

# Traffic Impact Analysis (TIA)

## Process and Procedures Manual

### Introduction

The purpose of this manual is to guide implementation of Appendix C, “Traffic Impact Analysis (TIA) Ordinance”, of the Town of Weddington Zoning Ordinance. This manual contains processes, procedures, design requirements, and guidelines for the preparation of TIAs. This manual also details the interaction between Town staff, the applicant, traffic consultants, and the requirements for the certification and re-certification of qualified traffic consultants who prepare TIAs, as required, for development proposals in the Town of Weddington.

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## **I. TIA Preparation and Process**

The TIA ordinance is administered by the Planning Board and the Town Council, in coordination with Planning staff. The Town may coordinate with NCDOT or other governmental agencies or Town-hired consultants as needed in this process. The TIA is intended to satisfy the requirements of the Town's TIA Ordinance. Additional traffic studies may be required by NCDOT or other governmental agencies. It is recommended that the applicant contact NCDOT and surrounding municipalities if the development has a site access that also falls within another jurisdiction.

It is recommended that the TIA consultant be present at the TIA scoping meeting, Public Hearing, Planning Board meeting, and Town Council meeting to respond to questions about the study (see Step 2 below).

The TIA preparation and review process is outlined below:

### **Step 1. Determination of Need for TIA**

The applicant shall submit a general site plan including the number of lots, roadways, and access points to Town Staff. If the applicant is applying for a major subdivision, both conventional and conservation, the general site plan shall be submitted prior to formal sketch plan submittal as outlined in Section 46-42 of the Weddington Zoning Ordinance. If the applicant is applying for a conditional rezoning (CZ), then the applicant shall submit the general site plan prior to submitting the application for CZ zoning (Section 58-271).

Based upon the proposed land use and development intensity information provided by the applicant, Town staff, in coordination with the Town Designated Transportation Engineer, will determine whether the proposed development is expected to generate enough peak hour vehicle trips (50 or more), or daily vehicle trips (500 or more) to require a TIA. The Town will notify the applicant if a TIA will be required.

The coordination and determination of the need for a TIA and its administration shall be the responsibility of the Zoning Administrator/Town Planner. Additional information regarding the TIA located in the Town of Weddington Zoning Ordinance (Appendix C).

### **Step 2. Applicant Selection and Retaining of TIA Consultant**

Should a TIA be required, the Applicant shall select and retain the services of a qualified TIA consultant. The TIA consultant shall be a licensed professional engineer in the state of North Carolina. The costs of the TIA consultant shall be the sole responsibility of the applicant.

### **Step 3. TIA Pre-Scoping Package and Scoping Meeting**

If Town Staff determines that a TIA is necessary, A TIA pre-scoping package and scoping meeting shall be completed prior to the preparation of a draft TIA. The TIA consultant shall contact Town staff to request a date/time for a TIA scoping meeting.

The TIA consultant shall assemble the following information (pre-scoping package) and submit it to the Town a minimum of 5 business days prior to the scheduled TIA scoping meeting.

- Site Plan (to scale)
- Vicinity map
- Draft trip generation table for the proposed land uses and intensities including internal capture, transit capture (if any), and pass-by calculations
- Draft trip distribution and assignment (separate trip distributions are needed for residential, retail, and office land uses.)
- Proposed historical growth rate
- Proposed build year
- Phasing plan (if phasing of the analysis is desired. This can be added after the full build analysis is completed if desired.)
- List/Map of study area intersections in accordance with Appendix C.

The Town shall provide the list of approved developments and any approved but not yet constructed transportation facility projects to be included in the study. The Town will forward the meeting date, time and location to NCDOT, should NCDOT want to attend.

Upon completion of a scoping meeting, Town staff will notify the applicant and TIA consultant in writing if additional information is needed to complete the TIA scoping process or if the TIA scoping process is complete.

Once TIA scoping is complete, preparation of the draft TIA can begin. The TIA shall be completed in accordance with this TIA Manual.

#### **Step 4. Submission and Review of Draft TIA**

The draft TIA will be submitted in conjunction with the sketch plan for major subdivisions, and will be submitted prior to formal submittal of the conditional zoning application for conditional rezoning.

