



## APPENDIX-G

### TIA Policy

Approved January 12, 2016

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1. Definition and Purpose – A Traffic Impact Analysis (TIA) is a tool used to evaluate the incremental impacts that development, redevelopment and/or change of development use may have on the surrounding transportation system which helps local decision makers evaluate whether a development is appropriate for a site, or identify certain mitigation measures that are necessary to maintain the integrity of the transportation network.
2. Responsibility for TIA – After a completed development application has been filed, and upon initial submittal of a site or sketch plan, the Town shall determine the need for a TIA. If warranted, the transportation consultant assigned by the Town shall prepare the TIA. At the discretion of the North Carolina Department of Transportation (NCDOT) and the Town, a Transportation Technical Memorandum (TTM), in lieu of a full TIA report, may be allowed for some developments. If proposed street connections are not consistent with adopted plans, Town policies, or professional standards, then an explanation or proposed transportation mitigation alternative that is equal or better should be discussed in the study. The North Carolina Department of Transportation (NCDOT) and the Town will be responsible for determining whether the alternative mitigation plan meets and/or exceeds the performance standards of the proposed street connections in the adopted plans and policies. The TIA review schedule will be determined as agreed to on the Town's TIA scoping requirements, generally based on the number of study intersections.
3. Minimum Thresholds for TIAs – A TIA will be **required** to accompany a site/sketch plan when expected gross trip generation is ***1000 total trips or more both entering and exiting the site in a 24-hour period, and/or 100 total trips both entering and exiting the site during either the AM or PM peak (prior to any trip reductions are applied). The gross trip generation will be calculated by the Town based on information provided by the applicant and the final determination for requiring the TIA will be by the Town.*** In the event that a site does not generate 1000 total trips both entering and exiting a site in a 24 hour period, and/or 100 total trips both entering and exiting the site during the AM or PM peak, a TIA may still be required for any site or sketch plan if the subject development reduces an intersection's level-of-service (LOS), and/or poses a potential safety challenge to the public or as otherwise set forth herein. The latest version of the Institute of Transportation Engineers (ITE) Trip Generation Manual shall be used to determine the expected gross traffic volumes a specific site and/or a specific use will generate. The Town may also determine the need for a TIA based on special circumstances associated with the development, and may determine that a TIA is still necessary even if the gross trips fall below this threshold. This may

be due to public safety concerns, sight distance, existing congestion issues within the vicinity of the site, or the nature of the use. The Town may also require a TIA and/or Transportation Technical Memorandum (TTM) in any of the following scenarios:

- a. Traffic generated from a non-residential development that could potentially significantly impact adjacent residential neighborhoods
  - b. Traffic operation problems for current and/or future years on nearby streets are expected to be significantly aggravated by traffic generated from the proposed new development
  - c. Major and minor thoroughfares near the site are experiencing noticeable delays
  - d. Traffic safety issues exist at the intersection or street that would serve the proposed new development
  - e. The proposed land use differs significantly from the adopted Land Use Plan for the Town
  - f. The internal street or access system is not anticipated to accommodate the expected traffic generation
  - g. The proposed development project includes a drive through facility, or other uses such as schools that require significant on site circulation that may have an off-site impact to adjoining roads and/or intersections
  - h. The amount and/or character of traffic is significantly different from a previously approved TIA, or more than 24 months have passed since completion of the previous TIA.
4. Scoping Meeting – A mandatory scoping meeting is required prior to beginning the TIA to discuss the requirements and strategies for a TIA specific to the site and the proposed development. Background information shall be submitted by the applicant five or more business days prior to the scoping meeting and shall include a conceptual site plan showing proposed access points, proposed land use and densities, structure and parking envelopes. The Town, the transportation consultant assigned by the Town, and the applicant(s) are required to attend the mandatory scoping meeting and the NCDOT district staff will be invited and encouraged to attend if access to a state road is involved. The applicant may invite members of his/her development team as needed.
  5. Memorandum of Understanding (MOU) – An MOU shall be prepared by the transportation consultant assigned by the Town documenting the understood scope of the project. The MOU shall be signed by the applicant, the Town, and the NCDOT District Engineer if access to a state road is involved before the consultant can begin work on the TIA. Failure by the applicant to provide accurate information or failure by the assigned transportation consultant to follow the MOU shall result in disapproval of the TIA. If significant changes are made to the scoping parameters documented in the MOU, a revised MOU will be required.
  6. Fees – After the scoping meeting, the transportation consultant assigned by the Town shall submit a summary of consultant fees for preparing the TIA to the Town. Per the

