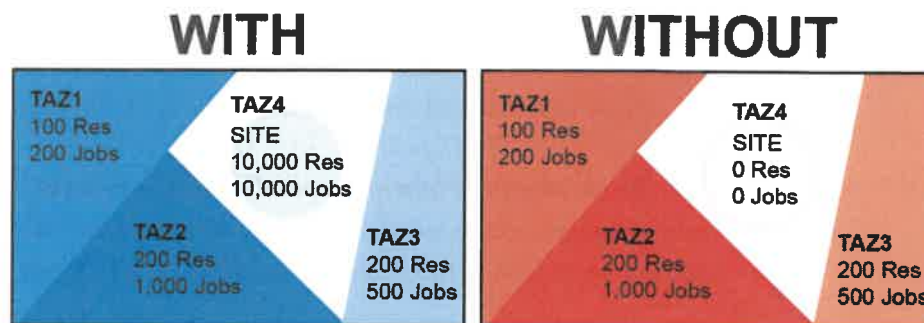
- If using Cube Voyager, the trip assignment module must be rerun with the “Create a Path File” option selected.
- After opening the new loaded network, select “Path” then “Use Path File” and navigate to the HIGHWAY.PTH file in the appropriate output folder.
- Within the Path File interface, choose “Selected Links” from the Mode menu. In the Selected Links/Nodes edit box, type N= followed by a comma-separated list of the development TAZ numbers.
- Click “Display.”

Central Office modeling contact information is listed on [FSUTMSOnline.net](http://FSUTMSOnline.net), “Contacts” link in the page footer.

Analysts should *NOT* attempt to evaluate traffic by running two separate model scenarios in which one scenario has the data corresponding to the development included and the other scenario has had the data corresponding to the development removed. The resulting estimate derived from subtracting the volumes of the scenario with the development data from the scenario without the development data, a technique commonly known as the “Net Impact” or the “With and Without” method, *DOES NOT* directly represent the site-generated trip assignment impact. This is because the equilibrium highway assignment process that drives the model diverts trips, often resulting in virtually no change in traffic volumes. This is a subtle but critical point. Judicial precedent in Florida has established that the development review process must account for *ALL* trips caused by development, *NOT* the net impact resulting from displacing existing trips to other roadways (*Reference: Westinghouse Gateway Communities, et al. v. Lee County Board of County Commissioners Case*).

*Do Not run a “with and without” analysis*



**Exhibit 24****With and Without Modeling Method**

This method is not to be used as is stated on the previous page. It is provided specifically because many analysts resort to this method. Here we are defining it, giving an example so that reviewers can identify when it is being used, and directing people not to use this method. If this comment is more general about including site projects in the model, it should be noted that the intention is to use socioeconomic data consistent with the analysis years of the project and to account for whatever anticipated regional growth is likely to occur. It is not expected that the analyst would use base year socioeconomic data and only add the project as the sole form of growth in the region. Also, this is not intended to be guidance on preparing models for LRTP/MTP plan development.

The appropriate use of the selected zone analysis is to identify the pattern of site trip assignment by roadway link and, in turn, use that pattern to prepare the actual assignment of site-generated traffic using other model or manual methods. The model assignment should *NOT* be used to calculate internal capture, background traffic, or turning movements. There are two appropriate methods for using travel demand models for traffic impact analysis:

- Special Generator Method
- Link Volume Factor Method

These methods are discussed in Chapter 2.5.4.

## FSUTMS Modeling of Assignment

At a conceptual level, five key steps are taken to perform a trip assignment.

- 1) Input proposed development's land use into zonal data and/or adjust the model's special generators
- 2) Run FSUTMS
- 3) Display traffic that enters/exits development zone(s) on the loaded network using the traffic assignment path file
- 4) Save development traffic as a new link attribute for further analysis (a new attribute may need to be created in the network for this purpose if one does not already exist)
- 5) Check for reasonableness

In some circumstances, such as at the fringe of a model, manual adjustments may be necessary. If post assignment adjustments are made, the process should be clearly justified and documented. *National Cooperative Highway Research Program (NCHRP) Report No. 765, Analytical Travel Forecasting Approaches for Project-Level Planning and Design*, identifies some procedures for adjusting link volumes and arriving at design traffic and turn movements. Even though published in the 1980's, the principles inside are still relevant.

The model output volumes from FSUTMS typically represent the Peak Season Weekday Average Daily Traffic (PSWADT) condition. These volumes must be converted to AADT and then to peak hour volumes using conversion factors. This process is described in FDOT [Project Traffic Forecasting Handbook](#). All adjustments and conversion factors should be documented, reviewed and approved by FDOT. Some models may represent AADT by default or may automatically convert model PSWADT to AADT during the model process. The analyst is encouraged to reference all available model documentation and coordinate with the appropriate professional staff if there is a question concerning the units of the model output volumes.

### 2.8.5 Trip Assignment at Intersections

The operational analysis of individual intersections is often required as part of a transportation impact assessment. The trip assignment at intersections should be compared to the assignment shown at the facility level so that both analyses are using consistent values. It is also noted that the background volumes used in a detailed intersection assessment should be compared to the background volumes used in the facility analysis. For example, the sum of a specific approach (left turn movements plus through movements plus right turn movements) at an intersection should reasonably match the approach volume used in the facility analysis. There are methods currently available in the [Project Traffic Forecasting Handbook](#) for use in developing intersection turning movements that indicate many of the methods can be categorized as “intersection balancing” methods. The degree of accuracy that can be obtained from “intersection balancing” methods depends on the magnitude of incremental change in land use and travel patterns expected to occur between the base year and future design year conditions. Model volumes are in most cases daily traffic and intersection operational analysis is performed for peak hour traffic. Some discrepancies, therefore, may occur when converting daily model outputs to peak hour estimates.

FDOT has also developed an Excel spreadsheet tool called “[TURNS5](#)” and the instructions for the use of this spreadsheet are found in FDOT [Project Traffic Forecasting Handbook](#).

### 2.8.6 Documentation of Trip Assignment

Proper documentation will allow for careful and thoughtful review of the assignment.

Trip assignment, by nature, will reflect driver tendencies behavior, and in part becomes a case study of personal preferences. Because the process can reflect a complex decision process, it is important to document the basis for making an assumed trip assignment. Proper documentation of the assumptions and decisions made in developing the trip assignment will allow for review of the assignment. Applicants are encouraged to work with FDOT and other local agencies to ensure trip assignment assumptions are reasonable and reflective of local conditions.

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## 2.9 Access Management, Site Access, and Internal Circulation

The proper application of access management and basic site planning principles is essential to all transportation impact analysis. This process involves the review of proposed site plans and expected improvements. During this stage, the reviewer assesses the impact of the project on traffic movements and evaluating safety and operations at, and near the access points (driveways or roadways). The level of detail of the site plans associated with the impact assessment will vary based on the purpose of the study and what level of approval is being sought.



The design of site circulation, parking, and access should also easily accommodate bus and pedestrian movements for existing or future bus services. Having a safe and well-marked pedestrian path to the entrance of the development is one important aspect of good design. In addition, bicycle access and parking should be included.

FDOT Transit Office has produced several publications that discuss pedestrian and transit-friendly design in greater detail and can be found at the [FDOT Public Transit Office](#) website.

Site impact design issues include identifying an appropriate design vehicle (the largest vehicle that will typically use the roadway), speeds, and multimodal accommodations. Most site plans should include the following information, at a minimum:

- Median opening locations and spacing
- Sufficiently detailed drawing of access, circulation and parking
- Landscaping details for analysis of sight distances
- Location of proposed multimodal accommodations

## Access Management Standards

FDOT has developed numerous standards, guidelines, policies and recommended practices in the areas of corridor access management and site access planning. These standards are provided in [Rule 14-96, Florida Administrative Code \(F.A.C.\)](#), (driveway permitting) and [Rule 14-97, F.A.C.](#) (access management standards).

All driveways associated with a new or expanded development will need to be permitted through the process described in the Rule [Chapter 14-96](#), State Highway System Connection Permits. Directions for traffic studies for access permits are located under Rules [14-96.005\(3\)](#) and [\(4\)](#), F.A.C.

The application of these principles to roadway and corridor design features are discussed in greater detail in many FDOT publications such as:



### FDOT Access Management Guidebook

- FDOT on-line collection of technical resources on access management posted on the [FDOT Systems Implementation Office Access Management](#) webpage.

## 2.10 Mitigation and Future Transportation Needs

Future conditions analysis determines what mitigation may be required

The future conditions analysis determines if the transportation system will operate acceptably with the additional site-generated trips. If not, one must determine what mitigation may be required. The reviewer should have a clear understanding of the evaluation method used.

This section assumes that an evaluation methodology is based on the most recent generally accepted professional practice. In some instances, local governments may use a different methodology or performance measure. The applicant should clearly document and justify the methodology used and confirm all methodology assumptions and analysis requirements with FDOT.

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*“Use of Department’s LOS targets and guidance on acceptable highway capacity and LOS methods (including software) apply to all appropriate Department reviews and assessments of proposed developments directly impacting the SHS. In the review of plans and designs of other entities directly impacting the SHS, the Department recommends the adoption and use of*

*the Department's LOS targets. Regardless of adoption or use by non-Department entities, the Department will use the LOS targets for the review of actions directly affecting the SHS for all its planning and permitting processes. The Department can modify a connection permit based on adverse impacts to operational, LOS or safety issues as part of a transportation impact assessment."*

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## Intersections

Both facility LOS and intersection v/c are appropriate to determine impacts

Although arterial facility LOS is stressed in highway level of service targets, detailed volume-to-capacity analyses at selected intersections may be necessary to evaluate specific projects. Both facility LOS and intersection volume-to-capacity ratio criteria are to determine impacts from proposed developments. Additional information about intersection assessments is provided in [FDOT's Quality/LOS Handbook](#).

