

# **GUIDE FOR THE PREPARATION OF TRAFFIC IMPACT STUDIES**



*Adopted by Town Council on November 25, 2008*

Prepared By:

**HNTB**

**Engineering Department**

**Planning Department**

**TABLE OF CONTENTS**

I. INTRODUCTION.....1

II. WHEN A TRAFFIC IMPACT STUDY IS REQUIRES.....1

    A. THRESHOLDS .....1

    B. EXCEPTIONS.....2

    C. UPDATING AN EXISTING TRAFFIC IMPACT STUDY .....2

III. SCOPE OF A TRAFFIC IMPACT STUDY.....2

    A. PRELIMINARY SCOPING MEETING .....2

    B. BOUNDARIES/LIMITS OF TRAFFIC IMPACT STUDY AREA.....3

    C. TRAFFIC DATA .....3

        i. *Trip Generation* .....3

        ii. *Trip Distribution*.....4

        iii. *Traffic Counts*.....4

        iv. *Peak Hours*.....4

        v. *Background Traffic Development* .....4

        vi. *Crash Data*.....5

    D. ADDITIONAL TRAFFIC IMPACT STUDY COMPONENTS.....5

        i. *Conceptual Site Plan* .....5

        ii. *Build Out and Planning Horizon Years* .....5

        iii. *Discussion of Transit*.....6

        iv. *Bicycle and Pedestrian Facilities* .....6

        v. *Truck Traffic*.....6

        vi. *Sight Distance Evaluation* .....6

IV. PLANNING HORIZONS .....6

V. CAPACITY ANALYSIS METHOD .....7

VI. MITIGATION.....7

VII. MINIMUM CONTENTS OF TRAFFIC IMPACT STUDY REPORTS.....8

VIII. GLOSSARY .....10

## **I. INTRODUCTION**

This document contains guidelines and requirements for conducting a Traffic Impact Study (TIS) for new development and existing redevelopment within the planning jurisdiction of the Town of Indian Trail, North Carolina (the Town). The intent of these guidelines is to provide adequate reference and a consistent methodology in which the Town will evaluate traffic impacts on local transportation facilities. The applicability of these guidelines is at the discretion of the Town. The Town reserves the right to revise and/or update this document.

The primary objectives of these guidelines are to provide:

- guidance in determining if and when a TIS is required
- consistency and uniformity in the identification of traffic impacts generated by local land use proposals
- consistency and objectivity in the identification of measures to mitigate the traffic impacts generated by land use proposals
- Town officials with the information necessary to make informed decisions regarding the existing and proposed changes to transportation infrastructure
- TIS requirements early in the planning phase of a project (i.e., initial study, notice of preparation, or earlier) to eliminate potential future delays for project approvals
- a quality TIS by agreeing to the assumptions, data requirements, study scenarios, and analysis methodologies prior to beginning the TIS
- early coordination during the planning phases of a project to reduce the time and cost of preparing a TIS.

## **II. WHEN A TRAFFIC IMPACT STUDY IS REQUIRED**

The Town of Indian Trail requires a TIS under each of the following circumstances:

- Request for a change in zoning
- Application for a subdivision
- Special use permit
- Site plan review.

### **A. Thresholds**

The following criteria are a starting point in determining when a TIS is required. The Town will require a TIS if it is determined that the proposed project will:

- Generate over 100 peak hour trips
- Generate 50 to 100 peak hour trips, and, affected transportation facilities are experiencing noticeable delay or approaching unstable traffic flow conditions (LOS "D").

The following are examples that require a full TIS or some less detailed analysis:

- Generates peak hour trips assigned to a transportation facility experiencing significant delay; unstable traffic flow conditions (LOS “E” or “F”).
- The potential risk for a traffic incident is significantly increased (i.e., congestion related collisions, non-standard sight distance considerations, increase in traffic conflict points, etc.).

Note: The appropriate level of study will be determined by the particulars of a project, the prevailing highway conditions, proposed modifications to the study area transportation facilities, and the forecasted traffic.

