

SCOPE OF WORK MEETING

**CHECKLIST: REQUIRED ELEMENTS OF A TRAFFIC IMPACT ANALYSIS:
24 VAC 30-155-60.C.**

<input checked="" type="checkbox"/>	Item	Site Generated Peak Hour Trips			
		Less than 100	100 to 499	500 to 999	1,000 or more
	<i>Background Information</i>				
	List of all non-existent transportation improvements assumed in the analysis	Required	Required	Required	Required
	Map of site location, description of the parcel, general terrain features, and location within the jurisdiction and region.	Required	Required	Required	Required
	Description of geographic scope / limits of study area.	Within 1,000 ft of site	Within 2,000 feet of site and any roadway on which 10% or more of the new vehicle trips generated by the proposal are distributed - not to exceed two miles.	Within 2,000 feet of site and any roadway on which 10% or more of the new vehicle trips generated by the proposal are distributed - not to exceed two miles.	To be determined by VDOT in consultation with the locality
	Plan at an engineering scale of the existing and proposed site uses.	Required	Required	Required	Required
	Description and map or diagram of nearby uses, including parcel zoning.	Required	Required	Required	Required
	Description and map or diagram of existing roadways.	Required	Required	Required	Required
	Description and map or diagram of programmed improvements to roadways, intersections, and other transportation facilities within the study area.	Required	Required	Required	Required
	<i>Analysis of Existing Conditions</i>				
	Collected daily and peak hour of the generator traffic volumes, tabulated and presented on diagrams with counts provided in an appendix.	Only diagrams required	Required	Required	Required

<input checked="" type="checkbox"/>	Item	Site Generated Peak Hour Trips			
		Less than 100	100 to 499	500 to 999	1,000 or more
	Analyses for intersections and roadways identified by VDOT. Delay and Level of Service (LOS) are tabulated and LOS is presented on diagrams for each lane group.	Only diagrams required	Required	Required	Required
	When the type of development proposed would indicate significant potential for walking, bike or transit trips either on- or off-site, analyses of pedestrian and bicycle facilities, and bus route or routes and segment or segments, tabulated and presented on diagrams, if facilities or routes exist	At frontage, only diagrams required	Within 2,000 feet of site	Within 2,000 feet of site	To be determined by VDOT in consultation with the locality ①
	Speed Study ②	If requested by VDOT	If requested by VDOT	If requested by VDOT	If requested by VDOT
	Crash history near site ③	If requested by VDOT	If requested by VDOT	If requested by VDOT	If requested by VDOT
	Sight distance ④	If requested by VDOT	If requested by VDOT	If requested by VDOT	If requested by VDOT
	<i>Analysis of Future Conditions Without Development</i> ⑤				
	Description of and the justification for the method and assumptions used to forecast future traffic volumes.	Optional	Required	Required	Required
	Analyses for intersections and roadways as identified by VDOT. Delay and Level of Service (LOS) are tabulated and LOS is presented on diagrams for each lane group.	Optional	Required	Required	Required
	When the type of development proposed would indicate significant potential for walking, bike or transit trips either on- or off-site, analyses of pedestrian and bicycle facilities, and bus route or routes and segment or segments tabulated and presented on diagrams, if facilities or routes exist or are planned.	At frontage, only diagrams required	Within 2,000 feet of site	Within 2,000 feet of site	To be determined by VDOT in consultation with the locality at the scope of work meeting ①

<input checked="" type="checkbox"/>	Item	Site Generated Peak Hour Trips			
		Less than 100	100 to 499	500 to 999	1,000 or more
	<i>Trip Generation</i>				
	Site trip generation, with tabulated data, broken out by analysis year for multi-phase developments, and including justification for deviations from ITE rates, if appropriate.	Required	Required	Required	Required
	Description and justification of internal capture reductions for mixed use developments and pass-by trip reductions, if appropriate, including table of calculations used.	Required	Required	Required	Required
	<i>Site Traffic Distribution & Assignment</i>				
	Description of methodology used to distribute trips, with supporting data.	Required	Required	Required	Required
	Description of the direction of approach for site generated traffic and diagrams showing the traffic assignment to the road network serving the site for the appropriate time periods.	Required	Required	Required	Required
	<i>Analysis of Future Conditions With Development</i>				
	Forecast daily and peak hour of the generator traffic volumes on the highway network in the study area, site entrances and internal roadways, tabulated and presented on diagrams.	Current traffic + site generated traffic	Future background + site generated traffic, at each expected phase and at build-out or six years after start, whichever is later	Future background + site generated traffic, at each expected phase, at build-out, and six years after build-out, which may be extended or reduced by VDOT in consultation with the locality	At a minimum the future background + site generated traffic, at each expected phase, at build-out, and six years after build-out; may be extended by VDOT in consultation with the locality
	Analyses for intersections and roadways identified by VDOT. Delay and Level of Service (LOS) are tabulated and LOS presented on diagrams for each lane group.	Only diagrams required	Required	Required	Required

