Transportation Impact Study Guidelines
City of Jonesboro, Arkansas

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PREFACE

This handbook was prepared by the City of Jonesboro Engineering Department, in cooperation with the Northeast Arkansas Regional Transportation Planning Commission, to establish a methodology for assessing the impacts of proposed developments on the transportation system.

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Chapter 1: Introduction

The purpose of a transportation impact study is to examine the anticipated effects of a proposed development on the surrounding transportation network, determine what necessary measures are needed to mitigate these effects and determine what provisions are reasonable and necessary for site access and circulation. A typical transportation impact study will answer the following questions, among others:

- What are the existing and background traffic conditions in proximity to the proposed development?
- How much and what type of traffic will the proposed development generate, and how will it be distributed on public streets?
- How many access points are necessary to adequately serve the proposed development?
- What impact will the proposed development have on the safety and efficiency of the public street system, with and without recommended on-site and off-site improvements?

This handbook has been developed to provide open, objective and consistent standards for conducting transportation impact studies pursuant to the Code of Ordinances of the City of Jonesboro, Arkansas; to promote sound planning of site access and internal circulation; and, to identify needed off-site improvements with regard to the proposed project. To ensure consistency with accepted practice, the guidelines included in this handbook were modeled on the recommendations in *Transportation Impact Analyses for Site Development* (Institute of Transportation Engineers 2010). Developers are encouraged to take these guidelines into account throughout their planning process.

1.1 Qualifications

All transportation impact studies shall be conducted by a Professional Engineer, currently licensed to practice in the state of Arkansas, with specific training or experience in traffic and transportation engineering and planning.

1.2 Consultation

Prior to the initiation of a transportation impact study, the preparer shall consult with the City Engineer or his designee to determine the scope of the study, identify data requirements and availability, discuss the methodologies that will be utilized, and agree upon the contents of the study report. Following the pre-study consultation, the preparer shall draft a scope of work outlining the parameters of the study, as agreed to by the parties. The transportation impact study should not begin until the scope of work has been

reviewed and approved by the City Engineer or his designee. Additional consultations may be requested by City staff or the preparer, as necessary.

1.3 Review

Transportation impact study reports shall be reviewed by appropriate staff from the City of Jonesboro's Engineering and Planning Departments. After reviewing a transportation impact study report, City staff may submit questions or concerns about the study to the preparer, who shall be given an opportunity to respond to those questions or concerns. This process shall continue until the objectives of the transportation impact study have been met, as determined by the City Engineer or his designee.

Chapter: 2 Scope of Study

This plan implements gradient levels of traffic impact analysis (TIA) based on the number of expected peak hour trips a development is expected to generate. All developments will be required to submit trip generation estimates as part of the permit application process to see of a TIA is required. Very small developments (fewer than 100 trips during the peak hour) are exempted from performing a TIA. The impact of these developments generally will be limited to the vicinity of the access connection. While these developments may not be required to perform a TIA, if the site plan review process identifies traffic related concerns generated by the development, these should be addressed with sound engineering judgement and practices.

2.1 Study Area

The area of the Traffic Impact Analysis shall be based on the peak hour trips to be generated by the project development, as set for the following table. As illustrated in Figures 2.1, 2.2 and 2.3, the larger the development, as measured by the number of trips generated, the larger the area that may experience measurable traffic impact due to the development.

Peak Hour Trips	TIA Level	Scope Radius
Less than 100	Trip Generation Worksheet (no TIA required)	N/A
$100 \leq T < 300$	Level 1	1/8 mile
$301 \leq T < 500$	Level 2	1/8 – 1/2 mile
$T > 501$	Level 3	1/2 – 1 mile