## **B. Exceptions**

The requirement to prepare a full traffic impact study may be waived by the Town if all the following conditions are met:

- The applicant submits a written request for a TIS waiver with appropriate supporting documentation including bicycle/pedestrian study, if applicable. The Town will make a determination on such requests within 14 days of submittal of a completed application for a waiver.
- The Town Planning and Engineering departments concur with the request.

## **C. Updating an Existing Traffic Impact Study**

A TIS requires updating when the amount or character of traffic is significantly different from the previous study. A TIS typically requires updating every two years if the proposed project has not been completed. However, a TIS may require updating sooner in rapidly developing areas of the Town. Conversely, a TIS may not need to be updated as often in slower developing areas. In these cases, consultation with the Town will be required.

# **III. SCOPE OF A TRAFFIC IMPACT STUDY**

## **A. Preliminary Scoping Meeting**

Preliminary consultation between the Applicant, Town, NCDOT, and those preparing the TIS is required before commencing work to establish the appropriate scope. This meeting shall include:

- Discussion of the requirements for a Traffic Impact Study
- Copies of any previous TIS prepared for the site, if applicable
- Sketch plans, drawn to scale, of the proposed site showing locations of access point(s) in relation to adjacent properties and transportation facilities
- Estimates of average daily traffic and peak hour traffic expected to be generated by the site development

## **B. Boundaries/Limits of Traffic Impact Study Area**

All transportation facilities impacted in accordance with the criteria in Section II shall be studied.

At a minimum, the TIS shall include an analysis of:

- adjacent streets
- transportation facilities upstream and downstream (i.e. driveways, intersections, and interchanges)
- site driveways, sidewalks, and bicycle lanes
- internal roadways

The Town reserves the right to select additional areas to be included in the study based on, but not limited to, the size of the proposed development, local or site specific issues, and or local policies and prevailing conditions of the surrounding area.

## **C. Traffic Data**

Prior to any fieldwork, consultation between the Town, NCDOT, applicant, and those preparing the TIS is required to reach consensus on the data and assumptions necessary for the study. It is required that each TIS is prepared by a qualified North Carolina based firm and sealed by a North Carolina licensed engineer (PE).

The following elements are to be discussed in that consideration.

### **i. Trip Generation**

The latest edition of the Institute of Transportation Engineers' (ITE) Trip Generation report shall be used for trip generation forecasts. Local trip generation rates are also acceptable if appropriate validation is provided to support them. Trip generation methodologies shall follow approved NCDOT requirements for use of average or equation-based rates.

- Trip Generation Rates – When the land use has a limited number of studies to support the trip generation rates or when the Coefficient of Determination ( $R^2$ ) is below 0.75, the NCDOT rate spreadsheet shall be utilized. Otherwise consultation between the Town, NCDOT, applicant, and those preparing the TIS is recommended.
- Pass-by Trips – Pass-by trips are only considered for retail oriented development. The NCDOT rate spreadsheet shall be utilized to calculate % pass-by trips. If the pass-by trips are not indicated on the NCDOT rate spreadsheet then justification for any pass-by trips shall be discussed in the TIS.
- Internally-Captured Trips – Captured trip reductions greater than 5% requires consultation and acceptance by the Town. The justification for exceeding a 5% reduction shall be discussed in the TIS.

## **ii. Trip Distribution**

Trip distribution will be based on the MPO regional modeling, market study, existing traffic flows, applied census data, and professional judgment. The procedures for estimating the trip distributions must be well documented. The trip distribution patterns must be presented for each phase if changes in roadway network, access or land use are proposed. The distribution percentages shall be noted in a clearly labeled figure(s).

## **iii. Traffic Counts**

Prior to field traffic counts, consultation between the Town, NCDOT, applicant, and those preparing the TIS is required to determine the level of detail (e.g., signal timing, travel speeds, turning movements, etc.) required in the traffic study area. All transportation facilities within the boundaries (established in Section III.B) of the TIS shall be considered. Common practices for counting vehicular traffic include but are not limited to:

- Vehicle counts shall be conducted on Tuesdays, Wednesdays, or Thursdays during weeks not containing a holiday and conducted in favorable weather conditions preferably when schools are in session.
- Vehicle counts shall be conducted during the appropriate peak hours (see peak hour discussion below).
- Seasonal and weekend variations in traffic shall also be considered where appropriate (i.e., recreational routes, tourist attractions, harvest season, etc.).

