





Multimodal Transportation Site Impact Handbook

March 2024

FDOT

Contents

1. Introduction 1
1.1. Purpose of the Handbook 2
1.2. Multimodal Transportation Impact Analysis Goals and Objectives 2
1.3. Types of Multimodal Transportation Impact Analyses 4
1.3.1. Comprehensive Plan Amendments 4
1.3.2. Driveway Connection Permits 5
1.4. Multimodal Transportation Impact Analysis Process 5
1.4.1. Methodology Development 7
1.4.2. Background Data Collection and Review 7
1.4.3. Trip Generation 7
1.4.4. Site Impact Analysis 7
1.4.5. Mitigation Analysis 8
1.5. Updates to the Handbook 8
1.5.1. Title 8
1.5.2. Organization 8
1.5.3. FDOT Documents 9
1.5.4. Bicycle/Pedestrian Analysis 10
1.5.5. Safety Analysis 10
2. Review of Comprehensive Plan Amendments 11
2.1. Introduction 12
2.2. Regulations and Authority 13
2.2.1. Florida Statute 163 13
2.2.2. Other Florida Statutes 13
2.3. Comprehensive Plan Review Process 14
2.3.1. Recommended Multimodal Transportation Impact Analysis 15
2.3.2. Comment Letters 19
3. Review of Driveway/ Connection Permits 20
3.1. Introduction 21
3.2. Regulations and Authority 22
3.3. Coordination and Incentives 25
3.3.1. Local Government Partnerships 25
3.3.2. Developer Incentives 25
3.4. Driveway/Connection Permit Study Review Process 25
3.4.1. Application Requirements 26
3.4.2. Required Multimodal Transportation Impact Analysis 27
3.4.3. Application Review 31
4. Multimodal Transportation Impact Analysis 32
4.1. Introduction 33
4.1.1. Methodology Development 34
4.2. Study Area 34
4.2.1. Comprehensive Plan Amendments 34
4.2.2. Driveway Connection Permits 34
4.3. Analysis Horizons Years and Periods 35

4.4. Performance Measures of Effectiveness and Targets 35
4.4.1. Automobile Level of Service Analysis 35
4.4.2. Pedestrian/Bicycle/Transit MOEs 36
4.5. Background Data Collection and Review 36
4.5.1. Proposed Site Development Characteristics 36
4.5.2. Transportation System Data 38
4.5.3. Data Considerations for Future Transit Service 38
4.5.4. Traffic Counts and Other Transportation Data 39
4.6. Trip Generation 40
4.6.1. Trip Generation Data 40
4.6.2. Person Trips 42
4.6.3. Land Use Setting 45
4.6.4. Use of Trip Generation Rates or Equations 45
4.6.5. Estimating Trips by Mode 46
4.6.6. Primary, Pass-by, and Diverted Trips 48
4.6.7. Model Method of Analysis for Trip Generation 55
4.6.8. ITE Limitations 57
4.6.9. Internal Capture Rates for Multi-Use Developments 57
4.6.10. Community Capture: Internal Capture for New Towns 59
4.6.11. Redevelopment Sites 62
4.7. Vehicular Impact Analysis 63
4.7.1. Existing Conditions Analysis 63
4.7.2. Future Background Conditions Analysis 63
4.7.3. Vehicular Trip Distribution and Assignment 71
4.7.4. Future Build Conditions Analysis 81
4.7.5. ICE 81
4.7.6. Interchange Areas 82
4.8. Pedestrian/Bicycle/Transit Impact Analysis 83
4.8.1. Study Requirements 83
4.8.2. Context-Based Assessment 84
4.8.3. Quantitative Pedestrian and Bicycle Analysis 86
4.8.4. Pedestrian and Bicycle Trip Distribution and Assignment 94
4.8.5. Transit Impact Analysis 97
4.9. Safety Analysis 97
4.9.1. Review of Crash Data 97
4.9.2. Site and Study Area Assessment 98
4.10. Site Circulation Review 100
4.10.1. Access Management 100
4.10.2. On-Site Queuing 101
4.10.3. Multimodal Access and Circulation 102
5. Mitigation 104
5.1. Introduction 105
5.2. Regulations and Authority 105
5.2.1. Comprehensive Plan Amendments 105
5.2.2. Driveway Connection Permits 106
5.3. Extent of Required Mitigation 107

5.3.1. Considerations for Local Governments Employing Transportation Concurrency.... 107
5.4. Mitigation Strategies 109
5.4.1. General Mitigation Strategies 110
5.4.2. Comprehensive Plan Amendment Mitigation Strategies 123
5.4.3. Driveway Connection Permit Mitigation Strategies 126
5.5. Funding of Mitigation Improvements 128
5.5.1. Optional Concurrency Mitigation (Proportionate Share) 128
5.5.2. Transportation Cost Resources 130
5.5.3. Impact Fees 130
5.5.4. Mobility Fees 132
5.5.5. Driveway Connection Permit Related Costs 133

Appendices

Appendix A – State Highway System Connection Permit Pre-Application Meeting Checklist and Scoping Form
Appendix B – Pedestrian/Bicycle Site Design Toolbox
Appendix C – Site Design Development and Review Checklist

Tables

Table 1 | Key Florida Statutes Governing Community Planning 13
Table 2 | Sample Trip Generation Information 17
Table 3 | Sample State-Maintained Roadway Information 18
Table 4 | Sample CPA MTIA Results 18
Table 5 | Driveway Category Criteria 21
Table 6 | Key Regulations Governing Connection Permits 22
Table 7 | Suggested Background Data for Collection and Review 37
Table 8 | Example Application of Trends Spreadsheet, Historical Volumes (Duval County, Site 0949) 66
Table 9 | Land Use Conversion Rates for Traffic Impact Assessments 78
Table 10 | Level of Pedestrian and Bicycle Study based on Context Classification and Peak Hour Volume 87
Table 11 | Pedestrian and Bicycle Study Requirements – Quantitative Analysis 88

Figures

Figure 1 | Basic Framework of a Multimodal Transportation Impact Analysis 6
Figure 2 | Updated Multimodal Site Impact Handbook Chapters 9
Figure 3 | Recommended Connection Permit MTIA Components 27
Figure 4 | Example of Existing Intersection Turning Movement Count 39
Figure 5 | ITE Trip Generation Manual Page Example 41
Figure 6 | ITE Approach to Estimate Site Trip Generation 44
Figure 7 | Types of Trips 48
Figure 8 | ITE Trip Generation Manual 11th Edition – Pass-By Trips for Land Use Code 820 50
Figure 9 | Example Application of 10 Percent Pass-By Trips 54
Figure 10 | Internal Capture Input/Output Example, NCHRP 684 Excel 59
Figure 11 | Linear Growth Projection Using Traffic Trends Spreadsheet 67
Figure 12 | Exponential Growth Projection Using Traffic Trends Spreadsheet 68
Figure 13 | Decaying Exponential Growth Projection Using Traffic Trends Spreadsheet 69
Figure 14 | Example of Major Directions of Trip Distribution from Site 71
Figure 15 | Manual Trip Distribution Example 72
Figure 16 | Manual Vehicle Trip Assignment Example 74
Figure 17 | Example of With and Without Modeling Method (Not to be Used) 75
Figure 18 | Two Pedestrian/Bicycle Site Impact Approaches 83
Figure 19 | Context-Based Assessment Study Requirements 84
Figure 20 | MTIA Pedestrian / Bicycle Measures of Effectiveness 87
Figure 21 | Pedestrian and Bicycle Quantitative Analysis Study Levels 87
Figure 22 | Quantitative Analysis Study Requirements 88
Figure 23 | Example of Route Directness Analysis 91
Figure 24 | Pedestrian Level of Traffic Stress 93
Figure 25 | BLTS Example 94
Figure 26 | Example Intersection Collision Diagram 97
Figure 27 | Inadequate Site Design with Drive-Through Queue Backup onto Arterial 101
Figure 28 | Pedestrian / Bicycle Site Design Toolbox 102
Figure 29 | Mitigation Strategies 109
Figure 30 | Example of Cross Access and Shared Driveway 112
Figure 31 | Example of Frontage Roads 113
Figure 32 | Example of Backage Road 113
Figure 33 | Example Multi-Way Boulevard 114
Figure 34 | Reliever Road Example 116



1. Introduction

1.1. Purpose of the Handbook

The Florida Department of Transportation (FDOT) has developed this Handbook to provide guidelines to assist FDOT staff in their review of transportation impacts associated with proposed 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 transportation impacts from developments. Since the last update to the FDOT *Transportation Site Impact Handbook* in 2019, the Handbook has been retitled to "Multimodal Transportation Site Impact Handbook" (MTSIH) to better reflect the broader scope of work which includes assessing development impacts to all modes of transportation. This Handbook is designed to reflect legislative and other changes that have taken place over time.

The inclusion of Site Impact in the title is for differentiation from the FDOT ***Traffic Analysis Handbook*** also published by FDOT. For purposes of this document and in professional practice, the terms Transportation Impact Analysis (TIA), Multimodal Transportation Impact Analysis (MTIA), Site Impact Analysis, and Traffic Impact Study, all refer to the process of analyzing the multimodal impacts of development on the transportation system. The term MTIA is used in this Handbook to better reflect consideration of all modes when assessing the transportation impacts of a development.

FDOT has developed a ***MTSIH Applications Guide*** to serve as a companion document to this Handbook. This ***MTSIH Applications Guide*** builds upon the guidance provided in the MTSIH by providing examples to demonstrate the concepts discussed in the MTSIH. ***FDOT's Systems Implementation Office website*** provides the ***MTSIH Applications Guide*** as well as documents covering a variety of topics including access management, interchange access requests, managed lanes, multimodal quality/level of service, lane repurposing, traffic analysis, transportation alternatives program, and site impact.

The ***MTSIH Applications Guide*** builds upon the guidance provided in the MTSIH by providing examples.

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 are critical to every traffic study.

1.2. Multimodal Transportation Impact Analysis Goals and Objectives

Per **Florida Statutes (F.S.)** ***334.044***, FDOT has the responsibility for "coordinating the planning of a safe, viable, and balanced state transportation system serving all regions of the state, and to assure the compatibility of all components, including multimodal facilities." To maintain a safe and efficient transportation system, FDOT reviews proposed developments for potential impacts to state-maintained

facilities. MTIAs are conducted to evaluate how the transportation network would function once a proposed land use change or development takes place. A MTIA is an analysis that estimates and quantifies the specific transportation-related impacts of a proposed comprehensive plan amendment or a proposed development.

The goals and objectives of a MTIA are listed below:

MTIA Goals	MTIA Objectives

• Promote safe and efficient movement of people and goods
• Maintain and enhance quality of life
• Determine the needed infrastructure to support developments and the surrounding community
• Support developments to attract and best serve their customers
• Build community partnerships and deliver community-centric projects
	• Assess transportation impacts of a proposed development
	• Identify mitigation measures needed to:
	  ○ Serve the proposed development
	  ○ Maintain the integrity of and minimize operational and safety impacts of the proposed development on the state-maintained facilities (all modes)

These goals and objectives are mutually beneficial to FDOT, the local government, and the applicant. It is important for all the involved parties to work collaboratively to achieve these common goals.

There are several additional reasons for FDOT to review a MTIA:

- Provide public agencies with a mechanism for managing transportation impacts of land development within the context of Metropolitan Planning Organization (MPO) plans, local government comprehensive planning (LGCP), and concurrency
- Manage access and impacts to state-maintained facilities
- Provide applicants with recommendations for effective off-site and on-site transportation system planning
- Establish a framework for the negotiation of mitigation measures for the impacts created by development
- Support implementation of the Department's Complete Streets policy
- Promote multimodal transportation systems where appropriate

The MTIA review provided by FDOT can be instrumental in ensuring the protection of the state's important transportation system for all road users.

1.3. Types of Multimodal Transportation Impact Analyses

Most MTIAs reviewed by FDOT are associated with one of the following activities:

Local government comprehensive plan amendments	Driveway connection permits to the State Highway System	Courtesy reviews at the request of local governments

Comprehensive plan amendments and driveway connection permits are discussed further below.

1.3.1. Comprehensive Plan Amendments

Per ***F.S. 163.3167(2)***, each local government shall adopt or amend and maintain a comprehensive plan. The Comprehensive Plan is the community's legally binding 'blueprint' for how it will develop. Per ***F.S. 163.3187(4)***, Comprehensive Plans can only be amended if they maintain the internal consistency of the plan. A Comprehensive Plan must contain the following elements:

- Future Land Use
- Transportation
- Sanitary sewer, solid waste, drainage, potable water, and natural groundwater aquifer recharge
- Conservation
- Recreation and open space
- Housing
- Coastal Management (select municipalities)
- Intergovernmental coordination

If a community desires to change its comprehensive plan in order to better plan for future growth or to allow a proposed development that is currently inconsistent with the comprehensive plan, the local government is required to submit a plan amendment to the state for review. FDOT is responsible for reviewing comprehensive plans and amendments. FDOT's review is limited to facilities within the agency's jurisdiction as it relates to transportation resources and facilities of state importance (***F.S. 163.3184(3)***, 2022). Per ***F.S. 163.3184***, local governments are required to submit appropriate supporting data and analyses to reviewing agencies. As such, a MTIA may be required for a comprehensive plan amendment to assist FDOT in determining impacts to important state transportation facilities.

Per ***F.S. 163.3184***, local governments are required to submit appropriate supporting data and analyses to reviewing agencies.

1.3.2. Driveway Connection Permits

Following the comprehensive plan amendment process, developments proceed to the issuance of development orders and permitting of connections. As defined by the American Association of State Highway and Transportation Officials (AASHTO) and the FDOT Design Manual (FDM), "A driveway is an access construction within a public right-of-way connecting a public road with adjacent property." It is also important to note that within other FDOT manuals, handbooks, and guides, driveways are at times referred to as "connection(s)," "turnouts," or "accesses."

Per ***F.S. 334.044***, FDOT has the responsibility to "establish, control, and prohibit points of ingress to, and egress from, the State Highway System, the turnpike, and other transportation facilities under the department's jurisdiction as necessary to ensure the safe, efficient, and effective maintenance and operation of such facilities."

FDOT administers connection permits for connections within FDOT controlled right of way. As such, FDOT is involved in the review and design of any access to a state-maintained facility. For developments projected to generate over 600 vehicle trips per day and proposing a connection to a state-maintained facility, or any application requesting or requiring a new traffic signal, new median opening, auxiliary lane, or modified median opening, a MTIA is required. The MTIA must include "vehicular and non-vehicular traffic operations analysis of the impacts of the development on the surrounding transportation system" consistent with this Handbook per ***Rule 14-96 F.A.C.***

Per ***F.S. 335.181***, "every owner of property which abuts a road on the State Highway System has a right to reasonable access to the abutting state highway but does not have the right of unregulated access to such highway. The operational capabilities of an access connection may be restricted by the department. However, a means of reasonable access to an abutting state highway may not be denied by the department, **except on the basis of safety or operational concerns** as provided in ***F.S. 335.184***." The MTIA can be used to assist FDOT in determining safety or operational concerns associated with a proposed access connection, the issuance of a connection permit, and any necessary conditions as a part of the permit.

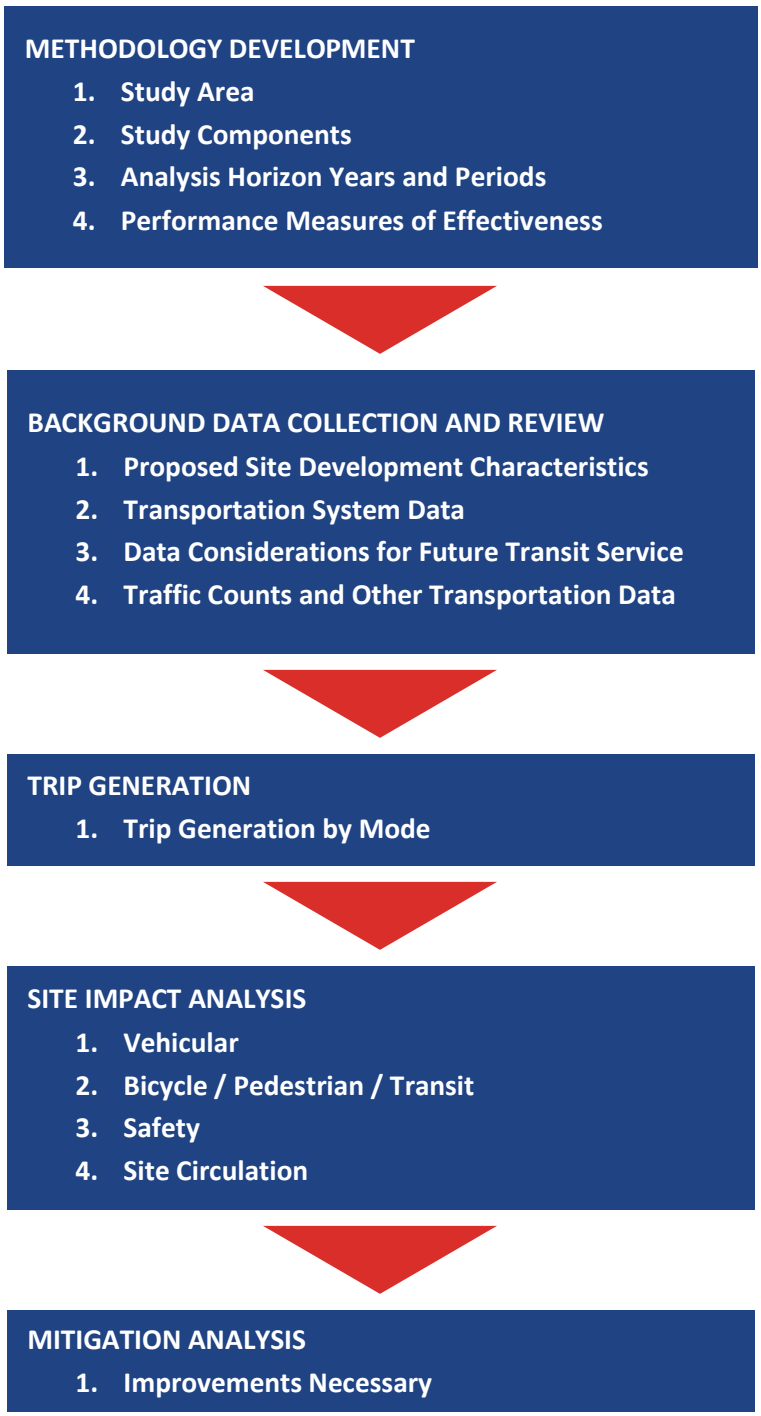
1.4. Multimodal Transportation Impact Analysis Process

The scope of a MTIA can vary based on many factors. The size, location, and type of development, associated development regulatory stage (comprehensive plan amendment versus driveway connection permit), as well as jurisdictional requirements, will influence the type and level of detail required for each component of the MTIA.

It is important to note that a MTIA performed for a comprehensive plan amendment or for a local government may not provide the necessary information needed to establish a driveway connection permit. **Early coordination is recommended to avoid multiple studies.**

Most MTIAs follow this general process (***Figure 1***). The main steps are discussed below.

Figure 1 | Basic Framework of a Multimodal Transportation Impact Analysis



1.4.1. Methodology Development

Methodology Development is an essential component in any MTIA. This process should define the data, methodology, tools, practices, and assumptions that will be used while preparing a MTIA. The methodology should include time horizons (such as Existing, Future No Build without the proposed development, and Future Build with the proposed development), and the study area. The parties should reach agreement regarding the data to be considered, analysis tools to be used, and the basic factors to be used in the study. Once a methodology has been defined and accepted, the technical analyses can begin.

1.4.2. Background Data Collection and Review

Background data should be collected and reviewed to establish existing conditions and the basis for background transportation demand. Suggested background data for collection and review include land use and demographics, transportation system availability, and transportation system use. Furthermore, the proposed site development characteristics should be defined to identify the location, type, size, phasing, and other information that will influence the number and types of trips. Existing transportation demand data should be collected and include current and historical traffic volumes, turning movement counts, traffic characteristics such as peak and directional factors, transit ridership data, and bicycle and pedestrian activity.

1.4.3. Trip Generation

The volume of trips associated with the proposed development are estimated by a process called trip generation. Trip generation is estimated in person trips which can be divided into personal passenger vehicle, bicycle, transit, truck, and walk trips. A person trip is a trip made by any mode of travel by an individual person from an origin to a destination. For example, a family of four traveling from home to school by vehicle would represent one vehicle trip and four person-trips.

1.4.4. Site Impact Analysis

As previously discussed, a MTIA is used to determine the transportation-related impacts of a proposed development. MTIAs can assess a site's impact on the transportation system by analyzing bicycle/ pedestrian, vehicular, safety, and site circulation impacts.

Vehicular impact analysis typically consists of both existing and future conditions analyses to compare conditions with and without the proposed development in place. The existing conditions analysis is used to assess current conditions and establish a basis for comparison to future conditions. The future conditions analysis assesses the future impacts of a proposed development or amendment. Future background traffic is projected for conditions with and without the proposed development. Once the site's trips are assigned to the network, measures of effectiveness (MOE) such as a quality/level of service (Q/LOS) are calculated for both motorized and non-motorized traffic.

The bicycle and pedestrian impact analysis is used to determine a site's impact on non-motorized traffic and needed mitigation. The scope of this analysis can vary and should be based on considerations such as the type of development and context classification. Study components can include review of planning documents, internal site design, bicycle/pedestrian connections, trip generation, network connectivity analysis, and Q/LOS analysis. In addition, the study should analyze the transit network and provide adequate pedestrian/bicycle access to and from nearby transit stops and, if applicable, impacts to routes, frequency, and other measures of transit quality.

A safety analysis can be provided to review existing crash patterns and assess safety issues in the study area. The goals of this analysis are to identify existing safety issues that may be exacerbated with the site in place, and to identify and mitigate potential new safety issues created by the site.

Finally, FDOT's review of a proposed site should also include review of the site plan's circulation. This can include review of the access connection(s), anticipated on-site queueing if present, and review of multimodal access and circulation.

1.4.5. Mitigation Analysis

When a MTIA indicates that the transportation system will operate below the desirable MOE target (such as LOS), or a safety or operational issue is identified, mitigation measures to reduce transportation impacts should be undertaken. Mitigation should be relative to the size of the transportation impact expected.

1.5. Updates to the Handbook

The following summarizes the major updates to this Handbook since the last update in October 2019.

1.5.1. Title

This Handbook has been retitled to the Multimodal Transportation Site Impact Handbook to better reflect FDOT's focus on providing safe and efficient movement of people and goods for all modes of transportation.

1.5.2. Organization

This Handbook has been reorganized to distinguish the differences between FDOT's role and review for transportation impacts related to comprehensive plan amendments and for driveway connection permits. A separate chapter is provided for each to discuss their unique processes, the MTIA needs, FDOT responsibilities, and the governing rules and regulations. This is followed by a chapter to discuss analysis tools and methodologies for the MTIA. Finally, a chapter is provided to discuss mitigation. The new organization is depicted in ***Figure 2***.

Figure 2 | Updated Multimodal Site Impact Handbook Chapters

Chapter 1. Introduction

Handbook Purpose, MTIA Goals and Objectives, Types of MTIAs, MTIA Process, Handbook Updates

Chapter 2. Review of Comprehensive Plan Amendments

Regulations and Authority, Review Types, Comprehensive Plan Review Process

Chapter 3. Review of Driveway/ Connection Permits

Regulations and Authority, Coordination and Incentives, Driveway/Connection Permit Study Review Process

Chapter 4. Multimodal Transportation Impact Analysis

Methodology Development, Background Data Collection and Review, Trip Generation, Vehicular Impact Analysis, Bicycle/Pedestrian/Transit Impact Analysis, Safety Analysis, Site Circulation Review

Chapter 5. Mitigation

Regulations and Authority, Extent of Required Mitigation, Mitigation Strategies, Funding of Mitigation Improvements

1.5.3. FDOT Documents

Several FDOT documents and rules have been updated since the last Handbook was published including:

- ***FDOT Design Manual***
- ***FDOT Rule 14-96***
- ***FDOT Rule 14-97***
- ***FDOT Access Management Guidebook***
- ***FDOT Manual on Intersection Control Evaluation***
- ***FDOT Interchange Access Request User's Guide***
- ***FDOT Traffic Analysis Handbook***
- ***FDOT Traffic Forecasting Handbook***

- ***FDOT Multimodal Quality/Level of Service Handbook***
- ***FDOT Context Classification Guide***
- ***FDOT Traffic Engineering Manual***

This Handbook has been updated to reflect the latest guidance and rules provided in these FDOT documents.

1.5.4. Bicycle/Pedestrian Analysis

The traditional TIA process typically considers only vehicular impacts associated with a proposed site. The potential impacts to bicyclists and pedestrians are not usually reviewed or accounted for. Per ***F.S 334.044***, FDOT has the authority and responsibility to establish and maintain bicycle and pedestrian ways, and to encourage and promote multimodal transportation alternatives. As such, this Handbook has been updated to include guidance and recommended practices to perform bicycle and pedestrian site impact analyses.

1.5.5. Safety Analysis

Safety is FDOT's highest priority. The FDOT Vision is to provide "a transportation network that is well planned, supports economic growth, and has the goal of being congestion and fatality free." This Handbook has been updated to include guidelines for a safety analysis component in the MTIA to assess safety impacts associated with developments.



2. Review of Comprehensive Plan Amendments

2.1. Introduction

Florida's Community Planning Act (***F.S. 163.3161***) establishes the role of local governments to guide and manage future growth to preserve and protect important infrastructure, while enhancing community livability.

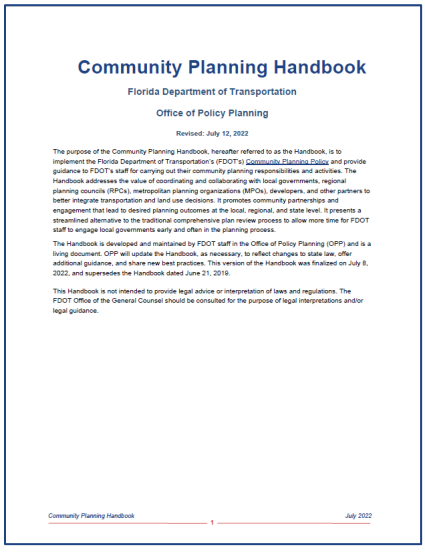
FDOT's roles in community planning include:

- Reviewing local government comprehensive plans and plan amendments to determine if they adversely impact transportation resources and facilities of state importance
- Providing technical assistance to local governments to address the impacts of land use on the transportation system and provide guidance in advance of the adoption of comprehensive plans and plan amendments
- Supporting implementation of the Department's Complete Streets policy
- Supporting collaborative planning approaches that bring together the Department and its partners to address transportation-related challenges and opportunities in a continuing, comprehensive, and cooperative manner
- Providing expertise to the state on transportation policy, planning, and implementation

Effective community planning can help identify and potentially avoid adverse impacts to state-maintained facilities before the CPA even reaches the proposal phase.

Effective community planning helps to build partnerships with local governments through early and continuous outreach along with technical assistance. This helps to identify and potentially avoid adverse impacts to state-maintained facilities before the Comprehensive Plan Amendment (CPA) even reaches the proposal phase.

For developers, outreach and explanation of the CPA process helps them to understand the benefits of working with the Department before the process is initiated. This allows for the development of better site plans to best attract and serve their customers. Early coordination can also allow the developer to understand potential issues and mitigation that may be required, potentially shortening the review process.


Community Planning Handbook

Florida Department of Transportation

Office of Policy Planning

Revised: July 12, 2022

The purpose of the Community Planning Handbook, hereafter referred to as the Handbook, is to implement the Florida Department of Transportation's (FDOT's) Community Planning Policy and provide guidance to FDOT's staff for carrying out their community planning responsibilities and activities. The Handbook addresses the value of coordinating and collaborating with local governments, regional planning councils (RPCs), metropolitan planning organizations (MPOs), developers, and other partners to better integrate transportation and land use decisions. It promotes community partnerships and engagement that lead to desired planning outcomes at the local, regional, and state level. It presents a streamlined alternative to the traditional comprehensive plan review process to allow more time for FDOT staff to engage local governments early and often in the planning process.

The Handbook is developed and maintained by FDOT staff in the Office of Policy Planning (OPP) and is a living document. OPP will update the Handbook, as necessary, to reflect changes to state law, offer additional guidance, and share new best practices. This version of the Handbook was finalized on July 8, 2022, and supersedes the Handbook dated June 21, 2019.

This Handbook is not intended to provide legal advice or interpretation of laws and regulations. The FDOT Office of the General Counsel should be consulted for the purpose of legal interpretations and/or legal guidance.

Community Planning Handbook 1 July 2022

More detailed information on community planning, the process, FDOT's role, and guidance for FDOT staff to carry out community planning responsibilities and activities can be found in the FDOT ***Community Planning Handbook***.

The purpose of this chapter is to summarize the regulatory authority for FDOT's involvement in community planning and to provide a recommended MTIA scope and methodology.

2.2. Regulations and Authority

Since the early 1970s, state interest in growth management has been connected to site impact through the Florida State Comprehensive Planning Act of 1972 and successor acts. Since that time, FDOT has been a partner to local governments in planning for state transportation. FDOT's responsibilities have evolved with legislative changes but its primary role remains to support growth management and maintaining a safe and efficient transportation system for the state. The following text provides a brief overview of the applicable *Florida Statutes* that govern FDOT's current role in community planning.

2.2.1. Florida Statute 163

> "The Department of Transportation shall limit its comments to issues within the agency's jurisdiction as it relates to transportation resources and facilities of state importance." ***163.3184(3)(b)4.c.***

F.S. 163.3184(1)(c), FDOT, along with several other state and regional agencies, is identified as a reviewing agency. FDOT is statutorily authorized to review local government comprehensive plans and amendments to comment on issues within its jurisdiction that relate to adverse impacts on transportation resources and facilities of state importance. FDOT considers important state transportation resources and facilities to include the Strategic Intermodal System (SIS), State Highway System (SHS), National Highway System (NHS), and other transportation resources and facilities within its jurisdiction that are owned and maintained by the state.

2.2.2. Other Florida Statutes

In addition to ***F.S. 163.3184***, the following Florida Statutes in ***Table 1*** are also applicable to the review of new developments:

Table 1 | Key Florida Statutes Governing Community Planning

Chapter	Title	Description
Chapter 186, F.S.	State and Regional Planning	State comprehensive plan and the role of the regional planning councils in community planning.
Chapter 334, F.S.	Transportation Administration	Responsibilities of state, county, and municipalities in the planning and development of the transportation system.
Chapter 380, F.S.	Land and Water Management; Environmental Land and Water Management	Areas of critical state concern, developments of regional impact (DRI).

Key elements from these statutes related to community planning goals include the following:

F.S. 186.002(c)	To promote intergovernmental coordination and the effective allocation of resources, the state should set goals to provide direction and guidance for state, regional, and local governments and agencies in the development and implementation of their respective plans, programs, and services.
F.S. 186.007(4)a	Prepare statewide goals, objectives, and policies related to the opportunities, problems, and needs associated with growth and development in this state, which goals, objectives, and policies shall constitute the growth management portion of the state comprehensive plan.
F.S. 186.009(f)	Provide guidelines for state transportation corridors, public transportation corridors, new interchanges on limited access facilities, and new airports of regional or state significance.
F.S. 334.044(1)	To assume the responsibility for coordinating the planning of a safe, viable, and balanced state transportation system serving all regions of the state, and to assure the compatibility of all components, including multimodal facilities.
F.S.334.044 (10)(a)	To develop and adopt uniform minimum standards and criteria for the design, construction, maintenance, and operation of public roads.
F.S. 334.044(14)	To establish, control, and prohibit points of ingress to, and egress from, the SHS, the turnpike, and other transportation facilities under the department's jurisdiction as necessary to ensure the safe, efficient, and effective maintenance and operation of such facilities.
F.S. 334.044(19)	To encourage and promote the development of multimodal transportation alternatives.

2.3. Comprehensive Plan Review Process

The FDOT ***Community Planning Handbook*** provides discussion of the types of plan amendments, types of review, and FDOT's role for each. It also provides information on the CPA review process. The responsibility for CPA reviews lies with the District Community Planning Coordinator (CPC) to determine the impacts of the amendment on state transportation resources or facilities, prepare a response, and coordinate with the following entities to address potential adverse impacts:

- Local government
- Other agencies, if applicable
- FDOT's Statewide CPC
- Florida Department of Economic Opportunity (DEO)

The ***Community Planning Handbook*** provides decision trees, found on pages 14 and 15, for reviewing future land use amendments and text amendments. These decision trees offer a streamlined approach to assist District CPCs and provide time for coordination and collaboration with local governments, regional planning councils, developers, and other partners involved in integrating transportation and land use decisions.

2.3.1. Recommended Multimodal Transportation Impact Analysis

The decision trees presented in the ***Community Planning Handbook*** address FDOT's need for appropriate data and analysis to be provided by the local government to determine impacts to facilities of state importance. Since the local government decisions regarding CPAs provide the basis for development approvals, they often incorporate land use changes and impacts to the transportation network. As such, MTIAs are conducted to evaluate how the transportation network would function once the proposed land use change or development takes place. MTIAs are instrumental in FDOT's review and ensuring protection of the state's transportation system. MTIAs are designed to include the following:

Per ***F.S. 163.3184***, local governments are required to submit appropriate supporting data and analyses to reviewing agencies.

A standard template letter is available to request additional information on the Community Planning SharePoint Site.

- 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 MOE
- Provision of a forum for stakeholder discussion
- Assessment of the needs of all roadway users and transportation modes impacted by the development

2.3.1.1. Methodology

The level and scope of a MTIA for a CPA can vary based on the size, type, location, and context of the proposed amendment. If a MTIA is determined to be necessary by FDOT, at a minimum it should include:

- Estimated number of trips generated by the amendment
- State maintained roadway/Strategic Intermodal System information
- Amendment analysis year and/or phasing plan for development
- MOEs to be considered

It should be noted that if a driveway connection to a state-maintained roadway is proposed as a part of the development, a more detailed MTIA may be required by FDOT as a part of the Driveway Connection Permit. The MTIA completed for the CPA, or completed as required by the local government, may not satisfy the MTIA scope and level of detail needed for FDOT to issue a Driveway Connection Permit. To avoid multiple studies, the applicant can opt to complete the full MTIA as part of the CPA submission that will ultimately be required by the local government and by FDOT to issue a Driveway Connection Permit. This can be accomplished through coordination with both the local government and FDOT to determine the MTIA scope and methodology needed to satisfy the FDOT Driveway Connection Permit and local requirements. Information on completing a MTIA is found in ***Chapter 4***.

> The MTIA completed for the CPA, or completed as required by the local government, **may not satisfy** the MTIA scope and level of detail needed for FDOT to issue a Driveway Connection Permit.

Completing the full MTIA required for permitting during the CPA can provide many benefits to the developer such as:

- Reduce overall effort with fewer required studies
- Understand and plan for issues that will impact the site plan, such as driveway constraints, early on before more detailed site planning occurs and when changes to the site plan can be more difficult and costly to make
- Propose and plan for mitigation strategies to address potentially adverse impacts
- Avoid unknown surprises later during the development process at permitting that could have impacts to budgets and schedules

At a minimum, developers and local governments are highly encouraged to coordinate with FDOT staff during the CPA stage regarding the potential access connection(s) and to discuss any potential issues or concerns related to operations and safety at and near the site.

Trip Generation

Trip generation for the proposed development program or the maximum allowable development allowed by the CPA should be estimated, as directed by District staff. The latest ITE *Trip Generation Manual* should be used to estimate trip generation where appropriate. Typically, the vehicular 'Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. rate from ITE is used for most CPAs to assess impacts to state-maintained roadways. When trips from other modes such as transit, bicycle, or pedestrians are expected, or when the total vehicle trips per day are expected to exceed 600, trip generation should include estimates for all applicable modes. More information on trip generation can be found in ***Chapter 4*** of this Handbook.

Table 2 provides a sample trip generation table for a Future Land Use Map (FLUM) Amendment for the City of Newberry.

Table 2 | Sample Trip Generation Information

Designation	Land Use	ITE Code	Size	Units	Daily Trips	AM Peak Trips	PM Peak Trips
Existing	Single Family Detached	210	44	DUs	415	31	41
	Existing Total				415	31	41
Proposed	Single Family Detached	210	750	DUs	7,073	525	705
	Shopping Center (40 – 150k)	821	50	1,000 SF	4,725	177	451
	General Office	710	50	1,000 SF	542	76	72
	Proposed Total				12,340	778	1,228
	Net New Trips				11,925	747	1,187

Note: Dwelling Units (DUs), Square Feet (SF)

State Maintained Facilities/Strategic Intermodal System Information

The MTIA should identify all state-maintained roadways and SIS facilities located within a three-mile study area radius from the parcel(s) affected by the CPA and obtain the following information:

- County in which the roadway is located
- Roadway name
- Segment
- Existing transit, bicycle, and pedestrian facilities in the study area
- FDOT level of service (LOS) target
- Peak hour maximum service volume (MSV)
- Current year peak hour LOS
- Current year peak hour volume
- Planned and programmed improvements, projects, and/or other plans affecting the study area, which may include corridor studies, Project Development and Environment (PD&E) studies, interchange access requests (IARs), and corridor preservation plans, as well as SIS First Five, SIS Second Five, SIS Cost Feasible Plan, SIS Unfunded Needs Plan, and Long Range Transportation Plan
- Five year and/or proposed full build year peak hour LOS
- Five year and/or proposed full build year peak hour volume

Table 3 provides an example of this data from SR 26/Newberry Road in District 2.

Table 3 | Sample State-Maintained Roadway Information

County	Roadway	Segment	FDOT LOS Target	Peak Hour Two-Way MSV	2020 Peak Hour LOS	2020 Peak Hour Two-Way Volume	2025 Peak Hour LOS	2025 Peak Hour Two-Way Volume
Alachua	SR 26	SR 45 to CR 241 South	C	4,020	B	1,725	B	1,933
Alachua	SR 26	CR 337/SW 266th St to SR 45	C	1,220	F	1,378	F	1,511

Amendment Analysis Year and/or Phasing Plan for Development

While the first two pieces of information provide what is necessary to assess the impacts of the proposed CPA to the state-maintained roadways and/or SIS facilities, opening years and/or phasing plans for the proposed developments may accompany the CPA applications. The MTIA should include this information to assess the full impact of the CPA, noting when the transportation facilities will exceed the adopted LOS target with the project/amendment trips. This will be needed in developing comments and identifying potential mitigation strategies.

Table 4 shows an example of this data from SR 26/Newberry Road in District 2. As shown, the segment of SR 26 from SR 45 to CR 241 South is anticipated to operate under capacity in future year 2025 and should be able to accommodate the proposed CPA. However, the SR 26 segment from CR 337/SW 266th Street to SR 45 is currently operating at LOS F and is anticipated to worsen in future year 2025 with increased traffic volumes.

