

SECTION VII

TRAFFIC IMPACT ANALYSIS GUIDELINES

A. GENERAL

Traffic Impact Analyses (TIAs) are tools that have historically been utilized to evaluate the interaction between existing transportation infrastructures and proposed land development projects. TIAs provide a large amount of information that can be used for a number of purposes, including documenting the growth of an area, assisting with planning activities, assessing immediate and long term needs relative to infrastructure improvements, etc. Historically, these documents have been applied in a variety of ways in order to maximize the efficiency and safety associated with ingress and egress facilities.

The following guidelines are intended to provide an understanding of the process through which a TIA is developed and submitted within Harris County, as well as an understanding of the technical requirements of the deliverables to be provided. Additionally, the criteria below outline when TIAs are required in Harris County.

- Evaluation of requests for variances and/or deviations from Harris County Design and Development Guidelines.
- All developments located within 500 feet of the intersection of two or more thoroughfare facilities (i.e., principal thoroughfares, thoroughfares, and/or major collectors as defined by the City of Houston thoroughfare map) with an overall footprint in excess of 5 acres.
- New school construction.
- Shopping centers with GLA in excess of 100,000 square feet.

It should be noted that the preparation of TIAs is strongly encouraged for all midsize and large developments. Furthermore, they may be requested, as a condition for review and/or acceptance, if it is determined by Harris County that these developments have the potential to impact regional transportation facilities and/or have the potential to have a regional impact on traffic patterns.

The goals of TIAs developed within Harris County are as indicated below:

- To attempt to identify any and all potential adverse impacts to the existing transportation system and to proposed developments.
- To assist public and private sector entities in identifying and resolving issues related to the location of driveways, traffic signals, and other transportation facilities that are requested but do not conform to the Harris County Design and Development Guidelines.
- To assist public and private sector entities with long term planning such that the extension and growth of the transportation infrastructure may occur in a manner that is comprehensive in nature and supportive of the public good.

B. DEFINITIONS

Boundary Street - A public street that is adjacent to and/or abutting one or more sides of the proposed site.

Build-out Year - The proposed year of completion of the land development project, when its capacity for attracting and producing traffic is maximized.

Intermediate Construction Phase - An intermediate phase of construction associated with a multiple-phase development project. There may be several intermediate construction phases that precede the final construction phase. The final construction phase is completed in the build-out year.

Multi-Phase Development Project - Any land development project that is developed with more than a single phase of construction.

Peak Hour Trips (PHTs) - The number of traffic units generated by and attracted to the proposed development during its heaviest hour of use.

Projected Traffic - The number of traffic units that is projected to exist at a given point in time on an existing or proposed street.

Site-Generated Traffic - Vehicular trips attracted to or produced by the proposed development site.

Study Area Boundary - The limits of the area for which the analysis is to be conducted. This area shall be determined by the Engineering Firm conducting the study (hereafter referred to as the Study Engineer) and approved by the Harris County Public Infrastructure Department, Engineering Division, Traffic and Transportation Group (HCPID - T&T Group) prior to the start of the study.

Trip Generation Summary - A table summarizing the trip generation characteristics of the development. Selection and development of appropriate trip generation rates and procedures shall be coordinated with the HCPID - T&T Group. Institute of Transportation Engineers trip rates will be used unless a better source is identified and is deemed acceptable to the HCPID - T&T Group.

C. PRELIMINARY SCOPING MEETING

In instances where TIAs are submitted, they must be completed in sufficient detail to allow the HCPID to evaluate the overall impact of the development on boundary facilities. In an effort to minimize the deliverables required and still insure that the document is sufficiently comprehensive, the Study Engineer shall be responsible for coordinating a **preliminary scoping meeting** with the HCPID - T&T Group.

The purpose of the preliminary scoping meeting shall be to determine the scope of the TIA, to establish the content, exhibits, magnitude of details and format requirements for the TIA.

D. STUDY AREA

The study area, scope of the TIA, the trip generation rates to be utilized for the study, and all requirements identified as necessary to provide a complete, accurate and useful study shall be determined at the preliminary scoping meeting. Additionally, these elements shall also be verified at the time of the preliminary scoping meeting. Any variances from the requirements identified below must be approved by the HCPID - T&T Group in writing prior to preparation of the study. As previously discussed, the Study Engineer is responsible for contacting the HCPID - T&T Group to schedule a preliminary scoping meeting prior to any studies being conducted.