<input checked="" type="checkbox"/>	Item	Site Generated Peak Hour Trips			
		Less than 100	100 to 499	500 to 999	1,000 or more
	When the type of development proposed would indicate significant potential for walking, bike or transit trips either on- or off-site, analyses of pedestrian and bicycle facilities, and bus route or routes and segment or segments tabulated and presented on diagrams, if facilities exist or are planned.	At frontage, only diagrams required	Within 2,000 feet of site	Within 2,000 feet of site	To be determined by VDOT in consultation with the locality ①
	Recommended Improvements				
	Description and diagram of the location, nature, and extent of the proposed improvements, with preliminary cost estimates as available from VDOT.	Required	Required	Required	Required
	Description of methodology used to calculate the effects of travel demand management (TDM) measures, if proposed, with supporting data.	Required if TDM proposed	Required if TDM proposed	Required if TDM proposed	Required if TDM proposed
	Analyses for all proposed and modified intersections in the study area under the forecast and site traffic. Delay, and Level of Service (LOS) are tabulated and LOS presented on diagrams for each lane group. For intersections expected to be signalized, MUTCD Signal Warrant analysis or ITE Manual for Traffic Signal Design, as determined by VDOT, presented in tabular form.	Only diagrams required	Required	Required	Required
	When the type of development proposed would indicate significant potential for walking, bike or transit trips either on- or off-site, analyses of pedestrian and bicycle facilities, and bus route or routes and segment or segments tabulated and presented on diagrams, if facilities or routes exist or are planned.	At frontage, only diagrams required	Within 2,000 feet of site	Within 2,000 feet of site	To be determined by VDOT in consultation with the locality ①
	Conclusions				
	Clear, concise description of the study findings.	Required	Required	Required	Required

Footnotes

① Analysis of pedestrian, bicycle, and/or transit facilities should be provided only in instances where such facilities, services are present in the area or are planned for the area, or if the development is of a type that can be expected to generate significant trips of the appropriate type. Generally speaking, isolated developments in rural or low density suburban areas will not have a need for pedestrian, bicycle, or transit analysis.

② Speed studies may be necessary when there is reason to believe that operational or geometric conditions on a roadway result in speeds that vary considerably from the posted speed limits. In those situations, they should be requested when entrance construction is expected to occur in the short term (within a few years) and without a complete rebuilding of the roadway at the location of concern, as changes in local conditions can be expected to have an impact on the road's operating speed. If a speed study is not requested under the TIA regulations, it may still be required at the land use (entrance) permit stage in order to address specific concerns.

③ Crash history data and analysis should be requested if a particular location affected by a development's traffic is suspected to have a higher crash rate than similar locations in the region and the development's traffic may contribute to the problem. Crash history should not be requested if there is a project to address the crash problem already planned and which will be completed by the time the development is expected to be generating traffic.

④ Sight distance information and measurement or calculation is necessary at the land use permit stage of development. Substandard sight distance at locations has resulted in the need for developers to rebuild roadways, conduct extensive grading operations, or relocate planned entrances. Therefore, while generally not necessary at the rezoning stage, providing this information as early in the development process as possible will help the developer avoid unnecessary costs.

⑤ Analysis of Future Conditions without Development (For Sites with Less Than 100 VPH). Sites with relatively low peak hour traffic generation that may still need to be submitted under the Traffic Impact Analysis regulations—for instance, rural developments on very low volume roadways that double the existing traffic volume, or sites whose unreduced trips are over the requirement threshold but, when internal capture and travel demand management reductions are calculated, fall below 100 VPH—can usually be expected to develop in a fairly short timeframe. In these cases, the provision of future traffic conditions without the development is generally of very limited use.

