



Traffic Impact Analysis Guidelines

Prepared by

WILSON
& COMPANY

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1.0 INTRODUCTION

This document has been established to provide uniform guidelines for preparing a Traffic Impact Analysis (TIA) for new developments or additions to existing developments within the City of Maricopa. The procedures outlined herein provide the developer (i.e., permit applicant), the developer's consultant, and City staff with information necessary to identify transportation infrastructure needs associated with new developments.

2.0 PURPOSE

In general, the purposes of the TIA procedures are to:

- Provide information to the permit applicant on specific requirement of the analysis;
- Ensure consistency in the preparation and review of TIA reports; and
- Identify the necessary infrastructure needed to improve the development.

3.0 REQUIREMENTS

Requirements for preparation of a TIA are generally based on the level of anticipated traffic activity associated with the proposed development, though other factors may be considered by the City Engineer.

3.1 REQUIRED COORDINATION

The developer and/or developer's consultant must coordinate with the City Engineer and, where appropriate, Pinal County and ADOT. At least one scoping meeting must be held with the City Engineer to review the proposed scope of the analysis and to reach consensus on specific requirements of the TIA. Prior to the scoping meeting, a scoping checklist must be prepared to document key elements of the proposed development and confirm key assumptions associated with the TIA report. The Scoping Checklist is provided in Appendix A.

3.2 REQUIREMENT FOR A TRAFFIC IMPACT ANALYSIS

The City Engineer will make the final decision on requirements of a TIA following the initial scoping meeting. Table 1 denotes the general scope requirements of a TIA. The level of analysis varies based on the anticipated peak hour trip generation of the proposed development.

A development that generates less than 100 peak-hour trips per average weekday will be required to submit a Traffic Impact Letter (TIL). A TIL is a letter that examines the trips generated in order to determine that a TIA is not required. A TIL would also examine proposed access and requirements for driveway turn lanes and access control.

Preparation of a TIA will be required for all new developments, or additions to existing developments, where the ultimate development of the site generates 100 or more peak-hour trips per average weekday or 750 daily trips. For single-phased developments generating 100-500 peak-hour trips, the scope of the analysis will focus on opening year traffic conditions. For larger developments that occur in multiple phases

and/or generate more than 500 peak hour trips, the scope of the study increases to include future horizon years.

Table 1
Traffic Impact Analysis Report Requirements

Proposed Action	Traffic Impact Letter (<100 peak hour trips)	Limited Report (100-500 peak hour trips)	Standard Report (>500 peak hour trips)
Description of Proposed Development	X	X	X
Study Area		X	X
Project Trip Generation	X	X	X
Analysis of Existing/Opening Year Conditions		X	X
Analysis of Future Year Conditions			X
Site Access	X	X	X
Level of Service	X	X	X
Improvement Analysis		X	X
Traffic Control Needs	X	X	X
Traffic Safety		X	X
Improvement Costs	X	X	X

Traffic analysis for developments on State highways must be performed in accordance with ADOT’s *Traffic Engineering Guidelines and Processes, Section 240 Traffic Impact Analyses*. The analysis of roadway improvements in the TIA shall follow guidelines established for City roadways as discussed in Appendix F of the *City of Maricopa Area Transportation Plan*.

4.0 TIA REPORT CONTENTS

This section specifies the report contents and format that must be followed in preparing a TIA. To enhance consistency and timely review of a TIA, the permit applicant is encouraged to follow the City-prepared report outline shown below, and summarized in Table 2. The following sections provide additional guidance regarding the information and/or data to be reported.

4.1 EXECUTIVE SUMMARY

The Executive Summary shall provide a concise description of the following:

- Proposed development characteristics
- Scope of analysis (study area and analysis years)
- Key findings
- Recommendations

4.2 BACKGROUND AND SCOPE

INTRODUCTION

Provide a brief overview of the development name, location, and purpose of the study. Indicate the date of the project Scoping Meeting, and reference the Scoping Checklist as an appendix to the TIA.