The study boundary will be established based on the size of the proposed development, the projected PHTs, and the application of sound Engineering judgement. In general, the study area will typically include an area of no less than ¼ mile in radius and no greater than a radius of one (1) mile from the boundary of the proposed development.

E. MULTI-PHASE DEVELOPMENT PROJECTS

Requirements for TIAs for multi-phase residential projects shall be in accordance with the requirements set forth in the design guidelines, and shall require no special treatment. As a result of the development of this document, however, it is recommended that general plans submitted to Harris County Public Infrastructure Permits Section be disseminated to the following:

- Appropriate Precinct contact.
- Appropriate HCPID Precinct Technical Assistant.
- HCPID Traffic and Transportation Group - Design and Planning Section.

The dissemination of these submittals shall be for informational purposes only, and requires no formal response. The intent of this action is to identify pending developments to appropriate Harris County personnel as early as possible, and thereby enhance the ability of Harris County to identify potential concerns with developments at an early stage in the process.

F. TECHNICAL CRITERIA AND REQUIREMENTS

Technical requirements have been established to standardize the format by which TIAs are prepared and to insure that the content and quality of a given TIA will result in an accurate and useful analysis. General items that shall be addressed in all TIAs include:

1. Identification of the scope of the TIA.
2. Identification of existing geometric conditions and traffic control devices that are impacted by development.
3. Estimates and distribution of site-generated traffic.
4. Forecast of future non-site related traffic.
5. Capacity analyses and projected operational levels of service for boundary roadways and intersections.
6. Analysis and justification of site improvements that will require deviation from established Harris County Design and Development Guidelines. Where site improvements deviate from these guidelines, supporting documentation shall be provided that detail why these variances are justified. Furthermore, it must be demonstrated that not only will these variances and/or deviations not have an adverse impact on the adjacent transportation facilities, but that they will actually augment the operation of the existing infrastructure.
7. Identification of any roadways and/or intersections within the study area that are expected to operate at LOS D, E or F under existing and/or projected traffic conditions.

G. TIA FORMAT

All TIAs shall be submitted to Harris County as a stand-alone document bound in a 3 ring binder. Accompanying appendices shall be provided at the time the TIA is submitted. The number of appendix documents to be submitted shall be identified at the time of the preliminary scoping meeting. Each copy of the appendix shall be presented as a separate document and shall be contained in a separate 3 ring binder.

As a minimum, the items identified below establish the general outline of the report, the required maps and diagrams, all required tables, and minimum submittal requirements for Appendices.

1. General Outline of Report
 - a. Executive Summary
 - Study Area
 - Summary of Findings and Recommendations
 - b. Table of Contents
 - c. List of Figures and Tables
 - d. Introduction

¹ Reference City of San Antonio Ordinances #84917 and #85561

- Traffic Impact Analysis Background and Requirements
 - Data Sources
 - e. Study Area
 - Existing Land Use
 - Proposed Development
 - Existing Roadway Conditions
 - f. Analysis
 - Trip Generation
 - Trip Distribution and Trip Assignment
 - Projected Site Turning Movement Counts
 - System Traffic
 - Capacity Analyses
 - g. Conclusions and Recommendations
 - h. References
2. Maps and Diagrams
- a. Conditions Maps and Drawings
 - Aerial Photograph of Study Area
 - Existing Conditions Layout^{1,2,3}
 - Proposed Master Plan and/or Site Plan^{1,2,3}
 - Existing Land Use Map (study area only)⁴
 - Projected Land Use Map (study area only)⁴
 - Major Thoroughfare Plan (study area only)⁵
 - Existing Turning Movement Count Diagram – AM Peak Hour⁶
 - Existing Turning Movement Count Diagram - PM Peak Hour⁶
 - Existing Turning Movement Count Diagram - Peak Period for Site⁶
 - Summary of Existing / Projected 24 Hour Volumes⁷

¹ Show pavement marking layout and lane usage for all boundary streets. Drawing must reflect driveway locations and roadway geometry within +/- 1 foot of actual location.

² Show driveways and land uses on both sides of all boundary streets of the proposed site.

