# CITY OF DRAPER

# TRAFFIC IMPACT STUDY DESIGN GUIDELINES

## June 1, 2012

# Traffic Impact Study Guidelines

## Table of Contents


Introduction ..... 1
Traffic Impact Classification Levels ..... 1
Analysis Approach and Methods ..... 1
1. Study Area ..... 1
2. Study Horizon ..... 2
3. Analysis Time Periods ..... 2
4. Data Collection ..... 2
5. Trip Generation ..... 3
6. Trip Distribution and Assignment ..... 3
7. Traffic Analyses ..... 3
8. Improvement Analyses ..... 4
9. TIS Review ..... 4
Study and Report Format ..... 5
References ..... 7

# Traffic Impact Study Guidelines

## Introduction

The purpose of this document is to provide guidelines for preparing the Traffic Impact Studies (TIS) for proposed land development projects or additions to existing developments in Draper City. This scope of work is a general guideline. The applicant will be responsible for performance and delivery of an acceptable traffic impact study. The TIS shall be performed by an individual or entity demonstrating capability to analyze and report mobility, traffic engineering elements, and design elements as necessary for the application study area and site design. The TIS should be prepared directly, or by direct supervision by a State of Utah Licensed Professional Engineer. Contact the City Engineer to discuss the scope of analysis, methodology, and level of detail required for the specific project prior to beginning the analysis. A traffic study may be as simple as providing existing and forecast traffic volumes and as complex as a microscopic traffic simulation by phase. The appropriate level of study is determined by assessing the proposed project, the existing and future traffic and roadway conditions, and the existing and forecast traffic, level of service, with and without the proposed development.

## Traffic Impact Classification Levels

The content required for a TIS is dependant upon the land use intensity and type of development being considered. Vehicle trips anticipated by particular land uses and categorized as Level 1, 2 or 3 Traffic Impact Analyses. Traffic impact study Levels are defined as follows:

Level 1. Small developments: estimated to generate 100-500 vehicle trips during either of the a.m. or p.m. peak hours.

Level 2. Moderate developments: estimated to generate 500-1,000 vehicle trips during either of the a.m. or p.m. peak hours.

Level 3. Large developments: estimated to generate more than 1,000 vehicle trips during either of the a.m. or p.m. peak hours.

In some cases, proposed developments that generate less than 100 peak hour trips may be required to submit a Traffic Impact Study. Some common reasons for requiring a TIS for fewer than100 peak hour trips are due to the following issues:

- Existing traffic problem or congestion near proposed development.
- Public concern about proposed development.
- High crash rates near proposed development.
- Negative impact on existing and proposed adjacent developments.
- Other specific problems or safety concerns that could be aggravated by the proposed development.

The Draper City Engineer will make the final decision on whether a TIS is required and at what level the TIS should be conducted. A table with the approximate thresholds for the 100 peak hour trips is located at the end of this guideline.

## Analysis Approach and Methods

1. **Study Area**
   The size of the study area typically depends on the proposed land use, the development

size, and the existing and future conditions. The City Engineer may adjust the study area as appropriate to the development size, specific site conditions and/or local and regional issues and policies. The minimum TIS area shall typically include the entire residential subdivision or site boundary and extend along existing neighborhood streets one-quarter mile of the project boundary. Study areas shall be increased accordingly based upon project complexity, topography, or other roadway characteristics that may be impacted by the proposed project. any neighborhood that is adjacent to the proposed development for a Level 1 analysis. Level 3 analyses may have study areas extending two or more miles beyond the project boundary.

2. **Study Horizon**

The study horizon years are typically determined by the project type and the size of a development.

a. Level 1 TIS - The study horizon shallbe the opening year
b. Level 2 TIS - The study horizon shall be the opening year and five years after opening
c. Level 3 TIS - The study horizon shall be the opening year, five years and fifteen years after opening.

All significant developments within the study area that have been approved or are likely to be approved by the specified horizon year shall be identified and incorporated into the study.

3. **Analysis Time Periods**

The TIS shall analyze the traffic peak hours. Peak hours generally occur during both the morning and afternoon weekday peak hours, typically between 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. respectively. Due to project specifics, peak hours may be the mid-day weekday (schools require an analysis of the peak period during the school start-up and school let-out), or can occur on a weekend (park events, shopping centers, church facilities).

