Baltimore County Traffic Impact Study Guidelines

Department of Public Works
Bureau of Transportation

111 W. Chesapeake Avenue
Towson Maryland 21204

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Table of Contents

Attachment:
1. Traffic Impact Study Checklist
2. Scoping Document

I. INTRODUCTION

The Traffic Impact Study (TIS) Guidelines for Baltimore County have been developed to provide a comprehensive and consistent approach to assessing the impact of proposed developments on the transportation system. As Baltimore County continues to experience growth and development, it is crucial to ensure new developments are evaluated in terms of their potential impact on safety, traffic flow, and access. These guidelines aim to assist the County, developers, engineers, and transportation professionals in preparing and reviewing traffic impact studies that comply with county regulations and provide meaningful information to decision-makers. By following these guidelines, we can better manage the transportation impacts and promote sustainable growth in Baltimore County.

The guidelines provide the technical standards for designation of the study area, site and background trip generation, analysis time, analysis methodology, and requirements to assess the traffic impacts of development proposals on the existing and future transportation system. This document shall be used along with an approved scoping letter to perform a TIS in Baltimore County. Final approval will be at the County's discretion and be contingent upon whether the requirements outlined are met within a submitted TIS.

II. THRESHOLD REQUIRING A TIS

A TIS is required if a new development is expected to generate **more than 49 trips** during any hour of the day. The trip generation should be based upon the appropriate land use code from the latest ITE Trip Generation Manual or approved trip generation rates by the County. For example, special generators may require a study of similar sites.

A scoping meeting is required prior to submission of a TIS, and all studies must be signed and sealed by a professional engineer. Required attendees include the applicant (and/or his/her representative), the Baltimore County Department of Public Works and Maryland Department of Transportation State Highway Administration (MDOT SHA) Officials (if a state-maintained roadway is impacted). A sample scoping document is attached to the end of this document. The meeting shall include a review and consent of the following:

1. Study area: freeways, roadways, arterials, and intersections
2. Build out or opening year
3. Clarification, justification, and agreement on all assumptions used in the report.
    a. Trip generation
    b. Trip distribution
    c. Pass-by and internal trip capture

   d. Capacity analysis type
   e. Adequate LOS standards
   f. Mitigation measures and recommendations
4. Approved preliminary site plans within the study area that will be included for estimation of background traffic. All plans should be legible.
5. Approved yet unbuilt background developments to be included in the study.
6. Future funded roadway construction/improvements in the area that may impact the subject site.

Only future roadway construction/improvements for which 100 percent of construction funding costs have been approved shall be accepted for future analysis. If the applicant fails to comply with the technical requirements and the scope of study outlined in the scoping meeting, the applicant will be advised in writing that an addendum is required. All issues regarding the TIS and recommended improvements must be resolved before site plan approval may be granted.

III. STUDY AREA

The definition of the study area is dependent upon the size of the development. Table 1 describes how many intersections shall be included in the TIS. The scoping meeting will help decide which intersections should be analyzed.

Table 1. Study Area Definition

Size of Development	ITE Trip Generated Single Peak Hour Trips	Study Area
Small	50-100	Site access driveway(s) and each intersection from the site access point(s) to and including the first intersection with an arterial or higher classification road in each direction. Key intersections as identified by the County during the scoping meeting.
Medium	101-750	
Large	>750	Site access driveway(s) and each intersection from the site access point(s) to and including the first intersection with an arterial or higher classification road in each direction to and including the second intersection with an arterial road in each direction. Any intervening intersections designated by the County. Freeway analysis as needed.

Figure 1 displays some examples of the implementation of the study area definition defined above. In scenario 1, the site access for the development is along an existing arterial. The study intersections would include the site access driveway and all intersections along the 1st arterial leading up the 2nd arterial. The intersection between the 1st and 2nd arterial must also be studied. Scenario 2 is similar to the first except the site access will add a fourth leg to an existing intersection. In this case, a third arterial would be analyzed. Scenario 3 displays how the network expands as the second intersection with the adjacent arterials are added to the study area. These scenarios are

not exhaustive of all the possible study areas.