### 2.10.1 LOS Analysis Tools

The Q/LOS Handbook is intended to be used by engineers, planners, and decision makers in the development and review of roadway users' quality/ level of service (Q/LOS) and capacity at a generalized planning level. The Q/ LOS Handbook provides Generalized Service Volume Tables and background regarding statewide default values used in their development.

Quality of service (QOS) is a traveler-based perception of how well a transportation service or facility operates. Level of service (LOS) is a quantitative stratification of quality of service into six letter grades. LOS provides a measure that assesses multimodal service inside the roadway environment (essentially inside the right-of-way). Capacity is the maximum sustainable flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of roadway during a given time period under prevailing conditions. The most recent [Generalized Service Volume Tables](#), present maximum service volumes, or the highest numbers of vehicles for a given LOS.

Direction found within the Q/LOS Handbook provides assistance in selecting the most appropriate tools for Q/LOS analysis. There is specific instruction within the handbook on how to use the Generalized Service Volume Tables.

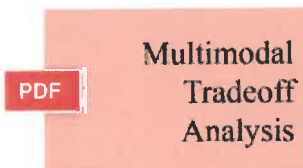
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## 2.11 Multimodal References



There are opportunities for including multimodal considerations at each stage of the transportation impact analysis. Some of the best references on these multimodal considerations are listed below. Even though some of the linked documents in this chapter list statutory and agency requirements that are no longer needed, the technical guidance is still valuable.

- [“Expanded Transportation Performance Measures to Supplement Level of Service \(LOS\) for Growth Management and Transportation Impact Analysis”](#)
- [Multimodal Trade-Off Analysis in Traffic Impact Studies](#), State of Florida Department of Transportation, Systems Implementation Office, 2003



## 3



## Mitigation

### 3.1 Introduction

This chapter provides guidance on strategies and funding mechanisms for mitigation.

This chapter will provide general guidance on mitigation of the impacts of development. It will provide some best practice examples and discuss FDOT's role in mitigation agreements.

Decisions about how to meet community plans and visions for development and transportation options are a key responsibility of local government planning, and should be coordinated with neighboring jurisdiction, Metropolitan Planning Organization (MPO), and other agency plans to ensure that local and regional mobility goals are met in a proactive, comprehensive way. When development is expected to impact important state resources and facilities such as Strategic Intermodal System (SIS) facilities, local entities should also consult with FDOT on mitigation plans. Local government comprehensive plans should align with regional and statewide mobility goals through a number of planning documents. Mitigation efforts should be consistent with local government comprehensive plans and future land use maps, as well as the applicable transportation agency plans including FDOT Work Program, SIS Cost Feasible Plan, MPO's Transportation Development Plan (TDP), Transportation Improvement Plan (TIP), the Unified Planning Work Program, and the Long-range Transportation Plan (LRTP).

As a result of the elimination of several sections of the Community Planning statutes, much of the process regarding mitigation for the SIS is removed from law. What remains is as follows:

- Per Section [163.3177\(6\)\(b\)](#), F.S., the transportation element shall be coordinated with plans and programs from any applicable MPO and transportation authority, Florida Transportation Plan and adopted FDOT Work Program; and
- Per Section [163.3180\(5\)\(h\)\(1\)](#), F.S., local governments implementing transportation concurrency must consult with FDOT when proposed plan amendments affect the facilities on the strategic intermodal system (SIS).

Under the expedited state review process and state coordinated review process, FDOT's role is essentially the same for identifying impacts and measures for eliminating, reducing or mitigating impacts, as noted below:

- Per Sections [163.3184\(2\)](#), (3)(b), and (4)(c), F.S., under the new expedited state review process, comments on proposed plan amendments must specifically state how the plan amendment will adversely impact important state resources and facilities and identify measures local governments can take to eliminate, reduce, or mitigate for these impacts.
  - Comments are sent to DEO and local government within 30 days after receipt of the amendment by FDOT. FDOT comments are limited to issues within the agency's jurisdiction as it relates to transportation resources and facilities of state importance.
- Per Section [163.3184\(4\)](#), F.S., under the state coordinated review process, FDOT is limited to making comments similar to the expedited state review process regarding important state resources and facilities.
  - Comments are then submitted to DEO within 30 days after receipt by DEO of the proposed plan amendment for their transmission of the Objections, Recommendations and Comments (ORC) Report.

### Extent of Mitigation Required

Mitigation should be relative to the scale of the expected transportation impacts. For example, while two developments might initially seem similar, a mall would expect to generate more traffic and have a greater impact to the existing transportation network than a warehouse even when both developments consists of an equal amount of commercial or retail square footage.



Considerations for local governments employing transportation concurrency

Transportation impact analysis and mitigation can range in complexity, from simple “pay-and-go” systems relying upon LOS impacts to more sophisticated impacts analysis employing concurrency options within the local jurisdiction.

Transportation impact analysis has traditionally focused on a few basic factors to identify expected automobile level of service impacts on the transportation system and the associated transportation facility and improvements and costs of addressing these impacts. While this traditional analysis still holds true for many traditional suburban developments and undeveloped areas, optional community concurrency planning provisions and associated strategies like Transportation Concurrency Exception Areas (TCEAs), Transportation Concurrency Management Areas (TCMAs), Multimodal Transportation Districts (MMTDs), and/or sector plans may involve additional factors that are not effectively measured in automobile level of service calculations alone. The location of these provisions and strategies are required to be indicated on a local government’s adopted future land use map pursuant to Section [163.3177\(6\)\(a\)](#), F.S. In these cases, consideration of transit needs, bicycle and pedestrian needs, and mitigation efforts to reduce automobile dependence may also be necessary. In addition to the traditional level of service considerations, some questions to consider in analyzing impacts include:

- Does the design of the proposed development work to reduce impacts on adjacent arterials?
- Are there factors in the proposed development that are expected to reduce automobile trip generation?
- Will the proposed development support higher rates of internal capture?
- Will the proposed development produce more trips by non-auto transportation modes?
- Does the proposed development support more trip chaining that may affect the activity patterns on the transportation system?

For local governments using transportation concurrency, it is important that FDOT reviewers be aware of the principles, guidelines, standards, and strategies included in the local comprehensive plan that will help to guide mitigation and the relevant strategies to be employed. Direction from the local government comprehensive plan will also help to determine the level of mitigation required. Examples of techniques and tools include area-wide LOS (e.g., TCMAs), exemptions or discounting impacts in specific areas where development has been determined to be desirable (such as MMTDs), and other techniques described in Section [163.3180\(5\)\(f\)](#), F.S., may be employed in implementing transportation concurrency, including:

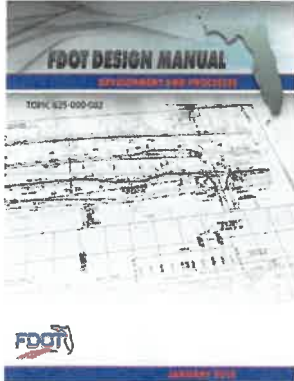
- Adoption of long-term strategies to facilitate development patterns that support multimodal solutions, including urban design, and appropriate land use mixes, including intensity and density.
- Adoption of an area-wide level of service not dependent on any single road segment function.
- Exempting or discounting impacts of locally desired development, such as development in urban areas, redevelopment, job creation, and mixed use on the transportation system.
- Assigning secondary priority to vehicle mobility and primary priority to ensuring a safe, comfortable, and attractive pedestrian environment, with convenient interconnection to transit.
- Establishing multimodal level of service standards that rely primarily on non-vehicular modes of transportation where existing or planned community design will provide adequate level of mobility.
- Reducing impact fees or local access fees to promote development within urban areas, multimodal transportation districts, and a balance of mixed use development in certain areas or districts, or for affordable or workforce housing. Adoption of long-term strategies can include land use planning tools that can reduce vehicle miles of travel for a development or specific area. Strategies can consist of land use policies that allow for higher densities and intensities in areas designated to promote multimodal options such as transit, bicycling, and walking and discourage development in areas with low amounts of supporting infrastructure.

**Transportation impacts may also vary by development type**

In addition, different transportation impacts may be expected depending upon development type. Developments that are designed to include an interconnected street network, support high density mixed-use development, or otherwise embrace transit-oriented design practices, serve to reduce reliance on adjacent arterials through design features that promote bicycle and pedestrian accessibility and the ability to move along local streets for daily trips. The transportation impacts for these developments are therefore less than conventional low density suburban developments that separate land uses and promote automobile use due to insufficient bicycle and pedestrian facilities accessibility, and vast distances to traverse.

FDOT reviewers should also recognize and look for opportunities to reduce impacts to the State Highway System. For instance, some local governments and MPOs have developed roadway constraint ordinances or policies to guide transportation investment priorities, promote community mobility goals, and offer less expensive options for enhancing regional transportation networks. These policies should be consulted along with other local and regional planning documents, and will have a significant impact on mitigation opportunities. For instance, the [Lake Sumter MPO Roadway Constraint Policy](#) defines the

PDF

Lake Sumter  
Policy

maximum number of lanes for several federal, state, and county roads within their jurisdiction in an effort to maintain and enhance the overall transportation network in a cost-effective way that considers long-term community mobility goals.

FDOT provides guidance in [Topic No. 625-000-002 FDOT Design Manual \(FDM\)](#). This guidance can be applied to provide a balance between mobility and livability when such features are desired, appropriate and feasible.

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*Lane elimination projects (a.k.a., “road diets”) are intended to reconfigure the existing cross section to allow other uses. Lane elimination projects typically provide more livable environments, and contribute to economic development and vitality to a community. The recovered travel way can be used to accommodate other purposes, such as bicycle lanes, wider sidewalks, landscaping, on-street parking, bulb-outs, traffic calming, and refuge islands. Chapter 126 of the FDOT Design Manual includes the lane elimination requests review and approval requirements.*

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Another method for reducing impacts on the SHS, particularly SIS facilities, is the use of nearby parallel roads that serve common destinations and run in the same direction as a major arterial. In the City of Destin, for example, parallel roadways operate to preserve existing capacity on US 98 (the main east-west arterial running through the city) while contributing to the overall multimodal transportation goals and policies of the community. In conjunction with the City’s adoption of a MMTD, various transportation options have been developed to improve roadway connectivity and reduce single occupant vehicle trip making in an overall effort to create a multimodal environment. When using this strategy, attention should be paid to safety considerations in the improvement of parallel relievers to address operational issues and unfamiliar movements that can lead to increased crash rates.