Figure 2.1: Level 1 TIA

Figure 2.2: Level 2 TIA

Figure 2.3: Level 3 TIA

2.2 Traffic Study Elements

Table 1: Requirements for Various Types of Traffic Impact Studies

Study Requirements	Trip Generation Threshold		
	Small Development Level 1 TIA	Medium Development Level 2 TIA	Large Development Level 3 TIA
	100 ≤ T < 300	301 ≤ T < 500	T > 501
Existing Conditions			
Existing LOS Analysis	*	✓	✓
Background Traffic Growth	*	✓	✓
Existing Roadway Layout	✓	✓	✓
Existing Traffic Volumes	✓	✓	✓
Site Design			
Traffic Generation	✓	✓	✓
Traffic Distribution	✓	✓	✓
Evaluate Number, Location, and Spacing of Access Points	✓	✓	✓
Evaluate Access Design	✓	✓	✓
Evaluate Site Circulation	✓	✓	✓
Proposed Conditions			
LOS Analysis with Site Traffic	*	*	✓
Mitigation Identification	*	*	✓
Proposed LOS Analysis	*	*	✓
Other Analyses			
Analysis of Proposed Signal Locations	*	*	✓
Effect on Traffic Signal Progression	*	*	✓

* Indicates this aspect may have to be included in the study if conditions warrant

Table 1

Chapter 3: Existing Traffic Conditions

3.1 Existing Level of Service (LOS) Analysis

Turning movement and overall levels of service for intersections shall be determined using the procedures documented in the latest edition of the *Highway Capacity Manual* (Transportation Research Board). Study preparers are expected to use the Highway Capacity Software, Synchro or another software package that implements the methods described in the latest edition of the *Highway Capacity Manual* to perform the computations. Questionable computed levels of service for existing conditions should be confirmed through field observations. The LOS at an intersection as defined in the Highway Capacity Manual is shown in the following table.

Level of Service Criteria		
Level of Service	Signalized Intersections Average Control Delay (Seconds/Vehicle)	Unsignalized Intersections Average Control Delay (Seconds/Vehicle)
A	0 to 10	0 to 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

3.2 Background Traffic Growth

Any development that has been approved but not yet occupied should be considered for use as background traffic. These projects should be reported as cumulative projects in a table format with the name of project, location description, ADT, and AM/PM peak hour trips indicated. The growth rate for the adjacent streets should be provided in a table format indicating the AADT value from the past five years when available.

3.3 Existing Roadway Layout

A drawing indicating the existing roadway configurations, geometric features, intersection lane configurations, driveway locations, traffic signal phasing, speed limits, transit stops and any other noteworthy roadway feature which will affect traffic shall be submitted.

3.4 Existing Traffic Data

The preparer should consult with City staff to determine the availability traffic volume data. Data collected by the City or by other studies within the past two years may be used. If recent traffic data is not available from the City, traffic volume data collection shall be the responsibility of the preparer and shall be conducted in accordance with professional data collection practices. If the type of development lends to high traffic volumes during the noon hour such as a restaurant Noon Peak counts will also be required. The following data should be collected

- Peak period turning movement counts in 15 min increments
  - 7:00 a.m. – 9:00 a.m. and 3:00 p.m. – 6:00 p.m.
- 24 Hour Counts
  - 24 Hour counts in 15 min increments
- Noon Peak Counts (if Applicable)
  - 11:00 a.m. – 1:00 p.m.

Chapter 4: Site Design Analysis

4.1 Traffic Generation

In general, study preparers will be expected to follow the guidelines and procedures set forth in the latest edition of the *Trip Generation Handbook* (Institute of Transportation Engineers) to produce trip generation estimates. Traffic Generation and Distribution Data shall be provided in a table format along with the, proposed land use, approximate size of the development, ITE code, 24-hour tow-way weekday volume, am peak hour volume, pm peak hour volume and the pass-by reduction factor. The method utilized to determine the pass-by reduction factor shall be referenced in the TIA report.

4.2 Traffic Distribution

Distribution and assignment of site traffic may be performed manually or by computer modeling, as appropriate. Whatever the approach, preparers are encouraged to consult with City staff to verify the plausibility of proposed distribution and assignment patterns prior to preparing subsequent analyses.

Trip distributions should be made in consideration of the size and type of the proposed development, the presence of competing developments, surrounding land uses and

demographic characteristics, the conditions of the surrounding street system, and other relevant considerations.

Consideration should be given to whether inbound and outbound trips will have similar distributions. If the site will generate considerable truck traffic, a separate distribution and assignment of truck trips may be warranted.

4.3 Evaluate Number and Location of Access Points

Driveways shall be limited to the number of access points necessary to achieve reasonable and safe site access. Capacity and signal warrant analyses will need to be performed to determine whether site access is appropriate given anticipated demand.