Table 4 | Sample CPA MTIA Results

County	Roadway	Segment	FDOT LOS Target	Peak Hour Two-Way MSV	2020 Peak Hour LOS	2020 Peak Hour Two-Way Trips with Project	2020 Peak Hour LOS with Project	2025 Peak Hour LOS	2025 Peak Hour Two-Way Trips with Project	2025 Peak Hour LOS with Project
Alachua	SR 26	SR 45 to CR 241 South*	C	4,020	B	2,912	C	B	3,120	C
Alachua	SR 26	CR 337/SW 266th St to SR 45	C	1,220	F	2,565	F	F	2,698	F

*Access facility

Pedestrian/Bicycle/Transit Impacts

In addition, CPAs should also assess impacts to the non-motorized and transit network. The requirements for a pedestrian/bicycle impact analysis can vary and should be based on considerations such as the type of development, context classification of the nearby SHS facilities,

and the volume of non-motorized trips generated by the development. In general, a proposal in a more urban context classification or one that generates a high volume of bicyclists and/or pedestrians would necessitate a larger study area with more analysis components.

Chapter 4 provides a guide to determine the suggested level of study based on whether a particular development is projected to have a low, medium, or high volume of peak hour of non-motorized trips for a particular context classification. The level of study sets the scale, complexity, and elements to be included in the bicycle/pedestrian impact analysis. The suggested study requirements based on the level of study is also discussed in ***Chapter 4***.

Mitigation

When a MTIA indicates that the transportation system will not operate at an acceptable MOE target for the nearby SHS, SIS, or NHS facility, then mitigation measures to reduce transportation impacts must be identified. Mitigation can be in the form of enhancing operational efficiency, reducing demand, increasing system capacity, or providing/improving multimodal facilities. It can also reduce the level of development or phase development impacts with capital improvements. The mitigation should be relative to the size of the transportation impact expected. When adverse transportation impacts are expected on 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.

More information on mitigation is provided in ***Chapter 5*** of this Handbook.

2.3.2. Comment Letters

Based on the analysis of the CPA, the District CPC prepares a comment letter to send back to the transmitting agency, coordinating with the Statewide CPC and DEO. Guidance on how to write comment letters and the types of comments can be found in the ***Community Planning Handbook.*** Letter templates for each type of review and possible findings are available on the Community Planning SharePoint Site. In addition, CPCs can choose to incorporate advisory comments in letters such as:

> *"Additional analysis and/or requirements may be required if the land use/size change, the site plan changes, there are changes in the surrounding area/roadways that affect the site, and/or during more detailed review, such as during driveway connection permits."*

Local governments (under state expedited review) or DEO (under state coordinated review) must receive the letter no later than 30 days after the date on which the District received the amendment. More information on review types and processes can be found in the FDOT ***Community Planning Handbook.***



3. Review of Driveway/ Connection Permits

3.1. Introduction

All new driveways associated with a new or expanded development must be permitted in accordance with Florida Administrative Code (F.A.C.): ***Rule 14-96*** (State Highway System Connection Permits). Connection permits authorize the initiation of construction of connections within Department right-of-way and the maintenance of connection(s) according to the permit provisions and adopted Department standards. Requirements for traffic studies for access permits are located under ***Rule 14-96.005(3) and (4) F.A.C.***

Driveways provide a physical transition between a property and the abutting roadway and thus are one of the most common roadway design elements. They should be located and designed to minimize impacts on roadway traffic while providing safe access to and from developments for all modes. The location and design of the connection must consider the characteristics of the roadway, the geographic location of the site, the access management classification, the context classification, and the potential users.

FDOT defines driveways by seven categories, as shown in ***Table 5*** based on the number of vehicle trips per day generated by the site (including all driveway trips such as pass-by trips).

Table 5 | Driveway Category Criteria

	Driveway Category	Vehicle Trips/Day	Typical Land Uses
	A	1 – 20	1 or 2 single family homes
	B	21 – 600	3 to 60 housing or apartment units; small office in converted home
	C	601 – 1,200	Small “Strip” shopping center (20 – 75,000 sq. ft.); Gas station / convenience market
	D	1,201 – 4,000	150,000 sq. ft. shopping center, e.g., grocery / drugstore with 10-15 smaller stores
	E	4,001 – 10,000	Local Mall; Wholesale Club
	F	10,001 – 30,000	Regional Mall (Outlet)
	G	30,001 +	Large Regional Mall

3.2. Regulations and Authority

FDOT reviews of connection permits should be consistent with ***F.S. 334.044*** and ***F.S. 335.181-188***, ***Rule 14-96 F.A.C.***, and ***Rule 14-97 F.A.C.*** (***Table 6***).

Table 6 | Key Regulations Governing Connection Permits

Title	Statute / Rule	Description
Transportation Administration	***Section 334.044, F.S.***	Powers and duties of the department
State Highway System (SHS)	***Section 335.181, F.S.***	Regulation of access to SHS; legislative findings/policy/purpose
	Section 335.182, F.S.	Regulation of connections to roads on SHS; definitions
	Section 335.1825, F.S.	Access permit required; authority to close unpermitted connections
	Section 335.183, F.S.	Permit application fee
	Section 335.184, F.S.	Access permit review process by the department; permit denial; justification; administrative review
	Section 335.185, F.S.	Permit conditions; expiration
	Section 335.187, F.S.	Unpermitted connections; existing access permit; nonconforming permits; modification & revocation of permits
	Section 335.188, F.S.	Access management standards; access control classification system; criteria
SHS Connection Permits	***Rule 14-96, F.A.C.***	Authorizations, management, and maintenance of connections within department right-of-way
SHS Access Control Classification System & Access Management Standards	***Rule 14-97, F.A.C.***	Context-based access control classification system; access management standards

Key statements and provisions from the Statutes and Rule include:

F.S. 334.044	"The department shall have the following general powers and duties: … (14) To establish, control, and prohibit points of ingress to, and egress from, the State Highway System, the turnpike, and other transportation facilities under the department's jurisdiction as necessary to ensure the safe, efficient, and effective maintenance and operation of such facilities."
F.S. 335.181(1)(a)	"Regulation of access to the State Highway System is necessary in order to protect the public health, safety, and welfare, to preserve the functional integrity of the State Highway System, and to promote the safe and efficient movement of people and goods within the state."

F.S. 335.181(2)(a)	"Every owner of property which abuts a road on the State Highway System has a right to reasonable access to the abutting state highway but does not have the right of unregulated access to such highway. The operational capabilities of an access connection may be restricted by the department. However, a means of reasonable access to an abutting state highway may not be denied by the department, except on the basis of safety or operational concerns as provided in ***F.S. 335.184***."
F.S. 335.181(2)(b)	"The access rights of an owner of property abutting the State Highway System are subject to reasonable regulation to ensure the public's right and interest in a safe and efficient highway system. This paragraph does not authorize the department to deny a means of reasonable access to an abutting state highway, except on the basis of safety or operational concerns as provided in ***F.S. 335.184***. Property owners are encouraged to implement the use of joint access where legally available."
F.S. 335.184(1)	"Any person seeking an access permit shall file an application with the department in the district in which the property for which the permit being requested is located. The department, by rule, shall establish application form and content requirements. The fee as required by ***F.S. 335.183*** must accompany the application."
F.S. 335.184(3)	"A property owner shall be granted a permit for an access connection to the abutting state highway, unless the permitting of such access connection would jeopardize the safety of the public or have a negative impact upon the operational characteristics of the highway. Such access connection and permitted turning movements shall be based upon standards and criteria adopted, by rule, by the department. (a) In making the determination of whether to deny access to an abutting property owner, the department may consider, but is not limited to considering: The **number or severity of traffic accidents** occurring on the segment of the highway to which access is sought, and the impact thereon from providing such access; The **operational speed** on the segment of the highway to which such access is sought and the level and amount of deceleration which such access would cause; The **geographic location** of the segment of the highway to which such access is sought; The **operational characteristics** of the segment of the highway to which such access is sought and the impact thereon from providing such access; or The **level of service** of the segment of the highway to which such access is sought and the impact thereon from providing such access."

F.S. 335.187(3)	"The department may issue a nonconforming access permit after finding that to deny an access permit would leave the property without a reasonable means of access to the State Highway System. The department may specify limits on the maximum vehicular use of the connection and may be conditioned on the availability of future alternative means of access for which access permits can be obtained."
Rule 14-96.005(5) F.A. C.	"Traffic Study Requirements. For Category C, D, E, F, and G applications, or any application requesting or requiring a new traffic signal, new median opening, auxiliary lane, or modified median opening, the following traffic study data requirements apply. The specific detail and content of the traffic study will vary depending upon the existing and projected traffic volumes, highway capacity, levels of service, and safety concerns. Any traffic study (except a cursory analysis, such as an indication of peak hour movements from the applicant's site) must be signed, dated, and sealed by a qualified, licensed Florida Professional Engineer. The traffic study must include: 1. Critical peak hour vehicular turn movements from each proposed connection and abutting public road in graphic form. 2. Bicycle and pedestrian trip generation for the critical peak hour. 3. Vehicular and non-vehicular traffic operations analysis of the impacts of the development on the surrounding transportation system and consistent with the FDOT Transportation Site Impact Handbook. 4. An appropriately sized study area and time horizon based upon the type and size of the development." [FDOT ***Rule 14-96.005(5) F.A.C.*** State Highway System Connection Permits]
Rule 14-97.003(1) F.A.C.	"The … access control classification and access management standards [are] to be used in the planning, design, and permitting of connections, and the planning and design of medians, median openings, and signal spacing for roads on the SHS. The Department encourages the use of joint access driveways and service roads." [FDOT ***Rule 14-97.003(1) F.A.C.*** State Highway System Access]
Rule 14-97.003(3)(a) F.A.C.	"Connection permit applications, submitted pursuant to ***Rule 14-96 F.A.C.*** shall be reviewed subject to the standards of this rule chapter."

3.3. Coordination and Incentives

3.3.1. Local Government Partnerships

FDOT staff are encouraged to build partnerships with local governments through early and continuous outreach and coordination, as well as through provision of technical assistance. By building community partnerships, community-centric projects can be delivered that meet the common goals of the Department, local government, and developer.

The connection permitting process is more efficient and streamlined when the local government partner understands and can enforce site requirements, even before reaching the permitting stage. For example, a traffic impact analysis that was completed as required by the local government for local government review, or during a previous Comprehensive Plan Amendment (CPA), may not meet the Department's needs for a connection permit. For that reason, early coordination on potential site development projects with local governments and developers is important to avoid the need for multiple studies. FDOT can help guide the site planning process and requirements more effectively when information is provided early in the development planning stage. An example of this type of partnership is that some local governments will not issue a Development Order (DO) without having current buy-in and approval from FDOT, including driveway connection permit approval(s).

3.3.2. Developer Incentives

There are also many incentives for developers with early coordination. A better site plan that will best attract and serve customers can be achieved, while optimizing access and maximizing safety. With early coordination, a developer will ideally understand study requirements and potential access, traffic operations, and safety concerns early on, such as during the CPA phase or earlier. This will provide the opportunity to make needed changes to their site plan earlier in the process, as opposed to later during permitting when changes can be difficult and costly to make. Finally, it allows the developer to understand, plan for, or even avoid potential impacts and mitigation to the transportation system.

3.4. Driveway/Connection Permit Study Review Process

"No person may construct, relocate, or alter a connection temporarily or permanently without first obtaining a connection permit from the Department, as provided in this rule chapter, regardless of governmental entity permits and approvals." FDOT ***Rule 14-96.003(1) F.A.C.***

Per FDOT ***Rule 14-96.003(1) F.A.C.***, "connection permits authorize the initiation of construction of connections within Department right-of-way and the maintenance of connection(s) according to the permit provisions and adopted department standards… No person may construct, relocate, or alter a connection temporarily or permanently without first obtaining a connection permit from the Department, as provided in this rule chapter, regardless of governmental entity permits and approvals."

3.4.1. Application Requirements

The Driveway/Connection Application and forms are available electronically from One-Stop Permitting (***https://osp.fdot.gov***), or from the office of the local area Maintenance Engineer, District Office, or Urban Area Office.

A complete driveway/connection application is required to include:

- Connection Permit Application
- Application fee
- Site plan
- Drawings
- Traffic data
- Connection and roadway information specified in ***Rule 14-96 F.A.C.***

The applicant can provide any additional information to the Department deemed pertinent to the driveway/connection permit review. The Department can request additional information or clarification, consistent with ***Rule 14-96 F.A.C.***, during the review process.

The following information is required for all applications:

- Identification of property owner and applicant
- Notarized letter of authorization
- Responsible person
- Signatures
- Property use
- Location of all existing and proposed connections
- Location of non-motorized access (pedestrians and bicyclists)

Furthermore, the following additional information is required for driveway/connection permit applications with Categories C through G:

- Multimodal trip generation data
- Site plan
- Transportation facility and neighboring connection information
- Connection location and design
- Traffic control plan
- Traffic study

Additional information and details can be found in ***Rule 14-96 F.A.C.*** Additional information regarding the MTIA is below.

3.4.2. Required Multimodal Transportation Impact Analysis

When a new or modified connection is proposed on a state-maintained roadway, it is FDOT's responsibility to review the proposed connection to determine if it will have any negative impacts on safety or operations. To facilitate this review, a MTIA is required for connection permit application Categories C through G. The MTIA must be "of sufficient depth to analyze the impacts of the development on the surrounding transportation system" per FDOT ***Rule 14-96 F.A.C.*** A connection permit MTIA is recommended to include four primary components as shown in ***Figure 3*** Details on methods and tools related to these components are discussed in ***Chapter 4***.

Figure 3 | Recommended Connection Permit MTIA Components



3.4.2.1. When Study is Required

A complete traffic study is required for all access connection permit applications for Driveway Categories C, D, E, F, and G, or any application requesting or requiring a new traffic signal, new median opening, auxiliary lane, or modified median opening. Even if a traffic study has been already completed as required by local governments, or during CPA, it may not meet the Department's needs for a driveway permit.

3.4.2.2. Pre-Application Meeting

Rule *14-96.003(2) and 14-96.005(1)(a) F.A.C.* require that applicants for a Category C, D, E, F, or G connection request a pre-application meeting with the Department.

Rule 14-96.003(2) F.A.C. and ***Rule 14-96.005(1)(a) F.A.C.*** require that applicants for a Category C, D, E, F, or G connection request a pre-application meeting with the Department to review the site plan with respect to the proposed connection(s) location, establish the connection category, and establish required documentation and traffic study requirements. This meeting is a courtesy and intended to be advisory only, with results of the meeting not binding on either the Department or the applicant. The benefit of this meeting is that it establishes a clear understanding of the proposed project and conveys the documentation the Department will require to conduct a review. Pre-application meetings should include the following:

- Discussion of the project and program details
- Proposed site plan
- Suggested methodology for the MTIA, including study area, analysis horizon years, and other key assumptions related to vehicular and pedestrian/bicycle/transit components, safety, and site circulation
- Potential impacts to the SHS
- Potential design of the connection(s) to the property
- Any previous studies and/or agreements

It is highly recommended for the local government to also be represented at the pre-application meeting to build partnerships and coordinate as previously discussed.



Pre-application meeting checklist is provided in ***Appendix A***.

Checklist and Scoping Form

A standard pre-application meeting checklist and scoping template has been developed to help provide guidance in conducting the meeting, materials that should be provided for the meeting, and important topics for discussion. This checklist can be found in ***Appendix A***.

3.4.2.3. Study Methodology

Pre-application meetings should include discussion of the methodology to be used for the MTIA. Key considerations for primary assumptions in the study methodology are discussed below.

Required Study Components

The MTIA should determine what effects the development will have on the SHS, and the improvements needed to safely accommodate development traffic into and out of the site with the proposed driveway/access location(s). The analysis should include review of vehicular, pedestrian/bicycle/transit, safety, and site circulation. Per ***Rule 14-96.005(5) F.A.C.***, the traffic study that is required for a driveway/connection permit must include the following components:

1. Critical peak hour vehicular turning movements from each proposed connection and abutting public road in graphic form
2. Bicycle and pedestrian trip generation for the critical peak hour
3. Vehicular and non-vehicular traffic operations analysis of the impacts of the development on the surrounding transportation system and consistent with the FDOT *Multimodal Transportation Site Impact Handbook*
4. An appropriately sized study area and time horizon based upon the type and size of the development

Category C applications are exempt from some of the requirements listed above if the applicant can show that the information would have no significant bearing on the permitting decision process.

Study Area

The study area for a driveway/connection permit MTIA should be considered on a case-by-case basis and should be determined at the methodology meeting. In contrast to a MTIA for a CPA which is typically focused on a larger study area using planning-level roadway segment LOS analysis, a driveway/connection permit application is typically focused on more detailed operational analyses at key intersections near and adjacent to the site. The study area for a driveway/connection permit MTIA is recommended to include at a minimum:

- The site access driveway(s) and the adjacent roadways, i.e., any location where vehicles will turn into or out of to directly access a site
- Indirect site access points, i.e., any location, including intersections or median openings, where vehicles cannot turn directly into or out of a site, but would be required to make a U-turn in order to travel into or out of the site from a particular direction
- First signalized intersection on the SHS in each direction from the site up to one-half (0.5) mile from each site access point [note this is a minimum requirement; see discussion below about extending the study area based on site-specific considerations]
- Interchange ramp terminals for developments requiring a MTIA and located within one-half (0.5) mile of an interchange, even if the ramp terminal(s) are unsignalized [note this distance threshold is consistent with the Area of Influence (AOI) defined in FDOT's ***Interchange Access Request User's Guide*** (IARUG) for considering new or modified access to the Florida interstate system, Florida's Turnpike Enterprise (FTE), and non-interstate limited access facilities on the SHS]

Beyond these minimum requirements, the study area should be considered for adjustment on a case-by-case basis to include the following:

- Indirect impact area, including signalized and unsignalized intersections, where traffic from the project site being reviewed is anticipated to result in a 25 percent increase or greater for any single movement during the peak hour analysis period
- Limited access facilities and ramp junctions for larger developments or where impacts are anticipated to be substantial (based on the above 25 percent threshold); in these cases,

it is recommended to coordinate with the FDOT District Interchange Review Coordinator (DIRC) to determine the appropriate level of analysis

- Other intersections determined necessary for inclusion in the study based on operational, safety, or other concerns.

A study area can also be expanded to a larger area based on local government requirements, particularly if a single MTIA can be used to satisfy both local government or MPO study requirements and those of the FDOT driveway/connection permit study. For example, some MPOs require the study area be determined based on project trips exceeding a 5 or 10 percent threshold of the roadway's maximum service volume.

The study area for non-motorized modes should meet the guidance provided in ***Chapter 4*** as a minimum or be consistent with the study area limits for vehicular trips. As noted and discussed in ***Chapter 4***, a context-based assessment should be completed for all developments for which a MTIA is required, although additional quantitative analysis is encouraged. Bicycle and pedestrian trip generation for the critical peak hour is required for traffic study as part of the MTIA for access connection permit applications for driveway classifications C, D, E, F, and G. Refer to the ***Pedestrian/Bicycle/Transit Impact Analysis*** section in ***Chapter 4*** for detailed guidance.

Analysis Horizon Years

A driveway/connection permit MTIA should include evaluation of future traffic operating conditions at build-out of the site for which access is being requested. At a minimum, the analysis horizon years and scenarios should include the following:

- Existing Year
- Future Background Build Year (without project)
- Future Build Year (with project)
- Future Build Year with Mitigation (with project) (if needed)

The future build year should be the anticipated build-out year of the site. In some cases, it may be pertinent to request additional analysis years or scenarios be included in the MTIA to understand project impacts within the study area, such as, if the site is part of a larger, multi-phase development, or if multiple development alternatives are being considered. This will allow overall project impacts to be understood, even if other portions of the development may not use the specific driveway connection(s) being requested but would contribute project traffic within the study area on the adjacent roadway(s). For multi-phase developments, the opening year of each phase should be analyzed, as well as the final build-out year of the development.

If an Intersection Control Evaluation (ICE) is required as part of a MTIA, the ICE analysis will include a Design Year analysis for the intersection/s requiring the ICE analysis. The Design Year analysis is used to determine the best intersection control for the subject intersection. More information on ICE is provided in ***Section 4.7.5***.

3.4.3. Application Review

The application is submitted electronically at One Stop Permitting: ***https://osp.fdot.gov***, or mailed/ delivered to the Department's District Permits Office or to the Department's District Maintenance and Field Offices.

After the application is submitted, the Department will notify the applicant within 30 days if additional information is needed, or if there are errors or omissions in the application. This notification will list those items needed to complete the application, consistent with the requirements of ***Rule 14-96 F.A.C.*** or additional information needed to evaluate the application. If such a request for additional information is given to an applicant within the 30-day period, the application will be deemed incomplete until the additional requested information is supplied to the Department. Failure by the applicant to provide the requested additional information within the time limits specified by ***Rule 14-96 F.A.C.*** will result in the application determination being made using only the information that has been provided.

The Department will notify the applicant of the decision for the driveway/connection permit application within 90 days of receipt of a complete application. The following determinations can be made:

- Notice of Intent to Issue Permit
- Direct Permitting (no additional permit conditions are required)
- Notice of Intent to Deny

Additional discussion regarding the Notice of Intent to Issue Permit and Conditions is provided in ***Chapter 5***, and ***Rule 14-96 F.A.C.***



4. Multimodal Transportation Impact Analysis

4.1. Introduction

This chapter provides technical guidance for scoping, performing, and 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 Multimodal Transportation Impact Analysis (MTIA) review process should encourage and verify the following:

- Study findings and recommendations have a rational link to the travel demand generated by the development
- Study matches the multimodal transportation policies of the community based on the context and perspective of parties involved
- Open to early and ongoing discussions between the review agencies and developer regarding A realistic awareness and consideration of other developments under construction, pending, approved, anticipated, or allowed
- Consideration of applicable local or state initiatives such as complete streets, active / healthy transportation, Safe Routes to School (SRTS), Vision Zero, or Target Zero
- If existing or future transit operations may be impacted by the development proposal or included as part of an impact mitigation strategy, the relevant transit provider(s) should be consulted early in the review process
- A thorough, objective review of material presented in the multimodal transportation impact study by a qualified transportation professional
- Recommendations regarding development of a comprehensive multimodal site access system, including complementary, effective, off-site improvements and/or developer participation to achieve an efficient and safe multimodal transportation system within and adjacent to the development site
- Fair assessment of development impacts to transportation facilities and need for improvements for all affected modes, including analysis of impacts to existing sidewalk, multi-use trails, crosswalks, bicycle lanes, transit facilities, and other multimodal facilities that are affected by vehicle trips generated from the proposed development site

  Adapted from Multimodal Transportation Impact Analysis for Site Development, A Recommended Practice of the Institute of Transportation Engineers (ITE), 2022

The scope and study components vary and depend on the particular development, location, context, and needs. The level of analysis is typically scaled to the size and context of a development, with the scope of the analysis decided during the pre-application meeting / methodology development. The remainder of this chapter provides a more detailed discussion of each of the components in the MTIA process describing key study elements both applicants and reviewers should consider when preparing and reviewing a multimodal transportation impact analysis.

4.1.1. Methodology Development

The Methodology Development process usually begins when the applicant (developer or other party) contacts the local government, FDOT or other agency to discuss a proposed development. Many local governments have adopted official methods they require for development related traffic studies. However, as previously discussed, the MTIA required by a local government may not be sufficient for FDOT's review of a driveway connection permit. As such, it is good practice for participating agencies to agree to a methodology before requesting the applicant to perform a multimodal 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 that explain these tools in more detail.

4.2. Study Area

The study area is sometimes referred to as the "traffic impact area" or simply the "impact area." The study area determination can vary based on considerations such as the MTIA purpose, development type and size, area context, and safety or operational concerns. To avoid multiple studies, the applicant should consult with both FDOT and the appropriate local agencies to identify applicable policies and criteria in defining the study area because these policies vary.

4.2.1. Comprehensive Plan Amendments

4.2.1.1. Vehicular Study Area

As discussed in ***Chapter 2***, the general recommendation for the CPA study area is to review all state-maintained roadways within three miles of the parcel(s) affected by the CPA. However, this area can be smaller or larger depending on the specific CPA, affected area, or other considerations.

4.2.1.2. Pedestrian and Bicycle Study Area

For CPAs, a study radius of 500 to 1,500 feet is recommended based on the level of analysis. Further discussion is provided in the ***Pedestrian/Bicycle/Transit Impact Analysis*** section of this chapter.

4.2.2. Driveway Connection Permits

4.2.2.1. Vehicular Study Area

Per ***Rule 14-96 F.A.C.***, the traffic study must include "An appropriately sized study area and time horizon based upon the type and size of the development." The study area for the driveway connection permit traffic study is typically established during the pre-application meeting. ***Chapter 3*** further discusses considerations when establishing the study area.

4.2.2.2. Pedestrian and Bicycle Study Area

The pedestrian and bicycle analysis study area should extend to the same limits as established for vehicular trips, or at a minimum have the same requirements as discussed for CPAs. Further discussion is provided in the ***Pedestrian/Bicycle/Transit Impact Analysis*** section of this chapter.

4.3. Analysis Horizons Years and Periods

Most TIAs include analysis of existing year and future year(s) with and without the proposed project. The analysis horizon years can vary based on the type of analysis (CPA versus driveway connection permit), and other considerations. For instance, some developments may necessitate additional analysis horizon years such as larger or multi-phased developments, or multiple development alternatives. More information regarding analysis horizon years is provided in ***Chapters 2 and 3***.

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. 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. The FDOT reviewer should check that appropriate adjustment factors have been applied to field collected data. Detailed information about the application of adjustment factors to collected traffic counts is found in the most recent FDOT ***Project Traffic Forecasting Handbook.***

4.4. Performance Measures of Effectiveness and Targets

4.4.1. Automobile Level of Service Analysis

The primary automobile measure of effectiveness (MOE) used by FDOT is level of service (LOS). FDOT adopted an LOS 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: ***Policy 000-525-006***

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

For CPAs, a planning-level automobile LOS analysis (which can be two-way or directional) can be performed along each segment of the roadway system identified in the methodology component within the study area.

For driveway connection permit applications, more detailed analysis is typically needed. It is usually necessary to review more detailed traffic operations looking at each peak hour turning movement with

intersection LOS analysis. Guidance for performing more detailed LOS analysis is provided in the ***FDOT Traffic Analysis Handbook.***

4.4.2. Pedestrian/Bicycle/Transit MOEs

To promote safe and efficient non-motorized travel and to adequately assess non-motorized site impact, pedestrian and bicycle-specific MOEs can be reviewed such as Q/LOS, network connectivity, and system completeness. The appropriate MOE for the pedestrian and bicycle analysis should be based on the size, scale, and context of the development. The ***Pedestrian/Bicycle/Transit Impact Analysis*** section of this chapter provides the suggested scope and MOEs for pedestrian and bicycle analysis. Proposed developments requiring a detailed transit analysis should coordinate with FDOT, transit agencies, and the local government to determine the study methodology.

4.5. Background Data Collection and Review

Types of data generally needed for the study area are shown in ***Table 7***, which summarizes typical background data that can be collected and reviewed to help establish existing conditions and the basis for background transportation demand. The type and scale of background data needed can vary for each study depending on the development size and context.

4.5.1. Proposed Site Development Characteristics

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 and multimodal facilities
- The proposed land uses should be identified by intensity and classification consistent with ITE's most recent ITE *Trip Generation Manual* as much as possible
- The proposed traffic signals, median openings, major driveways, access locations for all modes 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

Table 7 | Suggested Background Data for Collection and Review

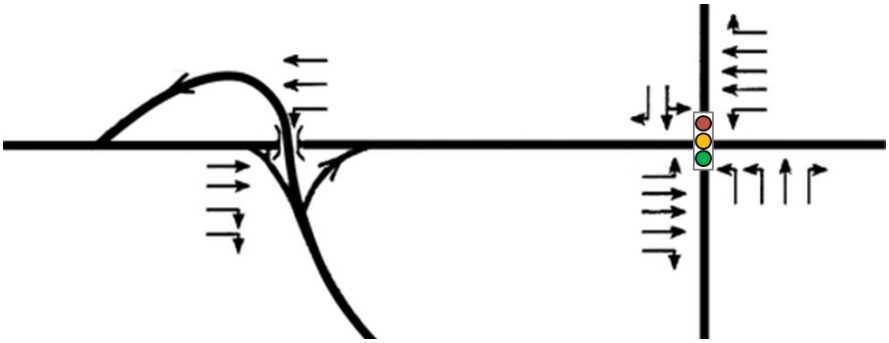
Category	Data Types
Land Use and Demographics	Current land use types, densities, and levels of occupancy/vacancy
	Approved development projects with planned land use types, densities, and completion dates
	Anticipated development as yet unapproved
	Comprehensive land use plan
	Zoning
	Current/future population and employment by census tract or transportation analysis zone (as needed for site trip distribution)
	Other relevant characteristics (preponderance of persons of certain ages or limited abilities)
Transportation System Availability	Current street system characteristics, including direction of flow, number and types of lanes, right-of-way width, type of access control and traffic control
	Roadway functional classification, access management classification, and context classification
	Roadway governmental jurisdiction
	Traffic signal locations, coordination, and timing
	Adopted transportation system plans
	Planned, programmed, and committed transportation system improvements
	Parking availability, cost, and usage
	Traffic flow
	Curb space management, including zones for parking, loading, bus stops, and mobility-as-a-service (MaaS) providers
	Transit system coverage, frequency, and span of service
	Pedestrian linkages by type
	Bicycle linkages by type
	Obstacles to the implementation of planned projects
	Implementation timing, funding source/certainty for programmed and planned projects and services
Transportation System Use	Origin-destination or trip distribution data
	Current (and if needed for trends analysis) historical daily and hourly vehicular counts
	Recent intersection turning movement counts
	Seasonal variations
	Projected future volumes from previous studies or plans
	Relationship of counts to average and design days
	Transit system ridership
	Pedestrian volumes
	Bicyclist volumes
	Other notable modes (e.g., scooters)
	Other notable characteristics (e.g., MaaS presence, goods movement considerations)
	Crash history (minimum of 3 years if available), particularly if hazardous conditions have been identified

Adapted from: *Multimodal Transportation Impact Analysis for Site Development, A Recommended Practice of the Institute of Transportation Engineers (ITE), 2022*

4.5.2. Transportation System 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 context classification
- The maintaining agency (state, county, or local) for all facilities within the area of influence
- Existing transit, bicycle, and pedestrian facilities in the study area
- Identification of transit, bicycle, and pedestrian routes
- Crash information for all modes, including pedestrian and bicycle crashes. This may point out problem areas for future remediation
- Identification of programmed improvements on state highways and significant regional and local (city or county) roads and current funding status (typically improvements with construction funding within the first three years are considered "committed" projects)
- 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, inclusive of facilities for all modes
- Identification and review of multimodal information, data, and considerations with appropriate agencies. FDOT ConnectPed (***https://www.fdot.gov/roadway/bikeped/connectped***) has a database of information that can be field verified for use.

4.5.3. 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.

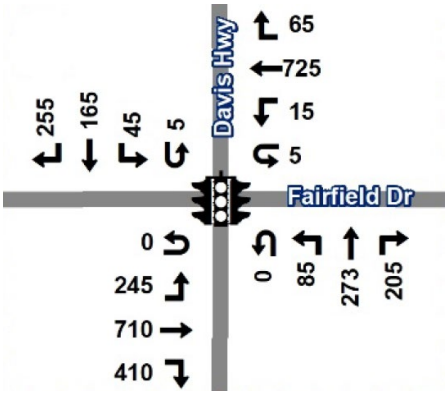
The study area should not be restricted in terms of walking distance; rather, the reviewer should consider, in consultation with the transit provider, whether it is desirable to extend service a modest distance to serve new development.

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

4.5.4. Traffic Counts and Other Transportation Data

Existing transportation demand data will include current and historical traffic volumes, turning movement counts (see ***Figure 4***), traffic characteristics such as peak and directional factors, transit ridership data, and pedestrian and bicycle volumes. All traffic analysis summaries and reports should clearly identify the specific year of analysis.

Figure 4 | Example of Existing Intersection Turning Movement Count



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.

FDOT's existing Annual Average Daily Traffic (AADT) counts, classification counts from the FDOT ***Florida Traffic Online (FTO)*** could be a prime source for historical traffic data. FDOT's pedestrian and bicycle counts and data is available through ***FDOT's Statewide Non-Motorized Traffic Monitoring Program***.

The sources for guidance on data collection and queue length are:

- ***FDOT Multimodal Quality/Level of Service Handbook***
- ***FDOT Project Traffic Forecasting Handbook***
- ***FDOT Traffic Analysis Handbook***

4.6. Trip Generation

Trip generation is the process by which the number and type of person trips associated with a given land use is estimated. Trip generation may be the most critical element of the multimodal transportation impact analysis because it estimates the number of person 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 version of ITE's *Trip Generation Manual,* is necessary in all site impact analyses.

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.

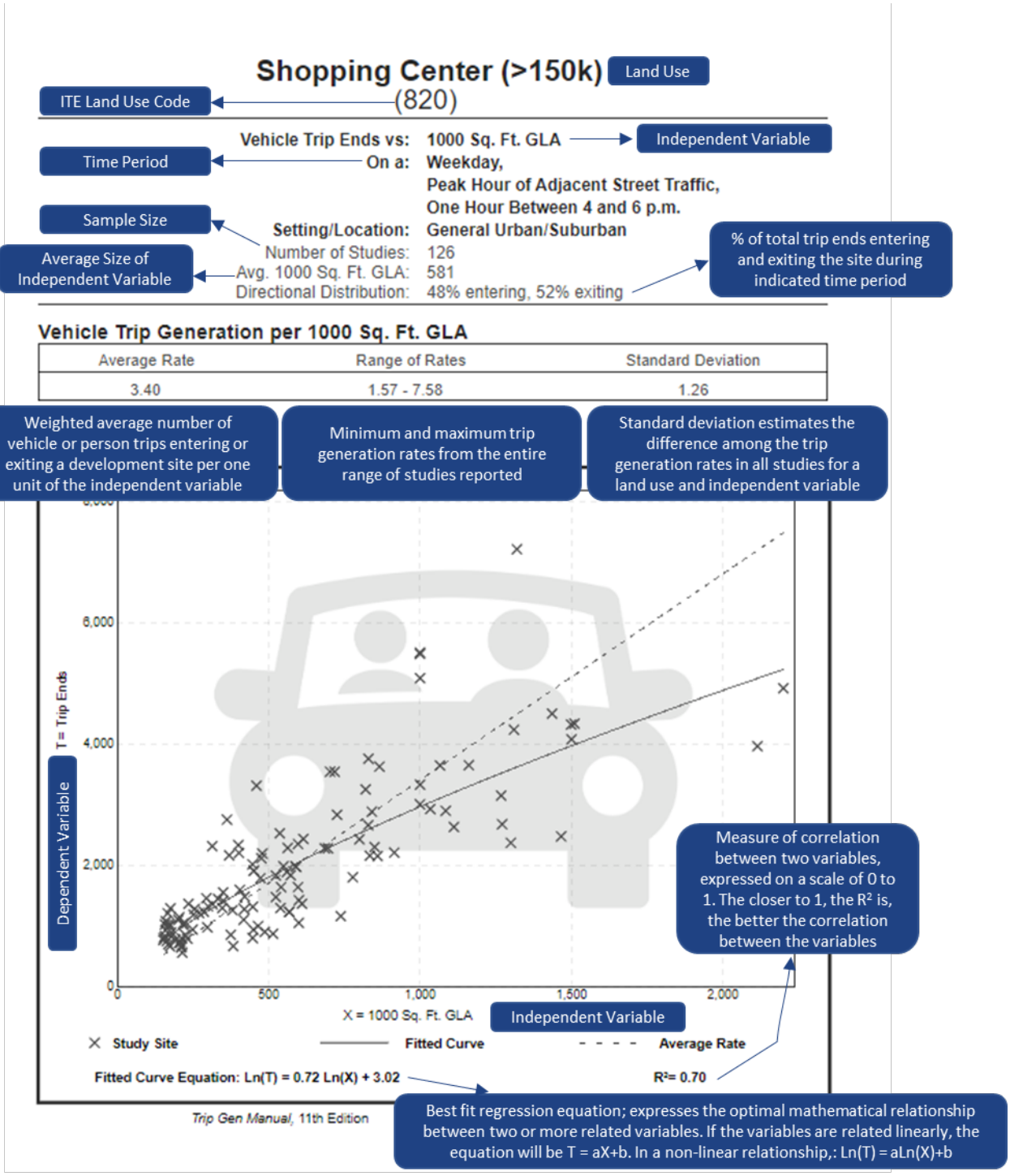
4.6.1. Trip Generation Data

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 movement with either the origin or the destination (entering or exiting movement) inside the study site and one origin or destination external to the study site.

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 reports of trip generation data available is the ITE's most current ITE *Trip Generation Manual*. It is comprised of data collected nationally. A wide variety of land uses are represented in the ITE *Trip Generation Manual*. See ***Figure 5*** for definition of terms such as independent variable, average rate, time period, etc.

Users should exercise judgment in selecting and applying trip rates for their situation. The most current ITE *Trip Generation Handbook* provides guidance on the process for estimating trip generation. More information on person trips, land use setting, selecting rates or equations, primary, pass-by, and diverted trips is discussed in the following sections. More detailed information can be found in the most current ITE *Trip Generation Handbook.*

Figure 5 | ITE Trip Generation Manual Page Example



Source: ITE *Trip Generation Manual, 11th Edition*

4.6.2. Person Trips

Historically, the ITE *Trip Generation Manual* has been used primarily for data collected at low-density, single-use, homogeneous, general urban or suburban developments (baseline sites). The collection sites have little or no public transit service and little or no convenient pedestrian access. As a result, the ITE trip rates usually represent 100 percent motor vehicle travel.

The ITE *Trip Generation Manual*, 11th Edition addresses this deficiency by including person trip generation rates for some of the land uses and expanding the settings to include Dense Multi-Use Urban, City Core, and Rural environments. A person trip is defined by the ITE *Trip Generation Manual* as a trip made by any mode of travel by an individual person from an origin to a destination. For example, a family of four traveling from home to school by vehicle would represent one vehicle trip and four person-trips. In addition to person trip generation data, the Manual provides walk, bicycle, transit, and walk+bicycle+transit trip generation data for many land uses and settings.

For land uses without available or adequate person, walk, bicycle, or transit trip data in the Manual, the ITE *Trip Generation Handbook 3rd Edition* provides a methodology to convert baseline vehicle trips (the vehicle trip estimation for baseline sites) to person trips and then estimate mode share. As depicted in ***Figure 6***, the analyst should first consider the land use type, characteristics, context, and analysis objectives. Next, the analyst determines if a site is multimodal, which means there is a potential for non-vehicle site trips in either existing or future conditions. Per the Handbook, a site is considered multimodal if the site is:

- An infill site
- A mixed-use development (see ***Internal Capture Rates for Multi-Use Developments*** for discussion on internal capture)
- A transit-friendly development
- Served by corporate transit or ridesharing
- In an area with walking or biking, or planned for walking or biking

If the site is determined to be multimodal, a procedure is provided to estimate person trips, walk/bike trips, transit trips, and vehicle trips. This is done by multiplying the baseline vehicle trips by the baseline vehicle occupancy, and then dividing by the baseline person trip mode share in vehicles (see the following example). The baseline vehicle occupancy rate is the average number of persons per vehicle and is obtained from either from the Handbook or through using local proxy sites. Per the Handbook, the baseline percentage mode share of person trips made by vehicles is assumed to be 95 percent or more. The number of person trips is equal to the number of vehicle trips times the vehicle occupancy, plus transit, walk, and bike trips.