As more options become available to meet the mobility needs of the transportation network, the analysis of mitigation options becomes more complex. In general, reviewers should utilize both quantitative and qualitative methods of analyzing the transportation impacts of new development.

FDOT reviewers should recognize the limitations of travel demand modeling in multimodal analyses so that transportation impacts are assessed effectively. For example, the use of transportation analysis zones (TAZs) as a unit of analysis does not consider trips within those zones, like the ones that constitute the

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## Multimodal Tradeoff Analysis

majority of walking trips, a significant portion of bike trips, and most trips to access transit. In addition, existing land use models do not consider differences in land use configurations that may occur as a result of changes in the transportation network. FDOT reviewers should refer to FDOT's [Multimodal Tradeoff Analysis in Traffic Impact Studies](#) for more detailed information on multimodal considerations.

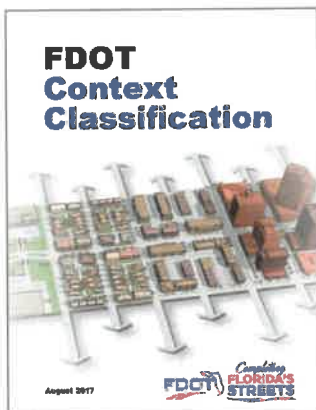
### 3.1.1 Complete Streets

Complete Streets serve the transportation needs of systems users of all ages and abilities, including pedestrians, bicyclists, transit riders, motorists, and freight handlers. A transportation system based on Complete Streets principles can help to promote safety, quality of life, and economic development.

Complete Streets are context sensitive, and the approach provides transportation system design that considers local land development patterns. Roadways will be planned and designed to support the safety, comfort, and mobility of all users based on the unique context of each roadway. FDOT context classification system broadly identifies the various built environments existing in Florida. The context classification of a roadway will inform FDOT's planning, Project Development and Environment (PD&E), design, construction, and maintenance approaches to ensure that state roadways are supportive of safe and comfortable travel for their anticipated users. Identifying the context classification is a preliminary step in planning and design, as different context classifications will have different design criteria.

Complete Streets are not a specific type of project, but rather an approach to ensuring that projects are based on their context. This means that a Complete Streets approach will be implemented consistently for all non-limited access projects from capital projects qualifying, Efficient Transportation Decision Making process (ETDM) screening to Resurfacing, Restoration, and Rehabilitation (RRR), traffic operations, and safety projects.

FDOT Context Classification and FDM Chapter 200 Context Based Design provides implementation guidance for design originating from a context-sensitive process. FDOT's Complete Streets Policy (*Topic 000-625-017*) is based on the context-sensitive process which consider all transportation needs of the transportation system.




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*FDOT's context classification system describes the general characteristics of the land use, development patterns, and roadway connectivity along a roadway, providing cues as to the types of uses and user groups that will likely utilize the roadway*

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### 3.1.3 Development or Land Use Changes

It is important to work in coordination with the applicable local government(s) when changes are necessary for a proposed comprehensive plan amendment which can impact the development plan initially proposed by an applicant. Changes may be required if there are no other feasible alternatives to mitigate for the traffic impacts such as reducing the magnitude of impacts by modifying the assignment of traffic by the development.

Examples of changes to a proposed comprehensive plan amendment could include:

- Change proposed land uses
- Modify development phasing
- Include mixed-use land uses
- Revise internal circulation
- Urban and roadway design
- Limiting the amount of traffic, a site can generate through a site-specific comprehensive plan policy
- Reduce maximum densities and/or intensities within development land uses

Recommendations for changes to a proposed comprehensive plan amendment should be coordinated through the local government and should be consistent with the local government comprehensive plan and land development regulations. It should be noted that FDOT reviewer objections to a plan amendment under review are limited to important state resources and facilities pursuant to Section [163.3184](#), F.S. Recommendations for all identified objections should be focused on strategies to minimize adverse impacts from additional traffic which can include roadway facility improvements or land use changes. FDOT reviewers may also provide technical assistance comments regarding additional methods for mitigation outside of objections but applicable to the site plan under review to provide further support pursuant to Section [163.3168](#), F.S.

The successful implementation of mitigation strategies will require increased and continuous intergovernmental coordination, and as such, the final section of this chapter provides guidance on developing mitigation agreements to help facilitate coordination with local governments and other transportation agencies.

According to Section [163.3180\(5\)\(h\)1.a](#), F.S., local governments must consult with FDOT when a proposed comprehensive plan amendment impacts designated SIS facilities. To ensure consistency and avoid confusion for all parties involved, a mitigation agreement can be used as an option to formalize

## Mitigation Agreements

agreed upon methodology, assumptions, and necessary mitigation. The mitigation agreement is entered by the applicant, the local government who issues the development order and the applicable reviewing agencies such as FDOT, RPC, or other local government which may be impacted by the proposed development.

Mitigation agreements are legally binding documents and should be thoughtfully and carefully prepared. At a minimum, the agreements need to address the following key issues:

- What are the project impacts?
  - A clear summary of project impacts should be included.
- What is the cost to mitigate the project impacts and what is the applicant's proportionate share responsibility of the needed mitigation?
  - This is usually shown in tabular form.
- What type of mitigation is the applicant proposing?
  - Options include paying a sum to the maintaining agency (i.e. write a check), participating in a needed study, donation of right of way, constructing a project, or a combination of strategies.
- When should mitigation be secured?
  - Usually prior to starting the project or entering phase.
  - May have a 'trigger' in the Development Order (DO), such as the number of trips.
- Who is party to the agreement?
- What should local governments commit to and when should commitments be made?
- How does the agreement satisfy concurrency guidelines and strategies of the local government's comprehensive plan, if being implemented through the local government?

FDOT reviewers can assist local governments with mitigation agreements. Section [163.3168\(3\)](#), F.S., provides a mechanism for planning innovation and technical assistance:

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*"If plan amendments may adversely impact important state resources or facilities, upon request by the local government, the state land planning agency shall coordinate multiagency assistance, if needed, in developing an amendment to minimize impacts on such resources or facilities."*

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## 3.2 Strategies

This section provides guidance on mitigation strategies and alternatives that should be considered in maintaining long-term mobility on the transportation system.

### Keys to Successful Mitigation

#### Involvement of Partners

When a development negatively impacts important state resources and facilities, several mitigation alternatives may be considered in the review process to lessen these transportation impacts. It is important to note, however, that FDOT reviewers should verify that mitigation strategies recommended are codified by the local government comprehensive plan, land development codes, transportation sufficiency plans as defined in Section [163.3182\(1\)\(e\)](#), F.S., and outlined in Section [163.3182\(4\)](#), F.S., consistent with the mitigation practices outlined below, and other applicable transportation plans.

Close involvement with transportation and land use partners can help assure that mitigation strategies proposed will effectively address the impacts of development.

Two general needs have emerged as Districts and local governments attempt to mitigate transportation impacts in a systematic way:

- 1) Regional Perspective
- 2) Land Use and Transportation Coordination

### Regional Perspective

It has become clear that transportation impacts to the State Highway System often cross traditional jurisdictional boundaries, and to meet the long-term needs of the transportation system, a regional perspective is needed. In addition, the consideration of other transportation modes such as, bicycle, pedestrian, and transit will help accomplish long-term mobility needs on the transportation system, and present new opportunities for partnering and funding. As part of the partnering process, FDOT planners and decision makers are encouraged to coordinate with DEO, regional planning councils (RPCs), metropolitan planning organizations (MPOs), and local governments, to maximize long-term approaches of achieving mobility goals.

### Land Use and Transportation

Strategies that embrace the connection between land use and good transportation service should be included in local government comprehensive plans and land development codes to meet community goals. These strategies may be found throughout the various elements of a comprehensive plan, and specifically in the transportation element. New provisions for mandatory and optional elements in Section [163.3177](#), F.S., dictate that the transportation element must contain “growth trends and travel patterns and interactions between land use and transportation.” It will be key for FDOT staff to

## Early and Continuous Involvement

coordinate with transportation partners in developing recommendations to accommodate future traffic on the impacted corridors based on solutions other than adding lanes to existing roads. This is particularly important if no roadway improvement projects are programmed on deficient facilities. Examples of these and other strategies are discussed in the following sections, and include context sensitive solutions, corridor access management solutions, transportation demand strategies, and transit oriented development.

Perhaps most importantly, initial efforts of FDOT staff will require establishing early and continuous involvement between FDOT and transportation partners. Transportation partners may include local governments, MPOs, RPCs, as well as the DEO staff. Typically, an interlocal agreement or memorandum of agreement is first established to identify the roles and responsibilities of all affected parties, and to ensure proper coordination and documentation of mitigation. Documentation should include a detailed description of the proposed improvement(s), identify funding responsibilities, and demonstrate that improvements are in compliance with local, regional, and state requirements.

With the revisions to [Chapter 163, Part II](#), F.S., in 2011 and subsequent changes thereafter, transportation concurrency is no longer state-mandated. FDOT interacts with local governments, in particular those who have made the decision to rescind transportation concurrency within their jurisdiction and how these changes will impact agreements such as proportionate share agreements into the future. For proportionate share agreements, the changes to state law were not retroactive for existing agreements. However, there are no restrictions in state law that may preclude a developer from modifying their existing agreement to take advantage of these changes.

It's important to understand that FDOT may only grant or deny modifications to proportionate share agreements if FDOT is a party to the agreement. Additional information regarding proportionate share may be found on [the DEO website](#).

