

TRANSPORTATION IMPACT ANALYSIS (TIA) Guidelines

Methodology

For
Development Applications



Requiring a TIA
in Volusia County, Florida

TIA Guidelines

As adopted on November 24, 2009

(The Volusia Transportation Organization (VTPO) was formally known as the Volusia County Metropolitan Planning Organization (VCMPO). The name change was effective July 1, 2010.)

Preface

The Volusia Transportation Planning Organization (VTPO) is responsible for the planning and programming of federal and state transportation funds within the metropolitan planning area. As part of an ongoing effort to provide a forum that facilitates cooperation and coordination, the TPO 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 (TIA) Guidelines Methodology was adopted by the Volusia TPO Board in May 2007.

The Volusia 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.

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PURPOSE AND APPLICABILITY

A Transportation Impact Analysis (TIA) will be required 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). The **TIA** must be provided at the first submission of the right of way Use Permit, rezoning, special exception, variance, Overall Development Plan, or the Final Site Plan stage of the development. Comprehensive plan land use amendments need to follow State of Florida Department of Community Affairs requirements.

A **TIA** is conducted in order to evaluate the transportation systems' ability to accommodate the additional traffic generated by the proposed development. 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.

Concurrency is 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 time frame, new road conditions or problems could surface that would require additional analysis and possible mitigation.

The developer and the professional engineer should note that the City/County Traffic Engineer (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.

Any reference to the "City/County" in these guidelines shall mean an incorporated city or Volusia County, its consultants, contractors, or employees, as applicable.

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.

1. METHODOLOGY STATEMENT

Prior to conducting any study, 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. The methodology statement will be first reviewed by the **CTE** or duly designated representative, if necessary, through a methodology meeting (or correspondence) with the applicant's consultant. The **CTE** may require the inclusion of proposed or anticipated traffic signals in the future year condition that may not exist in the "existing condition". The applicant's consultant will then revise the statement based upon agreed upon methodologies. The applicant shall ensure the consultant does not prepare a traffic study without an approved methodology statement signed by the **CTE** or their designee. The methodology agreements shall be valid to govern submittal of the **TIA** for a period of 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. REPORT FORMAT

The **TIA** report will follow the presentation order, graphics, and appendices as outlined below:

TIA Report Format

Four printed copies of the **TIA** and one electronic version of the **TIA** (including all plans graphs, figures, diagrams, etc. in a .pdf format) must be submitted to the City/County Land Development Manager (LDM) for review. Include on the electronic version in separate file folders all computer files, which could include (but not limited to) the Central Florida Regional Planning Model (CFRPM) and all capacity analyses files. The **TIA** must have a title page which will include the development name and project number assigned by the **LDM**, the developer's name, company, address and phone number, the professional engineer's name, company, address and phone number and the **TIA** preparation date. A table of contents shall be provided which lists the figures, tables, chapters and appendices. Each page of the report body and appendices must be numbered. Submit a completed **TIA** Submission Checklist with the **TIA** report.

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.

3. IMPACTED ROADWAYS/INTERSECTIONS

For purposes of this section, the term “**Major Roadways**” may include all existing collector and above-classified roadways per the latest, adopted **Volusia Transportation Planning Organization (TPO)** Federal Functional Classification Map, and those scheduled for construction within the first **3** years in the latest adopted Volusia County 5-Year Capital Improvement Program, adopted Volusia County MPO’s Transportation Improvement Plan (TIP) and/or adopted local jurisdiction’s Capital Improvement Element (CIE) and major roads under construction by a non-governmental party (e.g., built by developers).