Example

A 200,000 square foot shopping center (ITE Land Use Code 820) in a suburban setting is proposed, and an estimate of person trip generation is needed. The most current Manual (ITE *Trip Generation Manual, 11th Edition*) does not provide person trip generation rates or equations for this land use: only vehicle and truck trip generation data are provided.

Following the Handbook's process to estimate person trip generation, the first step is to estimate the baseline vehicle trips. The estimated baseline trip generation for the PM peak hour of adjacent street traffic per ITE *Trip Generation Manual, 11th Edition* is:

- 930 total trips, 446 entering, 484 exiting

After estimating the baseline vehicle trip generation, the person trip generation can be estimated by multiplying by vehicle occupancy factors and then dividing by the baseline person trip mode share in vehicles.

Per the Handbook (Table B.2 in Appendix B), this land use has the following baseline vehicle occupancy factors in the PM peak:

- 1.21 for inbound (entering), and 1.18 for outbound (exiting)

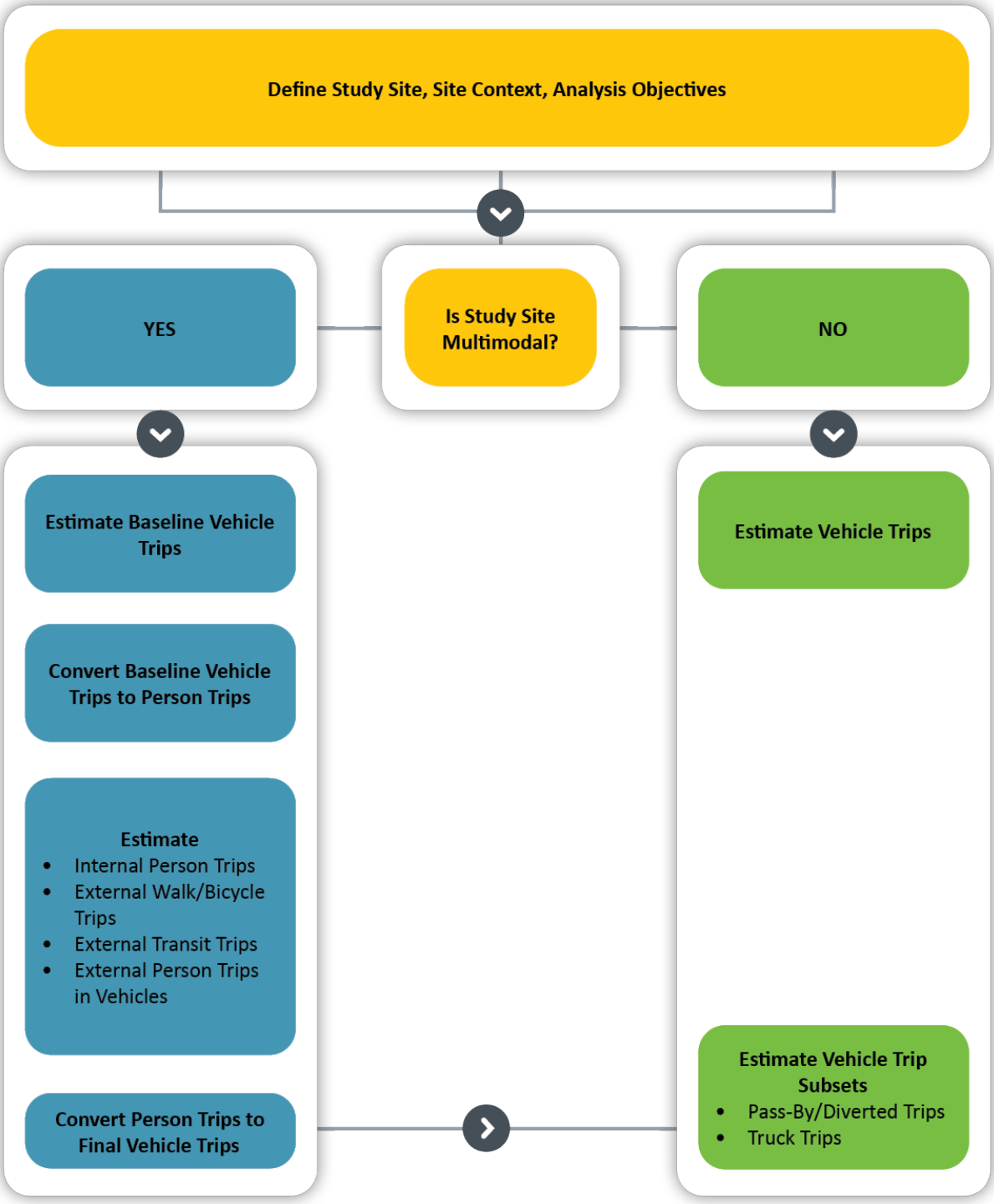
The baseline vehicle mode share (personal passenger vehicle + trucks) in the PM peak per Table B.2 in Appendix B is:

- 100% for inbound (entering), and 100% for outbound (exiting)

As such, the person trips for the 200,000 square foot shopping center can be estimated by:

- Entering: (446 trips x 1.21 vehicle occupancy) / 100% = 540 person trips
- Exiting: (484 trips x 1.18 vehicle occupancy) / 100% = 571 person trips
- Total: 1,111 person trips

Figure 6 | ITE Approach to Estimate Site Trip Generation



4.6.3. Land Use Setting

Follow-up studies of land uses have shown that vehicle trip generation data contained in previous editions of the ITE *Trip Generation Manual* have overestimated vehicle trips generated by developments in compact, urbanized areas where other modes of transportation (walking, bicycling, and transit) are viable. The majority of the data are from sites with low-density, single-use developments located in suburban or other outlying areas with little to no use of modes other than vehicular; these are called "baseline" sites. The application of suburban data in dense or multimodal urban settings can, in some cases, overestimate motor vehicle demand.

The ITE *Trip Generation Manual*, 11th Edition includes the general urban/suburban land use setting and adds three additional settings. The four land use settings are as follows:

- General Urban/Suburban
- Central City Core
- Dense Multi-Use Urban
- Rural

The provision of these additional land use settings also allows for flexibility in selecting the land uses that best match the environment where the development will be constructed, increasing the level of accuracy to assess impacts and identify appropriate mitigation.

4.6.4. Use of Trip Generation Rates or Equations

Many of the land use categories in ITE's *Trip Generation Manual* provide both an average trip rate and an equation to estimate the number of trips for that use. The Manual provides guidance regarding the use of trip generation equations versus average rates. In general, the range of data selected and the number of sites sampled should be reviewed. In most cases, 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.

The Manual contains a detailed method for determining the choice of average rate or equation. 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
- Neither weighted average rate line nor fitted curve is within data cluster at size of study site

4.6.5. Estimating Trips by Mode

The latest ITE *Trip Generation Manual* provides trip generation data, where available, for personal passenger vehicle, bicycle, person, transit, truck, and walk trips. When trip generation data is not available for the needed mode(s), mode share is provided for a variety of land uses. Mode share is divided between vehicles (including trucks), transit, and non-motorized modes such as walking and biking. The following process is used to estimate the non-vehicle person trips for the multimodal site:

a) If the site is a mixed use-development, calculate the number of internally captured person trips and subtract them from the total site-generated person trips to determine the external person trips. Internal capture is further discussed later in this section.
b) If the site is located in an infill setting, estimate the number of external trips made by pedestrian, bicycle, or transit modes by using infill trip generation mode share and vehicle occupancy information from the ITE *Trip Generation Manual* and *Trip Generation Handbook*, local proxy sites, or other available data as described in the ITE *Trip Generation Manual* and *Trip Generation Handbook*.
c) If the site is served by significant levels of transit, estimate the number of transit trips generated by the site per the ITE *Trip Generation Manual* and *Trip Generation Handbook*. These trips are subtracted from motorized person trips to calculate person trips in personal passenger vehicles or trucks.

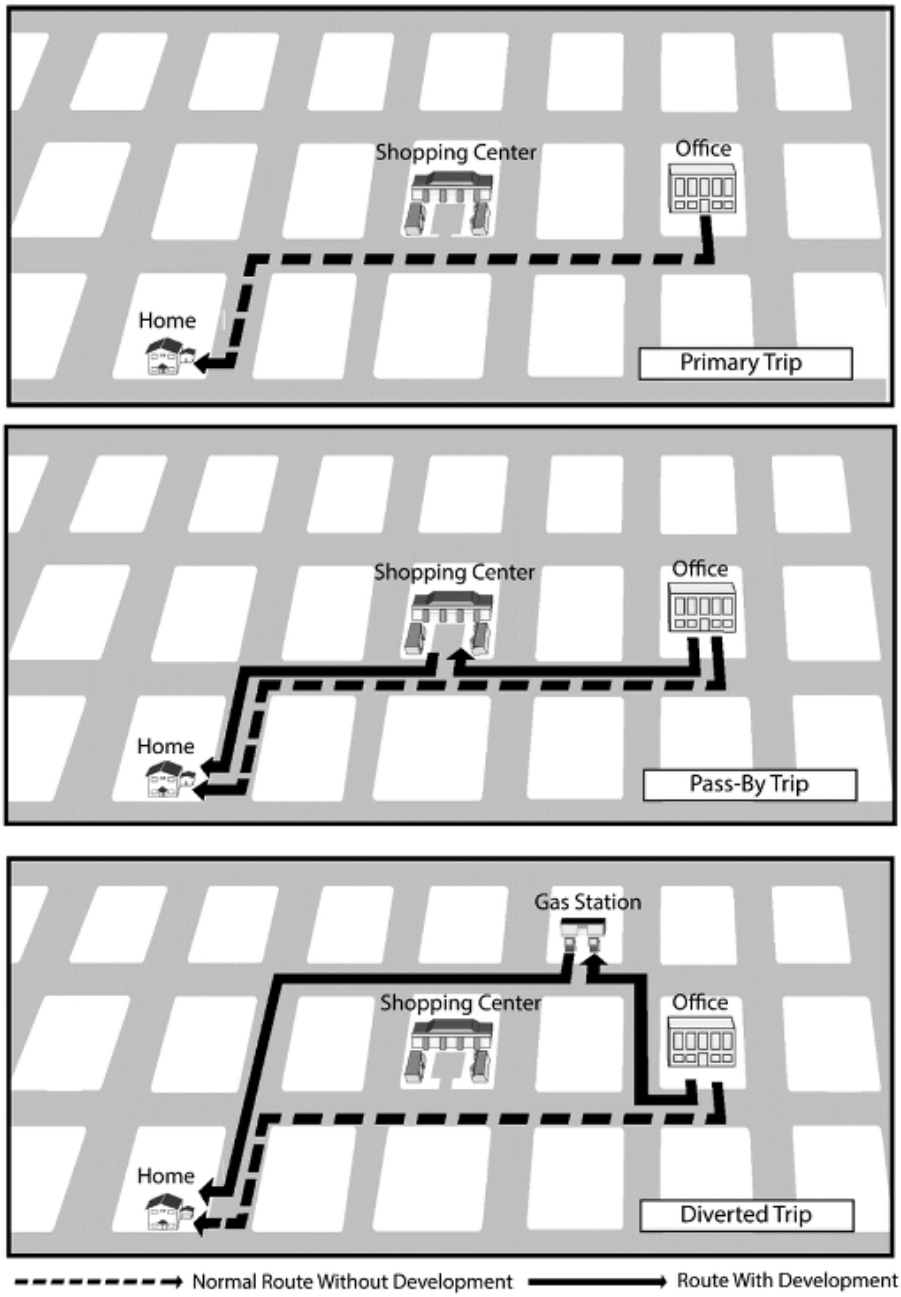
Additional data may be needed to supplement ITE. ITE person trip data is not available for every land use, and there is a limited number of study sites for several land uses. Additionally, mode split data is limited in the Manual. The limited data can result in potential discrepancies such as when comparing the calculated total person trips to the sum of the vehicle, walk, bike and transit trips. The methodology to estimate trips by mode should be reviewed during the methodology development. Furthermore, person,

walk, bike or transit trip estimations may not be necessary for every site. As determined during the methodology / pre-application meeting, a context-based assessment only (***Context-Based Assessment*** section) for pedestrian and bicycle site impact may be adequate and multimodal trip generation data is not necessary. However, note that multimodal trip generation data is required as part of the MTIA for access connection permit applications for driveway classifications C, D, E, F, and G. The primary importance of a quantitative pedestrian and bicycle analysis (***Quantitative Pedestrian and Bicycle Analysis*** section) is to provide developers an opportunity to demonstrate the need to go beyond minimum multimodal requirements with potential incentives for mitigation, as well as to determine if there are specific multimodal improvement needs related to intersection or midblock crossing points such as the need for new or improved traffic control devices. In many cases, the justification for such devices is based largely on the existing or anticipated usage. Appropriate assessment of the multimodal needs of the proposed site helps to ensure that needed facilities and devices are planned for and implemented commensurate with the development.

4.6.6. Primary, Pass-by, and Diverted Trips

After the number of external vehicle trips has been estimated, the type of trips should also be addressed. The ITE *Trip Generation Manual* defines three basic types of trips generated by a development: primary, pass-by, and diverted. ***Figure 7*** illustrates the types of trips from the most recent ITE *Trip Generation Manual.*

Figure 7 | Types of Trips



Source: ITE Trip Generation Handbook, 3rd Edition

4.6.6.1. Primary Trips

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

4.6.6.2. Pass-By Trips

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

4.6.6.3. Diverted Trips

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. 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.

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. The ITE *Trip Generation Manual* 11th Edition provides data on pass-by and diverted trip rates for many land use types; an example is provided in ***Figure 8***.

Figure 8 | ITE Trip Generation Manual 11th Edition – Pass-By Trips for Land Use Code 820

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	820								
Land Use	Shopping Center (> 150k)								
Setting	General Urban/Suburban								
Time Period	Weekday PM Peak Period								
# Data Sites	8 Sites with GLA between 150 and 300k				16 Sites with GLA between 300 and 900k				
Average Pass-By Rate	29% for Sites with GLA between 150 and 300k				19% for Sites with GLA between 300 and 900k				
	Pass-By Characteristics for Individual Sites								
		Survey	#	Pass-By	Non-Pass-By Trips			Adj Street Peak	
GLA (000)	State or Province	Year	Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
213	Florida	1990	312	28	31	41	72	—	33
225	Illinois	1994	264	35	32	33	65	1970	24
227.9	Kentucky	1993	—	34	35	31	66	—	34
235	Kentucky	1993	211	35	29	36	65	2593	2
255	Iowa	1994	222	23	38	39	77	3706	24
256	Connecticut	1994	208	27	51	22	73	3422	24
293	Illinois	1994	282	24	70	6	76	4606	13
294	Pennsylvania	1994	213	24	48	18	76	4055	24
350	Massachusetts	1994	224	18	45	37	82	2112	24
361	Virginia	1994	315	17	54	29	83	2034	24
375	North Carolina	1994	214	29	48	23	71	2053	24
413	Texas	1994	228	28	51	21	72	589	24
418	Maryland	1994	281	20	50	30	80	5610	24
450	California	1994	321	23	49	28	77	2787	24
476	Washington	1994	234	25	53	22	75	3427	24
488	Texas	1994	257	12	75	13	88	1094	13
560	Virginia	1994	437	19	49	32	81	3051	24
581	Colorado	1994	296	18	53	29	82	2939	24
598	Colorado	1994	205	17	55	28	83	3840	24
633	Texas	1994	257	10	64	26	90	—	24
667	Illinois	1994	200	16	53	31	84	2770	24
738	New Jersey	1994	283	13	75	12	87	8059	24
800	California	1994	205	21	51	28	79	7474	24
808	California	1994	240	13	73	14	87	4035	24

4.6.6.4. Estimating the Number of Pass-By and Diverted Trips

The ITE *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.

4.6.6.5. 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 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.
- 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).

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.

4.6.6.6. Explanation of the 10 Percent of 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.

If the development has driveways on more than one roadway, the 10 percent reasonableness check applies to each respective roadway. For instance, if the site is located at the corner of an intersection and the major road has a two-way peak hour volume of 2,000 vehicles, the maximum total volume of pass-by trips at the driveway/s along the major road is 200 trips for that hour. If the minor road has a peak hour two-way volume of 500 vehicles, the maximum total volume of pass-by trips at the driveway/s along the minor road is 50 trips for that hour.

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. The maximum allowable pass-by trips should be the total pass-by trips, which is the sum of the enter and exit pass-by trips.

4.6.6.7. Comparing ITE Pass-By Trips with FDOT Guidance

For example, refer to the ITE *Trip Generation Manual 11th 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 (SF) 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.

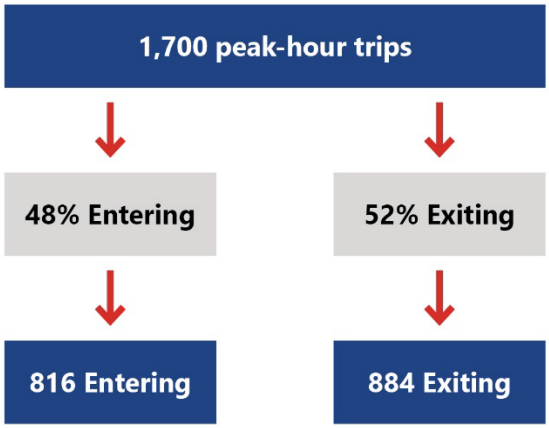
The average rate for the LUC 820 is 3.40 (figure 2)

Thousand Square Feet	X	Average Rate	=	Peak Hour Trips Generated
500	X	3.40	=	1,700 Peak Hour Trips Generated

STEP 2

Calculate trips generated for the proposed development.

As shown in Figure 2, the Directional Distribution for this LUC is 48% entering and 52% exiting.



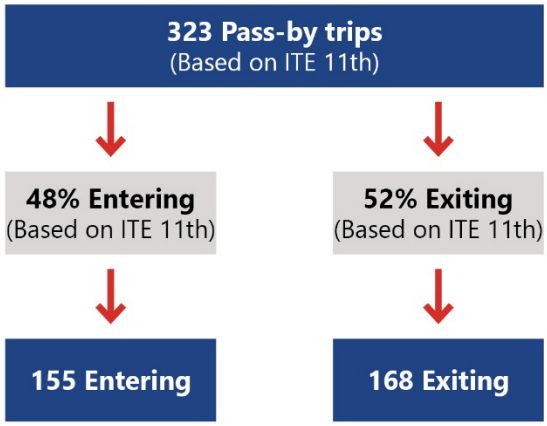
STEP 3

Calculate the Pass-by-trips reduction and its directional distribution

Based on the ITE Trip Generation Manual 11th Edition, the average pass-by trips percentage for the LUC 820 (between 300k and 900k) is 19% (Figure 5)

Peak Hour Trips	X	Average Pass-by Trips Percentage	=	Pass-by Trips
1,700	X	19%	=	323 Pass-by Trips

Directional Distribution



STEP 4

Compare ITE's Pass-by Trips reduction vs FDOT's Pass-by Trips guidance

The Adjacent Street Traffic is 3000.

FDOT suggests that Pass-by Trips should be no more than 10% adjacent street traffic

300 Pass-by Trips	vs	323 Pass-by Trips

Since 323 > 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.

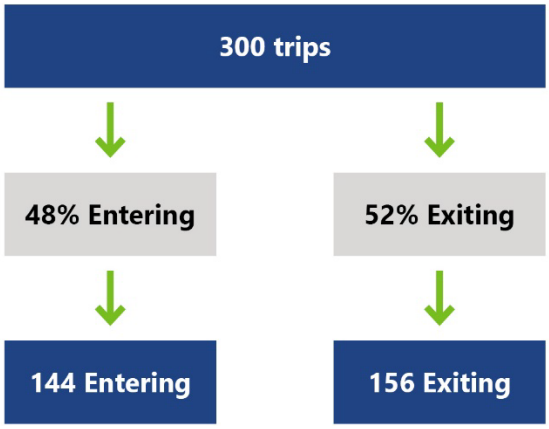


Figure 9 | Example Application of 10 Percent Pass-By Trips

10% Pass-by Trips Example

*for a Shopping Center Peak Hour two way traffic on adjacent street = **3,000 v/hr***

*ITE Trip Generation peak hour trips Pass-by rate = **19%***

New trips generated

1,700-323= 1,377

1,700-300= 1,400

10% of 3000=300 maximum pass-by trips

PER ITE

Shopping Center

pass by trips **155 Enter**

pass by trips **168 Exit**

Peak hour two-way traffic = 3000 v/hr

FDOT's Acceptable Method

Shopping Center

pass by trips **144 Enter**

pass by trips **156 Exit**

10% of 3000 = 300 maximum pass by trips

Adjust pass by trips to equal 300

4.6.7. Model Method of Analysis for Trip Generation

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 the ***Model Method for Trip Distribution and Assignment*** section and the FSUTMS website.

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. 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 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 the ***Model Method for Trip Distribution and Assignment*** section.

4.6.8. ITE Limitations

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

- The plots presented in the ITE *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. Therefore, professional judgment is required.
- 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.

4.6.8.1. Special or Unusual Generators

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.

4.6.8.2. Alternatives to ITE Trip Generation Data

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*.

4.6.9. 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.

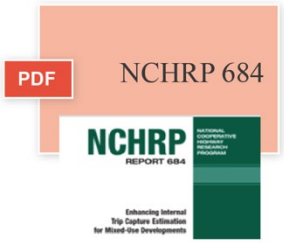
Because there are so many factors, FDOT cannot recommend just one method or one set of internalization factors to be used for all mixed-use developments. Research done in the past provides guidance on the

best way to estimate internal capture. Whatever method is chosen, it will need to be discussed and agreed to by the people and agencies involved in the analysis.

4.6.9.1. 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 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 in a mixed-use development which is auto oriented, single family residential oriented, and has a standard shopping center at its entrance.

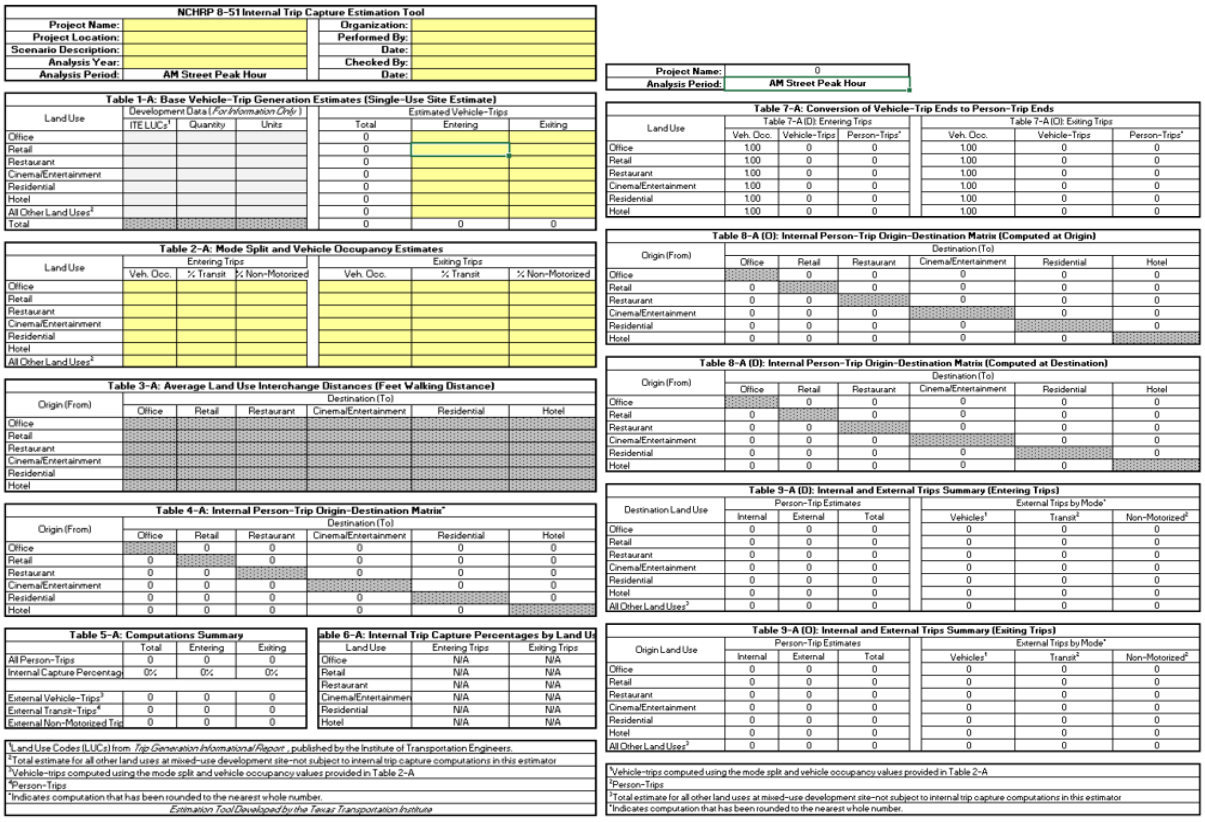
This research can be found in the FDOT study, ***Trip Internalization in Multi Use Developments*** BDK84 977-10.



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 (***NCHRP 684)*** 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.

Figure 10 | Internal Capture Input/Output Example, NCHRP 684 Excel



NCHRP 8-51 Internal Trip Capture Estimation Tool

Project Name:		Organization:	
Project Location:		Performed By:	
Scenario Description:		Date:	
Analysis Year:		Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
Total				0	0	0

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	0	0	0
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips[3]	0	0	0
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips	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

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

Project Name:	0
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (D): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
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[3]	0	0	0	0	0	0

Table 9-A (D): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
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[3]	0	0	0	0	0	0

[1] Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
[2] Person-Trips
[3] Total estimate for all other land uses at mixed-use development site--not subject to internal trip capture computations in this estimator
* Indicates computation that has been rounded to the nearest whole number.

4.6.10. Community Capture: Internal Capture for New Towns

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.

4.6.10.1. Where Community Capture May 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."

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

F.S. 163.3164(32), 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.

4.6.10.2. 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.

4.6.10.3. 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.

4.6.10.4. 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 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.

4.6.10.5. The Factors Impacting Community Capture

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.

4.6.10.6. Using Large-Scale Transportation Models to Estimate Community Capture

Current Florida travel demand models (such as 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.

4.6.11. Redevelopment Sites

If a new development is being proposed on a site that previously generated a significant amount of vehicular traffic, the reviewer should determine, in advance, the treatment of the vehicular 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 vehicular traffic and treat it as part of the Background Vehicular 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.

4.7. Vehicular Impact Analysis



The vehicular impact analysis assesses the site's impact to the surrounding roadway network based on personal vehicle and truck trips generated by the site. Vehicular impact analysis typically consists of both existing and future conditions analyses to compare conditions with and without the proposed development in place. This process is further discussed below.

4.7.1. Existing Conditions Analysis

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.

The existing conditions 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.

4.7.2. Future Background Conditions Analysis

4.7.2.1. 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 traffic, not including the proposed development being analyzed
- Traffic from other developments in the study area (other than the project being analyzed). For example, developments that are not yet built but have an approved development order, concurrency management certificate, or approved driveway connection permit 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 approved 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 (for instance, vested / committed trips)
- 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. 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

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.

Growth Rate / Trends Method for Future Background Traffic

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 Multimodal Transportation Impact Analysis for Site Development has this caution:

> *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 and person trips does not always parallel growth in peak-hour vehicle traffic, and most historical data are for average daily vehicle traffic. This method should also not be used where substantial multimodal transportation system changes (infrastructure changes) will alter future travel 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 locations(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

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.

The following example is provided to illustrate the use of the three models for forecasting traffic volumes on a roadway (SR 202 / James Turner Butler Boulevard) in Duval County. Information regarding the applicability of the three growth trend techniques is also presented. The selection of an appropriate growth method should be discussed during methodology development.

Table 8 summarizes the historical AADT on the roadway facility.

Table 8 | Example Application of Trends Spreadsheet, Historical Volumes (Duval County, Site 0949)

Year	Volume (AADT)
2010	109,000
2011	119,500
2012	113,000
2013	115,500
2014	117,000
2015	127,000
2016	129,000
2017	128,000
2018	132,500
2019	141,500

Linear Growth

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.

Using the Duval County example data, the results of the linear growth rate estimated an average growth of 3,085 vehicles per year as shown in *Figure 11*. The software allows users to select three analysis horizon years per evaluation run. In this example, an opening year of 2025 was evaluated along with a mid-year of 2030, and a long-term horizon of 2045.

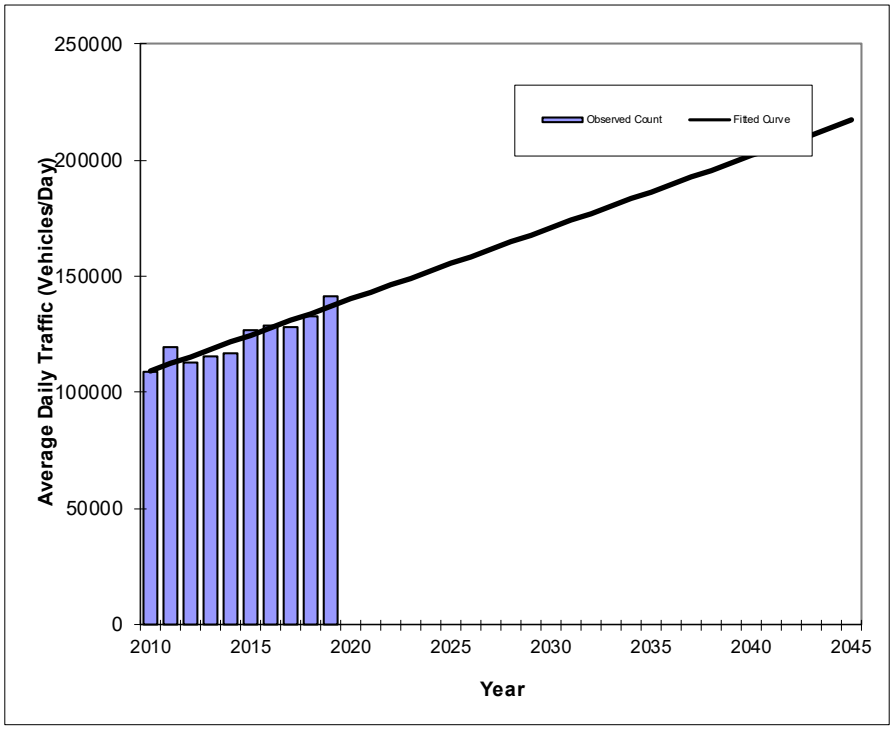
Figure 11 | Linear Growth Projection Using Traffic Trends Spreadsheet

Traffic Trends - V03.a

SR 202 --

FIN#	0
Location	1

County:	Duval (72)
Station #:	0949
Highway:	SR 202



Year	Traffic (ADT/AADT) Count*	Trend**
2010	109000	109300
2011	119500	112400
2012	113000	115500
2013	115500	118600
2014	117000	121700
2015	127000	124700
2016	129000	127800
2017	128000	130900
2018	132500	134000
2019	141500	137100
2025 Opening Year Trend		
2025	N/A	155600
2030 Mid-Year Trend		
2030	N/A	171000
2045 Design Year Trend		
2045	N/A	217300
TRANPLAN Forecasts/Trends		

** Annual Trend Increase:	3,085
Trend R-squared:	86.31%
Trend Annual Historic Growth Rate:	2.83%
Trend Growth Rate (2019 to Design Year):	2.25%
Printed:	10-Mar-23
Straight Line Growth Option	

*Axle-Adjusted

Exponential Growth

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. ***Figure 12*** illustrates application of exponential growth projection to the Duval County data.

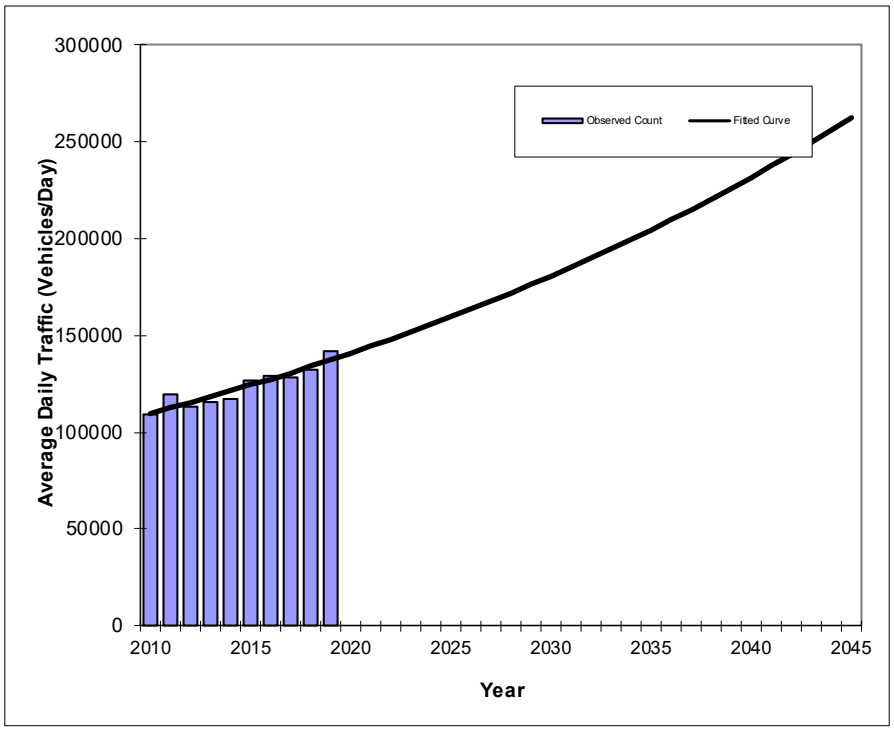
Figure 12 | Exponential Growth Projection Using Traffic Trends Spreadsheet

Traffic Trends - V03.a

SR 202 --

FIN#	0
Location	1

County:	Duval (72)
Station #:	0949
Highway:	SR 202



Year	Traffic (ADT/AADT) Count*	Trend**
2010	109000	109800
2011	119500	112600
2012	113000	115400
2013	115500	118300
2014	117000	121300
2015	127000	124400
2016	129000	127500
2017	128000	130700
2018	132500	134000
2019	141500	137400
2025 Opening Year Trend		
2025	N/A	159500
2030 Mid-Year Trend		
2030	N/A	180700
2045 Design Year Trend		
2045	N/A	262500
TRANPLAN Forecasts/Trends		

Trend R-squared:	86.52%
Compounded Annual Historic Growth Rate:	2.52%
Compounded Growth Rate (2019 to Design Year):	2.52%
Printed:	10-Mar-23

Exponential Growth Option

***Axle-Adjusted**

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. ***Figure 13*** illustrates application of exponential growth projection to the Duval County data.

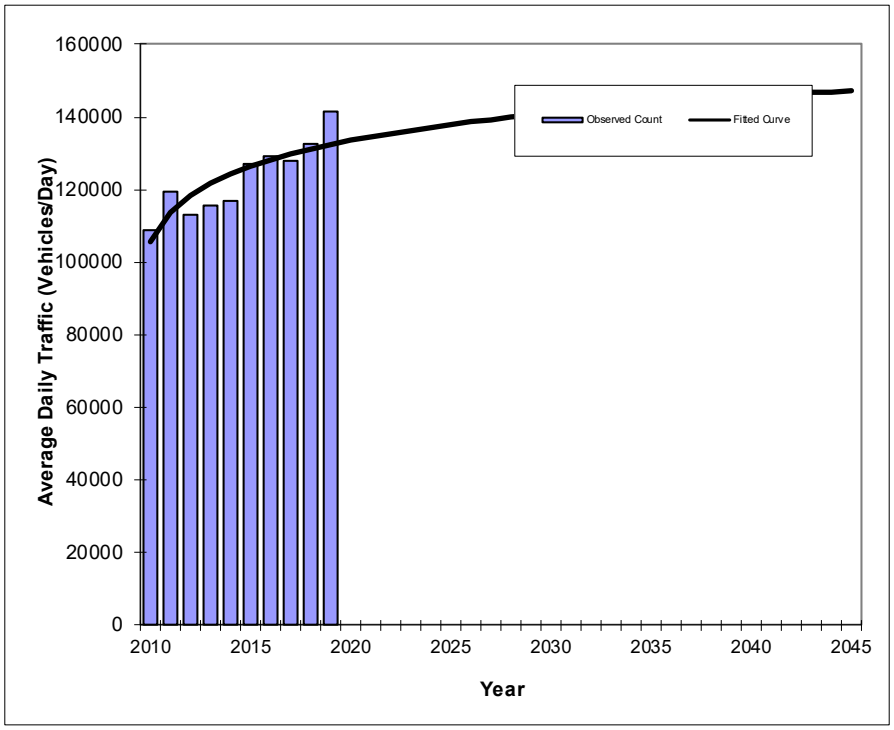
Figure 13 | Decaying Exponential Growth Projection Using Traffic Trends Spreadsheet

Traffic Trends - V03.a

SR 202 --

FIN#	0
Location	1

County:	Duval (72)
Station #:	0949
Highway:	SR 202



Year	Traffic (ADT/AADT) Count*	Trend**
2010	109000	105600
2011	119500	113700
2012	113000	118400
2013	115500	121800
2014	117000	124400
2015	127000	126500
2016	129000	128300
2017	128000	129800
2018	132500	131200
2019	141500	132400
2025 Opening Year Trend		
2025	N/A	137900
2030 Mid-Year Trend		
2030	N/A	141000
2045 Design Year Trend		
2045	N/A	147300
TRANPLAN Forecasts/Trends		

Trend R-squared:	71.87%
Compounded Annual Historic Growth Rate:	2.54%
Compounded Growth Rate (2019 to Design Year):	0.41%
Printed:	10-Mar-23
Decaying Exponential Growth Option	

*Axle-Adjusted

What if 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. It is recommended to coordinate with FDOT to determine if a minimum growth rate is needed for an area.

Build-Up Method for Future Background 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 (or using assignments from available TIAs), 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 (vested / committed trips).

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

- Identify and account for committed system improvements through mitigation agreements with the approved developments
- Apply a growth rate (see previous section ***Growth Rate / Trends Method for Future Background Traffic***) to capture area-wide / corridor traffic volume growth
- Identify and add approved development traffic
    - Confirm committed projects and phasing within the study area
    - Obtain trip assignment associated with approved projects (desirably including documentation of trip generation, trip distribution, and trip assignment)

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 since the approved development traffic can be assumed to be a part of the background growth rate.

Model Method for Future Background Traffic

The project study area future year background traffic volumes can be estimated using a FSUTMS model, if appropriate. 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. Models are typically calibrated and validated to reflect the travel behaviors as observed for a “base year.” The input data used for the model are population, employment, number of housing units, school enrollment, and the transportation network. After a model is validated, it can be used to forecast future traffic using the projected population and employment data and the transportation network for a future year. Use of a model to project future background conditions should be discussed during the Methodology Meeting.

4.7.3. Vehicular Trip Distribution and Assignment

Another component in the site impact analysis is project trip distribution and assignment. The purpose of trip distribution is to determine the final destination and origin of the traffic studied in the impact analysis. Trip assignment involves determining the amount of traffic that will use each route on the transportation network.

