2 TRAFFIC STUDY POLICY

2.1 INTRODUCTION AND PURPOSE

Traffic studies are tools used to evaluate the impacts of land development projects on the surrounding transportation system and determine if improvements are required to mitigate those impacts to the network.

The Town of Holly Springs has developed this Traffic Study Policy to define the need for traffic studies associated with proposed land development projects as well as guidelines for those studies. This policy is intended to provide transparent criteria for traffic studies performed in the Town, establish clear expectations through this process in the Town, and to ensure consistency with the Comprehensive Plan and other adopted Town plans and policies.

The Unified Development Ordinance Administrator (Administrator) shall administer this policy. The Administrator may elect to utilize professional services from a traffic consultant to administer portions of this policy on behalf of the Town.

2.2 RESPONSIBLE PARTY QUALIFICATIONS

Traffic studies must be signed and sealed by a Professional Engineer (PE) licensed in the State of North Carolina with relevant traffic engineering experience. The Administrator reserves the right to make a determination as to whether a particular engineer meets this criterion.

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2.3 TRAFFIC STUDY THRESHOLDS & STUDY AREA

The Unified Development Ordinance (UDO) defines three tiers of traffic studies as follows:

A. Tier 1: Trip Generation and Distribution Assessment (TGDA): For developments that are not expected to generate significant site traffic or have significant impacts at off-site intersections. This tier of Traffic Study would require a summary of the anticipated trip generation and site traffic distribution but would not require any capacity analysis.

B. Tier 2: Site Specific Traffic Assessment (SSTA): For developments when site traffic is sufficient to potentially necessitate improvements to the transportation network only in the immediate vicinity of the site. This tier of Traffic Study would typically require analysis of site driveways and critical nearby intersections in a limited study area and would require coordination through the Town's Traffic Study scoping process.

C. Tier 3: Traffic Impact Analysis (TIA): For developments when site traffic is sufficient to potentially necessitate improvements to the transportation network beyond only site access points or adjacent intersections. This tier of Traffic Study would typically require analysis of critical intersections within at least a 1-mile radius of the site and would require coordination through the Town's Traffic Study scoping process.

Thresholds for required traffic studies will be determined based upon the amount of site-generated vehicular traffic as defined in Table 1 below. The calculations of net new external vehicular trips as used in this section shall be based on the current Institute of Transportation Engineers (ITE) Trip Generation Manual. If an applicable ITE land use is not available or contains limited data, or if additional use-specific trip generation is provided, an alternative trip generation methodology may be approved by the Administrator.

The Administrator reserves the right to require additional or alternative studies on a case-by-case basis including, but not limited to, scenarios in which development is proposed near schools, in areas with significant crash history, or where known severe traffic conditions or other safety concerns exist currently.

TABLE 1
TRAFFIC STUDY TIERS

Tier	Title	Trip Generation Threshold		Required Study Area
		Daily (vpd.)	Peak Hour (veh.)	
1	Trip Generation and Distribution Assessment (TGDA)	300-499	30-49	No intersection analysis required
2	Site Specific Traffic Assessment (SSTA)	500-999	50-99	Site access points and critical nearby intersections
3	Traffic Impact Analysis (TIA)	1,000+	100+	Site access points and critical intersections within at least a 1-mile radius

Critical nearby intersections for Tier 2 studies are those in such proximity to the proposed development that, in the opinion of the Administrator, will be sufficiently impacted to warrant inclusion in the analysis.

2.4 TRAFFIC STUDY SCREENING, SCOPING, AND MEMORANDUM OF UNDERSTANDING

Prior to conducting any assessment or analysis for submittal, the Applicant shall complete a "Request for Traffic Study Scoping" form to initiate the Traffic Study scoping process with the Administrator to discuss the Traffic Study requirements. The Administrator will determine which Traffic Study tier will be required and, once determined, the Applicant or Applicant's Consultant will schedule a Traffic Study scoping meeting if either an SSTA or TIA is required. If applicable based on the site location, the Applicant shall also coordinate with the North Carolina Department of Transportation (NCDOT)

to confirm additional study requirements and scope elements.