MOU, the applicant(s) shall agree to provide payment in full to the Town for preparation of the TIA so that the Town can release the work to the consultant. The Town may require all or a portion of the estimated fees to be paid to the Town prior to commencement of the work. Any additional services incurred by the transportation consultant in addition to the MOU must be approved by the Town, and agreed to and paid for by the applicant, prior to performance of the additional work.

7. Transportation Mitigation Agreement (TMA) – Upon completion of the TIA, certain on or off-site transportation mitigation measures may be required as recommended by the TIA. If so, the transportation consultant assigned by the Town shall prepare a Transportation Mitigation Agreement (TMA) which will summarize the following:
  - a. Development plan
  - b. Phasing and timing of development (if applicable)
  - c. Site access and points of ingress/egress
  - d. On and off-site improvements required to adequately mitigate the project impacts to the Town’s transportation system, including vehicular, pedestrian, and bicycle improvements.
  - e. Trigger points and deadlines for construction of any improvements.

The TMA must be signed by the applicant, Town and the NCDOT District or Division Engineer if the mitigation involves a state roadway. All required mitigation measures must be implemented prior to final Certificate of Occupancy (CO), or the applicant(s) shall provide a cost estimate to the Town for review, and provide a payment in lieu for said measures prior to CO.

8. TIA Outline and Contents – The outline and contents of what is required to be included in the TIA will be discussed at the scoping meeting and included in the Memorandum of Understanding (MOU). A detailed summary of the expected content and methodologies to be used in the TIA are discussed below.
  - a. Cover/Signature page – Includes the project name, location, name of the applicant, contact information for the applicant, and date of the study. The name, contact information, registration number, signature, and seal of a duly qualified and registered professional engineer in the State of North Carolina are also required to appear on this page.
  - b. Table of Contents – Includes a list of all section headings, figures, tables, and appendices included in the TIA report. Page numbers shall denote the location of all information, excluding appendices, in the TIA report.
  - c. Executive Summary – Includes a description of the study findings, a general description of the project scope, study horizon years, probable transportation impacts of the project, and mitigation measure recommendations. Technical publications, calculations, documentation, data reporting, and detailed design should not be included in this section.

- d. Project Description – Includes a detailed description of the development, including the size of the parcel, development size, existing and proposed uses for the site, anticipated completion dates (including phasing). Should also include the square footage of each use and/or the number and size of dwelling units proposed, and should also include a map and copy of the site plan provided by the applicant(s).
- e. Site Description – Includes a description of the project location within the Town and region, existing zoning and use (and proposed use if applicable), and key physical characteristics of the site, including general terrain and environmentally sensitive or protected areas.
- f. Site Access – Includes a complete description of the ingress/egress of the site should be explained and depicted. It should include number of driveways, their locations, distances between driveways and intersections, access control (full-movement, leftover, right-in/right-out, etc.) types of driveways (two-way, one-way, etc.), traffic controls, etc. Internal streets (lanes, flow, and queuing), parking lots, sidewalks and bicycle lanes, and designated loading/unloading areas should also be described. Similar information for adjacent properties, including topographic grade relationship, should be provided to evaluate opportunities for internal connections. The design, number, and location of access points to collector and arterial roadways immediately adjacent to the site must be fully analyzed. The number of access points should be kept to a minimum and designed to be consistent with the type of roadway facility. Driveways serving the site from state roads should be designed in accordance with the NCDOT’s Policy on Street and Driveway Access, and/or the Town standards, as applicable.
- g. Study Area – The limits of the study area shall be based on the location, size and extent of the proposed project, and an understanding of existing and future land uses and traffic conditions surrounding the site. The limits of the study area for the TIA shall be reviewed and approved by the Town and NCDOT staff at the mandatory scoping meeting. At a minimum, the study area should include all streets and signalized intersections within a 1-mile radius of the proposed site and/or where site traffic estimated for build-out of the project will constitute 10% or more of any signalized intersection approach during the peak hour. Unsignalized intersections between the required signalized intersections will be added to the scope as directed by the Town. To initially determine the impacts, the Town will maintain a database of recent peak-hour intersection turning-movement counts. The applicable intersection counts will be equated to current year baseline volumes. Based on the proposed development program submitted by the applicant, a preliminary trip generation analysis, distribution and assignment will be performed within the area surrounding the site and compared to the current year base volumes. Due to related impacts or current operational problems, town staff and/or NCDOT staff may require other intersections be included in the study area. A narrative describing the study area should identify the location of the proposed project in relation to the existing transportation system and list the specific study intersections and/or segments. Any unique transportation plans or policies applicable to the area (e.g., CATS bus service and future plans) should be mentioned. A site location map shall