SCOPE OF WORK MEETING
TRAFFIC IMPACT ANALYSIS METHODOLOGY
AND STANDARD ASSUMPTIONS: 24 VAC 30-155-60.D
WITH COMMENTARY

A traffic impact analysis shall be prepared based upon methodology and assumptions noted below or as may be agreed upon by VDOT. Changes to the methodology and assumptions established by this regulation for developing the traffic impact analysis may be approved by VDOT based on the preparer submitting sufficient evidence to justify the change, e.g. characteristics of a project similar to what is being proposed.

VDOT can not apply traffic impact analysis standards used by a locality unless they meet or exceed the specifications in the regulations. However, if local requirements are stricter (e.g. a specific LOS must be achieved), those requirements must be met in the traffic impact analysis study as well.

1. Data collection.

Preparers shall collect traffic data in accordance with the identified study area. The count data shall include at a minimum, weekday 24-hour counts, and directional turning movement counts during AM and PM peak times of the day. The 24-hour counts shall include vehicle classification counts. With approval of VDOT, data collected by the transportation professional preparer within the last 24 months may be used, likewise for data from the VDOT count program.

The preparer shall monitor traffic operations during data collection to ensure extraneous events such as vehicle crashes or special event traffic do not affect integrity of count data. Preparers collecting data for utilization in traffic impact studies shall normally avoid data collection during the following instances:

- a. Holidays or times of the year when the traffic patterns are deemed to be unrepresentative of typical conditions, unless required by VDOT or the locality, or both.
- b. Summer months if school or schools in proximity.
- c. Fridays and weekends unless required by VDOT or the locality, or both.
- d. Other times of the year contingent upon existing adjacent land use activities.
- e. During times of inclement weather.

2. Trip generation.

Estimates of trip generation by a proposed development shall be prepared using the Institute of Transportation Engineers Trip Generation (see 24 VAC 30-155-100), unless VDOT agrees to allow the use of alternate trip generation rates based upon local trip generation studies. Rezoning proposals shall assume the highest vehicle trip generating use allowable under the proposed zoning classification. In determining which trip generation process (equation or rate) may be used, the preparer shall follow the guidance presented in the Trip Generation Handbook – an ITE Proposed Recommended Practice (see 24 VAC 30-155-100), which is summarized here. Regression equations to calculate trips as a result of development shall be utilized, provided the following is true:

- a. Independent variable falls within range of data; and
- b. Either the data plot has at least 20 points; or
- c. R^2 greater than 0.75, equation falls within data cluster in plot and standard deviation greater than 110% of weighted average rate.

If the above criteria are not met, then the preparer can use average trip rates, provided at least one of the following applies:

- d. At least three data points exist;
- e. Standard deviation less than 110% of weighted average rate;
- f. R^2 less than 0.75 or no regression equation provided; or
- g. Weighted average rate falls within data cluster in plot.

NOTE: *The ITE land use type used for a particular development should be chosen with care to best reflect the nature of the development, especially when several similar land use types are available.*

The use of ITE Trip Generation codes that have a small sample size are discouraged. If the Trip Generation database has an insufficient number of data points, the analyst should collect local data and establish a local rate. Some examples include:

- *ITE LU 030 Truck Terminal*
- *ITE LU 151 Mini-Warehouse*
- *ITE LU 251 Senior Adult Housing - Detached (aka Age Restricted)*
- *ITE LU 252 Senior Adult Housing - Attached (aka Age Restricted)*

If the ITE Senior Housing Trip Rate is used, it is recommended that a proffered condition was approved during the rezoning of the property establishing that a deed restriction will be recorded that limits occupancy of the residential dwelling units to “housing for older persons” as defined in the Virginia Fair Housing Law and that no persons under the age of 19 shall reside in such housing.

The ITE Shopping Center Trip Rate should not include out-parcel pad site uses (usually businesses). The trips generated by such uses should be added to the Shopping Center Trip Rate to determine the total.