DESCRIPTION OF PROPOSED DEVELOPMENT

A Site Plan for the proposed development is required. The plan shall illustrate:

- project location
- proposed vehicular access and site circulation elements
- proposed bicycle and pedestrian amenities (sidewalks, multi-use paths, bike lanes, etc.)
- type and size of the proposed land uses
- proposed development phasing (if applicable)

The site plan should be accompanied by a description of the proposed development. This description should provide as much detail as possible including:

- specific tenants, if known;
- specific types of uses, such as banks, fast food restaurants, etc.;
- intensity of each land use in terms of number of dwelling units (DUs) or square foot of gross building area; and
- special conditions, e.g., private school without bussing.

The projected opening date for the proposed development must be included. In the case of a large, phased development, the specific project land uses and completion dates for each phase must also be included.

TABLE 2
TIA REPORT OUTLINE

Section	Title/Content	Notes
	Cover/Title Page	
	Table of Contents	Include list of appendices
	List of Figures	
	List of Tables	
	Executive Summary	
1	Background and Scope Introduction Description of Proposed Development Study Area Definition (Existing and Future)	
2	Existing Conditions Study Area Roadways Transit Service Study Area Intersections Existing Traffic Volumes Crash History	
3	Project Trip Generation and Distribution Trip Generation Trip Distribution Project-Related Intersection Peak Hour Turning Movement Volumes	Document bases for all assumptions Detail rationale/calculations for directional distribution
4	Background Traffic Conditions Background Traffic Growth Planned Infrastructure Improvements	Discuss methodology for identifying future growth in non-project related traffic growth at study area intersections.
5	Combined Traffic Conditions	This section will document the resulting peak-hour traffic volumes for each analysis year anticipated following construction of the proposed development.
6	Level of Service and Operational Analyses	Discuss types/locations/timing of mitigation measures Include queuing analyses and storage lane reqmts Highlight “unacceptable” LOSs
7	Improvement Analysis	Discuss what improvements will be required to provide acceptable level of service with construction of the project.
8	Site Access	
9	Conclusions and Recommendations	
	Appendices	As required to support analysis assumptions, findings, and recommendations

STUDY AREA

The study area will vary according to the extent of the proposed development, and will be confirmed at the initial TIA Scoping Meeting. A large development will generate more traffic and influence a larger geographical area than a smaller development. Therefore, larger developments will have larger relevant study areas. The project type and size of the minimum relevant study area will be determined in accordance with the criteria in Table 3. Permit applicant must provide in the TIA report a description of the existing and expected future land uses in the study area. A map of the study area is required, denoting the location of the site driveways and all study area intersections to be analyzed. All intersections should be numbered for reference in future report discussions.

**TABLE 3
MARICOPA TIA STUDY AREA REQUIREMENTS**

Ultimate Development Characteristics	Analysis Years	Minimum Study Area on the City Road(s)
Small development 100-500 peak-hour trips	Existing Year Opening Year Opening Year plus 5 years	Site access drive Adjacent signalized intersections and/or major unsignalized street intersections with ½ mile
Moderate - single phase 500 – 1,000 peak-hour trips	Existing Year Opening Year Opening Year plus 10 years	Site access drive All signalized intersections and/or major unsignalized street intersections within one mile
Large - single phase > 1,000 peak hour trips	Existing Year Opening Year Opening Year plus 10 years Opening Year plus 20 years	Site access drives All signalized intersections and/or major unsignalized street intersections within two miles
Moderate or large - multi-phase* * A Master TIA will be required and will need to be updated as each phase develops	Existing Year Initial Phase Opening Year Interim Phase Opening Year(s) Buildout Year plus 10 years Buildout Year plus 20 years	Site access drives All signalized intersections and major unsignalized street intersections within two miles

4.3 EXISTING CONDITIONS

The report must include a description of the existing study area transportation network, including a discussion of:

- Existing Study Area roadways
- Existing Study Area transit service
- Study Area Intersections (geometry and traffic control)
- Traffic volumes (daily and peak hour)
- Crash history

EXISTING STUDY AREA ROADWAYS

The description of existing roadways should include:

- Roadway cross-section and lane configuration, inclusive of any existing pedestrian or bicycle infrastructure
- Posted speed limits
- Location of existing driveways

EXISTING STUDY AREA TRANSIT SERVICE

If applicable, provide a discussion of transit service within the Study Area, including the location of transit stops relative to the proposed development.