be provided and should identify natural features, major and minor roadways within the study area, study intersections, and a boundary of the site under consideration.

- h. Existing Conditions – Shall include a narrative and map that represents AM and PM peak-hour turning-movement volumes for all intersections within the study area. Traffic volumes shall be 15-minute interval weekday turning-movement counts (Tuesday through Thursday) and no more than twelve months old. The required count timeframes are from 6:30-8:30 a.m. and 4:30-7:00 p.m.; however, site-specific conditions may necessitate additional or different traffic counting hours and/or days depending on the development program and location within the Town (these unique circumstances will be determined and directed by the Town). For example, 12-hour turning movement counts shall be required to complete the analysis if a traffic signal warrant analysis is required as part of the TIA. The Town will determine if additional peak hours or weekend analyses shall be included in the TIA at the mandatory scoping meeting. For example, if the development is nearby a school that significantly alters traffic volumes at times other than the peak hours described above, additional study hours will be required. Traffic volumes should also represent weeks that have no observed federal, state, or local holidays and periods of the year when local schools are in session. The source of existing traffic volume information should be explicitly stated (e.g., Town counts, new counts collected by the applicant, NCDOT counts, etc.). If previous counts were obtained, only counts collected within the one year of the Scoping Meeting will be deemed acceptable. Summary sheets for existing turning movement counts should be included in the appendix of the TIA report. A separate narrative and map shall be prepared to describe the characteristics of surrounding major roadways, including functional classification, number of lanes, posted speed limit, existing average daily traffic volumes, typical cross section, intersection control, and lineal distance between major roadways. Field notes for the existing conditions investigation may be included in the appendix of the TIA report.
- i. Future Year Conditions – Unless otherwise approved by the Town, 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 five years after the build-out year (build-out + 5). For multiple-phased development, the scenarios should be completed in order, with any improvements specified by development included in the subsequent build scenarios, including five years after the full build-out year (build-out + 5). Specific analysis periods to include in the study shall depend greatly upon the development program, proposed project phasing plan, and significant improvements programmed for the surrounding transportation system. The approved offsite developments and transportation projects to be included in the base future-year background conditions for the transportation system within the study area shall be determined during the scoping meeting. Transportation improvements assumed in the future-year background conditions analysis may include those with an expected completion date concurrent with that of the development and funded through either by the Town of Waxhaw, State of North Carolina Transportation Improvement Program, or indicated as a required condition of approval from another nearby development application. Only projects approved by the Town at the scoping meeting may be included in the

analysis as future existing infrastructure. Those improvements committed by other projects must be clearly identified in the report as approved offsite development road improvements. Adjacent development traffic information used in the development of the future year background traffic volumes should be included in the appendix of the TIA report. Unfunded, planned infrastructure projects may be mentioned in the TIA, but the description should specifically identify that these projects are not included in the background condition. Future year background traffic volumes shall be forecasted using historical growth rate information, regional models, and/or TIA reports for development approved by the Town but not yet built. A narrative and map shall be prepared that presents turning movement volumes for each peak hour for all intersections identified within the study area. Future year base traffic volumes, other development volumes, and site traffic volumes should be clearly separated, and combined in the map.