Impacted roadways and intersections 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) Major roadways on which the two-way peak-hour project traffic which meet the following thresholds:
 - 1) If the project generates **less than 100 two-way peak hour external trips** – the **TIA** shall include an analysis of all roadways where the project’s peak hour trips consume **one percent (1%)** or more of a roadway’s 2-way peak hour generalized service volume based on the adopted LOS and the committed number of lanes;
 - 2) If the project generates **between 100 to no more than 300 two-way peak hour external trips** – the **TIA** shall include an analysis of all roadways where the project’s peak hour trips consume **three percent (3%)** or more of a roadway’s 2-way peak hour generalized service volume based on the adopted LOS and the committed number of lanes;
 - 3) If the project generates **300 or more two-way peak hour external trips** – the **TIA** shall include an analysis of all roadways where the project’s peak hour trips consume **five percent (5%)** or more of a roadway’s 2-way peak hour generalized service volume based on the adopted LOS and the committed number of lanes.
- c) To determine whether the development will impact critical and near-critical roads in a *de-minimus* nature and are not being analyzed by the threshold values above, major roadways that are designated on the most recent **Volusia County Critical and Near-Critical Roadway List** and within the following travel distance (via the major roads) shall be checked:
 - Residential, office, commercial, industrial, institutional – 5.0 miles
 - Recreation, local parks – 1.5 miles
 - Convenience stores – 1.0 miles
 - Other uses – 5.0 miles
- d) Major intersections (all signalized intersections and unsignalized intersections of major roadways that cross another major roadway) that are part of the impacted threshold roadways.
- e) The intersection(s) 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,

For purposes of determining if peak hour development traffic consumes the threshold values of the existing service volume of a road, the allowable capacity in the annual **Volusia County Traffic Counts and LOS for Volusia County Roadways**, which is based upon the generalized roadway service volumes from the Generalized Service Volumes tables of the Florida DOT's current Q/LOS Handbook shall be used. 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 and document any difference between jurisdictional agencies.

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. An evaluation of alternate modes of transportation such as mass transit, bicycles, sidewalks for pedestrians, etc, must also be included. VOTRAN's **Transit Development Guidelines** shall be included in review of alternative modes.

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

4. 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** years of the local jurisdiction's adopted **CIE** and/or adopted Volusia TPO's **TIP**. If there is a conflict between the local jurisdictions's **CIE** and the Volusia TPO's **TIP**, the local jurisdiction's **CIE** will be the controlling document for roadways not using state or federal funds.

[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 years two (2) and three (3) in any proportionate-share computation that might be required for the proposed development. Refer to the local jurisdictions proportionate fair share ordinance to determine how many years are eligible.]

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 Volusia County multi-way stop sign warrant summary worksheet shall be provided for the location(s) proposed.

- 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) **Alternative Mode Analysis.** 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. 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 American's with Disabilities Act requirements
- Buffering between vehicular areas and sidewalks
- Linkage to existing or future walkway and/or bikeway network and transit route
- Implementation of the VOTRAN's **Transit Development Guidelines**

5. GENERAL ANALYSIS REQUIREMENTS AND SOFTWARE

A.M. and P.M. peak hour analysis will be undertaken for all locations in the study network for residential and office developments. For other developments a determination of either the A.M. or P.M. peak hour analysis, or both, will be made by the **CTE** during the methodology process.

- a. **Level of Service (LOS)** will be analyzed for all site-access intersections and the major road segments and intersections included in the network defined by the **IMPACTED ROADWAYS/INTERSECTIONS** Section. In addition, for all site access intersections where left-turns are greater than 25 vehicles in the peak hour, a left-turn lane shall be constructed and a turn-lane length analysis shall be conducted.
- b. Road analysis sections shall be developed based on acceptable engineering and planning practices as set forth in the Highway Capacity Manual (HCM) and the **FDOT Q/LOS Manual**. **LOS** will be evaluated on the basis of entire analysis sections.
- c. All analysis shall be undertaken for conditions during the 100th highest hour of the year.
- d. 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 the preferred software for analyzing delay and **LOS**.
 - 2) For signalized intersections, the latest version of **HCS** or **Synchro** software using the **HCS** methodology is required.
 - 3) Use the **FDOT's ARTPLAN** (interrupted flow road segment analysis), **HIGHPLAN** (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.
- 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.
 - 7) 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.
 - (k) Analysis section lengths shall be as defined in Volusia County/Volusia TPO annual level of service spreadsheet. If any portion of the analysis section falls within the five-mile travel distance, then the entire analysis section shall be analyzed.