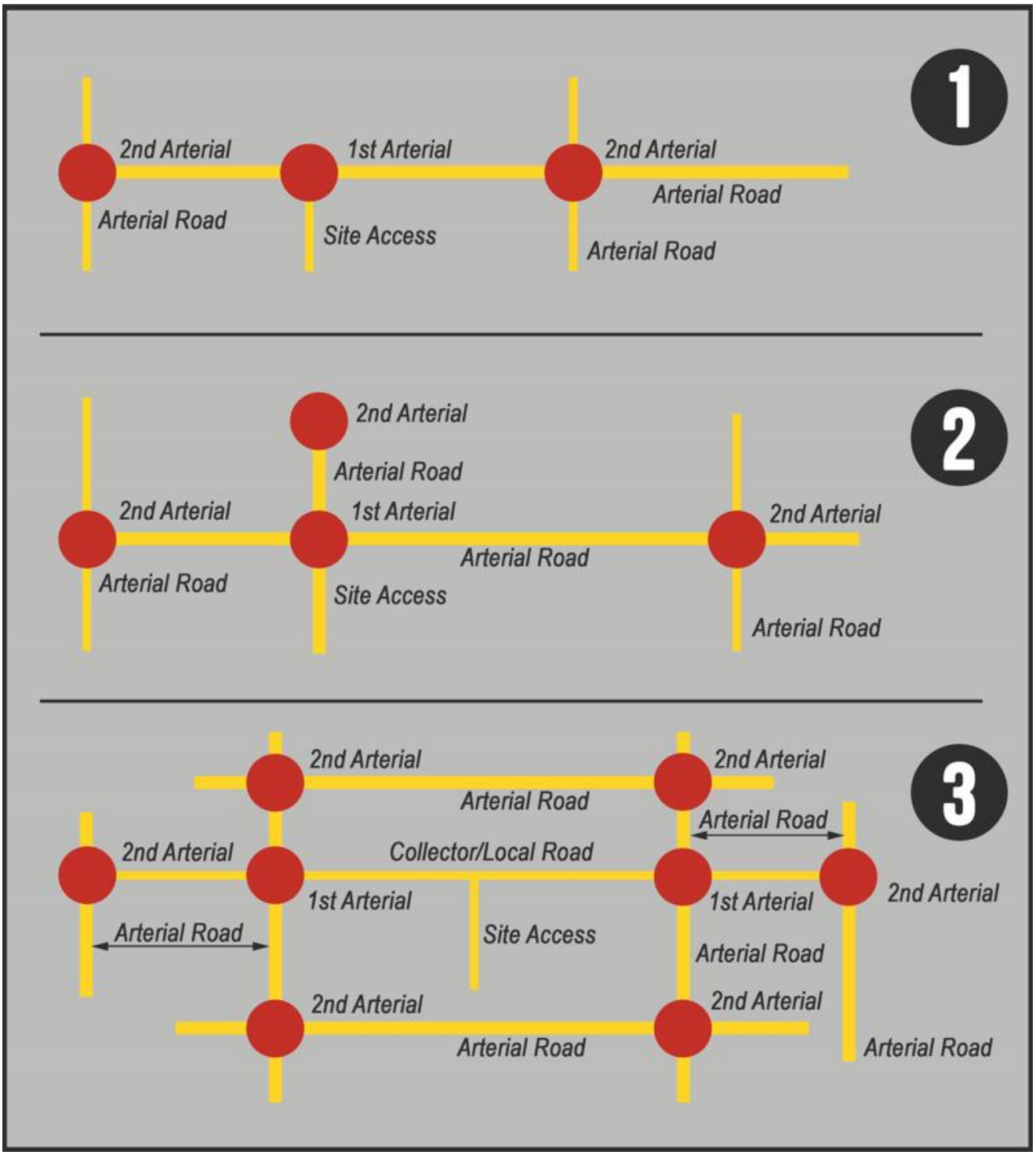

Figure 1. Study Area Examples

IV. TRAFFIC DATA REQUIREMENTS

To conduct an effective traffic impact study, a significant amount of traffic data is required. This data provides valuable information about the existing traffic conditions in the area surrounding the proposed development and helps to assess the potential impacts of the project on the transportation system. The data collected for a new traffic impact study must be thorough and accurate to ensure that the conclusions drawn from the study are accurate. This section will discuss the various traffic data requirements for a TIS in Baltimore County.

A) Existing Traffic Volumes

No traffic counts older than 2022 will be accepted due to the Covid-19 impacts. In the future, by the year 2025, all existing traffic counts shall be conducted **within three years** of the TIS submission. If counts are not conducted within the same year as the study submission, as part of the scoping agreement, adjustments to County roads can be made to bring the counts to the current year. For MDOT SHA maintained roadways, growth rates should be obtained from MDOT SHA Travel Forecasting and Analysis Division.

Traffic counts should be taken on Tuesdays, Wednesdays, or Thursdays when Baltimore County Schools are open with students and staff on site and operating on a normal schedule after Labor Day and before Memorial Day, not prior to or following a holiday, and not during the last two weeks of December, unless otherwise requested. **Traffic counts can be supplemented with data from MDOT SHA I-TMS**. It is key to ensure counts are taken under fair weather conditions and with no roadway construction nearby. For locations within high density shopping districts, weekend counts may be required.

