

# TRANSPORTATION IMPACT ANALYSIS (TIA) Guidelines

## Methodology

For Development Applications  
Requiring a TIA  
Within the River to Sea TPO  
Metropolitan Planning Area



TIA Guidelines

June 2016

## Preface

The River to Sea Transportation Planning Organization (R2CTPO) is responsible for the planning and programming of federal and state transportation funds within the Metropolitan Planning Area (MPA). As part of an ongoing effort to provide a forum that facilitates cooperation and coordination, the R2CTPO has worked with public and private sector transportation professionals to develop a uniform methodology for assessing the transportation impacts of proposed development. The Transportation Impact Analysis Guidelines Methodology was initially adopted by the TPO Board in May 2007 and subsequently updated in November 2009.

The Transportation Planning Organization applauds its members and business partners for working together to develop a reasonable and consistent methodology for use by local governments and the development community. Efforts such as this incorporate smart growth principles and demonstrate the benefits of partnering.

## Table of Contents

<b>LIST OF ACRONYMS.....</b>	<b>1</b>
<b>PURPOSE, APPLICABILITY AND REVIEW SCHEDULE.....</b>	<b>2</b>
<b>1. METHODOLOGY STATEMENT .....</b>	<b>6</b>
<b>2. DEFINITIONS .....</b>	<b>6</b>
<b>3. REPORT FORMAT AND SUBMITTAL REQUIREMENTS .....</b>	<b>6</b>
<b>4. EXTENTS OF STUDY .....</b>	<b>7</b>
<b>5. ANALYSIS SCENARIOS .....</b>	<b>10</b>
<b>6. GENERAL ANALYSIS REQUIREMENTS AND SOFTWARE .....</b>	<b>11</b>
<b>7. TRIP GENERATION.....</b>	<b>13</b>
<b>8. INTERNAL CAPTURE .....</b>	<b>14</b>
<b>9. PASSER-BY CAPTURE .....</b>	<b>14</b>
<b>10. DISTRIBUTION &amp; TRAFFIC ASSIGNMENT .....</b>	<b>14</b>
<b>11. TRAFFIC COUNTS.....</b>	<b>15</b>
<b>12. BACKGROUND TRAFFIC GROWTH/FUTURE TRAFFIC.....</b>	<b>16</b>
<b>13. PHASED DEVELOPMENTS .....</b>	<b>16</b>
<b>14. MITIGATION OF IMPACTS .....</b>	<b>17</b>
<b>15. REVIEW AND COMMENT OF TIA REPORT .....</b>	<b>20</b>
<b>16. APPEAL PROCESS AND SCHEDULE.....</b>	<b>20</b>
<b>17. VARIANCE .....</b>	<b>20</b>
<b>18. TRANSPORTATION IMPACT ANALYSIS SUBMISSION CHECKLIST .....</b>	<b>20</b>
<b>APPENDIX A-1: DEFINITIONS .....</b>	<b>23</b>
<b>APPENDIX A-2: INTERGOVERNMENTAL COORDINATION PROCESS.....</b>	<b>28</b>
<b>APPENDIX B-1: VOTRAN TRANSIT INFRASTRUCTURE RECOMMENDATIONS BY TYPE OF DEVELOPMENT TABLE .....</b>	<b>30</b>
<b>APPENDIX C-1: SAMPLE TIA.....</b>	<b>32</b>
 <b>LIST OF FIGURES</b>	
Figure 1: River to Sea TPO Metropolitan Planning Area Boundary .....	2
Figure 2: TIA Process .....	5

## LIST OF ACRONYMS

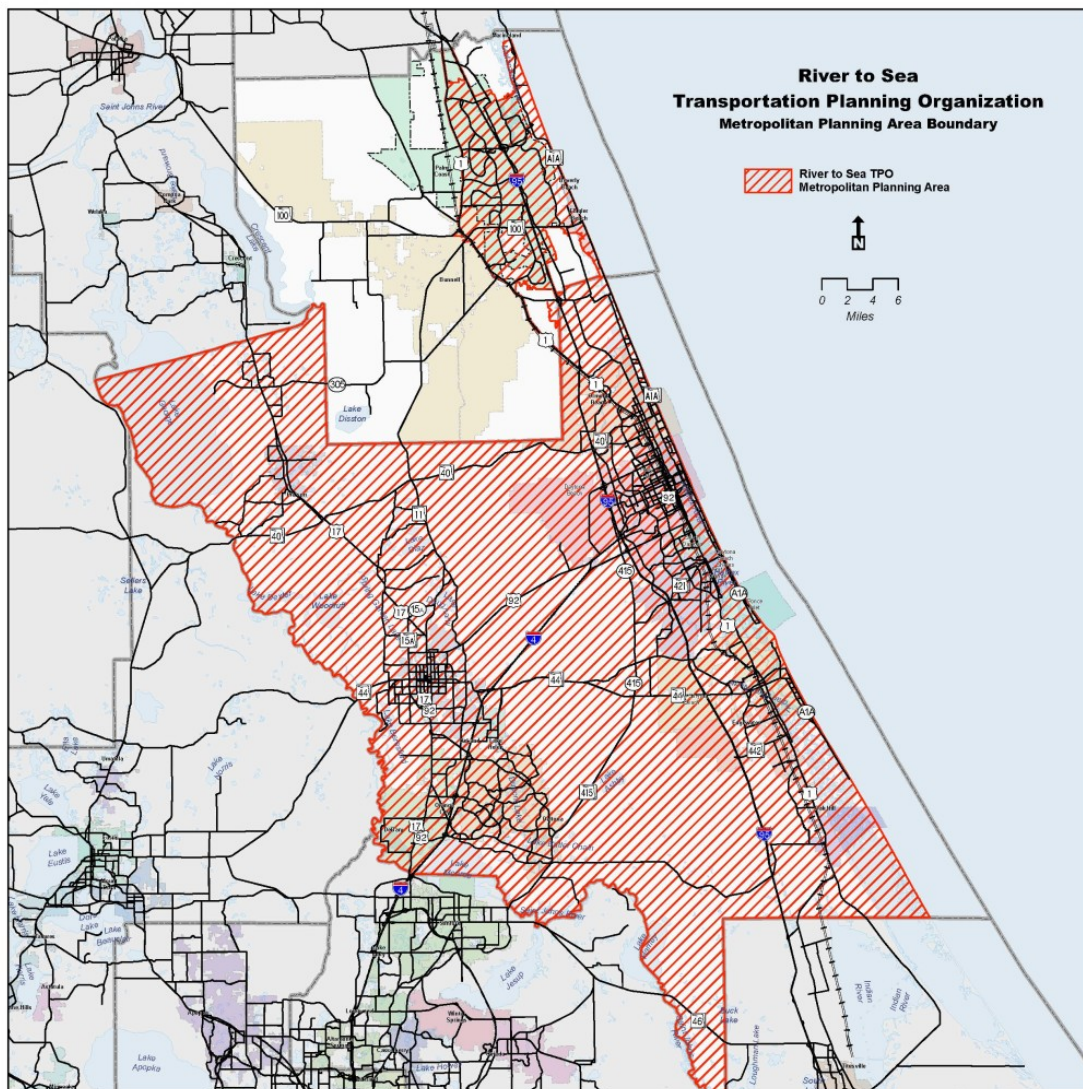
AADT	Annual Average Daily Traffic
ADA	Americans with Disability Act
ADT	Average Daily Traffic
AICP	American Institute of Certified Planners
CFRPM	Central Florida Regional Planning Model
CIE	Capital Improvement Element
CTE	City/County Traffic Engineer
DO	Development Order
DEO	Department of Economic Opportunity
DRC	Development Review Committee
FDOT	Florida Department of Transportation
FCPT	Flagler County Public Transportation
FS	Florida Statutes
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
IOAR	Interchange Operations Analysis Report
ITE	Institute of Transportation Engineers
LDC	Land Development Code
LDM	Land Development Manager
LOS	Level of Service
L RTP	Long Range Transportation Plan
MM	Methodology Memorandum
MOU	Memorandum of Understanding
MPA	Metropolitan Planning Area
MUCTD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
PHF	Peak-hour Factor
PUD	Planned Unit Development
Q/LOS	Quality Level of Service
R2CTPO	River to Sea Transportation Planning Organization
RODEL	Roundabout Delay Software
RRFB	Rectangular Rapid Flashing Beacons
SIS	Strategic Intermodal System
TDP	Transit Development Plan
TIA	Transportation Impact Analysis
TIP	Transportation Improvement Plan
TMC	Turning Movement Counts
TPO	Transportation Planning Organization
TRB	Transportation Research Board
V/C	Volume to Capacity

# PURPOSE, APPLICABILITY AND REVIEW SCHEDULE

## Purpose

A Transportation Impact Analysis (TIA) provides information on the projected traffic expected from a proposed development. A TIA also evaluates the impact of proposed development at full buildout on the multimodal transportation system, including roads, transit, bicycle, and pedestrian facilities.

The purpose of these TIA Guidelines is to provide a coordinated process for performing a TIA within the R2CTPO's Metropolitan Planning Area (MPA). The MPA for the R2CTPO includes Volusia County, Beverly Beach, Flagler Beach, and portions of the cities of Palm Coast and Bunnell, as well as portions of unincorporated Flagler County (see Figure 1). Local governments within the MPA have the opportunity to adopt these TIA Guidelines for use within their respective jurisdictions to be eligible for annual federal funding of transportation projects utilizing XU funds attributable to urbanized areas over 200,000 population.



**Figure 1: River to Sea TPO Metropolitan Planning Area Boundary**

The TIA should identify any potential traffic operational problems or concerns and recommend

appropriate actions to address such problems or concerns. If the TIA determines that the Level of Service (LOS) of the impacted roadway(s) is deficient, potential mitigation strategies and improvements to the transportation system will be required, in accordance with the local government comprehensive plan. The TIA should also identify and address impacts to multi-modal components (transit, bike, and pedestrian) of the transportation system and provide mitigation, as appropriate, for deficiencies.

