

# TRAFFIC IMPACT ANALYSIS GUIDELINES

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*Prepared for HARFORD COUNTY GOVERNMENT*

## ADEQUATE PUBLIC FACILITIES PROGRAM – TRAFFIC IMPACT ANALYSIS (TIA) GUIDELINES

### Title and Purpose

A Traffic Impact Analysis (TIA) is a study to provide information regarding the impact of generated trips from proposed land uses on traffic safety and operation within a designated area. It also provides recommended solutions to mitigate the impact.

The purpose of TIA specifications is to provide the most concise guidelines for designation of the area to be studied, type of analysis, methodology, and requirements to assess the traffic impacts of development proposals on the existing and future transportation system.

The specifications outlined in these TIA Guidelines are provided to advise applicants as to what will normally constitute a comprehensive, complete, and acceptable TIA for development proposals in Harford County. Any TIA not meeting the following guidelines shall be considered incomplete and unacceptable for use in the determination of recommended transportation improvements. The TIA will not be approved and will be required to be revised or amended unless the Department of Planning and Zoning and the Department of Public Works concurs with the modification or waiver of certain requirements based upon the individual circumstances applicable to a specific project.

### Threshold Conditions Requiring a TIA

A complete TIA is required for any development that generates more than 249 trips per day. All developments that meet this threshold shall submit a TIA at the Preliminary/Site Plan stage. A corridor impact analysis using Synchro software is required for all developments that generate 1,500 or more trips per day if impacted corridors contain two or more interconnected traffic signals within a mile.

### Residential and Nonresidential Developments

For residential developments, the developer shall provide their own traffic consultant. For all nonresidential projects, the County will select the traffic consultant and the developer shall pay in advance all costs before the County will order the preparation of the TIA. The Developer shall be responsible for any costs incurred by the County/Traffic Consultant due to any changes that happen during the development of the TIA.

### Administration

A scoping meeting is required prior to preparation of the TIA. The scoping meeting required attendees include the developer/applicant (and/or his/her representative), the traffic consultant, the Harford County Department of Public Works, the Harford County Department of Planning and Zoning, and Maryland State Highway Administration (SHA) Officials. The meeting shall include a review and consent of the following:

- a) The study area;
- b) Clarification, justification, and agreement on all assumptions used in the report;

- c) Approved preliminary and site plans within the study area that will be included for estimation of background traffic. (NOTE: Precise provisions for this item are discussed under total future traffic estimates in this document);
- d) Pending developments within the study area may be included in an alternate scenario within the study if approvals are pending for any required offsite road improvements;
- e) 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 TIA and recommended improvements must be resolved before preliminary or site plan approval may be granted.

### Study Area

The designated study area shall be determined by the County, who shall consider the following measures to designate the study area:

#### **Inside the Development Envelope**

Existing County and state roads in all directions from each point of entrance of the site through the intersection with the first arterial roadway to the next intersecting collector or higher functional classification road as defined by the Harford County Master Plan.

#### **Outside the Development Envelope**

Existing County and state roads in all directions from each point of entrance of the site to the first intersection of a Major Collector or higher functional classification road as defined by the Harford County Master Plan.

Study area for residential developments shall not exceed 2 road miles in all directions, except when proposed uses are projected to generate 1,500 or more trips per day. Such uses may be required to expand the study area. The study area for nonresidential developments shall extend 2 road miles in all directions from the site access or to the area identified above (Inside the Development Envelope and Outside the Development Envelope), whichever is greater. The study area may be expanded for uses projected to generate 1,500 or more trips per day.

### Design Year

The design year shall be based on the expected completion date of the project discussed at the scoping meeting. Any changes to the preliminary or site plan may require the submission of an updated TIA.

## Extension

Approved uses for which a preliminary or site plan extension has been requested will be required to update the traffic study in accordance with these guidelines. Re-submitted and/or revised plans may be required to complete a new TIA.

## Traffic Data Requirements

- a) **Existing Traffic.** All existing traffic counts shall be conducted within a 12-month period with an annual growth factor determined by the county prior to submitting the report. Traffic counts should be taken on Tuesdays, Wednesdays, or Thursdays when Harford County Public 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. Turning movement counts shall be collected from 7:00 am to 9:00 am and from 4:00 pm to 6:00 pm at 15-minute intervals, unless otherwise requested. Harford Community College must be open with students and staff on site and operating on a normal schedule for projects within a study area that encompasses MD 22, Schucks Road and/or Thomas Run Road.
- 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 TIA 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, Harford County will determine the trip generation.

The fitted curve equation shall be used for all trip generation estimates except those land uses for which the fitted curve equation is not available or instance in which the County recommends using a weighted average trip rate instead.

In addition to peak hour trip generation, the daily trip generation for all uses shall be included in the report.

Weekend trip generation and capacity analysis shall be included for all commercial developments, parks and recreation facilities, and churches. Analysis shall utilize Saturday or Sunday data, depending on which is higher. Turning movement counts shall be collected at times required by the County.