3. Internal capture and pass-by trips.

a. Internal capture rates consider site trips “captured” within a multi-use development, recognizing that trips from one land use can access another land use within a site development without having to access the adjacent street system. Multi-use developments include a combination of residential and non-residential uses or a combination of non-residential uses only. Internal capture allows reduction of site trips from adjacent intersections and roadways. Unless otherwise approved by VDOT, the following internal capture rates may be used if appropriate:

- (1) Residential with a mix of non-residential components—use the smaller of 15% of residential or 15% non-residential trips generated.
- (2) Residential with office use—use the smaller of 5.0% of residential or 5.0% of office trips generated.
- (3) Residential with retail use—for AM peak hour, use the smaller of 5.0% residential or 5.0% retail trips generated; for PM peak hour, use the smaller of 10% residential or 10% retail trips generated; for 24-hour traffic, use the smaller of 15% residential or 15% retail trips generated.
- (4) Hotel/motel with office use—use 15% of hotel/motel trips, unless the overall volume of the office traffic is more than the overall volume of hotel/motel traffic use in which case use the smaller of 10% of the hotel/motel traffic or the office traffic.
- (5) Multi-use development with more than five million square feet of office and retail—internal capture rate should be determined in consultation with and approval of VDOT.

b. Pass-by trip reductions consider site trips drawn from the existing traffic stream on an adjacent street, recognizing that trips drawn to a site would otherwise already traverse the adjacent street regardless of existence of the site. Pass-by trip reductions allow a percentage reduction in the forecast of trips otherwise added to the adjacent street from the proposed development. The reduction applies only to volumes on adjacent streets, not to ingress or egress volumes at entrances serving the proposed site. Unless otherwise approved by VDOT, the following pass-by trip reductions may be used:

- (1) Shopping center—25% of trips generated may be considered pass-by.
- (2) Convenience stores, service stations, fast food restaurants, and similar land uses—40% of trip generated may be considered pass-by.

NOTE: While internal capture and pass-by rates exceeding the standards set out in the regulation may be used with the submittal of appropriate documentation, care must be taken in the application of each of these, as inappropriate use can have a significant impact on the analysis. Studies submitted to justify altered rates must be confirmed to have been done in areas with economic, geographic, and social similarity to the locality with the proposed development.

4. Trip distribution.

In the absence of more detailed information, trip distribution shall be in accordance with logical regional travel patterns as suggested by existing highway directional split and intersection movements or population and destination site distribution. If more detailed information is available from trip origin/destination studies, marketing studies, or regional planning models, this may be used to distribute trips upon approval of VDOT.

5. Planning horizon.

In general, the analysis years shall be related to (i) the opening date of the proposed development, (ii) build-out of major phases of a multi-year development, (iii) long-range transportation plans, and (iv) other significant transportation network changes. The preparer should establish the planning horizon in consultation with and subject to the acceptance of VDOT.

6. Background traffic growth.

Unless directed by VDOT, geometric growth (or compound growth), based upon historical growth rates, shall generally be used for determining future background traffic levels where extensive traffic-count history is available and capacity constraint is not appropriate. This growth rate replicates “natural growth” and is typical for projecting urban growth.

NOTE: Approved but not yet constructed developments in the vicinity of the TIS site should be included in the background traffic calculation.

7. Future conditions.

For the purpose of the TIS, future conditions shall include background traffic and additional vehicle trips anticipated to be generated by approved but not yet constructed or improved projects.

8. Level of service calculation.

Level of service (LOS) analysis of roadways shall utilize the techniques described in the Highway Capacity Manual (see 24 VAC 30-155-100). Neither the intersection capacity utilization method nor the percentile delay method may be used in the traffic impact calculations of delay and level of service. Preparers shall consult with VDOT on which traffic analysis software package is to be used to conduct the LOS calculations. The results shall be tabulated and displayed graphically, with levels of service provided for each lane group for each peak period. All data used in the calculations must be provided

along with the results of the capacity analysis. Any assumptions made that deviate from the programmed defaults must be documented and an explanation provided as to why there was a deviation. Electronic files used for the analysis shall be provided to VDOT as a digital submission (e.g. .hcs, .sy6, .inp, .trf files), along with the printed report. If intersections analyzed are in close proximity to each other so that queuing may be a factor, VDOT may require the inclusion of an analysis with a micro simulation model. Unless actual on-ground conditions dictate otherwise, preparers should use the following defaults when utilizing the Highway Capacity Software (HCS) or other approved programs when evaluating roadway components:

- a. Terrain – choose the appropriate terrain type. Most of the state will be level or rolling, but some areas may qualify for consideration as mountainous.
- b. Twelve-foot wide lanes.
- c. No parking or bus activity unless field conditions include such parking or bus activity or unless the locality has provided VDOT with a written statement of intent for the services to be provided.
- d. Peak hour factor by approach – calculate from collected traffic counts (requires at least a peak hour count in 15-minute increments).
- e. Heavy vehicle factor – calculate from collected traffic (classification) counts or obtain from VDOT count publications.
- f. Area type – non-center of business district.