6. 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** manual **Trip Generation**. Other rates may be required by the **CTE**, or may be used if requested by the applicant and approved by the **CTE**. Use of other rates must be requested during the methodology step. If the petitioner can provide evidence of a prior use on the site, the **TIA** shall address the net increase in trips associated with the proposed land use. If the site was dormant during collection of the traffic count data the analysis is based upon, then the "prior vested" portion of the development traffic must be added as "background" traffic.

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:

- Summary of traffic count data by fifteen (15) minute increments
- Average daily volume during a.m. and p.m. peak hours of the adjacent street
- 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
- All data will be subject to review and acceptance. This review will be based on currently accepted traffic engineering principals

7. INTERNAL CAPTURE

The use of an internal capture factor will be allowed for certain types and sizes of mixed-use developments. Internal capture is allowed per the **ITE** acceptable methodologies. 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** manual ***Trip Generation***) 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. The internal capture rates or equations contained in the most recent version of the **ITE Trip Generation Handbook**.
- 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.

8. 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 the **ITE** methodologies or other methodologies that may be approved by **CTE**. The total passer-by capture shall not exceed 14 percent (14%) of the total background traffic on the adjacent roadway. 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.

9. DISTRIBUTION & TRAFFIC ASSIGNMENT

The latest adopted base year Central Florida Regional Planning Model (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 **Impacted Roadways/Intersections** 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. Manual trip distribution and assignment may also be acceptable as long as it is reviewed and accepted by **CTE** and logically replicates the existing and future travel patterns. A map showing the traffic-percent distribution (out to 5%), total background and project traffic assignments and intersection movements will be provided. The traffic-percent distribution must be shown on all critical hurricane roadways.

10. TRAFFIC COUNTS

Approved FDOT or City/County-maintained counts may be used if they are less than one year old in high growth areas. New counts will be requested if there are recent improvements to the transportation system that may cause significant traffic pattern changes. Counts more than one year old will not be acceptable unless otherwise approved by **CTE**.

New traffic volume counts shall be conducted based on acceptable engineering standards, and shall include the classification of heavy vehicles. Provide 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. Legal holidays or other days as specified by the **CTE** shall be excluded. Friday, weekend, or holiday counts may be required for land uses active on weekends, as determined by the **CTE**. 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 annual average daily traffic (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.

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**.

Provide intersection turning movement counts (**TMC**) where it is deemed necessary by the **CTE**. These **TMC**'s shall 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. Legal holidays or other days, as specified by the **CTE**, shall be excluded. Friday, weekend, or holiday counts may be required for land uses active on weekends, as determined by the **CTE**. The data should include a summary of traffic volumes 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.

11. 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's Annual Report** (or a local jurisdiction's vested trip database) and will be provided by the **CTE**, **TE** staff member or local jurisdiction. Under no circumstances is a negative growth rate allowed. Minimum annual growth rates in all cases shall be two percent, unless otherwise approved by the **CTE**.

12. LOS STANDARDS

- a.) The **LOS** standards for all major road segments shall be consistent with the letter standards per the **FDOT** on SIS State Roads.
- b.) The **LOS** standards for all major road segments shall be consistent with the letter standards per the local jurisdictions adopted Comprehensive Plan on non-SIS State Roads and the County's latest standard on County Thoroughfare Roads per the adopted Comprehensive Plan (unless the local jurisdiction has adopted a higher **LOS** standard).
- c.) On major roadway corridors, the minor street **LOS** standard may be less than adopted to ensure the major corridor **LOS** standard is acceptable, unless otherwise approved by the **CTE**.
- d.) The overall intersection **LOS** standard is the same as the segment standard. Where different segment **LOS** standards apply to different legs of the intersection, the overall intersection **LOS** standard will be the *lowest* crossing road standards. For example, between LOS E and LOS D the lowest crossing standard would be LOS E.

