

GUIDANCE
FOR THE PREPARATION OF
TRAFFIC OPERATIONAL ANALYSIS



Prepared by the City of Santa Rosa
Transportation and Public Works Department

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Introduction

The City of Santa Rosa has developed the following guidelines for the preparation of Traffic Operational Analysis. The purpose of these guidelines is to establish procedures to ensure consistency and the adequacy of information presented as part of the traffic operational review for a development proposal. It is recommended that the traffic engineering consultant consult with the Traffic Engineering Division prior to beginning the study to clearly define the scope, basic assumptions and approved deviations from these guidelines to avoid unnecessary delays or revisions. It may be determined that a letter describing traffic operational impacts is all that is required, depending on the impact to the roadway network. All traffic operational analysis reports and traffic operational letters shall be prepared and signed by a professional Traffic Engineer, licensed by the State of California Department of Consumer Affairs or a professional Civil Engineer with adequate traffic engineering experience.

When it appears that other jurisdictions will be impacted by a development, such as Sonoma County or Caltrans, the Planning and Economic Development Department will provide all other affected jurisdictions with a copy of the study and request written comments.

Purpose of Traffic Operational Analysis

The purpose of the traffic operational analysis is to identify impacts associated with a proposed development to the roadways and intersections within the impact area. Identification of impacts and appropriate mitigation measures allows the City to assess the existing and future roadway system's safety, performance, maintenance, and capacity needs.

The Traffic Operational Analysis guidelines will:

- Provide information to the consultant on initial information needed and specific traffic impact documentation required.
- Ensure consistency in the preparation of traffic operational analysis information.
- Define the acceptable format for the required traffic operational analysis.
- Create a clear understanding of the impacts resulting from the proposed access(es) to the adjacent and nearby roadways and intersections.

Level of Traffic Operational Analysis

Based on traffic volumes, there are two traffic operational analysis levels, Traffic Technical Operational Memorandum (Technical Operational Memo) or Traffic Operational Study (TOS).

TRAFFIC VOLUME	TRAFFIC TECHNICAL OPERATIONAL MEMORANDUM	TRAFFIC OPERATIONAL STUDY
AADT (Annual Average Daily Traffic)	<250 Trips	>=250 Trips
Peak Hour Volume	< 50	>=50 Trips

Specific threshold criteria have been defined as guidelines for each level related to traffic operations. Threshold criteria were developed to avoid placing an undue burden on development with low traffic volumes with minimum frequency, while ensuring that large developments are

thoroughly evaluated. The City Traffic Engineer or designee will determine the traffic operational analysis level based on preliminary data supplied by the consultant and potential operational issues on the adjacent roadway system. If this information changes following the initial review of the project, the City Traffic Engineer may require a different level of review. Additionally, the location of the development being on arterial streets may require a study even if the overall trip generation does not meet the 50 trips identified in the table above.

Traffic Operational Analysis Submittal

Based on the initial information provided and/or the pre-application meeting, the City Traffic Engineer or designee will inform the consultant which level of analysis will be required. Therefore, the consultant will be responsible for delivery of acceptable traffic operational documentation. The traffic operational analysis should be authored by an individual or entity demonstrating the capability to analyze mobility, traffic engineering, and design elements. Coordination between the study and proposed site design is essential. The traffic operational analysis must be completed and sealed by a Professional Traffic or Civil Engineer licensed in the State of California. The consultant will submit the required traffic operational analysis to the City Traffic Engineer or designee.

Traffic Technical Operational Memorandum (Technical Operational Memo)

A Technical Operational Memo shall be required under the following conditions:

1. Trip Generation indicating less than 50 peak hour trips in any one hour and/or less than 250 daily trips;
2. If determined by the City of Santa Rosa Traffic Engineering Division that due to the nature of the development and proposed project that documentation of the operational impacts of the development on the roadway will be necessary.
3. Where staff determines the need, based on the project scope a full traffic operational analysis may be required.

