# CITY OF VALLEJO
## PUBLIC WORKS DEPARTMENT
## TRAFFIC IMPACT Analysis/Study GUIDELINES

The City Engineer, under the authority of the Public Works Director and recommendations from the Traffic Engineer, will make the final decision on the need for a traffic study. The purpose of the traffic study is to identify the traffic impacts to traffic operation and safety. The purpose of these guidelines is to provide the standard requirements for the preparation of a traffic study.

**Traffic Study Requirement Review**

The City's Public Works Department shall do an initial assessment of the project based upon the description and proposed use(s). All consulting fees to perform the traffic study will be borne by the applicant. All the studies shall be completed consistent with the City's General Plan and/or Solano Transportation Authority policies. The City will be responsible for administering the consultant agreement to perform the traffic impact study. In general, the requirement for a traffic study as part of the project review process will be based upon, but not limited to, the following criteria:

- Any project with initial traffic generation estimates showing that the project is likely to add 500 or more daily two-way trips, and/or likely to add 100 or more peak period two-way trips to the existing circulation system, without consideration of pass-by trip reductions. Phased projects must be evaluated as a whole assuming full build-out conditions for purposes of determining the need for a traffic study.

- Any project that is located in the vicinity (within a 1½-mile radius from the project site) of any key intersections that currently operate at a level of service (LOS) D or worse and project traffic is likely to significantly worsen this condition.

- Any project that generates more than 40 percent of its total traffic in the form of truck traffic using passenger car equivalents (PCE).

- Any project that intensifies the usage, density, or traffic generation of the site above the level currently allowed by zoning codes, requiring a General Plan or Zoning Amendment.

- Modifications are required to the original TIA that is more than three years old, or where the increase in traffic volume as measured by ADT, peak hour, or peak hour of the critical movement is more than 10%.

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### Trip Generation Estimates

1. ***Trip Generation Rates***: Passenger vehicle trips shall be estimated using the rates and methodologies outlined in Trip Generation, latest edition, published by the Institute of Transportation Engineers (ITE). Approval must be obtained from the Public Works Director, City Engineer or Traffic Engineer prior to using any other source to establish the project trips.

2. ***Trip Generation Basis***: The basis of all trip generation calculations will depend on the type of land use proposed. The trips generated by most commercial and industrial uses should be based on gross floor area. The trips generated by most residential uses should be based on the number of dwelling units. A basis for how trips are established, including any methodologies and assumptions shall be noted in the report. An alternate basis for estimating the project trips may be approved and/or required by the Public Works Director, City Engineer, or Traffic Engineer for certain special uses where more appropriate and known features of the project will result in a more accurate estimate.

3. ***Unknown Trip Generation Rates***: Some unique types of development or uses may not have rates/formulas published by ITE. In this case, a trip generation study may be conducted at a similar existing facility in order to determine acceptable trip generation rates to be used in the study. The type and location of the similar existing facility and the study methodology must be pre-approved by the Public Works Director, City Engineer, or Traffic Engineer.

4. ***Pass-By and Diverted-Link Trips***: With prior Public Works Director, City Engineer, or Traffic Engineer approval, pass-by and/or diverted-link trips may be calculated and used in estimating the project-generated trips using the procedures specified in the latest edition of Trip Generation. The pass-by and/or diverted link trips must be justified by appropriate calculations. However, the reduced or net trips generated by the project should not be used to analyze project driveways and intersection(s) immediately adjacent to the project site (i.e., driveways and intersections in the immediate vicinity shall be analyzed using the full trip generation of the project). Typically, pass-by trips are associated with new fast-food restaurants, gas stations and shopping centers, etc.

5. ***Truck Trips***: Truck trips shall be calculated and shown separately. Peak hour distribution of inbound and outbound trucks shall be identified separate from passenger cars. For light industrial, industrial parks and warehouse uses, trip rates contained in the latest edition of Trip Generation shall be used. All truck trips shall be converted into passenger car equivalents (PCE) for intersection capacity analysis using the following factors:

2-axle trucks: 2.0 PCE
3-axle trucks: 2.5 PCE
4- and more axle trucks: 3.0 PCE

### Trip Distribution Assumption

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The traffic study preparer shall specify in the Scope of Study form at the end of this guideline, either independently or in consultation with the Public Works Department, the trip distribution assumptions to be used in the traffic study and have them approved by the Department prior to completing the study. Ideally, the distribution should be based on general socioeconomic characteristics of the study area, location and intensity of major trip generation and attraction centers, trip length information, origin-destination information (specifically for industrial and warehouse uses) and any other known but verifiable information. For heavy truck related uses, where truck trips comprise a minimum of 20 percent of the total generated trips after converting into passenger car equivalents, trip distribution assumptions for truck trips should be shown separately and presented in the report text and figures separately. Use of the City's Travel Forecast Model or other approved model may be required to establish the project trip distribution.