EXISTING STUDY AREA INTERSECTIONS

A list of Study Area intersections shall be provided, and numbered as depicted in the Study Area map. The report shall provide a figure illustrating the geometry and traffic control for each study area intersection, referencing the intersection number accordingly.

A discussion shall also be provided regarding the source of signal timing and phasing information.

EXISTING TRAFFIC VOLUMES

The TIA will provide 24-hour traffic volumes on the major roads in the Study Area. With the approval of the City Engineer, estimated 24-hour traffic volumes can be used in the case of low volume roads. Recent and available traffic counts can be used, if they are less than one-year old. However, factors may be required to adjust the traffic volumes to the current year.

Peak-hour turning-movement counts should be provided at all Study Area intersections within the study area. At the discretion of the City Engineer, the requirement for turning-movement counts at low-volume intersections may be waived. Peak periods will typically consist of the AM and PM peak hours of adjacent street traffic, though additional/alternate peak hours may be required for some uses (i.e. schools, places of worship, recreational uses). Required peak hours for analysis will be confirmed at the Scoping Meeting. A figure depicting the peak hour turning movements at each Study Area intersection shall be included in the report, with appropriate intersection reference numbers.

CRASH HISTORY

The existing Study Area roadways and intersections should be reviewed from a safety perspective. The three-year crash history should be analyzed to identify accident problems and patterns.

4.4 PROJECT TRIP GENERATION AND DISTRIBUTION

Estimates of site generated traffic will be computed for each analysis year.

TRIP GENERATION

Traffic volumes for the site will be estimated using the trip generation rates or equations published in the latest edition of the *Trip Generation Manual* published by the Institute of Transportation Engineers (ITE). The methods used to calculate traffic generation must be consistent with the methods included in the most recent ITE Trip Generation Handbook. This includes, but is not limited to, proper choice of average rate or the regression equation. If there is insufficient data, local data for the study will need to be collected. Local or other trip generation rates may be used, if approved by the City Engineer. The method for determining site trip generation will be approved during the project Scoping Meeting.

A table shall be provided that summarizes the land use type, size, and corresponding ITE land use category used in the calculation of project trip generation. The table shall also include a summary of daily traffic as well as entering, exiting, and total traffic for analyzed peak period conditions. Table 4 provides a sample summary table format

**TABLE 4
SAMPLE TRIP GENERATION TABLE**

Land Use	Size	ITE LUC	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
				Enter	Exit	Total	Enter	Exit	Total

TRIP REDUCTION CREDITS

If appropriate, the text and table shall also summarize proposed reductions in trip generation resulting from credit for pass-by traffic, internal trip capture for mixed use development, or alternate mode travel (transit, pedestrian, bicycle arrivals). Such trip reduction credits will be discussed and confirmed during the project Scoping Meeting.

Pass-by trip reductions shall be in accordance with data for applicable land uses documented in the ITE *Trip Generation Manual*. Similarly, internal capture for mixed use developments shall be based on the methodology document in the ITE *Trip Generation Handbook* for appropriate mixed use sites. A table documenting these calculation shall be provided in the report appendix.

Alternate mode credit may be awarded for developments that encourage a reduction in automobile trips through the provision of infrastructure that supports pedestrian, bicycle, and transit accessibility. Credit for alternate modes will be discussed and confirmed at the project Scoping Meeting, based on the following:

- Developments that provide sidewalk/multiuse path connectivity to adjacent uses. Additional credit will be provided based on multiple points of connectivity.
- Developments that provide connectivity to bicycle lanes and include bicycle racks on site
- Developments within 1/4 mile of an existing transit stop, with adequate pedestrian and bicycle connectivity to that stop.