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Prop Share Agreement

## 3.3 Three Basic Categories of Mitigation Strategies

As funding needs for new capacity improvements greatly exceed available funding resources, the focus of transportation impact mitigation has shifted to a more systematic approach to consider enhancing operational efficiency and increasing options for alternative modes of travel in addition to increasing roadway capacity. A variety of the following strategies may be chosen relative to the transportation impacts of the proposed development, transportation system long-term

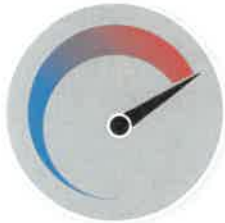


goals/plans, and applicable state and local requirements. Both short-term and long-term mitigation options should be considered to coordinate achieving long-term mobility goals. Mitigation strategies will be discussed in the following section within the framework of three general categories to provide reviewers with a range of options, specific to local and regional needs and goals:

- 1) Enhancing Operational Efficiency on Existing Transportation System
- 2) Increasing Other Modal Options
- 3) Increasing System Capacity

### 3.3.1 Enhancing Operational Efficiency on Existing Transportation System

#### OPERATIONAL



#### EFFICIENCY

Mitigation strategies designed to enhance operational efficiency on the existing system and reduce greenhouse gas emissions may include:

- Congestion Management Processes
- Corridor Access Management Plans
- Street Network Connectivity
- Transportation Demand Management (TDM)
- Transportation Systems Management & Operations (TSM&O)
- Enhancements for use of managed lanes or transit
- Public Transit Operational Improvements

#### Congestion Management Process (CMP)

Federal Regulation, [Titles 23 U.S.C. 134\(k\)\(3\)](#) and [49 U.S.C. 5303\(k\)\(3\)](#) require that all MPOs maintain a Congestion Management Process using travel demand reduction and operational management strategies to identify and address congestion issues on the transportation network. Partnering with MPOs through this CMP can help identify and prioritize mitigation options that address long-term mobility on the State Highway System. Employing this strategy can both aid in identifying low-cost operational and management improvements and present an opportunity for partnering in costly, large-scale needed improvements.

#### Corridor Access Management Strategies

Comprehensive corridor access management planning provides an excellent way to increase efficiency and safety on the impacted roadway systems. Good corridor access management practices can assist with orderly development patterns, increased safety, and efficiency on roadways. The management of driveways also ensures a safer environment for pedestrians and bicyclists. FDOT has many resources to help with the important strategy.



Comprehensive corridor access management incorporates coordination of land use decisions within the corridor. Comprehensive corridor access management planning may be considered in coordination with the local comprehensive plan elements and any transportation sufficiency plans. It should define improvement projects, and should evaluate corridors beyond the roadway right of way to address land use, street networks, and right of way. Examples of proposed improvements resulting from the strategy may include:

- Median improvements
- Signal location and spacing
- Auxiliary lanes
- Right of way needs and requirements
- New standards for site access, connectivity and circulation design
- Effective location of commercial and transportation activity centers
- Improvements to the supporting roadway network
- Improvements involving access for other transportation modes (e.g. bus pullouts, transitions for special use transit lanes or bus rapid transit, pedestrian crossing treatments)
- Better design and integration of bicycle lanes and sidewalk facilities.

To implement Corridor Access Management Plans, each implementing agency (e.g., FDOT, MPOs, and local governments) should adopt the plan. State and local governments should approve these plans. Implementation is typically achieved by combining regulations, interagency or public/private agreements, design standards, and road improvement projects. Detailed guidance and resources on evaluation techniques and best practices are available in Chapter 2 of this Handbook

[Corridor Preservation Best Practices](#) (Hillsborough County Corridor Study) CUTR 2003

## Street Network Connectivity Strategies

In many areas around Florida, SHS facilities are being used as the primary means for transportation between developments, while local and collector street networks remain underdeveloped and/or fragmented. In addition to the strain this puts on the ability of these facilities to maintain adequate mobility and emergency access, the use of major highways results in negative impacts to the community. The higher speeds and turning movements associated with traffic on major highways create unsafe conditions for bicyclists and pedestrians. In addition, these safety issues, combined with trip length and lack of connectivity produce a greater dependence upon the automobile as the sole means for transportation.

Mitigation to address transportation impacts to these facilities involves promoting activity centers, providing alternative routes for local trips, focusing on connecting existing roads, as well as considering street network connectivity as new development emerges. Transportation sufficiency plans which could include long-term corridor access management plans can use the existing local street system to identify where preferred alternative routes are located, and mitigation efforts can be focused on promoting connectivity over time. Continuous coordination with local governments is needed to implement this strategy successfully, and reviewers should consult applicable land development codes for street spacing or connectivity requirements for developments impacting SIS facilities.

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Guide for Analysis of  
Corridor Management  
Policies and Practices

## Transportation Demand Management Techniques (TDM)

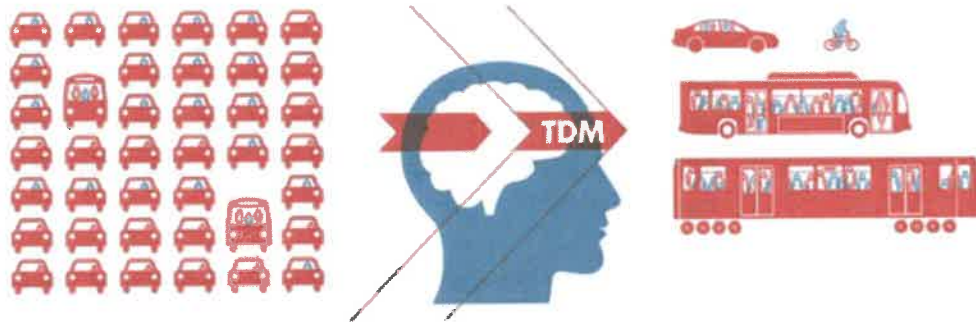
Transportation Demand Management (TDM) consists of strategies that foster increased efficiency of the transportation system by influencing travel demand by mode, time of day, frequency, trip length, regulation, route or cost. TDM discourages peak hour drive alone travel through better management of existing transportation infrastructure, services and resources. TDM strategies include, for example, public transit services, carpooling and vanpooling, compressed work weeks, telecommuting, limited parking, and provision of bicycle parking, shower, and locker facilities by employers. Detailed information about TDM strategies and existing programs can be found at [The National TDM and Telework Clearinghouse](#).

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House

FDOT staff unfamiliar with local government land development processes will find guidance on measures that can be used to influence the incorporation of TDM into the land development process in [Incorporating TDM into the Land Development Process](#). National Center for Transit Research at CUTR, August 2005. The report documents efforts to secure TDM strategies as part of

development approvals, summarizes the long-range planning groundwork that frames the land development process, includes several case study examples from Florida and other states, and identifies institutional barriers to the use of TDM as part of the land development process. Note that some of the statutory references are out of date, but the basic principles are sound.



Transportation partners interested in using TDM in land development should start their involvement early. This requires participation in review and updates of the MPO long-range transportation plan and transportation improvement program as well as local government comprehensive plans. The reviewer should ensure that the TDM measures are consistent with the MPO’s CMP and traffic analysis methodology. These activities will begin the integration of TDM principles and strategies into the land use and transportation planning process resulting in physical infrastructure and regulatory tools to support TDM as land development proceeds.

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*TDM methodologies can also utilize state of the art transportation system management and operations strategies (TSM&O) such as displaying real time duration of congestion information vs. travel times on rail or bus rapid transit.*

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TDM strategies can also be site specific if they are part of a larger regional effort.

Transportation Systems Management & Operation (TSM&O)

Transportation system management and operations (TSM&O) strategies are utilized to address mobility and safety goals for a region, area, or facility.

**Examples of TSM&O strategies include:**

- Modify traffic signals phasing or timing
- Improve signal progression and implementing signal priority
- Implement ramp metering
- Implement incident management programs
- Implement traveler information systems

- Install intelligent transportation systems (ITS) infrastructure or communication networks supporting TSM&O
- Active Arterial Management (AAM)
- Integrated Corridor Management (ICM)

For more information on TSM&O strategies used to improve mobility and safety refer to the [FDOT TSM&O Strategic Plan \(August 17, 2017\)](#).

### Enhancements for Use of Managed Lanes or Transit

Enhancements for the use of transit or managed lanes can alleviate traffic impacts by resulting in an increase in transit use and reducing the number of single occupant vehicle trips (SOV) thereby reducing the number of primary vehicle trips on the roadway system. These improvements should be evaluated carefully by FDOT and changes in mode split should be supported by the developer based on data collected on projects of similar intensity and use. In addition, FDOT should work with local governments and MPOs to encourage inclusion of these strategies into local and regional plans for potential impacts on important state resources and facilities. Managed lanes and transit operations improvements can be considered as either localized or regional mitigation strategies depending on the scale of the projects.

Some of the strategies that may be appropriate for mitigation include:

- Construction of park and ride lots
- Construction of bus shelters, turn-outs, etc.
- Construction of access ramps for managed lanes
- Implementation of managed lanes at ramp metering and intersections
- Operational funding for transit
- Incorporating site design principles to facilitate transit
- Add passing lanes so that transit vehicles can bypass congestion hotspots

### Public Transit Operational Improvements

Public transit operational improvement strategies are also strategies that are intended to reduce the number of primary-trip vehicles on the transportation network by changing the mode split. These strategies are encouraged; however, they should be carefully evaluated to ensure that the proposed changes in mode split are realistic. Additionally, it should be ensured that local transit agencies support the change in transit service and are committed to the proposed changes associated with the proposal. Examples of public transit operational improvements that may be appropriate for mitigation include new or more frequent service and employer subsidized transit service. Please note that public

transit facilities as defined under Section [163.3180\(5\)\(h\)1](#), F.S., are exempt from transportation concurrency.