All TIAs shall be reviewed by local government jurisdictions and agencies, as appropriate, and as required by Appendix A-2 Intergovernmental Coordination Process.

### **Applicability**

The TIA must be provided at the first submission of the Right of Way Use Permit, Overall Development Plan, or the Final Site Plan stage of the development. The applicant is responsible for coordinating with the respective local governments regarding at what development stage this should occur for their specific project. The requirements listed and applicability of this TIA shall be superseded by any future changes to Florida law.

A TIA is not required for a Comprehensive Plan Amendment. Comprehensive Plan Amendments should instead follow State of Florida Department of Economic Opportunity (DEO) requirements. A TIA for rezoning may be required prior to the development TIA to analyze the *net trip difference* between the current and proposed zoning categories rather than the impact of the proposed development as described herein, which includes Planned Unit Developments (PUDs). The need for a TIA or any studies for a rezoning should be coordinated with the respective City or County.

A City is responsible for reviewing all TIAs for developments within their jurisdiction. The respective County will review a TIA within the City's jurisdiction when any of the following conditions are met:

- a) the development occurs in the unincorporated section;
- b) the development requires a driveway connection to a county road; and/or,
- c) the local government request the county's review due to overall transportation concerns.

Any reference to the "City/County" in these guidelines shall mean an incorporated city or any unincorporated areas within Volusia County or Flagler County within the boundaries of the R2CTPO's MPA, its consultants, contractors, or employees, as applicable.

Any reference to the "applicant" includes the applicant, their designee, or consultant responsible for preparing the TIA.

TIAs are managed by the City/County Traffic Engineer (CTE) or designated equivalent. In the absence of a CTE, TIAs may also be managed by a local government transportation planner that has five or more years of transportation planning experience, the American Institute of Certified Planners (AICP) or Professional Transportation Planner (PTP) designations. Any reference to the CTE includes the CTE or his/her designee or the certified transportation planner.

A TIA will be required as determined by local ordinance or if not specified by local ordinance for developments generating:

- 1,000 or more two-way daily external trips on a weekday; or,
- 100 or more peak hour two-way external trips.

Developments generating less than 1,000 two-way daily external trips or 100 peak hour two-way

external trips may also be required to submit a TIA if determined necessary by the City/County Development Review Committee (DRC) and/or CTE.

Any exemptions to performing a TIA or deviating from these Guidelines unless described herein shall be adopted in the local government's comprehensive plan, Land Development Regulations, and/or Technical Standards of the local government and a copy shall be provided to the R2CTPO as the document repository for TIAs and TIA exemptions.

TIAs performed within a city are managed by the City's Traffic Engineer (City CTE). For TIAs performed within a city, it is Volusia County's policy not to meet with the applicant (or their designee) without the respective CTE or City review staff in attendance. Flagler County, at its discretion, may decline to meet with the applicant (or their designee) without the respective CTE or City review staff in attendance. A City, at its discretion, may decline to meet with applicant without CTE or County review staff in attendance. A TIA methodology shall be finalized and approved by the review agency(s) prior to submitting a TIA. This requirement saves review time, commenting, and significant TIA changes, which are costly to developers and local agencies. It is recommended that the TIA Submission Checklist be used during the methodology meeting to indicate specific elements of the TIA that will be required with the submission, such as models and analysis periods as further detailed in Section 18.

LOS standards and concurrency (if applicable) are determined by the local jurisdiction on state and county roads per s. 163.3180(5)(a), Florida Statutes (FS), and are evaluated during the TIA process to determine the entire project's impact on the thoroughfare system and to discuss potential mitigation measures at the beginning of the development process. Successful evaluation of *preliminary concurrency* as part of the TIA does not guarantee that *final concurrency* will be met at the time of the Development Order (DO) application, since *final concurrency* is granted at the time of the DO application. Larger projects that consist of several phases sometimes take years to complete the acquisition of a DO for all phases. During that timeframe, new road conditions or problems could surface that would require additional analysis and possible mitigation.

The applicant should note that the CTE reserves the right to request additional information, data or study after review of the Methodology Memorandum (MM) or the TIA. An itemized written response to the MM or TIA comments will be required from a professional engineer prior to any approvals.

## **Review Schedule**

The review schedule for a TIA methodology or TIA shall be in accordance with the applicable section of the City/County Zoning Ordinance or Land Development Code (LDC).

Failure on the part of the applicant to adhere to the applicable schedule may result in the City/County requiring updates or revisions to the analysis because of changing background conditions. If, after following the review process, the information submitted is not adequate for City/County staff to develop conditions of development approval, staff shall prepare a recommendation for denial of the development for insufficiency of supporting information.

## **TIA Development Process**

The process for developing the TIA as prepared using the guidelines is illustrated in Figure 2.

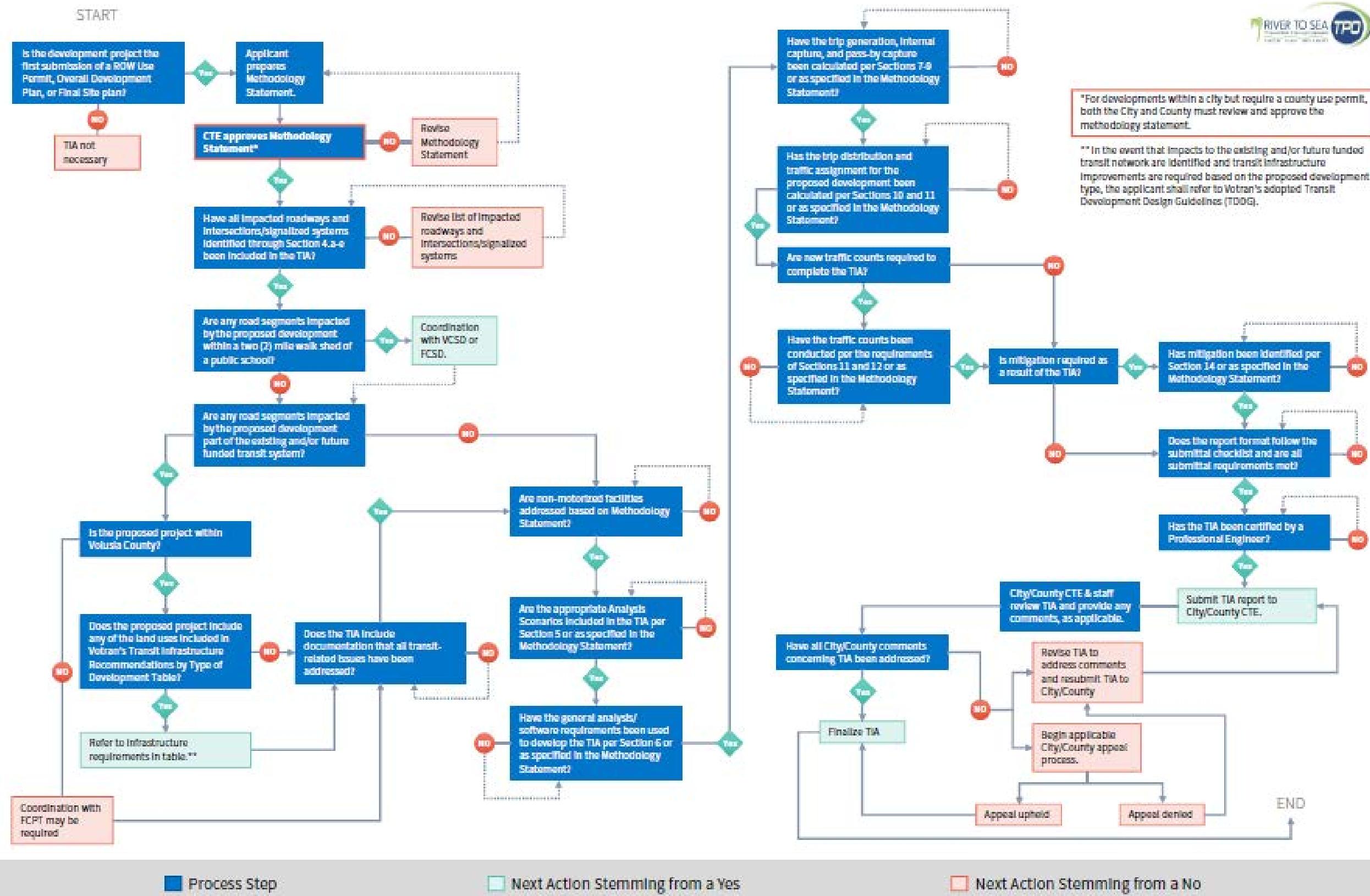


Figure 2: TIA Process



# 1. METHODOLOGY STATEMENT

Prior to conducting the TIA, a written methodology statement shall be prepared by the applicant and submitted for review and approval by the CTE. The purpose of the methodology statement is to establish agreed upon methodologies and assumptions prior to the start of the study, corresponding to the issues outlined in the following sections. The methodology statement shall be prepared using the guidelines provided in the following paragraphs, considering the requirements of Section 18 TIA Submission Checklist.

The methodology statement will first be reviewed by the CTE, if necessary, through a methodology meeting (or correspondence) with the applicant. Following review of the methodology statement by the CTE, the applicant will then revise the statement if necessary based upon agreed upon methodologies. The applicant shall not prepare a TIA without an approved methodology statement signed by the CTE.

For developments within a city that require a county use permit (e.g., Right of Way Use Permit), both the city and county must review and approve the methodology statement. Developments that generate 5,000 Average Daily Traffic (ADT) or more requires coordination with FDOT.

The methodology agreement shall be valid to govern submittal of the TIA for a period of six (6) months. In some sections, these TIA Guidelines identify optional ways to undertake elements of the analysis, and the methods to actually be applied should be agreed upon in the methodology process.