The maximum allowable trip reduction is 3%, provided each of these criteria are met. Partial credit may be awarded if some of the above elements are provided.

TRIP DISTRIBUTION

The distribution of site traffic to and from potential origins and destinations must be estimated. The distribution should be illustrated in a figure as percentages of total site traffic.

PROJECT-RELATED INTERSECTION PEAK HOUR TURNING MOVEMENT VOLUMES

Estimated site traffic volumes will be assigned to the roadways using the distributions previously discussed. A figure shall be provided in the report that illustrates the resulting increase in directional movements at each intersection for each peak period, with appropriate intersection reference numbers.

4.5 BACKGROUND TRAFFIC CONDITIONS

The non-site, or background traffic condition consists of the traffic that would be on the Study Area roadways and intersections if the site were not developed, as well as any planned improvements to the transportation network. Conditions should be documented for each analysis year.

BACKGROUND TRAFFIC VOLUMES

This section of the report should discuss any known developments that will be constructed prior to opening of the proposed development. A summary of trips associated with any known developments shall be documented in the report, and include reference to the source of the estimated trip activity.

In addition to the known developments, estimated growth in traffic volumes for unknown developments shall also be provided. Potential methods for estimating background traffic growth associated with unknown development include:

- Trends and growth rates;
- Application of the Maricopa Association of Governments regional travel demand model.

The list of known developments and the proposed methodology for determining background growth for each analysis year will be discussed and approved at the project Scoping Meeting.

Figures depicting the peak hour background traffic volumes for each analysis year at each Study Area intersection shall be provided in the report, with appropriate intersection reference numbers.

PLANNED IMPROVEMENTS

The report shall also discuss any planned improvements to the transportation network that will occur regardless of any actions associated with the proposed development. These would include improvements planned to be constructed as a result of other known developments within the study area that will be constructed prior to opening of the project, as well as projects included in the City's Capital Improvement Program.

4.6 COMBINED TRAFFIC CONDITIONS

The site generated traffic shall be combined with estimated background traffic volumes to predict the peak hour intersection turning movements that will occur following construction of the project for each analysis year. The report shall include a figure depicting the resulting combined peak hour intersection turning movement volumes, with intersection reference numbers.

4.7 LEVEL OF SERVICE AND OPERATIONAL ANALYSIS

Intersections in the study area will be analyzed using existing, background, and combined traffic volumes. The analysis will provide an estimate of the anticipated level of service at the site driveways and Study Area intersections and identify anticipated deficiencies. The analysis will be based on methodology and criteria documents in the latest edition of the Highway Capacity Manual.

EXISTING CONDITIONS

Level of service (LOS) shall be documented for each Study Area intersection using existing peak-hour intersection turn movement volumes. Results should include delays and LOS by movement, approach, and intersection and documented in a table and/or figure, inclusive of the corresponding intersection reference numbers. LOS D will be considered acceptable operations. Any existing deficiencies (i.e. LOS E or F) should be identified and documented in the report. Outputs from the selected analysis software shall be provided as a report appendix.

BACKGROUND TRAFFIC CONDITIONS

Similarly, peak-hour level of service shall be documented for each Study Area intersection based on background traffic volumes for each analysis year. The analysis should incorporate any planned transportation network improvements. Results should include delays and LOS by movement, approach, and intersection and documented in a table and/or figure, inclusive of the corresponding intersection reference numbers. Any resulting deficiencies should be identified and documented in the report. Outputs from the selected analysis software shall be provided as a report appendix.

COMBINED TRAFFIC CONDITIONS

Peak-hour level of service shall also be documented for each Study Area intersection based on combined traffic volumes for each analysis year. The analysis should incorporate any planned transportation network improvements. Results should include delays and LOS by movement, approach, and intersection and documented in a table and/or figure, inclusive of the corresponding intersection reference numbers. Any resulting deficiencies should be identified and documented in the report. Outputs from the selected analysis software shall be provided as a report appendix.