The location of driveways in relation to one another should take into account the potential for traffic conflicts and minimize the likelihood of conflicts where possible. In particular, closely-spaced and opposite-right alignments should typically be avoided.

At a minimum, driveways should be spaced far enough from intersections that they are not obstructed by typical intersection queues and entering/exiting site traffic does not interfere with intersection operations. Appropriate analyses such as proper geometry and driveways sight distance analyses should be conducted to verify that proposed driveways will function safely and efficiently.

4.4 Access Design

Access points should be designed such that alignment, width, grade, breakover, sight distances and other geometric considerations are conducive to safe and efficient ingress and egress for expected vehicle types, volumes and operating speeds. Driveways should be designed such that queuing takes place on site and does not spill onto adjacent streets. Queuing analyses should be performed to estimate the storage space necessary to accommodate anticipate traffic.

Right turn deceleration lanes and tapers are strongly encouraged on access points located on Principal and Minor Arterials to limit the speed differential and rear end crash potential.

4.5 Site Circulation

Internal service roads, drive aisles, storage areas, pedestrian pathways, and parking and loading areas should be designed such that:

(1) Conflicts between on-site and off-site traffic are minimized;
(2) All vehicle types that are expected to access the site can be accommodated safely, including bicycles, delivery vehicles, emergency vehicles and transit (if transit stops are planned or warranted); and
(3) Pedestrians can move safely and directly to and from parking areas and between structures.

Typical considerations for designing a safe and efficient internal circulation system include: potential for conflict, particularly between vehicles and pedestrians; queue storage; traffic calming; and pavement markings, signage and barriers; in addition to geometric considerations, such as sight distances, turning radii, and horizontal and vertical alignments.

Chapter 5: Analysis of Proposed Conditions

5.1 LOS Analysis With Site Traffic

A LOS analysis utilizing projected traffic volumes with existing traffic operating conditions shall be performed utilizing software programs such as Synchro. This information will be compared to the existing LOS analysis to see the true impact the development will have on the public roadway system.

5.2 Mitigation Identification

If the delay is increased within the study area as a result of development traffic, mitigation measures shall be identified to counteract this increase. The preparer shall investigate a range of mitigation alternatives that are viable, efficient and economical. These mitigation measures may be presented to the governing body for consideration of implementation.

5.3 Proposed LOS Evaluation

A LOS analysis utilizing projected traffic volumes with each proposed mitigation measure shall be conducted and displayed in table format.

Chapter 6: Other Analyses

6.1 Analysis of Proposed Signal Locations

The investigation for the need for a traffic control signal (if requested by the City) shall be conducted in accordance with the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways. The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:

Warrant 1, Eight-Hour Vehicular Volume
Warrant 2, Four-Hour Vehicular Volume
Warrant 3, Peak Hour
Warrant 4 Pedestrian Volume
Warrant 5, School Crossing
Warrant 6, Coordinated Signal System
Warrant 7, Crash Experience
Warrant 8, Roadway Network
Warrant9, Intersection Near a Grade Crossing

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. The ultimate decision will be with the City Council and/or ARDOT as the case may be.

6.2 Effect on Traffic Signal Progression

Signalized intersections shall not be spaced less than 2,000 ft apart. A time-space analysis utilizing existing cycle lengths and phase sequences shall be conducted when a proposed traffic signal is located within 1 mile of an existing traffic signal. If the time-space analysis indicates the existing bandwidth of the system will be compromised as a result of the proposed signal, the signal shall not be installed unless proper mitigation improvements are installed to maintain the existing bandwidth. These efforts may include aligning drives to eliminate split phasing or increasing the capacity of the side streets, to reduce the split time needed.