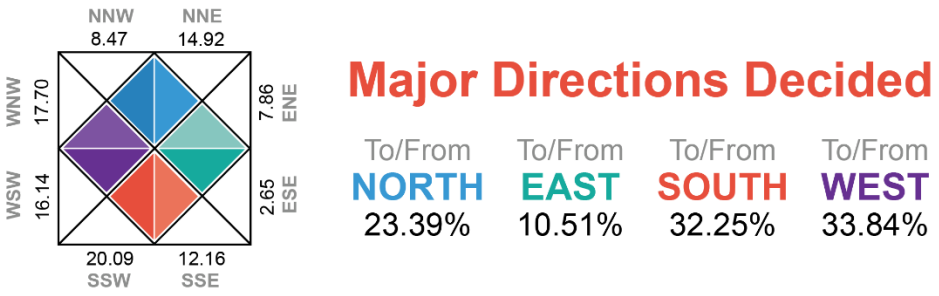
Trip distribution and assignment are two related but distinct activities. Trip distribution determines where trips wish to go. Assignment is when the trips are placed on the network to reach their desired destination. Trip assignment determines the volume of site-generated traffic on each study roadway and intersection within the study area network. The products of the assignment component are traffic volumes appropriate for use in the analysis of operating conditions.

Trip distribution and assignment 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 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 thoughtful review of the assignment. Applicants are encouraged to work with FDOT and other local agencies to ensure trip distribution and assignment assumptions are reasonable and reflective of local conditions.

It is important to note that traffic factors may need to be applied to both field collected data and model derived volumes. Even when using FDOT-approved adjustments, care must be taken to see if the output is reasonable. A full description of traffic factors as well as other adjustments can be found in the ***Project Traffic Forecasting Handbook***.

Whether a manual or large-scale modeling method is used, trip distribution and assignment should be performed in each analysis year and documented and summarized in ***Figure 14*** 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 percent.

Figure 14 | Example of Major Directions of Trip Distribution from Site

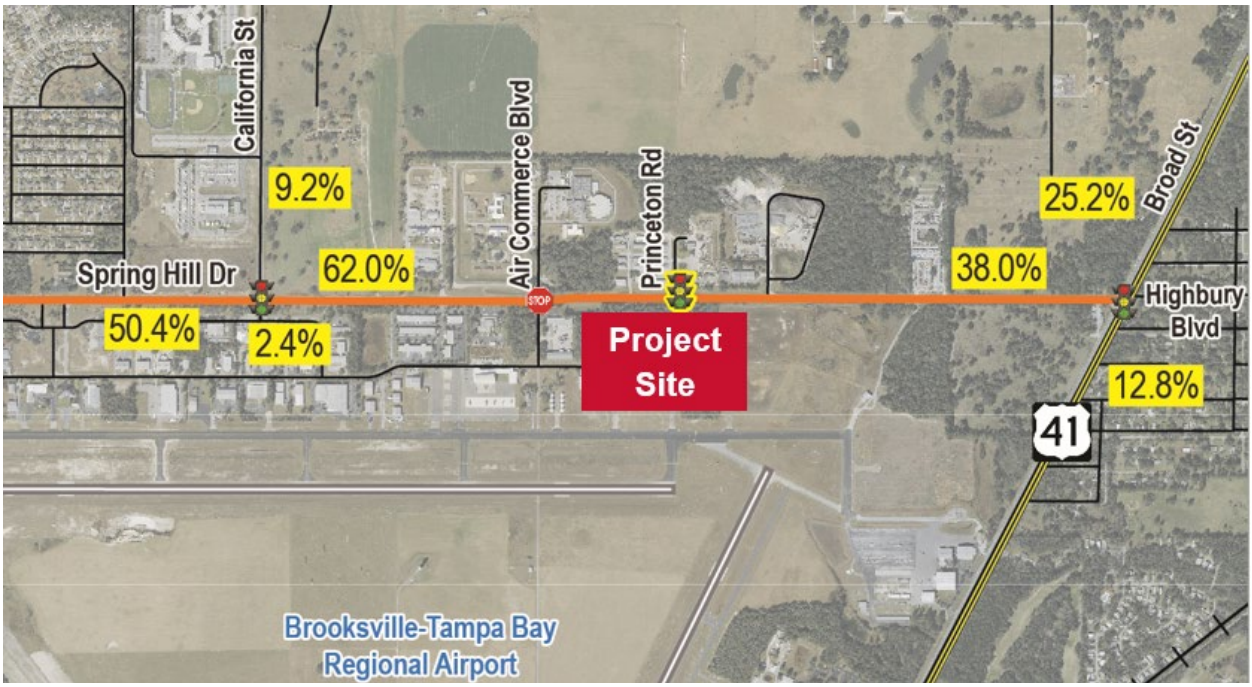


Source: KHA from a traffic study of a Miami Wal-Mart Circa 2005

4.7.3.1. Manual Method for Trip Distribution and Assignment

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. ***Figure 15*** provides a visual example of the manual distribution method.

Figure 15 | Manual Trip Distribution Example



Source: HDR Engineering, Inc.

Manual trip assignment often assigns site traffic based on existing or anticipated future turning and through movement percentages. 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:

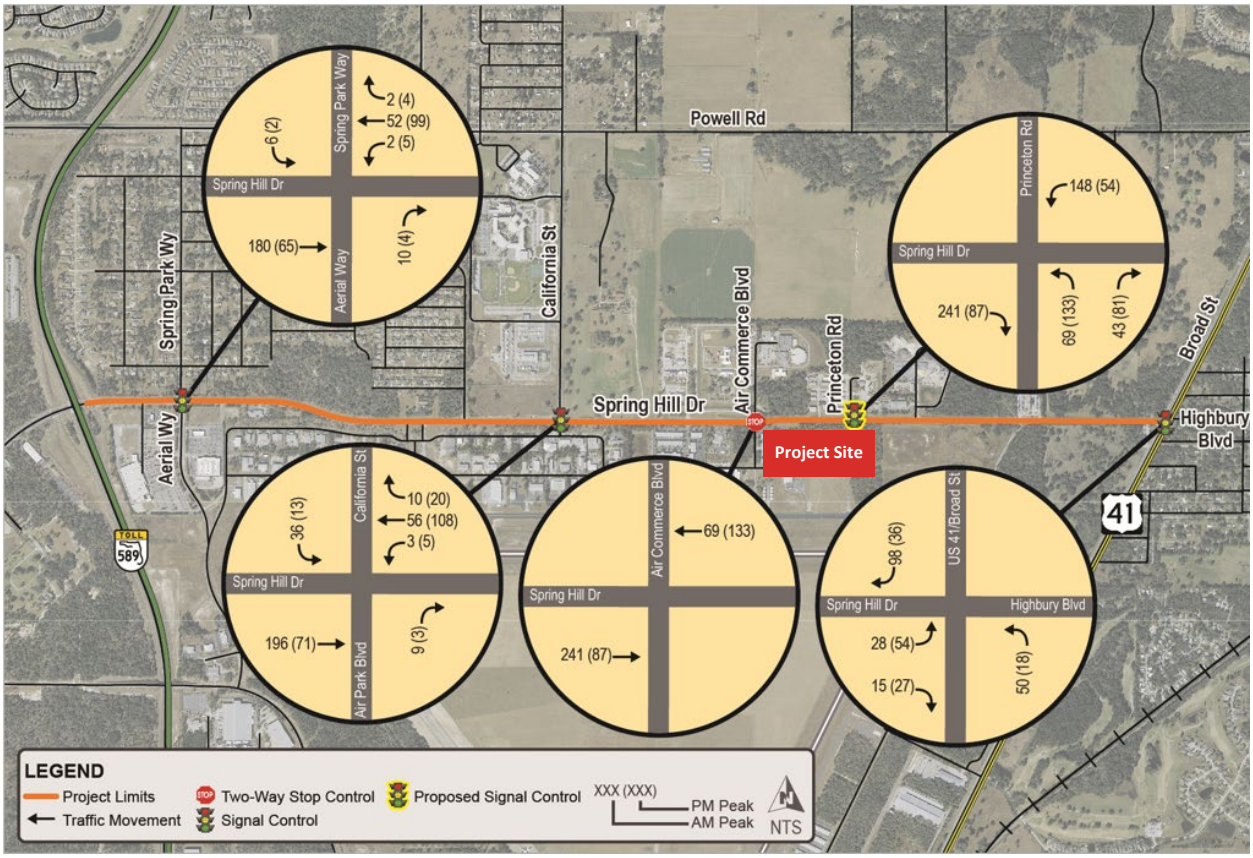
- Driver tendencies and local patterns in developing logical travel routes
  - Drivers will often use the first convenient driveway they reach to access a site with multiple driveways
  - Driver characteristics reflecting the proposed land use (will drivers tend to use back roads/local connections or 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

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.

Figure 16 | Manual Vehicle Trip Assignment Example



Source: HDR Engineering, Inc.

4.7.3.2. Analogy Method / Origin-Destination Studies for Trip Distribution and Assignment

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 2nd 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.

4.7.3.3. Model Method for Trip Distribution and Assignment

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 associated with site development.

Central Office modeling contact information is listed on FSUTMSOnline.net "Contacts" link in the page footer.

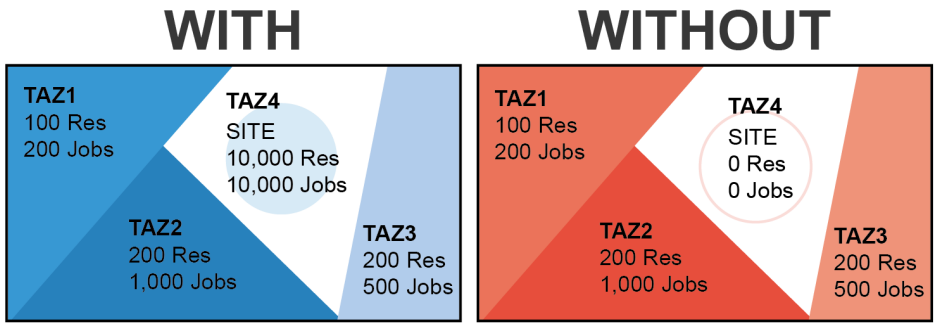
Large-scale travel demand models such as FSUTMS use a capacity restrained routine, known as user equilibrium, to perform the final highway assignment. The model decreases speeds on congested roadways and shifts traffic between routes after each iteration of the assignment until equilibrium is achieved. 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 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).

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).

Figure 17 | Example of With and Without Modeling Method (Not to be Used)



This method is not to be used as is stated above. 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 Long Range Transportation Plan (LRTP)/ Metropolitan Transportation Plan (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 transportation impact analysis:

- Special Generator Method
- Link Volume Factor Method

These methods are discussed below.

Note: In the examples below, care can be taken to avoid overestimating 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

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 ***Table 9***)
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 ***Table 9***)
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)

Table 9 | 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.

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.

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. 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.

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's ***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.

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 depend 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***. FDOT ***District 4's TM Tool*** is also available to estimate turning volumes.

4.7.3.4. Pass-By Trip Assignment

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 or the site's layout and circulation. Pass-by trips in the network should be analyzed carefully. The following procedure is based, in part, on the recommendations of ITE's ***Multimodal 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 (see ***Explanation of the 10 Percent of Adjacent Street Traffic*** section for details).

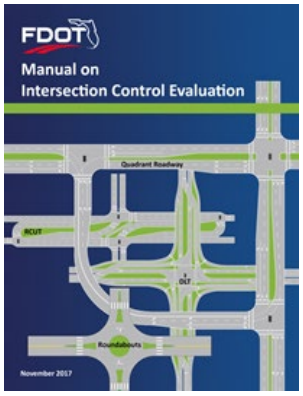
4.7.4. Future Build Conditions Analysis

The future build 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.

4.7.5. ICE

Intersections are designed points of conflict in all roadway systems. This includes U.S. and state highways, county roads, and local streets. Traditionally, the most common solutions to intersection challenges involved stop controlled, conventional signalization scenarios, or interchanges. In recent years, several new or innovative intersection designs have been introduced across the U.S. These "alternative" intersection control types are enhancing safety and improving operations, along with varying degrees of other benefits. 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.



FDOT has developed the ***Manual on Intersection Control Evaluation*** (ICE) and related forms to facilitate objective evaluations of intersection alternatives. ICE is intended to be a data driven, performance-based framework to optimize the state's investment and provide solutions that consider all users. It provides a transparent and consistent approach for agencies to consider intersection alternatives based on metrics such as safety, operations, and cost, as well as social, environmental, and economic impacts.

An ICE is required when:

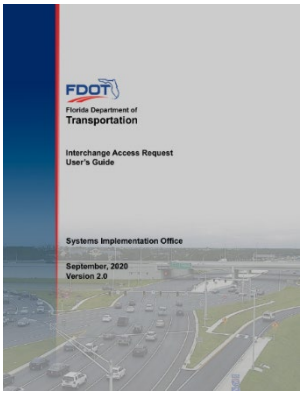
- New intersection signalization is proposed except for signalization at a midblock crosswalk
- Major reconstruction of an existing signalized intersection is proposed (e.g., adding a left-turn lane for any approach; adding an intersection leg)
- Changing a directional or bi-directional median opening 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
- District Design Engineer (DDE) and District Traffic Operations Engineer (DTOE) consider an ICE a good fit for the project

ICE has three stages:

1. Stage 1: Screening – completed during a project's initial stage. Federal Highway Administration (FHWA) 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.
2. 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.
3. 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 of analysis is already included as part of a PD&E.

At the completion of each stage, the appropriate FDOT ICE form is completed and submitted to the DTOE and DDE. FDOT ICE and related forms and tools can be found at:
http://www.fdot.gov/traffic/trafficservices/Intersection_Operations.shtm

4.7.6. Interchange Areas



FDOT's Interchange Access Request User's Guide (IARUG) provides guidance on how to prepare documents that support requests for new or modified access to the Florida interstate system, Florida's Turnpike Enterprise (FTE), and non-interstate limited access facilities on the SHS. This guide states that the Area of Influence (AOI) along a crossroad shall extend a minimum of up to one-half mile in either direction of the proposed access change. To maintain general consistency with this AOI threshold, developments that require a MTIA and are within one-half mile of an interchange should analyze the ramp terminals, at minimum, as part of the MTIA to determine if there will be any impacts to those locations requiring potential mitigation and a need for an interchange access request to modify a ramp or geometry within the limited access right-of-way. For larger developments, additional analysis including the limited access facility and its ramp junctions may be appropriate. It is recommended to coordinate with the FDOT District Interchange Review Coordinator (DIRC) in those cases to determine the appropriate level of analysis. The *Interchange Access Request User's Guide* and the *Traffic Analysis Handbook* are available at:
https://www.fdot.gov/planning/systems/systems-management/systems-management-documents

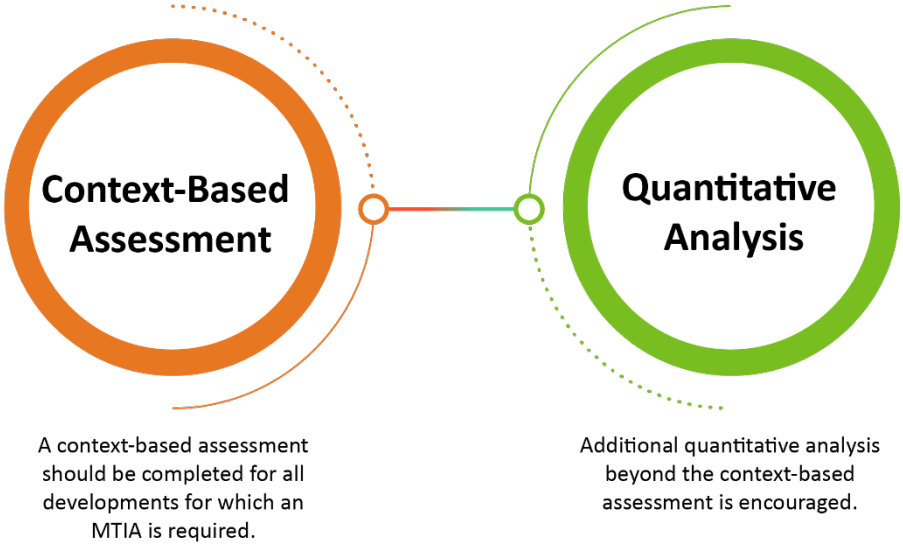
4.8. Pedestrian/Bicycle/Transit Impact Analysis

The traditional MTIA process typically has considered only automobile performance measures to determine a site's impact. In order to promote safe and efficient movement of non-motorized traffic and better mitigate multimodal impact, this Handbook has been updated to include guidelines to assess pedestrian, bicycle, and transit site impact.

4.8.1. Study Requirements

The study requirements for the pedestrian and bicycle impact analysis can vary and should be based on considerations such as the type of development and context classification. There are two approaches to assess a site's impact to bicyclists and pedestrians:

Figure 18 | Two Pedestrian/Bicycle Site Impact Approaches

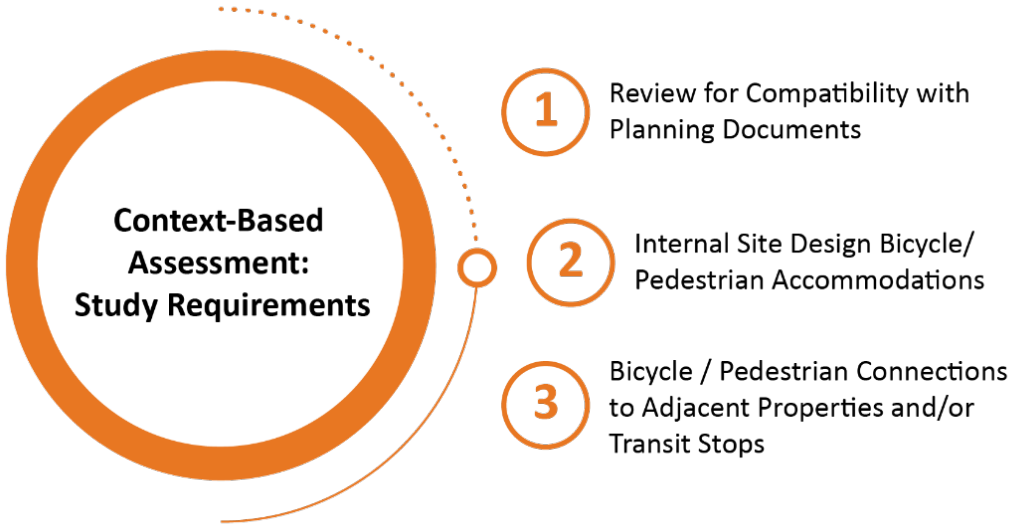


The following sections provide additional details related to the context-based assessment and the suggested methodologies for the quantitative pedestrian and bicycle analysis. Property frontage of developments along the SHS must meet the context-based requirements for non-motorized facilities as contained in the FDM. The quantitative analysis provides an opportunity for the developer to go beyond minimum requirements with incentives for potential mitigation.

4.8.2. Context-Based Assessment

The context-based assessment to review pedestrian and bicycle site impact consists of Steps 1-3:

Figure 19 | Context-Based Assessment Study Requirements



Each step is described below.

1

Review for Compatibility with Planning Documents. The first step of the context-based assessment is to determine if the development is located in an area with a master plan, a FDOT Districtwide master plan, or other planning document that includes pedestrian and bicycle modes. If so, it is recommended to provide a review to ensure the proposed development is consistent with the plan(s). This step should be coordinated with the applicable local government agency, as appropriate.

2

Internal Site Design Pedestrian and Bicycle Accommodations. To provide safe and convenient access to and circulation within developments for all users, the site's design should incorporate pedestrian and bicycle facilities, where appropriate. This step should be coordinated with the applicable local government agency, as appropriate. There are several components for on-site design to accommodate non-motorized users. These include:

a. ***Access Management.*** Traditionally, the goal of access management has been to reduce vehicle conflicts and to favor higher speeds of travel. However, with a change in statewide focus to promoting multimodal transportation, this goal has been refined to the management of modal conflicts. An overarching concept to improve pedestrian and bicycle safety is to reduce the overall number of driveways. Fewer driveways improve safety by decreasing the number of conflict points for all modes of travel, including non-motorized users. The number of

driveways can be reduced by providing consolidated or shared driveways with cross-access between properties, providing a unified internal access to outparcels, creating better networks with balanced driveway connections to the main road and side streets, and eliminating unused or abandoned driveways.

b. ***Driveway / Connection Design.*** Driveway (connection) design has a direct impact on pedestrians and bicyclists. The FDOT ***Access Management Guidebook*** includes pedestrian and bicycle driveway design considerations such as curb radius, driveway width, sight distance, and meeting the requirements of the Americans with Disabilities Act (ADA).

c. ***Site Frontage.*** Frontage improvements can support the site and all modes that may travel to and from the development. These improvements can include sidewalks, bicycle facilities, on-street parking, landscaping/streetscaping, transit stops or shelters, and right-of-way dedication.

d. ***Site Circulation and Pedestrian and Bicycle Access.*** A site can promote pedestrian and bicycle accessibility and connectivity by providing safe and convenient on-site paths. To provide access to the site, the paths should directly connect the external pedestrian and bicycle network(s) to the main entrance of the site's building(s). Paths should also be provided:

    i. Between the parking areas and building entrances. If off-site parking is provided, review the routes between the off-site parking and the building entrances to provide appropriate paths and traffic control at street crossings.
    ii. Between the main entrances of multiple on-site buildings, if present.

    These on-site paths should minimize conflicts with other modes and provide the most direct route to reduce the travel distance for non-motorized users.

e. ***Amenities.*** On-site design can incorporate pedestrian and bicycle amenities to further promote the use of non-motorized modes. Potential amenities include lighting, bicycle parking, bicycle repair stations, showers, lockers, changing rooms, benches, landscaping, and awnings or other shade and/or weather protection.

f. ***Network Review.*** A well-connected street network is beneficial for bicyclists and pedestrians since it can provide shorter and more direct paths to reach destinations. Additionally, a connected street network can better disperse vehicular traffic over multiple facilities, providing safer, lower volume route options for non-motorized users. A development's geographic location within the surrounding transportation network can be reviewed to assess potential improvements to the network's connectivity. This may include review of the street network and the pedestrian and bicycle networks.

Note for Comprehensive Plan Amendments. Although site design details are not typically available for comprehensive plan amendments, appropriate best practices for pedestrian and bicycle design can be reviewed and planned for incorporation in the site plan.

3

Pedestrian and Bicycle Connections to Adjacent Properties and/or Transit Stops. Where feasible, developments should consider neighboring properties and transit stops and provide direct pedestrian and bicycle access. Direct access can minimize the travel distance for non-motorized users.

Providing convenient access between properties will encourage walking or biking and help minimize short auto trips between adjacent properties. Care should be taken to account for appropriate connections to adjacent or related properties, particularly when a street must be crossed to travel between the two properties including appropriate traffic control provisions.

Pedestrian and bicycle paths to/from transit stops near the site should be reviewed for directness and adequacy of the available facilities. These connections should facilitate safe and convenient transit trips ends to/from the site.

This step should be coordinated with the applicable local government agency, as appropriate.

Note for Comprehensive Plan Amendments. Although site design details are not typically reviewed during comprehensive plan amendments, recommended connections to bus stops and compatible neighboring land uses can be reviewed and planned for incorporation in the site plan.

4.8.3. Quantitative Pedestrian and Bicycle Analysis

There are numerous quantitative performance measures used to assess bicycle and pedestrian modes. Each measure can provide a different perspective of the system's performance and should be selected based on the purpose and goal of the assessment. The scale of application for performance measures can differ ranging from long-term scenario planning or benchmarking to a near-term standard or target. For the purposes of assessing multimodal site impact, performance measures that can be applied to assess the near-term standard should be used.

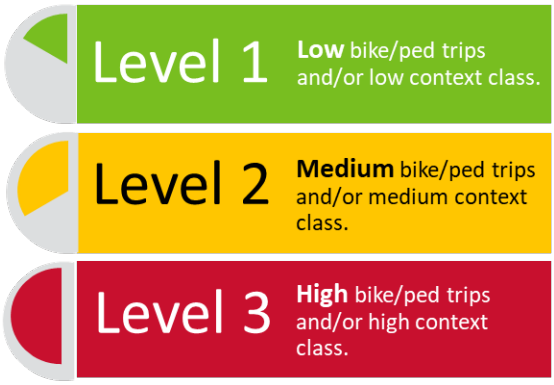
Since no singular performance measure can account for all of the aspects of walkability and bikeability, it is recommended to include multiple performance measures to assess potential site impacts to biking and walking. As such, it is recommended that Q/LOS, network connectivity, and system completeness performance measures be included in the MTIA quantitative pedestrian and bicycle analysis (***Figure 20***).

Figure 20 | MTIA Pedestrian / Bicycle Measures of Effectiveness



The level of study for the quantitative analysis can vary based on the site's context and characteristics. The level of study sets the scale, complexity, and elements to be included in the quantitative pedestrian and bicycle impact analysis. In general, a site in a more urban context classification or one that generates a high volume of bicyclists and/or pedestrians should include a larger study area with more analysis components (see ***Figure 21***).

Figure 21 | Pedestrian and Bicycle Quantitative Analysis Study Levels



Guidance on the appropriate level of quantitative pedestrian and bicycle analysis is provided in ***Table 10***, which indicates one of three suggested levels of study based on whether a particular development is projected to have a low, medium, or high volume of peak hour non-motorized trips for a particular context classification. If more than one state roadway provides direct access to the study site, then the highest level of study resulting for the site should be provided.

Table 10 | Level of Pedestrian and Bicycle Study based on Context Classification and Peak Hour Volume

Peak Hour Volume of Non-Motorized Trips	C1	C2	C2T	C3	C4	C5	C6
Low (< 20)	1	1	2	1	1	2	2
Medium (20 – 49)	2	2	2	2	2	3	3
High (≥ 50)	3	3	3	3	3	3	3

Figure 22 | Quantitative Analysis Study Requirements

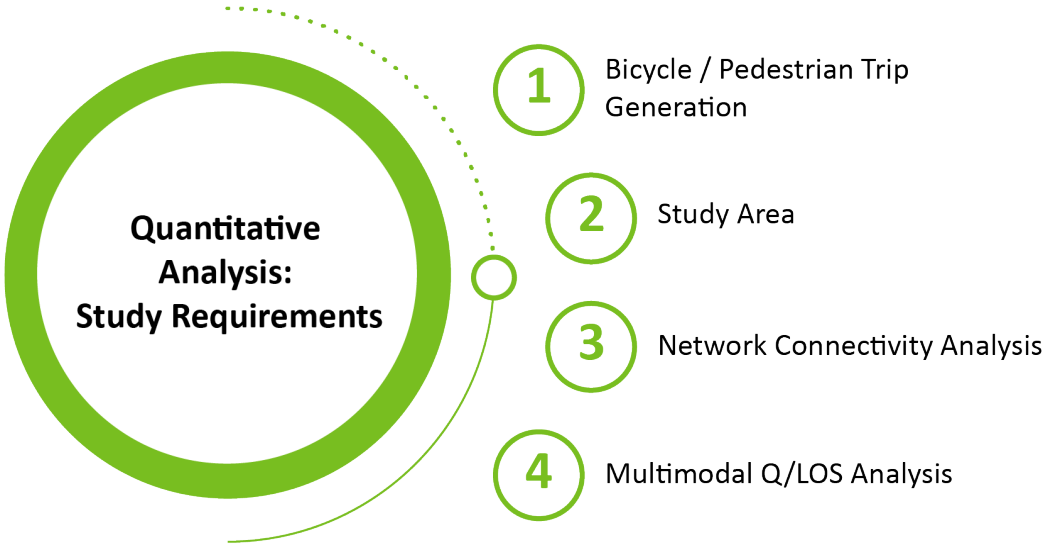


Table 11 shows the steps for the quantitative analysis. Note that Step 1 is required as part of the MTIA for access connection permit applications for driveway classifications C, D, E, F, and G.

Table 11 | Pedestrian and Bicycle Study Requirements – Quantitative Analysis

Analysis Type	Study Requirements	Level of Pedestrian and Bicycle Study		
		Level 1 (Low)	Level 2 (Medium)	Level 3 (High)
Quantitative Analysis	1. Bicycle / Pedestrian Trip Generation	Required when total vehicle trips per day exceeds 600 (driveway connection permit categories C-G). Optional for other study types.		
	2. Study Area	N/A	500-foot radius or nearest signalized intersection beyond 500 feet [1]	1,500-foot radius or nearest signalized intersection beyond 1,500 feet [1]
	3. Network Connectivity Analysis	N/A	Optional	Optional
	4. Multimodal Q/LOS Analysis	N/A	Optional	Optional

Note:

[1] Access connection permit applications for Driveway Categories C, D, E, F, and G should meet the above study area guidance as a minimum or utilize the same study area being evaluated for vehicle trips.

Each step from ***Table 11*** is described below.

1

Pedestrian and Bicycle Trip Generation. The first step beyond the context-based assessment and into the quantitative analysis is to provide pedestrian and bicycle trip generation. Note that this step is part of the required MTIA for any access connection application for driveway category C, D, E, F, or G. This step is otherwise optional, but encouraged, for any other study that requires vehicular trip generation and is necessary to determine the appropriate level of pedestrian and bicycle study as shown in ***Table 10***. The latest ITE *Trip Generation Handbook* provides a methodology to estimate trips by mode. This is further discussed in the ***Estimating Trips by Mode*** section. ITE or other approved methodology can be utilized to estimate non-motorized trips. The site's peak hour of non-motorized trips should be considered.

2

Study Area. As shown in ***Table 10*** and ***Table 11***, the study area determination can vary based on considerations such as context classification and the number of non-motorized trips generated by the site. It is recommended that the study area is measured from each driveway. For Comprehensive Plan Amendments or other types of community planning reviews or technical assistance, a 500-foot radius or nearest signalized intersection is recommended for a Level 2 analysis, and a 1,500-foot radius or nearest signalized intersection is recommended for a Level 3 analysis having more anticipated pedestrian and/or bicycle trips. For an access connection permit review, the study area should extend to the same limits as established for vehicular trips.

Note for Comprehensive Plan Amendments. The driveway(s) location(s) can be assumed for comprehensive plan amendments if they are not yet defined.

3

Network Connectivity Analysis. Network and connectivity performance measures provide a measure of a network's completeness and convenience. Per the FHWA *Guidebook for Measuring Multimodal Network Connectivity*, there are five components of multimodal network connectivity which are network completeness, network density, route directness, access to destinations, and network quality.

For the purposes of a site impact analysis, the Route Directness method can be used to measure network connectivity as it applies to a site. Route directness is the ratio between the actual route a bicyclist or pedestrian will travel between an origin and destination compared to the straight-line distance.

$$Route\ Directness\ Ratio\ = \frac{Shortest\ Path\ Route\ Distance}{Straight\text{–}Line\ Distance}$$

The following steps are recommended to assess the route directness for the site.

a. ***Determine onsite origin point(s).*** The trip origin point onsite should be located at the site's main front door entrance, or a central location for a development. Larger developments may require more than one origin point to measure route

directness. The specific origin point(s) and study area destinations can be determined during methodology development.

b. ***Determine destinations within the study area.*** The route directness ratio can be calculated for each potential origin/destination pair within the study area. Potential origins or destinations include off-site parking, bus stops, schools, parks, residences, places of employment, retail, health/recreation areas, etc.

c. ***Determine actual walking/biking routes.*** The actual walking/biking distance should be measured along designated pedestrian routes, where available, and not along informal routes such as on streets and through landscaping. Where formal routes along sidewalks, paths, or trails are not available, it can be assumed that the pedestrian will walk on the street.

d. ***Review completeness and quality of routes.*** After the walking/biking routes are determined, the quality and completeness of the routes should be reviewed. Design criteria to be considered as a part of this assessment can include availability or lack of facilities (gaps), safety, crossing treatments, design standards, ADA compliance, and appropriate and adequate lighting. All pedestrian and bicycle facilities along state roadways must meet minimum FDOT design criteria based on the FDM. However, consideration should be given to improving facilities beyond the required minimums based on the projected amount of usage (for example, wider sidewalks to accommodate a higher volume of pedestrians).

   The assessment should consider the anticipated volume of non-motorized users using the facilities along each route after the proposed development is in place to determine the suitability of the facilities (e.g., sidewalk width, crosswalk treatment, etc.). This can particularly be necessary for high pedestrian volume areas and/or Level 2 or 3 sites. Pedestrian and bicycle trip distribution is discussed in the ***Pedestrian and Bicycle Trip Distribution and Assignment*** section.

e. ***Calculate route directness ratios.*** Calculate the ratio by dividing the actual route traveled by the straight-line distance.

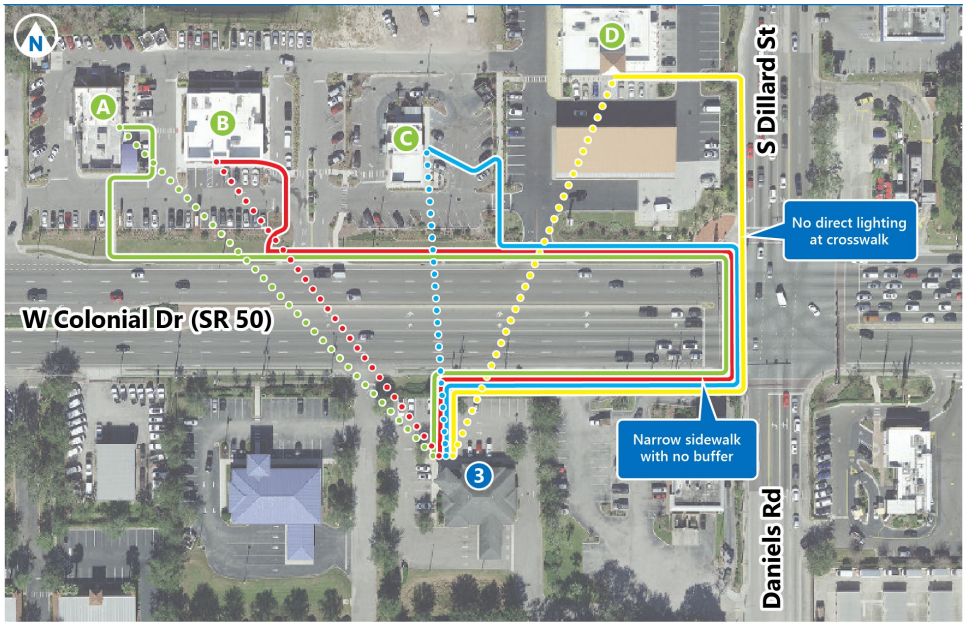
f. ***Determine needed improvements.*** To encourage pedestrian and bicycle trips, walking/biking routes should be safe, convenient, and direct. Indirect and circuitous routes or uncomfortable and unsafe routes can deter walking and biking trips and increase vehicular trips. Based on the findings in Steps d and e, improvements should be identified to improve walking/biking routes and to lower the route directness ratio. A route directness ratio of 1.5 or less should be maintained, where possible. Improvements should be identified to address inadequate or missing pedestrian and bicycle facilities along the designated routes, as identified in Step 6d. To lower the route directness ratio, as determined

in Step 6e, improvements should be identified to decrease the actual route distance (such as the addition of sidewalks, crosswalks, etc.). Where it is not feasible to provide the needed improvements off-site to create shorter paths, onsite infrastructure should be provided to allow for future connections (e.g., stub outs).

The review should also identify and assess locations where pedestrians/bicyclists may cross a roadway where a crosswalk does not exist to shorten their route based on the destinations and paths determined in this assessment. These locations should be assessed to determine if a new crosswalk is warranted based on FDOT guidance and criteria. Furthermore, existing and potential crossing locations along the routes should be reviewed to ensure that an adequate crossing treatment is in place to safely accommodate the anticipated crossing volumes after the addition of the site's pedestrian and bicycle trips. Crossing improvements can include the addition of a new crosswalk, high-visibility markings, raised crosswalk, curb extensions, refuge island, midblock crossing treatments (rectangular rapid-flashing beacons, pedestrian hybrid beacon), leading pedestrian interval at signals, and LED lighting. More information regarding crosswalks and treatments is provided in the ***FDOT Traffic Engineering Manual***.

An example of a route directness analysis is provided in ***Figure 23***.

Figure 23 | Example of Route Directness Analysis



Note for Comprehensive Plan Amendments. Since site details such as main entrance(s) (origin) and onsite pedestrian paths (actual route) are usually not defined for comprehensive plan amendments, assumptions can be made to complete the network connectivity analysis. This analysis is beneficial at the comprehensive plan amendment phase so that pedestrian route directness and quality issues can be identified and addressed during the site plan design, as appropriate.

4

Multimodal Quality/Level of Service (Q/LOS) Analysis. Q/LOS is a measure of the effect of factors that reflects how users may perceive a service condition which can include speed and travel time, traffic interruptions, freedom to maneuver, safety, comfort and convenience, and operating cost. There are numerous tools and methodologies available to measure bicycle and pedestrian Q/LOS. The FHWA ***Guidebook for Developing Pedestrian and Bicycle Performance Measures*** states that "Pedestrian and bicycle level of service can be assessed through various methodologies depending on context and desired outcomes, but generally focus on assessing comfort levels under specific situations." The ***FDOT 2023 Multimodal Quality/Level of Service Handbook*** utilizes Level of Traffic Stress (LTS) to provide an assessment of the quality (or level) of service for bicyclists and pedestrians. The following pedestrian and bicycle Q/LOS analyses are recommended as part of the site impact analysis.

Pedestrian Analysis

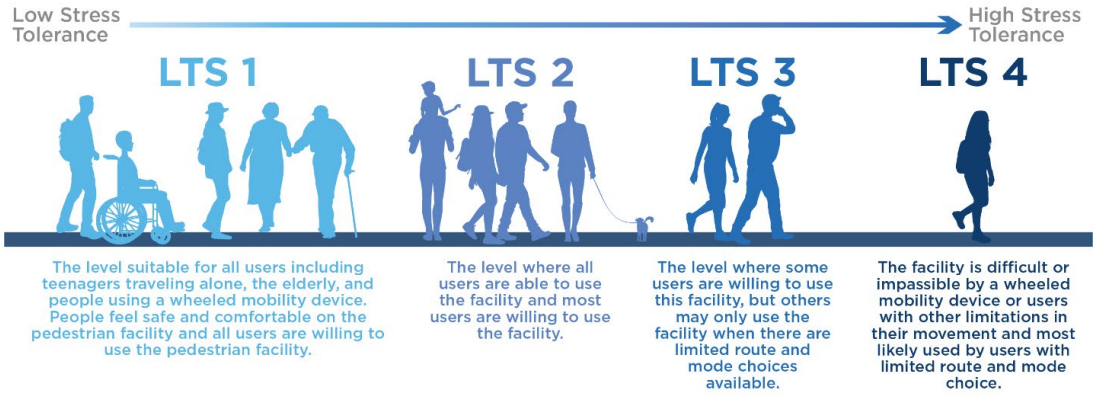
Pedestrian Level of Traffic Stress (PLTS) is a measure of quality (or level) of service for pedestrians. It qualitatively assesses the amount of discomfort people feel when they walk along a roadway within the roadway right-of-way. LTS levels range from 1 to 4, with 1 being the lowest level of stress and 4 being the highest level of stress, as follows:

- PLTS 1: The level suitable for all users including teenagers traveling alone, the elderly, and people using a wheeled mobility device. People feel safe and comfortable on the pedestrian facility and all users are willing to use the pedestrian facility.
- PLTS 2: The level where all users are able to use the facility and most users are willing to use the facility.
- PLTS 3: The level where some users are willing to use this facility, but others may only use the facility when there are limited route and mode choices available.
- PLTS 4: The facility is difficult or impassible by a wheeled mobility device or users with other limitations in their movement and most likely used by users with limited route and mode choice.