A Technical Operational Memo may include:

1. Study area description.
2. A description of the proposed land use.
3. A trip generation table of the proposed development. Use equations or rates available in the latest edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*. If equations or rates are unavailable, contact the City Traffic Engineer or designee.
4. The proposed parking and parking requirements per City Code.
5. A review addressing sight lines for each access locations.
6. Conclusion
 - a. Describe the operational impact of the proposed development on the surrounding area and roadway system.
 - b. Discuss any significant operational impacts the proposed development might have on the primary road being accessed.

A Traffic Operational Analysis shall be required under the following conditions:

1. Where a project generates 50 or more trips during any one-hour period or 250 or more daily trips, as determined by standard unadjusted trip generation rates as calculated by the latest edition of the ITE *Trip Generation*.
2. Where a project may increase conflict zones because of key or primary design features (i.e., congestion related collisions, non-standard sight distance considerations, increase in conflict points, etc.).
3. Where staff determines the need, based on the project scope. Traffic Operational Analysis updates, revisions, or addenda shall be required under the following conditions:
 - a. Where the land use is changed so that the trip generation is increased by more than ten percent, OR
 - b. Where a prior project was not approved, OR
 - c. Where a prior study is greater than two years old, unless waived by the Traffic Engineering Division, OR
 - d. Where specific details of the site plan, such as access points or circulation are not defined at the time the study is prepared.

Traffic Operational Analysis Requirements

The purpose of a Traffic Operational Analysis is a comprehensive evaluation of all traffic related safety, nuisance, service level and capacity issues at driveways, queue length analysis, roadway segments and adjacent intersections, generally within a ½ mile radius, affected by the proposed development. When a Traffic Operational Analysis is required, it shall, at a minimum, include the following items to provide consistency and to facilitate review of the document by staff, Planning Commission and City Council:

1. **Introduction and Project Description.**
 - a. Study/Report purpose and objective;
 - b. Description of the project;
 - c. Vicinity map showing the site location and the study area relative to other transportation systems;
 - d. Site plan showing proposed driveways, existing adjacent streets, internal circulation and parking facilities on the project site;
 - e. Description of the existing surrounding (adjacent or affected) land uses, roadways, intersections and associated controls, bicycle and pedestrian facilities and transit facilities; and
 - f. Brief history of the projects that are part of the phased Master Plan or a parent tract/parcel map.

2. **Trip Generation Analysis.** The report shall include peak period project trip generation for all turn movements during the weekday morning and evening peak hour conditions. Weekend period or weekday mid-day conditions may be required by the Traffic Engineering Division for analysis depending on the project scope and location.

Deliverables include:

- a. A summary table that lists each type of land use code as defined by the latest edition of the ITE *Trip Generation Manual*.
- b. Measurable unit of the project used to determine traffic operational concerns (e.g., square footage, occupancy, employees, acreage, etc.)
- c. Average trip generation rate (total daily traffic and peak hours of the adjacent streets)
- d. Total trips generated by the project.
- e. Any other trips generated which are determined to be critical to the project traffic (e.g., special event, recreational or seasonal traffic that may vary peaking conditions)
- f. Trip reductions may be considered for pass-by traffic, Transportation System Management (TSM) Measures, mixed use development, and for internal traffic in large subdivisions as prescribed in the Institute of Transportation Engineers *Trip Generation Handbook*. The estimates for trip reductions shall be approved by the Traffic Engineering Division prior to their use in the traffic analysis and will only be considered if well documented and if they can adequately demonstrate the long-term validity of any proposed reductions. Trips reductions may only be applied to the roadway and not to the access locations. Implementation, monitoring efforts, and contingency plans for meeting stated TSM program objectives shall be clearly defined.

Peak hour traffic volumes used to determine the study area operational concerns shall be based on a comparison of the maximum allowable development under existing or proposed zoning for the project. The official source for trip generation shall be the latest edition of the ITE *Trip Generation Manual*. Consideration will be given to the use of other published reports and papers if properly referenced and included with the support documentation, in addition to original research work of similar or like conditions subject to receipt of acceptable documentation. Use of sources other than those described in the *Trip Generation Manual* must be approved by the Traffic Engineering Division. In addition, where appropriate rates approved by the Traffic Engineering Division that reflect local conditions not represented in the ITE *Trip Generation Manual* may be considered.