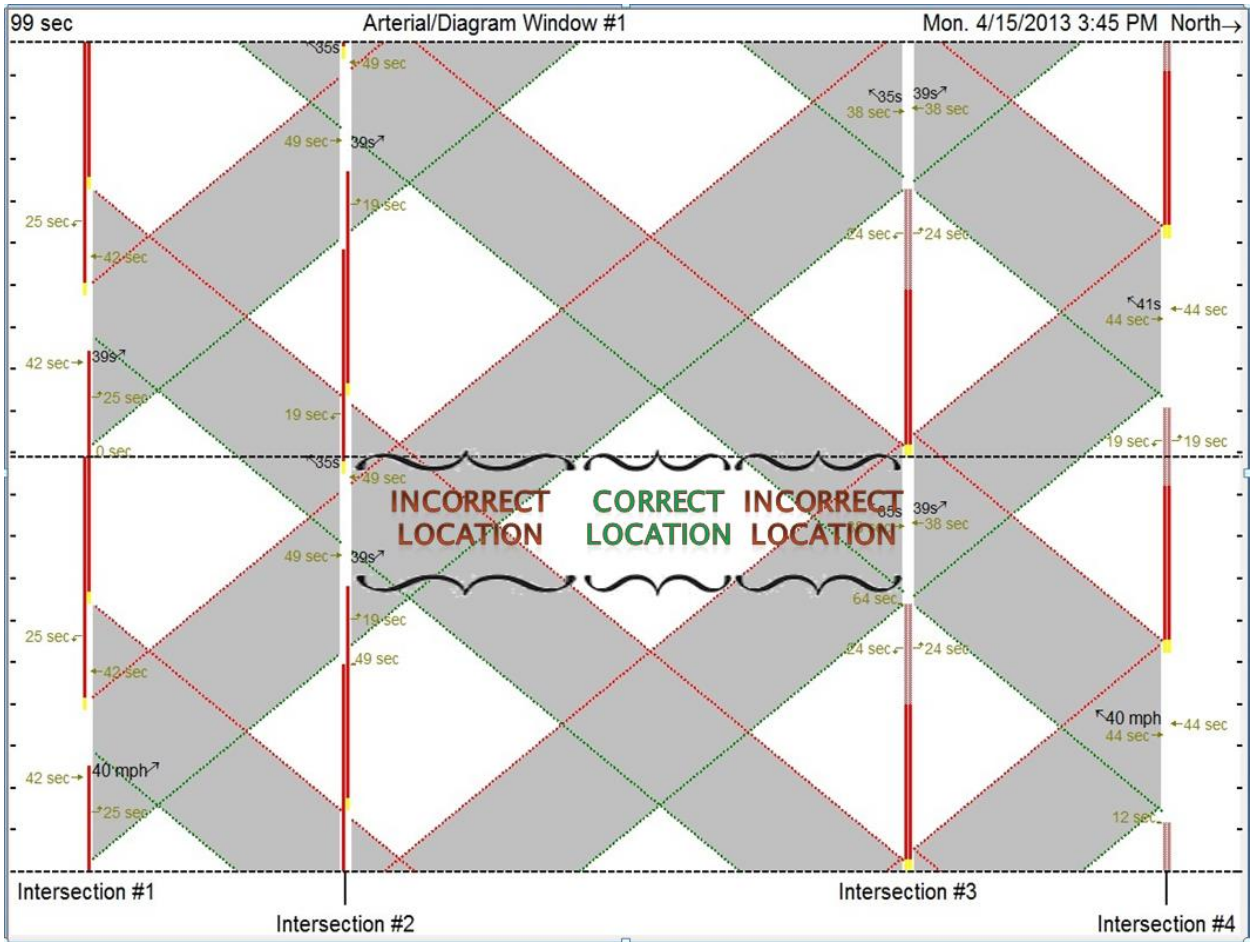

Figure 6.1: Traffic Signal Location Selection Related to Time-Space Analysis

Chapter 7: Recommendations

Recognizing that not all transportation problems have simple solutions, in developing study recommendations, the preparer should:

- Consider low-cost improvements;
- Recognize right-of-way limitations;
- Account for the phasing of the development and scheduled roadway improvements;
- Recognize accepted access-management principles; and,
- Maintain consistency with local policies;

Chapter 8: Report

The transportation impact study report shall document the purpose, procedures, assumptions, sources, findings, and recommendations of the study. Technical elements of the report shall be written in sufficient clarity and detail to allow City staff to evaluate the soundness of the methodology employed and the veracity of the findings and recommendations included in the report. Whenever possible, for clarity and ease of review, information should be presented in tables, graphs, diagrams or maps, rather than narrative text. The report shall be sealed, signed and dated by the preparer, who shall certify that the study was conducted consistent with these guidelines, applicable laws and regulations, the agreements between the parties and accepted engineering and planning practices. At the conclusion of the study, one hard copy of the report and one electronic copy of the report (preferably in a PDF) shall be submitted to the City Engineer or his designee.