PLTS uses six characteristics to assess pedestrians' perceptions of the roadway or nearby roadside environment: existence of a sidewalk, sidewalk continuity, sidewalk width, posted speed, lateral separation of pedestrians from vehicular travel lanes, and presence

of vertical separation. More information on PLTS can be found in the FDOT ***2023 Multimodal Quality/Level of Service Handbook***.

Figure 24 | Pedestrian Level of Traffic Stress



Source: FDOT ***Multimodal Quality/Level of Service Handbook***

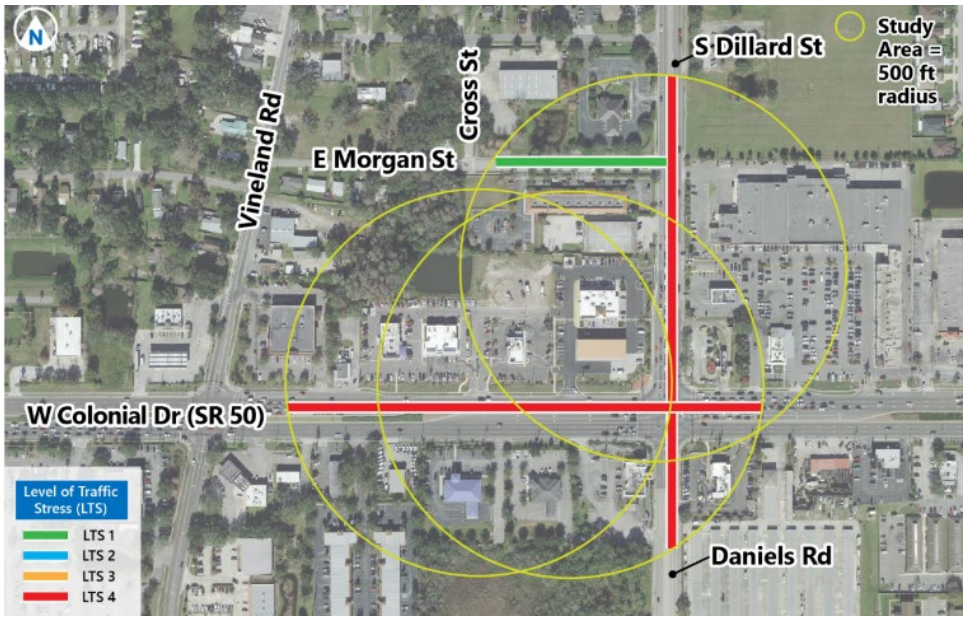
Bicycle Analysis

Bicycle Level of Traffic Stress (BLTS) is a rating given to a road segment or crossing indicating the relative traffic stress that is imposed on bicyclists when they bicycle close to traffic. The BLTS methodology measures the comfort level of specific facilities based on the perception of an average person and can be used to determine how well-connected a bicycle network is. The BLTS methodology includes four classifications for measuring the effects of traffic-based stress on bicycle riders. BLTS levels range from 1 to 4, with 1 being the lowest level of stress and 4 being the highest level of stress, as follows:

- BLTS 1: The level that most children can use confidently.
- BLTS 2: The level that will be tolerated by most adults.
- BLTS 3: The level tolerated by cyclists who are somewhat confident but still prefer having their own dedicated space for riding.
- BLTS 4: The level tolerated only by those characterized as highly confident or those with limited route or mode choice that choose to ride under stressful conditions.

BLTS applies to bicycle facilities within the roadway right-of-way and uses the following characteristics to assess bicyclists' perceptions of the roadway environment: bicycle facility type, bicycle facility width, posted speed, separation from traffic, and AADT. The simple and intuitive BLTS methodology allows a quick assessment of bicyclists' comfort along a corridor or overall transportation network while considering the needs and comfort levels of a wider range of bicyclist ages and abilities and a wider range of bicycle facility types. An example of a BLTS assessment is shown in ***Figure 25***.

Figure 25 | BLTS Example



More information on BLTS can be found in the FDOT ***2023 Multimodal Quality/Level of Service Handbook.***

4.8.4. Pedestrian and Bicycle Trip Distribution and Assignment

In some cases, it is necessary to determine the volume of pedestrian and bicycle trips for specific facilities after the proposed site is in place. This can particularly be necessary for high pedestrian volume areas and/or Level 2 or 3 sites. It is important to determine specific facility needs along the routes, particularly related to intersection and midblock crossing points, including the potential need for new or improved traffic control devices to improve the safety, comfort, and efficiency of walk and bike trips. For example, if a site is adding additional pedestrian trips to a midblock crossing, that midblock crossing should be assessed for conditions after the site is in place to confirm if the existing treatment is adequate or if improvements are needed to accommodate the site.

Pedestrian and bicycle trip distribution is the estimate of where entering trips by these modes originate and where exiting trips go. Origin and destination trips should be determined within and to the edges of the defined pedestrian and bicycle study area. This step, along with the following step of Trip Assignment, will help determine the specific routes within the study area of pedestrian and bicycle trips generated by the site.

As part of the Network Connectivity Analysis Route Directness previously discussed, origins, destinations, and actual pedestrian and bicycle routes are identified. As such, the Route Directness method incorporates most of the pedestrian and bicycle trip distribution and assignment steps. The only missing step is determining the volume of site trips on each route.

As discussed, trip distribution is typically estimated by one of two methods: manual or model. While these methods have historically been used to estimate automobile trip distribution, they could also be modified to estimate pedestrian and bicycle trip distribution. Moreover, there are many existing and new emerging tools and methodologies available to estimate pedestrian and bicycle trip distribution.

4.8.4.1. Manual Methods

The manual method of trip distribution can be applied to bicycles/pedestrians by utilizing the same method for vehicles (applying existing travel patterns, knowledge of the study area, and planning/engineering judgment). The destinations near the site, as identified in the Route Directness method, can be used to determine trip distribution by assigning weights to each. The weights of all the destination points surrounding the site should add up to 100 percent. The actual routes determined in the Route Directness analysis serve as the trip assignment.

Additional data, such as existing pedestrian and bicycle volumes and facilities can be used to determine a manual pedestrian and bicycle trip distribution. The manual method is appropriate for use in most cases due to the smaller pedestrian and bicycle study area size. However, additional tools are discussed below, and new tools continue to emerge.

4.8.4.2. American Community Survey & Census Data

American Community Survey (ACS) and Census Data can be used to estimate pedestrian and bicycle trip distribution. ACS provides pedestrian and bicycle commuting data by census block groups (US Census Bureau, 2017). ACS mode share information can be multiplied by total Census population data to estimate pedestrian and bicycle volumes. These volumes can then be scaled proportionally to the square mileage within a project area to estimate volumes at the corridor-level, and also forecasted into the future using a population growth estimate.

4.8.4.3. Travel Demand Models

Various travel demand modeling tools are widely used today to estimate trip distribution. These models have been traditionally used to estimate automobile trip distribution. When considering these same models to estimate pedestrian and bicycle trip distribution, their capabilities are currently limited. These models do not account for the unique travel characteristics of bicyclists and pedestrians, such as the "D" variables (density, diversity/land use, design, destination accessibility, distance to transit, demand management, demographics) and accessibility to pedestrian and bicycle travel opportunities. Furthermore, TAZ-based models are inherently constrained due to the fact that pedestrian and bicycle trips are typically shorter trips and often occur within a TAZ, as opposed to between TAZs.

However, there are new and emerging travel demand models and/or other tools for pedestrian and bicycle trip generation that can be used, if appropriate. National Cooperative Highway Research Program (NCHRP) Report 770, "Estimating Bicycling and Walking for Planning and Project Development: A Guidebook" provides a summary of the limitations of existing models and an analysis of new and emerging tools available for pedestrian and bicycle trip distribution. The report recommends the GIS Accessibility and PedContext tools as the "best" tools for site-level analysis.

The GIS Walk Accessibility Model was developed as a product of the NCHRP 770 report and includes a spreadsheet and methodology. The model is based on GIS with a geospatial overlay and network path-building to estimate accessibility between points. It can be used as a stand-alone tool or incorporated into a host GIS scenario planning model. The model can be used for site-level applications and provides walk trips. Bike trips can also be estimated with sufficient data. Trip assignment can be provided by a host model.

Output from the PedContext tool includes trip generation and trip distribution. However, only pedestrian trip data is provided. The tool uses a refined four-step process with pedestrian zones instead of TAZs. The tool can be used for site-level analysis and is used as a stand-alone model.

A potential downside of using the GIS Walk Accessibility Model or PedContext tool, as well as other similar emerging pedestrian and bicycle level distribution tools, is they require a greater up-front effort to configure compared to the relatively simple manual method previously described. This is particularly true given the relatively small study area for even the sites with the highest pedestrian and/or bicycle trip generation or most dense, urban contexts.

4.8.4.4. Assignment

Pedestrian and bicycle trips can be assigned to the network based on available or planned pedestrian and bicycle facilities, and based on accessibility to safe and convenient paths to nearby origins and destinations. A travel demand model or other tools can be used, if available. As discussed previously, this step is important to determine potential facility needs to safely accommodate walk and bike trips, particularly at intersection and midblock locations within the study area, including the potential need for new or improved traffic control devices.

The Route Directness analysis, discussed in the ***Quantitative Pedestrian and Bicycle Analysis*** section, incorporates pedestrian and bicycle trip assignment by identifying actual paths to destinations near the site. The following should be considered when determining and reviewing pedestrian and bicycle trip assignment:

- Shortest and most comfortable route to/from nearby origins/destinations
- Presence of pedestrian and bicycle facilities such as sidewalks, bike lanes, shared-use paths/trails, crosswalks, etc.
- Evidence of existing pedestrian or bicycle usage in locations without dedicated facilities, such as the presence of worn paths in grass or vegetation alongside roadways
- Other amenities such as shade from trees or canopies, lighting, benches, etc.

4.8.5. Transit Impact Analysis

In most cases, providing safe and efficient pedestrian and bicycle paths to/from transit stops near the site will address transit impacts. However, more detailed review of transit stop/shelter facilities, or existing and future transit operations may be required if impacted by the proposed development. The applicant should coordinate with FDOT, local, and transit agencies to determine if a special study should be 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.

4.9. Safety Analysis



The following guidelines should be followed to assess traffic safety in conjunction with a MTIA. These guidelines are split into two parts:

1. Assessing existing crash patterns and impacts the proposed development will have on existing crash patterns.
2. Assessing study area and proposed site geometrics.

The two parts of the safety assessment of the MTIA are applied to the defined study area of the MTIA (i.e., study intersections and roadway segments). It is important to include intersections and roadway segments adjacent to the development that will be impacted by development access. The study area should also include the site development itself.

4.9.1. Review of Crash Data

The most recent five years of crash data should be obtained for all existing roadways and intersections in the study area. More years of crash data may be used in cases where the focus is on particular crash types (i.e., crashes with non-motorists) and there is a need to increase the number of crashes in the dataset. Crashes should be assigned to particular roadway segments and intersections for further assessment.

The next step is identifying crash patterns that exist in the study area. Chapter 5 of the Highway Safety Manual provides support for diagnosing crash patterns. Descriptive statistics of crashes can help identify trends. Useful crash statistics that can help identify crash patterns include:

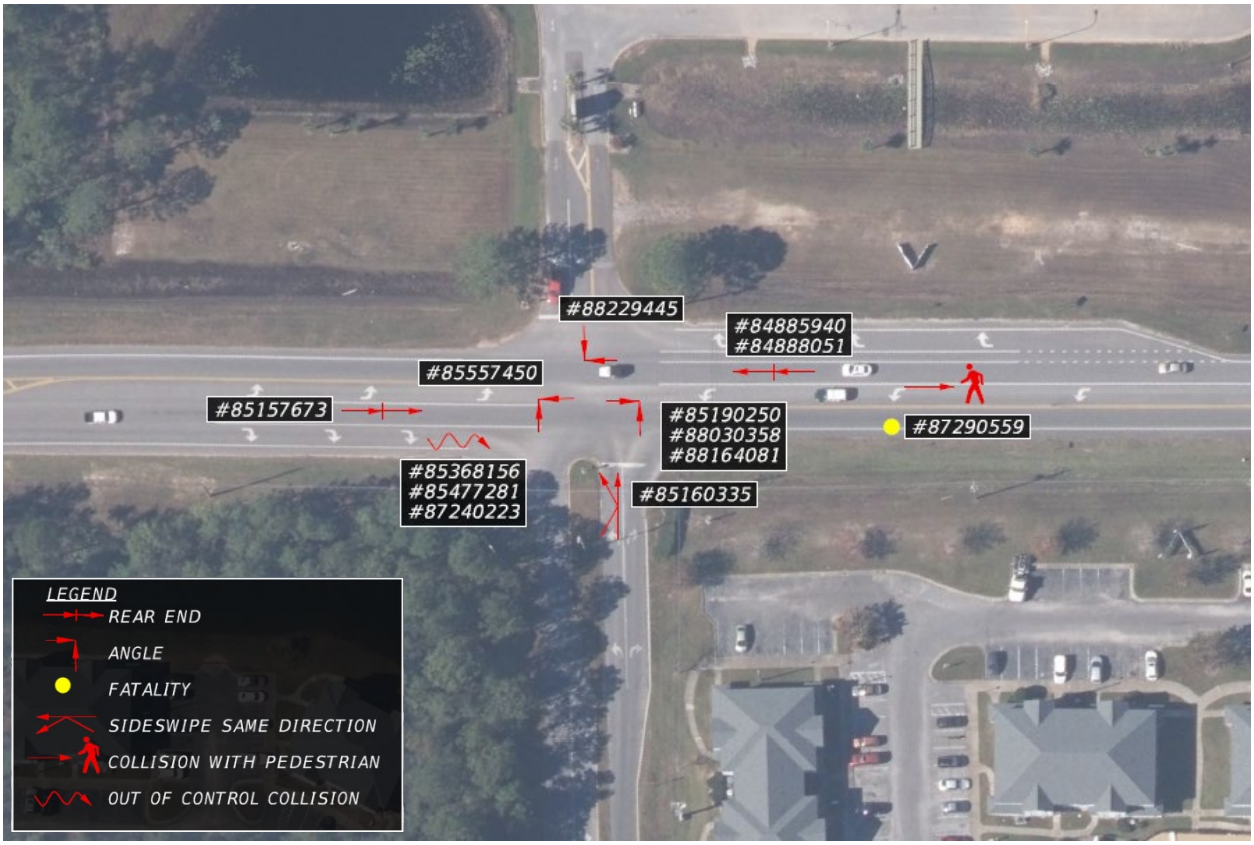
- Crash identifiers such as crash date, day of week, time of day
- Crash type
- Crash severity
- Sequence of events of the crashes
- Contributing circumstances
  - Modes involved
  - Road condition
  - Lighting condition
  - Weather conditions
  - Driver impairment

Summarizing these data into tables can help identify crash patterns, but also bar charts and pie charts can be used. Examples of tabular summaries can include:

- Crash severity by crash type
- Crash type and/or crash severity by contributing circumstance

Visual assessments may be just as useful as exploring descriptive statistics in identifying crash patterns. A common tool used is the collision diagram. A collision diagram is a two-dimensional plan view representation of the crashes that have occurred at a site. Collision diagrams can be constructed for both roadway segments and intersections. Crash patterns may become more apparent in the crash diagram after visual observation. ***Figure 26*** shows an example of an intersection collision diagram. See HSM Chapter 5 for more discussion about collision diagrams.

Figure 26 | Example Intersection Collision Diagram



Source: HDR Engineering, Inc.

There may be cases where existing crash patterns cannot be identified, either due to no crashes occurring, or no prevailing pattern to the crashes. In this case, the safety analysis can proceed to the Site and Study Area Assessment.

If crash patterns are identified, the next step is using engineering judgment to determine if the site will exacerbate those existing crash patterns. For example, will adding an approach to an intersection

influence an existing crash pattern at the intersection, or will adding a driveway on a roadway segment influence rear-end crashes which may be associated with congestion at a downstream intersection? The potential examples are numerous, and these guidelines are not meant to be exhaustive. In collaboration with FDOT District staff, appropriate countermeasures will be identified that will lessen the impact that the development will have on existing crash patterns.

4.9.2. Site and Study Area Assessment

The second part of the MTIA safety analysis is reviewing the study area and site development to see if additional changes can be done to improve safety for all users and to reduce the potential for crashes and severity. This is a proactive approach to mitigating crashes and fits the overall objective of ***Target Zero***, which is a statewide initiative to reduce the number of transportation-related serious injuries and deaths across Florida to zero. The number of items that can be explored as part of this assessment are numerous and will depend on the facility type of the roadways adjacent to the site development and the context area within which the development resides. The following are examples of items to review as part of this assessment. These examples can be applied to both the existing study area roadways and intersections as well as new roadways and intersections that will be constructed as part of the proposed development. Additional considerations can be found in the FDOT ***Access Management Guidebook*** and the FDOT ***Traffic Engineering Manual***.

4.9.2.1. Median Modification

Median openings impacted by the site can be reviewed for needed operational and/or safety improvements. For instance, a full median opening which allows for all traffic movements may need to be converted to a directional median opening based on safety concerns. Directional median openings are designed to restrict certain traffic movements. Restrictions could be made to left turns from the main street, or left turns and through traffic from the cross street.

4.9.2.2. Turn Lanes

Turn lanes should also be reviewed for access points into the site and nearby impacted intersections. Exclusive right-turn lanes are useful where a combination of high roadway speeds, and high right-turn volumes into a driveway are expected. There are also many situations in which to consider an exclusive left-turn lane, however, safety is the primary reason. Turn lane considerations are further discussed in the FDOT ***Access Management Guidebook***.

4.9.2.3. Sight Distance

Sight triangles and sight distance should be evaluated for new access points to make sure adequate sight distance is provided. If the site development includes pedestrian crosswalks, make sure stopping sight distance is adequate for a driver to perceive and react to pedestrians and/or cyclists in the roadway. Make sure that development signage, vegetation, planters, trees, etc., are not placed within the sight triangles that will obscure visibility.

4.9.2.4. Minimize Access Points

Minimize the number of access points to the site development along the SHS. Evaluate if there are existing access points that can be closed or identify unnecessary proposed access points. This helps reduce the number of conflict points and also reduces pedestrian exposure. Furthermore, cross access and shared driveways can replace multiple unsignalized driveways with one signalized driveway, which may help to mitigate existing crash issues at unsignalized locations, increase property value, and provide enhanced pedestrian connectivity.

4.9.2.5. Curb Extensions

Curb extensions should be considered at intersections where crosswalks are present, if appropriate. This strategy helps reduce crosswalk distances and helps slow down vehicles. Reducing speeds is directly proportional with reducing crash severity potential, and slower speeds increase perception/reaction time for a driver to yield to non-motorists. If the proposed development has internal intersections and pedestrian crossings, curb extensions should be considered as well. Curb extensions can also be provided at midblock crossing locations and can help reduce midblock vehicle speeds.

4.9.2.6. Reduce Curb Radii

Look for opportunities to reduce curb radii. Reduction of curb radii can reduce speeds of turning vehicles, which in turn reduces crash severity potential and increases perception/reaction time for a driver to yield to non-motorists. Reduction of curb radii also has the effect of shortening crosswalks. Shortening crosswalks reduces pedestrian exposure, which reduces the potential conflict between vehicles and pedestrians. Additional discussion of curb radii, including how to accommodate larger vehicles, is provided in the FDOT ***Access Management Guidebook.***

4.9.2.7. Remove Unneeded Channelized Right-Turn Lanes

Evaluate if existing channelized and proposed right-turn lanes are needed. Removing channelized right-turn lanes reduces motor vehicle speeds as well as reduces pedestrian exposure in cases where crosswalks are provided with the channelized right-turn lane.

4.9.2.8. Square-up Skewed Intersections

If the development is adding a leg onto a skewed minor-road stop-controlled intersection, evaluate if removing the skew is possible. Adding an intersection leg is a good opportunity for this kind of reconstruction activity to occur. Reducing intersection skew angle is directly proportional with reducing crashes at minor-road stop-controlled intersections. If intersection skew cannot be removed, look at the feasibility of converting the intersection to a roundabout. Look for opportunities to reduce/eliminate skewed minor-road stop-controlled intersections internal to the proposed site development.

4.9.2.9. Bike Lanes

For roadway segments adjacent to the development with conventional on-street bike lanes, explore the feasibility of converting the bike lanes to separated bike lanes. Converting conventional on-street bike lanes to separated bike lanes reduces the potential for conflicts between motor vehicles and bicycles. Evaluate the proposed site plan to make sure that the connections provided with existing bike infrastructure minimize conflicts with motor vehicles turning into the development.

4.9.2.10. Narrow Lanes

Narrowing motor vehicle lanes has shown to reduce vehicle speeds, which is directly proportional with reducing crash severity potential and increasing perception/reaction time for drivers to react to non-motorists and other events in the roadway. Evaluate if lanes on roadways adjacent to the development can be narrowed. This strategy to reduce vehicle speeds can be performed in conjunction with adding on-street bike lanes or converting on-street bike lanes to separated bike lanes. For proposed site developments with internal streets, consider narrower lanes to control vehicles speeds, especially where pedestrians and bicyclists will be present.

4.9.2.11. Accessibility Provisions

At a minimum, pedestrian ramps that meet ADA standards should be provided. Evaluate existing and proposed intersections to make sure curb ramps meet ADA standards.

4.9.2.12. Raised Crosswalks

Raised crosswalks may be used at driveways entering the proposed development as well as at new intersections internal to the proposed site development. Raised crosswalks help reduce motor vehicle speeds and also increases the visibility of the crosswalk. Reduction in vehicle speeds is directly proportional with reducing crash severity potential and increasing perception/reaction time for drivers to react to pedestrians in the crosswalk.

4.10. Site Circulation Review



A site plan provides the general layout and configuration of a site including building placement and orientation, parking and internal roadway layout, proposed access, landscaping, lighting, sidewalks, stormwater, utilities, and other features. 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

An effective site plan will provide adequate internal circulation, safe and efficient access to and from the site for all modes, minimize environmental impacts, provide adequate stormwater infrastructure, and more. This section reviews key components in the site plan that can affect the state transportation system.

4.10.1. Access Management

One of the main functions of a roadway is to provide access to adjacent land uses to allow people and goods the ability to enter or exit the transportation system to access properties. FDOT has developed 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 F.A.C.***, (driveway permitting) and ***Rule 14-97 F.A.C.*** (access management standards).

All driveways connecting to state-maintained roadways associated with a new or expanded development will need to be permitted through the process described in the ***Rule 14-96 F.A.C.,*** State Highway System Connection Permits. Effective driveway design is important to the safety and operation of state-maintained roadways. Further information on driveway design including median openings, spacing, curb radius, driveway throat length, etc. are provided in the FDOT ***Access Management Guidebook***.

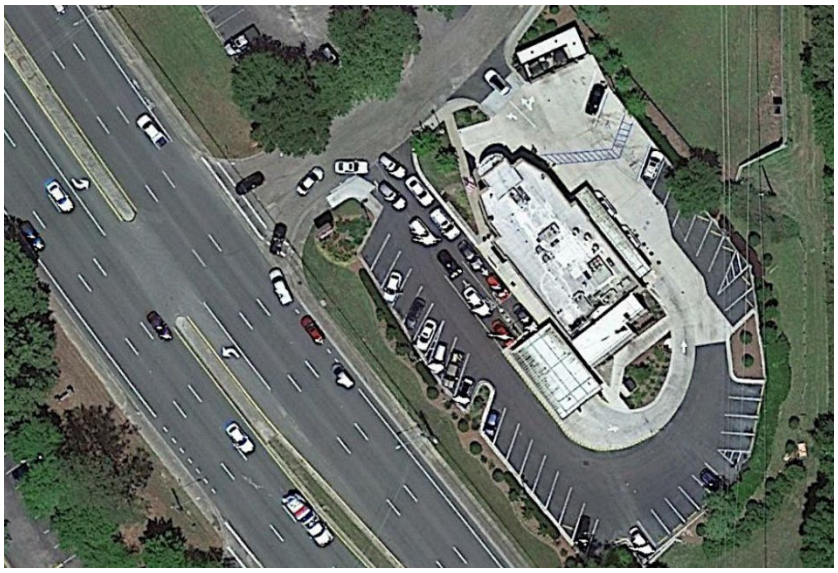
The design of site circulation, parking, and access should accommodate pedestrians, bicyclists, and other anticipated modes in addition to vehicles. Having a safe and well-marked pedestrian path to the entrance of the development is one important aspect of good design. In addition, bicycle access and parking should be included. Additional discussion on pedestrian and bicycle access, circulation, and considerations is provided below. Further guidance and best practices on topics such as parking lot layout and internal roadway layout are provided in the ITE's *Promoting Sustainable Transportation Through Site Design: An ITE Proposed Recommended Practice*, and ITE's *Transportation and Land Development* publications. Finally, local government development codes contain standards and requirements for site plan design.

Strategies such as shared access driveways, frontage roads, or backage roads can be effective ways to provide site access. These strategies are detailed further in ***Chapter 5***.

4.10.2. On-Site Queuing

For sites with drive-throughs, pick up/drop off areas such as schools, gates, or other features that create queues, a queuing analysis should be requested to determine the expected queuing and whether it can be accommodated on-site. It is important that queues do not back up onto the SHS, particularly in areas classified as C3C (Suburban Commercial) as these areas often have higher vehicle volumes and speeds. The queuing analysis can include a study of one or more similar sites, including service and arrival rates. It should be noted that queuing issues were exacerbated during the COVID-19 pandemic with increased drive-through usage and some restaurants going to 100 percent drive-through only with no indoor seating. If anticipated queuing cannot be handled by the proposed site design, consideration could be given for adding an additional service lane into the site plan.

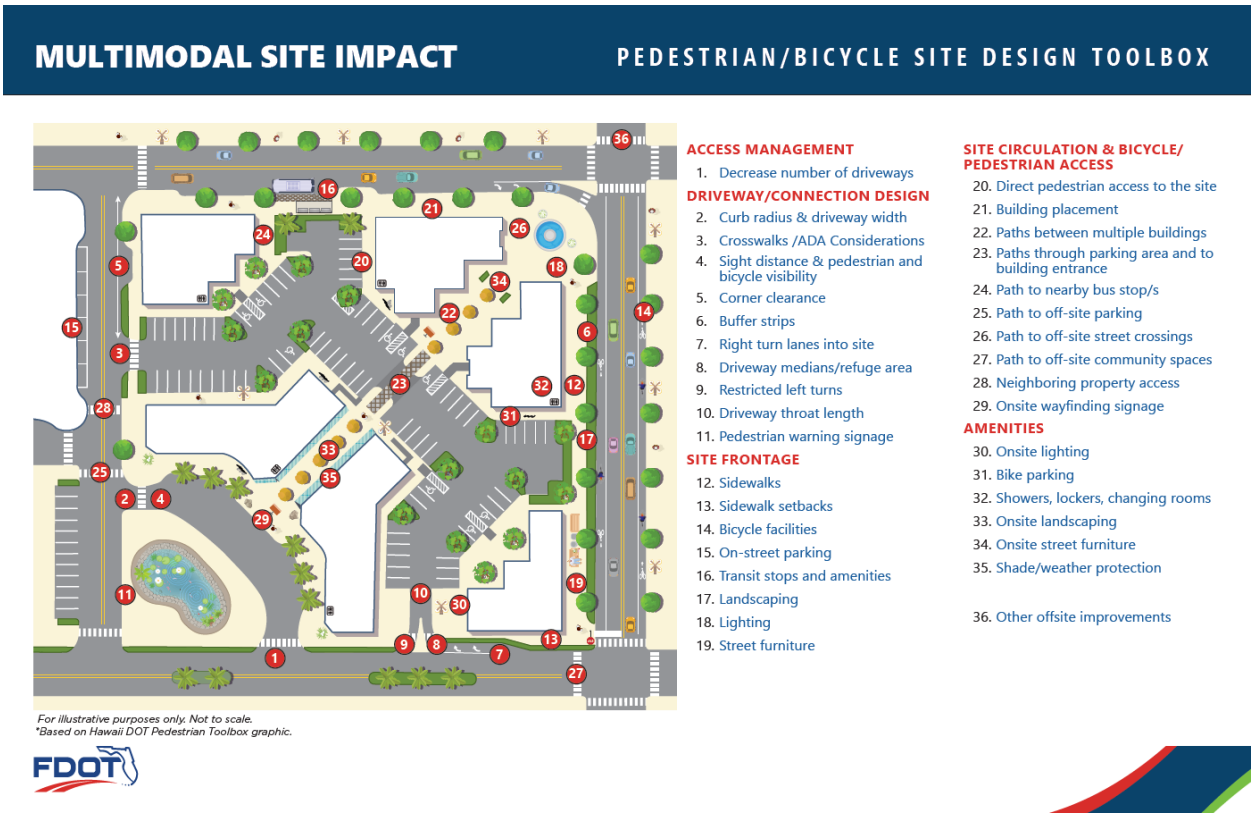
Figure 27 | Inadequate Site Design with Drive-Through Queue Backup onto Arterial



4.10.3. Multimodal Access and Circulation

To provide safe and convenient pedestrian and bicycle access to development sites, and circulation within developments for all users, the site's design should incorporate appropriate on-site pedestrian and bicycle facilities. Many engineering design strategies to accommodate pedestrians and bicyclists can be considered during the site design, including requirements for driveways, access management, site circulation, and sidewalks. The 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. Furthermore, a toolbox was developed to compile the various strategies available for site design. This toolbox is provided in ***Appendix B***.

Figure 28 | Pedestrian / Bicycle Site Design Toolbox



In addition, a review checklist was developed for use by developers, designers, and reviewers to facilitate site design development and review. This checklist provides a list of questions about the site design to verify if bicyclists and pedestrians are appropriately accommodated. It also provides another method to review and consider various available strategies. This checklist is provided in ***Appendix C***.

4.10.3.1. Florida Building Code

The Florida Building Code: Accessibility, 7th Edition (2020) provides language in Chapter 2 that requires accessible routes be provided in site developments with designs consistent with requirements in ***Chapter 4***. Specific provisions include the following:

- 206.1 General. Accessible routes shall be provided in accordance with 206 and shall comply with Chapter 4.
- 206.2 Where Required. Accessible routes shall be provided where required by 206.2.
- 206.2.1 Site Arrival Points. At least one accessible route shall be provided within the site from accessible parking spaces and accessible passenger loading zones; public streets and sidewalks; and public transportation stops to the accessible building or facility entrance they serve.

  Exceptions:

  1. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, no more than one accessible route from a site arrival point to an accessible entrance shall be required.
  2. An accessible route shall not be required between site arrival points and the building or facility entrance if the only means of access between them is a vehicular way not providing pedestrian access.

  Advisory 206.2.1 Site Arrival Points. Each site arrival point must be connected by an accessible route to the accessible building entrance or entrances served. Where two or more similar site arrival points, such as bus stops, serve the same accessible entrance or entrances, both bus stops must be on accessible routes. In addition, the accessible routes must serve all of the accessible entrances on the site.

  Advisory 206.2.1 Site Arrival Points Exception 2. Access from site arrival points may include vehicular ways. Where a vehicular way, or a portion of a vehicular way, is provided for pedestrian travel, such as within a shopping center or shopping mall parking lot, this exception does not apply.



5. Mitigation

5.1. Introduction

The mission of the Florida Department of Transportation (FDOT) is to "provide a safe statewide transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities" ***F.S. 334.046(2)***. The transportation system is a critical public resource and a major investment of public funds. It is FDOT's responsibility to protect the integrity of the transportation system to safeguard public safety and public investment. As such, FDOT reviews proposed developments for potential impacts to state-maintained facilities and determines needed mitigation measures based on operations and safety.

It is FDOT's responsibility to protect the integrity of the transportation system to safeguard public safety and public investment.

This chapter provides general guidance on mitigation measures and procedures for development impacts. It provides best practice examples and discusses FDOT's role in mitigation agreements. Separate discussion is provided for comprehensive plan amendments and driveway connection permits to review their different processes, rules, regulations, and FDOT's responsibilities.

5.2. Regulations and Authority

5.2.1. Comprehensive Plan Amendments

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 jurisdictions, the MPO, and other agency plans to verify 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 SIS facilities, local entities should consult with FDOT on mitigation plans to maintain safety and mobility in the area. Mitigation efforts should be consistent with local government comprehensive plans and future land use maps, as well as the applicable transportation agency plans and programs including FDOT Work Program, FDOT SIS Plans, Transit Development Plans (TDP), MPO Transportation Improvement Program (TIP), MPO Unified Planning Work Program (UPWP), LRTP, the FDOT Florida Transportation Plan (FTP), and planned and programmed improvements.

The key regulations and authority for FDOT regarding mitigation for comprehensive plan amendments are discussed in ***Chapter 2*** and provided below.

F.S. 163.3177 (6)(b)	Per ***F.S. 163.3177(6)(b)***, the transportation element of the local comprehensive plan shall be coordinated with plans and programs from any applicable MPO and transportation authority, Florida Transportation Plan and adopted FDOT Work Program.
F.S. 163.3180 (5)(h)(1)	Per ***F.S. 163.3180(5)(h)(1)***, local governments implementing transportation concurrency must consult with FDOT when proposed plan amendments affect the facilities on the SIS.

Under the expedited state review process and state coordinated review process (more information on the review types and process can be found in the FDOT ***Community Planning Handbook***), FDOT's role is essentially the same for identifying impacts and measures for eliminating, reducing, or mitigating impacts, as noted below:

F.S. 163.3184 (3)(b)	Per ***F.S. 163.3184(3)(b)***, under the expedited 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.
F.S. 163.3184(4)	Per ***F.S. 163.3184(4)***, 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.

5.2.2. Driveway Connection Permits

FDOT reviews driveway connection permit applications for consistency with rules and standards, and to assess potential operational and safety issues. FDOT decides if the permit application is approved, approved with conditions, or denied. As stated in ***F.S. 335.1825(1)***. "The department has the authority to restrict or deny access to the State Highway System, in accordance with the provisions of this act, at the location specified in the permit until the permittee constructs or alters the connection in accordance with the permit requirements."

> "A property owner shall be granted a permit for an access connection to the abutting state highway, unless the permitting of such access connection would jeopardize the safety of the public or have a negative impact upon the operational characteristics of the highway." ***F.S. 335.184(3)***.

The key regulations and authority for FDOT regarding mitigation during driveway connection permit applications are discussed in ***Chapter 3*** and provided below.

F.S. 335.185(1)	"The department may issue a permit **subject to any reasonable conditions** necessary to carry out the provisions of this act. The department may revoke a permit if the applicant fails to comply with the conditions upon which the issuance of the permit was predicated."
Rule 14-96.007 (5)(a) F.A.C.	"The Proposed State Highway Access Driveway/Connection Notice of Intent to Issue Permit, Form 850-040-24, (06/06), shall set forth all conditions not otherwise required by this rule chapter for issuance of a permit and maintenance of the connection(s). The notice will specify which of the conditions set forth in the notice must be met before issuance of a permit and those that must be met after the permit is issued."
Rule 14-96.007 (5)(c) F.A.C.	"Standard Conditions. The following standard conditions will apply to all Proposed State Highway Access Driveway/Connection Notice of Intent to Issue Permit, Form 850-040-24, (06/06), before a connection permit can be issued: … 5. **Special requirements added to promote safety and efficiency**." State Highway System Connection Permits."

5.3. Extent of Required Mitigation

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

In addition to the development land use type and size, the context of the area surrounding the site should be considered. Local agency requirements, neighboring land uses, the operation and safety of the surrounding roadway network, the extent and quality of the surrounding multimodal network, and community priorities for the site and the transportation network can all influence the required mitigation.

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 pedestrian and bicycle 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 vehicle use due to insufficient pedestrian and bicycle facilities accessibility, and vast distances to traverse.

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.

5.3.1. Considerations for Local Governments Employing Transportation Concurrency

Multimodal transportation impact analysis and mitigation can range in complexity, from simple "pay-and-go" systems relying upon Q/LOS impacts to more sophisticated assessment through employing concurrency within the local jurisdiction. Concurrency is the requirement that local jurisdictions set adequate LOS standards for public facilities within their jurisdiction with guidelines, principles, and strategies developed to obtain and maintain those standards. If a development is expected to impact those public facilities significantly and adversely, the development may be required to develop a mitigation strategy to offset these impacts. Florida Statutes only requires local jurisdictions to establish a concurrency program for sanitary sewer, solid waste, drainage, and potable water. Transportation is an optional requirement (***F.S. 163.3180***).

For local governments using transportation concurrency, it is important that FDOT reviewers be aware of the principles, guidelines, standards, and strategies in the local comprehensive plan that 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., Transportation Concurrency Management Areas or TCMAs), exemptions or discounting impacts in specific areas where development has been determined to be desirable (such as Multimodal

Transportation Districts, or MMTDs), and other techniques described in ***F.S. 163.3180(5)(f)***, 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 LOS 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 Q/LOS standards that rely primarily on non-vehicular modes of transportation where existing or planned community design will provide an adequate level of mobility.
- Reducing impact fees or local access fees to promote development within urban areas, MMTDs, 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.

The location of these provisions and strategies to address adverse impacts to the transportation network are required to be indicated on a local government's adopted future land use map pursuant to ***F.S. 163.3177(6)(a)*****.** In these cases, consideration of transit needs, pedestrian and bicycle needs, and mitigation efforts to reduce automobile dependence may also be necessary. In addition to the traditional Q/LOS 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?

