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# Transportation Impact Analysis Guidelines



Johnstown  
Colorado

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# Transportation Impact Analysis Guidelines

## Johnstown, Colorado

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## 1. INTRODUCTION

The purpose of this document is to outline the procedures and requirements for preparing a Transportation Impact Analysis (TIA) report for the Town of Johnstown. A TIA may be required for new development or redevelopment. The TIA will assist the Town in determining needed modifications to the existing and planned transportation system because of the proposed development.

One of the Town of Johnstown'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 two 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 objectives. 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 a TIA should be assessed as early as possible in the development process when there is maximum flexibility for mitigating traffic-related problems.

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 shall address the following:

- The current transportation system and operational characteristics in the vicinity of the site
- The interface between on-site circulation and adjacent roadway 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

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

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## 2. DETERMINING ANALYSIS REQUIREMENTS

### A. TRANSPORTATION ASSESSMENT

The first step for all development or redevelopment is to determine the size and scope of study required for the site through a Transportation Assessment.

An initial Transportation Assessment is required for all proposed development regardless of size. A form is included in this document for the developer/consultant to use in **APPENDIX A**. The Transportation Assessment should provide basic information regarding location, type, and size of the development and an initial estimate of the number of peak hour trips expected. The Transportation Assessment is also required at the Overall Development Plan (ODP) level. The Town of Johnstown Traffic Engineer, or designee, will review the initial Transportation Assessment and determine the level of study required for the proposed development. Additional information may also be requested at the ODP level at the discretion of the Town Traffic Engineer, or designee. Although the peak hour trips are the primary factor for determining 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 developer must first estimate the number of vehicular 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. The Town Traffic Engineer, or designee, will make the final decision.

### B. TRANSPORTATION IMPACT ANALYSIS (TIA)

Upon Town of Johnstown review of the Transportation Assessment, a determination will be made regarding the appropriate level of TIA to be completed for the proposed development. The initial determination of TIA level will be made based on estimated peak hour vehicle-trips to be generated by the proposed development or redevelopment. TIA categories based on trip generation are described below.

**LEVEL 1 TIA: if the vehicular peak hour trips are fewer than 100 with no other negative factors, this will serve as the only TIA document.** A Level 1 TIA shall include, at a minimum, the site location, access points, and expected vehicular trip generation.

**LEVEL 2 TIA: if the vehicular peak hour trips are equal to or greater than 100,** or the following factors are present, a given site development or redevelopment action will require a Level 2 TIA, even if the development generates fewer than 100 vehicular peak hour trips:

- Transportation concerns that currently exist and could be aggravated by the proposed development
- Public concerns regarding the development
- Negative impact on adjacent neighborhoods
- Internal connectivity to existing or proposed land uses (commercial, residential, etc.)
- Cut-through concerns and need for traffic calming
- Need for treatments at pedestrian/bicycle crossings and trail crossings – mid-block

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- Lack of internal Collector streets
  - Aggressive future growth factors
  - Heavy truck percentage (site specific)
  - Proximity of site driveways to existing driveways or intersections
  - Other local issues that may be present

While an initial determination of TIA Level can be made based on estimated site trips generated, the Town of Johnstown will make the final determination.

### **C. ANALYSIS METHODS AND ASSUMPTIONS**

Before initiating TIA work, the developer shall provide (and the Town of Johnstown approve) a written summary of methods and assumptions to be used in the study, including study area, need for other agency involvement, traffic parameter values, data collection methods, future time horizons for the development and forecasting methodology.

## **3. TIA REQUIREMENTS**

### **A. LEVEL 1 TIA**

The purpose of a Level 1 TIA is to evaluate the proposed vehicular and multimodal transportation connections associated with a development project. The study area for a Level 1 TIA is limited to the site access intersections.