In general, the format of the report shall be consistent with the outline attached hereto as *Appendix A*.

Appendix A: Report Outline

Cover (name and location of the proposed development; name, address and telephone number of the developer; name, address and telephone number of the preparer; and date of submission)

Certification (seal and signature of the preparer; attestation that the study was conducted consistent with the City of Jonesboro's Transportation Impact Study Guidelines, applicable law, the agreements between the parties, and accepted engineering and planning practices; and date of attestation)

Table of Contents (including lists of figures and tables)

Executive Summary (concise summary of the study, including descriptions of the proposed development and study area; and a discussion of the principal findings and recommendations of the study)

I. Introduction (scope and objectives of the study) [section 2]

II. Proposed Development (description of the proposed development, including location, zoning, land use and intensity, site plans, and phasing and timing)

III. Study Area (description of the area of influence of the proposed development, including location, zoning, land use and intensity of existing and anticipated development) [section 2.1]

IV. Existing Conditions (descriptions of the existing infrastructure and traffic volumes within the study area; and analyses of existing traffic conditions)

A. Background Traffic Growth
B. Existing Roadway Layout and Features
C. Existing Traffic Data
D. Existing LOS analysis

V. Site Traffic & Design (discussion and analysis of site access and layout) [*cf.* section 4.2]

A. Traffic Generation
B. Traffic Distribution and Assignment
C. Evaluate Number and Location of Access Points
D. Evaluate Access Design
E. Evaluation of Site Circulation, Parking and Loading

VI. Projected Conditions

A. Total Projected Traffic Volumes
B. Projected LOS Analysis
C. Mitigation Identification

VII. Findings and Recommendations (discussion of principal findings; detailed descriptions of recommended improvements with implementation schedules, itemized cost estimates, and discussions of the impacts of recommended improvements on system performance)

A. Roadways and intersections
B. Site access and layout
C. Other (*e.g.*, transportation demand measures, policy changes)

Appendices (*e.g.*, level-of-service worksheets, trip generation calculations)

Suggested Tables and Figures (included in the body of the report as necessary and where appropriate)

Site layout	Figure depicting the proposed development, including adjacent streets, access points, internal circulation and parking systems and structures
Site location	Map depicting the location of the proposed development in relation to the corporate boundaries of the city of Jonesboro
Study area	Map depicting the area of influence of the proposed development
Existing transportation system	Figure depicting the existing transportation system within the study area, including the configurations of all streets; transit, bicyclist and pedestrian routes; signal locations; and rights of way
Existing traffic volumes	Figure depicting current-year traffic volumes within the study area, including daily traffic volumes on all streets and peak-hour movement volumes for all intersections and access points
Existing levels of service	Table or Figure depicting current-year levels of service for intersections, access points and roadways within the study area
Horizon-year transportation system	Figure(s) depicting the horizon-year transportation system within the study area, including the configurations of all streets; transit, bicyclist and pedestrian routes; signal locations; and rights of way
Non-site horizon-year traffic volumes	Figure(s) depicting horizon-year non-site traffic volumes within the study area, including daily traffic volumes on all streets and peak-hour movement volumes for all intersections and access points
Horizon-year levels of service, non-site traffic	Table(s) or Figure(s) depicting levels of service for intersections, access points and roadways within the study area, reflecting only non-site traffic volumes
Site traffic generation	Table(s) containing estimated daily and peak-hour trips generated by the proposed development
Directional distribution of site traffic	Figure(s) depicting (by percentages) the portion of site traffic approaching or departing the site on each roadway within the study area
Site traffic	Figure(s) depicting daily and peak-hour traffic volumes at each site access

Total horizon-year traffic volumes	Figure(s) depicting total horizon-year traffic volumes within the study area, including daily traffic volumes on all streets and peak-hour movement volumes for all intersections and access points
Horizon-year levels of service, total traffic	Table(s) or Figure(s) depicting levels of service for intersections, access points, and roadways within the study area, reflecting total horizon-year traffic volumes
Recommended improvements	Diagram(s) depicting recommended improvements to the transportation system, site access or site layout