The peak hour trip generation for townhouses shall be calculated using the Multifamily Housing category.

Pass-by trip reduction factor on major arterials may be considered for commercial developments upon concurrence with the county prior to preparation of the report. Each case will be considered for the possible Pass-by reduction rate on an individual basis.

The county will determine and apply an internal trip capture rate to mixed-use developments and a transit impact trip reduction rate to transit-oriented developments (TOD).

### Total Future Traffic Estimates

In assessing the impact of development, the documented total future traffic shall include:

- 1) Background traffic, which is composed of
  - a) Existing traffic adjusted by a growth factor for the design year. The growth rate shall be determined by the County. A growth rate provided by the consultant with supporting data may be considered;
  - b) The estimated trip generation of all approved preliminary subdivision plans and all plans with recorded lots located within the designated study area. Background developments with approved mitigation plans must have the improvements bonded, escrowed, issuance of state highway access permit, and/or executed public works agreement to be included in the TIA;
  - c) Alternative analysis showing traffic generated from pending developments.
- 2) Estimated trip generation to and from the site.

### Trip Distribution and Assignment

The proposed distribution of background traffic and site generated traffic must be submitted to the County and approved prior to submitting the traffic study. The trips must be assigned to particular links and intersections in a path that reasonably connects the origin and destination of the vehicular trips. Any of the following methodologies shall be acceptable for the purpose of trip distribution only after concurring with the County:

- 1) Utilization of demographic data;
- 2) Current directional distribution. NOTE: This may be unacceptable if the directional distribution will change before the design year due to future change in the land use or 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 TIA.

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.

The inbound/outbound traffic may not always have similar distribution or assignments. Therefore, the approach and/or departure routes may be different. This is subject to discussion and agreement with the County.

## Analysis

Capacity Analysis shall be performed for all intersections, roadways, ramps, weaving sections, internal circulation and access points. The analysis shall be in accordance with the methodologies contained in the most current edition of the Highway Capacity Manual (HCM).

The most current version of the Highway Capacity Software (HCS) shall be utilized for the analysis; any deviation from the default values in the program must be proposed, documented and agreed to by the County and SHA.

Adequate Standards for intersection level of service (LOS) are as described in Article XV Growth Management Section 267-126 Adequate Public Facilities of the Harford County Code. LOS is as set forth in the HCM (current edition).

Acceptable traffic signal cycle lengths have been established using SHA guidelines, which are based on the critical lane analysis. The SHA recommended cycle lengths are as follows:

LOS	2 PHASES	3-5 PHASES	6-8 PHASES
A	90	100	120
B	90	100	120
C	100	120	135
D	120	135	150
E	135	150	165
F	150	165	180

Unsignalized intersections not meeting the adopted LOS standards may be required to complete a signal warrant analysis and/or a roundabout analysis. Unsignalized intersections will be evaluated based on the LOS on the minor street approaches.

The "Planning Procedure" contained in the HCS shall be used for any non-existent intersection subject to evaluation 5 years or more into the future.

Critical Lane Analysis, in addition to HCM analysis may be required per County and/or SHA requests.

Progression analysis may be performed for impacted arterials containing two or more traffic signals within a mile, for closely spaced intersections (i.e. when the distance between intersections is less than 1000-feet or when estimated 95-percent queue lengths exceed the distance between intersections), or for corridors with interconnected signals. VISSIM, or HCM programs such as Synchro or Corsim shall be utilized for the purpose of progression analysis. A minimum of 5 simulation runs shall be used.

All intersections within the study area may be analyzed as directed by the County for off-site/on-site queuing using HCS 95<sup>th</sup> percentile Back-of-Queue Methodology (i.e. queuing analysis to determine the length of a left or right turn lane and storage area).

The TIA shall include capacity analysis for all identified locations within the study area with and without the proposed development to determine the site's impact and the needed improvements.

On-site traffic circulation analysis may be included in the TIA. The analysis shall include, but not be limited to, all major internal intersections and queuing analysis.

#### Pending Developments

When two or more separate TIA reports are prepared concurrently and they study the same intersections, the applicant may include a "pending developments scenario" section in the study.

#### Recommendations

The TIA report shall include but not be limited to the following recommendations to mitigate the applicable traffic impact on the area transportation system:

- a) Widening of roadways, intersections and needed right of way;
- b) Access points shall be located and designed in a way that operates at a minimum acceptable LOS without a traffic signal
- c) Location of traffic control devices. Recommended intersection for signalization shall include a warrant analysis and must meet Warrant 1 or 2, except for unusual circumstances, of the Manual on Uniform Traffic Control Devices (MUTCD) in order to be accepted as mitigation. If the criteria for signalization are not met, another form of mitigation must be identified;
- d) Pedestrian and bicycle traffic movements;
- e) Improve access to transit stops and park and ride facilities;
- f) Service and delivery vehicles access;
- g) Drive through circulation;
- h) Parking design and access points;
- i) Internal roadway network;
- j) Specific off-site and on-site improvements.