3. **Level of Service Analysis.** The study shall describe traffic operation level of service to major collector and arterial roadways affected by the project. Additional studies may be required for key intersections within the study area. The Traffic Engineering Division shall set the boundaries for traffic distribution and the extent of the level of service analysis. In general, the study area should include collector and arterial roadways and major intersections within ½ mile radius of the project site. The Traffic Engineering Division requires an evaluation of not only specific development projects but also of

general plan updates and amendments. The study shall include written, tabular and graphical descriptions of the level of service:

- a. When a proposed project is seeking entitlements the level of service for all study roadway segments and intersections shall be analyzed for each peak period under the following scenarios:
 - i. Existing conditions – current year traffic volumes
 - ii. Existing plus proposed project only conditions
 - iii. Existing conditions plus other approved and pending projects without the proposed project
 - iv. Existing conditions plus other approved and pending projects with the proposed project
- b. When only a general plan amendment or update is being sought the level of service for all study roadway segments and intersections shall be analyzed for each peak period under the following scenarios:
 - i. Existing conditions – current year traffic volumes
 - ii. Existing plus proposed project only conditions
 - iii. General plan build out only conditions
 - iv. General plan build out plus proposed project
 - v. General plan build out without the proposed project
- c. A table comparing the levels of service shall be provided for all studied roadway segments and intersections.
- d. Actual counts of the impacted intersections shall be provided as part of the project analysis for any intersection where current data is not available. Current data is defined as collected within the last two years, unless provided or approved by the Traffic Engineering Division. The source and date of the traffic volume information shall be indicated.
- e. A queue analysis for each approach lane.
- f. Projected traffic from “in process or approved pending development” by the City and adjacent jurisdictions will be provided to the extent they are available. A current list is available in the “Pending Development Report” which can be found on the Planning and Economic Development website - <https://srcity.org/DocumentCenter/Index/173>. Related development shall include all approved, recorded or constructed development that are not occupied at the time of the study and located within ½ mile of the project site.
- g. If requested by staff, the consultant shall adjust the “approved development” volumes with an estimate of traffic associated with “proposed development,” defined as those applications in process that have not yet been approved. Traffic volumes shall be based on the maximum allowed development of the property based on the most recent proposal. Each of these estimated traffic levels shall be provided to the Traffic Engineering Division for review and approval.

- h. Trip distribution shall be performed in consultation with the Traffic Engineering Division and based on:
- i. Sonoma County Transportation Authority travel demand model outputs, OR
 - ii. The traffic network expected to exist upon completion of the project, OR
 - iii. Population and employment distribution for existing and future conditions as provided by census tract data and/or ABAG projections, OR
 - iv. Survey information of existing or similar uses approved by the Traffic Engineering Division, OR
 - v. Distribution of trips to and from a proposed site based upon trip type (work, school, home, etc.), travel time on congested routes and dissipation of traffic along travel corridors, OR
 - vi. Any combination of the above.
4. **Operational Thresholds.** Section 5.8 Transportation Goals & Policy of the City of Santa Rosa General Plan states:

T-D-1 Maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting the standard include:

- *Within downtown;*
- *Where attainment would result in significant degradation;*
- *Where topography or impacts makes the improvement impossible;*
or
- *Where attainment would ensure loss of an area's unique character.*

The LOS is to be calculated using the average traffic demand over the highest 60-minute period.

Traffic Engineering Division will require a level of service evaluation of arterial and collector corridors if deemed necessary.

T-D-2 Monitor level of service at intersections to assure that improvements or alterations to improve corridor level of service do not cause severe impacts at any single intersection.

General interpretation of Policy T-D-2. The impact to an intersection is considered significant if the project related and/or future trips result in:

1. The level of service (LOS) at a intersection degrading from LOS D or better to LOS E or F, OR
2. An increase in average vehicle delay of greater than 5 seconds at a signalized intersection where the current LOS operates at either LOS E or F.

3. Queuing impacts based on a comparative analysis between the design queue length and the available queue storage capacity. Impacts include, but are not limited to, spillback queue at project access locations (both ingress and egress), turn lanes at intersections, lane drops, spill back that impacts upstream intersections or interchange ramps.
4. Exceptions may be granted under the following conditions:
 - a. Within downtown,
 - b. Where attainment would result in significant degradation,
 - c. Where topography or impacts makes the improvement impossible; or
 - d. Where attainment would ensure loss of an area's unique character.