# 2. DEFINITIONS

For purposes of these Guidelines, the definitions included in Appendix A-1 shall apply.

# 3. REPORT FORMAT AND SUBMITTAL REQUIREMENTS

## Report Format

For consistency purposes and ease of City/County review, the TIA report shall include all items identified in the TIA Submission Checklist provided in Section 18 in corresponding order, as appropriate, unless otherwise directed by the CTE.

## Submittal Requirements

The applicant has flexibility in how the TIA report is formatted, but must clearly include the information required as described herein with sufficient detail and supporting graphics. Maps and other illustrative graphics accompanied with summary text, where appropriate, is encouraged.

In addition, the TIA must include:

- a) A title page which will include the development name and project number assigned by the local government, City/County, the developer's name, company, address and phone number, the professional engineer's name, company, address and phone number and the TIA preparation date.

- b) A table of contents shall be provided which lists the figures, tables, chapters and appendices.
- c) Each page of the report body and appendices shall be numbered.
- d) A copy of the project site plan.
- e) A completed and signed Transportation Impact Analysis Submission Checklist.

Two (2) printed copies of the TIA and one electronic version in .pdf format of the TIA (including all plans graphs, figures, diagrams, etc.) must be submitted to the City/County for review as a standard amount, unless a lower number is specified by the CTE. If another jurisdiction is reviewing the TIA, the same shall be provided to that jurisdiction for review. All model/GIS maps and pertinent figures/graphics must be provided in color. The applicant is encouraged to use the PDF bookmark function to allow City/County review staff to more quickly navigate through the document. Include on the electronic version submittal, in separate file folders, all computer files, which could include (but are not limited to) the currently adopted Central Florida Regional Planning Model (CFRPM) and all capacity analyses and signal system analysis files. A copy of the TIA shall also be submitted to the Florida Department of Transportation (FDOT) District 5 DeLand office, when the project site meets the conditions of Section 4b below for a designated strategic intermodal system (SIS) facility.

The reviewing jurisdiction reserves the right to return a TIA report without review that does not meet the requirements noted in this section.

### **Certification by the Professional Engineer**

A certification page shall be provided in the TIA, which must include the professional engineer's signature, seal, current registration number in the State of Florida and a statement that the professional engineer is trained in traffic engineering and was responsible for and in charge of the TIA preparation.

## **4. EXTENTS OF STUDY**

### **Roadways, Intersections, and Signalized Systems**

For purposes of this section, the term "Major Roadways" may include all existing collector (major and minor) and higher-classified roadways per the latest, adopted R2CTPO Federal Functional Classification Map, and those scheduled for construction within the first three (3) years in the adopted R2CTPO's Transportation Improvement Plan (TIP), and/or adopted local jurisdiction's Capital Improvement Element (CIE), and/or major roads under construction by a non-governmental party (e.g., built by developers).

Impacted roadways and intersections/signalized systems that must be studied in the TIA shall include:

- a) The major roadway segment(s) to which the site has direct connections, or to which the site has most direct access via local/non-major streets (if the site has no direct connection to major roadways).
- b) All roadways of the project where the project's peak hour trips consume three percent (3%) or more of a roadway's two-way peak hour generalized service volume based on the adopted LOS and committed number of lanes, unless otherwise specified by the City/County.
- c) All roadways currently operating at critical or near critical volume to capacity ratios must be

- included in the study network.
- d) Major intersections (all signalized intersections and unsignalized intersections of major roadways that cross another major roadway) and signalized systems that are part of the impacted threshold roadways.
  - d) The intersection(s) and signalized systems of the major roadways with the non-major roads that provide access for 50 or more peak-hour development trips to or from the site (two-way total) to the major road network.
  - e) An interchange operations analysis report (IOAR) shall be submitted when deemed appropriated by the CTE.
  - f) The CTE shall be able to add segments and/or intersections to be analyzed based on traffic capacity or safety concerns.

For purposes of determining if peak hour development traffic consumes the threshold values of the existing service volume of a roadway in Volusia County, the allowable capacity, in the annual County of Volusia's Average Annual Daily Traffic (AADT) and Historical Counts spreadsheet (referred to hereafter as the Volusia County AADT spreadsheet and found on the Volusia County Traffic Engineering website: [www.volusia.org/services/public-works/traffic-engineering](http://www.volusia.org/services/public-works/traffic-engineering) shall be used for development applications within Volusia County unless otherwise directed by the CTE. Capacity and adopted service volumes within this source are based upon the generalized roadway service volumes from the Generalized Service Volumes tables of the FDOT current Q/LOS Handbook and have been coordinated with local governments.

Applications for development within Flagler County shall utilize FDOT Generalized Service Volume tables, the R2CTPO service volumes tables or other capacity tables as directed by the CTE. Traffic counts shall be the latest available FDOT AADT traffic counts or the latest available Flagler County and Palm Coast traffic data (which is collected biennially), as directed by the CTE. If a question arises regarding the 2-way peak hour service volume of a roadway, coordination with the appropriate local jurisdiction that is responsible for designating the LOS standard shall occur and any difference between jurisdictional agencies will be documented.

The TIA will also include an evaluation of the traffic circulation at the development entrances in relation to the adjacent intersections and internally within the site. This assessment must include the vehicular stacking and storage provided for site plans at the entrance driveways in advance of any parking stalls or driveway aisles. Freight circulation shall also be addressed as appropriate in the traffic circulation analysis.

Further, an assessment of the potential for traffic generated by the proposed development to increase traffic through established neighborhoods, and potential mitigation measures as appropriate, shall be included.

### **Transit**

Impacts to the existing or future funded transit network on road segments within the TIA analysis area identified under Section 4.b must be assessed as part of the TIA. Coordination with the respective public transit provider—Votran in Volusia County, Flagler County Public Transportation (FCPT) in Flagler County, and FDOT or appropriate governing entity for SunRail should occur as directed by the CTE. The existing transit network refers to the transit service operating today and the future funded transit

network refers to the existing system plus improvements identified within the adopted Long Range Transportation Plan (LRTP) Cost Feasible Plan or funded within the respective 10-year Transit Development Plan (TDP).

The TIA should clearly demonstrate the relationship of the proposed development to the existing and/or funded future transit network. For TIAs within Volusia County, if impacts are identified to the existing and/or future transit network on road segments within the TIA analysis area identified under Section 4.b, the applicant shall refer to Votran’s Transit Infrastructure Recommendations by Type of Development Table. In the event that impacts to the existing and/or future funded transit network are identified and transit infrastructure improvements are required based on the proposed development type, the applicant shall refer to Votran’s adopted Transit Development Design Guidelines (TDDG).

Potential transit impacts in Flagler County shall be coordinated with FCPT based on funded transit service improvements included in the adopted FCPT TDP or R2CTPO adopted LRTP Cost Feasible Plan.

Documentation that impacts to Votran, FCPT, and/or SunRail networks have been reviewed and agency contact has been made, as appropriate, must be included within the TIA. Potential options to address identified transit impacts shall be discussed and documented during the TIA process.

### **Bicycle Facilities, Pedestrian Facilities and Multiuse Trails**

The site plan and recommended improvements shall be reviewed to ensure that pedestrian, bicycle and multi-use trail traffic can be accommodated safely and efficiently, where appropriate. The TIA should document existing and planned pedestrian and bicycle facilities within the project extents. The appropriate level of pedestrian and bicycle impact analysis in the TIA should be identified in the methodology. In making this determination, at a minimum the following questions should be considered:

- a) Are pedestrian and bicycle needs safely accommodated on-site and off-site?
- b) Will the proposed development maintain or improve safety for pedestrians and bicyclists?
- c) Will the proposed development’s access points increase potential conflicts with pedestrians and bicycles?
- d) Will site-generated traffic adversely affect pedestrians and bicycles?
- e) Will site-generated traffic adversely affect existing and planned pedestrian and bicycle facilities?
- f) How will proposed mitigation affect pedestrians and bicyclists?

At a minimum, the TIA should indicate that the proposed project will maintain or improve existing conditions for pedestrians and bicyclists. The TIA should identify any existing and planned bicycle or pedestrian facilities that are in the project area and identify facilities that would be modified or adversely affected by the proposed development. An adverse pedestrian or bicycle effect would occur if the project were to result in unsafe conditions for pedestrians or cyclists, including unsafe increases in pedestrian and/or bicycle conflicts with motor vehicles. The TIA should document all analysis of bicycle and pedestrian needs, including adverse effect and proposed mitigation. Consideration of the need for bicycle and pedestrian facilities should be based on location of nearby schools, generators and attractors, and the likelihood that they will be used as a productive transportation facility. The TDDG also includes recommendations for bicycle and pedestrian facilities, including site layout, lighting, and crime prevention through environmental design.

The applicant should provide specifics on where pedestrians will access the development, mid-block crossings (if any), locations of safe refuge, convenient and safe transit stops, etc. The applicant shall evaluate if pedestrian volumes warrant crossing treatments such as new crosswalks, flashing beacons, rectangular rapid flashing beacons (RRFB), pedestrian signals, etc. Consultation with the CTE and other relevant parties during the TIA preparation will be useful in assessing such adverse effects. For development projects that are within a two (2) mile walk zone of a school or college, consultation with the local school district or private educational body is required.

To determine adverse effects on pedestrian and bicycle facilities, including Americans with Disabilities Act (ADA) requirements, the following criteria should be evaluated as part of the TIA process as determined by the CTE:

- a) Road width
- b) Road design
- c) Acceptable grade
- d) Alignment where sidewalk crosses driveway
- e) Driveway widths
- f) Connection of street sidewalk and parking areas to building entrances
- g) Connections between adjacent developments/uses
- h) Access to adjacent and nearby pedestrian and bicycle facilities
- i) Traffic speed
- j) Traffic control operation and timing favorable to safe pedestrian crossing
- k) Whether right-turns-on-red should be prohibited to protect bikes and pedestrians
- l) Other items: sight lines, lighting, pavement condition, signing, curb extensions and pedestrian refuge medians.