**Study Area**

The scope of the traffic study shall include at a minimum any key intersection or roadway segment within a one and a half (1 ½) mile radius area from the project site. All key intersections and roadway segments within this study area must be analyzed to identify impacts to capacity and LOS. The study intersections and roadway segments should be clearly identified for review and approval by Public Works Department prior to starting the study.

Projects located within Specific Plan areas for which a program level Environmental Impact Report (EIR) has been previously approved by the City, may be allowed to use a study area limited to the immediate vicinity of the project to determine the need for any traffic improvements, in addition to those already identified in the EIR. The traffic study for this type of project must specifically identify any differences between the project and the land use assumed for the site in the EIR. A meeting with Public Works or Planning Department staff will generally be necessary to discuss the specific scope of the study prior to preparing the traffic study.

**Analysis Procedure and Methodology**

***1. Traffic Counts:*** Existing average daily traffic volumes for study intersections and roadways shall be estimated using 24-hour automatic machine counters or a recognized traffic counting agency or company. Existing peak period intersection turning movement volumes shall be estimated using skilled personnel/technicians or a recognized traffic counting agency or company. Typical count days are Tuesday, Wednesday and Thursday of a typical non-holiday work week. Counts taken on holidays and the day before and after a holiday should not be used. Days with abnormal traffic conditions (such as rains, construction activities, road

closures, etc.) must be avoided. Counts in the vicinity of a school should be taken when the school is in session. New traffic counts will not be necessary if counts are available from another source such as traffic studies and/or City records, provided that they have been obtained within the last two years.

***2. Peak Periods:*** Generally, both morning (7 a.m. to 9 a.m.) and evening (4 p.m. to 6 p.m.) peak periods should be used in the analysis to identify traffic impacts and level of service problems. In some cases, an off-peak period may be required as directed and approved by the Public Works Director, City Engineer, or Traffic Engineer. Ideally, the peak hours will be verified by 24-hour volume counts.

***3. Analysis Scenarios:*** The following analysis scenarios, in the order shown, should be included for roadway and intersection capacity analysis:

a. Existing Year Traffic Condition (identify any existing deficiencies)
b. Project Opening (Near - Term)Year Base Traffic Condition
c. Project Opening (Near – Term)Year Base plus Other Proposed Projects Traffic Condition
d. Project Opening (Near – Term)Year Base plus Other Projects plus Project Traffic Condition
e. Project Opening (Near – Term)Year Base plus Other Projects plus Project Traffic Condition with Mitigation, if necessary
f. Future Build-out Year Cumulative Base (TBD - approved projection method) Traffic Condition
g. Future Build-out Year Cumulative Base plus Project Traffic Condition
h. Future Build-out Year Cumulative Base plus Project Traffic Condition with Mitigation, if necessary

Additionally, a staging analysis may be required for phased projects to identify the timing of future phases and needed mitigation measures.

***4. Internal Circulation & Access Management:*** Include a discussion on internal circulation and proposed on-site parking. Show and discuss how vehicles would enter and exit via the main access driveways and identify any on-site or off-site circulation problems. Identify the need for signal controls using traffic signal warrants specified in the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD).

Requests for site access or access modification shall be addressed in the Traffic Impact Analysis. Recommendations shall include site access and transportation improvements needed to maintain traffic flow to, from, within, and past the site at an acceptable and safe level of service. Areas to address include:

- Separate conflict areas. Reduce the number of access points or

increase their spacing so conflict areas or maneuver areas do not overlap.
- Limit the type of conflict areas by preventing certain maneuvers.
- Remove turning vehicles or queues from through lanes
- Safety of a proposed access (sight distance both horizontally and vertically), including pedestrian features.
- Reduce the speed differential in through lanes between through vehicles and turning vehicles.
- Consider the impact of access points on adjacent or nearby properties on both sides of the roadway.

Improvements include such things as: relocation, restriction, or elimination of access points, roadway widening, turning lanes, traffic signals, and pedestrian facilities.

The number of vehicle access points should be minimized by sharing driveways and linking parking lots between adjacent uses. Commercial developments shall provide coordinated internal circulation and connected parking facilities. Well-defined walkways must be designed into all parking lots, with interconnections between walkways to create safe walking conditions.

***5. Capacity Analysis Method:*** The latest version of the Highway Capacity Manual (HCM) shall be the basis for operational delay (LOS) calculations for signalized and unsignalized intersections. Several software packages are available for conducting LOS analysis. The software package and version must be identified in the report.

***6. Traffic Growth:*** Use of the City's Travel Forecast Model or other approved model may be required to determine the future traffic volumes and growth. It shall be the responsibility of the traffic consultant to obtain these from whatever source that provides the most accurate projection within that area.

In the absence of traffic model information, the future build-out year base traffic volumes shall be estimated using an annual growth factor of 3 percent per year, unless a different rate can be justified and is approved and/or required by the Public Works Department.