Upon submission of a draft TIA (2 hard copies, 1 electronic (PDF) copy) by the consultant to the Town Planning Department, Town staff and the Town Designated Transportation Engineer will review the TIA within 30 days of submission. Comments (if any) shall be forwarded to the consultant and the applicant for discussion. If no comments are forwarded by the Town within 30 days of submission, the TIA is deemed acceptable and consultant shall submit final sealed copies to the Town. Revised draft TIA's may be needed depending on the level of comments submitted by the Town. The Town will notify the consultant if a revised draft TIA will be needed.

A meeting between Town staff, the applicant, and the TIA consultant may be needed or requested by the applicant to discuss the draft TIA.

#### **Step 5. Final TIA**

Once all comments by the Town have been addressed by the consultant and applicant, copies of the final sealed TIA (2 hard copies and 1 electronic (PDF) copy) shall be submitted to the Town. The final TIA will be submitted in conjunction with the preliminary plat for major subdivisions, and in conjunction with the conditional zoning application for conditional rezoning. Based on the final TIA, a list of required transportation mitigation improvements shall be prepared and included as part of any submitted development plans.

## **II. TIA Analysis Guidelines and Standards**

### **Analysis Methodology**

The TIA shall be completed using the latest Highway Capacity Manual methodology and in general conformance with Institute of Transportation Engineers (ITE) recommended practice.

### **Trip Generation**

- The trip generation for the site shall utilize NCDOT Congestion Management's "Rate versus Equation" spreadsheet to determine the best calculation method, unless otherwise approved by the Zoning Administrator in Coordination with the Town Designated Transportation Engineer.
- Internal capture trip reductions should be limited to the MX Zoning designation.
- Internal capture trip reductions shall be applied before the pass-by trip reduction is taken.
- Transit capture trip reductions if applicable should be based on ITE's most recent Trip Generation Handbook and approved by the Town Designated Transportation Engineer.
- Transit capture trip reductions shall be applied before the pass-by trip reduction is taken.
- Pass-by percentages should only be applied to land uses with an ITE land use code in the 800's or 900's.
- Pass-by trip reductions will be limited to 10 percent of the adjacent street traffic unless otherwise approved by the Town Designated Transportation Engineer.
- Pass-by percentages should come from the ITE Trip Generation Handbook or NCDOT Congestion management's "Rate versus Equation" spreadsheet.

### **Turn Lane Storage Lengths**

- Determination of turn lane storage lengths for signalized intersections shall be based on the SimTraffic Maximum Queue or Synchro 95th Percentile Queue, whichever is greater.
- Determination of turn lane storage lengths for unsignalized intersections shall be based on the Warrant for Left and Right-Turn lanes graph published by the North Carolina Department of Transportation (graph attached).
- Recommended storage lengths should be rounded up to the nearest 25 feet with a minimum of 100 feet for a right- or left-turn lane.

### **Other Guidelines**

- A peak hour factor of 0.90 should be used unless traffic count data indicate that the peak hour factor is higher.
- When analyzing school traffic, a peak hour factor of 0.50 should be used on intersection approaches where 50 percent or more of the traffic on the approach is attributable to school traffic.
- It is recommended that peak hour factors be calculated by approach.
- Ideal saturation flow rate shall equal 1900 vphpl.
- Traffic volumes along corridors should be balanced to account for variations in the counts. Balancing should be balanced with no loss of volume between intersections which have no driveways between them and within 5 percent where a sufficient number/type of driveways exist between the study intersections.
- The AM Peak (7-9) and the PM Peak (4-6) periods will be included for all studies unless otherwise specified by the Town Designated Transportation Engineer. Count times for school developments will be based on the proposed school hours.
- Traffic analysis should be completed using Synchro 8 software. Roundabout analysis should be completed using SIDRA software.
- A SimTraffic simulation should be completed at a minimum when 95th percentile queues indicate that traffic will spill over across adjacent public street intersection (in or out of the study area). The simulation should be seeded long enough so that traffic can traverse through the entire network (a minimum of 10 minutes is recommended). The simulation should record for an entire 60 minute period.
- Existing lane widths shall be noted in the field notes and included in the traffic analysis.
- Preparation of a signal warrant analysis will be needed for all proposed signalized intersections.