## 5. ANALYSIS SCENARIOS

- a) "Existing scenario" is defined as the analysis of existing traffic on the existing network. The existing network includes all existing roads, major roads under construction by a non-governmental party, plus all improvements for which construction contracts have been executed by government agencies at the time the proposed transportation methodology statement is initially submitted.
- b) "Future scenario" is defined as the analysis of existing traffic, plus background traffic (derived from growth rates, vested trips, or combination of both), plus the project's traffic placed on the existing network, plus all improvements funded for construction within the first three (3) years of the local jurisdiction's adopted CIE and/or adopted R2CTPO's TIP. If there is a conflict between the local jurisdiction's CIE and the R2CTPO's TIP, the local jurisdiction's CIE will be the controlling document for roadways not using state or federal funds. An adopted model, as specified by the CTE shall be used as the base for future year scenarios.

It should be noted that improvements funded for construction in the CIE or TIP may be relied upon for purposes of identifying solutions to future road operating conditions; however, the local jurisdiction may include in years two (2) and three (3) in any proportionate-share computation that might be required for the proposed development in accordance with

Florida Statutes and the local jurisdictions proportionate fair share ordinance.

If signalization is proposed as a mitigation measure, Florida DOT signal warrant summary worksheets shall be provided for the location(s) proposed for signalization. If a multi-way stop is proposed as a mitigation measure, then a multi-way stop sign warrant summary worksheet shall be provided for the location(s) proposed using the most up-to-date Manual on Uniform Traffic Control Devices (MUTCD).

- c) “Future scenario with Mitigation” is defined as analysis of the **Future Scenario** with the inclusion of any other improvements that are required for mitigation. This analysis scenario will be required only if mitigation is required as the result of the future scenario analysis.
- d) If the development is located in a present or future urbanized area, as determined by the CTE, an evaluation of present and programmed bike, pedestrian, and transit mobility options is necessary and is referred to as an “Alternative Mode Analysis.” A system assessment of sidewalks, bikeways and existing transit routes should be documented. The site plan should also address how walking, bicycling and transit ridership will be encouraged through one or more of the following:
  - safe, adequately lit and well maintained pathways;
  - shelters along sidewalks;
  - bicycle Parking facilities;
  - identifiable crosswalks;
  - transit bus stops & transit stop amenities (i.e., bench, bus shelter, etc.);
  - phased traffic signals to accommodate pedestrian movements;
  - removal of natural and/or built barriers that discourage walking;
  - compliance with ADA requirements on-site and for site connections;
  - buffering between vehicular areas and sidewalks;
  - linkage to existing or future walkway and/or bikeway network and transit route; and,
  - implementation of the Votran’s TDDGs

## 6. GENERAL ANALYSIS REQUIREMENTS AND SOFTWARE

The following general analysis requirements and software shall be used in development of the TIA unless otherwise agreed-upon during the methodology review or specified by the CTE.

- a) Determination of the time(s) of day and day(s) per week of the traffic analysis will be made by the CTE during the methodology process based on the site location and development type.
- b) LOS will be analyzed for all site-access intersections and the major road segments and intersections included in the network defined by the Extents of Study Section. All site access is to be determined using the applicable City/County code and maintaining agency’s code. If the City/County code and maintaining agency code concerning access and/or access management are not consistent, then the more conservative requirement shall be used in the TIA.
- c) Road analysis sections shall be developed based on acceptable engineering and planning practices inclusive of all modes comprising the transportation system.
- d) All analysis shall be undertaken for conditions during the 100<sup>th</sup> highest hour of the year.

e) The use of the FDOT's 2-way peak hour generalized tables is permitted as an initial screening tool. If failure is estimated, then more detailed analysis may be undertaken using the procedures described below:

- 1) For unsignalized intersections, the latest version of Highway Capacity Software (HCS) is preferred. For signalized intersections, the latest version of HCS or Synchro software using the HCS methodology is required.
- 2) Use the FDOT's ARTPLAN (interrupted flow road segment analysis), HIGHPLAN or Synchro (uninterrupted flow roads (those with more than two-mile signal spacing)), FREEPLAN, and/or HCS depending on the characteristics of the study roadway for road link analysis. This should be discussed at the methodology stage. Refer to FDOT's Site Impact Handbook and FDOT's Q/LOS software website for further guidance.
- 3) For any analysis of roundabouts, at a minimum, the latest version of HCS or Synchro software using the HCS methodology is required. Other analysis tools specific to the analysis of roundabouts, such as Roundabout Delay (RODEL) and SIDRA, may also be used based on upon approval by the CTE during the methodology review.
- 4) The hard copy of the summary sheets and electronic files of the software inputs and results must be provided.
- 5) Other analysis software may be required to address situations not addressed by the above provisions, or if requested by the applicant and approved by the CTE during the methodology step.
- 6) If any analysis software is used as an alternative to the FDOT's 2-way peak hour generalized tables, detailed analysis of all signalized intersections within the analysis section is required.

The following data shall be field verified and provided in the report including, but not limited to:

- (a) Class of roadway (interrupted or uninterrupted)
- (b) Road Maintaining Agency
- (c) Area type
- (d) LOS standard of the appropriate local jurisdiction
- (e) Geometry, including lane widths and turn-lane lengths
- (f) Heavy vehicle factor (i.e., percentage trucks)
- (g) Directional factor (D Factor, not to be less than 0.52 for the future conditions analysis)
- (h) Peak-hour factor (PHF), not to exceed 0.95 for the future conditions analysis)
- (i) Values of the above parameters should be estimated in the future conditions analysis to reflect unconstrained demand conditions.

Signal density

- (j) Existing signal timing and phasing can be obtained from the County Traffic Engineering Division (or applicable City Engineering Division). The existing signal timing, including its maximum and minimum settings, shall be used for the initial analysis of future conditions. Any signal timing changes outside of the existing minimum and maximum setting may be presented for County approval (or applicable City approval) as part of the mitigation strategy. Any proposed signal timing or phasing modifications must be submitted with appropriate documentation as required by the CTE.
- (k) Analysis section lengths shall be as defined in Volusia County/R2CTPO annual

level of service spreadsheet. If any portion of the analysis section falls within the three (3) analysis roadways identified under Section 4b, then the entire analysis section shall be analyzed.

## 7. TRIP GENERATION

Each traffic impact study will list all project land uses, applicable Institute of Transportation Engineers (ITE) land use code, building size(s) and/or dwelling units. The trips from/to the site shall be estimated using the trip generation rates or equations in the latest edition of ITE's *Trip Generation Manual*. Other rates may be required by the CTE, or may be used if requested by the applicant and approved by the CTE during the methodology review.

If the applicant can provide evidence of a prior use on the site, the TIA shall address the net decrease or increase in trips associated with the proposed land use, though a decrease in trips associated with a prior use should be discussed during a methodology review as this may negate the need to complete a TIA (though an analysis of safety and access management issues may still need to be completed). If the site was dormant during collection of the traffic count data, then the analysis must add the "prior vested" portion of the development traffic as "background" traffic. The CTE, at their discretion and in accordance with local plans, may provide credit for trips generated by a prior use on a sliding scale over a five year period as indicated below.

- 1st Year: 100% credit of trips generated by prior use
- 2nd Year: 80% credit of trips generated by prior use
- 3rd Year: 60% credit of trips generated by prior use
- 4th Year: 40% credit of trips generated by prior use
- 5th Year: 20% credit of trips generated by prior use
- After 5 years, 0% credit provided for trips generated by prior use

To address the local government's goals for infill development, the CTE may further increase the percentage of credit, up to 100% credit.

If a site specific trip generation study of the same type or similar land use should be proposed by the applicant, then the applicant will need to analyze a minimum of three (3) separate similar land use sites approved by the CTE. The survey data will be collected for at least a continuous seventy-two (72) hour period between Monday 6:00 p.m. and Friday at 6:00 a.m., or as otherwise determined by the CTE. Legal holidays or other days specified by the CTE will be excluded. Selection of other trip generation study times will be made when it is determined by the CTE that collection of the data between the above times will not result in a reasonable estimation of the trip generation characteristics of the proposed land use. The data will include the following:

- a) Summary of traffic count data by fifteen (15) minute increments
- b) Average daily volume during a.m. and p.m. peak hours of the adjacent street
- c) The accuracy of the traffic counts will be verified by performing manual counts and comparing them to machine counts twice daily, once in the a.m. and once in the p.m. for each day of the traffic counts
- d) All data will be subject to review and acceptance. This review will be based on currently accepted traffic engineering principals



## 8. INTERNAL CAPTURE

The use of an internal capture factor will be allowed for certain types and sizes of mixed-use developments. Calculation of internal capture rates must be documented in the Internal Capture Worksheet. Allowable sources for internal capture rates are identified below; however, in no case will an internal capture of more than 20 percent (20%) of the gross project trip ends (or the internal capture rates or equations contained in the most recent version of ITE's *Trip Generation Manual*) be allowed, unless the CTE accepts a higher internal-capture percentage based on verifiable documentation (e.g. field studies of comparable sites).

- a) The internal capture rate from a previous traffic impact analysis of a similar land use approved by the CTE.
- b) National Cooperative Highway Research Program (NCHRP) Report 684: Enhancing Internal Trip Capture Estimation for Mixed-Use Developments (March 2011)
- c) A site specific capture study of the same type or similar development approved by the City/County. Such a site specific study will be conducted at three (3) separate similar land use sites. The survey data will be collected for at least a two consecutive hour period each day for three (3) days between Tuesday at 12:00 p.m. and Thursday at 8:00 p.m., or as otherwise determined by the CTE. Legal holidays or other days specified by the City/County will be excluded. Selection of other internal capture study times will be made when it is determined by the CTE that collection of the data between the above times will not result in a reasonable estimation of the internal capture characteristics of the proposed project.