For vehicular connections, the evaluation should:

- Address whether access spacing relative to current or future intersections is acceptable, providing sufficient sight distance and meeting applicable corner clearance criteria.
- Identify whether exclusive left and/or right turn lanes are needed to serve the access based on projected traffic levels. Section Three, Access Category Standards, starting on page 32 of the State Highway Access Code contains traffic volume criteria for auxiliary lanes.
- Address whether accesses will be full movement or limited movement and identification of turn lane needs based on projected traffic volume levels.

For non-motorized connections, the evaluation should:

- Describe the routes that bicyclists and pedestrians may use to reach the site and recommend on-site measures for accommodating efficient multimodal connections that maximize safety for non-motorized trips. On-site measures may include sidewalks, shared-use paths, signage and pavement markings to support multimodal access and circulation.

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The following table of contents is suggested for a Level 1 TIA:

**A. PROPOSED DEVELOPMENT**

- i. Site location
- ii. Land use and intensity
- iii. Site plan
- iv. On-site circulation and access

**B. ANALYSIS OF EXISTING CONDITIONS**

- i. Roadway characteristics (number of lanes, functional classification, etc.)
- ii. Traffic control devices
- iii. Transit service
- iv. Pedestrian/Bicycle facilities
- v. Nearby driveways
- vi. Traffic volumes
  - a. Daily, morning and afternoon peak periods at proposed site access location(s)

**C. PROJECTED VEHICULAR TRAFFIC**

- i. Site traffic (each horizon year)
  - a. Trip generation
  - b. Trip distribution
  - c. Trip assignment
- ii. Non-site traffic forecasts (20-year horizon) and methodology
- iii. Total traffic (each horizon year)

**D. TRAFFIC ANALYSIS**

- i. Site access
  - a. Movements provided
  - b. Access spacing
  - c. Turn lane requirements
- ii. Traffic safety
  - a. Sight distance
  - b. Location and design of site access
- iii. Pedestrian/Bicycle considerations
- iv. Traffic control and connectivity needs

**E. FINDINGS/RECOMMENDATIONS**

A Level 1 TIA does not need to address intersection Level of Service, unless specified by Town of Johnstown Staff.

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## **B. LEVEL 2 TIA**

### **1. STUDY AREA**

The minimum study area will be determined by project type and size. At a minimum, the intersections to be studied will include site access driveways, all signal-controlled intersections within 2 miles of the site and arterial street unsignalized intersections within 1 mile. The Town Traffic Engineer, or designee, 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. A scoping meeting may be required to define the study area, depending on which category is applicable to the development.

### **2. STUDY HORIZON YEARS**

The study horizon year is the future year that should be studied for the development. The existing background vehicular traffic shall be adjusted to provide a reasonable estimation of future vehicular traffic without the site in the horizon years. The horizon years, at a minimum, will include the opening year and 20 years from current year. Additional interim years may be required to evaluate phased implementation of key project development milestones and are determined by the project type and size in accordance with the criteria in **Table 1**.

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, or designee.

### **3. BACKGROUND (NON-SITE) TRAFFIC VOLUME FORECASTS**

The future background vehicular traffic can be estimated using growth information available from available travel demand modeling; typically through the official North Front Range MPO Travel Demand Model. Other growth information that may be referenced includes growth rates provided by the Colorado Department of Transportation for state highways and available municipal transportation plans.

Current growth expectations within Johnstown translate to a 3 percent annual growth rate (both near-term and long-term); the use of lower annual growth rates will require additional supporting technical information and coordination with Johnstown staff.

### **4. ANALYSIS TIME PERIOD**

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

If the vehicular 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 school arrival and school



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dismissal. For banquet or church facilities, an analysis of evening and/or weekends may be required.

## **5. DATA COLLECTION REQUIREMENTS**

All data is to be collected in accordance with the latest edition of the Institute of Transportation Engineers (ITE) Manual of Transportation Engineering Studies or as directed by the Town Traffic Engineer, or designee, 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, or designee.
- The current and projected daily vehicular traffic volumes shall be presented in the report.
- 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.