Turning movement counts shall be collected for a **minimum of 4 hours**, ensuring that the 7:00 am to 9:00 am morning peak and the 4:00 pm to 6:00 pm afternoon peak at 15-minute intervals, unless otherwise requested. Saturday and Sunday peak hours are typically between 10 am and 2 PM. Pedestrian and bicycle counts may also be required based on the study area and/or at the request of the County. Consideration should be given to longer counts at unsignalized intersections where signal warrants may be required.

Traffic classification counts may be needed for a TIS, depending on the development and scale of the study area, for instance at industrial sites.

B) Trip Generation

The estimated trip generation for each proposed land use shall be obtained by utilizing the **Institute of Transportation Engineers (ITE) Trip Generation Manual, Current Edition**. The land use shall be agreed upon at the TIS scoping meeting. Local data reviewed and approved by the County may be utilized, for land uses not compatible to the ITE Trip Generation Manual. In cases where land uses are not identified in the ITE Trip Generation Manual and local data is not available, Baltimore County will determine the appropriate trip generation, especially for special generators. In this case, a special study of similar sites may need to be conducted.

Table 2 displays the criteria for choosing either the fitted curve equation or the weighted average rate from the ITE Manual.

Table 2. ITE Trip Generation Criteria

Regression Equation	Weighted Average Rate
Use of the regression equation is recommended when: • A regression equation is provided. • The independent variable is within the range of surveyed data. • Either the data plot has at least 20 data points or the regression equation has an R^2 value greater than or equal to 0.75, the regression equation falls within the data cluster in the plot, and the standard deviation is greater than 110 percent of the weighted average rate.	Use of the weighted average rate is recommended when: • At least three data points are available. • The independent variable is within the range of surveyed data. • The standard deviation is less than or equal to 110 percent of the weighted average rate. • The regression equation has an R^2 value less than 0.75, or no equation is provided. • The weighted average falls within the data cluster in the plot.

For all commercial developments, parks and recreation facilities, and churches, weekend trip generation and capacity analysis may be included. Analysis shall utilize Saturday or Sunday data, depending on which trip generation is larger. Pass-by trip reduction factor, per the ITE Trip Generation Manual, on major arterials may be considered for commercial developments upon concurrence with the county prior to preparation of the report. Trip reductions to account for transit ridership may be considered if the development is **within 0.25 miles of a transit station (light rail/metro)**. This would apply to account for the internal trip capture rate for mixed-use and transit-oriented developments (TOD). The MDOT developed Transit Station Area Profile Tool can be used to help locate nearby transit and includes socioeconomic and demographic data that could be helpful in the TIS development.

Growth in existing traffic used to develop the background condition should be representative of the regional traffic growth in and around the study area. This factor should be applied to the existing through traffic, and appropriate turning movements, before approved development traffic is applied. Typically, a growth rate does not need to be applied to lower functioning roadways such as local roadways and driveways. Again, these growth rates should be established as part of the scoping process.

C) Trip Distribution/Assignment

The proposed distribution for the study development must be submitted to the County and approved prior to submitting the traffic study. The trips must be assigned to the roadway network including intersections in a path that connects the origin and destination of the vehicular trips. Current directional distribution from the latest traffic counts can be used, although in some cases may be unacceptable if the directional distribution will change before the build year due to future changes in the land use or other transportation system improvements.

Justifications will be noted at the scoping session and the county's agreement with the suggested traffic distribution must be achieved before preparing the TIS. Assignment of traffic to the network shall be in accordance with the percentage distribution and type of transportation facility. County and SHA concurrence and recommendations shall be required prior to preparation of the report if a SHA roadway is included in the study area. **Travel demand modeling may be required for larger developments and can be coordinated with MDOT SHA Travel Forecasting and Analysis Division.**

Trip distribution for approved yet unbuilt development traffic should match the approved TIS. If the study area of the approved TIS does not completely overlap with the proposed development's study area, then the approved development traffic should be assigned in the new study area using the distribution from the most recent turning movement counts or other approved method.

V. TIS REQUIREMENTS

Prior to submitting a TIS, a Traffic Impact Study Scope of Work Agreement must be completed and agreed upon by both the County and the Developer/Consultant. Each TIS must be submitted in PDF format to the appropriate contact at Baltimore County prior to any type of construction on the subject site. The document must contain the listed chapters/sections below. Additional sections may be included as needed based on the analysis.

1. Cover
2. Table of Contents
3. Introduction
4. Existing Conditions
5. Background Conditions
6. Projected Conditions
7. Conclusion/Recommendations

8. Appendix

Cover

The cover must denote the name of the development, the date of submission, the developers name along with the consultant if applicable.