Following the Traffic Study scoping meeting, the Applicant shall submit a Memorandum of Understanding (MOU) or similar document that outlines the required scope of the project. The MOU shall be reviewed by the Administrator and NCDOT (if appropriate) before performing the Traffic Study. If significant changes are made to the parameters documented in the MOU, a revised MOU shall be provided by the Applicant for review and approval by the Administrator and NCDOT (if appropriate). If a required analysis is not submitted within 6 months of the Traffic Study scoping meeting, a new Traffic Study scoping meeting and updated MOU may be required.

2.5 GENERAL TRAFFIC STUDY REQUIREMENTS

While the Administrator may require additional elements for inclusion through the Traffic Study scoping process, Table 2 below provides a summary of the typical scope items to be included for each Traffic Study tier.

2.6 TYPICAL MEMO/TRAFFIC STUDY CONTENTS

A. Required Elements for all Traffic Studies (Trip Generation and Distribution Assessment (Tier 1), Site Specific Traffic Assessment (Tier 2) and Traffic Impact Analysis (Tier 3) Elements).

The following elements related to the site and study area shall be included in the memorandum for all Traffic Studies:

1. Applicant/Project Information.
   Includes the project name, location, name of the applicant, and date of the Traffic Study and the name, contact information, registration number (individual or firm), signature, and seal of a duly qualified and registered professional engineer in the State of North Carolina.
2. Project Description.
   Includes a detailed description of the development, including site location and all access points, existing and proposed uses for the site, and anticipated completion dates (including phasing). This section shall also include a map depicting the location and surrounding roadway network. A conceptual development plan shall also be provided with the memorandum by the Applicant.
3. Methodology Summary.
   Includes a summary of trip generation calculations and anticipated site traffic distribution for project trips.

   Figures and maps shall be included as needed to depict site traffic distribution and percent and assignment at site access points.
4. Results and Conclusions.
   Includes a detailed summary of results and recommendations.

B. Additional Elements for Site Specific Traffic Assessment (Tier 2) and Traffic Impact Analysis (Tier 3) Elements.

In addition to the elements required for all Traffic Studies, the following elements related to the site and study area shall be included for Tier 2 and 3 Traffic Studies:

1. Table of Contents.
   Tier 2 and Tier 3 studies shall include a Table of Contents that lists the section headings, figures, tables, and appendices included in the Traffic Study.
2. Executive Summary.
   Includes a general description of the development location, Traffic Study scope, Traffic Study horizon years, general description of the Traffic Study findings, and a summary and graphic depicting mitigation recommendations. Technical publications, calculations, documentation, data reporting, and detailed design shall not be included in this section.

TABLE 2 TYPICAL TRAFFIC STUDY ELEMENTS			
Traffic Study Tier	Tier 1 (TGDA)	Tier 2 (SSTA)	Tier 3 (TIA)
Site and Study Area Summary			
Project Location Map & Description	X	X	X
Existing & Proposed Uses and Access	X	X	X
Study Area Roadway Summary (Speed Limit, ADT, etc.)	X	X	X
Existing Condition			
Existing Roadway Network and Signal Timings		X	X
Traffic Counts		X	X
Future Year No-Build (Background) Condition			
Ambient Traffic Growth		X	X
Approved Development Site Traffic		X	X
Roadway/Signal Improvements by Others		X	X
Future Year Build Condition			
Estimated Trip Generation	X	X	X
Anticipated Trip Distribution	X	X	X
Future Year + 5 Conditions (No-Build and Build)			
Additional Growth to Build + 5 Study Year			X
Recommendations and Conclusions			
Capacity Analysis Summary		X	X
Improvement Recommendations & Diagram		X	X
Additional Traffic Study Considerations			
Traffic Signal Warrant Analysis		If Applicable	
Turn Lane Warrant Analysis		If Applicable	
Multimodal Analysis		To be determined by Administrator	
Crash Data Review		To be determined by Administrator	

X – Required Elements

3. Project Description.

   This section shall include a description of the study area roadway network (including speed limits, functional classifications, AADT volumes, etc.), a location map depicting the location, study intersections (including site driveway locations), and surrounding roadway network

4. Methodology Summary.

   Includes a summary of inputs and methodology incorporated in the Traffic Study. This shall include discussion related to traffic volume data sources, volume development methodology (including approved developments, growth rate, etc.), and site traffic distribution.

   Figures and maps should be included as needed to depict study condition volumes and laneage as well as site traffic distribution and assignment.

