Traffic Impact Analysis Guidelines

Town of Queen Creek

January 2016

1. INTRODUCTION

The purpose of this document is to outline the procedures and requirements for preparing a Transportation Impact Analysis (TIA) study and report for the Town of Queen Creek. In addition, this document includes driveway guidelines for new or modified development. The TIA may be required for new development or redevelopment depending on the Town's review of the Initial Traffic Impact Statement (TIS). The TIA will assist the Town in determining needed modifications to the existing and planned transportation system as a result of the proposed development.

One of the Town of Queen Creek's primary objectives is to operate and maintain a safe and efficient transportation system. The review and management of development generated traffic is an integral part of that objective. The TIA guidelines as outlined in this document have been established for this purpose. The TIA guidelines establish a range of traffic impact study categories based on the characteristics of development and estimated peak hour traffic volumes. The TIA guidelines also outline the analysis approach and methods. The TIA identifies existing and projected traffic volumes and conditions, site generated traffic, and their combined impacts on the existing and planned roadway system.

The TIA provides an opportunity for the Town and the developer to share information and jointly address traffic related problems. It provides a means of balancing development needs with the functional integrity of the roadways that serve both the development and the surrounding transportation system. The need for the TIA should be assessed as early as possible in the development process when there is maximum flexibility for mitigating traffic-related problems. The consultant preparing the TIA should contact the Town Traffic Engineer to request a pre-TIA scoping discussion to establish the TIA requirements, and base assumptions for the development.

The guidelines contained herein are provided to:

- assist developers through the approval process by outlining the requirements and level of detail of traffic analysis that will be required
- standardize the types and details of analysis required in the assessment of traffic impacts for developments with similar levels of size and intensity
- ensure consistency in the preparation and review of the TIA through standardization of the reports

The TIA will address the following:

- The current transportation system and operational characteristics in the vicinity of the site
- The interface between on-site circulation and adjacent circulation system
- The intensity and character of the development
- Trip generation
- Trip distribution and assignment estimates
- Impacts of the development on the existing and planned transportation system

All level of service/capacity analysis shall be completed using the most current Synchro software (version 8) developed by Trafficware.

The TIA is to be prepared by a professional engineer registered in the State of Arizona and the final TIA report shall be signed and sealed by the engineer.

The first step for any TIA is to determine the size and scope of study required for the site.

2. INITIAL TIA ASSESSMENT

An initial traffic impact statement is required for all proposed development regardless of size. A form is included in this document for the developer/consultant to use. Basic information regarding location, type, and size of development will provide an initial estimate of the number of peak hour trips expected. The Town of Queen Creek Traffic Engineer will review the initial traffic impact statement and determine the level of study required for the proposed development. Although the peak hour trips is the primary factor to determine the level of study; other factors such as location and existing traffic conditions may require a more detailed study than the trip generation would indicate. The Town Traffic Engineer will make the final decision.

The traffic impact study categories based on trip generation are described below.

A. **TRAFFIC IMPACT STATEMENT (TIS):** Required for all developments so that the level of further study required can be determined. If the peak hour trips are less than 100 with no other negative factors, this will serve as the only traffic impact study document. It shall include at a minimum: the site location and access points, and expected trip generation. The following factors may require additional traffic analysis even if the development generates less than 100 peak hour trips.
   - Traffic concerns that currently exist and could be aggravated by the proposed development
   - Public concerns regarding the development
   - Negative impact on adjacent neighborhoods
   - Proximity of site driveways to existing driveways or intersections
   - Other local issues that may be present

B. **CATEGORY B:** Developments which generate between 100 and 500 trips during the morning or afternoon peak hour.

C. **CATEGORY C**: Developments which generate between 500 and 1,250 trips during the morning or afternoon peak hour.

D. **CATEGORY D**: Developments which generate more than 1,250 trips during the morning or afternoon peak hour.

The developer must first estimate the number of vehicle trips generated by the proposed development using the procedure(s) outlined in this document. The developer must obtain the concurrence of the Town Traffic Engineer or a designated representative on the number of trips generated by the development, and the appropriate analysis category.

3. ANALYSIS APPROACH AND METHODS

The traffic analysis approach and methods are presented below.

A. STUDY AREA

The minimum study area will be determined by project type and size in accordance with the criteria in Table 1. The Town Traffic Engineer may require expansion of the study area when the minimum study area identified in Table 1 does not provide sufficient information to meet the intent of these guidelines.