Introduction

This section must include the following information:

- A complete explanation of project including the type (land use) of development and proposed build year.
- A study area map displaying the site location, any new or existing proposed access points and all studied intersections analyzed in the report.
- A brief description of key roadways and road characteristics such as highway classification, AADT, typical cross-section, posted speed limit, non-motorized access including sidewalks, bus.
- Report the forecasted total new trips as defined by the latest ITE Trip Generation Manual both entering and exiting the site due to the proposed development.
- A summary of the analysis type used for the study.

Existing Conditions

The existing conditions refer to the current state of the transportation system, including the roadway network, traffic flow, safety, and other factors that affect the movement of motor vehicles through the study area. The purpose of this section is to establish a baseline condition for which the future scenarios can be compared. This scenario along with the background can help to determine if mitigation is necessary. This section shall include:

- A description of the traffic counts used in the study area, including the date/year the count was performed, location, and type of count (TMC/Mainline).
- Existing lane configuration and turning movement diagrams must be provided for the study area.
- Existing operations relating to the study area; These will include traffic operations, but may also include pedestrian, bicycle, and transit operations. Note if a field visit was conducted and provide pertinent findings relating to overall congestion, queues, and/or travel times.
- The results of the traffic analysis for this condition should also be included.

Background Conditions

The background refers to the future conditions including all nearby approved yet unbuilt developments and capital projects in the study area, *except* for the proposed development. The annual growth rates used to develop the future year should be explicitly stated along with a source. We encourage coordination with the Maryland Department of Transportation Office of Planning and Preliminary Engineering Travel

Forecasting and Analysis Division to establish valid growth rates. The background traffic volume is defined below:

$$Background\ Traffic = Existing\ Traffic + Growth\ in\ Existing\ Traffic + Development\ Traffic$$

This section should include the following:

- A description/list of any approved/funded capital projects impacting the study area.
- A Background lane configuration and the following turning movement diagrams:
    1. Background growth traffic
    2. Approved yet unbuilt development traffic
    3. Total background traffic as defined above
- A list of the approved yet unbuilt developments should be included along with a map displaying the location of each new development.
- The results of the traffic analysis for this condition with graphics or tables.

Projected/Total Condition

The projected condition is similar to the background, except the proposed development is included in the analysis. This future year's analysis will include the same background growth, approved yet unbuilt developments, and capital projects. The total traffic is defined as:

$$Total\ Traffic = Background\ Traffic + Site\ Generated\ Traffic$$

This section shall include the following information:

- The ITE land use code is used to forecast the trips generated by the site. A diagram with the approved trip distribution displaying only the trips generated by the site.
- The trip generation/pass by trips shall be noted.
- A diagram with the total traffic turning movement volumes shall be provided. If lane configurations are expected to change, a total condition lane configurations diagram should also be provided.
- The results of the traffic analysis for this condition should be displayed in graphics or tables.
- Depending upon the results of the analysis, an additional condition that includes mitigation may be required to meet the TIS requirements.

Conclusion and Recommendations

The results of the analysis should be concisely summarized. If found to be needed, the consultant/developer should suggest improvements to mitigate the impacts generated by the site, either in the projected conditions sections of the TIS or under a separate mitigation proposal and provide analysis results of these mitigations. Concept plans showing proposed mitigation should be developed.

Appendix

The appendix shall include the following information in the following order:

- Approved Traffic Impact Study Scope of Work Agreement
- Latest development site plan (must be legible)
- Any relevant correspondence between the County and Developer/Consultant such as agreement to use a particular land use code, trip distribution, growth rate, etc, beyond the scoping document.
- All background development site trip generation diagrams
- All traffic counts used in the study
- Critical Lane Volume (CLV) Analysis calculation worksheets
- Synchro/SimTraffic, Sidra, or Vissim outputs

VI. ANALYSIS

Capacity analysis shall be performed for all intersections (including new site access points) in the agreed upon study area outlined in the scoping letter. Additional analysis along roadways, ramps, weaving sections, internal circulation may be necessary based upon the analysis. The analysis shall be in accordance with the methodologies contained in the most current edition of the Highway Capacity Manual (HCM). Guidelines on conducting Critical Lane Volume (CLV) analysis and analysis tool can be requested from MDOT SHA/UMD[1]. Table 2 below outlines the type of analysis needed based upon the area type defined by the Baltimore County Transportation Basic Services Map[2].