### 3.3.2 Increasing Other Modal Options

Another strategy for ensuring the long-term viability of the transportation network is mitigation that increases mode choice. All mitigation options utilizing non-automobile modes must be firmly rooted in local government comprehensive plans. Options for increasing mode choice are discussed below, and include:

- Transit Oriented Development (TOD)
- Providing Better Transit Options
- Bicycle/Pedestrian Network Connectivity

#### Transit Oriented Development (TODs)

Another method for addressing congestion on the SHS is through the promotion of land uses that are supportive of transit. Transit oriented development is defined in Section [163.3164\(46\)](#), F.S. to relate to areas defined in the local comprehensive plan that is or will be served by existing or planned transit service. These areas are characterized by compact, moderate to high density mixed-use developments with integrated land uses that support multimodal options such as bicycle/pedestrian access and transit amenities.



To implement these strategies, local governments should refine comprehensive plans and land development codes to include transit supportive design criteria, such as density and intensity ranges, as part of the development standards. FDOT planners and decision makers can then support these efforts in partnership with local governments. FDOT’s [Transit Development Plan \(TDP\) Guidance Handbook](#) and [Accessing Transit Design Handbook for Florida Bus Passenger Facilities](#) contain guidance on design features, safety issues, and land use strategies that promote TODs.

#### Provide Transit Options

Transit options are an important consideration in developing any mitigation strategy in urbanized areas. All transit options should be included in transit agency TDPs and LGCPs. Implementing this strategy requires early and continuous coordination with transit agency representatives, such as MPOs in addition to local governments, in the development of mobility strategies. Consideration of funding mechanisms to maintain operational costs of the system is needed to create cost feasible solutions.

Providing for  
Transit  
Operations

PDF

The report, [Land Developer Participation in Providing for Bus Transit Facilities/Operations](#) documents various strategies that Florida’s local governments and transit agencies can use to generate public transportation funding through the involvement of private developers. Local and national case studies highlight application of these strategies. Suggestions are designed for use within the framework of local government comprehensive plans, land development codes, and transit development plans, and call for increased coordination and cooperation between local governments and transit. FDOT planners and decision makers may also become involved in this process as development impacts SIS facilities, and should work on establishing coordination efforts to plan for transit options for mitigation.

Bicycle/Pedestrian  
Connectivity

To foster the use of non-auto transportation modes, connectivity for bicycle and pedestrian movement should be an integral part of any multimodal transportation network. Although often considered the realm of local government alone, FDOT planners and decision makers should be prepared to share technical expertise in this area. Ample bicycle and pedestrian connections within and between residential areas and activity centers, such as shopping areas, employment centers, transit stops, neighborhood parks, and schools may reduce the number of short automobile trips.

MMTD QOS  
Handbook

PDF

Multimodal  
Transportation Districts  
and  
Area-wide  
Quality of Service  
Handbook



A bicycle and pedestrian network comprised of a system of interconnected and direct routes can be measured by a connectivity index. One method to perform this analysis is found in FDOT’s Multimodal Transportation Districts and Area-wide Quality of Service Handbook. Even though Multi-Modal Transportation Districts are no longer FDOT administered areas, this document is still useful for the concepts and strategies in the report. Missing links or gaps in the bicycle and pedestrian network should be identified and eliminated where appropriate through the development process. Missing links may include locations between cul-de-sacs, through walls or fences, mid-block where block length exceeds 660 feet, or where bicycle pedestrian routes would otherwise be “excessively” circuitous. Highest priority for improvements should be given to locations with high concentrations of pedestrian activity and where connections are needed to ensure easy access between transportation modes, with particular attention to bicycle and pedestrian access to schools, transit stops and regional greenway or trail systems. Model comprehensive plan amendment and land development regulation language can be found in the [Model Regulations and Plan Amendments for Multimodal Transportation Districts](#).

Model  
Regulations

PDF

Model Regulations  
and Plan Amendments  
for Multimodal  
Transportation Districts



### 3.3.3 Increasing System Capacity

Options for increasing roadway capacity may include:

- Construction of new transportation facilities, such as new roads or transit
- Addition of new through lanes
- Improvements that support the main highways, such as connectivity, parallel facilities, or increased transit service

#### Construction of New Facilities

Applicable considerations when proposing new facilities include impacts to regional community and environmental objectives, congestion management system goals and policies, and air-quality planning requirements. As such, features in roadways that aid future transportation system management (TSM&O) strategies (e.g., Intelligent Transportation Systems), enhance the use of transit (e.g., geometric and operational improvements to accommodate bus travel) and future travel demand management strategies (e.g., access to park and ride lots) can be part of this strategy.

In addition, new roadway facilities on the SHS should be consistent with all FDOT standards and policies.

#### Add Lanes

The addition of new through lanes on existing facilities is another way of addressing the impacts resulting from new developments. However, the lane additions should be consistent with regional goals and policies for SOV travel, FDOT's Procedure [\*Topic No. 525-030-260 Strategic Intermodal System \(SIS\) Highway Component Standards and Criteria\*](#). The selection of corridors for new general use lanes should be coordinated with FDOT. Features that facilitate future transportation system management strategies, enhancements for the use of transit and future travel demand management strategies are part of this strategy.

#### Alternatives to SIS Roads

Improvements made to arterial or collector roads running parallel to a SIS facility and serving common destinations may be considered as an option for mitigation of transportation impacts to SIS facilities at or near capacity. This strategy creates an opportunity to partner with appropriate transportation agencies and/or MPOs to meet mutually beneficial, cost effective transportation improvements. FDOT staff play a key role in approving relievers as SIS mitigation.

Developing these reliever roads may take the form of new road development as well as expansions to existing roads. Because of the expense and complexity associated with obtaining right of way for new roads, the designation of existing roads as a parallel reliever may be desirable where travel demand evaluations warrant such designation. Where service roads are designated as parallel



relievers, opportunities exist to integrate corridor development with local street networks and enhance the ability of smaller areas to establish service roads on the state highway system. Examples of mitigation options for parallel relievers include improving access from the main facility to these reliever roads, connecting a number of existing reliever roads into one interconnected road, adding lanes to the parallel road to increase capacity, as well as improvements to signal timing, turn lanes, and medians.

**Exhibit 25**  
**Reliever Road**  
**Example**



The opportunities for partnering between FDOT, local governments, and other transportation agencies to establish parallel reliever roads offer viable options for meeting FDOT objectives of maintaining levels of service and mobility on the SIS, SHS and local visions for mobility; however, reviewers should be aware of known design issues to ensure safety and mobility in the creation of these facilities. Continuous frontage roads, for example, are known to lead to crashes and operational problems due to unfamiliar movements and where connecting too close to a major roadway intersection. In addition, one of the lessons learned from Destin’s parallel reliever has been the need to create bicycle and pedestrian facilities in conjunction with these parallel relievers to develop a connected, multimodal environment. Close coordination between FDOT and local governments can help in ensuring that community and safety needs are met on a project by project basis.

### 3.4 Other Mitigation Strategies: Land Use and Transportation Strategies to Enhance Mobility

In addition to the approaches referenced above, the following additional mitigation options may be considered in reducing transportation impacts. These options are long-term planning strategies that require adoption into local government comprehensive plans.

### 3.4.1 Transportation Concurrency and Alternatives (TCEAs, TCMA, and MMTDs)

Legislation in 2011 removed the state mandate for transportation concurrency in local government comprehensive plans. However, transportation concurrency remains a part of the adopted local government comprehensive plan as an optional provision until an amendment removes this provision, pursuant to Section [163.3180](#), F.S.

For local governments that retain transportation concurrency, there may be some cases where the strict application of transportation concurrency requirements may conflict with important area planning objectives such as urban infill, redevelopment, or the promotion of public transportation. In these cases, local governments can designate geographic areas into their comprehensive plans as Transportation Concurrency Exception Areas (TCEAs), Transportation Concurrency Management Areas (TCMA), and Multimodal Transportation Districts (MMTDs) in order to provide flexibility from the strict application of concurrency. TCEAs, TCMA, and MMTDs are used to implement transit system improvements and supporting pedestrian/bicycle infrastructure as a viable mitigation strategy, and proportionate share contributions may be used to fund these mitigation efforts. For example, the City of Tallahassee has implemented a multimodal transportation district for the urbanized area surrounding the downtown area and Florida State University. Land uses within this area are eligible for density and intensity bonuses to encourage infill and redevelopment. Multimodal transportation district policies also include urban design requirements for the width of sidewalks, location of parking lots and other infrastructure to promote multimodal options. Review agencies aiming to encourage development in special high-density infill areas may opt to make adjustments to standard ITE trip generation calculations. As discussed in the ITE Trip Generation Manual, the ITE rates are based almost exclusively on suburban locations. Higher-density urbanized land uses with highly walkable and mixed-use design characteristics are known to generate significantly fewer vehicle trips per development unit (square feet or households), compared to typical suburban developments. In the urbanized environment, a greater percentage of overall trips are by walking and transit. Some locations may have well-developed bicycle facilities that may further reduce vehicle trip generation.

To account for the reduced vehicle trip generation expected for urban infill or transit-oriented developments, the applicant and reviewer should mutually agree upon appropriate adjustments to account for higher internal capture, transit mode share, and percentages of walk and bicycle trips, as determined by surrounding development characteristics. These negotiated rates should only be

implemented after first ensuring the proposed development truly exhibits the urbanized characteristics conducive to vehicle trip reductions.

Similar to analysis methods for internal capture trips, it is recommended that these special adjustments be conducted prior to the FSUTMS modeling process, and that the model then be used as a tool to aid in vehicle trip distribution and assignment. Though some Florida models may contain bus, rail, and even non-motorized travel modes, FSUTMS selected zone analysis procedures isolate only the development's vehicle trips after all the vehicle-trip reductions discussed above are applied. These methods avert any concern of double-counting mode shift toward non-automobile modes.

### 3.4.2 Transportation Sufficiency Plans

Under Section [163.3182](#), F.S., a local government can create a transportation development authority for its jurisdiction if there is an identified transportation deficiency. The area for which the transportation development authority is created for is defined as the transportation deficiency area which includes the geographic location of the identified transportation deficiency. It is the responsibility of the transportation authority to develop a transportation sufficiency plan for the designated transportation deficiency area to correct or mitigate the area's deficient transportation facilities.