B. STUDY HORIZON YEARS

The study horizon year is the future year that should be studied for the development. The existing background traffic shall be adjusted to provide a reasonable estimation of future traffic without the site in the horizon year. For small developments, the base future traffic can be estimated using a growth factor; and for larger developments, a traffic model may be required. The horizon years are determined by the project type and size in accordance with the criteria in Table 1.

TABLE 1

Analysis Category	Trip Generation	Study Horizon	Minimum Study Area
Initial Statement	Required for all development Only requirement if <100 peak hour trips[1]	NA	1. Site access drives
B	100-500 peak hour trips	Opening year 5 years after opening	Site access drives 2. All signal controlled intersections within ½ mile and major street intersections without signal control within ½ mile[2]
C	500-1,250 peak hour trips	Opening year 10 years after opening	Site access drives 2. All signal controlled intersections within 1 mile and major street intersections without signal control within ½ mile[2]
D	>1250 peak hour trips	Opening year 10 years after opening	Site access drives 2. All signal controlled intersections within 2 miles and major street intersections without signal control within 1 mile[2]

[1]unless otherwise directed by the Town Traffic Engineer

[2]at a minimum, one signalized intersection will be analyzed regardless of distance from the proposed development

Assume full occupancy and build-out for single-phase developments. Multi- phase developments may require assessment of more than one horizon year corresponding to key phases of development as determined by the Town Traffic Engineer.

C. **ANALYSIS TIME PERIOD**

Both the AM and PM weekday peak hours based on existing traffic are to be analyzed.

If the peak traffic hour in the study area occurs during a time period other than the normal AM and PM peak traffic periods such as a weekend, or if the proposed project has unusual peaking characteristics, these peak hours must also be analyzed. For example, schools require an analysis of the peak period during the school arrival, and school dismissal. For banquet or church facilities, an analysis of evening and/or weekends may be required.

D. **DATA COLLECTION REQUIREMENTS**

All data is to be collected in accordance with the latest edition of the ITE Manual of Transportation Engineering Studies or as directed by the Town Traffic Engineer if not specifically covered in the ITE reference.

- Turning movement counts shall be obtained for all existing cross-street intersections to be analyzed during the morning and evening peak periods. Available turning movement counts may be extrapolated a maximum of two years with concurrence of the Town Traffic Engineer.

- The current and projected daily traffic volumes shall be presented in the report. Available daily count data may be obtained from the Town and extrapolated a maximum of two years with the concurrence of the Town Traffic Engineer. Where daily count data are not available, mechanical counts may be required as directed by the Town Traffic Engineer.

- Roadway geometric information shall be obtained including roadway width, number of lanes, turning lanes, grade, and location of nearby driveways that are in the study area and included in the TIA analysis.

- The location and type of traffic controls shall be identified.

E. **SEASONAL ADJUSTMENTS**

The traffic volumes for the analysis hours should be adjusted for the peak season if appropriate. The Town Traffic Engineer shall determine and approve use of seasonal adjustment factors. The intent is not to assess maximum peak hourly volumes, such as the day after Christmas for a retail development, but to address peak seasonal variations in traffic.

F. TRIP GENERATION

The latest edition of ITE's Trip Generation shall be used for selecting trip generation rates. The guidelines contained in the Trip Generation shall be used to determine whether the average trip generation rate or the equations should be used.

Other rates may be used with the approval of the Town Traffic Engineer in cases where Trip Generation does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been proven to differ from the ITE rates.

For a mixed-use development, it may be acceptable to assume that some trips are internal to the site and do not impact the external street system. If appropriate for the development, this should be discussed with the Town Traffic Engineer to agree on a percentage of internal trips.

G. TRIP DISTRIBUTION

The directions from which traffic will access the site can vary depending on many factors, including:

- The type of proposed development and the area from which it will attract traffic
- The presence or absence of competing developments within the same area
- The size of the proposed development
- The conditions on the surrounding street system

The influence area of the development needs to be identified for the site. Ideally, the influence area should contain approximately 80% of the trip ends that will be attracted to the site. If a market study is available, it should be used in establishing the influence area. Otherwise, an influence area should be established based on a reasonable estimate.