5. Additional Traffic Study Considerations.

   If during the Traffic Study scoping meeting or while performing the required analysis it is determined that additional traffic study considerations are required for inclusion (such as traffic signal warrant analyses, turn lane warrant analyses, multimodal analyses, crash data reviews, etc.), summaries of those additional items shall be documented in the report.

6. Results and Conclusions.

   Includes a detailed summary of results of the capacity analysis as well as other applicable required analyses (queue, traffic signal warrant, crash data, multimodal, etc.) evaluated as part of the Traffic Study. Unless otherwise noted, level-of-service (LOS) and delay shall be reported for all signalized intersections and approaches at study area intersections. Based on the Highway Capacity Manual (HCM), LOS for unsignalized intersections is not defined as a whole; instead, only the individual stop-controlled or yield approaches shall be reported from HCM through the Synchro analysis.

   The Traffic Study shall also provide a description of the findings regarding impacts of the proposed project on the existing and future transportation system and describe the location, nature, and extent of all mitigation measures recommended to be performed as part of the development to achieve required mitigation thresholds, including a graphic depicting recommended mitigation.

7. Appendices.

   Includes the MOU and other applicable documents. Tier 2 and Tier 3 studies shall provide Appendices that include applicable study documents. These sections should include, but are not limited to, scoping documents, traffic count data, approved development data, analysis results (Synchro analysis LOS reports, etc.), and traffic signal plans and timing data. Documents related to additional traffic study considerations (crash data, traffic signal warrant analyses, etc.) should be included as applicable.

2.7 TRAFFIC STUDY METHODOLOGY

The following summary details the methodology expected to be used in required traffic study:

A. Existing Condition Analysis.

   The following elements shall be considered in existing condition analyses required in Tier 2 and Tier 3 Traffic Studies:

   1. Traffic Counts.

      Unless otherwise approved by the Administrator, count data shall be no more than 12 months old and shall be collected for the peak periods of the proposed development.

      It is expected that counts will be performed in 15-minute intervals on weekdays (Tuesday through Thursday) when schools are in session and not impacted by significant

events that would affect normal traffic patterns (holidays, severe weather, special events, road closures, etc.). For most projects the typical peak conditions occur between 7:00 to 9:00 AM and 4:00 to 6:00 PM, though site-specific conditions may necessitate additional or alternate count timeframes at the direction of the Administrator. For example, 12-hour turning movement counts may be required if a traffic signal warrant analysis is required as part of the Traffic Study, or weekend peak counts may be required for projects with special event peaks or significant traffic peaks on weekends.

Traffic count data shall be included in the Appendix of the Traffic Study, and existing peak hour volumes shall be depicted in a figure included in the Traffic Study.

2. Existing Roadway Network.

Existing signal plans and timing data shall be obtained from NCDOT or collected in the field with permission from NCDOT. This data, along with existing study area intersection laneage, shall be incorporated in existing analyses per NCDOT Congestion Management Unit guidelines.

It is recommended that a site visit is conducted to confirm the existing network and to observe existing traffic conditions. Existing study intersection configurations (including turn lanes, storage lengths, and intersection control) shall be depicted on a figure included in the Traffic Study.

B. Future No-Build (Background) Condition Analysis.

The following elements shall be considered in background condition analyses required in Tier 2 and Tier 3 Traffic Studies:

1. Volume Development.

Future year background traffic volumes shall be forecasted using historical growth rate information, regional models, and/or Traffic Studies for development approved by the Town but not yet built.

Background Traffic Growth: Unless otherwise approved by the Administrator, a 5% annual growth rate shall be accounted for each movement at study intersections.

Approved Development Traffic: The approved developments and transportation projects to be included in the background conditions shall be determined during the Traffic Study scoping meeting. Approved development traffic information used in the development of the future year background traffic volumes shall be included in the appendix of the Traffic Study.

On a case-by-case basis, additional analysis scenarios may be required by the Administrator that consider the impact of significant pending but not-yet-approved projects in the study area.

Future year base traffic volumes, background traffic growth, and other development volumes shall be depicted in a figure (or figures) included in the Traffic Study.