Transportation sufficiency plans identify transportation facilities that do not achieve and maintain the level of service standards established in a local government's comprehensive plan, and therefore, these facilities are considered deficient. These plans include a priority listing of deficient facilities of which transportation projects and associated project funding are meant to resolve deficiencies. Projects that are identified within the plan shall be organized into a schedule with the intent to eliminate transportation deficiencies within 10 years after the adoption of the plan. Such projects shall also be included in a local government's Five-Year Schedule of Capital Improvements found within the comprehensive plan.

The adoption of the transportation sufficiency plan shall satisfy all applicable transportation concurrency requirements as established by the local government for the designated transportation deficiency area. Proportionate share mitigation shall be limited to ensure that development within the transportation deficiency area is not charged with additional costs to resolve any deficiencies. The transportation sufficiency plan for this area may only be removed from the comprehensive plan once all the projects and costs associated with the

transportation sufficiency plan have been taken care of pursuant to Section [163.3182\(8\)](#), F.S.

FDOT reviewers should be aware of any transportation deficiency areas and sufficiency plans for local governments implementing transportation concurrency. Reviewers should make recommendations when applicable to additional mitigation actions which can be included in local transportation sufficiency plans.

### 3.4.3 Funding of Mitigation Improvements

Transportation mitigation needs vary by project and have the potential to impact the viability of a proposed development. As a result, the funding of mitigation options such as Proportionate Share and Mobility Fees can be challenging and typically requires negotiation.



More information regarding local governments that have adopted mobility fees/mobility plans is available in [A Guidebook: Using Mobility Fees to Fund Transit Improvements](#).

The methodology for determining the developer's share of funding for mitigation improvements should be identified in the methodology phase of the development. The share is determined in relationship to the number of trips generated by the development and the capacities on an affected roadway segment or some other calculation based on impact, mobility fees or other options a local government may adopt, including multimodal improvements.

The final mitigation fee is typically negotiated among the applicant, appropriate local governments, RPC and FDOT (if improvements to significant state facilities such as the SIS are involved) following the mitigation analysis that demonstrates the proposed improvements will be acceptable to the local government or agency for alleviating any deficiencies caused by the proposed development. This negotiation should occur before or concurrent with the drafting of the development order.

#### Optional Concurrency Mitigation (Proportionate Share)

Section [163.3180](#), F.S., requires that if transportation concurrency is utilized, the local government must provide an option for mitigation, also known as proportionate-share. There has been much discussion across the state on the interpretation of this type of mitigation and this handbook will only provide general principles and statutory references.

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*163.3180 (5)(h)1.c, F.S. -Allow an applicant for a development-of-regional-impact development order, development agreement, rezoning, or other land use development permit to satisfy the transportation concurrency requirements of the local comprehensive plan, the local government's concurrency management system, and s. 380.06, when applicable, if:*

*The applicant in good faith offers to enter into a binding agreement to pay for or construct its proportionate share of required improvements in a manner consistent with this subsection.*

*The proportionate-share contribution or construction is sufficient to accomplish one or more mobility improvements that will benefit a regionally significant transportation facility. A local government may accept contributions from multiple applicants for a planned improvement if it maintains contributions in a separate account designated for that purpose.*

*163.3180 (5)(h)1.d, F.S. - Provide the basis upon which the landowners will be assessed a proportionate share of the cost addressing the transportation impacts resulting from a proposed development.*

*163.3180 (5)(h)2, F.S. - An applicant shall not be held responsible for the additional cost of reducing or eliminating deficiencies. When an applicant contributes or constructs its proportionate share pursuant to this paragraph, a local government may not require payment or construction of transportation facilities whose costs would be greater than a development's proportionate share of the improvements necessary to mitigate the development's impacts.*

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Deficiencies, pursuant to Section [163.3180\(5\)\(h\)4.](#), F.S., pertain to any facility on which the adopted level-of-service is exceeded by the existing, committed, and vested trips, plus additional projected background trips from any source

other than the development project under review, and trips that are forecast by established traffic standards. Under the proportionate share system, only facilities considered deficient with the additional traffic projected for a development project under review are considered in the proportionate share calculation for that development. The additional trips projected to impact a facility should be coincident with the stage of the development project. For those facilities that are identified as deficient before the establishment of the development project and will be impacted by the project, the improvements necessary to alleviate the deficiency are in place at the time of the proportionate share calculation.

The current legislation also specifies that the applicant shall receive a credit on a dollar-for-dollar basis for impact fees, mobility fees, and other transportation concurrency mitigation requirements paid or payable in the future for the project. It also states that the credit shall be reduced up to 20 percent by the percentage share that the project's traffic represents of the added capacity of the selected improvement, or by the amount specified by local ordinance, whichever yields the greater credit. Local governments that have repealed their transportation concurrency system and associated impact fees and have instituted a mobility-fee based system include counties such as Alachua and Pasco, and municipalities such as Kissimmee and St. Petersburg.

## Transportation Cost Resources

Determining accurate mitigation costs is an essential component to developing an equitable mitigation package. FDOT maintains several cost estimating and documentation resources to assist with the determination of:

- Highway construction costs
- Right of way costs
- Bridge costs
- Transit costs
- Bicycle and Pedestrian facility costs
- Inflation factors (for converting present day costs to future years)
- Construction cost indicators



[FDOT's Long-range Estimates \(LRE\)](#) site contains a full list of cost estimates and documentation resources. In reviewing the on-line resources, it should be noted that much of the information is general. Many, if not all, of the cost factors are situation specific and will vary from District to District within FDOT based on local circumstances. In many situations, costs will vary even within a given District. This is particularly true with right of way costs due to the price of right of way acquisition in dense urban areas.

Because of the wide cost variation, all costs and adjustment factors relating to specific transportation projects should be addressed with the District office where the project will be located and all assumptions and cost estimating methodologies should be reviewed and approved by FDOT. It is noted that the generalized costs available from FDOT may not be accepted for use in mitigation calculations. Where available, cost estimates based on design, Project Development and Environment, or feasibility/corridor studies should be used. Tools such as FDOT's Long Range Estimating (LRE) software may also be used to determine a more location specific cost as compared to generalized costs. Because of the significant differences that can exist between a cost estimate based on generalized costs and a cost estimate based on more site-specific information, the use of site specific costs in mitigation agreements is preferred by FDOT.

### Cautionary Considerations

The funding of transportation improvement projects is often key to satisfying local government comprehensive plan and local ordinance requirements and FDOT operating standards, allowing development to move forward. Proportionate share mitigation, may be considered as a tool through which development applicants can contribute their share of the cost of improving the impacted transportation facility and thereby mitigate their impact. When properly developed and administered, this funding mechanism can effectively generate funding for future transportation improvements in an equitable manner while allowing development to continue. To be effective, it is essential that cost-sharing mitigation plans:

- Be developed based on correct application of site related traffic
- Be developed based on accurate and reliable cost estimates
- Have an applicant's or agency's commitment to deliver a funded transportation improvement adopted into the local capital improvements element

Development and administration of cost-sharing mitigation plans can be complicated by:

- Cost uncertainties such as:
  - Lack of detailed design or cost estimates for future improvements
  - Right of way acquisition costs
  - Potential for large fluctuations in construction costs due to unanticipated changes in material availability (particularly shortages), fuel costs, and other inflationary considerations

- Developments that are obligated to contribute but do not because the development is unable to move forward (no development = no contribution)
- Potential lack of consistency between a project identified for proportionate share and other adopted planning documents (that may not include the project needed)
- Funding shortfalls if insufficient funds are collected to fully pay for a given proportional share mitigation project

It should be noted that cost-sharing contributions may be in the form of funds, right of way, or the construction of improvements. FDOT should be consulted with projects that involve the SIS in order to ensure impacts on these facilities are addressed.

## Impact Fees

Impact fees, one-time charges imposed on new development as a condition of approval, is another funding strategy that may be used by county and municipal governments to ensure that new development pays its proportionate share of the costs to expand transportation system capacity. The “Florida Impact Fee Act,” Section [163.31801](#), F.S., permits local governments to adopt impact fee ordinances as long as these charges are consistent with the local government’s land development code and comprehensive plan, and meet the minimum requirements stated in the statute.

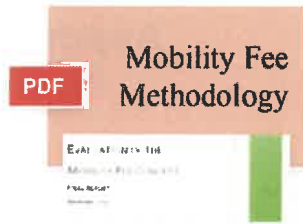
In addition, Section [163.2517\(3\)\(j\)](#), F.S., requires urban infill and redevelopment plans to contain a package of financial incentives, which may include strategies to lower impact fees for developments that promote the use of non-auto transportation modes. These types of incentives recognize the differences in travel demand generated by different land use types, and should be considered in the impact review process. Section [163.3180\(5\)\(f\)](#), F.S., also includes alternative techniques that may employ impact reductions for certain types of development.

## Mobility Fees

Section [163.3180](#), F.S., encourages the use of mobility fees as an option for local governments that decide to repeal their transportation concurrency provisions. Several local governments, such as Alachua and Pasco Counties, have implemented mobility fee ordinances and associated provisions.

The mobility fee is a charge on new development as a form of mitigation for its impact on a local government’s transportation system. The revenue from the fee is used to alleviate deficiencies to the portion of the system impacted by a development project and can include internal roadway facilities, exclusive turn lanes, and other forms of improvements. Mobility fees can be used to help





establish multimodal friendly land use patterns. For example, the Pasco County mobility-fee system assesses improvement costs for roadway, transit, and bicycle/pedestrian infrastructure. The system is tiered to focus infill and redevelopment in urbanized areas of the county.