Table 3. Analysis Type

Urban		Rural	
Signalized	Unsignalized	Signalized	Unsignalized
CLV If CLV > 1300 Then HCM	HCM	CLV If CLV > 1150 Then HCM	HCM

In addition to Table 2, the following should be followed:

- Roundabouts should be analyzed with the HCM through Synchro and/or Sidra Intersection (preferred)
- If any signalized intersection along a coordinated corridor has a CLV greater than 1,300, then all intersections, regardless of CLV, shall be analyzed using HCM procedures and arterial LOS shall be reported. MDOT SHA has developed Synchro files for the state-owned coordinated arterials and these files may be requested to reduce model development time.
- An adequacy of sight distance evaluation shall be conducted and the impacts and opportunities for bicycle, pedestrian, and transit modes of transportation should be reviewed.
- For unsignalized intersections, Simtraffic can be used to determine simulated delay for the minor street approaches, where applicable, in addition to HCM. The simulated delay can provide more realistic delay values as opposed to the equation based HCM analysis. For example, microsimulation can capture the impact of gaps created by signalized intersections. The inclusion of this type of analysis should be confirmed in the scoping meeting.
- In special cases where the development type is categorized as “Small,” per Table 1, it is possible that microsimulation analysis would not be necessary. Such

[1] https://attap.umd.edu/2017/07/27/midcap-2/
https://attap.umd.edu/wp-content/uploads/2022/05/MIDCAP_INTRO_website_05202020.pdf

[2]https://resources.baltimorecountymd.gov/Documents/Public_Works/basicservices/2022/trans2022_final.pdf

scenarios and analysis requirements can be discussed during the initial scoping process.

While any software that implements the latest version of the HCM can be used, the following are recommended:

- Synchro and Simtraffic for microsimulation
- Vissim for freeway analysis
- Sidra Intersections for roundabouts
- Highway Capacity Software (HCS)
- Highway Safety Software for any crash analysis

Simulation files must be submitted for review with the Traffic Impact Study report.

Model Calibration Synchro/SimTraffic

If a microsimulation model is used in the analysis, the model must be calibrated for existing conditions prior to analysis of any future condition. As noted, MDOT SHA microsimulation models may be available and encouraged to be used. Common calibration requirements and techniques for the Synchro/SimTraffic software are provided below:

- Common data needed for Synchro model calibration includes travel time runs (at least five runs per direction during the AM and PM peak periods on a typical traffic day, usually Tuesday, Wednesday, or Thursday), which provide observed conditions regarding vehicular speeds and delays throughout the corridor. Existing queues and throughput can also be collected in the field during observations to aid in the calibration process. The extent of the calibration data necessary, or if alternative methods/data can be used, can be discussed at the scoping meeting.
- Model seeding time must allow a car to travel from one end of the network to the next. Customary simulation seeding times span from 900 seconds (15 minutes) to 1,800 seconds (30 minutes). Longer seeding times may be considered for excessively large networks or high congestion. Recording time must be at least one hour for each peak and must account for the peak hour factor.
- A minimum of five model runs must be completed before the average outputs of all runs can be used for analysis.
- Queues should be observed over a couple of signal cycles at least, and queue lengths should be recorded for each turning movement. Noting where queues are excessive (e.g., spill out of the turning bays, extend beyond the turning bays and to an adjacent intersection) can provide valuable information when calibrating the microsimulation model.
- If adverse outside operations impact the study area network, it is important to incorporate these impacts into the Synchro model; otherwise, the model may not reflect the existing conditions.

- Simulation travel time (from SimTraffic) is to be within 10% of observed travel time by roadway segment, by direction (e.g., from one major signalized intersection to another, by direction).
- Simulation turning movement queues must reflect observed queues.
- Changes to model calibration should be documented and submitted for review.

Model Calibration Vissim

Common calibration requirements and techniques for VISSIM microsimulation software is provided below:

- Two calibration approaches are required of all Vissim models:
  - Travel time and/or speed
  - Vehicle throughput
- Seeding time must allow a car to travel from one end of the network to the next. Customary simulation seeding times span from 900 seconds (15 minutes) to 1,800 seconds (30 minutes). Longer seeding times may be considered for excessively large networks or high congestion.
- A minimum of five runs must be completed before the average outputs of all runs can be used for analysis.
- Calibration of the network using travel times or speed must use short segment data, rather than overall corridor travel time/speed. A maximum of a ± 10 percent variation is permitted for small segments no more than 1 mile long.
- For a facility spanning more than one mile, it is recommended to break the facility into segments based on obvious breakpoints (e.g., between signalized intersections, or at ramps). These new smaller segments would then be calibrated at ± 10 percent variation with an overall corridor calibration of ± 5 percent. On a facility longer than 1 mile without obvious breakpoints (e.g., between freeway ramps), the FHWA standard of ± 10 percent is considered appropriate.

Analysis Results

All analysis results should be summarized in a comprehensive table, with separate tables for AM and PM peak hour results. Meaning the existing, background and total traffic conditions should be compared in the same table for each time period.

The following section describes the results that are to be included in the TIS. These will be used to assess both the existing and future conditions as well as the overall impact of the proposed development.