2. Roadway Network.

Transportation improvements assumed in the future-year background conditions analysis may include those improvements with an expected completion date concurrent with that of the development and funded by the Town of Holly Springs, NCDOT, or indicated as a required condition of approval from another nearby development application. Only projects approved by the Administrator at the Traffic Study scoping meeting may be included in the analysis as future existing infrastructure. Those improvements committed by other projects must be clearly identified in the Traffic Study as approved offsite development road improvements.

Planned infrastructure projects that are unfunded, or otherwise not expected

to be completed prior to the identified development Traffic Study horizon year, may be mentioned in the traffic study but the description shall specifically identify that these projects are not included in the background condition.

C. Build-out Condition Analysis.

Unless otherwise approved by the Administrator, future year conditions for a single-phase development shall be analyzed for the year the development is expected to be at full occupancy (build-out year) and, for Tier 3 Traffic Studies, 5 years after the build-out year (build-out + 5).

The following elements shall be considered in build-out condition analyses required in Tier 2 and Tier 3 Traffic Studies:

1. Volume Development.

Trip Generation: Trip generation for the proposed land use(s) should be calculated using data published in the latest version of the Institute of Transportation Engineers' (ITE) Trip Generation Manual. Data limitations, data age, choice of peak hour of adjacent street traffic, choice of independent variable, and choice of average rate versus equation shall be discussed at the Traffic Study scoping meeting. Consistent with NCDOT trip generation methodology, collection of local data may be if appropriate validation is provided by the applicant to support them. Any deviation from ITE trip generation rates shall be discussed in the Traffic Study scoping meeting and documented in the MOU, if approved by the Administrator and NCDOT. For school sites, trip generation and peak hour factor (PHF) methodology shall be based on guidance from the NCDOT Municipal School Transportation Assistance (MSTA) group unless alternative methodology is approved.

Unless otherwise approved by the Administrator, internal capture and pass-by reductions shall be applied per guidance in the most current Trip Generation Handbook published by the ITE or per guidance from the National Cooperative Highway Research Program (NCHRP). The internal capture reductions shall be applied before pass-by trips are calculated, and pass-by trips associated with the development program may not exceed 10% of the peak-hour volume reported for the adjacent public street network. Evaluation of diverted trips may apply depending on the specifics of each site.

Mode split, which is based on an estimated volume of trips anticipated to use transportation modes other than automobiles (such as bikes, pedestrians, and transit), may be considered on a case-by-case basis. The Administrator may approve a mode-split reduction as part of the Traffic Study scoping process, and mode split calculations shall be applied prior to accounting for pass-by trips.

A trip generation table summarizing all trip generation calculations for the project shall be included in the Traffic Study.

Trip Distribution and Assignment:
Trip distribution assumptions should be developed based on a review of the development plan, existing traffic patterns in the project vicinity, and surrounding land uses. Based on the proposed development, multiple trip distributions may be referenced for differing land use types. Regardless of methodology, the procedures followed and logic for estimating trip distribution percentages must be well-documented in the Traffic Study. Overall site trip distribution percentages proposed for the surrounding transportation network shall be discussed during the Traffic Study scoping meeting and shall be approved by the Administrator and NCDOT (if appropriate) before proceeding with the Traffic Study.

If the project will be built in phases, traffic assignments shall be reported for each phase and subject to Section 8 (Period of Validity), below. Pass-by traffic shall be included at the driveways and access points.

2. Roadway Network.

   In addition to the improvements included in the background condition, laneage in the build-out condition should include signal and roadway improvements recommended to be performed as part of the development. Those improvements must be clearly identified in the Traffic Study and in figures as recommended development improvements. See Section 7.F for mitigation measure recommendation standards.

D. Capacity Analysis Inputs.

Level-of-Service (LOS) and delay are the primary measures of effectiveness for impacts to the transportation system, and those measures are defined by the most current edition of the Highway Capacity Manual (HCM). Unless otherwise noted, Synchro LOS and delay shall be reported for all signalized intersections and approaches identified in the study area. Based on HCM, LOS for unsignalized intersections is not defined as a whole; instead, only the individual stop-controlled or yield approaches should be reported based on the HCM reports determined through the Synchro analysis. SimTraffic delay results may also be accepted subject to approval by the Administrator.

