CHAPTER 1: TRAFFIC IMPACT ANALYSIS

1.1. Background Information

Per the City of Boerne Traffic Impact Analysis Ordinance (Ordinance No. XXXX), no subdivision, development plat, change in zoning, Planned Unit Development (PUD) submission, or building permit application, shall be approved unless a traffic impact analysis (TIA) or peak hour trip (PHT) generation form is completed and approved.

TIA Threshold and Categories

A TIA or a PHT generation form shall be performed by the property owner (or its agent) according to the format established in this Chapter. The type of submittal shall be based upon the number of peak hour trips (PHT) generated by the proposed development, as set forth in **Table 1**.

Table 1: TIA Categories

Peak Hour Trips	Submittal Category
1,001 or more	Level 3 TIA
300-1,000	Level 2 TIA
150-299	Level 1 TIA
100 or less	PHT Generation Form (no TIA is required), Turn Lane Evaluation Form, Border Street Evaluation Form, Rough Proportionality Worksheet

Note: Categories are for the purpose of review fee assessment only

When an activity on, or change to, property is proposed to occur that varies from the previous activity on the property, and the new activity generates an increase of at least 100 PHT relative to the previous use, the property owner (or its agent) shall perform and submit to the city a TIA (or an amended TIA, whichever applies) consistent with the format identified in Section 1.7, to determine if the increase in the PHT impacts capacity and requires additional mitigation.

A Master Plan Level TIA (as outlined in Section 1.8) may be prepared for multi-phased developments for which all land uses may not yet be determined.

Impact Area

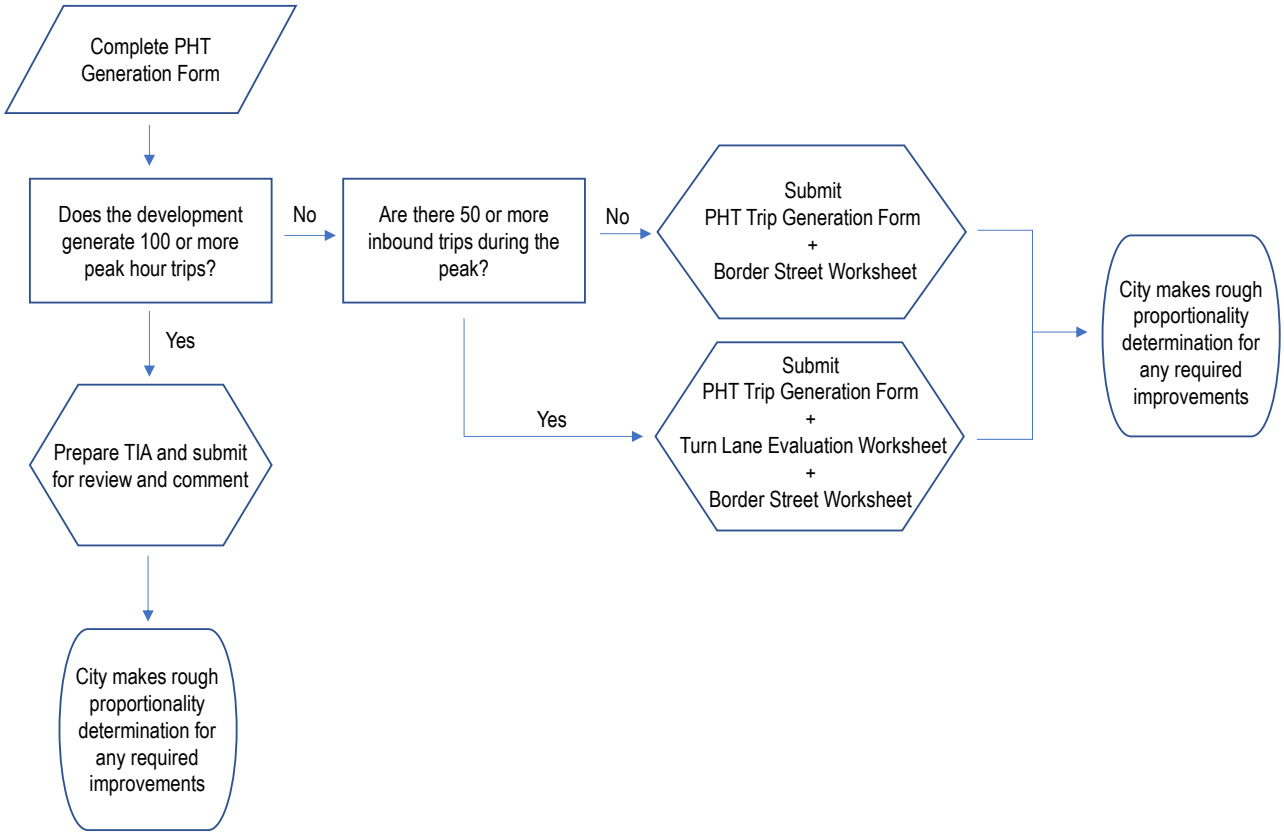
The impact area is the area within which any analysis is conducted in order to determine compliance with the level of service standards. This area shall be based on the distribution patterns of the PHT projected to be generated by the proposed development. The specific intersections for analysis will be established in coordination with City staff according during the scoping process as outlined in Section 1.2. The impact area is defined as those intersections with 75 or more peak hour trips on any single approach within two (2) miles of the boundary of the site along the roadway network. See Section 1.6 (7) for an example trip distribution and assignment.