4. **Data Collection**

All data should be collected in accordance with the latest edition of the ITE *Manual of Traffic Engineering Studies* or as directed by the City Engineer.

a. Collect the existing daily traffic volume for the roadways near the proposed developments if current data is not available from Draper City, the County or UDOT. Vehicle speed data may be required for specific existing speed issues possibly aggravated by the proposed development.
   Available traffic data statistics from the Utah Department of Transportation (UDOT) website may be used as existing traffic volumes as well as background for future projections. Mechanical counts may be obtained for approach volumes and speeds for the studied intersections if counts that are more recent are needed.

b. Collect peak hour turning movement counts at all relevant existing intersections in the study area.

c. Obtain vehicle crash data from the UDOT.

d. Base projected traffic volumes on the latest available traffic projections contained in the Draper City Master Transportation Plan or from Wasatch Front Regional Council (WFRC). If projected traffic volumes are not available for the roadways, document the methodology utilized to forecast volumes in detail in the TIS. The projected

traffic volume methodology is subject to approval by the City Engineer.

e. Include in the background information, roadway layout with lane/shoulder widths, number of lanes, existence of curb and gutter and sidewalks, and road configuration including horizontal and vertical curvature. Record any specific roadway elements, like curb extensions or objects blocking sight distance. Traffic control and traffic operations need to be defined in the study area and should include the type of intersection traffic control (i.e. stop sign, signal, yield), lane configurations, turn lane lengths, speed limits, etc. In addition, existing signs and pavement markings should be identified within the study area.

## 5. Trip Generation

a. Use the latest edition of ITE's *Trip Generation* to estimate the expected vehicle trip generation rates for the proposed development.

b. Other rates can be used if *Trip Generation* does not include rates for the specific land use, or the available data is limited, or where local trip rates (if available) differ from the ITE rates. Obtain the City Engineer's approve before using other rates.

## 6. Trip Distribution and Assignment

Projected trips should be distributed and added to the existing and proposed road system based on a most direct route (route offering the lowest average delay). Clearly present daily and peak hour volumes in the TIS for existing conditions, opening year background, proposed development plus background, and all other future analyses years.

## 7. Traffic Analyses

Level of Service (LOS) shall be computed for the peak hour, typically morning and afternoon for un-signalized and signalized intersection according to latest edition of Highway Capacity Manual, or using the latest version of Highway Capacity Software (HCS), SYNCHRO, RODEL, or other software acceptable to Draper City.

Points of access shall be designed in compliance with the provisions of the Access Management Section of the Draper City Master Transportation Plan and the Utah Department of Transportation Access Management Standards (Utah Administrative Rule R930-6). Variance requests or deviations from strict compliance to these rules shall be submitted in writing to the City Engineer.

Sight distance analysis shall be conducted to insure the appropriate length of visible roadway is provided. The three most common types are sight distance, stopping sight distance, and passing sight distance. Intersection sight distance shall analyze approach sight triangles, departure sight triangles. Obstructions to view within these triangles shall be indicated. Due to the variation of topography, location, speed of the roadway, etc., other sight criteria may need to be addressed in accordance with sight specific requirements.

Queuing analysis shall be conducted to determine the length of the queues. Analysis shall include left turn and right turn bays as well as the queues from intersection to intersection.

Where appropriate, traffic signal warrants for the un-signalized intersection shall be conducted based on latest version of MUTCD.

a. Level 1- Evaluate warrants for the opening year
b. Level 2- Evaluate warrants for the opening year; if the warrants are not met evaluate for the five year horizon
c. Level 3- Evaluate warrants for the opening year; if the warrants are not met evaluate for the five year horizon; if the warrants are not met evaluate fifteen year horizon.

Conduct analyses for existing traffic conditions, for future non-site traffic conditions (background), and total future conditions (background plus project).

Present the results in tables, figures and/or graphs. Results should include average delay, LOS, and volume-to-capacity (V/C) ratios for every intersection in study, and for all critical movements for existing, background, and background plus project traffic conditions.

## 8. Improvement Analyses

Analyze the intersections and roads within the study area before and after proposed development in order to identify impacts to the area. Analyze roadway improvements and traffic mitigation improvements and provide recommendations needed to maintain an acceptable level of service after the proposed development is constructed.

## 9. TIS Review

Submit copies of the TIS to UDOT and other agencies that have facilities impacted by the proposed development for review. Address and incorporate review comments by Draper City or other involved agency appropriately in the revised report before final submittal. The final submittal shall be approve, stamped and signed by a Utah licensed professional engineer.

## Study and Report Format

1. Introduction and Summary
    a. Purpose of report (description of a project) and study objectives
    b. Executive summary
        - Site location and study area including site map
        - Proposed development description including location, current land use and proposed use
        - Principal findings
        - Conclusions
        - Recommendations

2. Proposed Development
        - Land use and densities
        - Location (vicinity map)
        - Site plan
        - Development phasing (if any) and timing
        - Trip Generation

3. Area Conditions
    a. Study area
        - Area of influence
    b. Land use
        - Existing land use
        - Anticipated future development
    c. Site accessibility
        - Existing and future roadway system

4. Analysis of Existing Conditions
    a. Physical characteristics
        - Roadway characteristics
        - Pedestrian/bicycle facilities
        - Traffic control devices
    b. Safety related deficiencies (e.g. non-adequate sight distance due to grown vegetation)
    c. Traffic Volumes
        - Daily, morning and afternoon peak periods
        - Level of service for the peak periods

5. Projected Traffic

    a. Site traffic (each horizon year)
        - Trip generation (from Chapter 2)
        - Trip distribution
        - Mode split (if applicable)
        - Trip assignment
    b. Non-site (background) traffic forecast (each horizon year)
    c. Total traffic (background plus project for each horizon year)

6. Traffic and Improvement Analysis

    a. Site access
    b. Level of service
        - Without project
        - With project
    c. Traffic Safety
        - Sight distance
        - Left turn lanes
        - Adequacy of location and design of driveway access
    d. Pedestrian accommodations
    e. Speed considerations
    f. Traffic signal needs (base plus five-year horizon if needed)

    (Traffic analysis results should be presented in tables and graphs for easy review.)