Existing signalized intersections shall be modeled based on existing signal timing plans provided by either the Town or NCDOT. Existing signal timing plans shall be included in the appendix of the Traffic Study. If a signalized study intersection is part of a coordinated traffic signal system, it must be analyzed as such under all conditions. Optimized signal timings and signal phasing may be incorporated as part of the future analysis scenarios provided that those changes could be made without degradation to other corridor intersections.

Unless otherwise approved, analysis methodology identified by the NCDOT MSTA group shall be used for analyses associated with school sites, including drop-off and pick-up operations and peak hour factor (PHF) inputs. Unless otherwise directed by NCDOT, actual peak hour factors (PHF) per turning movement counts may be used in the Traffic Study. Right-turns on red (RTOR) may be incorporated in the Traffic Study for existing intersections where currently permitted in the field or at new signalized intersections where it is reasonable to expect that condition can be accommodated, if confirmed with NCDOT.

Other standard practices and default input values for evaluating signalized intersections shall be consistent with the most recent guidelines published by the NCDOT, Traffic Engineering and Safety Systems Branch, Congestion Management Unit ("Capacity Analysis Guidelines").

Unless otherwise approved, all traffic studies submitted to the Town shall use Synchro/SimTraffic or HCS analysis software for signalized and unsignalized intersections and SIDRA or Vissim software for roundabouts consistent with policies released by the NCDOT. A narrative, table, and map shall be prepared that summarizes the methodology and measured conditions at the intersections reported in LOS, intersection and approach signal delay for signalized intersections, and approach delay for unsignalized intersections.

Volume development calculations should be included in the appendix of the Traffic Study.

E. Additional Analyses.

Traffic Signal Warrant Analysis – The Administrator and NCDOT may consider potential signal locations at the Traffic Study scoping meeting. Furthermore, even if a traffic signal warrant analysis was not specifically identified through the scoping process, the Administrator may require traffic signal warrant analyses upon completion of the Traffic Study if a traffic signal is recommended for installation as part of the study. However, traffic flow progression is of paramount importance when considering a new traffic signal location. A new traffic signal should not cause an undesirable delay to the surrounding transportation system. Installation of a traffic signal at a new location

shall be based on the application of warrant criteria contained in the most current edition of the Manual on Uniform Traffic Control Devices (MUTCD) and engineering judgment. Traffic signal warrants shall be included in the appendix of the Traffic Study. Additionally, spacing of traffic signals within the Town must adhere to NCDOT requirements. Pedestrian movements must be considered in the evaluation, and adequate pedestrian clearance provided in the signal cycle split assumptions. If a traffic signal warrant analysis is recommended in the Traffic Study, the Administrator and/or NCDOT may decide to defer a traffic signal warrant analysis until after the development has opened in order to use actual turning movement counts at an intersection.

Turn Lane Warrant Analysis – At new site driveways, a turn-lane warrant analysis shall be performed based on projected build-out traffic volumes and site thoroughfare improvements. This turn-lane warrant analysis shall reference the NCDOT Driveway Manual or other approved industry standards.

Multimodal Analysis – If a multimodal analysis is identified as a requirement in the Traffic Study scoping meeting, the Administrator will provide information on the required scope and methodology of the analysis. The traffic engineer will provide an assessment and discussion of current multimodal LOS conditions in the report as well as a description of how the proposed development will impact multimodal LOS.

Crash Data Review – A summary of crash data (type, number, and severity) for the most recent 5-year period may be required on a case-by-case basis at the direction of the Administrator. Traffic Engineering Accident Analysis System (TEAAS) reports should be obtained from NCDOT or with permission from NCDOT. For locations with prevalent crash types and/or frequency, a discussion shall be included describing factors that may be contributing to the incidents. Depending on the timeline for obtaining these crash reports, this summary may be provided as an update to the Traffic Study.

F. Mitigation Measure Recommendations.

Mitigation Measure Recommendations – This section of the Traffic Study shall provide a description of the Traffic Study's findings regarding impacts of the proposed project on the existing and future transportation system and describe the location, nature, and extent of all mitigation measures identified per the thresholds identified below. to improve and/or maintain the future year background conditions level-of-service (LOS) conditions through phasing and ultimate build-out of the project. This mitigation will be based on a comparison of the levels-of-service (LOS) in the background and build-out year condition scenarios. The development is only required to mitigate transportation deficiencies caused by the projected impact of their proposed development, and not unacceptable background conditions (LOS E-F) or other deficiencies caused by offsite development within the defined study area. For multi-phase developments, the capacity analyses scenarios shall address the phasing of improvements for each phase of development.