TIA Longevity

As long as a development is being incrementally implemented in general conformance with the TIA, a TIA will remain valid for five (5) years beyond the projected build out year of the last phase of the development. General conformance is defined as trip generation characteristics that do not increase by more than 10% than the uses originally proposed.

1.2. TIA Process Overview

The chart below summarizes the process and required forms for various density developments.



1.3. TIA Scoping Process

The purpose of the TIA scoping process is to establish the TIA requirements in accordance with generally accepted practice, as described in the most recent edition of Transportation Impact Analysis for Site Development: An ITE Recommended Practice.

Prior to the preparation of the TIA, the property owner or their representative shall coordinate with City staff to establish the scope of the TIA. In preparation, the applicant shall prepare the following:

1. PHT Generation Form (provided by City)
    a. The trip generation form shall be completed using the current edition of the ITE Trip Generation Manual.
    b. If the development generates less than 100 peak hour trips and does not have 50 or more inbound vehicles during the peak period, the applicant should complete the Border Street Worksheet and submit it and the PHT Generation Form to the City for review. A TIA is not required.
    c. If the development generates less than 100 peak hour trips and has 50 or more inbound vehicles during the peak period, the applicant should complete the Turn Lane Evaluation Worksheet and Border Street Worksheet and submit these two documents along with the PHT Generation Form to the City for review. A TIA is not required.

2. TIA Scoping Meeting Worksheet (provided by City). The TIA Scoping Meeting Worksheet provides a framework for establishing the parameters of the TIA. Including:
    a. Build Out Year
    b. Proposed Phasing
    c. Background Traffic Growth Rate
    d. Peak Periods for Analysis
    e. Proposed Trip Distribution
    f. Proposed Trip Assignment
    g. Intersections for Analysis

    Additional detail on the parameters identified above can be found in Section 1.6.

1.4. PHT Generation Form

Complete the PHT Generation Form using the most recent edition of the ITE Trip Generation Manual. Typically, the peaks for evaluation will be AM and PM peak periods of the adjacent road. The other peak period section on the worksheet should be utilized if the two highest peaks for the development are not traditional AM and PM peak periods. For example, retail uses typically experience the greatest peak on Saturday, therefore the analysis peaks would be PM and Saturday peak hours. Analysis for a school should include the AM peak and PM peak hour of the generator (corresponding with the afternoon school release).

An example of a completed PHT Generation Form is included below.