The three most common methods for estimating trip distribution are by analogy, model, and surrogate data. In most cases, a surrogate data method can be utilized for developing the trip distribution. Utilizing this procedure involves using socioeconomic data to establish population or employment land use distributions around the site. In most cases, population can be used as the basis for estimating distribution of office, retail, and entertainment trips; employment can be the basis for estimating residential trips. The Town's General Plan should be used to establish future year land use.

H. TRIP ASSIGNMENT

Based on the trip distribution percentages, site traffic should be assigned to the street network using reasonable traffic patterns and existing traffic volumes. If the site use is conducive to pass-by trips, the ITE methodology can be proposed to obtain concurrence from the Town Traffic Engineer. Pass-by trip reduction only applies to added external trips; the site driveway analysis will include all site generated trips.

I. CAPACITY ANALYSIS

Level of service shall be computed for signal controlled and non-signal controlled intersections as identified in the Study Area in Table 1, in accordance with the latest edition of the Highway

Capacity Manual. Capacity analysis shall be performed for existing conditions, future base conditions for the study years and future with site for the study years. For existing signalized locations, the existing timing should be obtained from the Town. All level of service/capacity analysis shall be completed using the Synchro software (version 8) developed by Trafficware.

For signal-controlled intersections, operational analyses shall be performed for time horizons up to 5 years. Operational analyses shall also be performed for street or intersection sizing. The operational analysis method can be used for horizons beyond five years; however, the planning method will be acceptable and is also acceptable for Traffic Impact Analysis prepared at the Development Master Plan level, unless used for street sizing.

J. **TRAFFIC SIGNAL NEEDS**

A traffic signal needs study shall be conducted for all arterial/arterial and arterial/collector intersections within the Study Area for the opening year. If the warrants are not met for the opening year, they should be evaluated for a 5-year horizon for Categories B, C and D.

Traffic Signal needs studies shall be conducted per the MUTCD.

K. **QUEUING ANALYSIS**

A queuing analysis shall be conducted for all turn lanes, and median openings within the study area. Queuing analysis should be supported by HCM methodologies and represent 95th percentile conditions with the exception of school site as outlined herein. Examples for estimating queue lengths for signal controlled and non-signal controlled intersections are given below.

For signalized intersections, the peak number of vehicles arriving at the intersection during one cycle shall be determined. A vehicle length of 25 feet shall be used to calculate queue length.

For non-signalized intersections, find the number of vehicles per average 2-minute period per the AASHTO Green Book. A vehicle length of 25 feet shall be used to calculate queue length.

L. **SPEED CONSIDERATIONS**

Vehicle speed is used to estimate safe stopping and cross-corner sight distances. Sight distance shall conform to the American Association of State Highway and Transportation Officials (AASHTO) standards. The design speed used shall be ten miles/hour above the posted speed limit.

M. **IMPROVEMENT ANALYSIS**

The roadways and intersections within the study area shall be analyzed with and without the proposed development to identify any projected impacts in regard to level of service and safety.

Where an intersection will operate at a level of service below D, E, or F, alternatives which

mitigate these impacts shall be evaluated and included as part of the study.

Where a street section will operate at a level of service below E or F, alternatives which mitigate these impacts shall be evaluated and included as part of the study.

Other factors to be considered in the analysis are:

- number and location of driveways
- on-site storage
- deceleration lanes
- internal circulation
- pedestrian, bicycle, and transit access

N. OTHER ANALYSIS

Other analyses as requested by the Town of Queen Creek may be required due to the type and location of the proposed development, such as weaving analyses, parking analyses, on-site circulation and queuing, pick-up and drop-offs, and the number of accesses among others.

O. ADDITIONAL CRITERIA FOR SCHOOL SITES

The study for any public, charter, or private school with students ranging in grades K-12 shall provide the following additional information:

a) Student Enrollment

The maximum student enrollment at build out shall be indicated in the TIA Introduction and Summary. Partial student enrollment may be discussed for opening day conditions, but the final horizon year analysis will include maximum build-out and build-out conditions will be used for on-site queuing requirements.

b) Minimum Required Parent Vehicle Queue Calculation

The site shall accommodate a minimum parent vehicle queue for student drop-off and pick-up.