³ All driveways and intersecting streets that connect to a boundary street shall be illustrated in sufficient detail to serve the purpose of illustrating traffic function. As a minimum, this detail shall include all lane widths, traffic islands, medians, sidewalks, curbs, traffic control devices, and a general description of the existing pavement conditions.

⁴ As a minimum, general land uses identified shall include residential, office/business, industrial, and retail.

⁵ As a minimum, drawing shall encompass a minimum four (4) mile radius from the site and shall identify all roadways designated on the City of Houston Major Thoroughfare Map, their corresponding designation, a legend identifying roadway classifications, and the approximate location of the proposed development.

⁶ Results of the turning movement count for each location shall be overlaid on top of the Existing Conditions Layout.

⁷ Indicate existing and projected 24-hour volumes for all major roadways, as identified in the preliminary scoping meeting. Assumptions of growth rates for traffic demand and references shall be identified on this exhibit.

- b. Trip Generation / Trip Distribution Diagrams
 - General Study Area Trip Distribution¹
 - Site Trip Distribution^{2,3}
 - Site Trip Assignment^{2,3}
 - Boundary Street Turning Movements – AM Peak Hour⁴
 - Boundary Street Turning Movements – PM Peak Hour⁴
 - Boundary Street Turning Movements – Peak Period for Site⁴
 - c. Recommended Site Access Configuration and Roadway Improvements Diagram⁵
3. Tables
- a. Site Trips Attracted from Passing Traffic (if applicable)⁶
 - b. Land Use Characteristics and Total Site Trips Generated⁷
 - c. Land Use Characteristics and “Passer-By” Site Trip Generated⁷
 - d. Land Use Characteristics and New Site Trip Generated⁷
 - e. Summary of Capacity Analyses^{8,9,10,11}
4. Conclusions and Recommendations

As a minimum, all geometric and operational improvements necessary to provide an acceptable LOS for facilities within the project site and/or along the boundary streets of the project site shall be identified. Both on-site and off-site improvements should be evaluated. Priority should be given to beneficial off-system improvements as a

¹ Indicate general directional distribution of trips to and from the development.

² Indicate assignment/distribution of projected trips for the site, by movement, at each access point.

³ Indicate summary of trip assignment/distribution for all boundary street approaches.

⁴ Indicate combined existing and site generated traffic and the site generated traffic volume for all movements at each boundary street intersection and/or driveway.

⁵ Diagram shall, as a minimum, indicate existing and proposed pavement marking layouts for all boundary streets, proposed modifications to existing and/or the installation of new traffic control devices, proposed on-site circulation, parking layout, pad locations, and any modifications necessary to address increases in traffic demand associated with the site development that result in significant reductions in operations.

⁶ The table shall include assumptions regarding percentage of passer-by traffic associated with each land use for the development, including proper source references. Copies of these references shall be provided upon request by the HCPID T&T Group.

⁷ The table shall include land use, gross leaseable area (GLA), estimated daily trip generation estimates, and trip generation rates and estimates for weekday AM, PM, and for the development peak traffic period, broken down by entering and exiting trips.

⁸ The table shall summarize before and after conditions associated with level of service (LOS) for all boundary road access drives. As a minimum, this shall include the name of all intersections of boundary roadways adjacent to the site, whether signalized and unsignalized. Furthermore, existing and proposed conditions shall be summarized side-by-side for each peak period evaluated. All special evaluation conditions shall be appropriately footnoted.

⁹ Capacity analyses will be required for each roadway infrastructure improvement in order to verify the LOS associated with a given improvement.

¹⁰ Capacity analyses will follow the principles established in the latest edition of the Transportation Research Board's Highway Capacity Manual (HCM) unless otherwise directed by the HCPID T&T Group. Capacity will be reported in quantitative terms as expressed in the HCM and in terms of traffic LOS.

¹¹ Capacity analyses will include traffic queuing estimates for all critical applications where length of queues is a design parameter (i.e., auxiliary turn lanes, traffic gates, etc.).

means of minimizing the impact on the existing transportation system. Improvements that are to be considered for the purpose of mitigating less than acceptable LOSs shall include as a minimum pavement widening, installation of turn lanes, installation of median islands, access control, installation of curbs and/or sidewalks, installation of traffic signalization, traffic signing, and/or pavement marking modifications. In all cases, however, traffic impact improvements shall be limited to those that can be implemented within the project site and along its boundary streets.