The data will include a summary of internal capture data by fifteen (15) minutes increments during the peak hours of the adjacent street. All data will be subject to review and acceptance by the City/County. This review will be based on currently accepted traffic engineering principals.

## 9. PASSER-BY CAPTURE

The total gross external trips of the project traffic may be reduced by a passer-by factor to account for the project traffic that is already traveling on the adjacent roadway. Passer-by rates are developed for commercial development only.

Passer-by estimation shall be based on ITE, impact fee ordinance, or other methodologies as approved by the CTE. The total passer-by capture shall not exceed 14 percent (14%) of the total background traffic on the adjacent roadway, unless approved by the CTE. In analysis of the site-access intersections with major roads, the passer-by trips shall be included and separately identified (i.e., evaluated based on the full passer-by, not the reduced passer-by to ensure driveways are designed correctly).

The passer-by capture percentage shall be computed as the sum of the number of trips entering plus exiting the site land uses claimed as captured divided by the number of background trips passing by the site on major roads directly abutting or passing through the site.

## 10. DISTRIBUTION & TRAFFIC ASSIGNMENT

The latest adopted base year CFRPM is acceptable in determining the trip distribution percentages and number of trips assigned per roadway segment assignments. The model will reflect the roadway

network as identified in the Extents of Study Area and the Analysis Scenarios sections. The results of the model will be reviewed by City/County to ensure the existing and future travel patterns are reasonably simulated.

Engineering judgement may be used to develop trip distribution and assignment as long as it is reviewed and accepted by the CTE and logically replicates the existing and future travel patterns. A map showing the traffic-percent distribution (out to 3%), total background and project traffic assignments and intersection movements will be provided. The traffic-percent distribution must be shown on all critical hurricane roadways.

## 11. TRAFFIC COUNTS

Approved FDOT or City/County-maintained counts may be used if they are less than two years old. New counts may be requested by the CTE if there are recent improvements to the transportation system or new developments that may cause significant traffic pattern changes. Counts more than two years old will not be acceptable, unless specifically approved by the CTE.

If the CTE requires more recent traffic counts than those in the applicable County or R2CTPO's available AADT spreadsheet for the TIA submission, new traffic volume counts may be conducted based on acceptable engineering standards, and shall:

- a) Include the classification of heavy vehicles.
- b) Include segment traffic counts, by direction, for a minimum of forty-eight (48) consecutive hours between 12:00 p.m. Monday and 12:00 p.m. Friday.
- c) Exclude legal holidays or other days as specified by the CTE.
- d) Require Friday, weekend, or holiday counts for land uses active on weekends, as determined by the CTE.
- e) For development projects that are within a two (2) mile walk zone of a school or college, traffic volume counts, including pedestrians, must be collected during a normal school day and year. If school is not in session at the time of discussions concerning the traffic methodology, the CTE may accept traffic count data collected at an earlier date within the last year or allow for the submission of required traffic count data at a future time certain date for the specific school and/or college.

The data should include a summary of traffic volumes by direction in fifteen (15) minute increments. The a.m., p.m. and other peak hours should be identified as well as the peak hour-to-daily traffic ratio and peak hour directional split. The average daily traffic counts will be adjusted to AADT using appropriate FDOT seasonal adjustment factors and truck axle adjustment factors. The peak hour segment volume will be determined by applying the approved K-factor for that segment to the AADT volume. All data will be subject to review and acceptance by the CTE.

Prior to approval of the methodology statement, other peak-season adjustment factors or adjustment methodologies that may result in different peak-season adjustment factors may be requested at the discretion of the CTE.

If the CTE requires more recent turning movement counts (TMCs) for the TIA submission, new TMCs may be conducted based on acceptable engineering standards, and shall:

- a. Be made on one (1) typical weekday (Tuesday, Wednesday or Thursday) from 7:00 a.m. to

- 9:00 a.m., 4:00 p.m. to 6:00 p.m., or as otherwise specified.
- b. Legal holidays or other days, as specified by the CTE, shall be excluded.
  - c. Friday, weekend, or holiday counts may be required for land uses active on weekends, as determined by the CTE.
  - d. For development projects that are within a two (2) mile walk zone of a school or college, TMCs, including pedestrians, must be collected during a normal school day and year. If school is not in session at the time of discussions concerning the traffic methodology, the CTE may accept TMC data collected at an earlier date within the last year or allow for the submission of required TMC data at a future time certain date for the specific school and/or college.

The data should include a summary of TMC in fifteen (15) minute increments, with a.m., p.m., and other peak hours being identified. All data will be subject to review and acceptance.

Mid-segment tube counts should be checked against turning-movement counts at near-by intersections. Generally, the mid-segment machine counts and turning-movement counts should not be significantly different unless the difference can logically be explained.

## **12.BACKGROUND TRAFFIC GROWTH/FUTURE TRAFFIC**

The existing traffic counts shall be increased by a growth factor provided by the CTE up to the project's build-out date, which shall be reasonably specified, to account for increases in existing traffic due to other approved and pending, but not-yet-built, developments. The build-out date shall be provided by the developer/applicant. Background traffic growth rates and background traffic may be based on the most recently approved City/County Concurrency Management Program information, local jurisdiction's vested trip database, traffic trends analysis, or a combination of several methods to be determined in the approved TIA methodology. The LOS for any interstates shall be as defined in the FDOT 2013 Quality/Level of Service Handbook, or later approved versions of this handbook. Under no circumstances is a negative growth rate allowed. Minimum annual growth rates in all cases shall be two (2) percent unless support documentation is provided to justify a lower percentage and is approved by the CTE.

## **13.PHASED DEVELOPMENTS**

Developments with build-out dates more than five (5) years in the future shall be analyzed in five-(5) year phases, unless a different phasing plan is approved by the CTE. Developments which are contemplated to be phased should undertake transportation analyses that assess the total impacts of the full anticipated development levels for the entire "parent" tract. A parent tract is a tract of land that was or will be subdivided, for sale to separate individuals. The mitigation requirement for each phase of the development will then be pro-rated in proportion to the magnitude of the net external peak-hour trips generated by that phase. In lieu of pro-rating the complete parent tract, the local government may instead recommend that projects be subject to phasing and monitoring and modeling requirements to ensure that the impacts of the development are occurring as expected. If concurrency approval for only one phase is secured, then payment or construction of needed mitigation improvements associated with that phase only will be required. The TIA supporting subsequent phases will remain valid through the horizon year of the TIA, but the cost of the mitigation required will be determined using the appropriate local government's cost indexing procedures.

In the event a transportation concurrency certificate of capacity for a parent tract expires, an updated

TIA must be undertaken for the entire parent parcel development as a part of the subsequent parcel concurrency review. To establish the mitigation requirement for the unapproved phases, the mitigation requirement for the total parent tract, as updated, will be reduced by the mitigation already provided for by the previously approved phases (indexed to current value). The difference will then be allocated to the remaining unapproved portions of the site in proportion to the net external trips generated by each remaining phase.

## 14. MITIGATION OF IMPACTS

This section provides guidance on how the adequacy of mitigation can technically be determined and reviewed by the Local Government. However, it is the responsibility of Local Government to ensure that technical calculations are applied in a manner that is consistent with the current Florida Statutes and Local Government ordinances, codes, and technical procedures.

State law no longer requires a local government to implement transportation concurrency. However, in order for a local government to rescind transportation concurrency, a comprehensive plan amendment is required per s. 163.3180(1)(a), FS. Mitigation for impacts of a development project on the multimodal transportation network should be based on the applicable City/County adopted comprehensive plan. If a major roadway segment is below its adopted LOS standard, then the developer shall propose a solution to mitigate the transportation impacts of the proposed site. The following options are provided to developers for mitigation of transportation impacts:

**Restore to Adopted Standard** – Identify an improvement at an impacted location that restores level of service to the adopted standard for the “future year with development traffic” condition.

**Equal Mitigation (Same Location)** – Identify improvements that offset the impacts of a development at impacted locations. Each improvement shall, at a minimum, result in no degradation in the delay per vehicle on each lane group at deficient intersections and/or travel speed along deficient roadways (on segments that use speed as criteria for the LOS standards) that existed (considering background growth and committed roadways) prior to addition of the development traffic. Impacts on such facilities shall require construction of all necessary improvements to correct the deficient condition in accordance with the TIA guidelines.

Equal mitigation improvements will be deemed acceptable if capacity is added (through the addition of general purpose through-lanes, auxiliary turn-lanes, and/or signal phasing or timing changes that are accepted by the City/County) that restores or improves the delay and volume to capacity V/C ratio to the level it was in the “base scenario.” The “base scenario” is defined as the analysis of existing traffic, plus background traffic (derived from growth rates, vested trips, or combination of both) on the model that includes the roadway network identified in the Extents of Study Area and the Analysis Scenarios sections.

The developer shall only be responsible for the equal mitigation improvement; however, for informational purposes only, if equal mitigation improvements are identified at any deficient location(s), then additional improvements that may be needed to bring the entire deficient location(s) back to the LOS standard, shall also be identified and reported separately.

The design and construction of any mitigation improvements shall be in accordance with City,

County, or FDOT standards as applicable.

The analysis of intersections to demonstrate the adequacy of an improvement to achieve equal mitigation must be based on a consistent, traffic-signal timing strategy (e.g. minimizes delay, balance V/C or delay, subject to V/C maximums) and must follow the steps below:

- a) Analyze total future traffic on existing geometry (future scenario). For this analysis, signal timings may be optimized within the limits of the existing timing plan or may be adjusted manually within the limits of the existing timing plan. If the LOS standard is met, no further analysis is required. If the LOS standard is not met, further analysis to identify appropriate mitigation is required.
- b) The next analysis is to evaluate the “base scenario” condition. For this scenario, signal timing optimization within the limits of the existing timing plan or manually adjusted timings within the limits of the existing timing plan is required. The choice of signal-timing methodology in this step must be carried consistently into the next step. From the analysis, an overall Intersection Signal Delay is reported by the software.
- c) The next analysis is to evaluate total future traffic on an improved intersection concept (future scenario with mitigation). The same signal-timing strategy used in paragraph b. (above) is required. If the overall Intersection Signal Delay, and delay by movement are equal or less than in the base scenario, the improvement is considered to be adequate to offset the impacts of the development.