1. The minimum number of parent vehicles to be accommodated shall be calculated by multiplying the school's maximum dismissal student enrollment by release time. A value of 0.10 shall be required for traditional public schools with walking and busing to school. A value of 0.15 shall be required for magnet, charter, and private schools that generate a greater number of parent vehicles trips than an average neighborhood school. The engineer may provide values based on observations of existing comparable school sites, subject to the Town Traffic Engineer's approval.

2. The minimum vehicle queue length shall be calculated by multiplying the number of parent vehicles by 25 feet.

    a) The entire vehicle queue should be contained within the school site and/or on

a consenting adjacent shared-use site.

b) The length of an adjacent right turn lane may be added to the minimum required queue if approved by the Town Traffic Engineer.

c) School Traffic Circulation Overview

A school traffic circulation overview with diagrams shall detail motor vehicle, bus, bicycle, and pedestrian circulation on site, including:

1. Direction of traffic flow and number of lanes throughout diagram;
2. Ingress and egress from the site;
3. Vehicular drop-off/pick-up locations;
4. Minimum required parent vehicle queue;
5. School bus loading areas; and
6. Pedestrians and bicycle routes that avoid crossing school driveways.
7. On-site and off-site school-related traffic control.

4. TIA REPORT OUTLINE

1. INTRODUCTION AND SUMMARY

a. Purpose of report and study objectives
b. Executive Summary
Site location and study area
Development description
Principal findings
Conclusions and Recommendations

2. PROPOSED DEVELOPMENT

a. Site location
b. Land use and intensity
c. Site plan
d. On-site circulation
e. Development phasing and timing

3. STUDY AREA CONDITIONS

a. Study area conditions
b. Existing Land use
c. Site accessibility

d. Existing and future roadway system

4. ANALYSIS OF EXISTING CONDITIONS

a. Physical characteristics
    Roadway characteristics (number of lanes, classification, etc.)
    Traffic control devices
    Transit service
    Pedestrian/bicycle facilities
    Nearby driveways
b. Traffic volumes
    Daily, morning and afternoon peak periods and others as required
c. Level of service
    Morning peak hour, afternoon peak hour, and others as required
d. Safety related deficiencies, crash experience

5. PROJECTED TRAFFIC

a. Site traffic (each horizon year)
    Trip generation
    Internal trips (if applicable)
    Mode split (if applicable)
    Pass-by traffic (if applicable)
    Trip distribution
    Trip assignment
b. Non-site traffic forecasts (each horizon year) and methodology
c. Total traffic (each horizon year)

6. TRAFFIC ANALYSIS

a. Site access
b. Level of service analysis
    Without project (including programmed improvements for each horizon year)
    With project (including programmed improvements for each horizon year)
    Improvements necessary to accommodate site traffic
d. Traffic safety
    Sight distance
    Location and design of site access
e. Pedestrian considerations
f. Traffic control needs

7. FINDINGS / RECOMMENDATIONS

8. APPENDICES

a. Traffic counts
b. Capacity analyses worksheets
c. Traffic signal needs studies

9. EXHIBITS

The following information shall be provided on clear and legible figures:

a. Site location
b. Site plan
c. Existing transportation system(s) (Number of lanes, traffic control, etc.)
d. Existing and future area development
e. Existing daily traffic volumes
f. Existing peak hour turning volumes
g. Estimated site traffic (AM and PM peak periods)
h. Directional distribution of site traffic (AM and PM peak periods)
i. Total traffic (peak periods)
J. Electronic File of the project Synchro Analysis

APPENDIX A

Initial TIS Form

INITIAL TRAFFIC IMPACT STATEMENT

This initial traffic impact statement is required for all development proposed in the Town of Queen Creek. The purpose of this traffic impact statement is to provide preliminary trip generation information for the proposed development to determine the category of traffic impact study required. Based on the proposed development, Table 1 should be completed to provide preliminary trip generation data. The Town Traffic Engineer or designee will review the preliminary trip generation estimate provided by the developer and determine the category of traffic impact study required. Other factors in addition to trip generation can affect the impact of a development; and based on these guidelines, the Town of Queen Creek traffic engineer will determine the final scope for the traffic impact analysis.

Location of proposed development (location map can be attached)

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TABLE 1: PRELIMINARY TRIP GENERATION ESTIMATE

Type of development (e.g. residential, retail)	Size	AM peak hour trips per unit*	PM peak hour trips per unit*
TOTAL			

*The trip generation rates can obtained from the Institute of Transportation Engineers, Trip Generation, latest edition. Use of other rates must be justified and accepted by the Town Traffic Engineer.