- For CLV analysis, the critical lane volume, V/C ratio, and LOS should be reported.
- Highway Capacity Manual (HCM) methodologies within the software may be used to report various Measures of Effectiveness (MOEs), including Level of Service (LOS), intersection delay, and volume to capacity ratio for each intersection, and/or for turning movements at each intersection. In certain circumstances, as discussed during the scoping meeting, arterial LOS will be required for major roadway segments, by direction, within the study area.

- Queue shall be reported for each study intersection. The longest queue for each movement shall be reported **including through** and turning movements. Queues should be reported along with the available storage capacity. When Synchro is used, the average and 95th percentile queues from Simtraffic should be reported. Again, models can be requested from MDOT SHA. If an analysis only uses CLV, queues can be obtained from the SHA queuing methodology. If queues are excessive and extend beyond the storage length in the background condition, the developer shall recommend mitigation.
- In circumstances where 95th percentile queues for a particular turning movement block access to an adjacent travel lane (e.g., through queues blocking access to a right or left turn bay, left or right turn queues blocking access to a through lane), Percent Blocking times for 95th percentile queues must be reported (using SimTraffic outputs).
- If microsimulation software tools are used to perform an analysis that involves signalized intersections, submission of existing signal timing phase diagrams (hard copy or digital) will be required.
- In study areas where a large number of pedestrian and/or bicycle traffic is expected to be present, pedestrian and bicycle delays, as well as pedestrian and bicycle LOS, is required for all crosswalks within the study area. Requirements for providing these MOEs will be discussed during the scoping meeting.

Results from VISSIM would include:

- Simulated travel times and speeds for each major roadway segment. A major roadway segment typically consists of a section of roadway between two major signalized and/or unsignalized intersections.
- Maximum queue lengths for each turning movement of each study area intersection.
- Intersection LOS, based on HCM methodology and thresholds (calculated from node delay)
- Diverge, merge, and/or weave densities and corresponding LOS (if applicable to the study area). LOS must be calculated, based on HCM thresholds.
- Network performance measures of effectiveness
    - Network overall delays
    - Network overall travel times
    - Latent vehicles (“vehicles denied entry”)

VII. OPERATIONAL REQUIREMENTS/MITIGATION

Mitigation is necessary to manage excessive developer induced queues and delay. Developer mitigation should be proposed in the TIS when the Total condition causes the facility to become inadequate as defined by the LOS requirements noted below. Importantly, the comparison between the Background condition and the Total condition should be used determine if mitigation is necessary. Developers should be held responsible to mitigate the effect that new traffic the development introduces to the roadway network. Signal timing changes must be approved as an appropriate form of mitigation.

In Baltimore County, the level-of-service can regulate the issuance of building permits for non-industrial development in urban areas determined to have a considerable influence on a particular intersection. Areas around a LOS F intersection, as defined in the Basic Services Map, would have a moratorium on building permits for non-industrial development, with some limited exceptions. Therefore, the following LOS thresholds should be applied as applicable based on the Baltimore County Transportation Basic Services Map.:

1. If an intersection is located in a LOS F shed, mitigation measures must be developed to address additional site trips so the Total condition HCM LOS is at the same level (LOS and delay) as the Background condition, regardless of Total condition Level of Service. For example, if under the Background condition the intersection operates at HCM LOS D (50 sec/veh), and is in a LOS F shed, mitigation for the Total condition must bring the LOS back to D (50 sec/veh).
2. The exception to item 1 is if an intersection is located within the Towson Urban Center or Commercial Revitalization Areas, HCM LOS E is acceptable under the Total traffic condition. This applies to intersections which overlap in a LOS F shed and the Towson Urban Centers and Commercial Revitalization Areas. Otherwise, mitigation is required to bring the Total condition back to the same level as the background condition.
3. For all other areas, to promote sensible growth without restricting urban development, the minimum acceptable Total Traffic condition LOS requirement without mitigation, based on HCM methodologies, is LOS D. Otherwise mitigation is required to bring the LOS back to the background condition.

While the LOS and delay are key requirements for evaluating a TIS and determining the capacity of roadways, it does not provide a complete picture of the transportation impact in a given area. Additional consideration should be taken for all modes of transportation including pedestrian and bicyclist traffic. For example, if a proposed development could extend an existing sidewalk/bike lane facility, it is expected that the developer would work with the County to better the overall transportation network. Furthermore, queues, travel time, and movement availability are necessary to provide a more detailed analysis of traffic flow and potential issues. Queues, for example, can help identify areas where traffic is likely to back up, causing delays and potentially creating safety hazards. Turning movement availability is important if signal modifications need to be made to provide new phasing. By incorporating these additional operations into a traffic impact study, planners and engineers can gain a more comprehensive understanding of the traffic impact in a given area, which can inform decisions about road design, traffic signal timing, and other crucial factors.