***7. Traffic Impacts:*** Traffic impacts at an intersection are to be considered "significant" when any of the following changes in the volume to capacity (V/C) ratios occur between the "without project" and the "with project" conditions identified in Item 3 above:

| LOS | V/C Without Project Difference |
|---|---|
| C | > 0.0400 |
| D | > 0.0200 |
| E, F | > 0.0100 |

The LOS and V/C ratios above are based on the delay methodology outlined in the Highway Capacity Manual.

***8. Mitigation Requirement:*** The report should identify level of service problems under existing conditions and identify measures that will provide an acceptable LOS. These measures shall be assumed to be in place for subsequent analyses. Mitigation measures must be identified for intersections that show a significant project impact per item 7 above, and operate at LOS D or worse under the conditions identified in Items 3d and/or 3g above. The LOS with mitigation must be improved to LOS D or better for intersections and LOS C or better for roadway segments, under the conditions identified in Items 3e and/or 3h above. Identify mitigation measures for both opening year and future build-out year conditions. Mitigation measures may need to be identified for other conditions, depending on the project phasing and timing.

***9. Mitigation Fair-share Cost Calculations:*** The percentage of fair-share for the project shall be calculated at each location using the total trips generated by the project divided by the total "new" traffic, which is the net increase in traffic volume from all proposed projects (Other Projects plus Project) and growth. The cost of mitigation shall be estimated using verifiable cost estimates from reliable and recognized sources. Fair-share cost of mitigation shall be calculated using the fair-share percentage of the project volumes multiplied by total estimated cost of mitigation.

***10. Sight Distance:*** Sight distance restrictions shall be addressed in the TIA. Sight distance is the length of roadway visible to the driver. Specified areas along intersection approach legs and across their included corners should be clear of obstructions that might block a driver's view of potentially conflicting vehicles. These specified areas are known as clear sight triangles. The dimensions of the legs of the sight triangles depend on the design speeds of the intersecting roadways and the type of traffic control used at the intersection. Intersection sight distance calculations shall be based on the most recent edition of the AASHTO Manual or Caltrans Highway Design Manual.

***11. Alternate Modes of Transportation:*** The TIA shall identify other transportation modes that may be applicable, such as transit use, bicycle and pedestrian facilities. New developments are encouraged to implement Transportation Demand Management practices and introduce methods for trip reduction when practical.

***12. Safe Walking Conditions:*** If applicable, the TIA must consider pedestrian connections and provision of safe walking routes for school children. It shall consider sidewalks and other planning features to assure safe walking conditions for students who walk to and from school.

***13. Road Adequacy:*** The TIA shall include detailed discussion and analysis of the adequacy of roads serving the site and within the project. Recommendations for needed upgrades to local roadways shall be included in the TIA.

***14. Traffic Calming:*** Internal traffic calming shall be incorporated into all developments to control cut-through traffic and reduce speed within the development. The Traffic Impact Analysis shall identify and propose specific traffic calming measures and locations to be incorporated in the development. Traffic calming shall be aesthetically pleasing. Public transportation shall also be evaluated. The traffic-calming plan shall include an overall drawing of the development and identify specific locations and features to be included in the development. The proponent's traffic engineer shall work with the Community Development Department to develop a traffic-calming plan for the development.

**Report Format**

To address traffic impact concerns, the traffic study report shall contain the following:

- **Cover Page** with an appropriate title of the Study and applicable application numbers, Preparer's name and address with phone and fax numbers, and preparation date.
- **Certification Page** with a statement indicating that the study has been prepared by, or under the supervision of, a registered traffic engineer or professional engineer licensed to practice as a traffic engineer, and the preparer's signature and seal of registration.
- **Table of Contents**
- An **Executive Summary** (describing the study scope and findings)
- **Introduction** – (describing the project and the purpose of the study)
- Data Collection, Data Source and **Analysis Methodology**
- **Documentation of Analysis and Findings** (details may be included in an appendix)
- **Identification of traffic impacts** associated with the project
- **Identification of measures** required to mitigate the traffic impacts associated with the project and their timing, if needed
- **Project Mitigation** Fair-Share Cost Calculation as a percent of impact, if needed
- **Figures** showing, at a minimum, the following:

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- Vicinity Map
- Site Plan showing project driveways
- Existing traffic volumes (peak hours and ADT)
- Existing intersection lane configuration and traffic control
- Location of Related Projects
- Cumulative traffic volumes from other projects
- Project trip distribution percentages
- Project related traffic volumes, including at site-access driveways
- Project opening year cumulative traffic volume
- Build-out year traffic volume with Project
- Future lane configuration and traffic control used in future analysis
- Future lane configuration and traffic control used in future analysis with identified mitigation, if necessary.

- **Tables** showing, at a minimum, the following:
  - Project trip generation
  - Other projects' trip generation
  - Intersection Capacity Analysis results for various scenarios, identifying locations with significant impacts that require mitigation, if necessary
  - Mitigation Measures, if necessary
  - Calculation of Project's fair-share cost of mitigation, if necessary

- Discussion of **internal circulation and access management**

- **Site distance** and safety at intersections and access points

- Transit, pedestrians, and bikes opportunities

- Roadway adequacy

- **Conclusion**