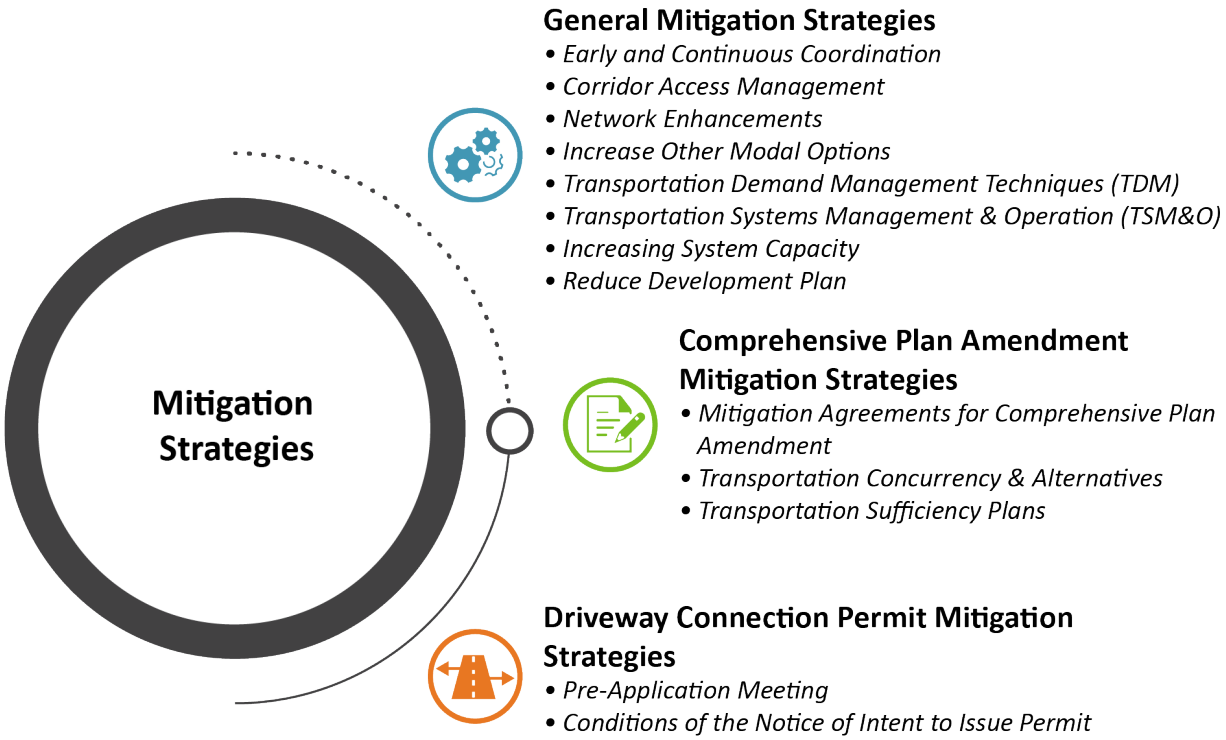
Regardless of the strategy or technique employed to minimize impacts from new developments, concurrency-based systems require any remaining significant and adverse impacts to the transportation network to be addressed. The following section describes different approaches to mitigate these impacts.

5.4. Mitigation Strategies

This section provides guidance on mitigation strategies and alternatives that could be considered in maintaining long-term mobility and safety on the transportation system. As funding needs for new vehicular 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, increasing options for alternative modes of travel, and network enhancements to provide alternative routes and relieve congested corridors. 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.

The strategies are organized by general, comprehensive plan amendment, and driveway connection permit mitigation strategies.

Figure 29 | Mitigation Strategies



5.4.1. General Mitigation Strategies



The following general mitigation strategies are applicable to both the comprehensive plan amendment phase and the driveway connection permit phase of a proposed development.

5.4.1.1. Early and Continuous Coordination

Coordination is perhaps the most important mitigation strategy. Through early and continuous coordination, potential impacts to state facilities can be determined in advance which allows the opportunity for affected parties (FDOT, local government, and the developer) to discuss and agree on mitigation solutions, or to even avoid the impacts altogether. Building relationships with local governments and other transportation partners is a win-win for all involved. Working together aligns local and regional visions while coordinating land use and transportation decision-making. It generates greater trust and confidence among partners as well as a greater understanding of FDOT processes and procedures and leads to desired planning outcomes at the local, regional, and state level. FDOT can build partnerships with local governments through early and continuous outreach and technical assistance.

5.4.1.2. Corridor Access Management

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 provides a safer environment for pedestrians and bicyclists. Strategies for corridor access management include:

- Access Management Plans
- Shared Access Driveways
- Frontage Roads
- Rear Service/Backage Roads
- Multi-Way Boulevards

Access Management Plans

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, as appropriate. Implementation is typically achieved by combining regulations, interagency or public/private agreements, design standards, and road improvement projects.

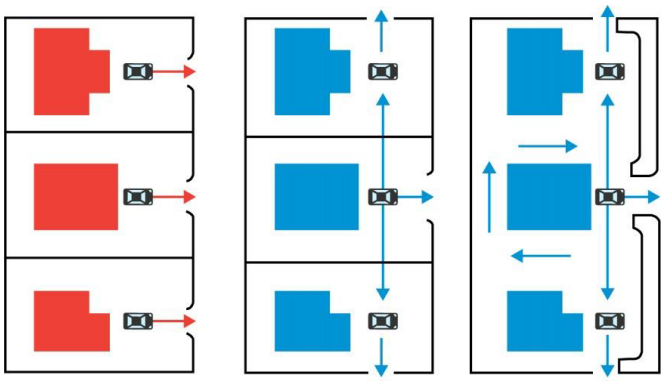
An example of a best practices document is the ***Corridor Planning and Preservation Best Practices*** (Hillsborough County Corridor Plan Study), Center for Urban Transportation Research (CUTR), 2022. This study provides a review of corridor planning practices in several Florida cities and counties. The report provides best practices for integrating land use context and modal options, reviews policy and planning context for corridor management, and also discusses issues such as resiliency and emerging technology.

Shared Access Driveways

Cross or joint property access via shared driveways provide single access points from primary roadways to multiple developments. There are numerous benefits for providing cross property access and shared driveways, including the following:

- Fewer driveways reduce the number of conflict points for vehicles, pedestrians, and bicyclists, and creates a safer environment for all modes.
- Fewer driveways also help reduce congestion caused by frequent stops and reduce the number of trips on major roads.
- Cross access and shared driveways can replace multiple unsignalized driveways with one signalized driveway, which may help to mitigate existing crash issues at unsignalized locations, increase property value, and provide enhanced pedestrian connectivity.
- Providing cross access between properties enhances accessibility for the driver.
- Cross access particularly benefits small corner properties and outparcels because left turn access is often a problem as they would conflict with the functional area of the adjacent intersection.
- Fewer driveways may provide the ability to provide a turn lane or longer turn lane, shift an existing median opening, or provide an additional median opening.

Figure 30 | Example of Cross Access and Shared Driveway



While FDOT cannot require cross access and shared driveways, they can and should be encouraged to the extent possible, particularly as mitigation for non-conforming connection permit applications. To reserve future cross access to adjacent undeveloped parcels, cross access should be requested to be deeded into property for future connection. Sidewalk and roadway stub-outs can be provided to adjacent properties so future connections can be established. Local government land development codes are often written to require connection to existing stub-outs.

Rule 14-96 F.A.C. contains provisions for encouraging and establishing cross access, including the following:

- ***Rule 14-96.007(8) F.A.C.*** states that "The Department may require permits to be recorded in the public records with the legal description of the property when cross or joint access exists, when permit conditions requiring future performance by the permittee exist such as installation of traffic control features or devices, or when other conditions warrant recording."
- In reference to non-conforming connection permits and specific conditions or limits, ***Rule 14-96.009 F.A.C.*** states "When an adjoining property owner consents to cross access or joint access, the agreement between the parties will be recorded in the public records."

Frontage Roads

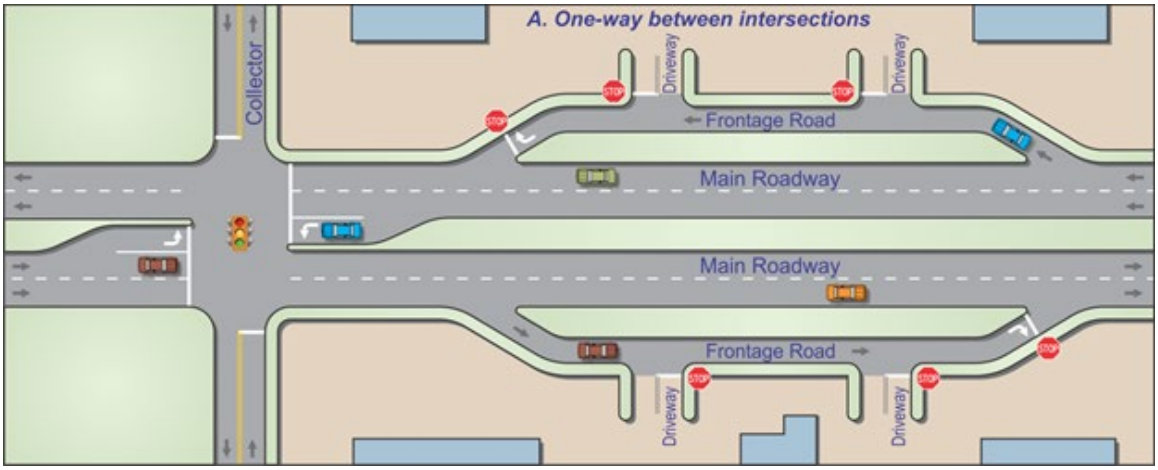
Frontage roads are a type of service road that generally run parallel to the main road and are located between the right-of-way of the main road and the front building setback line. Frontage roads provide access to commercial sites at a lower speed. They can help separate local traffic for commercial businesses from high-speed traffic to maximize efficiency along corridors. Frontage roads provide direct access to businesses fronting major roads.

Using frontage roads to separate through traffic from access-related traffic reduces traffic delays on the main road, while reducing the frequency and severity of conflicts along major roadways.

The spacing between intersections along the major roadway enables the design of auxiliary lanes used for acceleration/deceleration, which further improves safety and traffic operations.

Frontage roads should be designed to provide ample spacing between signalized intersections to avoid queuing conflicts. Additionally, they are typically safer when they are designed for one-way traffic.

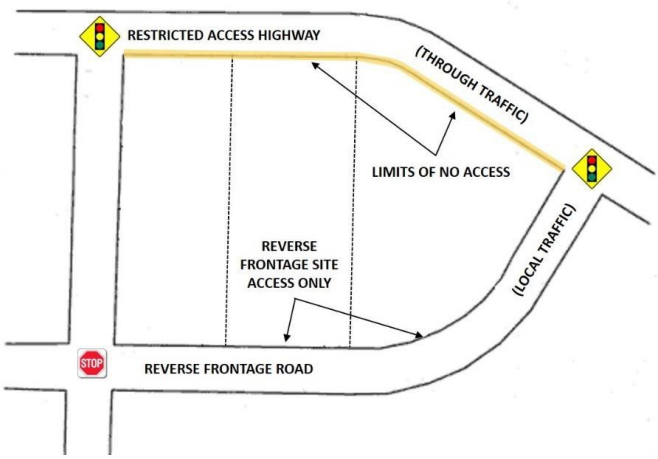
Figure 31 | Example of Frontage Roads



Rear Service/Backage Roads

Backage roads, which are also called “reverse frontage roads” or “reverse access” roads, serve a similar purpose to frontage roads, but are located behind business properties that front the main roadway. Backage roads are typically less disruptive to surrounding businesses compared to frontage roads and also typically cost less than frontage roads. They have better functionality compared to frontage roads and can operate safely in both directions.

Figure 32 | Example of Backage Road



Backage roads can be used to remove traffic from major roadways and increase traffic flow. Backage roads can help reduce congestion on main roadways and increase efficiency. They reduce the number of conflict points on primary roadways and contribute to a safer network. They can provide access to businesses on both sides of the road.

Multi-Way Boulevards

Multi-way boulevards can be considered along corridors to accommodate high traffic volumes, as well as multi-modal infrastructure. Multi-way boulevards are streets that can accommodate multiple types of mobility options. They consist of three characteristics: central through lanes, parallel frontage lanes, and landscaped buffers. Accommodations for transit, pedestrian, and bicycle facilities are typically included, although designs may vary. Multi-way boulevards are designed to facilitate commercial and mixed-use development while creating a comfortable pedestrian environment. They are aesthetically pleasing and promote livability for the surrounding community. Additionally, businesses benefit from being close together and generate pass-by trips.

Figure 33 | Example Multi-Way Boulevard



Source: NACTO

5.4.1.3. Network Enhancements

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 pedestrians and bicyclists, as opposed to lower stress facilities with lower speeds and volumes. 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. The following network enhancement strategies are discussed:

- Street Network Connectivity
- Parallel Facilities

Street Network Connectivity

Connectivity is the number of roadway connections that exist in an area between different points of interest. Well-connected networks consist of many short segments and intersections, while a poorly connected network may consist of long segments and few intersections.

Connectivity helps reduce travel distances and increases the number of travel routes for drivers, making destinations more accessible. Connected networks allow traffic to be dispersed across more roads over a larger area, improving circulation. Connectivity enhancements for pedestrians and bicyclists can increase safety and improve accessibility to points of interest. Communities with more connectivity can improve overall livability.

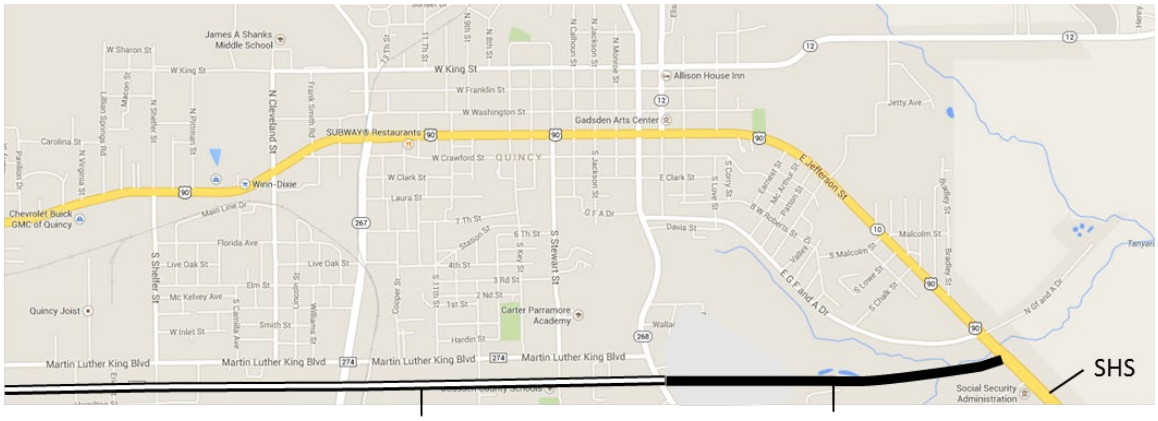
Mitigation to address transportation impacts to major highways involves promoting activity centers, providing alternative routes for local trips, focusing on connecting existing roads, as well as considering street network connectivity as new development emerges. Local plans can include long-term corridor access management plans and 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.

Parallel Facilities

Improvements made to arterial or collector roads running parallel to a state-maintained 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 SHS. 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.

Figure 34 | Reliever Road Example



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.

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 Q/LOS and mobility on the SIS, SHS and local visions for mobility; however, reviewers should be aware of known design issues to verify safety and mobility in the creation of these facilities. Continuous frontage roads, for example, are known to lead to crashes and operational problems where connecting too close to a major roadway intersection due to unfamiliar movements. In addition, one of the lessons learned from Destin's parallel reliever has been the

need to create pedestrian and bicycle 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.

5.4.1.4. Increase Other Modal Options

A strategy for ensuring the long-term viability of the transportation network is mitigation that increases mode choice. Options for increasing mode choice are discussed below, and include:

- Transit Oriented Development (TOD)
- Transit Options
- Transit Lanes
- Bicycle and Pedestrian Network Connectivity

There are several benefits to providing alternative modes of transportation, including reducing greenhouse gas emissions. Per ***F.S. 339.175(7)***, "Each MPO is encouraged to consider strategies that integrate transportation and land use planning to provide for sustainable development and reduce greenhouse gas emissions" in development of the long range plan.

Transit Oriented Development

Another method for addressing congestion on the SHS is through the promotion of land uses that are supportive of transit. TOD, also known as transit oriented communities, is defined in ***F.S. 163.3164(46),*** to relate to areas defined in the local comprehensive plan that are 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 pedestrian and bicycle 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 ***Accessing Transit Design Handbook for Florida Bus Passenger Facilities*** contain guidance on design features, safety issues, and land use strategies that promote TODs.

Transit Options

Transit options are an important consideration in developing any mitigation strategy in urbanized areas. By providing transit service to the site, it is possible to reduce the number of primary-trip vehicles on the transportation network by changing the mode split. While this strategy is encouraged, it should be carefully evaluated to verify that the proposed changes in mode split are realistic. Additionally, it should be confirmed that local transit

Please note that public transit facilities as defined under ***F.S. 163.3180(5)(h)1***, are exempt from transportation concurrency.

agencies support the change in transit service and are committed to help implement the new service. Examples of providing additional transit options that would be appropriate for mitigation include new or more frequent service and employer subsidized transit service.

Implementing this strategy requires early and continuous coordination with transit agency representatives in the development of mobility strategies. In addition, expanding transit options should evaluate different funding mechanisms to continue operating the routes for a significant period. For example, the City of Gainesville includes the following language:

> *"Planned Developments (PD) adopted pursuant to this Policy may require that [DEVELOPER] provide for transit access when approved by the City's Regional Transit System (RTS), and the owner/developer may be required to provide comfortable, multi-use transit stations when transit service is made available to the [DEVELOPER]. The owner/developer may be required to fund transit service (capital and operations) for the development with minimum 15-minute frequencies in the a.m. and p.m. peak hours for RTS. If the funding is for a new route to serve the development, the funding for transit must be for a minimum period of 5 years. If the funding is for expansion of an existing route to serve the development, the funding for transit must be for a minimum period of 3 years.*
>
> *If transit service to the [PROJECT] is approved by RTS, transit service must be phased at the development to maximize successful transit routes consistent with population and density standards set by RTS as the [PROJECT] develops. The transit phasing plan for the required transit service must be provided in the associated PD ordinances and will be subject to RTS approval." (Proposed Policy 4.3.4.a.14)"*

For an additional transit option to be a successful mitigation strategy, it needs to remain in operation. This can be a challenge for some transit agencies as they are balancing the operational needs of numerous routes in their service area. The report, ***Land Developer Participation in Providing for Bus Transit Facilities/Operations***, provides various strategies that Florida's local governments and transit agencies could use to generate additional public transportation funds through partnering with developers. The different 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.

Transit Lanes

Constructing transit or managed lanes can also alleviate traffic impacts by increasing transit use and reducing the number of SOV trips thereby removing some of the primary vehicle trips generated by the proposed development. 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.

Additional capital transit projects 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
- Add passing lanes so that transit vehicles can bypass congestion hotspots

Pedestrian and Bicycle Facilities and Connectivity

To foster the use of non-motorized modes, connectivity for pedestrian and bicycle movements should be an integral part of any multimodal transportation network. Ample pedestrian and bicycle connections within and between activity centers, such as shopping areas, residential areas, employment centers, transit stops, neighborhood parks, and schools may reduce the number of short automobile trips.

Network connectivity performance measures assess a network's completeness and convenience. The FHWA published a *Guidebook for Measuring Multimodal Network Connectivity* which provides discussion on various analysis methods and measures to assess multimodal network connectivity. The Guidebook addresses five components of multimodal network connectivity which are network completeness, network density, route directness, access to destinations, and network quality. There are several pedestrian and bicycle network / connectivity measures. As noted in ***Chapter 4***, the two primary pedestrian and bicycle network connectivity measures recommended for inclusion in a MTIA are:

- Route directness
- Network completeness

As detailed in ***Chapter 4***, route directness is simply the ratio between the actual route a bicyclist or pedestrian will travel compared to the straight-line distance. Larger ratios indicate longer and indirect routes, while ratios closer to one indicate more direct paths. To encourage pedestrian and bicycle trips, walking/biking routes should be safe, convenient, and direct. Indirect and

circuitous routes or uncomfortable and unsafe routes can deter walking and biking trips and increase vehicular trips. For larger route directness ratios (greater than 1.5), improvements can be identified to create shorter and more convenient routes.

Missing links or gaps in the pedestrian and bicycle 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 there are long block lengths, 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 provide easy access between transportation modes, with particular attention to pedestrian and bicycle access to schools, transit stops and regional greenway or trail systems.

System Completeness

The quality and completeness of pedestrian and bicycle facilities can be reviewed for availability or lack of facilities (gaps), safety, crossing treatments, design standards, ADA compliance, and appropriate and adequate lighting. All pedestrian and bicycle facilities along state roadways must meet minimum FDOT design criteria based on the FDM. However, consideration should be given to improving facilities beyond the required minimums based on the projected amount of usage (for example, wider sidewalks to accommodate a higher volume of pedestrians).

The assessment should consider the anticipated volume of non-motorized users using the facilities along each route after the proposed development is in place to determine the suitability of the facilities (e.g., sidewalk width, crosswalk treatment, etc.). This can particularly be necessary for high pedestrian volume areas. Crossing improvements can include the addition of a new crosswalk, high-visibility markings, raised crosswalk, curb extensions, refuge island, midblock crossing treatments (rectangular rapid-flashing beacons, pedestrian hybrid beacon), leading pedestrian interval at signals, and LED lighting. More information regarding crosswalks and treatments is provided in the FDOT ***Traffic Engineering Manual***.

Additionally, innovative intersection control treatments can be evaluated to improve existing pedestrian and bicycle accommodations, if applicable. The benefit of specific innovative intersection control types to improve multimodal transportation is highly dependent on the context of the location and environment. More information is provided in FDOT's ***Manual on Intersection Control Evaluation.***

5.4.1.5. Transportation Demand Management Techniques (TDM)

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 FDOT's TDM policy, commuter assistance program, and park and ride information can be found at ***Commuter Services*** website.

Transportation partners interested in using TDM in land development should start their involvement early. This requires participation in review and updates of the MPO LRTP and TIP as well as local government comprehensive plans. The reviewer should verify that the TDM measures are consistent with the MPO's Congestion Management Process (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. TDM strategies can also be site specific if they are part of a larger regional effort. However, any TDM program should be incorporated in the Development Order (DO) and evaluated on an annual basis to verify the targeted mode split and/or peak hour traffic generation goals are being met. If not, then the program may need to be reevaluated with additional mitigations strategies implemented.

5.4.1.6. Transportation Systems Management & Operation (TSM&O)

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
- Implement transit 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
- Connected Vehicle (CV) planning and pilot projects
- 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)***.

5.4.1.7. Increasing System Capacity

Options for increasing roadway capacity may include:

- Construction of new transportation facilities, such as new roads or transit
- Operational improvements such as turns lanes, prohibiting turns, and median treatments
- Innovative intersection control (see FDOT's ***Manual on Intersection Control Evaluation***)
- Grade-separated intersections or rail crossings
- Managed lanes

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

Add lanes and construction of new facilities are further discussed below.

Add Lanes

The addition of new through lanes on existing facilities is another potential way of addressing the impacts resulting from new developments. However, the lane additions should be consistent with regional goals and policies for SOV travel and mode share. 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.

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 TSM&O strategies (e.g., ITS), 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.

5.4.1.8. Reduce Development Plan

A developer can reduce their development intensity, size and/or their land use type to lessen impact to the transportation network. For instance, a revised development plan can lower the estimated vehicular trip generation of the site, thus reducing vehicular site impacts. Examples of changes to decrease potential impact and mitigation 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

5.4.2. Comprehensive Plan Amendment Mitigation Strategies



As previously discussed, it is the responsibility of the local government to make land use decisions consistent with their community plans and visions for future development and growth. Given that transportation and land use decisions are fundamentally interrelated, 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. Provisions for mandatory and optional elements in ***F.S. 163.3177***, 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 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.

Furthermore, federal Regulation, ***Titles 23 U.S.C. 134(k)(3)*** and ***49 U.S.C. 5303(k)(3)*** require that all MPOs maintain a CMP 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 SHS. 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.

When a proposed comprehensive plan amendment is anticipated to negatively impact important state resources and facilities, several mitigation alternatives may be considered to address these transportation impacts. These could include strategies already identified in local comprehensive plans or development codes, or in the CMP. The previous section also lists several general mitigation strategies that could be considered. In addition, the strategies below are specific to comprehensive plan amendments and can be considered when addressing impacts to important state facilities.

5.4.2.1. Mitigation Agreements for Comprehensive Plan Amendment

FDOT is statutorily authorized (***F.S. 163.3184***) to review local government comprehensive plans and amendments, to comment on issues that relate to adverse impacts on transportation resources and facilities of state importance, and to recommend measures the local government may take to eliminate, reduce, or mitigate the adverse impacts. To provide consistency and avoid confusion for all parties involved, a mitigation agreement can be used as an option to formalize the agreed upon methodology, assumptions, and necessary mitigation. The mitigation agreement is entered by the applicant, the local government who issues the DO and the applicable reviewing agencies such as FDOT, 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 responsibility of the needed mitigation?
  - Can be 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 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?

5.4.2.2. Transportation Concurrency and Alternatives

As discussed in ***Chapter 2***, 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 ***F.S. 163.3180***.

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 TCEAs, TCMAs, or MMTDs to provide flexibility from the strict application of concurrency.

TCEAs, TCMAs, and MMTDs are used to implement transit system improvements and supporting pedestrian and 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 MMTD 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. MMTD 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 primarily on suburban locations. However, the latest version of the Manual reflects person trip generation rates for a growing number of land uses and has also expanded the land use settings beyond suburban land uses to include Center City Core, Dense Multi-Use Urban, and Rural land use environments. 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.

The most current available trip generation data may not accurately account for the reduced vehicle trip generation expected for urban infill or transit-oriented developments. In this case, the applicant and reviewer should mutually agree upon appropriate adjustments to the traditional suburban trip rates 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 verifying the proposed development would include 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 select 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.

5.4.2.3. Transportation Sufficiency Plans

Under ***F.S. 163.3182***, 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 confirm 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 ***F.S. 163.3182(8).***

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.

5.4.3. Driveway Connection Permit Mitigation Strategies



Operational and safety improvement needs for all modes related to a development's access to the SHS should be identified and addressed as part of the FDOT review of driveway connection permits. These can be identified through review of the general location and context of the development and proposed access/es, and through review of the MTIA. The following provides discussion of mitigation strategies and considerations specific to FDOT driveway connection permits. These are in addition to the general mitigation strategies previously discussed.

5.4.3.1. Pre-Application Meeting

Per ***Rule 14-96.003(2) F.A.C.***, all applicants applying for a Category C, D, E, F, or G connection, are required to request a pre-application meeting to review the site plan with the Department. It is recommended that the pre-application meeting include FDOT, the applicant, and the local government, and others as necessary for coordination. At the meeting, the proposed driveway connection/s are discussed as well as traffic study requirements. Coordination at the pre-application meeting can allow for an understanding between all parties of the proposed development plans, any FDOT concerns with the proposed access points or nearby transportation facilities, and local government concerns. Additionally, it provides an opportunity to discuss mitigation solutions or options to avoid impacts altogether.

> A pre-application meeting provides an opportunity to discuss mitigation solutions or options to avoid impacts altogether.

Local versus State Requirements

It is important to note that approvals and plans outside of the official FDOT Driveway Connection Permit approval process do not commit FDOT to approving a proposed connection. Per ***Rule 14-96.003(5) F.A.C.***, "The Department shall not be obligated to permit or approve any connection, traffic control feature or device, or any other site related improvement that has been specified in a development approval process separate from the official connection approval process described in this rule chapter. However, early coordination may minimize conflicts at application time."

> "The Department shall not be obligated to permit or approve any connection, traffic control feature or device, or any other site related improvement that has been specified in a development approval process separate from the official connection approval process described in this rule chapter." ***Rule 14-96 F.A.C.***

Likewise, the applicant is also responsible for any additional permitting or approvals needed from local governments associated with mitigation improvements. As such, early and continuous coordination between all parties is recommended to avoid miscommunication, misunderstandings, and to obtain necessary approvals.

5.4.3.2. Conditions of the Notice of Intent to Issue Permit

FDOT issues a Proposed State Highway Access Connection Notice of Intent to Issue Permit, Form 850-040-24, if FDOT determines a permit application meets ***Rule 14-96 F.A.C.*** and ***Rule 14-97 F.A.C.*** The Notice of Intent to Issue Permit form establishes all conditions, outside of ***Rule 14-96 F.A.C.***, that are required by the applicant for issue of a permit. The notice also specifies which conditions must be met before the issuance of the permit, and those that must be met after issuance of a permit.

Standard conditions of the notice include applicable local government approvals, assurance of performance, indemnity agreement, compliance with drainage requirements, liability insurance, and requirements for access modifications affecting other property owners.

Another standard condition of the notice is "special requirements added to promote safety and efficiency" ***Rule 14-96.007(5) F.A.C.*** Furthermore, ***F.S. 335.185*** states that FDOT can issue a permit subject to any reasonable conditions. Examples of conditions could include improvements at the proposed access point such as turn lanes and intersection control, and improvements offsite as determined by the MTIA.

Per ***Rule 14-96.007(8) F.A.C.***, failure by the applicant to meet the conditions after the permit issuance can serve as cause for the Department to order alteration of the connection, or to revoke the permit and close the connection at the applicant's expense.

Future Conditions

Per ***Rule 14-96.007(8) F.A.C.***, the Department can require permits to be recorded in public records with the legal description of the property when cross or joint access exists, when there is future performance required by the applicant such as installation of traffic control features or devices, or other needed conditions. For instance, if a proposed development is phased and a traffic signal at a proposed access is not anticipated to be warranted until a later phase, FDOT can require a legal recording of the permit to verify the future work is performed as agreed to in the permit. The following section provides further discussion of funding and security instrument requirements for such improvements.

"The Department can require permits to be recorded in public records with the legal description of the property when cross or joint access exists, when there is future performance required by the applicant such as installation of traffic control features or devices, or other needed conditions." ***Rule 14-96 F.A.C.***

5.5. 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.

The developer's share of funding for mitigation improvements is typically 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. For instance, some Districts require a developer to pay for 100 percent of an improvement such as a new turn lane if their development contributes 25 percent or more of the total trips to that turning movement.

The final mitigation fee is typically negotiated among the applicant, appropriate local governments, and FDOT following the mitigation analysis that demonstrates the proposed improvements will be acceptable to the local government and FDOT for alleviating any deficiencies caused by the proposed development. This negotiation should occur before or concurrent with the drafting of the DO.

5.5.1. Optional Concurrency Mitigation (Proportionate Share)

F.S. 163.3180, 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.

F.S. 163.3180 (5)(h)1.c	The local government must "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: (I) 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. (II) 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."
F.S. 163.3180 (5)(h)1.d	The local government must "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."

F.S. 163.3180 (5)(h)2	"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."

Deficiencies, pursuant to ***F.S. 163.3180(5)(h)4***, pertain to any facility on which the adopted LOS 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 considered to be in place for the purposes of the proportionate share calculation.

One downside to proportionate share is that the full funding needed to complete a project may not be achieved within a reasonable time or potentially ever. One option available when a developer is required to pay proportionate share for multiple improvements is to have the total proportionate share pipelined towards one project with the aim to fully fund its design and construction. This provides a strategy to allow critical deficiencies to be addressed sooner than they would be otherwise. This is another reason for early and continuous coordination with the local governments, as pipelining may potentially be used to implement critical improvement needs on the SHS.

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. More examples are listed in the Mobility Fees subsection below.

5.5.2. 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
- Pedestrian and bicycle 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 (PD&E), or feasibility/corridor studies should be used. Tools such as FDOT's 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 are preferred by FDOT.

5.5.3. 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," ***F.S. 163.31801***, 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, ***F.S. 163.2517(3)(j)***, 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. ***F.S. 163.3180(5)(f),*** also includes alternative techniques that may employ impact reductions for certain types of development.

On June 4, 2021, the Governor signed House Bill 337 which changed how local governments are allowed to spend and account for impact fees. The bill includes the following changes:

1. The introduction of definitions for the terms "infrastructure" and "public facilities."
2. A cap on Impact Fee increases.
    a. Jurisdictions can only increase impact fees once every four years in the following manner: Increases between 25 to 50 percent must be spread over four years, while smaller increases would be implemented in two equal installments. ***House Bill 337 (2021) - The Florida Senate (flsenate.gov)***
    b. A local government interested in surpassing the 50 percent cap would be required to perform a study demonstrating why the increase is justified, host two workshops dedicated to the extraordinary circumstances necessitating the need and secure the approval of at least two-thirds in a vote of the governing body for the increase.
3. Requirements for impact fee credits to developers.
4. Accounting for the creation and increase of impact fees.

Below are examples of cities and counties in Florida that currently have updated their impact fee programs based on the legislation passed in 2021 and a basic description of how they operate their program:

- Flagler County, Florida (***Notice of New and Updated Impact Fees | Flagler County, FL***)
    - At the December 6, 2021 meeting of the Board of County Commissioners of Flagler County, Florida, the Board adopted Ordinance No. 2021-09, which established new and updated impact fees for transportation (roads), parks and recreation, law enforcement, fire rescue, emergency medical services, and library facilities in all unincorporated and incorporated areas of Flagler County; provided that collection of county impact fees within municipalities will not occur until the county and the city/town have entered into an interlocal agreement.
    - These impact fees are imposed on all new construction that applies for a building permit on or after the dates specified in the notice below and will fund capital improvements and additions to the noted county facilities needed to serve new growth. The impact fees will be due and collected at or prior to the issuance of a building permit as the rates specified in the notice linked: ***2021 New and Updated Impact Fees***

- Brevard County, Florida (***Brevard County Planning and Development Impact Fees (brevardfl.gov)***
  - Brevard County collects commercial and residential impact fees regarding transportation, correctional facilities, EMS, fire rescue, libraries, educational facilities, and solid waste.
  - Brevard County assesses and collects commercial and residential impact fees for all projects located and permitted within Brevard County. Brevard County collects impact fees for all 16 cities within the County. The impact fees collected vary based on the inter-local agreement between the County and each individual city.

5.5.4. Mobility Fees

F.S. 163.3180, 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. A mobility fee is essentially an impact fee that allows funds to be expended not only on roadways, but also on transit-supportive investments and pedestrian and bicycle infrastructure. Mobility fees also may be expended on more significant transit capital, including buses, stations, and rail infrastructure.

It generally uses the following equation:

> Mobility fee = Additional transportation demand from development x identified cost for transportation improvements to mitigate associated development impact.

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 pedestrian and bicycle infrastructure. The system is tiered to focus infill and redevelopment in urbanized areas of the county.

These fees must meet the following statutory requirements (***F.S. 163.3180***):

- Any alternative mobility funding system adopted may not be used to deny, time, or phase an application for site plan approval, plat approval, final subdivision approval, building permits, or the functional equivalent of such approvals provided that the developer agrees to pay for the development's identified transportation impacts via the funding mechanism implemented by the local government.
- The revenue from the funding mechanism used in the alternative system must be used to implement the needs of the plan which serves as the basis for the fee imposed.

- A mobility fee-based funding system must comply with the rational nexus test applicable to impact fees.
- An alternative system that is not mobility fee-based shall not be applied in a manner that imposes upon new development any responsibility for funding an existing transportation deficiency.[1]

The following cities and counties have adopted a mobility fee program:

- Alachua County
- Altamonte Springs
- Boca Raton
- Broward County
- Clay County
- Destin
- Gainesville
- Hillsborough County
- Jacksonville
- Jacksonville Beach
- Kissimmee
- Maitland
- Miami Lakes
- Nassau County
- Orlando
- Ormond Beach
- Osceola County
- Panama City Beach
- Pasco County
- Plant City
- Port St. Lucie
- Sarasota
- Sarasota County
- Seminole County
- St. Augustine
- Tampa
- Tarpon Springs
- Walton County

Regardless of the approach used by local jurisdictions to preserve capacity on their transportation network, they are encouraged to work with FDOT to minimize adverse impacts to the SHS and the SIS.

5.5.5. Driveway Connection Permit Related Costs

It is important to note that approvals and agreements outside of the official FDOT Driveway Connection Permit process, such as approvals from local governments and local impact or mobility fees, do not replace the driveway connection permit process or requirements, including costs for required mitigation as determined during the permit review. Per ***Rule 14-96.003(3) F.A.C.***, the cost of all construction activities related to the driveway connection permit is the responsibility of the applicant.

"Approvals and agreements outside of the official FDOT Driveway Connection Permit process, such as approvals from local governments and local impact or mobility fees, do not replace the driveway connection permit process or requirements, including costs for required mitigation as determined during the permit review." ***Rule 14-96 F.A.C.***

[1] https://www.fdot.gov/docs/default-source/transit/Pages/FinalMobilityFeeGuidebook111816.pdf

Assurance of performance is required pursuant to ***F.S. 334.187***, for extensive work in the right of way such as turn lanes, median modifications, modifications to structures, or traffic signals. Per ***Rule 14,96.008(3) F.A.C.***, a security instrument is required for the estimated dollar amount of the improvements within the ROW with the Department named as the beneficiary. The security instrument is required before the permit is issued and must be valid for sufficient time to cover construction and inspection of the work. Security Instrument Receipt, Form 850-040-20 is used record the security instrument and must include a cost estimate signed and sealed by a professional engineer. In the case of a future improvement, such as a signal that is not yet warranted but anticipated to be warranted in the future, FDOT can encourage the immediate design of the future improvement so that it can be constructed as soon as it is warranted.

> "The security instrument is required before the permit is issued and must be valid for sufficient time to cover construction and inspection of the work." ***Rule 14-96 F.A.C.***

A performance bond required by the local government for development approval can be used in lieu of the security instrument if it covers the work within FDOT ROW and if the Department is a named beneficiary. Additionally, the security instrument is not required if there is an agreement with the local government to withhold the certificate of occupancy until the work within state ROW is satisfactorily completed and inspected.

If the permit requires extensive work in the ROW such as auxiliary lanes, median modifications, or traffic signals, a statement from a professional engineer is required documenting that the work was constructed in accordance with the permit. The Record Drawings Report by Permittee's Professional Engineer, Form 850-040-19 should be used. It also documents that the work was done meeting applicable standards and necessary inspections, tests, and physical measurements are satisfactorily completed. It documents that the materials conform to the permit and the latest ***Standard Specifications for Road and Bridge Construction***.

Furthermore, the applicant is responsible for identifying and notifying utilities within the ROW in accordance with ***F.S. 556*** before starting construction. Any utility conflicts and associated expense are the responsibility of the applicant.

If a constructed driveway must be modified due to reasons such as a need to modify or revoke a permit, noncompliance, significant change, safety, or other reasons listed in ***Rule 14-96.001 F.A.C.***, the cost is the responsibility of the property owner or its designated representatives.



Appendices

Appendix A – State Highway System Connection Permit Pre-Application Meeting Checklist and Scoping Form

STATE HIGHWAY SYSTEM CONNECTION PERMIT
PRE-APPLICATION MEETING CHECKLIST AND SCOPING FORM

Pre-application Meeting Date: _____

PERMIT APPLICATION
• A driveway permit is required for a change in the use of the property causing an increase in the trip generation of the property exceeding 25% more trip generation (either peak hour or daily) and exceeding 100 vehicles trips per day more than the existing use - **Significant Change Florida Statutes 335.182(3)(b)**. • The permit submittal must include a complete set of signed and sealed design plans and traffic control plans, a signed and sealed traffic study, and the required project related information in accordance with Florida Administrative Code 14-96. • All property under ownership to be included in the complete submittal. Entire property to be included in both plans and traffic study. • All relevant permit submittals should be made simultaneously via the One Stop Permitting (OSP) website. • Proposed or modifications to access points not within state right of way must be coordinated and approved by the appropriate maintaining entity. Proof of the maintaining entity's approval must be provided. • Any proposed development adjacent to the state road, irrespective of access connection, is required to submit for a drainage permit.
PRE-APPLICATION MEETING
• All permit Categories C through G (>600 vehicle trips per day) must request a pre-application meeting with FDOT Staff and provide the permit application details and proposed site plan for the meeting. • The purpose of the pre-application meeting with the department is to review the site plan, proposed access connection(s), establish the connection category, and establish the required documentation and traffic study requirements. • Upon request, the department will meet with the applicant, on-site and/or in-office, to discuss the project, projected impacts to the state highway system, and the suggested methodology for the analysis of traffic impacts. • Proposed site plan or aerial exhibit illustrating the proposed access connection(s), buildings, roadway features, is recommended to facilitate discussion in the pre-application meeting. • The pre-application meeting is advisory only and the results of this meeting are not binding on the department or the applicant. • An application must be submitted, and a connection permit must be issued before the applicant can initiate construction.