13. PHASED DEVELOPMENTS

Developments with build-out dates more than five years in the future shall be analyzed in five-year phases. 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 after October 29, 1976, 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 & 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 mitigative improvements associated with that phase only will be required. The TIA supporting concurrency approval for the subsequent phases will remain valid through the horizon year of the TIA, but the cost of the mitigation requirement will be indexed to the year in which the mitigation improvements or payments are made, using the cost indexing procedures of Volusia County’s (or applicable City’s) transportation impact fee ordinance.

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

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 **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 **Impacted Roadways/Intersections** 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, Volusia 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 location(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, which must be approved by the **DRC** or City/County Commission/Council.

The proportionate share payment shall be calculated as follows:

- a. Identify all needed improvements to bring all deficient locations in the study network back to the **LOS** standard,
- b. Submit an engineer-certified cost estimate of the required improvements as approved by the City/County,
- c. Calculate the proportionate-share cost of those improvements per the following formulae:

For road segments:

$$\text{Proportionate share cost}^1 = \frac{\text{Project traffic}}{\text{Increase in capacity created by the improvement}} \times \text{Total cost of improvement (Indexed to future year of construction)}$$

¹ Refer to local jurisdictions proportionate share ordinance based upon project location.

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

- d. 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 is **required to accept** proportionate share mitigation include:

Where improvements to maintain the adopted level of service on all roadway locations impacted by the proposed development are specifically identified for funding in the 5-year schedule of capital improvements in the capital improvements element of the local plan or the long-term concurrency management system or if such contributions or payments to such facilities or segments are reflected in the 5-year schedule of capital improvements in the next regularly scheduled update of the capital improvements element (F.S. 163.3180 (16)(b)1).

Circumstances where the local government may **choose to not accept** Equivalent Mitigation or 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 are not in the five-year **CIE**,
- 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 un-cured if the development were to proceed,
- d. Situations where severe or undesirable environmental or social impacts may result,
- e. Situations where granting of impact fee credits for the costs of the improvements might disrupt the orderly scheduling of impact fee funded capital improvements.

Generally, the proportionate share funds from a development will be used by the developer to implement an improvement that is agreed upon by the City/County and agencies responsible for the road to be improved and other impacted roadways, to be of substantial benefit to the impacted roadway network. If needed improvements are scheduled in the **CIE**, then the City/County will accept payment of the proportionate share.

15. APPEAL PROCESS AND SCHEDULE

If a petitioner 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**).

16. 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**).

TRANSPORTATION IMPACT ANALYSIS SUBMISSION CHECKLIST

	DESCRIPTION	INFORMATION INCLUDED			
		YES	NO	N/A	Remarks ¹
TRANSPORTATION IMPACT ANALYSIS REPORT DATA	4 Printed TIA Copies Signed and 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				
	Proposed Build-out schedule				
	Study area boundaries including all Thoroughfare Road segments and intersections within appropriate radius (map)				
	Existing Traffic Volumes				
	Existing roadway segment analysis				
	Existing intersection analysis				
	List scheduled improvements within first three years of County, FDOT, and/or City Capital Improvement Programs				
	Proposed development trip generation/internal capture/pass by capture				
	Proposed development trip distribution and assignment (map)				
	Future Background Traffic Volume Estimates				
	Projected future roadway segment analysis				
	Future Total Peak-Hour(s) Traffic Volume Estimates (Background + Vested + Project Trips)				
	Projected future Peak-Hour(s) roadway intersection analysis including proposed turn lanes and signals				
	Projected Future Roadway Concurrency Analysis				
	Conclusions and Recommended Improvements				
	Site access recommendations				
	Concurrency mitigation strategy				
APPENDIX DATA	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 Printouts)				
	Background Traffic Growth Worksheets				
	Trip Generation, Internal Capture, Pass-By Capture Worksheets				
	Future Conditions Analysis Worksheets (HCS Printouts)				
	Turn Lanes Analysis Worksheets (Queue Length)				
	Signal Warrant Analysis				
Multi Way STOP Warrant Analysis					

1 – Remarks: Justify “NO” and “N/A”

Submitted By: _____ Printed Name: _____

Date: _____

APPENDIX

A-1 Definitions

Annual Average Daily (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 (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 100th 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 features and services within the study area, and identification of the developments proposal for improvements to those if 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, is the requirement of s. 163.3180, FS, that public facilities and services needed to support development shall be available at the same time the impacts of such development will occur.