Under Section [163.3180\(5\)\(i\)](#), F.S., mobility fee systems may not be used to deny, time, or phase an application for development provided that the applicant has agreed to pay for the impacts of the development project through the mobility fee system. The mobility fee system implemented by a local government must also comply with the dual rational nexus test applicable to the development and associated fees. If a local government decides to repeal its transportation concurrency system and uses a system that is not mobility-fee based, the new alternative system may not be used to charge an applicant for improvements to existing deficient roadway facilities as defined under Section [163.3180\(5\)\(h\)](#), F.S.

Note: *Italicized words and phrases* in the Handbook are defined in this glossary.

- Access Management** – The control and regulation of the spacing and design of driveways, medians, median openings, traffic signals and intersections on arterial roads to improve safe and efficient traffic flow on the road system.
- Accessibility** – The dimension of *mobility* that addresses the ease in which travelers can engage in desired activities.
- Adverse Impact** – When a roadway is significantly impacted and/or the LOS on the roadway with the development trips is below the adopted LOS.
- Analysis Period** – The analysis period should be related to expected peaking patterns of demand on the roadway and anticipated development traffic (usually a peak-hour analysis).
- Analysis Years** – The years agreed to analyze transportation impacts. They should be clearly defined in the report and agreed to during the methodology process.
- Annual Average Daily Traffic (AADT)** – The volume passing a point or segment of a roadway in both directions for 1 year divided by the number of days in the year.
- Area Type** – In this Handbook, a general categorization of an extent of surface based primarily on the degree of urbanization.
- Arterial** –
  - 1) A signalized roadway that primarily serves thru traffic with average signalized intersection spacing of 2.0 miles or less.
  - 2) A state facility that is not on *freeway*.
  - 3) A type of roadway based on FDOT functional classification.
- Assignment** – A stage of the transportation demand modeling process in which the various trips are placed on the transportation network.
- Auxiliary Lane** – An additional lane on a *freeway* connecting an on ramp of one interchange to the off ramp of the downstream interchange.
- Average Daily Traffic** – The total traffic volume during a given time period (more than a day and less than a year) divided by the number of days in that time period.
- Background Traffic** – The traffic that includes the expected increase from overall growth in through traffic as well as traffic from other developments in the study area.
- Base Year** – The base year is the year in which the model is validated to accurately represent the current conditions of that year.

## Appendix B | Websites and Links

- Bicycle Los Model** – The *operational methodology* from which this Handbook’s bicycle quality/level of service analyses are based.
- Blended Methods** – The use of model methods to determine distribution percentages of vehicles is common in combination with manual assignment processes.
- Boundaries** – In this Handbook, the geographical limits are associated with FDOT’s *Level of Service Targets* for the *State Highway System* or its MPO Administrative Manual.
- Build-Up Method** – Identifies all trips associated with vested developments in the study area, assigns those trips to the study area transportation system, and then adds the background through traffic.
- Capacity** – The maximum number of vehicles that can pass a point in a one-hour time period under prevailing roadway, traffic and control conditions.
- Capital Improvements Element (CIE)** – Adopted and updated to reflect the timing and funding of capital projects to meet and maintain adopted LOS standards for all infrastructure.
- Collector** – A roadway providing land access and traffic circulation with residential, commercial and industrial areas.
- Community** – In this Handbook, outside of an urban or urbanized area, an incorporated place or a developed but unincorporated area with a population of 500 or more identified in the appropriate *local government comprehensive plan*.
- Community Capture** – Extends the application of internal capture to include potential trip interactions and reductions within the boundaries of large-scale, multi-use developments.
- Community Planning Concepts** – The ideas necessary for use in planning for urban growth so as to responsibly balance the growth of the infrastructure required to support a community’s residential and commercial growth with the protection of its natural systems (land, air, water).
- Concurrency** – A systematic process utilized by local governments to ensure that new development does not occur unless adequate infrastructure is in place to support growth.
- Concurrency Management Areas (CMA)** – Designated in a local government comprehensive plan and must be a compact geographic area with an existing network of roads where multiple, viable alternative travel paths or modes are available for common trips.
- Concurrency Management Systems (CMS)** – Official government plan to manage and pay for growth.
- Congestion** – Condition in which traffic demand approaches or exceeds the available capacity of the transportation facility.

## Appendix B | Websites and Links

- Corridor** – A set of essentially parallel transportation facilities for moving people and goods between two points.
- Cube Voyager** – The Cube Voyager Modeling software is a tool used in Florida to forecast travel demand.
- Deficiency** – In general, defined under Section [163.3182](#), F.S., transportation deficiency “means an identified need where the existing and projected extent of traffic volume exceeds the level of service standard adopted in a local government comprehensive plan for a transportation facility”.
- For local governments which have chosen to continue implementation of transportation concurrency, “the term “transportation deficiency” means a facility or facilities on which the adopted level-of-service standard is exceeded by the existing, committed, and vested trips, plus additional projected background trips from any source other than the development project under review, and trips that are forecast by established traffic standards, including traffic modeling, consistent with the University of Florida’s Bureau of Economic and Business Research medium population projections. Additional projected background trips are to be coincident with the particular stage or phase of development under review” pursuant to Section [163.3180\(5\)\(h\)4.](#), F.S.
- Demand** – The number of persons or vehicles desiring service on a roadway.
- Demographic Data** – Intensity, population, employment, comprehensive plan data and zoning requirements.
- Dense Urban Land Area** – Any jurisdiction, established under Section [380.06\(29\)](#), Florida Statutes (F.S.), that meets the following criteria:
- A municipality that has an average of at least 1,000 people per square mile of land area and a minimum total population of at least 5,000;
  - A county, including the municipalities located therein, which has an average of at least 1,000 people per square mile of land area; or
  - A county, including the municipalities located therein, which has a population of at least 1 million. Miami-Dade and Broward Counties are the exceptions.
- Development of Regional Impact (DRI)** – A development which, because of its character, magnitude, or location, would substantially affect the health, safety, or welfare of citizens of more than one county in Florida, as defined in Section [380.06\(1\)](#), F.S.
- Directional Distribution Factor (D)** – The proportion of an hour’s total *volume* occurring in the higher volume direction.

## Appendix B | Websites and Links

- Diverted Trips** – Similar to pass-by trips, however, vehicles use a segment of the roadway system that they previously were not using.
- DRI Amendments** – An amendment to a development which, because of its character, magnitude, or location, would substantially affect the health, safety, or welfare of citizens of more than one county in Florida, as defined in Section [380.06\(1\)](#), F.S., implemented by [Rule 73C-40, F.A.C.](#)
- Evaluation and Appraisal Review (EAR)** – An audit of a local government’s successes and failures in implementing its comprehensive plan. The EAR is prepared every seven years to evaluate and update a LGCP (s.[163.3191](#), FS). It is the first step in updating the comprehensive plan.
- Express Managed Lanes** – In Florida, express lanes are a type of managed lane where congestion is managed with pricing, access, eligibility and dynamic tolling. Dynamic Tolling.
- Functional Classification** – The assignment of roads into systems according to the character of service they provide in relation to the total road network.
- Future Conditions Analysis** – Determines if the transportation system will operate acceptably with the additional site-generated trips and, if not, what mitigation may be required.
- Future Land Use Element** – Includes goals, objectives and policies and a Future Land Use Map that implement the jurisdiction’s desired land use pattern.
- Future Land Use Map (FLUM)** – Community’s visual guide to future planning. Future land use designations show land use types and densities that a county and/or city has determined to be the most desirable for a particular area.
- Future Year Conditions** – The Future Background Conditions for a future horizon year that does not include the proposed development.
- General Transportation Factors** – Include: Analysis periods, Trip Generation, Current traffic conditions, Future traffic conditions, current and future development, and comprehensive plans.
- Generalized Planning** – A broad type of planning application such as statewide analyses, initial problem identification, and future year analyses; typically performed by use of the *Generalized Tables*.
- Generalized Service Volume Tables** – *Maximum service volumes* based on *roadway, traffic* and *control* variables and presented in tabular form.
- Growth Rate/Trend Method** – Uses historic trends to predict future growth.
- Guideline** – Based on FDOT’s Standard Operating System ([Topic No: 025-020-002](#)), a recommended process intended to provide efficiency and uniformity to the

implementation of policies, procedures, and standards; a guideline is intended to provide general program direction with maximum flexibility.

- Heavy Vehicle** – A FHWA vehicle classification of 4 or higher, essentially vehicles with more than 4 wheels touching the pavement during normal operation.
- Internal Capture** – The number of trips that occur inside the development and don't impact existing roads outside the development.  
The current use or planned future use of land within an area. Common types of land use include residential, industrial, and commercial
- Large Urbanized Area** – An *MPO urbanized area* greater than 1,000,000 population; in Florida, these 7 areas consist of the following central cities: Ft. Lauderdale, Jacksonville, Miami, Orlando, St. Petersburg, Tampa, and West Palm Beach.
- Large-Scale Plan Amendment** – Any change in text to the Comprehensive Plan or any change in the future land use map.
- Large-Scale Transportation Model** – The term [FSUTMS \(Florida Standard Urban Transportation Model Structure\)](#) is used to represent a formal set of modeling steps, procedures, software, file formats, and guidelines established by the Florida Department of Transportation (FDOT) for use in travel demand forecasting throughout the state. The primary objective of travel demand forecasting is to forecast the effects of various policies, programs, and projects on highway and transit facilities. These impacts are commonly quantified by representing the projected demand in terms of forecasted traffic volumes and transit ridership
- Level of Service Targets for The State Highway System** – A value of a performance measure representing the level of desired performance reflecting an agency's goals and objectives. FDOT's Policy [Topic No. 000-525-006](#) to be used in the planning and operation of the State Highway System.
- Local Government Comprehensive Plan (LGCP)** – Any county or municipal plan that meets the requirements of Sections [163.3177](#), [163.3178](#), [163.3180](#), [163.3191](#), [163.3245](#), and [163.3248](#), F.S., as well as with the principles for guiding development in areas designated as areas of critical state concern and [Chapter 369, Part III](#), F.S.
- Local Government Draft Development Order Review** – FDOT's final opportunity to ensure that mobility on SIS/SHS segments located in the project impact area has been adequately addressed. The purpose is to resolve any outstanding issues before the DO is rendered.