Only capital projects with specifically identified line items in the DPW Capital Improvement Program and with 100% of construction funds appropriated may be utilized in the analysis. Other approved plans that have planned roadway improvements may be utilized within the traffic analysis only if the developer/development has an executed Public Work Agreement with the County or has acquired an access permit from SHA for the improvements. Developments that have required improvements identified in the plan approval letter will not be included in the background traffic analysis until access permits have been issued or public works agreements have been executed. Possible exceptions to the Public Works Agreement may occur where, capital projects are included in larger developments that have an established program in terms of improvements and build out of lots.

The recommended design of improvements must be achievable and when requested by the County, shall be demonstrated as such by progressing the design to the 30% stage, prior to receiving final approval for the mitigation to verify the constructability of an improvement. The Harford County Road Code, MDOT Standards and AASHTO sources shall be utilized for the design of the recommended improvements. A TIA without specific recommendations to mitigate negative impacts shall not be considered complete.

All necessary SHA access permits must be issued, and any Harford County Public Works Agreements must be fully executed by the developer for the road improvements identified to mitigate the developments impact to the studied roads and intersections. Copies of executed documents must be provided to the Department of Planning and Zoning. All access permits must be issued, and all public works agreements must be executed prior to issuance of any building permits. Construction of all improvements must be completed and operational prior to issuance of certificates of occupancy.



In addition to a hard copy of the TIA, the consultant is required to submit a digital copy on an acceptable storage device (Disc, USB Flash Drive, email, etc.) and shall include the following information:

- Table of Contents
- Introduction
  - Explanation of Project/Purpose of Report
  - Area Map showing site location and studied intersections
- Existing Conditions
  - Traffic counts & Analysis
  - Existing Lane Configuration Sketch
- Background Conditions, without site
  - Area Map showing the locations of the approved developments
  - Annual Growth in traffic to build year
  - Traffic generated by other approved developments
  - Background Analysis (Background Traffic = Existing Traffic + Growth in Existing Traffic + Approved Development)
  - Background Analysis with approved/funded highway projects
  - Background Trip Distribution
- Projected Conditions, with site
  - Traffic generated by the proposed development (i.e. site generated traffic) at build out, and/or at any significant stage of development
  - Total Traffic Analysis (Total Traffic = Existing + Growth + Approved Development + Site Generated)
  - Back-of-Queue Queuing Analysis
  - Analyze total traffic with improvements
  - Total Traffic Analysis with Pending Developments
- Conclusions/Recommendations
  - Explain results of analysis
  - Recommended Improvements to mitigate the site traffic impacts
- Appendix
  - All work sheets, traffic counts, intersection lane width and turn lane storage length, ITE Trip Generation for Background Traffic, and pertinent correspondence

## ADEQUATE PUBLIC FACILITIES PROGRAM – TRAFFIC IMPACT ANALYSIS

### Traffic Parameters for LOS Analysis using the Highway Capacity Software (HCS)

Version of HCS: Latest available version  
Use HCS defaults unless otherwise specified

### TRAFFIC CHARACTERISTICS

PHF: As determined from the turning movement count

Heavy Vehicles: Use 10% on US 40 from Baltimore County to Cecil County, on MD 7 from Baltimore County to US 40, on Brass Mill Road from MD 543 to MD 7, on MD 543 from US 1 Bypass to US 40, on Old Philadelphia Road from MD 159 to US 40, on MD 159 from Old Philadelphia Road to Chelsea Road, on Chelsea Road from MD 159 to the end, on Woodley Road from Chelsea Road to MD 715, on MD 440 from MD 543 to US 1, on Hughs Road from MD 440 to US 1, MD 24 from Singer Road to APG, on Edgewood Road from MD 24 to US 40, on MD 152 from I-95 to APG, and on Trimble Road from MD 152 to MD 24. Use 2% everywhere else unless otherwise specified

Ideal Saturation Flow: 1,900 vphgpl (vehicles per hour of green time per lane)

### SIGNAL CHARACTERISTICS

Signal Type: Fully actuated if it is not within the closed loop system;  
Actuated with coordination if it is within a closed loop system

Arrival Type: Fully actuated:  
Arrival Type 3 must be used on each movement  
  
Actuated with coordination:  
Arrival Type 3-4 as appropriate must be used on the coordinate lane groups. Arrival Type 3 must be used on the non-coordinated lane groups

Right-turn on Red: 0 if it is not permitted or counted from field if it is permitted

Cycle Length: Existing cycle length. Signals within a coordinated system shall use the system cycle length

Yellow/All Red:	As determined by the current timing plan
Extension of Effective Green:	4 seconds per phase
Queue Length Percentile:	95 <sup>th</sup>