Table 2 provides the criteria for each category of traffic impact analysis based on the estimated trip generation. This table is for information and guidance only – as noted above, the Town Traffic Engineer will make the final determine regarding the type of study.

TABLE 2: REQUIREMENTS FOR TRAFFIC IMPACT STUDY

TYPE OF STUDY	PEAK HOUR TRIPS
Traffic Impact Statement	<100
Category B	100-500
Category C	500-1250
Category D	>1250

APPENDIX A

Driveway Guidelines

Driveway Guidelines

Town of Queen Creek

December 2015

General

These guidelines have been prepared for use in determining access for newly developed commercial, industrial, and multi-family properties. Driveway location and design are closely tied to the site plan and specific conditions for a given development. It is recognized that there will be instances where it may be impractical to meet these guidelines. In such cases, careful judgment must be used in granting variances. Traffic Engineering must approve all variances.

These guidelines were developed primarily for access from major streets. It is important that the minimum design features of driveway type and width not be compromised. To do so would adversely affect traffic flow on the major street. In general, these guidelines also should be applied to lower volume streets, although more latitude and flexibility are possible on lower volume streets.

The guidelines generally provide minimum standards. They should not be used to discourage engineers, architects, and designers from proposing innovative design solutions that vary from the minimum standards described here. Nor should they be applied arbitrarily when specific site conditions warrant something different.

Any questions about these guidelines, driveway and site layout in general; or specific problems should be directed to Traffic Engineering.

Figure A attached hereto provides a graphical representation of driveway spacing and location.

Number of Driveways

- At least one driveway per abutting street will be allowed.
- One additional driveway may be allowed for a site with continuous frontage of 600 feet or more.
- Two additional driveways may be allowed for a site with continuous frontage of 900 feet or more.
- An additional service type driveway may be allowed for a site with continuous frontage of 1000 feet or more, where the site layout is such that the service driveway is unlikely to be used by customers of the businesses on the site. For example, a large corner shopping center may have a service driveway near the property line for service truck access to the rear of the buildings.
- Driveway location must be evaluated with respect to the particular site layout and location.

Variations may be permitted where a traffic analysis justifies a departure from these guidelines.

Driveway Location-Arterial Street

Driveways near a corner must be located with a minimum of 250 feet for a collector cross street and 350 feet for an arterial cross street between the driveway and the extension of the curb of the intersecting street. This may be reduced for unusual circumstance if approved by Traffic Engineering. Driveways shall be a minimum of 50 feet from the site property line. For sites that have frontage on two streets, primary access should be onto the minor street frontage.

Driveway Location-Collector Street

Driveways near a corner must be located with a minimum of 150 feet for a collector cross street and 250 feet for an arterial cross street between the driveway and the extension of the curb of the intersecting street. This may be reduced for unusual circumstance if approved by Traffic Engineering. Driveways shall be a minimum of 25 feet from the site property line.

Driveway Spacing

Minimum driveway spacing will generally conform to the following table. This minimum spacing applies to proposed site driveway separation as well as separation from existing or planned driveways on adjacent parcels.

Street Type	Minimum Driveway Spacing
Collector	100 feet
Arterial	200 feet

Joint Use Driveways/Cross Access

The joint use of a single driveway to serve adjoining parcels should be encouraged wherever possible. An access easement shall be recorded when the parcels are developed. When larger corner sites are developed with small corner pads reserved for future construction, or vice versa, provision should be made for the corner pads to have access via the driveways for the larger development, and not require separate driveways for the pads.