## **6. SEASONAL ADJUSTMENTS**

The vehicular traffic volumes for the analysis hours should be adjusted for the peak season if appropriate. The Town Traffic Engineer, or designee, 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 vehicular traffic.

## **7. TRIP GENERATION**

The current 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, or designee, 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 vehicular 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, or designee, to agree on a percentage of internal trips.

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## 8. TRIP DISTRIBUTION

The directions from which vehicular 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 vehicular 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 shall be identified for the site. Ideally, the influence area should contain approximately 80 percent of the vehicular 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 vehicular trip distribution are by analogy, model, and surrogate data. In most cases, a surrogate data method can be used to develop the trip distribution. Using 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.

## 9. TRIP ASSIGNMENT

Based on the vehicular trip distribution percentages, site vehicular 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, or a designee. Vehicular pass-by trip reduction only applies to added external trips; the site driveway analysis shall include all site generated trips.

## 10. CAPACITY ANALYSIS

All level of service/capacity analysis methods shall be computed for signal controlled and non-signal-controlled intersections as identified in the Study Area in **Table 1**, in accordance with the current edition of the Highway Capacity Manual (HCM). Capacity analyses shall be performed for existing conditions, future base conditions for the study years, and future with site generated vehicular traffic for the study years.

For signal-controlled intersections, operational analyses shall be performed for time horizons up to five years. Operational analyses shall also be performed for street or intersection sizing. The operational analysis method can be used for horizons beyond five years.

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## **11. 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 five- and ten-year horizon for Level 2 TIA's.

Traffic Signal needs studies shall be conducted per the current Manual on Uniform Traffic Control Devices (MUTCD).

## **12. QUEUING ANALYSIS**

A vehicular 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 sites 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, use the number of vehicles per average 2-minute period per the American Association of State Highway and Transportation Officials (AASHTO) Green Book. A vehicle length of 25 feet shall be used to calculate queue length.

If the site contains a land use that has queuing potential, such as a drive-through service (e.g., fast food, coffee shop, car wash), then a trip generation for the peak hours should be provided along with a queuing analysis for internal, as well as external, site impacts.

## **13. SPEED CONSIDERATIONS**

Vehicle speed is used to estimate safe stopping and cross-corner sight distances. Sight distance shall conform to the AASHTO standards. The design speed used shall be 10 miles/hour above the posted speed limit.

## **14. 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 that 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 that mitigate these impacts shall be evaluated and included as part of the study.

Other factors to be considered in the analysis are:

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- Number and location of driveways
  - On-site storage
  - Acceleration/deceleration lanes
  - Internal circulation
  - Pedestrian, bicycle, trail, and transit access

## **15. ADDITIONAL ANALYSIS**

The Town of Johnstown may request additional analyses 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-off areas, the number of accesses, among others.

## **16. ADDITIONAL CRITERIA FOR SCHOOL SITES**

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

i. 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 shall include maximum build-out and build-out conditions and shall be used for on-site vehicular queuing requirements.

ii. Minimum Required Parent\* (or other authorized person) Vehicle Queue Calculation

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

a. 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. Values should be based on observations of existing comparable school sites, subject to the Town Traffic Engineer, or designee's, approval.

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

i) The entire vehicle queue should be contained within the school site and/or on a consenting adjacent shared-use site unless approved by the Town Traffic Engineer, or designee.

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

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c. School Traffic Circulation Overview

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

- i) Direction of traffic flow and number of lanes throughout diagram;
- ii) Ingress and egress from the site;
- iii) Vehicular drop-off/pick-up locations;
- iv) Minimum required parent\* vehicle queue;
- v) School bus loading areas; and
- vi) Pedestrians and bicycle routes that avoid crossing school driveways.
- vii) On-site and off-site school-related traffic control.