Any changes to existing conditions, including traffic-signal timing or phasing changes shall be noted on the intersection capacity analysis worksheets and in the conclusions of the report. Arterial analysis worksheets for the base and improved network conditions must also be submitted.

**Alternate Location Mitigation** – If the developer presents evidence acceptable to the DRC or the City/County Commission/Council that the mitigation improvements required by sections a. or b. above are not cost feasible in relation to the development proposed, mitigation strategies at alternative locations may be proposed and may be accepted by the DRC or the City/County Commission/Council. At a minimum, the proposed improvements should meet the following criteria:

- a) The locations proposed for improvement must be within the impacted area and must be at or near deficiency,
- b) The improvement must be other than simply a signal timing or phasing change,
- c) Mitigation must, at the minimum, improve the overall vehicle-hours of delay, intersection capacity utilization, and/or speed of the alternative location by the equivalent amount of the reduced vehicle-hours of delay, intersection capacity utilization, and/or speed at the primarily impacted location(s),
- d) The improvements must not already be, or be in the process of being, a condition of approval of another development,
- e) All applicable analysis requirements for the primary locations(s) shall apply to the analysis of the alternative location(s).

**Proportionate Share Mitigation** – If the developer submits evidence acceptable to the DRC or City/County Commission/Council that the required equal mitigation is not cost feasible in relation to the development proposal, the developer may propose a proportionate-share payment as

mitigation, as outlined in the local government comprehensive plan and in accordance with Florida Statutes, which must be approved by the DRC or City/County Commission/Council.

The proportionate share payment shall be calculated per Florida Statutes in accordance with HB 319 adopted May 30, 2013:

- a) The proportionate-share cost of those improvements per the following formulae:

$$\text{For road segments: } \frac{\text{Project traffic}}{\text{Increase in capacity created by the improvement}} \times \text{Total cost of improvement (Construction cost at the time of development payment)}$$

**Proportionate share cost =**

If other unforeseen situations arise, they will be dealt with on a case-by-case basis.

The above values shall be in units of peak hour, two-way values. Cost values shall include design, right-of-way, maintenance of traffic, construction, and construction observation/ administration costs. However, costs of major utility upgrades or the costs of other activities that are advantageous to accomplish with the road construction but that do not relate to providing transportation capacity or services should not be included.

Circumstances where the local government may accept proportionate share mitigation include:

- a) Where the local government comprehensive plan has identified proportionate share options in accordance with Florida Statutes.

Circumstances where the local government may choose to not accept Proportionate Share mitigation include, but are not limited to:

- a) Situations where all of the needed improvements to offset development impacts or maintain the adopted level of service standard, as defined in the local government comprehensive plan are not met; and,
- b) Situations where the proposed improvements are not compatible with the long-range transportation plan,
- c) Situations where severe transportation congestion may be caused and remain uncured if the development were to proceed,
- d) Situations where severe or undesirable safety, environmental, or social impacts may result.

**Alternate Mode Mitigation** – Based on the desire of the City/County to develop a transportation system that is oriented to multi-modal choices, and in accordance with the local jurisdiction’s comprehensive plan, mitigation may be in the form of improvements to the transit, bike, or pedestrian networks as long as such mitigation meets the legal nexus of the projects estimated impacts. The mitigation proposed shall identify how the improvement to the alternate mode will support transit oriented development goals identified in the local jurisdiction’s comprehensive plan and support a shift from use of the private automobile to alternative modes. Measures such as improved transit service and enhanced bike and pedestrian facilities should be identified along with the supporting documentation on how these improvements will help to maintain the overall mobility for the TIA study area. Any proposed public transit bus improvements will need to be reviewed by the CTE and Votran or FCPT, respectively. Proposed SunRail improvements will need to be reviewed with the CTE and SunRail governing agency.

Alternate mode mitigation will be available as identified within the local jurisdiction’s comprehensive plan and along corridors identified as multi-modal corridors in the adopted R2CTPO LRTP. Alternate mode mitigation options as established within the local jurisdiction’s comprehensive plan will include multi-modal and transportation demand strategies.

## **15. REVIEW AND COMMENT OF TIA REPORT**

Upon review, the City/County shall provide to the applicant written response of comments and findings. For documentation purposes, the applicant shall provide written response to all City/County comments dealing with the methodology or TIA, including TIA resubmittals.

## **16. APPEAL PROCESS AND SCHEDULE**

If the applicant desires to appeal any portion of the requirements of this procedure, the appeal shall be in accordance with the applicable section of the local government’s land development process (e.g., City/County Zoning Ordinance or LDC).

## **17. VARIANCE**

Any deviation or variance requested shall be in accordance with the applicable section of the local government’s land development process (e.g., City/County Zoning Ordinance or LDC).

## **18. TRANSPORTATION IMPACT ANALYSIS SUBMISSION CHECKLIST**

The following checklist is required to be submitted with the TIA Report. The City/County reserves the right to return a TIA report without review if this checklist is not included or completed in its entirety. Additionally, the CTE may add clarifying comments or additional requirements to the Checklist as discussed and agreed to at the methodology meeting.

**Transportation Impact Analysis Submission Checklist (Page 1)**

**Project Name:** \_\_\_\_\_

**Project Location:** \_\_\_\_\_

**Type of TIA Methodology**

- COMP PLAN     REZONING     SITE PLAN

	DESCRIPTION	INFORMATION INCLUDED			
		YES	NO	N/A	Remarks <sup>1</sup>
<b>TRANSPORTATION IMPACT ANALYSIS REPORT DATA</b>	2 printed TIA color copies signed & sealed by Professional Engineer				
	1 electronic version of the TIA & all analysis computer files				
	Site location relative to surrounding roadway network (map)				
	Description of proposed land uses (# of units, sq. feet, etc.)				
	Proposed build-out schedule (state years)				
	Conceptual site plan and/or proposed access description				
	Study area boundaries including all thoroughfare road segments and intersections within appropriate radius (map)				
	Existing traffic volumes				
	Existing roadway segment operations analysis				
	Existing interchange operations analysis				
	Existing intersection operations analysis				
	List scheduled improvements within first three years <input type="checkbox"/> FDOT Work Program <input type="checkbox"/> County CIP <input type="checkbox"/> City CIP				
	3% capacity roadway significance test and critical & near critical segments				
	Analysis Period(s): <input type="checkbox"/> AM <input type="checkbox"/> Mid-Day <input type="checkbox"/> PM <input type="checkbox"/> Weekend				
	Analysis of impacted existing and future funded transit routes (existing and future)(map), as applicable				
	Analysis of impacted bicycle, pedestrian, and multiuse trail facilities				
	Traffic volume counts (day & time)				
	Proposed development trip generation <input type="checkbox"/> Daily <input type="checkbox"/> 2-Way Peak Hour <input type="checkbox"/> Internal Capture <input type="checkbox"/> Pass By Capture (<14% Adjacent Road)				
	Proposed development trip distribution and assignment (map) <input type="checkbox"/> CFRPM <input type="checkbox"/> by Engineering Judgment				
	Future background traffic volume estimates <input type="checkbox"/> CFRPM <input type="checkbox"/> Historical Growth Rate – State/Justify Proposed Minimum				
	Projected future roadway segment analysis, including signal system (list)				
	Future total traffic volume estimates (background + vested + project trips) verify with near-by local governments				
	Projected future roadway intersection analysis (list) including proposed turn lanes and signals <input type="checkbox"/> HCS <input type="checkbox"/> Synchro <input type="checkbox"/> Other				
	Projected future roadway concurrency analysis				
	Conclusions and recommended improvements				
	Transportation improvements <input type="checkbox"/> FDOT TIP <input type="checkbox"/> County CIP <input type="checkbox"/> City CIP				
	Transportation Improvement Recommendations				
	Site access improvement recommendations				
Concurrency mitigation strategy (include in TIA)					
Documentation of coordination with public transit agency					
Subsequent submissions: response(s) to previous comments					



**Transportation Impact Analysis Submission Checklist (Page 2)**

**Project Name:** \_\_\_\_\_

**Project Location:** \_\_\_\_\_

<b>APPENDIX DATA</b>	Methodology documentation & conceptual site plan				
	Traffic count data & inventory of existing road conditions				
	Confirmation of scheduled Improvements (copy of appropriate CIE)				
	Existing conditions analysis worksheets (HCS/Synchro/Other printouts)				
	Background traffic growth worksheets				
	Trip generation, internal capture, passer-by capture Worksheets				
	Future Conditions Analysis Worksheets (HCS/Synchro/Other printouts)				
	Turn lanes analysis worksheets (queue length)				
	Analysis of alternative modes				
	Signal warrant analysis				
	Multi Way STOP warrant analysis				
<b>ADDITIONAL COMMENTS/REQUIREMENTS</b>					

1 – Remarks: Justify “NO” and “N/A”

Submitted By: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX A-1: DEFINITIONS

**Annual Average Daily Traffic (AADT)** refers to a basic traffic parameter for determining the level of service for motorized vehicles along a roadway. It is the total volume passing a point or segment of a roadway facility, in both directions, for one year, divided by the number of days in the year.

**Annual Average Weekday Daily Traffic (AAWDT)** is the total volume passing a point or segment of a highway facility, in both directions, for weekdays only for one year, divided by the number of weekdays in the year.

**Average Daily Traffic (ADT)** is the average number of vehicles that pass a specified point during a 24-hour period.

**Average Peak Hour Volume** refers to the average of peak season and off-peak season turning movements. *Most typically the 100<sup>th</sup> highest hour which is considered to be the primary planning analysis hour in Florida. (Refer to FDOT's Q/LOS Handbook)*

**Alternative Mode Analysis** refers to the evaluation of bicycle, pedestrian, and transit modal components that provide access through other means than private automobile travel within the study area, and identification of the developments proposal for improvements to those as applicable.