T-C-3 Implement traffic calming techniques on streets subject to high speed and/or cut-through traffic, in order to improve neighborhood livability, Techniques Include:

- *Narrow Streets*
- *On-street parking*
- *Choker or diverters*
- *Decorative crosswalks*
- *Planted islands*

General interpretation of Policy T-C-3. An impact is considered significant if the project has the potential to alter community character by significantly increasing cut-through traffic, unexpected vehicle maneuvers or commercial vehicle trips in a residential area.

T-H-3 Require new development to provide transit improvements, where a rough proportionality to demand from the project is established. Transit improvements may include:

- *Direct and paved pedestrian access to transit stops*
- *Bus turnouts and shelters*
- *Lane width to accommodate buses.*

General interpretation of Policy T-H-3. An impact is considered significant if the project has the potential to disrupt existing transit operations or establishes transit facilities and equipment such that it creates a sight distance deficiency or vehicle conflict point.

T-J Provide attractive and safe streets for pedestrian and bicyclists.

General interpretation of Policy T-J. An impact is considered significant if the project generates 20 pedestrians in any single hour at an unsignalized intersection, mid-block crossing or where no crossing has been established.

An impact is further considered significant if the project interrupts existing or proposed pedestrian, bicycle and transit facilities, path or travel, direct access resulting in excessive rerouting or creates a vehicle conflict condition which affects the safety of other roadway users.

5. **Traffic Signal Analysis.** The Study shall determine the need for new traffic signals in accordance with the latest edition of the California Manual of Uniform Traffic Control Devices. Bicycle, pedestrian and transit movements shall be given equal consideration with traffic progression in the evaluation of traffic signal needs. Intersections may be required to remain unsignalized and have turning movements limited by access design or median islands if signalization reduces roadway capacity.

Traffic signal warrants and model output shall be attached to the report as part of a technical appendix.

6. **Unsignalized Intersections.** The Traffic Engineering Division may require estimates of delay per vehicle and queue lengths for unsignalized intersections, using the unsignalized intersection methodology contained in the Highway Capacity Manual. New unsignalized intersection and access points may have access restrictions imposed to maintain level of service on the primary roadway.
7. **Traffic Collisions.** Special studies of traffic collision records may be required on corridors related to the project. Unless modified, the study period would normally be the prior two years with base data provided by the City. Data provided by the California Highway Patrol's Statewide Integrated Traffic Records System shall be used in the evaluation of collision history. Changes in collision potential should be related to project traffic or roadway changes, and safety measures should be included where necessary. Measures relating to collision trends shall be addressed in consultation with the Traffic Engineering Division.
8. **Sight Distance Analysis.** The report shall include analysis of existing and proposed sight distance conditions for all primary access locations, such as driveways, private roads/alleys or public intersections. The analysis shall conform to the guidance provided in the latest edition of, "A Policy on Geometric Design of Highways and Streets," published by the American Association of Street and Highway Officials (AASHTO).
9. **Pedestrian & Bicycle Impacts.** The study shall identify the location of adjacent pedestrian & bicycle facilities serving the proposed development. Where applicable, the project shall incorporate pedestrian and bicycle facilities as project features pursuant to the City of Santa Rosa General Plan, Design Guidelines, Pedestrian and Bicycle Master Plan and the Design and Construction Standards.