Traffic data shall be no more than one year old at the initial submission date of the report. The report must state the source of the data used. New counts will be requested if there have been significant changes in the area of influence that would have modified traffic patterns since the data was collected.

## **iv. Peak Hours**

The TIS shall include a morning (AM) and an evening (PM) peak hour analyses. Other peak hours (e.g., 11:30 AM to 1:30 PM, weekend, holidays, etc.) may also be required to determine the significance of the traffic impacts generated by a project.

## **v. Background Traffic Development**

### Ambient Study Area Traffic Growth

A projection of traffic growth in the study area must be made to determine build-out year baseline peak hour traffic volumes. This projection can be based on the following sources of data:

- NCDOT Traffic Survey Unit Annual Average Daily Traffic (AADT) Data
- Past peak hour turning movement counts at study area intersections
- Metrolina Travel Demand Model Data

- Other traffic-related studies and transportation planning documents that would document growth trends

Projections shall be expressed in a per-year growth estimate for study area roadways, and can vary by roadway if detailed information is available. Any assumptions shall be documented. The ambient growth data shall NOT include any effects of Town-approved projects in the study area that are either planned to be built by the study build-out year or under construction.

#### Approved Background Traffic Generator Growth

The traffic study, and scoping meeting discussion, shall define any planned development in the study area that has been approved by the Town and would contribute to background build-out year peak hour traffic volumes. Any data from traffic studies from these developments shall be incorporated in the traffic impact study as “approved background traffic” that would be added to ambient traffic growth estimates to produce baseline build-out year traffic volumes. Consideration shall be made to establish timelines for background development build-out schedules and any appropriate adjustments made to background generator data if these developments are not fully complete by the study build-out year.

#### **vi. Crash Data**

Crash data must be summarized and incorporated into the TIS. The report shall identify high accident locations in study area and include the findings of any specific accident patterns.

### **D. Additional Traffic Impact Study Components**

The TIS shall also include: a conceptual site plan, build-out and planning horizon years, discussion of transit, bicycle and pedestrian facilities, truck traffic, and sight distance evaluation described below.

#### **i. Conceptual Site Plan**

The site plan shall be plotted at a scale suitable for presentation and review and include the following information to a distance of 500 feet beyond the proposed property limits

- Parcels included in the application, and other parcels in a multi-phase development;
- Location of the above parcels with respect to existing adjacent private and public roadways and driveways;
- Location of on-site parking and vehicular and pedestrian access to the site including inter-parcel connections; and
- Existing and proposed rights-of-way, roadway centerlines, driveways to public roadways, which are part of overall project, including lane and/or pavement widths.

#### **ii. Build Out and Planning Horizon Years**

The year that the proposed action would be constructed and substantially operational, and the projected opening year of a facility, respectively.

iii. **Discussion of Transit**

A discussion relating to bus routes and rail lines that have or are planned to have a station or stop within 1/4 mile of the project. Transit-related trips and guidelines for determining multi-modal trips will be discussed at the pre-application meeting.

iv. **Bicycle and Pedestrian Facilities**

Existing or planned facilities that will be modified or installed by the project or will capture trip ends shall be identified and clearly defined and substantiated that trip reduction assumptions for these modes are being considered.

v. **Truck Traffic**

The number of anticipated truck trips shall be discussed and incorporated into the analysis where applicable.

vi. **Sight Distance Evaluation**

The primary definition for intersection sight distance is provided by the American Association of State Highway Transportation Officials *AASHTO Policy on Geometric Design for Streets and Highways*, i.e. “the Green Book”. In accordance with AASHTO, the minimal required intersection and stopping sight distance shall be provided at all access points during the design plan review stage.