PROJECT SITE AERIAL EXHIBIT (FOR THE PRE-APPLICATION MEETING)	
☐	Proposed site aerial exhibit should include: • All connections and median features • Locations of the nearest driveways • Adjacent parcels, label ownership, and all known easements • Location of all property boundaries • Locations of the nearest traffic signals • Locations of the nearest median openings • Location of all existing multimodal facilities, such as on-street bicycle lanes, sidewalks, shared-use paths, etc., that are located along state roadways or the parcel for which the state highway connection permit is being sought • Right-of-way and property lines
PROPOSED SITE PLAN	
☐	Per FDOT rule 14-96, proposed site plan should be provided in the pre-application meeting for review, including the following features: • All proposed buildings and outparcels • All proposed driveways/connections • Cross access or joint access driveways • All parcels to be served with requested access connection(s) • All parking and internal site circulation plan • Connection/driveway design and geometrics (lane widths, radii, length, throat depth, etc.) • Safe and convenient access for non-motorized users – separate non-motorized connections, bicycle parking within the site, etc. • The bicycle/pedestrian access should connect the external bicycle and pedestrian network/s to the main entrance of the site's building/s • Internal site design bicycle/pedestrian accommodations • Bicycle/pedestrian connections to adjacent properties and transit stops, where applicable • Pedestrian and bicycle access should be safe and convenient with minimal conflicts with vehicular modes • Minimized travel distance for pedestrian and bicyclists with the most direct route

TRAFFIC STUDY		
☐	Traffic Impact Study is required for Categories C through G (>600 vehicle trips per day including pass-by trips) or any application requesting or requiring a new traffic signal, new median opening, auxiliary lane, or modified median opening.	
☐	**Project Description** • Proposed project site • Size - building square footages, units, etc. • Information about project site outparcels • Project site type of uses • Construction schedule – opening and build-out years • Traffic study area determination – area of significant traffic impact	**Details:**
☐	**Existing Conditions/Data Collection** • Posted and planned speed limits, target/design speeds for major roadways • Context classification • Nearest driveways • Nearest median openings • Adjacent signalized intersections and signal timings • Access classification • Study area intersection turn-lane lengths and queueing conditions during peak hours • Multimodal facilities such as sidewalks, bicycle lanes, shared use paths, transit stops, etc. • AM/PM turning movement counts (TMCs) - include trucks, pedestrians, and bicycles • Other planned off-site developments in the area • Planned and programmed improvements on state and local roads in the study area • Any discussions/agreements with local entity	**Details:**
☐	**Access Management Spacing Considerations** • Spacing requirements for the roadway/s access classification • Driveway spacing requirements	**Details:**

	• Median spacing requirements • Signal spacing requirements • Multimodal access spacing considerations	
☐	**Project Vehicle Trip Generation:** • Trip Generation estimates for the entire project site including outparcels (assume highest and best use for the unknown outparcels) • Utilize the most recent version of the ITE Trip Generation Manual (currently 11th Edition) • Documentation of any alternative data used to estimate trip generation and the source of data • Daily/AM/PM peak hours • Provide source, trip rates, and table of calculations by land-use • Use ITE approved pass-by and internal capture rates or other alternative documented and agreeable rates	**Details:**
☐	**Project Vehicle Trip Distribution:** • Model data and/or existing traffic pattern to be used for analysis	**Details:**
☐	**Background Motorized Traffic Estimation:** • Model data and/or historical data to estimate the build-out year traffic growth rates • Include traffic from planned off-site developments	**Details:**
☐	**Motorized Traffic Analysis** • Identify the impacted roadway segments and intersections for the traffic analysis • AM and PM peak hour analyses - unless special circumstances require mid-day/weekends • Traffic analysis methodology – HCS, Synchro, Sidra, Vissim, etc. • Connections/driveways, turn lane requirements/warrants – NCHRP, etc. • U-turn traffic considerations • Signal evaluation - reasonable signal timings • Signal warrant analysis if new signal/s proposed	**Details:**

	• ICE Analysis for new signals (except midblock pedestrian signals), major reconstruction of signalized intersections, changing a directional or bi-directional median opening to a full median opening, or driveway connection permit application for Category E, F, or G • Intersection queue length analysis – potential blocking of adjacent intersections • Intersection turn-lane analysis • On-site queuing analysis for sites with drive-throughs • Mitigation measures result in acceptable traffic operations	
☐	**Multimodal (Non-motorized) Traffic Study Considerations** • Identify any impacts to existing pedestrian, bicycle, and transit facilities • Incorporate geometric features to minimize the impacts of driveway connection/s to existing or proposed non-motorized facilities • Provide appropriate recommendations for safe and efficient movement of pedestrians, bicyclists, and transit **Multimodal (Non-motorized) Traffic Study Requirements** • Review of pedestrian/bicycle access to site. • Review of compatibility with local agency and project area planning documents • Internal site design bicycle/pedestrian accommodations • Bicycle/pedestrian connections to offsite parking, adjacent properties, transit stops, or other attractors. • Estimation of daily and/or peak hour trip generation of pedestrians, bicyclists, and transit users, to identify the needs of the multimodal network – ITE methodology, person trips, non-motorized mode share, etc. (Optional *) • Determination of the type and level of multimodal evaluation based on the project area context classification and the peak hour volume of non-motorized trips (Optional *) • Multimodal study area determination if network connectivity analysis and multimodal LOS analysis are performed (Optional *) • Network connectivity analysis – potential non-motorized trip origin/destinations within the study area, completeness and quality of routes, route directness ratio, etc. (Optional *)	**Details:**

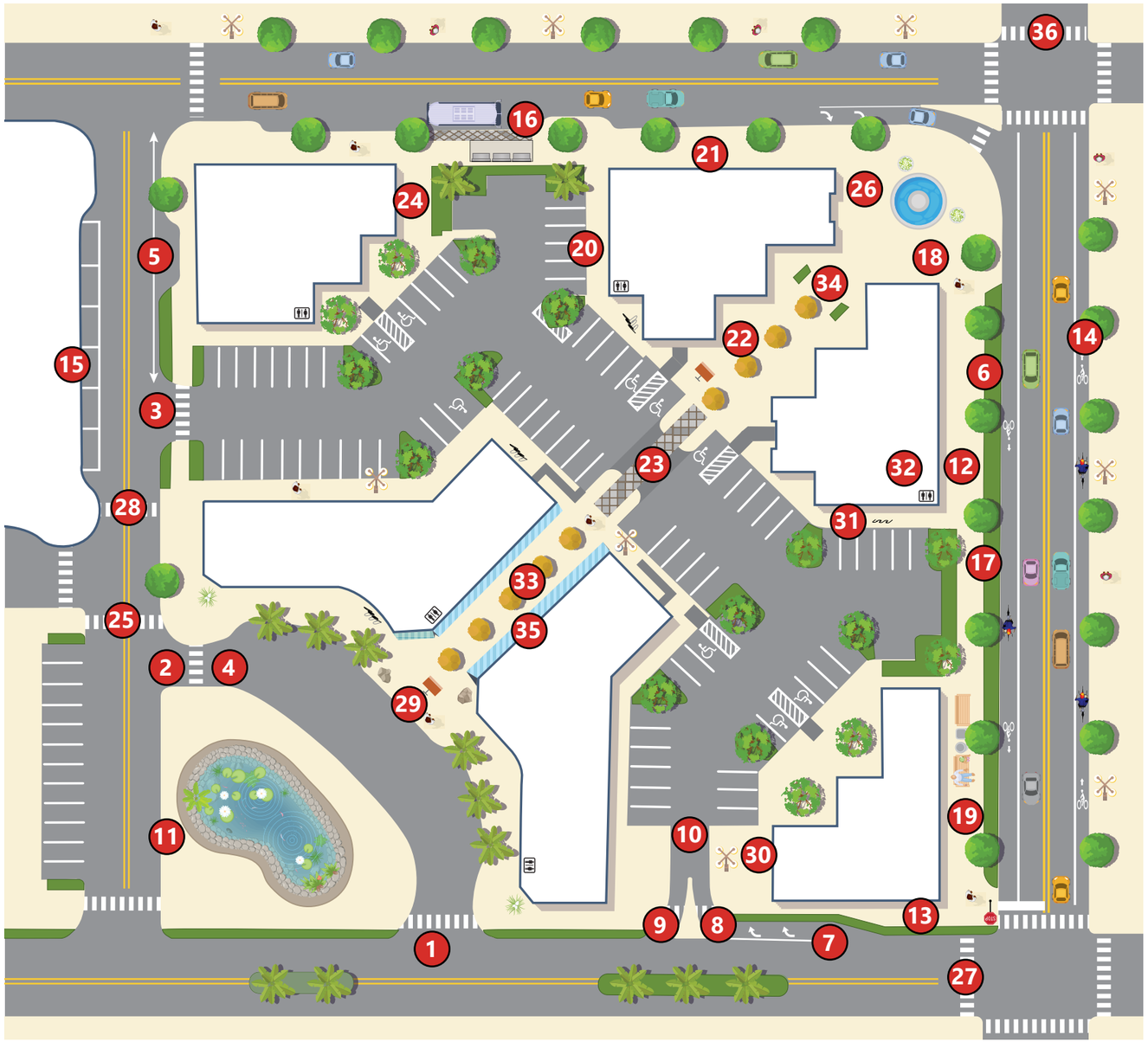
	• Multimodal LOS analysis – Pedestrian LOS (PLOS), Bicycle Level of Traffic Stress (BLTS), PLOS and BLTS targets, etc. (Optional *) • Non-motorized (pedestrians and bicycles) trip distribution method (Optional *)	
☐	**Safety Analysis** • Crash history for the past three years (minimum) at/near proposed site. • Determination of the level of safety evaluation within the study area – intersection/segment crash data analysis, HSM application, etc.	**Details:**
☐	**Curbside Management** • Propose a curbside management plan consistent with current FDOT policies and practices – established zones for pick-up/drop-off, commercial loadings, parking, etc.	**Details:**

* Context-based steps are required for multimodal (non-motorized) assessment. If the applicant opts for additional analysis, for example to document and justify additional or alternative mitigation measures, the steps noted as Optional should be completed as appropriate.

Appendix B – Pedestrian/Bicycle Site Design Toolbox

MULTIMODAL TRANSPORTATION SITE IMPACT

PEDESTRIAN/BICYCLE SITE DESIGN TOOLBOX



For illustrative purposes only. Not to scale.
*Based on Hawaii DOT Pedestrian Toolbox graphic.

ACCESS MANAGEMENT

1. Decrease number of driveways

DRIVEWAY/CONNECTION DESIGN

2. Curb radius & driveway width
3. Crosswalks /ADA Considerations
4. Sight distance & pedestrian and bicycle visibility
5. Corner clearance
6. Buffer strips
7. Right turn lanes into site
8. Driveway medians/refuge area
9. Restricted left turns
10. Driveway throat length
11. Pedestrian warning signage

SITE FRONTAGE

12. Sidewalks
13. Sidewalk setbacks
14. Bicycle facilities
15. On-street parking
16. Transit stops and amenities
17. Landscaping
18. Lighting
19. Street furniture

SITE CIRCULATION & BICYCLE/ PEDESTRIAN ACCESS

20. Direct pedestrian access to the site
21. Building placement
22. Paths between multiple buildings
23. Paths through parking area and to building entrance
24. Path to nearby bus stop/s
25. Path to off-site parking
26. Path to off-site street crossings
27. Path to off-site community spaces
28. Neighboring property access
29. Onsite wayfinding signage

AMENITIES

30. Onsite lighting
31. Bike parking
32. Showers, lockers, changing rooms
33. Onsite landscaping
34. Onsite street furniture
35. Shade/weather protection
36. Other offsite improvements

1 ACCESS MANAGEMENT
Decrease number of driveways

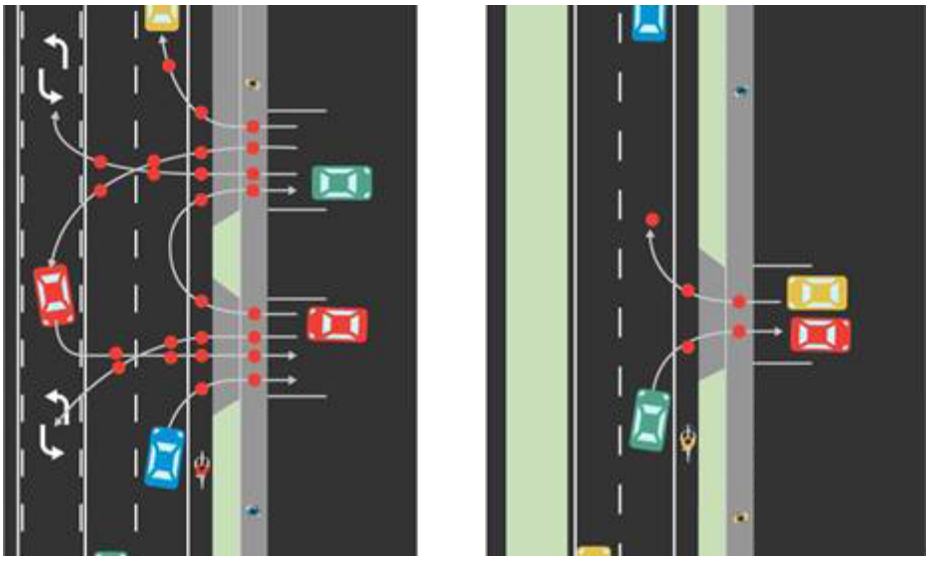


Photo Source: FDOT

Description
A driveway is a road that provides access to a building or group of buildings at a site. Implementing plans to limit or reduce the number of driveways reduces the total potential conflict points for all users including bicyclists and pedestrians, with the potential to improve safety and flow around the site.

Considerations
- *Provide consolidated or shared driveways with cross-access between properties.*
- *Provide unified internal access to outparcels.*
- *Enhance roadway networks with balanced driveway connections to the main road and side streets.*
- *Replace multiple unsignalized driveways with one signalized driveway.*
- *Eliminate unused or abandoned driveways.*
- *Consider the conditions of adjacent roadways including average speed, roadway material, and traffic patterns.*

Sources
- *FHWA, How to Develop a Pedestrian Safety Action Plan*
- *FDOT Access Management Guidebook*

2 DRIVEWAY/CONNECTION DESIGN
Curb radius & driveway width

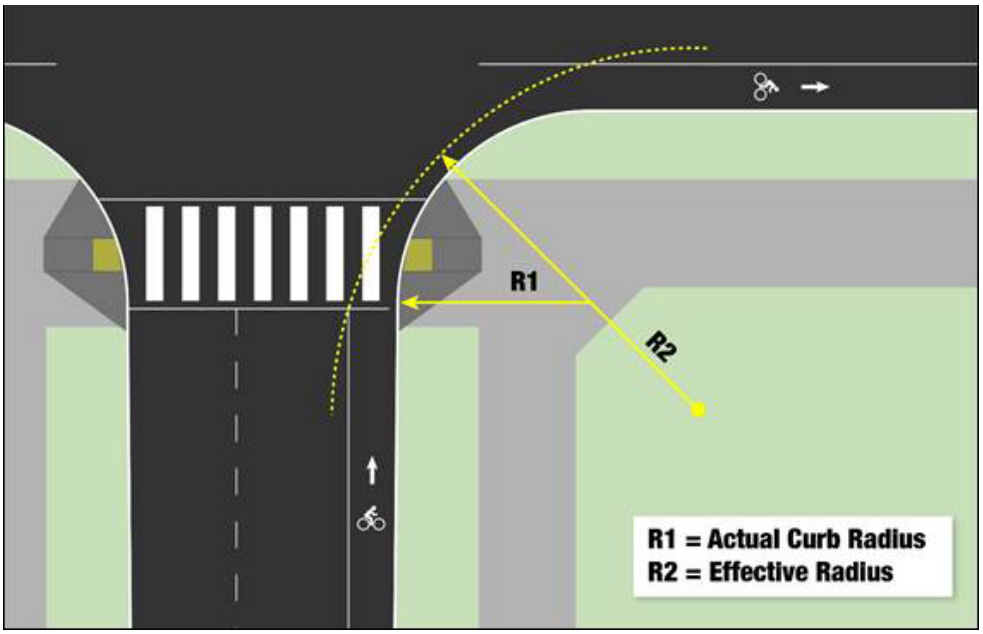


Photo Source: FDOT

Description

The radius of a driveway affects the turning movements of vehicles. A smaller curb radius can improve the safety of non-motorized users in several ways. Drivers must drive slower to navigate a smaller radius which can improve bicycle/pedestrian safety by decreasing the number and severity of bicycle/pedestrian crashes. Smaller curb radii also decrease the crossing distance for pedestrians. This decreases their exposure time to traffic which can also improve safety.

Considerations

- *Implement context sensitive designs to determine appropriate curb radius, consistent with FDM on state roadways.*
- *Consider lower turning speeds in higher context classifications and C2T, as well as other locations where speed management is desired.*
- *Consider the typical vehicle type, heavy vehicle and emergency vehicle usage. Large trucks turning right from driveways onto multilane roadways should be permitted to use multiple lanes to execute their turn in order to keep curb radii smaller.*
- *Reinforced, raised, textured truck aprons can be considered to accommodate the turns of larger vehicles but also help limit the speed of other smaller turning vehicles.*
- *To keep pedestrian crossing distances shorter, limit the number of entering lanes at a driveway to the minimum necessary to accommodate the number of turning lanes. If an additional lane is needed once on-site for circulation purposes, consider keeping the driveway more narrow at the crosswalk and then widening out for an additional lane once beyond the crossing point.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Walkways, Sidewalks, and Public Spaces*
- *FDOT, Access Management Guidebook*

3 DRIVEWAY/CONNECTION DESIGN
Crosswalks/ADA considerations



Photo Source: UIIG

Description

Where driveways cross a sidewalk, crosswalks should be provided to increase visibility and expectation of pedestrians for motorists entering or exiting the driveway. Maintaining ADA compliance and improving access to walkways, amenities, and connections improves the pedestrian experience and allows facilities to accommodate users of all abilities. This includes the use of curb ramps, accessible crossing signals, parking areas, and other accessible features.

Considerations

- *Crosswalk markings should be white with reflective properties consistent with MUTCD guidance, high visibility, and non-slip.*
- *At flared driveways where the sidewalk stays at a constant level (i.e., no curb ramps) but higher traffic volumes are expected (e.g., driveway class C and above), consider using color and/or texture to help the crosswalk stand out from the rest of the driveway. The use of crosswalk markings is optional, but if used on concrete, consider using contrast markings to improve visibility of the crosswalk markings.*
- *Provide adequate sight distance for all users and design to facilitate eye contact between vehicles and nonmotorized users.*
- *Keep crossing distance at a minimum. Techniques such as curb extensions and pedestrian refuge areas can be considered.*
- *Consider other enhancements, such as raised crosswalks, where appropriate.*
- *Provide facilities that comply with ADA provisions including for curb ramps, detectable edges, cross and running slopes, landing areas, widths, etc.*
- *Align curb ramps with the corresponding crosswalk.*
- *Provide adequate drainage at intersection corners.*

Sources

- *U.S. Department of Justice, ADA Standards for Accessible Design*
- *U.S. Access Board, Americans with Disabilities Act: Accessibility Standards*

4 DRIVEWAY/CONNECTION DESIGN
Sight distance & pedestrian and bicycle visibility

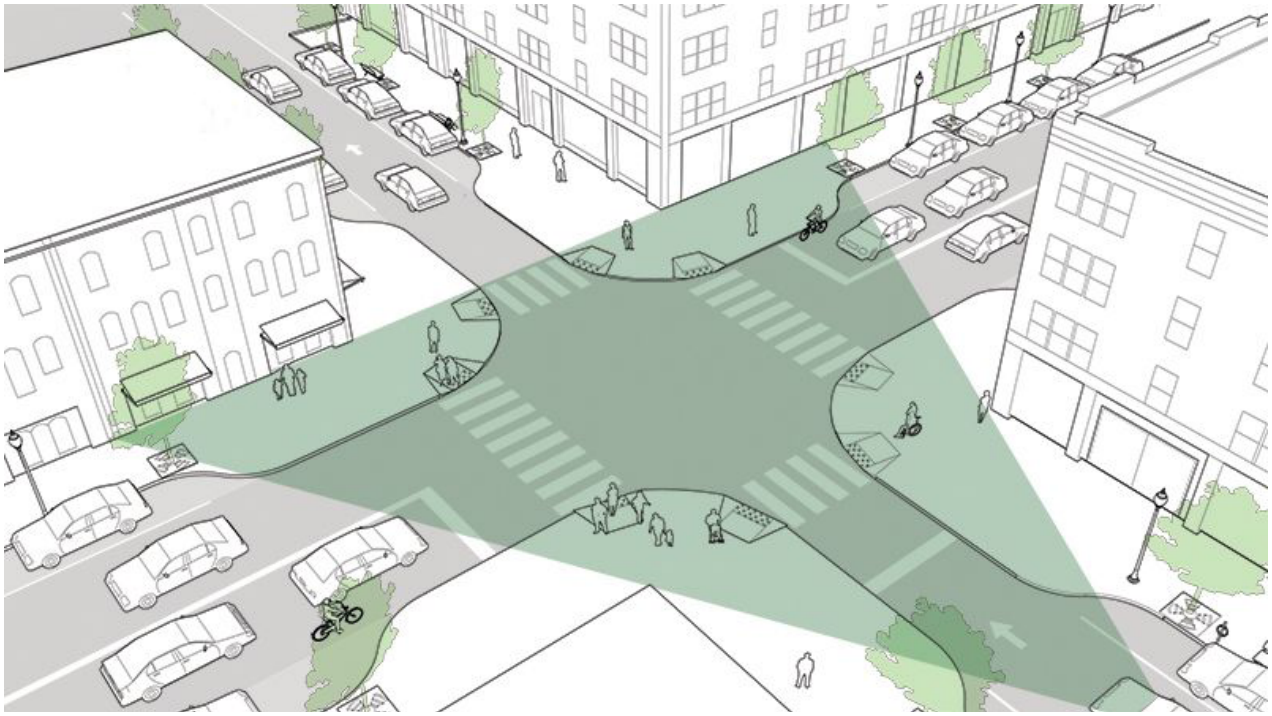


Photo Source: NACTO

Description

Sight distance and pedestrian and bicycle visibility is important to provide safe movement. Intersection and crosswalk design should facilitate eye contact between street users, ensuring that motorists, bicyclists, pedestrians, and transit vehicles intuitively read intersections as shared spaces.

Considerations

- *Remove trees, shrubs, or any landscaping that may obstruct visibility for motorists or pedestrians at crossing locations.*
- *Improve wayfinding and crossing signage and signaling at crossing locations or areas with high non-motorized traffic.*
- *Provide uniform lighting and illumination that is appropriate for site needs and area weather conditions.*
- *Remove parking within 20–25 feet of the intersection to daylight intersections, i.e. increase the visibility for all mobility users at the intersection.*
- *Reducing corner radii while also keeping the corners clear of visual obstructions helps keep the speed of turning vehicles slow while also enhancing sight distance.*

Sources

- *NACTO, Urban Street Design Guide, Visibility/Sight Distance*

5 DRIVEWAY/CONNECTION DESIGN
Corner clearance



Photo Source: FDOT

Description

Corner clearance is the minimum distance required between an intersection and an adjacent driveway along an arterial road or collector street. Inadequate corner clearance can cause safety issues including traffic congestion caused by blocked traffic entering or existing driveways.

Considerations

- *Follow FDM and FDOT Access Management standards for minimum driveway spacing along state roadways.*
- *When the minimum spacing cannot be met, consider the following strategies:*
  - *Locate the driveway as far from the intersection as possible.*
  - *Limit driveway movements to right-in/right-out only and construct a non-traversable median or flexible pylon, if necessary, to limit the movements.*
  - *Reserve locations with limited corner clearance to low volume driveways.*

Sources

- *FHWA, Safety Evaluation of Corner Clearance at Signalized Intersections*
- *FDOT, Chapter 14-97.001, State Highway System Access Control Classification System and Access Management Standards*
- *FDOT, Design Manual Topic #625-000-002, Driveways*
- *FDOT, Access Management Guidebook*

6 DRIVEWAY/CONNECTION DESIGN
Buffer strips



Photo Source: JLA

Description

A buffer space is an area that separates traffic from a workspace or sidewalk. This additional space can improve safety for pedestrians and bicyclists by placing them farther from adjacent traffic. If the sidewalk buffer strip is of an adequate width, drivers can pull completely out of the roadway traffic stream before yielding to a pedestrian at the driveway pedestrian crossings.

Considerations

- *Follow latest FDM criteria for the buffer width along state roadways.*
- *Sidewalk on flush shoulder roadways is not to be constructed directly adjacent to the roadway or shoulder pavement.*
- *Nearing intersections, the sidewalk should be transitioned as necessary to provide a more functional crossing location that also meets driver expectation. Consideration should be given based on the location's context to using a "bend-in" versus a "bend-out" style of design at the crossing point. A "bend-in" design allows drivers on a side street to see vehicles and sidewalk users in a similar field of vision, and requires less space than bending out. A "bend-out" design may allow turning vehicles to yield to sidewalk users before crossing, and makes it easier to employ a raised crosswalk.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Walkways, Sidewalks, and Public Spaces*
- *FDOT, Chapter 14-97.001, (State Highway System Access Control Classification System and Access Management Standards*
- *FDOT, Design Manual Topic #625-000-002, Driveways*
- *FDOT, Access Management Guidebook*

7 DRIVEWAY/CONNECTION DESIGN

Right turn lanes into and out of site



Photo Source: FHWA

Description

Right-turn lanes can be designed to enhance pedestrian safety by improving pedestrian visibility, decreasing vehicle speeds, and reducing crossing distance. Right-turn lanes can create potential hazards for pedestrians since they increase their crossing distance and exposure at the intersection.

Considerations

- *Reduce corner radius to slow vehicle speeds and to reduce the crossing distance for pedestrians.*
- *Consider channelization in order to provide an island large enough to accommodate pedestrians to serve as a refuge with accessibility features.*
- *Reduce right-turn lane width to encourage slower vehicle speeds.*
- *Optimize sight lines between vehicles and pedestrians.*
- *Orient the crosswalk at a 90-degree angle to the right-turn lane. Upon entering the right turn lane, provide enough distance for a vehicle to come to a complete stop if needed.*
- *Use high-visibility pavement markings and signage to increase pedestrian visibility.*
- *Consider other enhancements, such as raised crosswalks, where appropriate.*
- *Provide accessibility features.*
- *To encourage slower speeds, do not provide for an uncontrolled, free flow right-turn movement, which includes providing an acceleration lane for right-turning vehicles.*
- *If channelized, position the crosswalk one car length away from the cross street to allow a vehicle to wait for a gap to complete their right turn without blocking the crosswalk.*
- *If channelized, use a tighter angle of entry for the vehicles.*

Sources

- *FHWA, Signalized Intersections: Informational Guide*
- *FDOT, Chapter 14-97.001, (State Highway System Access Control Classification System and Access Management Standards-FDOT, Design Manual Topic #625-000-002, Driveways*
- *FDOT, Access Management Guidebook*

8 DRIVEWAY/CONNECTION DESIGN
Driveways medians/refuge area



Photo Source: HDR

Description

Medians and refuge areas can improve pedestrian safety by reducing random and unexpected pedestrian crossings and improve driver expectations, decrease pedestrian walking distance, and encourage walking/biking trips instead of vehicular trips. Raised medians and pedestrian refuge areas at marked crosswalks has demonstrated a 46 and 56 percent reduction in pedestrian crashes, respectively. At unmarked crosswalk locations, medians have demonstrated a 39 percent reduction in pedestrian crashes.

Considerations

- *Include a vertical element on pedestrian refuges to improve visibility to motorists.*
- *Verify that the pedestrian refuge island is clear of visual obstructions taller than 2 feet.*
- *Provide a median/ refuge island of at least 6 feet wide (preferably 8 feet wide or greater).*
- *Install ADA compliant warning strips on refuges 6 feet or wider that serve designated pedestrian crossings.*
- *Consider using the "z crossing" or angled crossing design for the pedestrian refuge to orient pedestrians' line of sight towards oncoming traffic.*
- *Provide adequate lighting so that crossing pedestrians are visible on the refuge and through the crosswalk.*
- *Consider appropriate traffic control at both intersection and midblock crossing locations.*
- *Consider closing excess median openings.*

Sources

- *FHWA, Consideration and Implementation of Proven Safety Countermeasures, Chapter 8: Medians and Pedestrian Refuge Areas in Urban and Suburban Areas*
- *FDOT, Chapter 14-97.001, (State Highway System Access Control Classification System and Access Management Standards*
- *FDOT, Design Manual Topic #625-000-002, Driveways*

9 DRIVEWAY/CONNECTION DESIGN
Restricted left turns

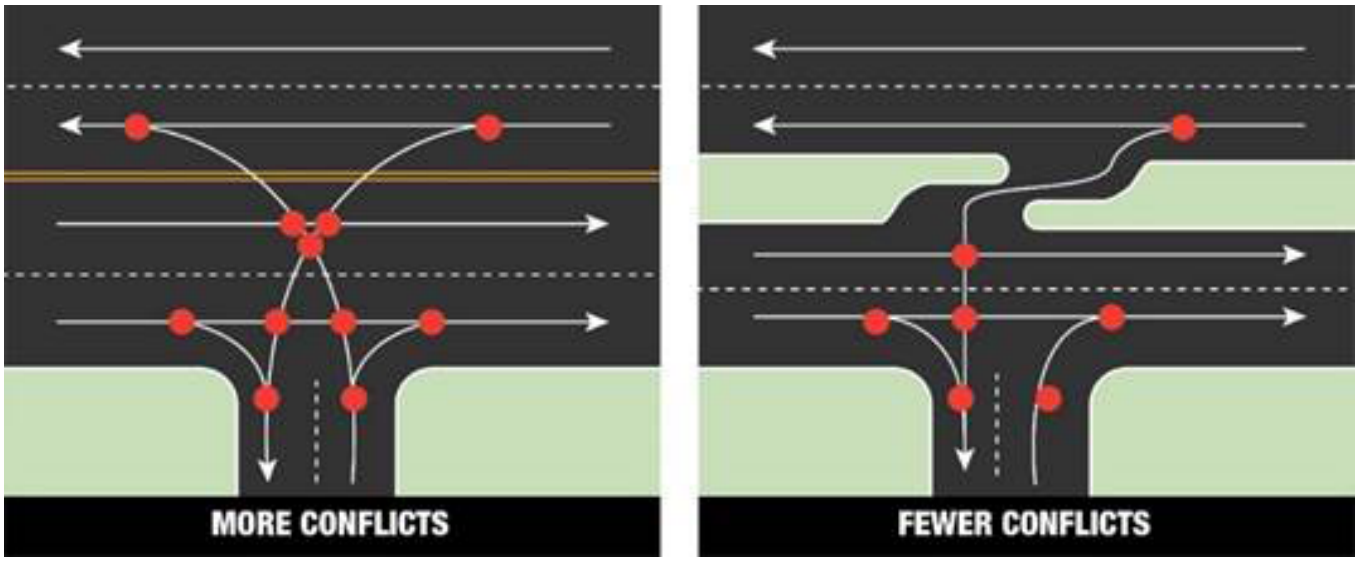


Photo Source: FDOT

Description

Eliminating left-turns reduces conflict points for all users and reduces safety risks for pedestrians

Considerations

- *Restrict left turn movements to reduce conflict points. For instance, directional median openings reduce conflict points by restricting side streets or driveways to right-in, right-out only movements.*
- *Use channelizing islands to enforce turn restrictions, for example an island at a driveway that restricts turns to right-in, right-out and prohibits left turns in or out.*
- *Consider designs that rely on U-turns to complete left-turn movements including a restricted crossing U-turn (RCUT) or the median U-turn (MUT).*
- *Place turn prohibition signs where they will be most easily seen by drivers who might be intending to turn.*
- *Provide wayfinding signage to direct vehicles to permitted turns or recommended diversion paths.*
- *At signalized locations where left turns are prohibited (for example, in association with an adjacent signalized RCUT or MUT), install NO LEFT TURN signage adjacent to a signal face viewed by road users in the left lane.*
- *When applicable, bikes should be excepted from the turn restriction and provided with additional bicycle facilities.*
- *Directional median openings reduce conflicts by restricting side streets or driveways to right-in, right-out only movements.*

Sources

- *NACTO, Transit Street Design Guide Turn Restrictions*
- *NCHRP, Guidance for Implementation of the AASHTO Strategic Highway Safety Plant*
- *FHWA, Consideration and Implementation of Proven Safety Countermeasures, Chapter 6: Left and Right-Turn Lanes at Stop Controlled Intersections*

10 DRIVEWAY/CONNECTION DESIGN
Driveway throat length

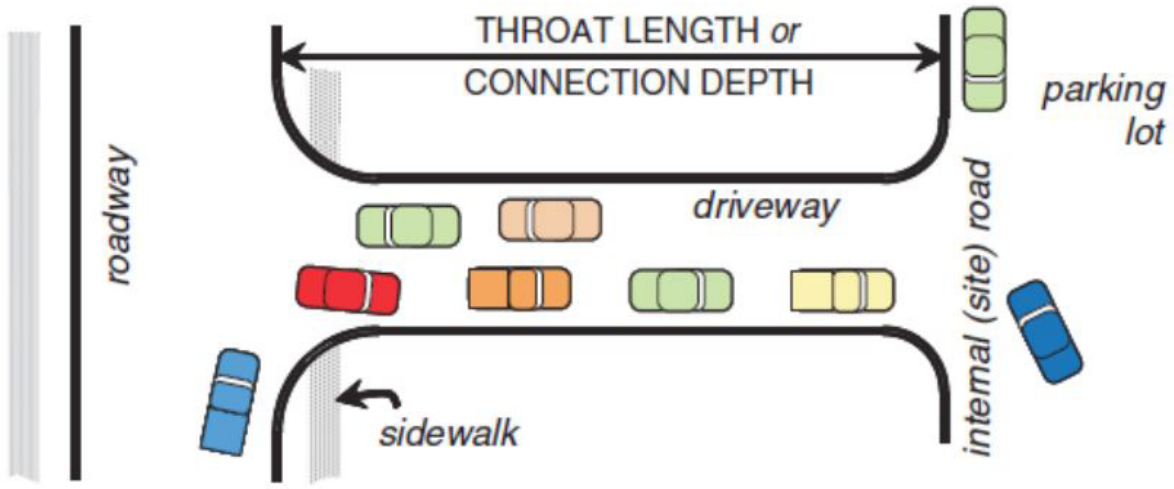


Photo Source: City of Fairfield, CA

Description

The driveway throat length is the distance between the street and internal site roadway. Providing sufficient throat length helps keep traffic conflicts to a minimum and promotes efficient operations entering and exiting the site. The driveway length should allow the vehicle to clear the intersection/driveway before running into the onsite circulation. Insufficient throat length can cause unsafe conditions and congestion.

Considerations

- *Refer to the FDOT Access Management Guidebook for the recommended minimum driveway throat length.*
- *One strategy to increase driveway throat length is to place building(s) adjacent to the main roadway, with parking located behind the building(s).*
- *Where a longer driveway length is not possible due to constraints, onsite design and circulation should be reviewed to minimize conflicts and operational issues.*
- *Consider the type of driveway intersection traffic control (stop sign or signal) and traffic signal timing.*
- *Consider the number of parking spaces per exit lane.*
- *Consider the positions of bike paths and sidewalks.*

Sources

- *NACTO, The Access Management Guidebook, Chapter 2: Standards for Access, Non-Motorized, and Transit*
- *FDOT, Chapter 14-97.001, (State Highway System Access Control Classification System and Access Management Standards*
- *FDOT, Design Manual Topic #625-000-002, Driveways*

11 DRIVEWAY/CONNECTION DESIGN
Warning signage



Photo Source: FHWA

Description

Warning signage can be used to warn motorists of possible bicycle and pedestrian crossings or other locations where motorists may not be expecting pedestrians and bicyclists. One location that warrants signage is shared-use path crossings at driveways, where drivers may need to be warned about the presence of the path and to look both ways for conflicting trail traffic. These signs create more predictability and should be used where conflicts are common or unexpected.

Considerations

- *Install signage in advance of mid-block crosswalks or other locations where pedestrians crossings are less predictable.*
- *Colors for signs and markings should conform to the color schedule recommended by the MUTCD to promote uniformity and understanding from jurisdiction to jurisdiction.*
- *Signage should be free of any obstructions and clearly visible to motorists and pedestrians.*
- *Consider the directional flow of traffic, roadway speeds, and pedestrian and bicyclist visibility.*

Sources

- *FHWA, Manual on Uniform Traffic Control Devices (MUTCD), Standard Highway Signs*

12 SITE FRONTAGE
Sidewalks



Photo Source: NACTO

Description

Sidewalks create a safe and accessible environment around the site by reducing the need to walk along roadways, directing foot traffic, and improving pedestrian comfort. Sidewalks reduce pedestrian crashes and incidences, improve roadway drainage, reduce the need for shoulder maintenance, and provide additional space for signage and amenities.

Considerations

- *Refer to latest FDM for sidewalk width requirements along state roadways. Wider sidewalks should be considered in areas with high pedestrian volumes.*
- *Sidewalks should be graded and placed in areas where water will not pond.*
- *Widen paved shoulders to create a separated walkway if a separate sidewalk is not feasible.*
- *Consider constructed or natural features to provide additional separation between the walkway and road.*
- *Crosswalk markings should be highly visible and non-slip.*
- *Crosswalk markings should be white with reflective properties consistent with MUTCD guidance.*
- *Sidewalks should align with the corresponding curb ramp.*

Sources

- *FHWA, Accessible Sidewalks and Street Crossings, Informational Guide*
- *NACTO, Urban Street Design Guide, Sidewalks*
- *FHWA, Course on Bicycle and Pedestrian Transportation: Walkways, Sidewalks, and Public Spaces*

13 SITE FRONTAGE
Sidewalk setbacks



Photo Source: NACTO

Description

A sidewalk setback increases the distance between the sidewalk and the roadway by adding additional space between the curb and the sidewalk. This additional space provides separation between motorized users along the road and non-motorized users utilizing the sidewalk.

Considerations

Sidewalk setbacks provide space to address the four distinct functional zones of the streetside:

1. *Edge zone - the area between the face of curb and the furnishing zone that provides the minimum necessary separation between objects and activities in the streetside and vehicles in the traveled way.*
2. *Furnishings zone - the area of the streetside that provides a buffer between pedestrians and vehicles, which contains landscaping, public street furniture, transit stops, public signage, utilities, etc.*
3. *Throughway zone - the walking zone that must remain clear, both horizontally and vertically, for the movement of pedestrians. The ADA establishes a minimum width for this zone.*
4. *Frontage zone - the distance between the throughway and the building front or private property line that is used to buffer pedestrians from window shoppers, appurtenances and doorways. It contains private street furniture, private signage, merchandise displays, and can also be used for streetside dining and cafes. This zone is sometimes referred to as the "shy" zone.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Walkways, Sidewalks, and Public Spaces*
- *ITE, Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*

14 SITE FRONTAGE
Bicycle facilities



Photo Source: City of Bellingham, WA

Description

In order to promote non-motorized modes of transportation, bicycle facilities should be integrated into site design. Dedicated bike lanes (conventional, buffered, or separated) and shared-use paths allow bicyclists to feel more comfortable and reduce the risk of collision with pedestrians and/or motorists.