If a roadway facility such as an intersection becomes inadequate exclusively from a proposed development, the developer is responsible to propose a mitigation strategy to provide improvements on the impacted facility such that it will operate at an adequate LOS. The mitigation must be applied to the facility or other transportation element that

needs to be improved because of the proposed development. Mitigation by the developer is preferred, yet if circumstances deem that improvements will be infeasible, payment of impact fees or fees in lieu of construction towards an escrow account can be used to mitigate negative development effects on the roadway facilities. The payment should be equal to the estimated cost of the improvement as approved by the County.

VIII. SIGNAL WARRANTS

Performing signal warrants can be a crucial aspect of a TIS, as a new development may trigger the need for signalization to safely allow ingress/egress with the new facility. These criteria consider factors such as traffic volume, pedestrian activity, and safety concerns. A signal warrant analysis should be included in the TIS if a traffic signal is proposed or if requested by the County. The analysis must be performed in accordance with the latest Manual on Uniform Traffic Control Devices (MUTCD). Diurnal ITE trip generation rates should be used if available.

Considerations such as turning phase analysis, special operations (e.g., flashing signals) and pedestrian and bicycle accommodation should be documented as well. After review of this analysis, the County may require additional study, including exploring other alternatives to signalization, before reaching a final determination as to the need for a signal. Meeting of a signal warrant(s) does not automatically guarantee County approval of a new signal.

IX. CONCLUSION

In conclusion, a traffic impact study is a crucial tool in assessing the potential impact of a development project on the surrounding transportation network. By providing detailed analysis of current traffic conditions and projecting future traffic patterns, such studies can inform the development process and ensure that appropriate mitigation measures are implemented to minimize adverse effects on traffic flow and safety. The guidelines presented in this document aim to provide a framework for conducting effective traffic impact studies, considering the unique characteristics of each project and the needs of the Baltimore County/Communities. It is our hope that these guidelines will serve as a valuable resource for transportation planners, developers, and other stakeholders involved in the development process, helping to ensure that our transportation network continues to function efficiently and safely for years to come.

Traffic Impact Study (TIS) Checklist

Instructions: All Traffic Impact Study submissions shall contain the following information. Any submissions brought to the County with a missing or incomplete study may be rejected and not reviewed until all necessary information has been provided. It should be noted that not all items contained below will, necessarily, be required for every project.

Consulting Engineer shall place one of the following marks (as appropriate) on each line (engineering reviewer shall verify each mark).

N/A - Not applicable **Y** - Provided

The following checklist is provided to assist the design professional in developing a complete Traffic Impact Study to expedite review by the Department. All final Traffic Impact Studies submitted for review are to include a copy of the checklist(s) signed by a design professional in responsible charge of the firm. Submittals made that do not include the checklist(s) will be returned without review, comments, or approval. Compliance with the checklist, however, is in no way is meant to relieve the design professional of responsibility for project design or the requirements outlined in the TIS Guidelines.

Each Traffic Impact Study shall contain the following:

A. Cover sheet that contains:
   1) Title of Report
   2) Name of Project/Development
   3) Project Number if applicable
   4) Prepared for "*name of developer*"
   5) Date of submission
   6) Name and Address of Traffic Consultant

B. Table of contents which includes:
   1) Introduction
   2) Existing Conditions
   3) Background Conditions
   4) Projected Conditions
   5) Conclusions/Recommendations
   6) Appendix

C. An Introduction that includes:
   1) Description of the project including proposed land use
   2) Study Area map and description of roadway/area
   3) Analysis methodology
   4) ITE expected total new trips

D. Existing Conditions that includes:
   1) A description of traffic counts
   2) Lane configuration and turning movement diagrams

3) Report of field observations
4) Results of analysis

E. Background Conditions that includes:
   1) A list of nearby approved developments
   2) A list of nearby funded capital projects
   3) Lane configuration and turning movement diagrams
   4) Results of the analysis
F. Projected/Total Conditions
   1) Diagram with total traffic turning movement volumes
   2) Proposed lane configurations
   3) ITE trip generation summary and diagram with new trip distribution
   4) Results of analysis
   5) Mitigation if applicable
G. Conclusion and Recommendations
   1) Summarize study and findings
   2) State if operations are expected to meet County guidelines
   3) Describe mitigation is applicable
H. Appendix
   1) Approved Traffic Impact Study Scope of Work Agreement
   2) Latest development site plan
   3) Any relevant correspondence between the County and Developer/Consultant such as agreement to use a particular land use code, trip distribution, growth rate, etc.
   4) All background development site trip generation diagrams
   5) All traffic counts used in the study
   6) Critical Lane Volume (CLV) Analysis calculation worksheets
   7) Synchro/SimTraffic, Sidra, or Vissim outputs and electronic simulation files

Applicant's Certification

I, the undersigned, hereby certify that the attached Traffic Impact Study has all items required by the Baltimore County Traffic Impact Study Guidelines. I understand that if any of the items required are deemed missing from the study, the study will not be acceptable for review and will be returned as incomplete. My client is aware of this criterion and will accept all responsibility for delays due to an incomplete study. I am enclosing an explanation for each item which I feel is not required and, therefore, has not been included in this study.