## IV. Planning Horizons

Traffic Impact Studies shall incorporate the following planning horizons unless directed otherwise by the Town:

- **Existing Condition** - Current year traffic volumes and peak hour LOS analysis of affected transportation facilities.
- **No Build Condition (Existing Condition Plus Other Approved and Pending Projects Without Proposed Project)** - Trip assignment and peak hour LOS analysis in the year the project is anticipated to complete construction.
- **Proposed Project Only** - Trip generation, distribution, and assignment in the year the project is anticipated to complete construction.
- **Build Condition (Existing Condition Plus Other Approved and Pending Projects Plus Proposed Project)** - Trip assignment and peak hour LOS analysis in the year the project is anticipated to complete construction.
- **No Build Condition Plus Proposed Phases (Interim Years)\*** - Trip assignment and peak hour LOS analysis in the years the project phases are anticipated to complete construction.



- **Build Condition with Mitigation** - Trip assignment and peak hour LOS analysis in the year the project is anticipated to complete construction with proposed improvements.

*\*Required for projects with multiple phases*

## V. CAPACITY ANALYSIS METHOD

Capacity analyses shall be performed on each of the major street and site access intersections (signalized and unsignalized) within the project study area as defined in the pre-application meeting.

Consistent with the NCDOT Congestion Management Capacity Analysis Guidelines, all guidelines from the *POLICY ON STREET AND DRIVEWAY ACCESS TO NORTH CAROLINA* (July 2003, pages 18-22) will be accepted without prior consultation. Any other deviation from these standards must be approved in advance and documented. Failure to properly justify and document changes and deviations will result in the TIS being returned for changes, corrections and justification. Planned and anticipated deviations shall be discussed during the preliminary scoping meeting.

The Town of Indian Trail requires that all Traffic Impact Analysis be prepared and results submitted using the most recent version of Synchro Software approved by NCDOT and will be accepted without prior consultation. Any other software must be approved in advance. It shall be noted that the Town does not officially advocate the use of any specific capacity analysis software. However, consistency with the latest version of the Transportation Research Board's *Highway Capacity Manual* (HCM) is advocated in most but not all cases.

Intersection studies shall include a queuing analysis and level of service determinations for all approaches and movements. The study shall include an assessment of access consistent with guidelines set forth in the NCDOT *Policy on Access to North Carolina Highways and Streets*.

## VI. MITIGATION

Mitigation measures must be included in the traffic impact study. This determines if a project's impacts can be eliminated or reduced to a level of insignificance. It is recognized that a specific proposed development may not by itself create an impact, but that an inadequacy would exist regardless of whether or not the property were to be developed. The mitigation criterion takes prevailing conditions into account when assessing the required level of mitigation.

The traffic impact study shall identify all impacts by lane group and evaluate suitable mitigation measures that mitigate the impact or return projected No Build conditions to what they would be if the proposed action were not in place or to acceptable levels. For No Build LOS D, E, or F, mitigation back to the No Build condition is required. For No Build LOS A, B, or C, mitigation back to LOS D is required.

The range of traffic mitigation measures can be viewed under four categories:

1. Low cost improvements, such as signal phasing with timing modifications, parking regulation modifications, lane restriping and pavement marking changes, or signing changes.
2. Moderate cost improvements such as intersection channelization improvements or traffic signal installation
3. Higher cost improvement, such as street widening or construction of new streets.
4. Trip reduction or travel demand management measures such as, staggering business hours, providing transit service, telecommuting, bicycle and pedestrian facilities.

For purposes of identifying improvement possibilities (either by the applicant, Town, or State) necessary to mitigate a significant impact, the cost of the improvements shall not be considered a limiting constraint within the context of the traffic impact study. However, the goal of the evaluation is to identify cost-effective solutions that yield an acceptable level of service. Extremely high-cost solutions may not be cost effective, but it is important to at least identify solutions so that decision-makers are cognizant of existing options.

If the mitigation measures require work in the State highway right-of-way an encroachment permit from NCDOT will be required. This work will also be subject to NCDOT standards and specifications. Consultation between the Town, NCDOT and those preparing the TIS early in the planning process is strongly recommended to expedite the review of local development proposals and to reduce conflicts and misunderstandings in both the Town review process as well as the NCDOT encroachment permit process.