Peak Hour Trip Generation Form
City of Boerne, Texas

Development Name: Example Site
Applicant:
Legal Description (Lot, Block):
Case / Plat Number: **Date:**

Alternate Peak (SAT, SUN, Generator): Saturday

ITE Code	Land Use	Variable	Density	AM Peak Hour Rate	AM Total Trips	AM In	AM Out	PM Peak Hour Rate	PM Total Trips	PM In	PM Out	Other Peak Hour Rate	Other Total	Other In	Other Out
820	Shopping Center	1,000 SF	50	0.94	47	29	18	3.81	68	33	35	4.5	159	83	76
930	Fast Casual Restaurant	1,000 SF	3.5	2.07	7	5	2	14.13	34	19	15	34.02	517	284	233
				Total	54	34	20		102	51	51		676	367	309

To Be Completed by City of Boerne

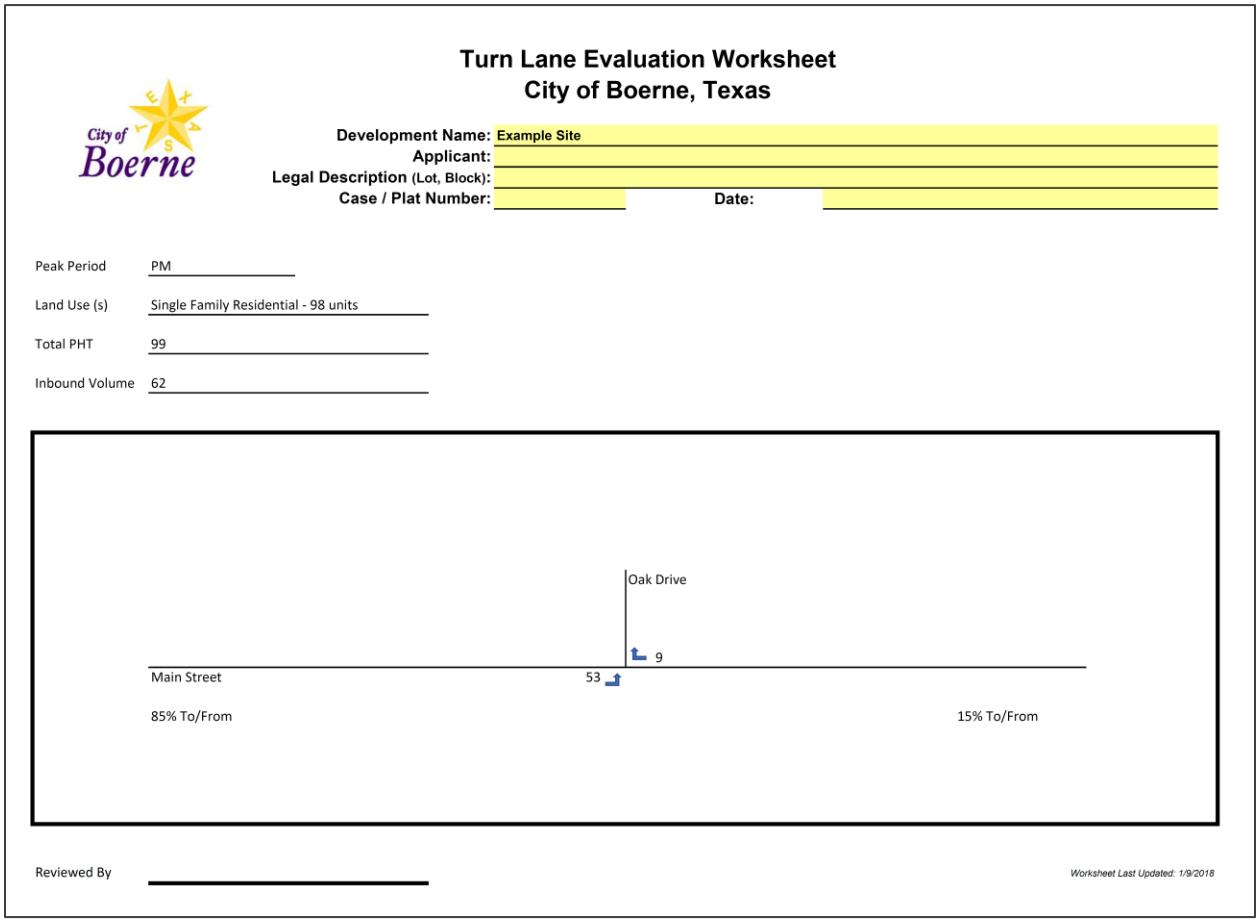
Peak Period	SAT
Peak Hour Trips	676
TIA Required	Yes
Turn Lane Evaluation Required	Yes