#### Analysis of New Intersections (new site access drive or new public street)

- The baseline LOS for unsignalized intersections at build-out shall be LOS C.
- Unsignalized access locations at project build-out shall be mitigated (if needed) to obtain LOS C. If the proposed access intersection fails with the addition of a right-turn lane, a left-turn lane, and a through lane in each direction, a review of restriction of access shall be completed.
- Recommendation of turn lanes at unsignalized intersections shall be based on the thresholds depicted in the Warrant for Left and Right-Turn lanes graph published by the North Carolina Department of Transportation (graph attached).
- Preparation of a signal warrant analysis will be needed for all proposed signalized intersections.

### **III.TIA Report Requirements**

#### **Report Content**

- The Synchro Lanes, Volumes, Timings reports shall be provided for all analysis scenarios for all intersections.
- All figures shall be numbered.
- Existing laneage and Recommended laneage figures shall:

- Show a separate arrow for each exclusive lane
- Existing laneage shall be shown as a different arrow type than proposed lanes
- Show the distance between existing and proposed intersections
- Show existing and/or proposed storage lengths
- Unsignalized intersections shall indicate which approaches are stop or yield controlled
- Signalized intersections shall be indicated
- Identify all streets by name. Also include a route number if street is a US or NC route.
- Include a north arrow
- Include a legend
- The site location shall be generally indicated
- The following traffic volume figures shall be included at a minimum:
  - Existing traffic volumes: AM(PM)
  - Future Background AM traffic volumes: existing AM(historical growth){approved development volumes}[AM Total]
  - Future Background PM traffic volumes: existing PM(historical growth traffic){approved development volumes}[PM total]
  - Future Build-out AM traffic volumes: background AM total(net new site traffic){pass-by}[AM total]
  - Future Build-out PM traffic volumes: background PM total(net new site traffic){pass-by}[PM total]
- Figures depicting each of the approved developments site trip assignment shall be included in the Appendix.
- Field notes shall be included in the Appendix.
- Study scoping documents shall be included in the Appendix.
- Synchro reports shall be organized in the Appendix by analysis scenario then by peak period. For Example the 2011 Background AM Peak analysis for all intersections should be grouped separate from the 2011 Background PM Peak analysis.
- Signal timing plans (if available) should be included in the Appendix.
- Internal capture calculations shall be included in the Appendix.
- Traffic count data shall be included in the Appendix of the report and provided in electronic Excel format.
- Photos of the intersections from the site visit may be included.
- A table of contents, list of figures, and list of tables shall be included in the front of the report.
- The name of the development shall be included in the header or footer of each page of the report.
- Existing study intersections shall be called out in the report as signalized or unsignalized.
- Analysis results (Delay in seconds with corresponding LOS grade) shall be summarized in table format by intersection and approach. Level-of-Service results for existing, future background, future build-out, and future build-out mitigated (if needed) shall be included in one table. A summary table listing all intersections may be included as well.

## **Report Outline**

### **1. Executive Summary**

- Site location
- Development description
- Recommendations

### **2. Introduction**

- Site location
- Development description
- Type of studies undertaken (impacts, signal warrant, sight distance, etc.)

### **3. Existing Conditions**

- Study area intersections
- Description of roads
- Traffic counts including location, date, and time of counts (including figure)
- Existing land uses for site and adjacent area
- Site location figure and vicinity map figure

### **4. Future Conditions**

- Historical growth rate
- Description of proposed public projects (figure may be needed)
- Description of proposed private development and associated improvements (figure may be needed)
- Future background traffic volumes (including figures)

### **5. Proposed Site**

- Description of development
- Site plan figure
- Trip generation discussion including table
- Trip distribution and assignment discussion (including figure)
- Proposed site access
- Phasing (if applicable)
- Future build-out traffic volumes

### **6. Capacity Analysis**

- Methodology discussion including
  - Listing of Town level-of-service (LOS) ) guidelines for determination of mitigation thresholds.
  - Discussion of storage length determination methodology.



- Analysis results by intersection
  - Table of results are to show the LOS and second of delay for each study intersection and approaches for all scenarios. For example, the 2009 existing, 2014 background, 2014 build-out, and 2014 build-out improved (if needed) would all be in the same table.
  - Listing and/or discussion of the recommended improvements including storage lengths.