- j. Trip Generation – Base 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 mandatory scoping meeting. Local trip generation rates may be acceptable if appropriate validation is provided by the applicant to support them. Any deviation from ITE trip generation rates shall be discussed in the mandatory scoping meeting and documented in the MOU if approved by the Town and NCDOT. The NCDOT Municipal School Transportation Assistance (MSTA) calculator should be used to calculate projected trip generations for school sites.
  - Internal Capture – Base trip generation may be reduced by rate of internal capture when two or more land uses are proposed using methodology recommended in the most current Trip Generation Handbook published by the Institute of Transportation Engineers. Reductions for internal capture should be applied to multi- or mixed-use sites only, and reductions greater than 10% in any peak hour require consultation and acceptance by the Town and NCDOT. The internal capture reduction should be applied before pass-by trips are calculated.
  - Pass-by Trips – Pass-by trips are those made as intermediate trips between an origin and primary destination (i.e., home to work, home to shopping, etc.). However, pass-by trips are not diverted from another roadway. Base trip generation may be reduced by rate of pass-by capture using methodology recommended in the most current Trip Generation Handbook published by the Institute of Transportation Engineers. Pass-by trips associated with the development program may not exceed 10% of the existing peak-hour volume reported for the adjacent public street network. This network shall include the streets that provide primary access to/from the site. For example, a site access drive that connects to a low-volume local street, which its primary access is to a major collector road, the traffic on the major collector shall be used as the adjacent street for pass-by calculation purposes. Evaluation of diverted trips

may apply depending on the specifics of each site. A trip generation table shall summarize all trip generation calculations for the project.

- k. Trip Distribution – External trip distribution shall be determined on a project-by-project basis using one of several sources of information available to transportation and land planning professionals. Potential sources for determining project trip distribution may include the regional travel demand model, market analysis, existing traffic patterns, or professional judgment. At the Town’s direction, multiple trip distributions may be required for differing land use types. Regardless of methodology, the procedures followed and logic for estimating trip distribution percentages must be well-documented in the TIA. Trip distribution percentages proposed for the surrounding transportation network should be discussed during the scoping meeting and shall be approved by the Town and NCDOT before proceeding with the TIA. A map showing the percentage of site traffic on each street included in the study area should be included in the TIA.
- l. Trip Assignment – Project traffic shall be distributed to the surrounding transportation system based on the site’s trip generation estimates and trip distribution percentages. Future year build-out traffic forecasts (i.e., future year background traffic plus project traffic) shall be represented in graphic formats for AM and PM peak-hour conditions at all intersections included in the study area. If the project will be built in phases, traffic assignments shall be reported for each phase. Pass-by traffic shall be included at the driveways and access points for evaluating driveway volumes. Multiple assignment analyses may be required if the traffic control at the access drives varies (i.e., right-in/right-out vs. stop controlled vs. signalized).
- m. Capacity Analysis – Level-of-Service (LOS) and delay are the primary measures of effectiveness for impacts to the transportation system, and is 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. Existing signalized intersections shall be modeled based on existing signal timing plans provided by either the Town or NCDOT. Existing signal timing plans should be included in the appendix of the TIA report. If a traffic signal is part of a coordinated system it must be analyzed as such under all conditions. Other standard practices and default input values for evaluating signalized intersections should be consistent with the most recent guidelines published by the NCDOT, Traffic Engineering and Safety Systems Branch, Congestion Management Unit (“Capacity Analysis Guidelines”). The Town may also require safety, traffic simulation, gap and/or other analyses appropriate for evaluating a development application. Additional analyses and/or traffic capacity or simulation tools (such as VISSIM) required for the TIA shall be identified during the scoping meeting. Capacity calculations should be included for the existing and all future year scenarios, as described in Section 7.i. Impacts from the proposed project shall be measured by comparing the future year background conditions to

the future year build-out conditions. Requirements for mitigation are described in Section 7.q. All TIA reports submitted to the Town shall use SYNCHRO, SimTraffic or VISSIM analysis software for signalized and unsignalized intersections, or Sidra 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 (LOS A – F), intersection and approach signal delay for signalized intersections, approach delay for unsignalized intersections, and 95th percentile queue lengths for all movements. Capacity analysis worksheets and auxiliary turn lane warrants for unsignalized intersections should be included in the appendix of the TIA report.