The TIS shall identify any existing or proposed bicycle and pedestrian accommodation that would be affected by the proposal. For the purposes of this subsection, a bicycle accommodation is defined as on-street bike lanes, paved shoulders of roadways that are not part of the designated traveled way for vehicles, intersection treatments, or exclusive and shared off-street bicycle paths

For the purposes of this subsection, a pedestrian accommodation is defined as sidewalks, intersection treatments and exclusive, or shared off-street trails or paths. If significant potential for bicycle or pedestrian trips exists, the TIS shall include current and future service level analyses at build-out for existing or proposed bicycle and pedestrian accommodations. When the proposal requires or includes improvements or modifications to the roadway, bicycle or pedestrian accommodations the TIS shall analyze the impacts of such improvements and modifications on bicycle and pedestrian accommodations and service levels, and provide recommendations for mitigation of adverse impacts.

The TIS shall provide analysis for all bus service with routes that have, or will have a station or stop within 2,000 feet of the proposal. The TIS shall evaluate and discuss potential for increased demand for bus use due to the proposal, addressing whether such increases will demand longer dwell time at stops or more buses on a route. The quality of service analysis for bus service shall be determined in accordance with the Transit Capacity and Quality of Service Manual (see 24 VAC 30-155-100). The TIS shall provide both route and segment quality of service. The TIS shall provide recommendations for mitigation of adverse impacts where adverse impacts are expected to the quality of service to bus service. If an analysis of pedestrian quality or level of service is required for calculation of the bus quality of service, the preparer shall use a methodology approved by VDOT.

NOTE: *The traffic impact analysis shall include current and future service level analyses at build-out for existing or proposed bicycle and pedestrian accommodations. Such analysis should be based upon the methodologies presented in one of the following documents:*

- ***The Bicycle Compatibility Index: A Level of Service Concept, Implementation Manual (FHWA)***
- *“Bicycle and Pedestrian Level of Service Performance Measures and Standards for*

*Congestions Management Systems” Transportation Research Record 1538 (TRB)
Quality/Level of Service Handbook (Florida DOT)*

- *The quality of service analysis for bus service shall be determined in accordance with the Transit Capacity and Quality of Service Manual (TRB).*

NOTE: *Examples of standard assumptions for LOS at signalized intersections include (i) minimum “yellow/all red” of six seconds; (ii) minimum “green” time for a movement of six or seven seconds; and (iii) all left turns treated as “protected” left turns in the TIS analysis on roadways with speed limits of 45 mph or higher rather than as a permissive left turn.*

9. Trip reduction, and pedestrian and bicycle accommodations.

When a proposal meets the criteria listed below the preparer of the TIS may reduce the number of vehicle trips generated by the proposal in the TIS analysis in accordance with this subsection. Notwithstanding the percentages below, the total number of reductions used by a preparer in accordance with this subsection shall never exceed 500 vehicle trips per peak hour of the generator unless otherwise approved by VDOT.