Acceptable levels of service shall be in accordance with Table 2. To summarize, Table 2 indicates that:

- a. When the LOS Without Development is LOS A, B, or C, the minimum acceptable Projected LOS shall be LOS C.
- b. When the LOS Without Development is LOS D, E, or F, the minimum acceptable Projected LOS shall be equal to the LOS Without Development.

| | | <i>LOS Without Development</i> | | | | | |
|----------------------------------|---|--------------------------------|------|------|------|------|------|
| | | A | B | C | D | E | F |
| <i>Projecte d LOS</i> | A | N.A. | | | | | |
| | B | B | N.A. | | | | |
| | C | C | C | N.A. | | | |
| | D | C | C | C | N.A. | | |
| | E | C | C | C | D | N.A. | |
| | F | C | C | C | D | E | N.A. |

Table 2 – Minimum Acceptable Level of Service¹

5. Appendix

Appendix documents shall be provided to Harris County at the time the TIA is submitted. The number of appendix documents to be submitted shall be identified at the time of the preliminary scoping meeting. Each copy of the appendix documentation shall be presented as a separate document, each copy of which shall be contained in a separate 3 ring binder. As a minimum, the Appendix shall contain:

- a. Summaries of Turning Movement Counts.
- b. Summaries of “Tube” Counts.
- c. Summaries of Capacity Analyses.
- d. All other data necessary to support findings and recommendations.

H. SUBMITTAL REQUIREMENTS

¹ Reference City of San Antonio Ordinances #84917 and #85561

Upon completion of the TIA, five (5) copies will be submitted to the HCPID - T&T Group. Up to fifteen (15) additional copies could be required if deemed necessary by the HCPID - T&T Group. An **initial review** of the study will be made to determine if the TIA was developed in accordance with the technical requirements and within the scope of the study as outlined in the preliminary scoping meeting. If deviations from the technical requirements and/or the scope of study, as established during the preliminary scoping meeting are identified, the initial review will be terminated until the said deviations are addressed. A **notice of technical deficiencies** will be developed by HCPID - T&T Group and submitted to appropriate Harris County personnel and to the Study Engineer at such time as deficiencies are identified. All copies will be returned to the Study Engineer at that time as well.

Upon submittal of a TIA meeting the technical and scoping requirements established in the preliminary scoping meeting, **final review** of the TIA will be conducted. If during the course of the final review it is determined that additional information is needed, a written **request for addendum** will be provided to the Study Engineer. No more than one request for addendum will be requested and/or required for a given TIA.

Following completion of the final review, written recommendations regarding any requested variances, observations, objections to and/or concurrence with the findings of the study will be provided to appropriate Harris County personnel and to the Study Engineer.

REFERENCES

1. A Street Hierarchy System for the City of Houston, Texas; June 1997.
2. Geometric Design Guidelines for Subdivision Streets for the City of Houston and Harris County; City of Houston, September 1993.
3. 1999 Major Thoroughfare and Freeway Plan; City of Houston Planning Commission, September 1999.
4. A Short Course on City Street Design; Texas Transportation Institute, August 1988.
5. Development of Warrants for Left-Turn Lanes; Kentucky Department of Transportation; Agent, Kenneth R., July 1979.
6. Transportation and Land Development; Institute of Transportation Engineers; Stover, Vergil G. and Koepke, Frank J., 1988.
7. Special Report 209, The Highway Capacity Manual; Federal Highway Administration, 1985.
8. Traffic Engineering Theory and Practice; Pignataro, Louis J., 1973.
9. Chapter 19; Sections 1, 69, 82, 83, 84, and A101 of the City of San Antonio City Code.
10. City of San Antonio Ordinances #84917 and #85561.
11. Draft Ordinance Amending Chapter 19 of the City of San Antonio City Code; May 2000.
12. Chapter 5, Article II of the Land Development Code; City of Austin, August 1991.
13. Draft Regional Standards for Subdivision Development; Dallas County, September 1999.
14. Driveways and Culverts - Regulations of Harris County, Texas for the Construction of Driveways and/or Culverts on County Easements and Rights of Way; HCPID Permits Group, 1993.
15. Statewide Programs to Assess Land Use Decisions on Transportation - An Examination of Seven Case Studies; ITE Technical Committee 6A-57, November 1995.