Reviewed/Approved By _____

Worksheet Last Updated: 1/9/2018

1.5. Turn Lane Evaluation Worksheet

A right or left turn lane is required when projected turning movements are 50 vehicles or more per hour to facilitate the turning movement with limited impact to through traffic. It is possible that a development that does not require the preparation of a TIA might still necessitate the construction of a turn lane. To determine if a turn lane is required the applicant shall prepare a sketch indicating the location of



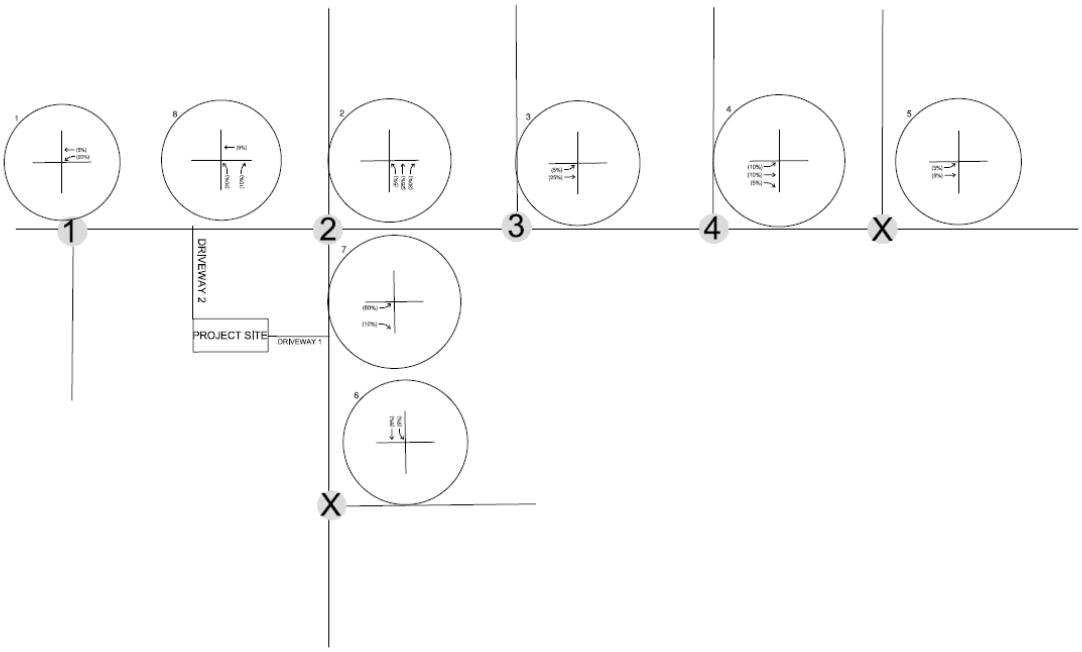
1.6. TIA Parameters

1. Build Out Year. The maximum allowable single phase build out year is five (5) years from the existing traffic scenario. If the development will take longer than five (5) years to build out, interim phases must be analyzed.
2. TIA Phasing. If a development will take longer than five (5) years to build out interim phases must be established in increments of five (5) years or less.
3. Background Traffic Growth Rate. The background traffic growth rate will be established based on an average of five (5) years of TxDOT traffic count data collected at a location near the site. If the City provides specific development information as submitted in other TIAs for nearby development, the background traffic growth rate may be reduced.
4. Peak Periods for Analysis. The TIA shall analyze the two (2) peak periods in which the development generates the greatest peak hour trips. While this will typically be the AM peak period (one hour between 7AM and 9AM) and PM peak period (one hour between 4PM and 6PM) that corresponds with a traditional “rush hour,” for land uses with a heavy retail component this could be a Saturday midday

peak period (12PM – 2PM). For special land uses such as a church or event center, the peak period of concern shall be identified during the scoping process.

5. Trip Distribution. The applicant shall propose a trip distribution consistent with area traffic patterns and present the information graphically as part of the TIA scoping process.
6. Trip Assignment. Based on the trip distribution the peak hour trips associated with the development shall be assigned to the roadway network. Trip assignment should be presented graphically for all collector or higher classification intersections through which site trips travel within two (2) miles of the boundary of the project site along the roadway network.
7. Intersections for Analysis. Intersections for analysis will be those where there are 75 or more site trips (inbound and outbound combined) on any single approach and will be determined using the Site Trip Assignment figure.