10. **Transit Impacts:** The study shall identify the location of adjacent or nearest transit facilities (e.g., inbound and outbound bus-stops); detail the existing transit facilities (bench, trash can, shelter, etc.) and pedestrian facilities (including ADA provisions) from the property to the bus-stop; and identify all routes and route frequency for transit operators serving the proposed development (which could include SMART, Sonoma County Transit, Golden Gate Transit and Santa Rosa CityBus). The study shall review how the new development would impact transit service operationally (e.g., by affecting transit vehicle speed, turning movements and other operational considerations). The study shall identify whether ADA-compliant pedestrian access exists to the nearest transit stops (both inbound and outbound) as well as identify new transit facilities required in accordance with adopted planning documents or identified by the Transit Division.
11. **Commercial Vehicle Impacts.** Where applicable, the report shall identify and discuss the following commercial vehicle impacts:
 - a. Required routes through non-commercial districts and how this use can be compatible and non-destructive to the community character.
 - b. Deliveries, including loading/unloading zones if identified on-street or directly adjacent to project access locations.
12. **Requirements.** If the Study identifies unsatisfactory levels of service or significant impacts within the study area, measures shall be identified which restore satisfactory levels of service or operation for which there is a feasible identified improvement. All feasible measures shall be discussed including those measures within the study area which are conditioned to be implemented by other approved developments that are assumed to be in place prior to issuance of their respective building permits.

The analysis shall provide and discuss the location, nature and extent of the proposed improvements to the transportation system that assure sufficient roadway capacity and safety. The percentage of traffic impacts attributed to the project shall be determined for each required mitigation measure.

- a. Engineering Techniques. Examples of mitigation measures are as follows:
 - i Locate access points to optimize visibility and reduce potential conflicts;
 - ii Design parking facilities to avoid queuing into public streets during peak arrival periods;
 - iii Dedicate visibility easements to assure adequate sight distance at intersections and driveways;
 - iv Signalize or modify traffic signals at intersections;
 - v Install left-turn phasing and/or multiple turning lanes to accommodate particularly heavy turning movements;
 - vi Widen the pavement to provide left- or right-turn lanes to lessen the interference with the traffic flow;
 - vii Widen the pavement to provide bike lanes;

- viii Restrict access by prohibiting left-turns to and from the proposed development;
 - ix Install a pedestrian activated flasher at a mid-block crossing or intersection.
 - b. Transportation System Management (TSM) Techniques. The Study shall identify, discuss and quantify the benefits of all TSM proposals, which may include:
 - i Establish flexible working hours;
 - ii Encourage employee use of carpools and public transportation;
 - iii Establish preferential parking for carpools;
 - iv Restrict truck deliveries during the peak-hours;
 - v Establish a monitoring program to ensure that project traffic volumes do not exceed the projected traffic demand.
13. **Exceptions.** This section does not relieve a developer from providing any mitigation as determined appropriate or feasible by the Traffic Engineering Division. Recommendation for inclusion on the exception status list included in Table 5-I and Policy TD-1 of the City of Santa Rosa General Plan shall be based on the following conditions:
- a. Proximity of a critical intersection to freeway access or a critical intersection directly affected by freeway access, where such locations may require multi-jurisdictional funding and/or major cost improvements of freeway widening and overpass reconstruction.
 - b. Statements of overriding consideration and/or exceptions to the level of service /vehicle miles traveled standards may be granted by the City Council after consideration by the Planning Commission. Such findings shall be based on a statement of overriding consideration consistent with the latest guidelines of the California Environmental Quality Act (CEQA). Consideration for exception to level of service/vehicle miles traveled standards under this category shall demonstrate the following:
 - i The total benefit of the project and/or traffic mitigations associated with the project outweigh the potential traffic impacts at a given intersection or roadway segment;
 - ii Mitigations are provided to the extent possible at the intersection or roadway segment requested for exception;
 - iii A TSM program is provided; and
 - iv An agreement is established with the City to provide for abatement for those intersections or roadway segments which may exceed the level of service criteria provided in this policy and the City of Santa Rosa General Plan.

14. **Information Requests.** The Traffic Engineering Division will provide the following information if available and if needed as part of the analysis upon request if it is available:
 - a. Traffic counts
 - b. Signal timing
 - c. Arterial classification
 - d. Committed and planned roadway improvements and schedule
 - e. Approved development and background traffic data
 - f. Available aerial photographs of the study intersections
 - g. Other information in the current road system that would affect the data or analysis (i.e., construction activities)
15. **Fair Share Methodology.** The Traffic Engineering Division in consultation with Planning and Economic Development will determine an equitable responsibility and cost of project's traffic impact. This may be related to traffic signals, widening, signal timing, striping, traffic calming (roundabouts) or other public transportation infrastructure, such as bicycle and pedestrian enhancements that the private development project affects.