NOTE: \*Parent vehicle may mean "Responsible Person" or "Designated Person"

#### **4. LEVEL 2 TRANSPORTATION IMPACT ANALYSIS (TIA) REPORT SUGGESTED OUTLINE**

##### **A. INTRODUCTION AND SUMMARY**

- i. Purpose of report and study objectives
- ii. Executive Summary
  - a. Site location and study area, development description, principal findings
  - b. Conclusions and recommendations

##### **B. PROPOSED DEVELOPMENT**

- i. Site location
- ii. Land use and intensity
- iii. Site plan
- iv. On-site circulation and access
- v. Development phasing and timing

##### **C. STUDY AREA CONDITIONS**

- i. Study area conditions
- ii. Existing Land use
- iii. Site accessibility
- iv. Existing and future roadway system

##### **D. ANALYSIS OF EXISTING CONDITIONS**

- i. Physical characteristics
  - a. Roadway characteristics (number of lanes, classification, etc.)
  - b. Traffic control devices
  - c. Transit service
  - d. Pedestrian/Bicycle facilities
  - e. Nearby driveways
- ii. Vehicular Traffic volumes

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- Daily, morning and afternoon peak periods and others as required
  - iii. Level of service
    - Morning peak hour, afternoon peak hour, and others as required
  - iv. Safety related deficiencies, crash experience

**E. PROJECTED VEHICULAR TRAFFIC**

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

**F. TRAFFIC ANALYSIS**

- i. Site access
- ii. Level of service analysis
  - a. Without project (including programmed improvements for each horizon year)
  - b. With project (including programmed improvements for each horizon year)
  - c. Improvements necessary to accommodate site traffic
- iii. Traffic safety
  - a. Sight distance
  - b. Location and design of site access
- iv. Pedestrian/Bicycle considerations
- v. Traffic control and lane geometry needs

**G. FINDINGS/RECOMMENDATIONS**

**H. APPENDICES**

- i. Traffic counts
- ii. Capacity analyses worksheets
- iii. Traffic signal needs studies
- iv. Additional analysis as requested by Town of Johnstown TIA Guidelines

**I. EXHIBITS**

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

- i. Site location
- ii. Site plan
- iii. Existing transportation system(s) (number of lanes, traffic control, etc.)
- iv. Existing and future area development

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- v. Existing vehicular daily traffic volumes
  - vi. Existing vehicular peak hour turning volumes
  - vii. Estimated vehicular site traffic (AM and PM peak periods)
  - viii. Directional distribution of vehicular site traffic (AM and PM peak periods)
  - ix. Total vehicular traffic (peak periods)
  - x. Electronic PDF file of the project level of service/capacity analysis

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**APPENDIX A.**  
**Initial Transportation Assessment Form**



## INITIAL TRANSPORTATION ASSESSMENT

This initial transportation assessment is required for all development proposed in the Town of Johnstown. The purpose of a Transportation Impact Analysis (TIA) is to provide preliminary vehicular trip generation information for the proposed development to determine the category of TIA required. Based on the proposed development, **Table 1** should be completed to provide preliminary vehicular 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 TIA required. Other factors in addition to vehicular trip generation can affect the impact of a development; and based on these guidelines, the Town of Johnstown Traffic Engineer, or designee, will determine the final scope for the TIA.

Location of proposed development (location map must be attached)

**TABLE 1: PRELIMINARY VEHICULAR TRIP GENERATION ESTIMATE**

Types of land uses (e.g., Multi Family, Single Family residential, specific retail, etc.)	Size (thousands of sq. ft., acres, number of units, etc.)	AM peak hour trips per size/unit*	PM peak hour trips per size/unit*	Subtotal of trips AM/PM
<b>GRAND TOTAL</b>				

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

**Table 2** provides the criteria for each category of the TIA based on the estimated vehicular trip generation. This table is for information and guidance only. As noted previously, the Town Traffic Engineer, or designee, will make the final determination regarding the type of study.

**TABLE 2: REQUIREMENTS FOR TRANSPORTATION IMPACT ANALYSIS (TIA)**

TYPE OF STUDY	PEAK HOUR TRIPS
Level 1	<100
Level 2	>100