The Traffic Study shall identify improvements to the roadway network if at least one of the following conditions exists when comparing future year build-out conditions to future year no-build (background) conditions for overall intersection or intersection approaches:

- the background condition is LOS C-D and the total average delay at an intersection or individual approach increases by 25% or more, while maintaining the same LOS.
- the background condition is LOS E-F and the total average delay at an intersection or individual approach increases by 15% or more, while maintaining the same LOS.
- the LOS degrades by at least two levels between background and build-out but remains LOS D or better at project build-out.
- the LOS degrades from an acceptable LOS (A-D) in the background condition to an unacceptable LOS (E-F) in the build-out condition.

If an intersection or approach operates at LOS E-F in the existing or background conditions and there are identified but not fully funded improvements at that location as part of other developments, fees-in-lieu may be required of the project based on proportionate impact at that location.

The Administrator and NCDOT will review the identified improvements in the final version of the Traffic Study and will have the ultimate determination in the scope of the required mitigation measures.

For cases in which implementation of an improvement is infeasible or is otherwise not required by the Administrator, the Administrator may require payment of fees-in-lieu (discussed in a later section of this Policy) based on the project's percent impact.

Mitigation measures shall be identified for the build-out + 5 scenario to meet the criterion above but will not be used for informational purposes only.

A narrative and table shall be prepared that summarizes the methodology and measured conditions at the intersections reported in LOS and average control delay for each intersection and approach. A narrative and map shall also be prepared that describes and illustrates recommended improvements, by development phase if necessary, for mitigating the projected impact of the proposed development.

G. Transportation Mitigation Agreement (TMA) and Mitigation Implementation.

Upon completion of the Traffic Study, certain on or off-site transportation mitigation measures may be required as recommended by the Traffic Study. The Applicant's Consultant shall prepare a Transportation Mitigation Agreement (TMA) which will summarize the following the results of the study, including:

- Development plan (land uses and intensities),
- Phasing and timing of development (if applicable),
- Site access and points of ingress/egress,
- On and off-site improvements required to adequately mitigate the project impacts to the Town's transportation system, including vehicular, pedestrian, and bicycle improvements, and
- Trigger points and deadlines for construction of any improvements if improvements are planned to be phased,
- Payment of fees in lieu of required improvements (if applicable).

The TMA must be prepared by the Applicant and provided to the Administrator prior to action by the decision-making body for the project. The TMA must be signed by the applicant and the Administrator prior to submittal of Civil Construction Drawings unless otherwise approved by the Administrator.

The required mitigation shall be designed and constructed by the Applicant at the Applicant's expense.

H. Payment of Fees in Lieu of Required Improvements.

In some limited circumstances, a payment of fee-in-lieu may be recommended by the Administrator to the decision-making body. The amount of payment shall be 100% of the actual installation and construction cost of completing such improvements (unless otherwise approved). In cases in which payment of only proportional fee-in-lieu is proposed, the development's contribution should be calculated based on the impact necessitating improvements, such as the impact to a minor-street left-turn (or approach) volume where traffic signal installation is considered or the proportion of site traffic relative to build-out traffic volumes on a movement where an improvement is identified. Cost estimates for required improvements shall be calculated by a registered professional engineer licensed in the State of North Carolina and provided to the Administrator for review before TMA approval.

2.8 PERIOD OF VALIDITY

The Traffic Study will be deemed valid as long as the associated development plan is valid. However, updates may be required to the Traffic Study to address impacts associated with modifications to the development that would impact traffic operations for the site. These changes may include, but are not limited to, changes in land uses that result in increases in trip generation or significantly different entering and exiting trip patterns (e.g., a change from a residential use to an office use) or changes to site access. For phased development, these changes could include circumstances in which net new peak hour external trips for a proposed phase of development exceed phasing assumed in the Traffic Study by more than 5% (while still remaining less than the total trips analyzed for the overall development). For projects requiring rezoning, updated analyses may be required even if previous studies considered developments generating equivalent or higher volumes of peak hour trips.


HOLLY SPRINGS
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