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 163.3177(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.*)

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 ≥ 1.0 on an emergency evacuation route or if the v/c ratio is ≥ 1.1 on a non-emergency evacuation route then it considered a critical roadway segment (*Approved by the TPO on June 24, 2008*).

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.

De minimis “The Legislature finds that a de minimis impact is consistent with this part. A de minimis impact is an impact that would not affect more than 1 percent of the maximum volume at the adopted level of service of the affected transportation facility as determined by the local government. No impact will be de minimis if the sum of existing roadway volumes and the projected volumes from approved projects on a transportation facility would exceed 110 percent of the maximum volume at the adopted level of service of the affected transportation facility; provided however, that an impact of a single family home on an existing lot will constitute a de minimis impact on all roadways regardless of the level of the deficiency of the roadway. Further, no impact will be de minimis if it would exceed the adopted level-of-service standard of any affected designated hurricane evacuation routes. Each local government shall maintain sufficient records to ensure that the 110-percent criterion is not exceeded.” (*Per FS 163.3180 - Concurrency*)

DOT Guidelines refers to the Florida Department of Transportation (FDOT) Quality/Level of Service 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 100th 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 Volusia 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 are published by the Institute of Transportation Engineers (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.

Areawide 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, pursuant to *Rule 9J-5.0055(5), FAC*, 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. (*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.*)

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 $\text{hourly volume} / (4 \times \text{peak 15-minute volume})$.

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. (*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.*)

Signal Density is the number of signalized intersections per mile.

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.

Threshold is the breakpoints between level of service 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.

SIS refers to the Strategic Intermodal System (SIS) 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.*)

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.

A-2

INTERGOVERNMENTAL COORDINATION PROCESS

(As approved by the VCMPO on Jan 27, 2009)

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.

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 Volusia County MPO.

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) and said impact is not classified as *de minimis*, the City/County considering said development will coordinate with the affected jurisdiction(s) to mitigate the impacts via the steps below: *Per 163.3180(6) F.S., if the impact on the deficient roadway consumes one percent or less of the roadway's adopted service volume and the roadway is not over 110% of capacity on a non-evacuation route, then the impact can be considered de minimis and will not be subject to mitigation. No de minimis designations shall be made on evacuation routes over 100% of capacity.*

- 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 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, a meeting shall be held between all affected parties to discuss necessary mitigation solutions and funding strategies.
- c. The developer 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 Volusia TPO TIA Guidelines.
- d. The developer 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 developer will work towards an acceptable alternative mitigation project with the local jurisdiction approving concurrency of 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 Volusia TPO.

A-3 ACRONYMNS

(AADT)	<u>Annual Average Daily Traffic</u>
(CFRPM)	<u>Central Florida Regional Planning Model</u>
(CTE)	<u>City/County Traffic Engineer</u>
(DO)	<u>Development Order</u>
(DRC)	<u>Development Review Committee</u>
(FDOT)	<u>Florida Department of Transportation</u>
(HCM)	<u>Highway Capacity Manual</u>
(HCS)	<u>Highway Capacity Software</u>
(ITE)	<u>Institute of Transportation Engineers</u>
(LDC)	<u>Land Development Code</u>
(LDM)	<u>Land Development Manager</u>
(LOS)	<u>Level of Service</u>
(MM)	<u>Methodology Memorandum</u>
(MOU)	<u>Memorandum of Understanding</u>
(TPO)	<u>Transportation Planning Organization</u>
(PHF)	<u>Peak-hour factor</u>
(Q/LOS)	<u>Quality Level of Service</u>
(TIA)	<u>Transportation Impact Analysis</u>
(TIP)	<u>Transportation Improvement Plan</u>
(TMC)	<u>Turning Movement Counts</u>
(V/C)	<u>Volume to Capacity</u>