## **VII. MINIMUM CONTENTS OF TRAFFIC IMPACT STUDY REPORTS**

The information contained in this section is required in all traffic impact studies submitted to the Town of Indian Trail. All of the required data and information must be clearly identified in the appropriate sections of the report.

The Traffic Impact Study report shall be typed, bound, and include the following content:

- **EXECUTIVE SUMMARY**
- **TABLE OF CONTENTS**
  - List of Figures (Maps)
  - List of Tables
- **INTRODUCTION**
  - Description of the proposed project
  - Location of project
  - Site plan including all access to State highways (site plan, map)
  - Circulation network including all access to State highways (vicinity map)
  - Land use and zoning
  - Phasing plan including proposed dates of project (phase) completion
  - Applicant(s) information

- References to other traffic impact studies, if applicable
- **TRAFFIC ANALYSIS**
  - Clearly stated assumptions
  - Existing and projected traffic volumes (including turning movements), facility geometry (including storage lengths), and traffic controls (including signal phasing and multi-signal progression where appropriate) (figure)
  - Crash data summaries (table)
  - Project trip generation including references (table)
  - Project generated trip distribution and assignment (figure)
  - LOS and v/c ratios for each lane group of each study intersection in the Existing, No Build, Build, and No Build Conditions with proposed phases conditions analyses, if applicable (table)
- **CONCLUSIONS AND MITIGATION RECOMMENDATIONS**
  - LOS of impacted facilities with and without mitigation measures
  - Mitigation phasing plan including dates of proposed mitigation measures
  - Define responsibilities for implementing mitigation measures
  - Cost estimates for mitigation measures and financing plan
- **APPENDICES**
  - Raw traffic data
  - Worksheets used in analyses (i.e., signal warrant, LOS, traffic count information, etc.)

All of the required data and information must be clearly identified in the appropriate sections of the report mentioned above. The TIS shall be signed and sealed on the title page by a North Carolina Registered Professional Engineer. Ten (10) copies of the draft and final reports including electronic files of report, figures, traffic counts, and Synchro files shall be submitted to the Town. In addition one copy of each report shall be provided for submission to the NCDOT.

## VIII. GLOSSARY

**Build Out:** When the proposed action would be constructed and substantially operational.

**Captured Trips:** Trips that do not enter or leave the driveways of a project's boundary within a mixed-use development.

**Horizon year:** The projected opening year of a facility e.g. new roadway or completion of improvements to a roadway or completion of a funded capital improvement plan.

**Level of Service (LOS):** LOS is the primary qualitative measurement describing operational conditions within a traffic stream, based on service measures such as traffic interruptions, comfort, and convenience. (refer to the Highway Capacity Manual)

**Multimodal:** A transportation facility for different types of users or vehicles.

**MPO:** Metropolitan Planning Organization

**NCDOT:** The North Carolina Department of Transportation

**Pass-by trips:** Trips are made as intermediate stops between an origin and a primary trip destination (i.e., home to work, home to shopping, etc.).

**Peak Hour:** The hour of highest volume of traffic entering and exiting the site during the AM or PM hours. Traffic impacts are typically evaluated to coincide in time or volume with the peak hour of adjacent street traffic. The TIS shall include an AM and PM peak hour analyses. Other peak hours (e.g., 11:30 AM to 1:30 PM, weekend, holidays, etc.) may also be required to determine the significance of the traffic impacts generated by a project.

**Vehicular Stacking or Queuing:** The process of vehicles forming a line of delayed vehicles.

**Traffic Impact Study (TIS):** A comprehensive analysis of the "before" and "after" operational traffic impacts to a road system resulting from proposed development and associated traffic movements and volumes. A technical report shall be prepared by a trained professional to assess the level of impact to be created by a proposed development on roadway capacity and level-of service.

**Trip Generation:** The number of trips to be generated by a particular land use specified in person or vehicular trips.

**Trip or Trip End:** A single or one-direction vehicular movement with either the origin or the destination inside a study site.

**Volume-to-Capacity Ratio:** Expressed as  $v/c$ , this is a ratio of flow rate to capacity on a transportation facility.