Section IV. Guidelines for Traffic Impact Analysis (TIA)

Requirement:
A Traffic Impact Analysis (TIA) is required if the proposed development is expected to generate 150 or more peak hour vehicle trips as determined by the ITE Trip Generation Manual, most recent edition. The TIA must be of sufficient scope and detail to allow the City to evaluate the impact of the proposal and the need for roadway capacity, operation and safety improvements resulting from the proposed development. Supplemental analysis may be required if there is a change in the development plan, site plan or land use. A TIA is valid as long as the approved site plan or development plan associated with the TIA is deemed valid.

Preparer:
The report shall be prepared by a professional engineer who is registered in North Carolina and has expertise in traffic engineering.

Analysis Period:
The analysis must examine expected traffic conditions one year after the project is scheduled to be complete.

Pre-Submittal Conference:
Prior to submitting the TIA, the traffic engineer must consult with the City Transportation Division to discuss various assumptions for the study, including, but not limited to: trip generation assumptions, other approved developments within the study area, study area limits, trip distribution and pass-by traffic. This discussion may be accomplished via phone, e-mail or fax or in person. TIAs submitted without a pre-submittal conference may be rejected.

Memorandum of Understanding:
The traffic engineer shall submit a memorandum of understand to the City Transportation Division to document the agreements made during the pre-submittal conference. The memorandum of understanding may be received by the City via e-mail, fax, or mail. The traffic engineer shall not begin work on the TIA until the City Transportation Division has approved the memorandum of understanding.

Trip Generation:
Trip generation estimates must be obtained from the latest version of the ITE Trip Generation Manual. The standard trip generation estimates to be used are those for the AM and PM peak hours of adjacent street traffic on a weekday. Exceptions to this may include churches, recreation facilities or other special generators. ITE procedures for generating traffic shall be used as specified in the Trip Generation Manual. Alternate rates may be used with prior approval by City Transportation staff. Any assumption regarding site traffic distribution or demand reduction via pass-by trips, internal trips, transit usage or transportation demand management (TDM) strategies, must be approved in advance by the City Transportation staff and documented in the report. Include documentation calculations (i.e. rates or equations used for each land use) in the report.

Trip Distribution and Assignment:
Sketches of site traffic distribution percentages must be included. An accompanying trip assignment sketch should clearly indicate turning movements attributable to the project site at the analysis intersections.

Area of Analysis:
The analysis area should include all streets where site traffic will constitute 10% or more of any intersection approach during the peak hour. Current intersection turning movement counts must be obtained unless recent counts (within the last twelve months) are available from the City or NCDOT. All turning movement counts utilized must have been collected within the twelve months prior to the date of submittal and on weekdays (excluding Monday AM and Friday PM peak hours and holidays). Other peak periods such as noon or weekend periods, may be required if appropriate for the development. Efforts should be made to balance traffic volumes between closely spaced intersections where appropriate. City Transportation staff may require signal warrant analyses for high volume un-signalized intersections. The analysis must follow the warrant guidelines specified in the latest edition of the Federal Highway Manual of Uniform Traffic Control Devices (MUTCD).

The analysis may include recent crash data in the study area. The report should identify locations where traffic safety should be given extra consideration.

Approved Development Traffic:
As listed below, traffic from other nearby significant approved developments must be included in the analysis. Analysis of traffic from pending development projects with significant trip generation potential may also be required at the discretion of the City. Traffic volumes for any approved developments can be obtained from the City's Transportation Division.

Improvements:

Improvements which may be assumed in the analysis are those which have an expected completion date concurrent with that of the project and are either:

1. Funded in the City's Capital Improvement Program,
2. Funded through the State's Transportation Improvement Program, or
3. Indicated as required improvements of other approved development projects.

Those improvements related to other development projects must be clearly referenced in the report. Prior approval must be obtained from City Transportation staff to include other roadway improvements.

The study should clearly indicate those improvements offered by the developer to improve safety or operations. The goal is to achieve LOS D, ensure proper traffic operations, and mitigate potential safety concerns. Where existing conditions are below LOS D, improvements must be recommended that, at a minimum, attain LOS D unless otherwise approved by City staff.

Analysis Required:
The study shall be performed using the operational analysis of the latest Highway Capacity Manual and its associated software (Synchro HCM Reports may be substituted for HCS). Other software packages such as Synchro are preferred for coordinated signal systems and may be required for supplemental analysis. All signalized intersections within the analysis area, all project entrances, and all un-signalized intersections at which site traffic will constitute 10% or more of any one approach shall be modeled. Due to related impacts or current operational problems, the Transportation Division may require other adjacent intersections to be included in the study area. Safety, traffic simulation, gap, queue, traffic signal warrants or other analyses may also be required under certain circumstances.

If a signal is part of a coordinated system, it must be analyzed as such under all scenarios. It is acceptable to optimize all signals for future alternative analyses, however present signal timings and phasing shall be used for the existing conditions analysis. The following assumptions shall be used unless City Transportation staff grants prior approval for variance. Supporting data may be required.