QUEUING ANALYSIS

Documentation of resulting left and right turn queues should be provided for all background and combined traffic analyses, along with a comparison to the existing available turn lane storage. Instances where projected queues exceed available storage shall be noted.

4.8 IMPROVEMENT ANALYSIS

For each identified deficiency, appropriate changes to intersection geometry and/or traffic control should be identified. The analysis of existing conditions and background conditions shall be modified to incorporate any such mitigations and demonstrate their effectiveness in providing acceptable LOS D or better at all locations prior to inclusion of the project traffic. If feasible mitigation measures are not available to provide LOS D or better with existing and background traffic volumes, this should be noted. A summary table of the mitigated LOS should be provided, to include delays and LOS by movement, approach, and intersection, inclusive of the corresponding intersection reference numbers. Outputs from the selected analysis software shall be provided as a report appendix.

Similarly, the analysis of combined traffic volumes should be modified to include these respective mitigation measures necessary to address existing and background deficiencies. Any remaining deficiencies associated with the revised analysis of combined traffic should be noted. Additional mitigation measures should be identified. Project-related mitigation measures will be required if:

- the intersection will operate at LOS 'D' or better without the development, then operations with combined traffic will be mitigated to LOS 'D'; and
- the intersection will operate below LOS 'D' in the horizon year(s) without the development, then operations with the development will be mitigated to provide the same LOS at the horizon year(s).

A summary table of the mitigated LOS for the combined traffic condition should be provided, to include delays and LOS by movement, approach, and intersection, inclusive of the corresponding intersection reference numbers. Outputs from the selected analysis software shall be provided as a report appendix.

4.9 SITE ACCESS

Access drives should be designed and located in accordance with the City of Maricopa Design Manual, Appendix F of the *City of Maricopa ATP Update*, and applicable Maricopa Association of Government (MAG) Standards.

The TIA will include a review of site access for safety, including the following considerations:

- Access drives designed to permit vehicles to enter the site without impeding traffic;
- The need for auxiliary speed-change lanes;
- Adequate storage length for turning vehicles;
- Adequate sight distance at intersections and access drives;
- Alignment of intersections and driveways opposite the site's access drives where possible;
- Special signage;
- Pedestrian circulation; and

- Language for provisions of transit facilities or infrastructure.

The TIA will also indicate the appropriate type and location of traffic control, such as stop signs or traffic signals. If a traffic signal is recommended, an analysis shall be included to demonstrate the ability of the traffic volumes at the site access to meet signal warrant criteria contained in the *Manual on Uniform Traffic Control Devices* (MUTCD).

4.10 CONCLUSIONS AND RECOMMENDATIONS

A summary of all identified deficiencies and associated mitigation measures shall be provided. The recommendations shall be noted by intersection (and corresponding reference number), and include required changes to traffic control, additional travel/turn lanes, or additional turn bay storage requirements. The discussion should clearly indicate those improvements required to address deficiencies associated with existing and/or background traffic operations, and those specifically required to address additional project traffic.

If a traffic signal is proposed, the TIA must discuss the following:

- Location of the signal in relation to intersections and access drives;
- Traffic signal actuation and phasing;
- Traffic signal progression, if appropriate;
- Interconnect needs; and
- Pre-emption, if required.

IMPROVEMENT COSTS

The TIA will include estimated costs of the proposed improvements and will recommend the allocation of these costs among the developer, City, County, State, and other jurisdictions, as appropriate.

4.11 CERTIFICATION

The TIA will be prepared under the supervision of a Professional Engineer (Civil) registered in the State of Arizona. The report must be sealed and signed.