OUTBOUND DISTRIBUTION EXAMPLE



1.7. TIA Contents and Structure

The following components shall be included in the TIA document:

1. Introduction
    a. Site and Study Area Descriptions and Boundaries – Include a location map and site plan
    b. Existing and Proposed Site Uses
    c. TIA Parameters
        i. Build Out Year
        ii. Phasing (if any) - maximum 5-year increments, 10-year total build out
        iii. Peak Periods for Analysis
        iv. Intersections for Analysis
2. Existing Conditions Overview
    a. Existing Roadways and Intersections in Study Area

        i. Roadway configuration and classification (per thoroughfare plan)
        ii. Speed limit
        iii. Planned/pending improvement projects
    b. Existing Traffic Volumes
3. Proposed Conditions Overview
    a. Roadway Configuration – Identify any changes resulting from addition of development
    b. Sight distance evaluation for proposed intersections
    c. Background Traffic Growth
        i. Background Traffic Growth Rate
        ii. Other Nearby Development(s)
    d. Background Traffic Volumes (by phase)
4. Development Summary
    a. Trip Generation
    b. Trip Distribution
    c. Trip Assignment
    d. Projected Traffic Volumes (by phase)
    e. Total Traffic Volumes (by phase)
5. Capacity Analysis
    a. Existing Conditions Level of Service Determination
    b. Background Conditions (by phase) Level of Service Determination
    c. Build Out Conditions (by phase) Level of Service Determination
    d. Auxiliary Lane Evaluation
    e. Mitigation Summary (developed per criteria in Section XX) by Phase
    f. Mitigated Build Out Conditions (by phase) Level of Service Determination
6. Conclusion
    a. Compliance with Border Street Policy
        i. Substandard Existing Streets
        ii. Thoroughfare Plan Construction
    b. Summary of Proposed Mitigation with Exhibit

1.8. Master Plan Level TIA Requirements

A master plan level TIA may be prepared for a development at the zoning or Master Development Plan (MDP) stage when precise land uses, quantities, and driveway locations may not yet be well defined. The goal of a master plan level TIA is to evaluate the adequacy of proposed access to adjacent existing or planned roadways and to determine effects the proposed project may have on current and future roadway systems in its study area. While a master plan level TIA has many of the same components as a typical TIA, the master plan TIA permits extended phasing timeframes and requires limited driveway analysis.

The following components shall be included in the master plan level TIA document:

1. Introduction
    a. Site and Study Area Descriptions and Boundaries – Include a location map and site plan
    b. Existing and Proposed Site Uses
    c. TIA Parameters
        i. Build Out Year
        ii. Phasing – maximum 5-year increments
        iii. Peak Periods for Analysis
        iv. Intersections for Analysis
2. Existing Conditions Overview
    a. Existing Roadways and Intersections in Study Area

        i. Roadway configuration and classification (per thoroughfare plan)
        ii. Speed limit
        iii. Planned/pending improvement projects
    b. Existing Traffic Volumes
3. Proposed Conditions Overview
    a. Roadway Configuration – Identify any changes resulting from addition of development
    b. Site distance evaluation for any proposed roadway intersections
    c. Background Traffic Growth
        i. Background Traffic Growth Rate
        ii. Other Significant Nearby Development(s)
    d. Background Traffic Volumes (by phase)
4. Development Summary
    a. Trip Generation
    b. Trip Distribution
    c. Trip Assignment
    d. Projected Traffic Volumes (by phase)
    e. Total Traffic Volumes (by phase)
5. Capacity Analysis
    a. Existing Conditions Level of Service Determination
    b. Background Conditions (by phase) Level of Service Determination
    c. Build Out Conditions (by phase) Level of Service Determination
    d. Auxiliary Lane Evaluation
    e. Roadway Classification Review (see procedure in Section XX)
    f. Mitigation Summary (developed per criteria in Section XX) by Phase
    g. Mitigated Build Out Conditions (by phase) Level of Service Determination
6. Conclusion
    a. Compliance with Border Street Policy
        i. Substandard Existing Streets
        ii. Thoroughfare Plan Construction
    b. Summary of Proposed Mitigation with Exhibit

As the phases of a development for which a master plan level TIA was prepared are platted, the applicant must demonstrate that the development is occurring consistent with the original plan. If the number of trips increases by more than 10% or the applicant desires to alter the mitigation plan, an update must be prepared. Driveway turn-lane evaluations will be performed with the conformance review process.