- a. Pedestrian accommodations. For the purposes of this subsection, a pedestrian accommodation is defined as a sidewalk, pedestrian path, or multi-use trail. Where a pedestrian service level of A exists, vehicle trips per peak hour of the generator may be reduced by 4.0%. Where a pedestrian service level of B exists, vehicle trips per peak hour of the generator may be reduced by 3.0%; where a pedestrian service level of C exists, vehicle trips per peak hour of the generator may be reduced by 1.5%. These reductions may only be taken if:
 - (1) Pedestrian facility coverage in a 2,000-foot radius of the proposal is on or along at least 80% of the road network; and
 - (2) The connectivity index within the 2,000-foot radius is equal to or higher than 1.4; and
 - (3) There are at least two of the 10 major land use classifications, as defined in ITE Trip Generation (see 24 VAC 30-155-100), within the 2,000-foot radius.
- b. Bicycle accommodations. For the purposes of this subsection, a bicycle accommodation is defined as a street with a design speed of 25 MPH or less that carries 400 vehicles per day or less, on-street bike lanes, a pedestrian accommodation, paved shoulders of roadways that are not part of the designated traveled way for vehicles and are at least two feet wide, or exclusive and shared off-street bicycle paths. Where a bicycle service level of A exists, vehicle trips per day may be reduced by 3.0%. Where a bicycle service level of B exists, vehicle trips per day may be reduced by 2.0%. Where a bicycle service level of C exists, vehicle trips per day may be reduced by 1.0%. These reductions may only be taken if:
 - (1) Bicycle accommodations within a 2,000-foot radius of the proposal exist on or along at least 80% of the road network; and
 - (2) The connectivity index within the 2,000-foot radius is equal to or higher than 1.4; and
 - (3) There are at least two of the 10 major land use classifications, as defined in ITE Trip Generation (see 24 VAC 30-155-100), within the 2,000-foot radius.

NOTE: *In the event that site-specific (non-ITE) trip generation rates are used, care must be taken to not “double-count” vehicle trip reductions, since the studied location’s rates may already take these trip reductions into account. See page 56 in the “Administrative Guidelines” for additional discussion on this item.*

10. Modal split and trip reduction.

All vehicle trip reductions used in the TIS pursuant to this subsection are subject to the approval of

VDOT.

- a. If a proposal is located within 1/2 mile along roadways, pedestrian or bicycle accommodations of a transit station, excluding bus stops and stations, reasonable vehicle trip reductions of vehicle trips generated by the proposal may be made with approval of VDOT. The preparer shall submit documentation to justify any such vehicle trip reductions used with the TIS. When a proposal is located more than 1/2 mile but less than two miles from a transit stop, excluding bus stops and stations, with parking accommodations transit modal split vehicle trip reductions may be utilized. The analysis of capacity of the parking accommodations shall be included in the TIS when such trip reductions are used.
- b. If a proposal is located within 1/4 mile along roadways, pedestrian or bicycle accommodations of a bus stop or station where the segment and route service levels are C or higher, reasonable vehicle trip reductions of vehicle trips generated by the proposal may be made with the approval of VDOT. The preparer shall submit documentation to justify any such vehicle trip reductions used with the TIS.
- c. Transit and bus modal split data from similar developments within the geographic scope of the TIS or one mile of the proposal, whichever is greater, shall be collected if the TIS vehicle trip reductions are used pursuant to this subsection and similar developments exist within the geographic scope of the TIS or one mile of the proposal, whichever is greater.

NOTE: In the event that site-specific (non-ITE) trip generation rates are used, care must be taken to not “double-count” vehicle trip reductions, since the studied location’s rates may already take these trip reductions into account. See page 56 in the “Administrative Guidelines” for additional information on this item.

11. Signal warrant analysis.

Traffic signal warrant analysis shall be performed in accordance with the procedures set out in the Manual on Uniform Traffic Control Devices (see 24 VAC 30-155-100) or ITE Manual of Traffic Signal Design as determined by VDOT.

NOTE: VDOT is the final authority regarding the installation of new traffic signals or the expansion of the number of approaches to existing signals. If a site meets the signal warrants it does not guarantee that the signal is appropriate or that VDOT should and will approve the installation of a traffic signal.

12. Recommended improvements.

Recommendations made in the TIS for improvements to transportation facilities shall be in accordance with the geometric standards contained within the Road Design Manual (see 24 VAC 30-155-100).

SCOPE OF WORK MEETING

ADDITIONS TO THE REQUIRED ELEMENTS, CHANGES TO THE METHODOLOGY OR STANDARD ASSUMPTIONS, AND SIGNATURE PAGE

Any additions to the Required Elements or changes to the Methodology or Standard Assumptions due to special circumstances that are approved by VDOT: _____

AGREED: _____ DATE: _____
Applicant or Consultant

PRINT NAME: _____
Applicant or Consultant

SIGNED: _____ DATE: _____
VDOT Representative

PRINT NAME: _____
VDOT Representative

SIGNED: _____ DATE: _____
Local Government Representative

PRINT NAME: _____
Local Government Representative