**Arterial Road** refers to a roadway providing service which is relatively continuous and of relatively high traffic volume, long trip length, and high operating speed.

**ARTPLAN** is FDOT's arterial planning software sometimes used for calculating level of service and service volume tables for interrupted flow roadways.

**Background Traffic** means and refers to the projected traffic generation from previously approved but incomplete projects.

*Note: FDOT's Site Impact Handbook defines Background Traffic as an estimate of future traffic within the vicinity of the proposed development, without the site development traffic, but with existing traffic adjusted for expected growth, and addition of traffic from major vested projects.*

**Capacity** refers to the availability of a public service or facility to accommodate users, expressed in an appropriate unit of measure, such as average daily trip ends of two way peak hour trips. It means the maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions. *Sometimes, capacity is referred to as "service volume" due to its reliance on the local government's adopted level of service.*

**Captured Trips** refer to trips not generated by a proposed project which are passing trips already on the roadway on which the proposed project is to be located.

**Concurrency** is an evaluation of whether a transportation facility or service has adequate capacity to accommodate the trips generated from a proposed development. *Concurrency*, as used in growth

management under s. 163.3180, FS, stipulates that public facilities and services needed to support development shall be available at the same time the impacts of such development will occur. Concurrency for transportation facilities is optional for local governments under s. 163.3180(1), FS and, if applied, the local government comprehensive plan must provide the principles, guidelines, standards, and strategies, including adopted levels of service, to guide its application.

**Concurrency Management System** refers to the procedures and/or process that the local government will utilize to assure that development orders and permits are not issued unless the necessary facilities and services are available concurrent with the impacts of development (*Specific Authority 163.3180*)

**Collector Road** refers to a roadway providing service which is of relatively moderate traffic volume, moderate trip length, and moderate operating speed. Collector roads collect and distribute traffic between local roads or arterial roads (*Specific Authority 163.3177(9), (10) FS. Law Implemented 163.3177, 163.3178 FS. History–New 3-6-86, Amended 10-20-86, 11-22-89, 4-2-92, 3-23-94, 5-18-94, 3-21-99, 2-25-01.*)

**Critical Roadways** are identified by the volume to capacity ratio (v/c). If the v/c ratio is  $\geq 1.0$  on an emergency evacuation route or if the v/c ratio is  $\geq 1.1$  on a non-emergency evacuation route then it considered a critical roadway segment.

**Critical Signalized Intersection** refers to a signalized intersection with the lowest volume to capacity ratio (v/c), typically the one with the lowest effective green ratio (g/C) for the through movement.

**Cycle Length (C)** is the time it takes a traffic signal to go through one complete sequence of signal indications.

**Development Review Committee (DRC)** is the governing body that reviews development applications to ensure compliance with local government codes and regulations.

**DOT Guidelines** refers to the Florida Department of Transportation (FDOT) Quality/Level of Service (Q/LOS) Handbook published in 2002 by the Florida Department of Transportation, all as subsequently amended and updated.

**Existing Traffic** refers to the average annual daily traffic and two way peak hour traffic volumes. Most typically the 100<sup>th</sup> highest hour which is considered to be the primary planning analysis hour in Florida. (See Q/LOS Handbook)

**Evacuation Routes** as identified in the currently Adopted in Volusia and Flagler County Comprehensive Plan, pursuant to *Chapter 163*, FS, and consist with the Transportation Element.

**FREEPLAN** is FDOT's freeway planning software for calculating level of service and service volume tables.

**Generalized Level of Service Volume Tables** is the maximum service volumes based on area wide roadway traffic and control variables and presented in tabular form.

**Growth Rate** is the rate of which traffic increases or decreases over a given period of time based on historic traffic count information and land use.

**HIGHPLAN** is FDOT's software for calculating levels of service and service volume tables for two-lane highways and multilane highways.

**Highway Capacity Manual (HCM)** is the Transportation Research Board (TRB) document on highway capacity and quality of service.

**ITE** refers to the Institute of Transportation Engineers (ITE) Trip Generation Rates published by the ITE for traffic engineers and transportation planners for site level planning and analysis.

**Internal Capture** are trips that remain on a proposed development's site due to the presence of non-residential and residential land uses which in combination reduce impact on the surrounding roadway network.

**Internal Capture Rate** is the percentage of the total number of trips from a site that are contained within on-site circulation systems only.

**K-30** is the proportion of AADT occurring during the 30th highest hour of the design hour.

**K-100** is the proportion of AADT occurring during the 100th highest hour of the design hour.

**K-FACTOR** is the ratio of the demand traffic volume in the 30th highest hour of the year to AADT.

**Level of Service (LOS)** is a quantitative stratification of the quality of service of a service or facility into six letter grade levels with "A" describing the highest quality and "F" describing the lowest quality; a discrete stratification of a quality of service continuum. With regard to traffic and transportation, the measure of the functional and operational characteristics of a roadway based upon traffic volume in relation to road capacity. The LOS for alternative modes may be based on headways for transit modes, access, length, width, and connectivity for pedestrian and bike modes under the direction of the CTE in coordination with Votran, FCPT, and/or SunRail.

**Area-wide LOS** refers to a standard that may be established for facilities with similar functions serving common origins and destinations within one or more designated transportation concurrency management areas, and must be maintained as a basis for the issuance of development orders and permits.

**Local Road** means a roadway providing service which is of relatively low traffic volume, short average trip length or minimal through traffic movements.

**Link** refers to the portion of a major thoroughfare between two (2) major intersections, or between a major intersection and the end of the thoroughfare, or between a major intersection or end of the thoroughfare and the city limits.

**Near Critical Roadways** are roadways with a v/c ratio > 0.90 and < 1.0 on an emergency evacuation route or a v/c ratio > 0.90 and < 1.1 on a non-emergency evacuation route. The roadway segment is considered to be near capacity and flagged for analysis and monitoring to ensure that a development's trips do not make a roadway fail or reach "critical" status. *(Approved by the TPO on June 24, 2008)*

**Major City/County Roadway** is a roadway not on the State Highway System whose roadway, traffic and control characteristics are similar to those classified as state minor arterials.

**Transportation Planning Organization (TPO)** is the organization designated as being responsible, together with the state, for conducting the continuing, cooperative, and comprehensive planning process under 23 USC 134 and 49 USC 1607. It is the forum for cooperative transportation decision-making. *Florida follows federal requirements, see s. 339.175, FS.*

**Peak Direction** is the course of the higher flow of traffic.

**Peak Hour Traffic** is hours of which traffic volumes are the highest during a 24-hour period, usually the highest volume in the am (between 7am and 9 am) and in the pm (between 4 pm and 6pm)

**Peak Hour Factor (PHF)** is the ratio of the hourly volume to the peak 15-minute flow rate for that hour; specifically hourly volume / (4 x peak 15-minute volume).

**Peak Season** is the 13 consecutive weeks with the highest daily volumes for an area.

**Peak Season Weekday Average Daily Traffic** is the average daily traffic for Monday through Friday during the peak season.

**Peak to Daily Ratio** is the ratio of the highest 1 hour volume of a day to the daily volume.

**Passer-by Factor** is the percentage of a development's total traffic that is considered already on the road network and merely stops at the development in passing.

**Roadway Functional Classification** refers to the assignment of roads into categories according to the character of service they provide in relation to the total road network. Basic functional categories include limited access facilities, arterial roads, and collector roads, which may be subcategorized into principal, major or minor levels. Those levels may be further grouped into urban and rural categories.

**Signal Type** is the kind of traffic signal (actuated, pre-timed or semi-actuated) with respect to the way its cycle length, phase plan, and phase times are operated.

**Signalized Intersection** is a place where 2 roadways cross and have a signal controlling traffic movements.

**Signalized Intersection Spacing** is the distance between signalized intersections.

**Signalized System** is the entire signal system within the project extents that is potentially impacted from an adjustment to the signal time at a single intersection.

**SIS** refers to the Strategic Intermodal System (SIS) and relates to statewide and interregional significant transportation facilities and services that provide for the smooth and efficient transfer of both passengers and freight, including but not limited to interstates, ports, airports, and railways. (Strategic Intermodal System (SIS) as established pursuant to Sections 339.61-.64, F.S.)

**Threshold** is the breakpoints between LOS differentiations.

**Transportation Impact Analysis (TIA)** is a study conducted to evaluate the impacts of a proposed development on the transportation system and identify possible mitigation strategies.

**Traffic volume** is the number of vehicles passing a point on a highway during a specific time period.

**Trip Generation Standards** refers to the book entitled trip generation, 8th Edition, prepared by the ITE in 2007, and as amended or revised from time to time including more recent editions.

**Turning Movement Counts (TMC)** are traffic counts that are at a specific intersection broken out by direction and movement on the links, and used for intersection analysis.

**Vested Trips** are trips from an approved development that are distributed on the road network and treated as existing as a means to monitor background traffic growth and preserve capacity for that development.

## APPENDIX A-2: INTERGOVERNMENTAL COORDINATION PROCESS

*(As approved by the R2CTPO June 2016)*

If a Transportation Impact Analysis (TIA) is required and all or a portion of the project trips are projected to cause a new LOS deficiency or contribute to an existing LOS deficiency on a roadway in a neighboring jurisdiction, then an electronic copy of the TIA must be provided to the affected jurisdiction(s) for review and comment.

If an impact occurs on a roadway maintained by any other jurisdiction(s) the respective maintenance jurisdiction(s) shall also be provided an electronic copy of the TIA for review and comment.

If the project trips are projected to impact transit LOS, then an electronic copy of the TIA shall also be provided to the affected public transit agency for review and comment.