1.9. Mitigation Requirements

Roadways and intersections, within the study area, that are expected to operate at level of service D, E, or F, under traffic conditions including projected traffic plus site-generated traffic must be identified and viable recommendations made for raising the traffic conditions to level of service C or better. If the existing level of service is already below LOS C, the intersection must be mitigated to within 20% of the projected background delay value.

Traffic mitigation tools include, but are not limited to, pavement widening, turn lanes, median islands, access controls, curbs, sidewalks, traffic signalization, traffic signing, pavement markings, etc.

Mitigation Threshold Example

[Incorporate Example]

Phasing of Mitigation

For phased projects, implementation of these traffic improvements must be accomplished no later than the completion of the project phase for which the capacity analyses show that they are required. Plats for project

phases after a phase for which a traffic improvement is required may be approved only if the traffic improvements are completed or bonded.

Limitations on Traffic Impact Mitigation

Voluntary efforts. Beyond those herein required, to mitigate traffic impacts are encouraged as a means of providing enhanced traffic handling capabilities to users of the land development site as well as others.

If the city finds that there is little opportunity to expand transportation capacity in the established central core of the City, without destroying the city's historic built environment, the development may be exempt from certain provisions of this Ordinance. This exemption may also apply outside the historic core if there are no viable improvements possible at a study intersection.

CHAPTER 2: ROUGH PROPORTIONALITY

If the City requires as a condition of approval that the developer bear a portion of the costs of infrastructure improvements, the developer's portion of the costs may not exceed the amount required for infrastructure improvements that are roughly proportionate to the proposed development.

Proportionality Methodology

Traffic generation of new development impacts the area roadway system by using available capacity. To measure system impacts, an analysis using vehicle-miles of travel in the PM peak hour is conducted. Using vehicle-miles of travel, the capacity provided by roadway improvements can be compared with the traffic generated by a proposed development. For roadway improvements, supply (vehicle-miles) is determined by multiplying the length of the facility by its available capacity. Capacity values are based on generalized criteria from the Highway Capacity Manual (HCM). For site traffic generation, demand (vehicle-miles) is determined by multiplying an appropriate trip rate for a specific use by an average trip length associated with such use. Trip generation rates and resulting trip estimates are found in the Institute of Transportation Engineers (ITE) publication entitled Trip Generation, 9th Edition. Trip length information is derived information from a data that analyzes Home-Work trips as well as aerial photography determining route choice.

Using this supply and demand information, a comparison can be made to determine the rough proportional impact. The analysis consists of four steps:

- Step 1: Identify Proposed Development and Roadway Improvements

  Proposed Development: Based upon information provided by the applicant, the proposed development will ultimately consist of the following land use:

  Proposed Roadway Improvements: The proposed roadway improvements for the development consist of the following (based upon the currently adopted Transportation Master Plan):

- Step 2: Demand Calculation

  Projected Demand of Proposed Site

  The projected vehicle-miles of demand are calculated by multiplying the proposed size of development by its appropriate trip rate and trip length. The PM peak hour trip rate per XXX land use is XXX vehicles per hour. This trip rate results in approximately XXX PM peak hour trips for the facility. No additional reduction was applied for pass-by trips.

Trip length data from the XXXXX represents that the average home to work trip is XXXX miles, however, this was adjusted to account for the trip end associated with the site and limited to travel on city roadways. The resulting average trip length is approximately XXX miles (average trip length to/from XXXXX).

Total vehicle-miles of demand XXXX vm_d

- Step 3: Supply Calculation

This calculation determines the vehicle-miles of supply provided by the proposed roadway improvements and is based on length of improvement and hourly roadway capacity values. Capacity values are based on an area type of suburban residential resulting in hourly capacity values of XXX vehicles per hour per lane (vphpl).

Total vehicle-miles of supply XXXX vm_d

- Step 4: Proportionality Calculation Results

A comparison of projected demand of the site relative to the roadway supply being provided reveals that the projected demand exceeds the capacity supplied.