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- Maintain** – Continuing operating conditions at a level that prevents significant degradation. In terms of transportation concurrency, this applies to local governments which have chosen to continue implementation.
- Manual Methods** – Manual methods of trip distribution that provide the analyst with a basic understanding of the travel patterns associated with the development.
- Maximum Service Volume** – The highest number of vehicles for a given *level of service*.
- Methodology Development** – An essential component in any traffic impact analysis. It defines the data, techniques, practices, and assumptions that will be used while preparing a transportation impact analysis.
- Mitigation** – Specific design commitments made during the environmental evaluation and study process that serve to moderate or lessen impacts deriving from the proposed action. These measures may include planning and development commitments, environmental measures, right-of-way improvements, and agreements with resource or other agencies to effect construction or post construction action.
- Mixed-Use Developments** – Contain a mix of land uses.
- MMTDS** – Multimodal Transportation District: An area in which secondary priority is given to vehicle mobility and primary priority is given to assuring a safe, comfortable, and attractive pedestrian environment, with convenient interconnection to transit. Applies to local governments that have designated and implemented these areas prior to legislative changes in 2011.
- Mobility** – The movement of people and goods.
- Mode** – Form of transportation, such as automobile, transit, trucks, carpool, ship, and bicycle.
- Mode Split** – The travel mode percentages (automobile, transit, walking, etc.) used by site-generated trips.
- Mode Split/ Alternative Travel Forecasts** – Separating the predicted trips from each origin zone to match each destination zone into distinct travel modes (walking, biking, driving, train, bus).
- Model Method** – Involves the use of a computerized large-scale travel demand model, such as FSUTMS.
- Model Volumes** – The number of vehicles, and occasionally persons, passing a point on a roadway during a specified time period, often 1 hour; a volume may be measured or estimated, either of which could be a constrained value or a hypothetical demand volume.
- Multimodal Transportation District** – An area in which secondary priority is given to *vehicle* mobility and primary priority is given to assuring a safe, comfortable, and attractive pedestrian environment, with convenient interconnection to transit. Applies to local

governments that have designated and implemented these areas prior to legislative changes in 2011.

- Neo-Traditional Developments** – Provides a mix of land uses to serve residential needs and by providing a community design that supports walking and alternative modes of travel.
- Non-State Roadway** – A roadway not on the *State Highway System*.
- NOPC** – Notice of Proposed Change: A report that is required to be submitted by the applicant to the local government when a change is proposed to a previously approved DRI.
- OMD** – FDOT District 4 Office of Modal Development.
- Operational Analysis** – A detailed analysis of a roadway’s present or future level of service, as opposed to a generalized planning analysis or preliminary engineering analysis.
- Operational Efficiency** – Occurs when the right combination of people, process, and technology come together to enhance the productivity and value of any business operation, while driving down the cost of routine operations to a desired level.
- Pass-By Trips** – Currently on the roadway system and pass directly by a generator on the way to the primary destination.
- Peak Hour** – One-hour time period with the highest volume.
- Peak Season** – The 13 consecutive weeks with the highest daily volumes for an area.
- Performance Measure** – A metric that quantifies an agency’s progress in meeting stated goals and objectives.
- Pre-Application Meeting** – Conducted to identify issues, coordinate appropriate State and local agency requirements, promote a proper and efficient review of the proposed development, and ensure that RPC staff are aware of all the issues to which reviewing agencies will require the applicant to respond.
- Primary Trips** – Trips made for the specific purpose of visiting the generator.
- Proportionate Share** – Provides a way for developers to mitigate the impacts of proposed development on significantly impacted state and regional roadways and allows a contribution from developers to the governmental agency that has maintenance for the transportation facility in order to satisfy transportation concurrency requirements according to Section [163.3180](#), F.S. Examples of proportionate fair-share mitigation may include the contribution of private funds, contributions of land, and/or construction and contribution of facilities.
- PSWADT** – Peak Season Weekday Average Daily Traffic: The *average daily traffic* for Monday through Friday during the peak season.



- Rendered Development Order Review** – Once the development order is rendered by the local government, it is FDOT’s responsibility to ensure that all commitments are contained within the LGDO.
  
- Roadway Class** – Categories of arterials and two-lane highways; arterials are primarily grouped by signal density or speed; two-lane highways are primarily grouped by area type.
- Route** – As used in the *Transit Capacity and Quality of Service Manual*, a designated, specified path to which a bus is assigned.
  
- Scheduled Fixed Route** – In this Handbook, bus service provided on a repetitive, fixed-schedule basis along a specific route with buses stopping to pick up and deliver passengers to specific locations.
- Sector Plan** – Sector plan means the process authorized by s. 163.3245 in which one or more local governments engage in long-term planning for a large area and address regional issues through adoption of detailed specific area plans within the planning area as a means of fostering innovative planning and development strategies
  
- Service Measure** – A specific performance measure used to assign a level of service to a set of operating conditions for a transportation facility or service.
- Significance** – Determined by considering the percentage of traffic on a roadway segment that is generated by the development during the peak hour in relationship to the maximum service volume at the adopted LOS for the facility during the same period.
- Site Access** – Accommodation of automobiles, buses, pedestrians, bicycles and other modes of transportation to a given site.
- Site Development Characteristics** – The location of the proposed development, site boundaries and other site related characteristics.
- Special Generator Method** – Uses a combination of ITE Trip Generation and FSUTMS. The trips in the model are adjusted to match the ITE trip generation rate.
- Special or Unusual Generator** – One that cannot be adequately described by ITE Trip Generation Report.
  
- State Highway System (SHS)** – All roadways that the Florida Department of Transportation operates and maintains; the State Highway System consists of the Florida Intrastate Highway System and other state roads.
- Statute** – A written law enacted by a duly organized and constituted legislative body.

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- Strategic Intermodal System (SIS)** – Florida’s system of transportation facilities and serves of statewide and interregional significance.
- Study Period** – An hour period on which to base quality/level of service analyses of a facility or service.  
A length in time including a future year of analysis.
- System** – A combination of facilities selected for analysis.
- Target** – Florida Department of Transportation formally established criterion for the State Highway systems to achieve a desired level of quality.
- Traffic** – A characteristic associated with the flow of vehicles.
- Traffic Analysis Zone (TAZ)** – A geographic unit of analysis used to aggregate socioeconomic data (household and employment data).
- Traffic Attenuation** – As traffic from a specific site travels longer distances, the number of those site generated trips attenuate (drop) because more and more people reach their final destinations.
- Transit System Structure** – The Transit Capacity and Quality of Service Manual’s analytical methodology of transit stops, route segments, and system.
- Transitioning Area** – An area that exhibits characteristics between *rural* and *urbanized/urban*.
- Transitioning/Urban** – The grouping of transitioning areas and urban areas into one analysis category in the *Generalized Tables* and software.
- Transit-Oriented Developments** – “Transit-oriented development” means a project or projects, in areas identified in a local government comprehensive plan, that is or will be served by existing or planned transit service. These designated areas shall be compact, moderate to high density developments, of mixed-use character, interconnected with other land uses, bicycle and pedestrian friendly, and designed to support frequent transit service operating through, collectively or separately, rail, fixed guideway, streetcar, or bus systems on dedicated facilities or available roadway connections.
- Transportation Concurrence Exception Areas (TCEA)** – An urban area delineated by a local government where infill and redevelopment are encouraged, and where exceptions to the transportation concurrence requirement are made, providing that alternative modes of transportation, land use mixes, urban design, connectivity, and funding are addressed. Applies to local governments that have designated and implemented these areas prior to legislative changes in 2011.
- Transportation Concurrence Management Area (TCMA)** – A geographically compact area designated in a *local government comprehensive plan* where intensive development exists, or is planned, so as to ensure adequate mobility and further the achievement of identified important state planning goals and policies, including discouraging the

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proliferation of urban sprawl, encouraging the revitalization of an existing downtown and any designated redevelopment area, protecting natural resources, protecting historic resources, maximizing the efficient use of existing public facilities, and promoting public transit, bicycling, walking, and other alternatives to the single-occupant automobile. Applies to local governments that have designated and implemented these areas prior to legislative changes in 2011.

- Transportation Demand Data** – Includes current and historical traffic volumes, turning movement counts, traffic characteristics such as peaking and directional factors, ridership data, and bicycle and pedestrian activity.
- Transportation Element** – Goals, objectives and policies creating the jurisdiction’s transportation system.
- Transportation System Data** – Include the physical and functional characteristics of the transportation system.
- Trip Assignment** – Determines the amount of traffic that will use each access point and route on the roadway network and determines the number of site-generated turning and through movements at each intersection and roadway segment of the study area network.
- Trip Distribution** – Trip-making characteristics between the proposed development and off-site areas to determine trip origins and destinations.
- Trip End** – A single or one-direction vehicle movement with either the origin or the destination inside the study site and one origin or destination external to the land use.
- Trip Generation** – The number and type of trips associated with site development.
- Trip Generation Rates** – Weighted average trip generation rate based on one unit of independent variable.
- Trip Types** – Three types of trips generated by ITE trip generation:
  - 1) Primary trips
  - 2) Pass-by trips
  - 3) Diverted trips
- Urban Area** – A place with a population between 5,000 and 50,000 and not in an *urbanized area*.
- Urban Infill** – A land development strategy aimed at directing higher density residential and mixed-use development to available sites in developed areas to maximize the use of adequate existing infrastructure; often considered an alternative to low density land development.
- Urbanized Area** – An area within an MPO’s designated urbanized area boundary. The minimum population for an urbanized area is 50,000 people.

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- V/C** – The ratio of *demand flow rate* to *capacity* of a signalized intersection, segment or facility.
- Volume** – Number of vehicles, persons passing a point on a roadway during a specified time period.
- ZDATA** – Socioeconomic data input to FSUTMS.