7. Conclusions

8. Recommendations

    a. Roadway improvements
    b. Traffic mitigation measures

9. Appendices

    a. Existing traffic volume counts (hourly volumes, daily totals, turning movement counts, data collection sheets and reports).
    b. Capacity analysis (HCS and other relevant reports).
    c. Other material related to the traffic study data collection and study results including but not limited to:
        - Site location plan
        - Existing and future development plans
        - Non-site (background) traffic volumes for the peak periods
        - Site (project) traffic volumes for the peak periods
        - Future traffic (background plus project) traffic volumes for the peak periods

## References


- Butler County Engineer's Office. "Transportation and Project Studies." *Butler County Engineer's Office.* 2006. http://www.bceo.org/TISGuidelines-Feb06.pdf (accessed July 6, 2011).
- City of Peoria, Arizona. "Engineering Download Documents." *City of Peoria, Arizona.* 2002. http://www.peoriaaz.gov/uploadedFiles/Peoriaaz/Departments/Engineering/Traffic_Engineering/Traffic_Impact_Study_Criteria.pdf (accessed July 6, 2011).
- Institute of Transportation Engineers:
  —. *Manual of Transportation Engineering Studies - 2nd Ed.* Washington DC: ITE, 2010.
  —. *Traffic Engineering Handbook - 6th Ed.* Washington DC: ITE, 2008.
  —. *Transportation Impact Analysis for Site Development.* Washington DC: ITE, 2005.
  —. *Transportation Planning Handbook - 3rd Ed.* Washington DC: ITE, 2008.
- Maricopa County. "MCDOT Traffic Impact Procedures." *Maricopa County Department of Transportation.* 2011. http://www.mcdot.maricopa.gov/technical/eng-manuals/traff_impact.pdf (accessed July 6, 2011).
- Traffic Engineering Divison, City of Chandler. "Scope of Work For Traffic Impact Studies." *City of Chandler.* 2002. http://udm.chandleraz.gov/document.php?id=419 (accessed July 6, 2011).
- Utah Department of Transportation. http://www.udot.utah.gov/main/uconowner.gf?n=200509151532191 (accessed July 6, 2011).

Approximate Thresholds for Requiring Traffic Impact Analysis
(Project Sizes Generating 100 Peak Hour Trips)

| Land Use | UNIT | THRESHOLD |
|---|---|---|
| RESIDENTIAL | | |
| Single Family | DU | 100 DU |
| Condominium/Townhomes | DU | 175 DU |
| Apartments | DU | 150 DU |
| Mobile Home | DU | 180 DU |
| RV Park | SPACE | 400 DU |
| Retirement Community | DU | 250 DU |
| COMMERCIAL | | |
| Walk-in Bank | 1,000 SF | 5,000 SF |
| Drive-in Bank | 1,000 SF | 2,000 SF |
| Walk-in S & L | 1,000 SF | 18,000 SF |
| Drive-in S & L | 1,000 SF | 10,000 SF |
| Shopping Center | 1,000 SF | 6,000 SF |
| Grocery Store | 1,000 SF | 10,000 SF |
| 24-Hour Convenience Store | 1,000 SF | 1,500 SF |
| Discount Store | 1,000 SF | 16,000 SF |
| Furniture Store | 1,000 SF | 250,000 SF |
| Lumber Store | 1,000 SF | 30,000 SF |
| Hardware/Paint Store | 1,000 SF | 20,000 SF |
| Auto Sales | 1,000 SF | 40,000 SF |
| Nursery/Garden Center | ACRE | 13.5 ACRES |
| Vehicle Repair (Automobile Care Center) | 1,000 SF | 35,000 SF |
| Bowling Alley | LANE | 30 LANES |
| Gas Station | PUMP | 6 SINGLE PUMPS |
| Racquet Club | COURT | 26 COURTS |
| Health Club | 1,000 SF | 24,000 SF |
| Quality Restaurant | 1,000 SF | 13,000 SF |
| Sit Down High Turnover | 1,000 SF | 6,000 SF |
| Fast Food (with drive-thru) | 1,000 SF | 2,000 SF |
| OFFICES | | |
| Office | 1,000 SF | 43,000 SF |
| Office Park | 1,000 SF | 60,000 SF |
| Business Parks | 1,000 SF | 70,000 SF |
| Research & Development | 1,000 SF | 100,000 SF |
| Government Office | 1,000 SF | 9,000 SF |
| Post Office | 1,000 SF | 10,000 SF |