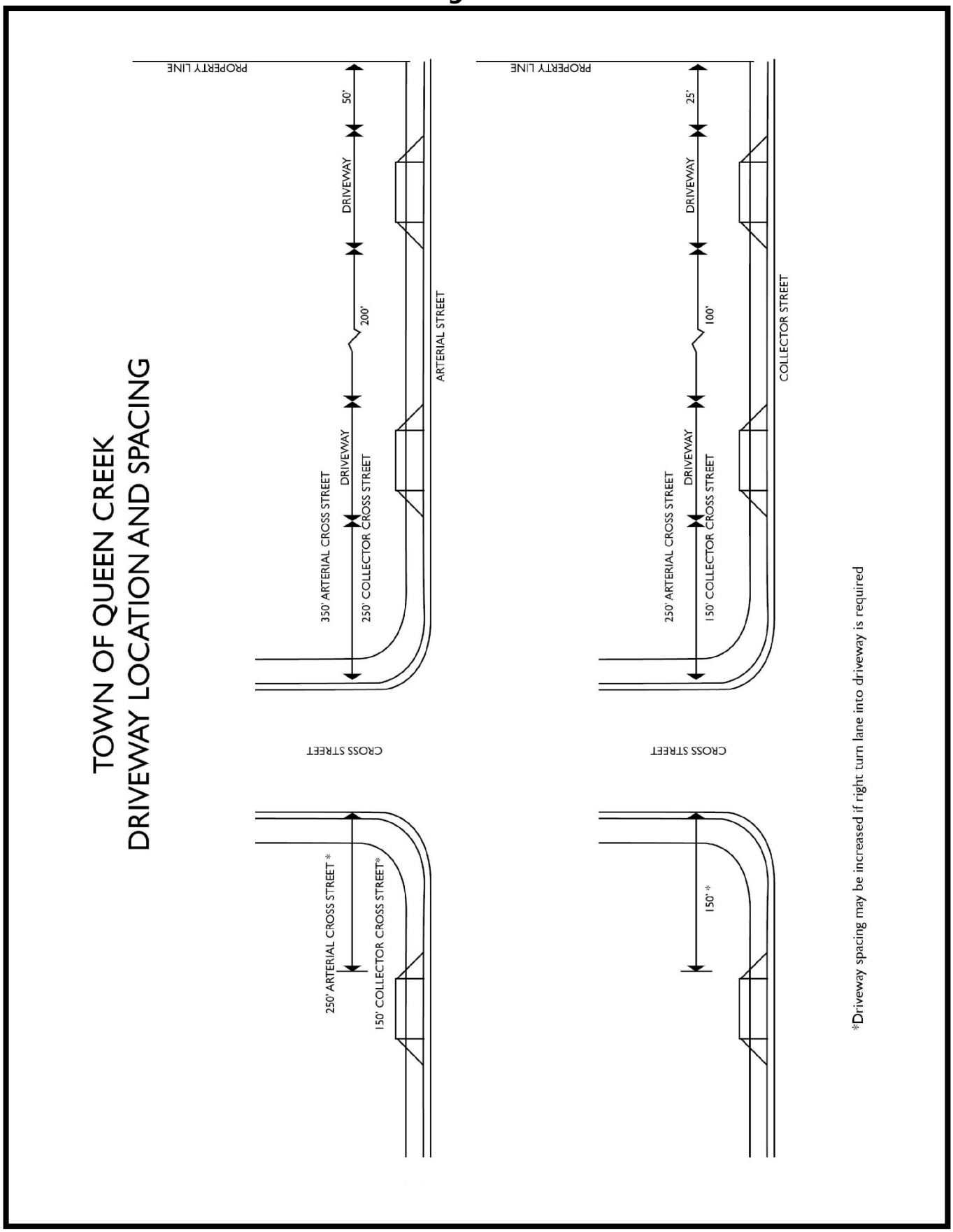
Where new development adjoins other similarly zoned property or compatible land uses, a cross access easement may be required to permit vehicular movement between the parcels and reduce the number of access points required onto the adjacent public street. This may be

required regardless of the development status of the adjoining property, unless the cross access is determined to be unfeasible by staff.

Protection of Access

For proper control of driveway access, a vehicular non-access easement (V.N.E.) is to be granted to the Town, except at approved access points, along all collector and arterial streets when abutting property develops.

Figure A


TOWN OF QUEEN CREEK
DRIVEWAY LOCATION AND SPACING
PROPERTY LINE
50'
DRIVEWAY
200'
350' ARTERIAL CROSS STREET
DRIVEWAY
250' COLLECTOR CROSS STREET
ARTERIAL STREET
CROSS STREET
250' ARTERIAL CROSS STREET *
150' COLLECTOR CROSS STREET*
PROPERTY LINE
25'
DRIVEWAY
100'
250' ARTERIAL CROSS STREET
DRIVEWAY
150' COLLECTOR CROSS STREET
COLLECTOR STREET
CROSS STREET
150' *
*Driveway spacing may be increased if right turn lane into driveway is required