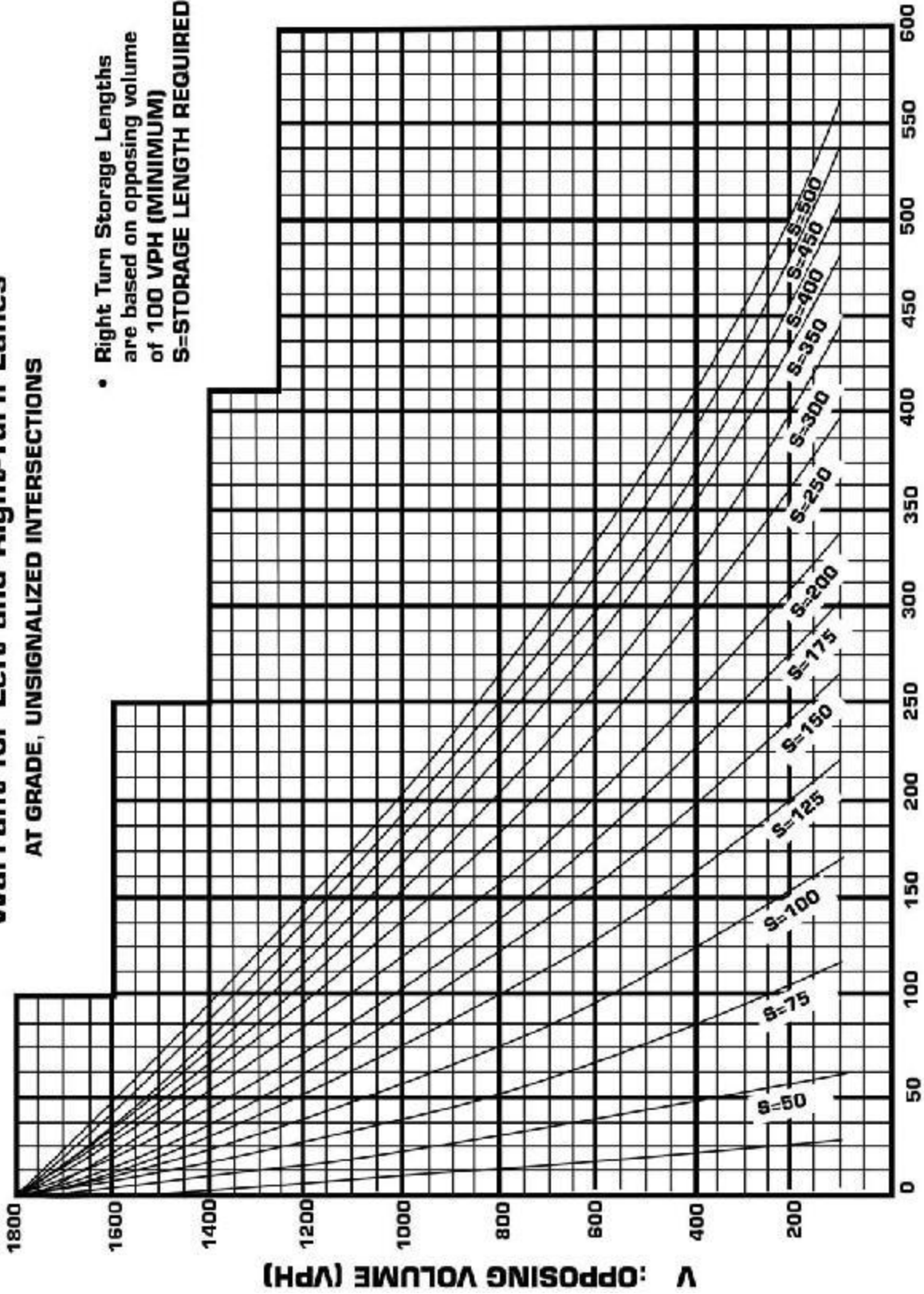
#### 7.Recommendations

- List of recommended improvements
- Recommended laneage figure

# Warrant for Left and Right-Turn Lanes

AT GRADE, UNSIGNALIZED INTERSECTIONS

- Right Turn Storage Lengths are based on opposing volume of 100 VPH (MINIMUM)  
S=STORAGE LENGTH REQUIRED



Note: Where adjacent signalization may provide opportunities for gaps in the traffic stream a reduction in the above storage values can be considered on a case by case basis.

V<sub>L</sub>: LEFT TURNING VOLUME (VPH)  
V<sub>R</sub>: RIGHT TURNING VOLUME (VPH)