- n. Queuing Analysis – 95<sup>th</sup> percentile and simulation analysis of future year queues shall be consistent with NCDOT’s Traffic Engineering and Safety Systems Branch, Congestion Management Unit current practices and published Capacity Analysis Guidelines. Turn lanes and storage lengths for the major street (uncontrolled) approaches at unsignalized intersections shall be identified using volume thresholds published in the NCDOT’s Policy on Street and Driveway Access to North Carolina Highways (see Warrant for Left- and Right-Turn Lanes Nomograph, pg. 80). Recommendations for left and right turn lanes serving the site shall be designed to both account for the NCDOT warrants described above and to meet future year capacity needs identified in the TIA report. For projects that include drive-through facilities, pick-up/drop-off areas or entrance gates, a queuing analysis may be required by the Town to ensure that vehicle stacking will not adversely impact the public transportation system. The queuing analysis must be performed using accepted transportation engineering procedures approved by the Town. If a TIA is required for a new school site, the internal circulation and ingress/egress of the site should be modeled using a “dummy signal” in the SYNCHRO software as prescribed by NCDOT Municipal School Transportation Assistance (MSTA) department.
- o. Crash Analysis – A summary of crash data (type, number, and severity) for the most recent 3-year period at each study location is required. Traffic Engineering Accident Analysis System reports will be provided by the Town and/or NCDOT and should be included in the appendix of the TIA report. For locations with prevalent crash types and/or frequency, a discussion shall be included describing factors that may be contributing to the incidents. At a minimum, the proposed development features shall not contribute to factors potentially involved in collision rates. If contributing factors are identified, recommendations to eliminate or mitigate these features shall be included.
- p. Traffic Signal Warrants – Town staff and NCDOT may consider potential signal locations at the scoping meeting. 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 warrants criteria contained in the most current edition of the Manual on Uniform Traffic Control Devices (MUTCD) and engineering judgment. Traffic signal warrants should be included in the appendix of the TIA report. 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 signal warrant analysis is recommended in the TIA, the Town and/or NCDOT may decide to defer a signal warrant analysis until after the development has opened in order to use actual turning movement counts at an intersection. The TIA recommendations must clearly state that this analysis shall occur at a specified date following the opening of the development. The applicant must issue a bond or letter of credit in the name of the Town for the estimated cost of the signal warrant analysis and resulting signal prior to final approval of the TIA. The cost shall be established based on an engineer's estimate provided by the engineer of record for the applicant; however, final approval of the dollar amount rests with the Town.

- q. Mitigation Measure Recommendations – This section of the TIA report shall provide a description of the 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 recommended to the applicant 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 the build-out year scenario. The applicant is only required to mitigate transportation deficiencies caused by the projected impact of their proposed development, and not unacceptable background conditions or other deficiencies caused by offsite development within the defined study area.

The applicant shall be required to identify mitigation improvements to the roadway network if at least one of the following conditions exists when comparing future year background conditions to future year build-out conditions:

- the total average delay at an intersection or individual approach increases by 25% or greater, while maintaining the same LOS,
- the LOS degrades by at least one level,
- or the LOS is "D" or worse in background conditions and the proposed project shows a negative impact on the intersection or approach

If the background LOS (intersection or approach) is inadequate (i.e., "D", "E" or "F", the applicant will be expected to mitigate only the impact caused by the proposed project. For example if the background LOS of an approach is LOS F with 85 seconds of delay, and the project traffic increases the delay to 95 seconds (LOS F), the applicant will be required to mitigate the added 10 seconds of delay on the approach, not required to mitigate the inadequate background delay. Town staff and NCDOT will review the recommendations in the final version of the TIA and will have the ultimate determination in the scope of the required mitigation measures.

For multi-phase developments, the capacity analyses scenarios shall address the phasing of improvements for each phase of development. The build-out + 5

scenario will only require the analysis of five years beyond the full build-out year, but not used for mitigation purposes.

A narrative and table shall be prepared that summarizes the methodology and measured conditions at the intersections reported in LOS (LOS A–F) 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.

- r. Compliance with Adopted Transportation Plans – All TIA reports must include a statement of compliance with plans, programs, and policies adopted by the Town of Waxhaw for maintaining a safe and efficient multi-modal transportation system.