- A peak hour factor of 0.90 shall be applied for all cases except existing traffic.
- Zero right turns on red for signalized intersections as a worst-case scenario.
- Type III arrival rate.
- Minimum four (4) second yellow and two (2) second all-red clearance interval.
- Minimum seven (7) second green time per phase for left turns.
- Minimum ten (10) second green time for through movements.
- Preferred Signal Cycle Lengths:
    - Two or Three Phase = 60 second minimum, 120 second maximum
    - Four to Eight Phase = 110 second minimum, 180 second maximum

Intersections shall be analyzed under four scenarios:

1. Existing
2. No-Build (existing + 3% annual growth + approved developments)
3. Build (existing + 3% annual growth + approved + site traffic)
4. Build Improved (existing + 3% annual growth + approved + site + necessary improvements)

Scenario 4 may be eliminated if improvements are not necessary to satisfy any queuing problems or the LOS criteria listed herein. Overall LOS must be provided for all signalized intersections and worst movement LOS must be provided for all unsignalized intersections. Intersection analysis shall include queue analysis. The analysis year for all future scenarios is one year following the development's scheduled completion year (Build + 1).

Report Content:

Two copies of the final report should be submitted to the City Transportation Division, one copy shall be submitted to the City Planning Department, and if necessary, copies relating to projects impacting state roads should be submitted to the NCDOT District Office as well as the NCDOT Traffic Engineering Branch.

The report must include:

- A full size copy of the site/development plan, (If the site plan had a development plan preceding it, then the site plan must be consistent with the official development plan submitted to the City-County Planning Department.)
- A vicinity map,
- Speed limits of streets within the study area,
- Sketches of traffic distribution percentages and peak hour volumes,
- All capacity analyses (detailed report),
- Signal warrant studies, if appropriate,
- Intersection diagrams, which, as a minimum shall indicate:
    - The current approach and departure laneage at each intersection,
    - The distance between adjacent intersections,
    - The length of full width storage and departure for existing auxiliary lanes,
    - Recommended storage for proposed auxiliary lanes,
    - Any mid-block changes in cross section should also be noted, and
- Other documentation of data and assumptions used in the analysis.

Any submittal not containing all of the above elements will be considered incomplete and shall not be reviewed until a complete submittal is received.

The report must clearly indicate those improvements proposed by the developer. For multi-phase developments, the phasing of improvements should be addressed. Capacity analyses may be required to confirm that the phasing of improvements will provide an acceptable level of service with each phase.

Attached are pages that illustrate the preferred outline (table of contents) for all TIA reports submitted to the City along with the Review Checklist used by City of Durham officials. ***See attachments.***

TIA Attachment #1 - Standard Table of Contents

FOR TIA REPORTS SUBMITTED TO THE CITY OF DURHAM

1. **Introduction**

2. **Executive Summary**

3. **Site Location and Access**
   - Figure: Vicinity Map
   - Figure: Site Plan Map
   - Figure: Existing Lane Geometry of Study Intersections *(include current approach and departure laneage at each intersection, distances between intersections, speed limits, and full width storage for exclusive turn lanes)*

4. **Existing Analysis**
   - Figure: Existing AM and PM Turning Movement Volumes
   - Table: Existing LOS Results *(Overall LOS indicated for signalized intersections and Worst Movement/Approach for unsignalized intersections)*

5. **Future No-Build Analysis**
   - Figure: No-Build AM and PM Turning Movement Volumes
   - Table: No-Build LOS Results *(Overall LOS indicated for signalized intersections and Worst Movement/Approach for unsignalized intersections)*

6. **Trip Generation**
   - Table: Trip Generation Rates *(Land use and quantity, ITE Code, and resulting ADT volumes, AM and PM Enter and Exit volumes included)*

7. **Trip Distribution and Assignment**
   - Figure: Directional Distribution Percentages
   - Figure: Site Generated Trip Assignment

8. **Future Build Analysis**
   - Figure: Build AM and PM Turning Movement Volumes
   - Table: Build LOS Results *(Overall LOS indicated for signalized intersections and Worst Movement/Approach for unsignalized intersections)*

9. **Future Build Improved Analysis *(Not required if no improvements are necessary)***
   - Figure: Build Improved AM and PM Turning Movement Volumes
   - Table: Build Improved LOS Results *(Overall LOS indicated for signalized intersections and Worst Movement/Approach for unsignalized intersections)*

10. **Supplemental Analysis (Safety, Signal Warrant, Queue, or other analysis as required)**

11. **Findings and Conclusions**
    - Table: LOS Comparison of All Scenarios *(Overall LOS indicated for signalized intersections and Worst Movement/Approach for unsignalized intersections)*
    - Figure: Roadway Lane Configurations *(Existing, Proposed, and Committed Improvements Indicated, with accompanying identification of parties responsible for improvments)*

Appendix – Count Data, Trip Generation, LOS Analysis and Output