Considerations

- *Follow best practices, such as the FHWA Bicycle Selection Guide, to determine an appropriate bicycle facility.*
- *On state roadways, follow the latest FDM standards for bicycle facility design along the site's frontage.*
- *Refer to the FDM regarding acceptable forms of physical separation for bicycle lanes, including tubular markers, islands, on-street parking, and rigid barriers. Appropriate types of separation are dependent on the design speed of the adjacent roadway.*
- *Roadway and bikeway designs should be selected to reduce the frequency and severity of crashes and minimize conflicts between users.*
- *Trips within a bicycle network should be direct and convenient and offer access to all destinations served by the roadway network.*
- *Transitions between roadways and bikeways should be seamless and clear.*

Sources

- *FHWA, Bikeway Selection Guide*

15 SITE FRONTAGE
On-street parking



Photo Source: Center Coast Realty

Description

On street parking provides a buffer between moving motor vehicle traffic and pedestrians along a sidewalk. This option can also narrow the effective crossing width and encourage slower speeds.

Considerations

- *On-street parking is permissible for state roadways with posted speeds of 35 mph or less and with context classifications of C2T, C4, C5, and C6. If on-street parking is not provided in areas that meet these criteria, it should be considered.*
- *Build curb extensions where pedestrians cross.*
- *At least 20 feet of parking should be removed on the approach to a marked or unmarked crosswalk.*
- *Verify compliance with corner parking regulations to promote pedestrian visibility.*
- *Consider the effects of on-street parking on the visibility of pedestrians crossing the street. This strategy may create a visual barrier for motorists and pedestrians.*
- *When bicycle facilities are placed directly adjacent to on-street parking, appropriate lateral separation should be provided between the parking lane and the bicycle facility to avoid having vehicle doors open into the bicycle facility.*

Sources

- *FHWA, Consideration and Implementation of Proven Safety Countermeasures, On-street Parking*

16 SITE FRONTAGE
Transit stops and amenities



Photo Source: NACTO

Description

Safe access to transit is a core component of transit service delivery. Existing or planned transit stops along the site's frontage can help to encourage transit use as well as serve the site.

Considerations

- *Provide direct and safe paths from the site to the adjacent bus stop/s.*
- *Driveway placement near bus stops should be reviewed to provide proper operations and visibility of oncoming traffic, buses, and transit patrons.*
- *Coordinate with local transit agency to determine how to best serve the site and transit stop/s.*

Sources

- *NACTO, Transit Street Design Guide, Station and Stop Elements*
- *FDOT, Don't Stop at the Stop: Actualizing Safe Access to Transit Final Report*
- *FDOT, FDM Chapter 225 Public Transit Facilities*

17 SITE FRONTAGE
Landscaping



Photo Source: NACTO

Description

Landscaping and green spaces along a corridor can enhance the livability of a community by improving aesthetics, providing environmental benefits, and providing shade for non-motorized users. This feature can/may also break up the monotony of the roadway and promote more attentive drivers around the site.

Considerations

- *Follow FDOT design standards along state roadways.*
- *Utilize landscaping to create natural separation between facilities with different uses including horizontal elements on medians and refuges.*
- *Verify that landscaping is complimentary to sidewalks and pathways between various on- and offsite features and does not obstruct the most direct path.*
- *Street trees are specifically noted in FDM 202 as a potential speed management strategy.*
- *Plant selection is an important consideration in mitigating potential hazards for lane departure crashes.*

Sources

- *FHWA, An Integrated Approach to Sustainable Roadside Design and Restoration*

18 SITE FRONTAGE
Lighting



Photo Source: FDOT

Description

The placement and quality of lighting and illumination has the potential to increase visibility and safety for pedestrians and cyclists on roadways. This feature helps to improve safety at night and during inclement weather.

Considerations

- *Follow FDOT design guidelines for lighting on state roadways.*
- *Install lighting and illumination on both sides of wide streets.*
- *Use uniform lighting levels that provide visibility at night and through adverse weather conditions.*
- *Lighting and illumination should be provided at intersections and street corridors with pedestrian infrastructure.*
- *Lighting and illumination should be provided at controlled or uncontrolled mid-block crossing locations.*
- *Lighting and illumination should be provided along bridges, tunnels, and pedestrian over- and underpasses.*
- *Lighting and illumination should be provided at transit stop locations.*
- *Lighting and illumination should be provided at all other places with high volumes of pedestrian activity.*

Sources

- *FHWA Lighting Handbook*

19 SITE FRONTAGE
Street furniture



Photo Source: Something Curated, Street Furniture

Description

Street furniture includes parking meters, lighting, tree planters, benches, trash receptacles, magazine and newspaper racks, and other forms of furniture. Street furniture not only has functional use for non-motorized users on the corridor, but also adds visual interest which improves aesthetics and encourages use by pedestrians and bicyclists. Street furniture can add to pedestrian comfort and promote economic growth to adjacent businesses.

Considerations

- *Furniture should be durable and suitable to area weather conditions.*
- *Street furniture should be prioritized on roadways with a high volume of pedestrians, where pedestrians are encouraged to linger, and near community features like trails and parks.*
- *Any street furniture should be located outside of the clear zone, consistent with design standards.*

Sources

- *FHWA, Pedestrian Safety Guide and Countermeasure Selection System,Street Furniture/Walking Improvements*
- *City of San Francisco, SF Better Streets: Street Furniture Overview*

20 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Direct pedestrian access to the site

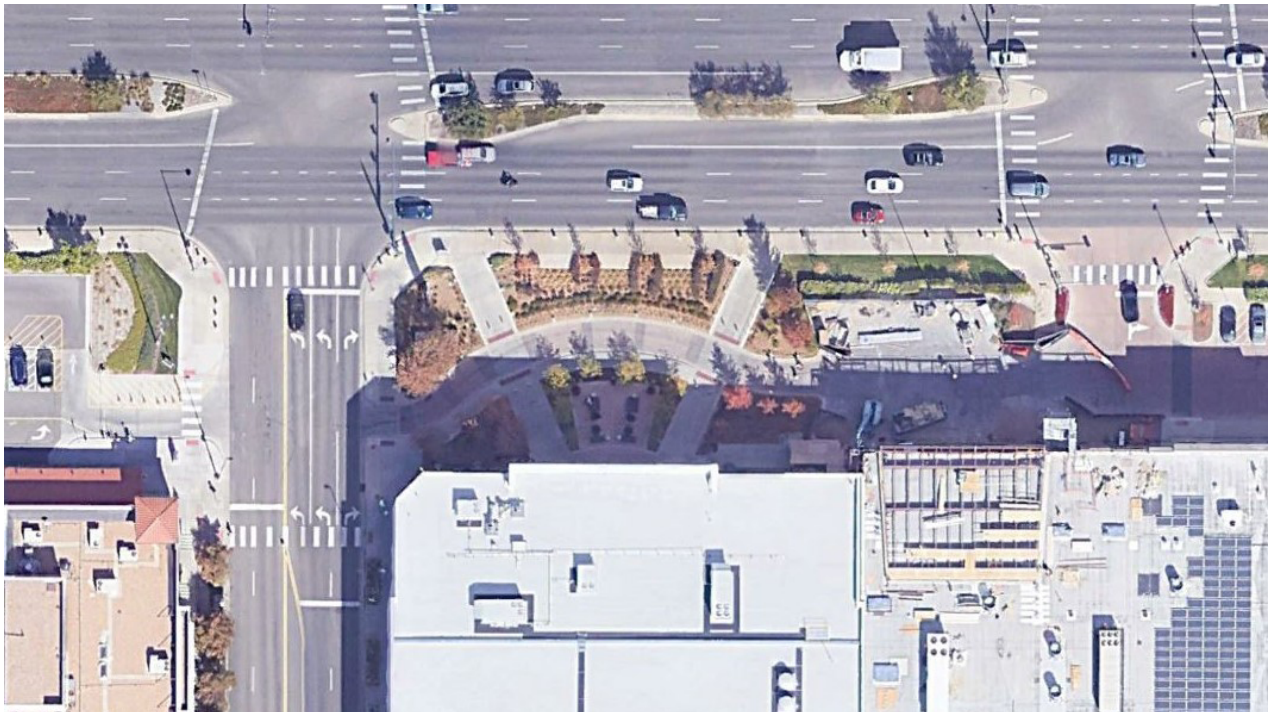


Photo Source: Google Earth

Description

It is important to provide direct, designated access for pedestrians and bicyclists to a site. Often site design only accounts for vehicular access to the site and does not provide access for pedestrians and bicyclists. This can lead to safety issues for pedestrians/bicyclists since they will create their own path through driveways, landscaping, or parking lots. Furthermore, it discourages non-motorized trips which can increase vehicular trips. This in turn contributes to congestion on the roadway system as well as negatively impacting air quality and public health.

Considerations

- *Establish the safest and most direct route from external sidewalks to the building entrance/s.*
- *Provide ADA compliant access using sidewalks and pathways.*
- *Provide wayfinding signage when the route is not obvious to pedestrians.*
- *Provide appropriate signage and pavement marking if crossing internal site roadways or parking lots.*
- *Provide sufficient visibility for motorists and pedestrians.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Walkways, Sidewalks, and Public Spaces*
- *FHWA, Course on Bicycle and Pedestrian Transportation: Land Use Regulations to Encourage Nonmotorized Travel*

21 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS
Building placement



Photo Source: Dan Burden

Description

Site design and building placement is important to pedestrian circulation and safety. Placing a building close to an adjacent roadway enables direct and efficient access for pedestrians. However, considerations should also be made for the conditions of the roadway to confirm this option is compatible with the roadway's context and local land development regulations.

Considerations

- *Consider the existing site conditions, such as views, orientation, natural features and surrounding buildings.*
- *In more urbanized areas, orient buildings and building entrances to the street demonstrating a clear public front and private back.*
- *Consider parking availability and type, roadway speed, and pedestrian traffic.*
- *Create the shortest path between parking, non-motorized facilities, and adjacent buildings.*
- *The number of entrances should increase in proportion to the length of the building and be located along main corridors or at the street corner.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Land Use Regulations to Encourage Nonmotorized Travel*

22 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Paths between multiple buildings



Photo Source: Google Earth

Description

Creating efficient paths between multiple onsite buildings reduces potential conflicts and improves pedestrian circulation onsite.

Considerations

- *Establish the safest and most direct route between building entrances.*
- *Provide ADA compliant access using sidewalks and pathways.*
- *Provide wayfinding signage when the route is not obvious to pedestrians.*
- *Provide appropriate signage and pavement marking when crossing internal roadways or parking areas.*
- *Provide sufficient visibility for motorists and pedestrians.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Land Use Regulations to Encourage Nonmotorized Travel*

23 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Paths through parking area to building entrance



Photo Source: Google Earth

Description

Providing designated pedestrian paths through and between parking areas and to the buildings entrances creates predictability for motorists so they know where to expect pedestrians, and helps to enhance the safety for pedestrians.

Considerations

- *Establish the safest and most direct pedestrian paths.*
- *Minimize conflicts with other modes along the paths.*
- *Design paths to meet ADA requirements.*
- *Provide wayfinding signage when the flow is not obvious to pedestrians.*
- *Provide appropriate signage and pavement marking when crossing internal roadways or parking areas.*
- *Provide sufficient visibility for motorists and pedestrians.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Land Use Regulations to Encourage Nonmotorized Travel*

24 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Path to nearby bus stop/s



Photo Source: Google Earth

Description

Providing a safe and direct path to transit stops and amenities is key in improving access for transit riders. This helps to increase safety by providing predictability around transit stops for motorists and reduce potential conflicts. This may also decrease congestion and parking demand at a site by promoting a viable, non-motorized mode of transportation.

Considerations

- *Establish the safest and most direct pedestrian paths.*
- *Minimize conflicts with other modes along the paths.*
- *Design paths to meet ADA requirements.*
- *Provide wayfinding signage when the route is not obvious to pedestrians.*
- *Provide appropriate signage and pavement marking when crossing internal roadways or parking areas.*
- *Provide sufficient visibility for motorists and pedestrians.*
- *Consider and address the crossing needs of transit users. If a transit stop is on the other side of the roadway from a project site, a safe and convenient crossing should be provided for transit users to access the site.*

Sources

- *FTA, Stops, Spacing, Location and Design*

25 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS
Path to off-site parking

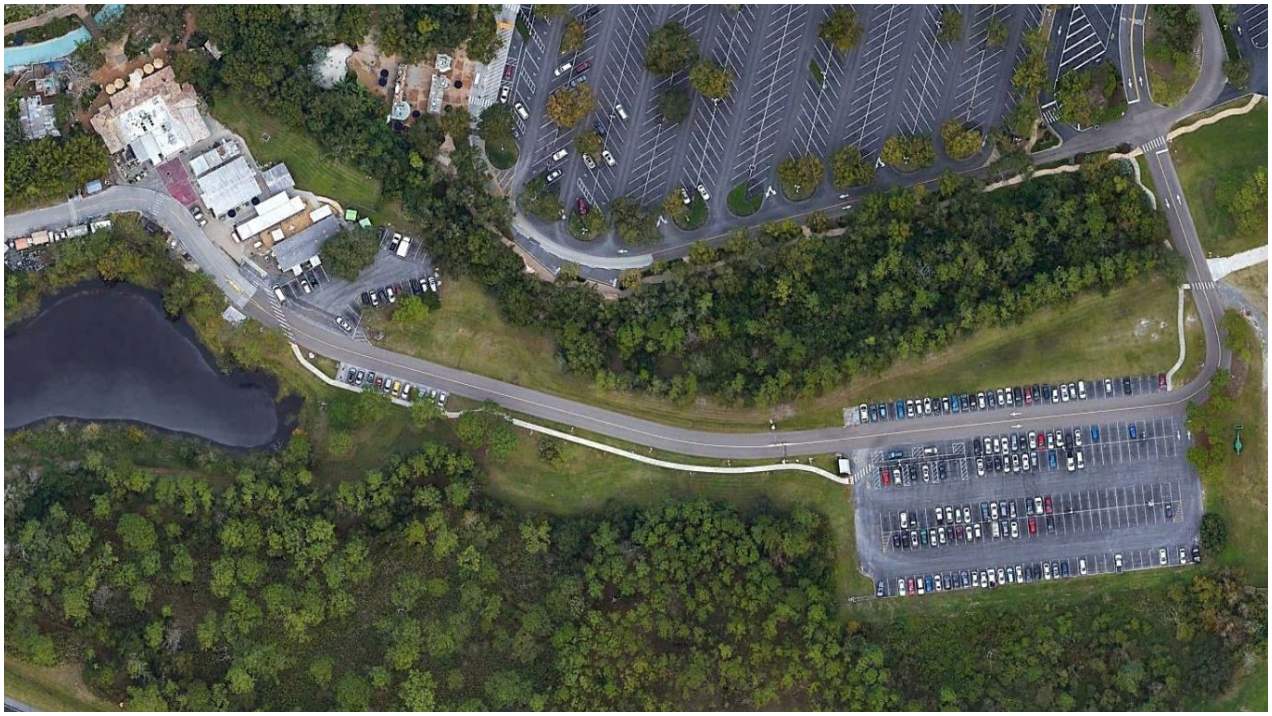


Photo Source: Google Earth

Description

Offsite parking may include public and private parking lots or parking garages. Providing designated, safe, and convenient pedestrians paths to and from offsite parking is critical for enhanced operations and safety.

Considerations

- *Create safe pedestrian facilities at all pathways and for crossing intersections.*
- *Provide adequate separation between pedestrian and vehicular facilities.*
- *Review crossing locations, both midblock and at intersections, to confirm adequate treatment is in place for the anticipated volume of pedestrians.*

Sources

- *FHWA, Access Management in the Vicinity of Intersections*

26 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Path to off-site street crossings

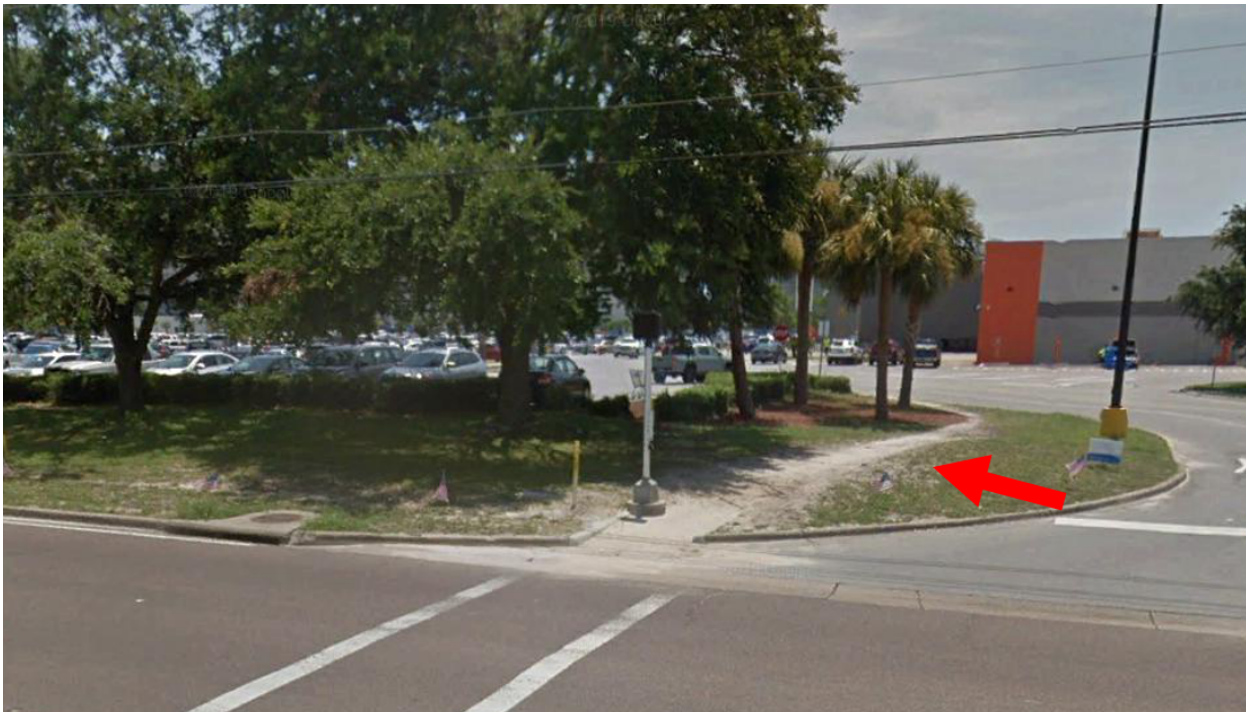


Photo Source: Google Earth

Description

Providing pedestrian and bicycle paths to offsite street crossings helps to maintain connectivity and convenience for nonmotorized users traveling to/from the site.

Considerations

- *Street lighting should be provided along pedestrian and bicycle paths and crosswalks to help provide enhanced visibility and safety.*
- *Accessible curb ramps are required by the ADA at all crosswalks.*
- *Establish the safest and most direct pedestrian paths.*
- *Minimize conflicts with other modes along the paths.*
- *Provide appropriate signage and pavement marking when crossing internal roadways or parking areas.*
- *Provide sufficient visibility for motorists and pedestrians.*

Sources

- *NACTO, Urban Street Design Guide: Crosswalks and Crossings*

27 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Path to off-site community spaces

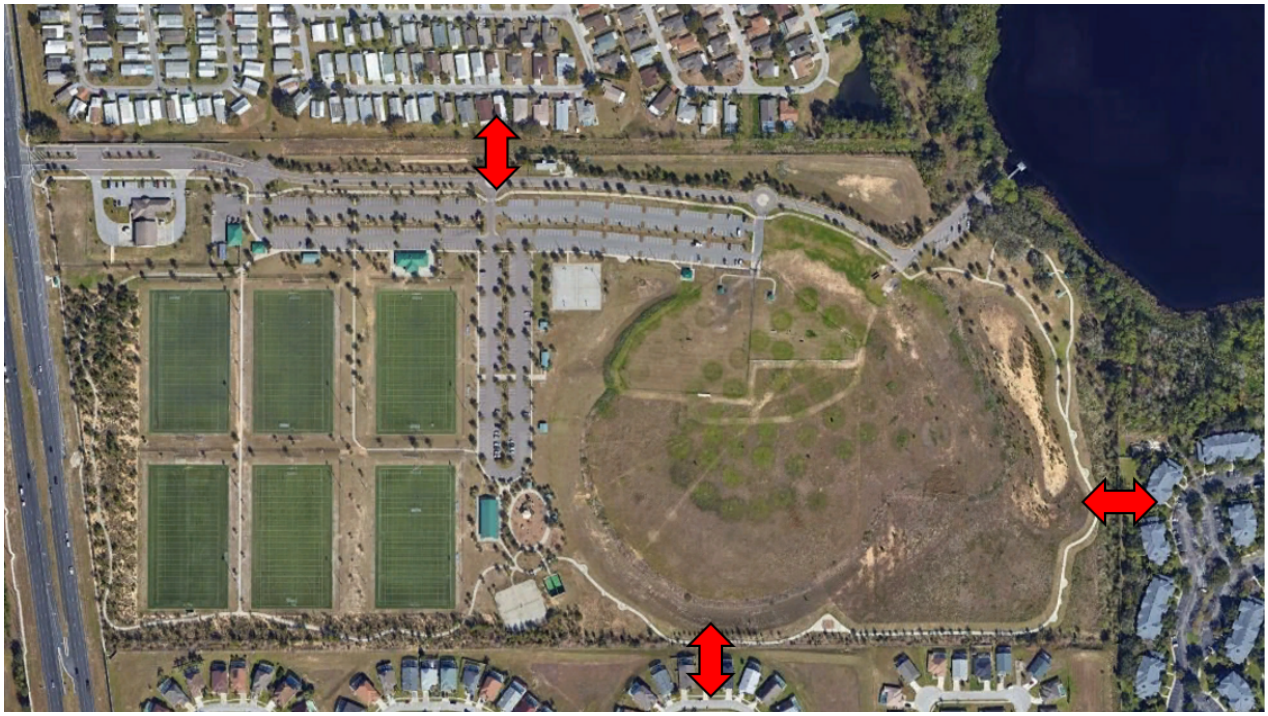


Photo Source: Google Earth

Description

Urban green and community spaces such as parks, sports fields, lakesides, and other recreational and community spaces near the site can be an attraction for non-motorized users traveling to/from the site. Providing direct and safe access using paths to these offsite areas improves the safe and efficient movement of bicyclists and pedestrians traveling to/from the site.

Considerations

- *Establish the safest and most direct pedestrian paths.*
- *Minimize conflicts with other modes along the paths.*
- *Design paths to meet ADA requirements.*
- *Provide wayfinding signage when the route is not obvious to pedestrians.*
- *Provide appropriate signage and pavement marking when crossing internal roadways or parking areas.*
- *Provide sufficient visibility for motorists and pedestrians.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Land Use Regulations to Encourage Nonmotorized Travel*
- *NACTO, Standards for Access, Non-Motorized, and Transit*

28 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Neighboring property access

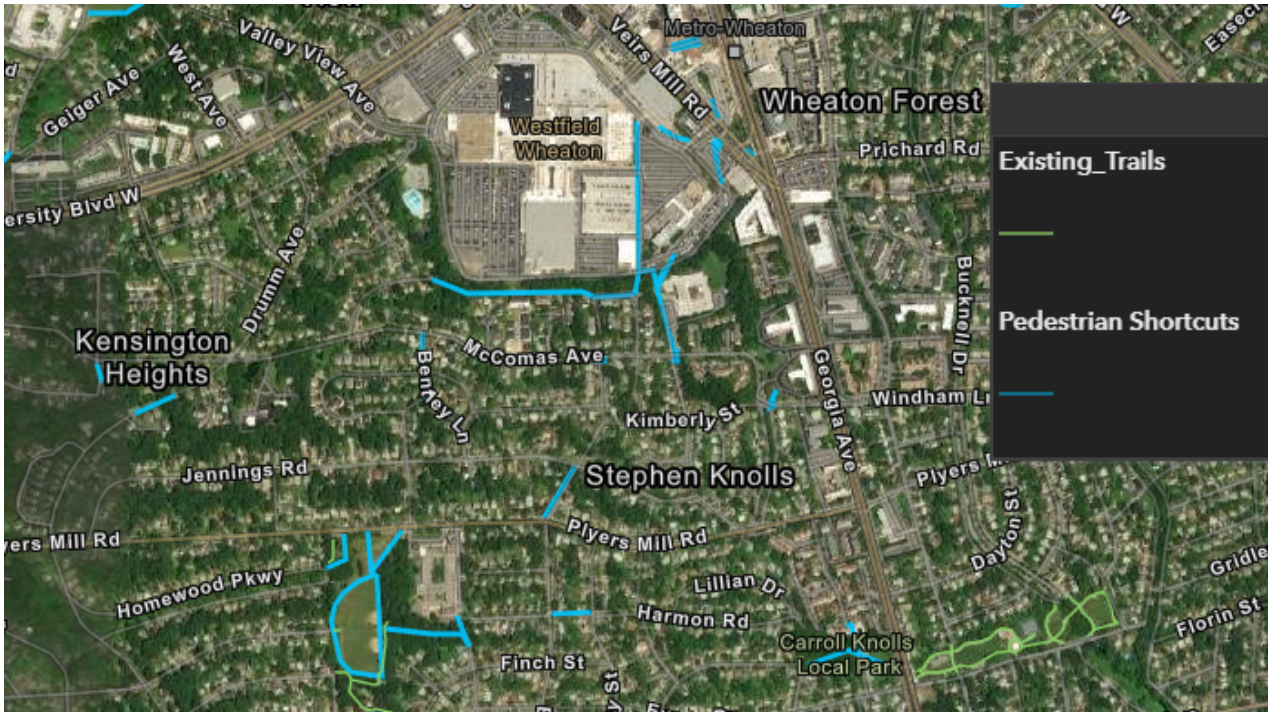


Photo Source: Montgomery County Planning, MD

Description

Creating direct access between neighboring properties reduces pedestrian travel time and helps improve safety. These types of connections can make it possible for non-motorized users to avoid arterial roadways to access key destinations, which greatly shortens trips and can improve pedestrian/bicycle safety. These direct and convenient paths for bicyclists and pedestrians can reduce vehicle trips and lessen the demand on roadways by encouraging walking and biking instead of driving a car.

Considerations

- *Consider the compatibility of the site and adjacent land uses to determine the need for connectivity and access.*
- *Provide ADA compliant access using sidewalks and pathways.*
- *Provide appropriate signage, marking, and other appropriate traffic control devices when crossing adjacent roadways.*
- *Consider providing stub-outs (either sidewalk or roadway) to adjacent properties so that future connections can be established.*

Sources

- *NACTO, Standards for Access, Non-Motorized, and Transit*

29 SITE CIRCULATION & BICYCLE/PEDESTRIAN ACCESS

Onsite wayfinding signage



Photo Source: RSM Design

Description

Onsite wayfinding signage improves the movement and efficiency of foot traffic by helping people navigate the environment. The combination of symbolism, colors, and verbiage can direct users from point to point and communicate progress along the route.

Considerations

- *Wayfinding signage should be placed at key decision points along pedestrian and bike routes and at origins and destinations.*
- *Wayfinding signs should not be placed in or protrude into the pedestrian throughway zone, except for pavement decals.*
- *Pavement decals should not be thicker than ¼ inch to comply with ADA and so as not to create a tripping hazard and shall not have a joint or opening exceeding ½ inch.*
- *Post-mounted signage should be mounted 7 feet above the surface of the sidewalk.*
- *Wayfinding signage should be durable and designed to withstand harsh weather conditions.*

Sources

- *NACTO, Urban Bikeway Design Guide: Bike Route Wayfinding Signage and Markings System*
- *NACTO, Transit Street Design Guide: System Wayfinding & Brand*

30 AMENITIES
Onsite lighting



Photo Source: Adobe Stock

Description

The placement and quality of lighting and illumination helps increase visibility and safety for pedestrians, but it also adds a visually appealing feature to site design.

Considerations

- *Install lighting and illumination on both sides of wide streets.*
- *Use uniform lighting levels that provide visibility at night and through adverse weather conditions.*
- *Lighting and illumination should be provided at onsite intersections and street corridors with pedestrian infrastructure.*
- *Lighting and illumination should be provided at controlled or uncontrolled mid-block crossing locations.*
- *Lighting and illumination should be provided at transit stop locations.*
- *Lighting and illumination should be provided at all other places with high volumes of pedestrian activity.*

Sources

- *FHWA, Lighting Handbook*

31 AMENITIES
Bike parking



Photo Source: DERO

Description

Bicycle parking increases the convenience of bicycling and discourages random placement of parked bicycles. Additional considerations for the placement of bike parking should be made to provide a safe environment for those utilizing this amenity.

Considerations

- *Locate bicycle parking in convenient and visible locations such as along pedestrian paths and near building main entrances.*
- *Place bike parking in convenient and well-lit locations.*

Sources

- *FDOT, FDOT Design Manual, 223 Bicycle Facilities*
- *NACTO, Transit Street Design Guide: Bike Parking*

32 AMENITIES
Showers, lockers, changing rooms



Photo Source: Sports Facility Advisories, LLC

Description

Showers, lockers, and changing rooms create an additional layer of comfort for non-motorized users. This amenity also reduces the difficulties of riding a bicycle to work.

Considerations

- *Confirm that showers, lockers, and changing rooms are located in areas that are convenient to the entrance of the building or from site pathways.*
- *Provide wayfinding signage in locations when necessary.*
- *When it is not possible to provide these amenities, it may be possible to negotiate access for users with an adjoining building or a nearby gym where these facilities are available.*

Sources

- *FHWA, Course on Bicycle and Pedestrian Transportation: Bicycle and Pedestrian Connections to Transit*

33 AMENITIES
Onsite landscaping



Photo Source: Adobe Stock

Description

Onsite landscaping creates dynamic and inviting spaces that attract people and encourage them to engage in meaningful social interaction. Landscaping helps create clean air, water, soil, and can provide shade onsite.

Considerations

- *Utilize landscaping to create natural separation between facilities with different uses including horizontal elements on medians and refuges.*
- *Confirm that landscaping is complimentary to sidewalks and pathways between various on- and offsite features and does not obstruct the most direct path.*
- *Include plans for landscape irrigation and maintenance at the outset.*

Sources

- *FHWA, An Integrated Approach to Sustainable Roadside Design and Restoration*
- *NACTO, Urban Street Design Guide, Sidewalks*

34 AMENITIES
Onsite street furniture

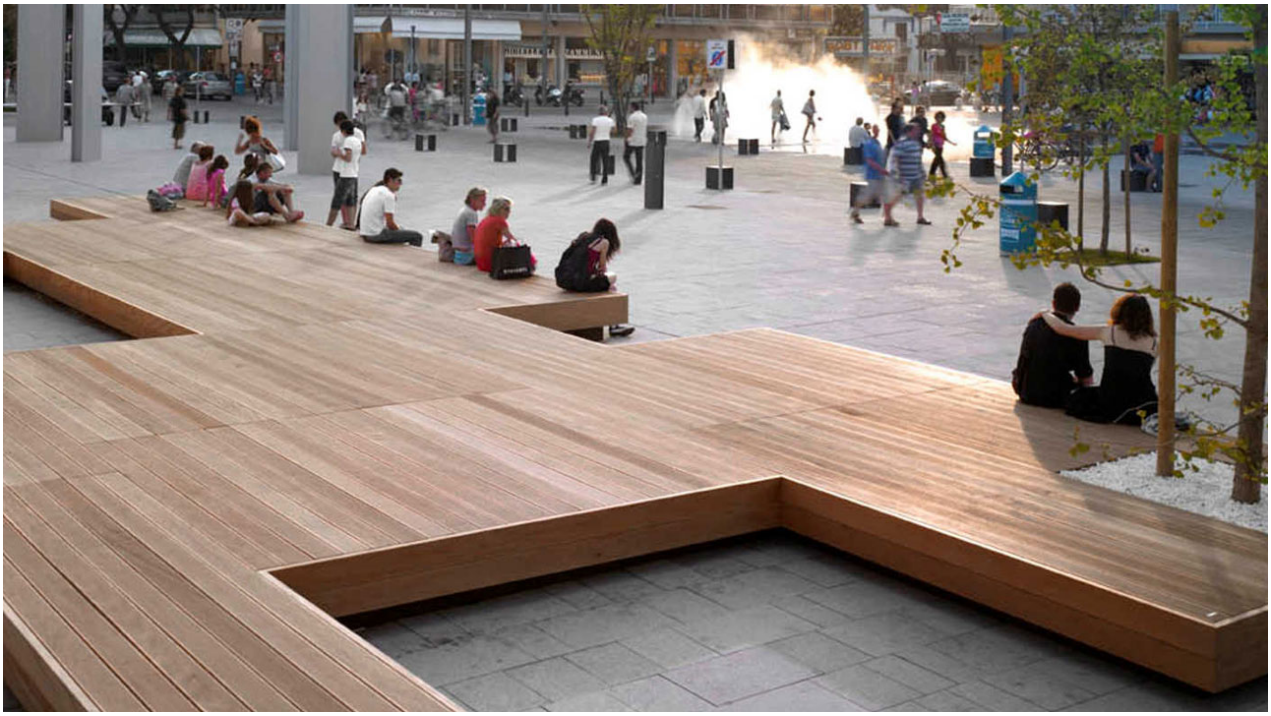


Photo Source: Bailey Street Furniture Group

Description

Street furniture includes parking meters, lighting, tree planters, benches, trash receptacles, magazine and newspaper racks, and other forms of furniture. Street furniture not only has functional use for non-motorized users onsite but also adds visual interest which improves aesthetics and encourages use by pedestrians and bicyclists. Street furniture can add to pedestrian comfort and enhance the pedestrian experience while onsite.

Considerations

- *Confirm proper placement of furniture; do not block pedestrian walkway or curb ramps or obstruct sightlines.*
- *Confirm adequacy of overhead clearances and detectability of protruding objects for pedestrians who are blind or visually impaired.*

Sources

- *FHWA, Pedestrian Safety Guide and Countermeasure Selection System, Street Furniture/Walking Improvements*
- *City of San Francisco, SF Better Streets: Street Furniture Overview*

35 AMENITIES
Shade/weather protection



Photo Source: NACTO

Description

Shade and weather protection are important for community spaces and site design to provide a more comfortable pedestrian environment with shelter from the sun and inclement weather conditions.

Considerations

- *Confirm shade and weather protection does not obstruct line of sight for pedestrians or motorists.*
- *Consider shade or weather protection devices for non-motorized transportation facilities.*
- *Consider using landscaping to provide shade/weather protection in areas where the line of sight would not be obstructed.*
- *Consider shade or weather protection devices near transit stops.*

Sources

- *NACTO, Urban Street Design Guide, Sidewalks*

36 Other offsite improvements



Photo Source: FHWA

Description

Offsite improvements should be consistent with FDOT guiding documents and policies including the FDOT Design Manual (FDM) and FDOT Traffic Engineering Manual (TEM).

Sources

- *FDOT, Traffic Engineering Manual (TEM)*
- *FDOT, Design Manual (FDM)*

Appendix C – Site Design Development and Review Checklist

Review Checklist

Access Management

- ☐ *Are the number of driveways designed with pedestrians and bicyclists in mind (e.g., less driveway density, access management)?*
- ☐ *Is site designed to maximize cross-access to adjacent parcels?*

Driveways/Connections Design

- ☐ *Are pedestrians accommodated at driveways/access points?*
- ☐ *Are driveways appropriately designed and signed to improve drivers yielding to pedestrians at driveways (curb radius, driveway width, corner clearance, throat length)*
- ☐ *Are signs and pavement markings for pedestrian and bicycle access facilities present and effective?*
- ☐ *Do sidewalks extend across the driveway opening and meet the required cross slope per standards across the driveway opening?*
- ☐ *Are crossing points for pedestrians properly signed and/or marked? Are curb ramps provided? Do crosswalks line up with sidewalks?*
- ☐ *Are pedestrian crossings lit and do the lighting levels meet design standards?*
- ☐ *What driveway characteristics increase/decrease pedestrian and bicycle safety (e.g., channelized right turns, large curb radii, wide crossing distances)?*
- ☐ *Does roadway curvature (horizontal and/or vertical) impede adequate sight distance between drivers and pedestrians/bicyclists at the crossings?*

Site Frontage

- ☐ *Are pedestrian and bicycle access facilities shared, separated, or buffered?*
- ☐ *Are there obstacles (e.g., utility poles or signs) in the pedestrian travel path?*
- ☐ *Does vegetation infringe on pedestrian or bicycle access facilities?*
- ☐ *Are there any drop-off conditions that need to be mitigated or shielded?*

Site Circulation & Bicycle/Pedestrian Access

- ☐ *Does the site plan include sidewalks connecting the adjacent roadway network?*
- ☐ *Does the site plan include pedestrian connections to adjacent properties?*
- ☐ *Are there trip generators (such as offsite parking) that lead to pedestrians and bicyclists crossing mid-block?*
- ☐ *If future changes are proposed to the surrounding land use, will pedestrian and bicyclist needs still be met?*

Review Checklist

- ☐ *Do access facilities address pedestrian and bicyclist needs, including those with disabilities per the Americans with Disabilities Act (ADA) requirements?*
- ☐ *Are pedestrian and bicycle access facilities appropriate for the land use?*
- ☐ *Are there any conflicts between bicycles and pedestrians and vehicles?*
- ☐ *Are pedestrian and bicycle access facilities well-lit?*
- ☐ *How does transit infrastructure interact with ped and bike access facilities?*
- ☐ *Do parked vehicles obstruct pedestrian paths?*
- ☐ *Does parking adversely affect bicycle safety?*
- ☐ *Are pedestrian walkways continuous? Are bicycle routes continuous?*
- ☐ *Is there an internal pedestrian connection to connect the building with the parking area?*
- ☐ *Are building entrances located and designed to be obvious and easily accessible to pedestrians?*
- ☐ *If there are multiple buildings on the parcel, is there an adequate pedestrian connection between the buildings?*
- ☐ *Are pedestrian accommodations sited along logical pedestrian routes?*
- ☐ *Do the sidewalks meet the minimum width requirements per the standards?*
- ☐ *Are measures needed to direct pedestrians to safe crossing points and pedestrian access ways?*
- ☐ *Are pedestrian travel zones clearly delineated from other modes of traffic through the use of striping, colored and/or textured pavement, signing, and other methods?*

Amenities

- ☐ *Does the site include pedestrian lighting where appropriate?*
- ☐ *Are there shade and weather protection provided along pedestrian routes on-site?*
- ☐ *Is bicycle parking provided at convenient and visible locations?*
- ☐ *Are other amenities needed such as benches, showers, changing rooms?*

Sources

- *Pedestrian and Bicyclist RSA Guide and Prompt List, FHWA*
- *Model Access Management Policies and Regulations for Florida Cities and Counties, 2nd Edition, CUTR*
- *NY5 Access Management Plan*



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