Design Professional's Signature _____ Date _____

NOTE: DESIGN PROFESSIONAL MUST <u>SIGN</u> THIS CHECKLIST

Reviewer's signature _____ Date _____

BALTIMORE COUNTY DEPARTMENT of PUBLIC WORKS
Bureau of Transportation
111 W. Chesapeake Avenue, Towson Maryland 21204

TRAFFIC IMPACT STUDY SCOPE OF WORK AGREEMENT

Contact Information			
Transportation Consultant (Company, contact, email, and phone number)			
Name of Applicant/ Developer			
Email			
Phone Number			
Project Information- *Attach Tables/Graphics As Needed*			
Project Name (include plan no. if known)			
Project Location (include address if known)			
Policy Area(s) (Basic Service Map LOS Zone)		Urban or Rural (As denoted by Demarcation Line)	
Project Description & Previous Approvals (Proposed ITE land uses, zoning, no. of units, square footage, construction phasing, prior approvals and proposals, existing uses, site operations, year built, other relevant info)			

Site Access (proposed access location(s), existing/adjacent/opposite curb cuts, interparcel connections, access configurations and restrictions, internal circulation, private roads, parking/loading areas,)		
Transportation Analysis Requirement (refer to Baltimore County TIS guidelines)	☐ Traffic Study Generates 50 or more total weekday single peak hour trips	☐ Traffic Study Exemption Statement Generates 49 or fewer total weekday single peak hour trips.

Traffic Impact Study Assumptions	***Include Tables/Graphics, As Needed***	
Study Years / Phases	Existing Year:	Phases / Build-out Year(s):
Study Periods	☐ AM ☐ PM ☐ Mid-day ☐ Saturday ☐ Sunday ☐ Other:	
Study Intersections (List all signalized & significant unsignalized intersections, and site driveways; traffic counts must be collected within 12-months of completed TIS scope agreement)	Number of intersections to study: *For the purpose of determining the number of study intersections, refer to the TIS guidelines which outlines the study area based on the maximum ITE generated peak hour trips.*	
	1)	7)
	2)	8)
	3)	9)
	4)	10)
	5)	11)
	6)	add more rows if necessary
Trip Generation (ITE code(s), methodology, current approvals, proposed uses, trip reduction allowance)		

Proposed Total AM Peak Hour Trips		Proposed Total PM Peak Hour Trips	
Reductions / Mode Split (Include justification and supporting documentation for internal capture, pass-by, TOD, diverted, transit, TDM, bicycle/pedestrian)			
List Multimodal Transportation in Study Area (Include existing bus stops, Light Rail/train stops, shared use trails, sidewalks, bicycle lanes			
Trip Distribution (Show percentage distribution throughout study area with proposed percentages for new in/out trips)			
List Background Developments to be considered as background traffic (Include name/description, land uses, and sizes for approved but unbuilt developments or concurrently pending applications)			
Approved Additional Background Growth Rate			

(Describe source)	
Capital Improvement Projects Included (Funded County CIP, State CTP, developer projects, etc.)	
Additional Analysis or Software Required	☐ Queuing Analysis ☐ Synchro ☐ Signal Warrant Analysis ☐ SIDRA ☐ Sight Distance ☐ Freeway Analysis ☐ VISSIM ☐ Other _____ ☐ Crash Analysis ☐ CLV

Clarifications

- Traffic study will comply with all other requirements outlined in the Baltimore County Traffic Impact Study Guidelines.
- If physical improvements are proposed as mitigation, the traffic study will demonstrate feasibility with regards to right-of-way and utility relocation (at a minimum).
- If the development proposal significantly changes after this traffic study scope has been agreed to, the Applicant will work with County staff to amend the scope to accurately reflect the new proposal.
- A PDF copy of the traffic study and appendices will be provided.

Additional Assumptions / Special Circumstances for Discussion

Traffic study scope agreement is not final until signed by County staff.

AGREEMENT

_____ _____

APPLICANT OR TRAFFIC CONSULTANT SIGNATURE DATE

(Must be PE, PTOE, PTP, or AICP unless exempt from traffic study)

_____

PRINT NAME

_____

COMPANY

_____ _____

BALTIMORE COUNTY STAFF SIGNATURE DATE

_____

PRINT NAME

Please include a signed copy of this document and accompanying graphics with submitted traffic study or statement.