This Traffic Impact Analysis (TIA) check list should be completed and submitted to the City Engineer now fewer than three (3) business days prior to a scheduled Scoping Meeting. It is important that sufficient information is provided in response to each of the requested items to provide a foundation for discussion regarding the scope of the TIA analysis. Forms can be submitted electronically to:

PROJECT CONTACT AND REFERENCE INFORMATION

Develop Contact Information

Name:

Telephone:

Email:

Consultant Contact Information

Name:

Telephone:

Email:

Project Reference Information

Parcel Number:

Case Number:

Date of Initial Application:

CHARACTERISTICS OF PROPOSED DEVELOPMENT

Site Location (Attach Site Plan)

Alternate Modes (discuss characteristics of the site plan that encourage alternate mode travel)

Proposed Development Phasing (include opening year, buildout year, and any interim year phases)

Proposed Land Use (land use type and size at buildout and any interim phases; include anticipated hours of operation)

Proposed Peak Hours of Development Trip Activity

AM Peak PM Peak Weekend Other

(If other peak hours are required for unique generators, such as schools, places of worship, special event uses – please specify)

Queuing

Are the proposed uses anticipated to result in any substantial queuing? (i.e. schools, places of worship, commercial uses with drive-thrus, etc.)

Yes No Unknown at this time

If checked "Yes" or "unknown at this time", the City Traffic Engineer may request additional queuing analyses to demonstrate that the proposed site plan has been designed to safely accommodate anticipated queuing without interruption of traffic on adjacent public roadways.

Development Trip Generation

Attach table documenting daily, and peak hour entering, exiting, and total traffic volumes. Include applicable Land Use Code (LUC) from the latest edition of the Institute of Transportation Engineer's Trip Generation Manual and SF/units/employees/etc. assumed for trip generation calculations, or provide a description of alternate trip generation source. Provide trip generation for buildout and all interim phases).

Sample Table Format

Land Use	Size	IT LUC	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
				Enter	Exit	Total	Enter	Exit	Total

Trip Generation Adjustments

Will any reduction in total trip generation be assumed?

N/A Pass-by trip reduction Mixed-use trip reduction Alternate Mode trip reduction

(If other trip reduction is requested – please specify)

If trip reduction is assumed, please specify amount and justification:

What percentage of the development traffic will be attributable to large vehicles (trucks, buses)?

SCOPE OF STUDY

Proposed Study Area (attach map or provide list of relevant intersections to be included in the analysis based on the requirements found in Table 3 of the TIA guidelines, and included below)

Proposed Study Horizons (based on the requirements found in Table 3 of the TIA guidelines, and included below)

**TABLE 5
MARICOPA TIA STUDY AREA REQUIREMENTS**

Ultimate Development Characteristics	Analysis Years	Minimum Study Area on the City Road(s)
Small development 100-500 peak-hour trips	Existing Year Opening Year	Site access drive Adjacent signalized intersections and/or major unsignalized street intersections with ½ mile
Moderate - single phase 500 – 1, 000 peak-hour trips	Existing Year Opening Year Opening Year plus 10 Years	Site access drive All signalized intersections and/or major unsignalized street intersections within one mile
Large - single phase > 1,000 peak hour trips	Existing Year Opening Year Opening Year plus 10 years Opening Year plus 20 years	Site access drives All signalized intersections and/or major unsignalized street intersections within one mile
Moderate or large - multi-phase* * A Master TIA will be required and will need to be updated as each phase develops	Existing Year Initial Phase Opening Year Interim Phase Opening Year(s) Buildout Year plus 10 years Buildout Year plus 20 years	Site access drives All signalized intersections and major unsignalized street intersections within oen mile

DATA SOURCES AND KEY ASSUMPTIONS

Source of Existing Traffic Volumes (cite source if using available traffic data or proposed dates of new data collection)

Proposed Future Background Growth Rate and Source

Proposed Annual Growth Rate: _____

Source:

N/A Historical Traffic Data MAG Travel Demand Model Other

(If other peak – please specify)

Other Known Developments (to be considered in addition to annual background growth)

Planned/Programmed Improvements (improvements by others assumed to be in place prior to opening of proposed development)