XXXX vm_d > or < XXXX vm_s [~XXX%]

The purpose of this evaluation is to assess the impacts of the proposed development on the City roadway system and to determine the roughly proportional supply of roadway capacity necessary to address the added demand. The analysis reveals that the City is OR is not justified in having the developer construct.

Proportionality Worksheet

To facilitate the rough proportionality determination process, the City of Boerne has developed a worksheet available at XXXXX.

[INSERT EXAMPLES]

Appeal Process

A developer who disputes the determination may appeal to the City through the City Manager within 30 days of the rough proportionality determination. A developer may further appeal the determination of the City Manager to the Board of Adjustments and Appeals. At the Board of Adjustments and Appeal review, the developer may present evidence and testimony under procedures adopted by Board. After hearing any testimony and reviewing the evidence, the Board of Adjustments and Appeals shall make the applicable determination within 30 days following the final submission of any testimony or evidence by the developer.

CHAPTER 3: ACCESS MANAGEMENT

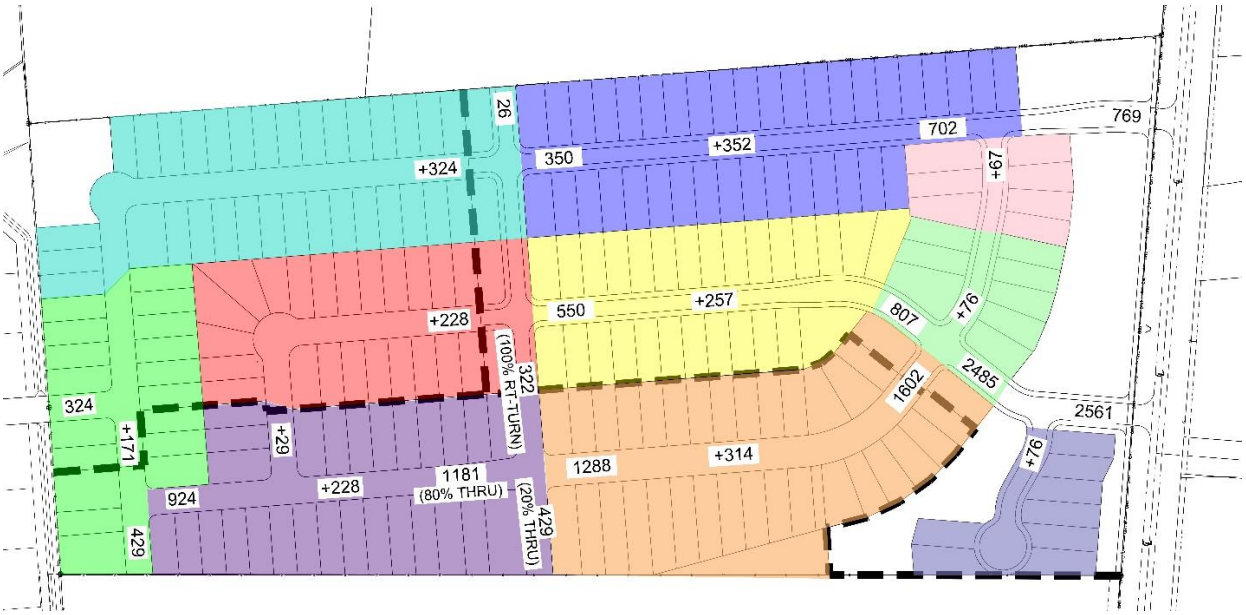
[short term insert reference to Subdivision Ordinance and TxDOT access management criteria]

Long term - Boerne to remove from subdivision ordinance and document here instead and provide examples and figures

CHAPTER 4: ROADWAY CLASSIFICATION AND CAPACITY

[reference cross section standards – Table 3-4 – summarize ADT thresholds for street classification]

Example Internal Roadway Projected ADT Exhibit



FORMS AND RESOURCES

1. TIA Threshold Worksheet
2. Turn Lane Evaluation Worksheet
3. Border Street Evaluation Form
4. Rough Proportionality Worksheet
5. Example TIA Scoping Meeting Material Set
6. TIA Submittal Checklist