If the project trips are projected to impact a public school or there is a public school within a two (2) mile walk zone of the proposed development, then an electronic copy of the TIA shall also be provided to the affected school district.

If the project trips are projected to impact a state roadway in accordance with Section 4 Extents of Study, then an electronic copy of the TIA shall be provided to FDOT District 5 DeLand for review and comment.

Comments from the affected jurisdiction(s) shall be submitted in a timely manner, to the City/County that is considering the development approval, within 30 days from the day of receipt of the TIA. Upon final approval of the development for which the TIA was prepared, an electronic copy of the approved TIA shall be submitted to the R2CTPO.

***Cross-Jurisdictional Impacts:*** If the City/County that is considering the development approval determines that the proposed development causes or contributes to a LOS deficiency located in an affected jurisdiction(s) based on the adjacent jurisdiction's comprehensive plan, the City/County considering said development will coordinate with the affected jurisdiction(s) to mitigate the impacts via the steps below:

- a) The City/County shall ensure that the local jurisdiction(s) in which the LOS deficiency exists is notified in writing or via electronic mail. The notification shall include a request for confirmation that the applicant has provided a copy of the proposed development's TIA and a full description of the LOS deficiency. Additionally, if impacts occur on a roadway not maintained by the City/County considering the proposed development for approval, the respective maintenance jurisdiction(s) shall be notified in writing or via electronic mail.
- b) If necessary as determined by either jurisdiction's CTE, a meeting shall be held between all affected parties to discuss necessary mitigation solutions and funding strategies.
- c) The applicant and/or the City/County considering approval of the development shall be responsible for any mitigation unless the affected jurisdiction(s) agree to support the mitigation through a formal agreement in accordance with the mitigation measures enumerated in, but not limited to, the R2CTPO TIA Guidelines.
- d) The applicant shall be required to: 1) pay proportionate fair-share for the development's impacts, or 2) determine a reasonable mitigation solution agreeable to all parties, and implement such mitigation. If the City/County and/or the jurisdiction that maintains the roadway in which the LOS deficiency exists does not have funding in its five-year CIE to mitigate the existing LOS deficiency that requires a capital improvement and does not desire to amend its CIE to include the funding for the necessary mitigation project, then the applicant will work

towards an acceptable alternative mitigation project with the local jurisdiction approving the site as well as the affected jurisdiction(s).

- e) Upon final agreement and approval of the development for which the TIA was prepared, an electronic copy of all formal agreements (i.e. proportionate fair-share, inter-local agreements, memorandum of understanding (MOU) or others) shall be submitted to the R2CTPO.

It is recommended that the CTE utilize the following list to ensure all affected governmental departments and agencies are included in review of applications for development, as appropriate:

1. Circulate the applicant's TIA Methodology Memorandum to all potentially impacted jurisdictions and their respective departmental staff and external agencies requesting any comments on the methodology be returned within five (5) business days of receipt.
2. An invitation has been sent to all potentially impacted jurisdictions and their respective departmental staff and external agencies for inclusion in the methodology meeting.
3. If the study area is within ¼-mile of a transit route, or ½-mile of a rail line, rail station, or intermodal facility, or proposing alternate mode mitigation, has Votran, FCPT, and/or governing agency for SunRail received a copy of the TIA from the applicant?
4. If the study area is within three miles of an FDOT roadway or a SIS facility, has FDOT received a copy of the TIA from the applicant?
5. If the TIA identifies an impact to adjacent jurisdictions, has a copy of the TIA been provided to the adjacent jurisdiction's CTE?
6. Has coordination regarding the TIA occurred with the jurisdiction's staff responsible for trail improvements?
7. Prepare and circulate the responses to the TIA comments to all agencies included under bullets two through six above, as appropriate.
8. Review any proposed mitigation with all agencies included under bullets two through six above, as appropriate.

To ensure all potential impacts of development is considered intergovernmental coordination will be a vital part of the TIA review process. Coordination will also occur with the R2CTPO to ensure development impacts continue to be identified for the ongoing planning processes completed by the R2CTPO.



**APPENDIX B-1: VOTRAN TRANSIT INFRASTRUCTURE  
RECOMMENDATIONS BY TYPE OF DEVELOPMENT TABLE**

# Transit Infrastructure Recommendations by Type of Development

Step I: Select Development Type	Transit Infrastructure Recommendations by Type of Development	General Development Type by Density/Intensity					Transit Oriented Development (TOD)		Traditional Neighborhood Development (TND)		Mixed Use Trip Reduction Measures (MUTRM) Area	
		2 DUs/Acre OR Residential Development of 50-100 DUs	3-4 DUs/Acre OR Residential Development of 101-250 DUs	5-6 DUs/Acre OR Residential Development of 251-500 DUs	7-10 DUs/Acre OR Residential Development of 501-1000 DUs	> 10 DUs/Acre OR Residential Development of > 1000 DUs	Transit Neighborhood (0.25 - 0.50 miles from the center of TOD)	Transit Core (0 - 0.25 miles from the center of TOD)	Neighborhood Center	Town/Village Center	Non-Compact Development Area (Non-CDA)	Compact Development Area (CDA)
		10K-30K SF of Non-Residential or Mixed Use Developments	31K-50K SF of Non-Residential or Mixed Use Developments	51K-200K SF of Non-Residential or Mixed Use Developments	201K-600K SF of Non-Residential or Mixed Use Developments	> 600K SF of Non-Residential or Mixed Use Developments						
Step II: Review Transit Plans	10-Year Funded TDP (build if service is funded within 5 years. Meet with to determine applicable infrastructure for services funded for later than 5 years.)											
	LRTP Cost Affordable Transit Plan (build if service is funded within 5 years. Meet with to determine applicable infrastructure for services funded for later than 5 years.)											
Step III: Identify Infrastructure Requirements for Each Planned Service Type in TDP and/or LRTP (local/express/BRT) & Coordinate with County/City Staff to Provide Required Infrastructure	Bus Bay/Pull Out	■	■	■	■	■	■	■	■	■	■	■
	Bulb-Outs	■	■	■	■	■	■	■	■	■	■	■
	Bus Shelter Easement	■	■	■	■	■	■	■	■	■	■	■
	Sidewalk Connectivity (Paved Walkway)	■	■	■	■	■	■	■	■	■	■	■
	Bike Lane Access	■	■	■	■	■	■	■	■	■	■	■
	Bus Stop Landscaping	■	■	■	■	■	■	■	■	■	■	■
	Park-n-Ride Connectivity (Paved Walkway)	■	■	■	■	■	■	■	■	■	■	■
	Bus Stop Sign & Pole	■	■	■	■	■	■	■	■	■	■	■
	B&A Area Concrete Pad	■	■	■	■	■	■	■	■	■	■	■
	Rear-Door B&A Area	■	■	■	■	■	■	■	■	■	■	■
	Bench	■	■	■	■	■	■	■	■	■	■	■
	Basic Shelter (5' X 8')	■	■	■	■	■	■	■	■	■	■	■
	Intermediate Shelter (5' X 12' or 4' X 12')	■	■	■	■	■	■	■	■	■	■	■
	Large Shelter (5' X 16')	■	■	■	■	■	■	■	■	■	■	■
	Major Transit Station	Provide in Transit Center Overlay Areas and any other areas as specified by County/City. See Comprehensive Plans or LRTP for Transit Overlay locations, density/intensity, and station types.										
	Park-n-Ride	Provide at applicable locations identified in the 2040 LRTP. Scale, timing, and site requirements should be based on discussions with County/City staff and Transit Design Manual.										
	Map/Schedule Display	■	■	■	■	■	■	■	■	■	■	■
	Lighting	■	■	■	■	■	■	■	■	■	■	■
	Real Time Traveler Information Display	■	■	■	■	■	■	■	■	■	■	■
	Bike Storage	■	■	■	■	■	■	■	■	■	■	■
Trash Receptacle	■	■	■	■	■	■	■	■	■	■	■	
Off-Board Ticket Vending Machines	■	■	■	■	■	■	■	■	■	■	■	
Public Art	■	■	■	■	■	■	■	■	■	■	■	

**Notes:**

- If bus transit services, including local, express, or BRT services in TDP or LRTP are funded within 5 years of the date of development approval, provide recommended infrastructure.
- If bus transit services in TDP or LRTP are funded after 5 years from the date of development approval, meet with County/City staff to determine applicable infrastructure that should be provided. These may include, but not limited to bus bays/pull outs, bulb-outs, bus shelter easements, sidewalk or/and park-n-ride connectivity (paved walkway).
- These recommendations apply to existing & proposed developments meeting the following criteria:
  - The existing or planned transit service route shown in the funded TDP or LRTP is wholly or partially within the development.
  - The development abuts a roadway corridor with an existing or planned transit route shown in the funded TDP or LRTP.
- Intermediate and large bus shelter sizes may vary based on ROW availability.
- Use Table A - Average Bus Stop Spacing by Mode as a guide to determining the required number of bus stops. Final determination of the number and location will be made by County/City staff.
- Facilities identified here must be constructed in accordance with the Transit Design Manual and Americans with Disabilities Act (ADA) Standards.
- Off-board ticket vending machines are for BRT/Real only.

**Table A: Average Bus Stop Spacing by Mode**

Facility/Type	Bus Stop Spacing (miles)						
	Rural	Suburban	Urban	TOD	TND	MUTRM Area	Activity Center*
Local Bus Stop	3/4 - 1/2	3/4 - 1/4	1/4	1/4 - 1/8	1/4 - 1/8	1/4 - 1/8	At or adjacent to
Express Bus Stop	Varies. See TDP/LRTP and Development Services/ staff.						major activity
BRT Station	Varies. See TDP/LRTP and Development Services/ staff.						centers.

\*As determined by County/City staff. Major activity centers may include regional malls, airports, hospitals, colleges, big box retailers, large recreational facilities, etc.

## APPENDIX C-1: SAMPLE TIA

To be included at a later date.