Appendix F

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Redwood City Transportation Analysis Manual

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FEHR PEERS

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Introduction

Transportation Analysis Manual (TAM)

The TAM defines how to evaluate a project's effect on transportation access and circulation for all travel modes. The analysis may focus solely on the project site and access points, and may also include an evaluation of the nearby transportation system to ensure the infrastructure supports the traveling public.

The Transportation Analysis Manual (TAM) provides a clear and consistent technical approach for evaluating projects that could have transportation effects (adverse or beneficial) on the City's transportation system and services.

A transportation analysis provides essential information for decision-makers and the public when evaluating individual development and transportation infrastructure projects. A transportation analysis in Redwood City serves three purposes:

- Evaluate a project's consistency with the City's *General Plan*.
- Evaluate a project's consistency with the San Mateo County Congestion Management Program (CMP).
- Evaluate significant impacts and mitigation measures per the California Environmental Quality Act (CEQA).

Intent of the TAM

Redwood City's Citywide Transportation Plan, *RWCmoves*, seeks to "promote the best travel experience possible for everyone in Redwood City by creating and maintaining a safe, multimodal, and accessible transportation network." The TAM supports this goal by evaluating new projects against the policies of the *General Plan* and *RWCmoves*, and by determining conformance with the County's CMP and CEQA.

For environmental analysis, the TAM incorporates California's Senate Bill 743 (SB 743) where vehicle delay is replaced with vehicle miles traveled (VMT).

The TAM provides the City's approach for determining the need for a transportation analysis, its content, and identifying acceptable transportation improvements for land use and transportation projects proposed within Redwood City. The TAM establishes protocols for performing the following:

- Site Access and Circulation Plan Review (on-site).
- Local Transportation Analysis (non-CEQA) for *General Plan* and CMP consistency analysis.
- Transportation Analysis for analyzing and determining impacts under CEQA.

City staff will review transportation studies and reports based on the process presented in this Manual. ***However, each project is unique,***

and the TAM is not intended to be prescriptive beyond practical limits. Not all criteria and analyses described in this Manual will apply to every project. Early and consistent communication with Community Development & Transportation Department staff is encouraged to confirm the type and level of analysis required for each study.

Environmental Evaluation

SB 743 changed some of the transportation significance criteria used in CEQA analyses. Specifically, vehicle level of service (LOS) is no longer used as a determinant of significant environmental impacts, and a VMT analysis is required.

This Manual outlines the required methodology and thresholds with which to evaluate projects, consistent with the latest *CEQA Guidelines* (Governor's Office of Planning and Research, December 2018).

Project Types

A transportation analysis is prepared for a project before a discretionary action is taken. The following types of projects, which involve development activity in and around Redwood City and affect the adjacent transportation system, may require a transportation analysis.

- **Land use entitlements** requiring discretionary approval by Redwood City, which includes *General Plan* amendments, precise plans and specific plans (and related amendments), zoning changes, use permits, planned developments, and tentative subdivision maps.
- **Land use activity** advanced by agencies other than Redwood City that is subject to jurisdictional review under State and federal law such as school districts, Peninsula Corridor Joint Powers Board, and others, or advanced within Redwood City by agencies other than the City, that is inconsistent with the City's *General Plan*.
- **Transportation infrastructure modification or expansion**, including capital improvement projects on City roads, county roads and State highways that may impact City facilities and services.

The *Determining the Need for a Transportation Analysis* chapter identifies specific project parameters or "triggers" that may necessitate a transportation analysis.

CEQA and Non-CEQA Terminology

To distinguish the CEQA analysis from the non-CEQA analysis (i.e., the local transportation analysis) the analyses apply different terminologies as summarized below in Error! Reference source not f ound..

Table F-1: Comparison of Select Non-CEQA and CEQA Terms

Non-CEQA Term	CEQA Term
Local Transportation Analysis	CEQA Transportation Analysis
Threshold or performance standard	Significance criteria
Substantial effect or deficiency	Significant impact
Mitigation improvement	Mitigation measure
Existing Conditions	Baseline Conditions
Background Conditions	Not applicable
Cumulative Conditions or General Plan Conditions	Year 2040 Cumulative Conditions

Determining the Level of Transportation Analysis

What level of transportation analysis is required?

The need for a transportation analysis may stem from General Plan consistency, CMP consistency, CEQA compliance, or all three. The scope of the content will vary based on the type and scale of the project per the City's established screening criteria.

Screening Criteria

The applied screening criteria varies by the type of analysis being completed. This section outlines the different screening thresholds for General Plan consistency, CMP consistency, and CEQA impacts. All projects need to document and justify the applied screening criteria for City review and concurrence. The screening process is discussed below and illustrated in **Figure F-1**.

General Plan Consistency Screening

Projects that generate fewer than 100 net new peak hour vehicle trips are generally not required to conduct a General Plan Consistency analysis. Net new trips include the project's trip estimates minus existing uses, as applicable.

Using the most recent vehicle trip generation rates available, examples of projects that generate around 100 peak hour vehicle trips include:

- ~100 units of Single Family Residential
- ~200 units of Multifamily Residential
- ~130,000 s.f. Office

Projects that generate fewer than 100 net new peak hour vehicle trips are still required to provide a site access and circulation analysis, including parking supply and loading evaluation to demonstrate that the project conforms to City policies and standards. Key elements of this assessment are included in the checklist in **Attachment A: Site Access and Circulation Plan Review**.

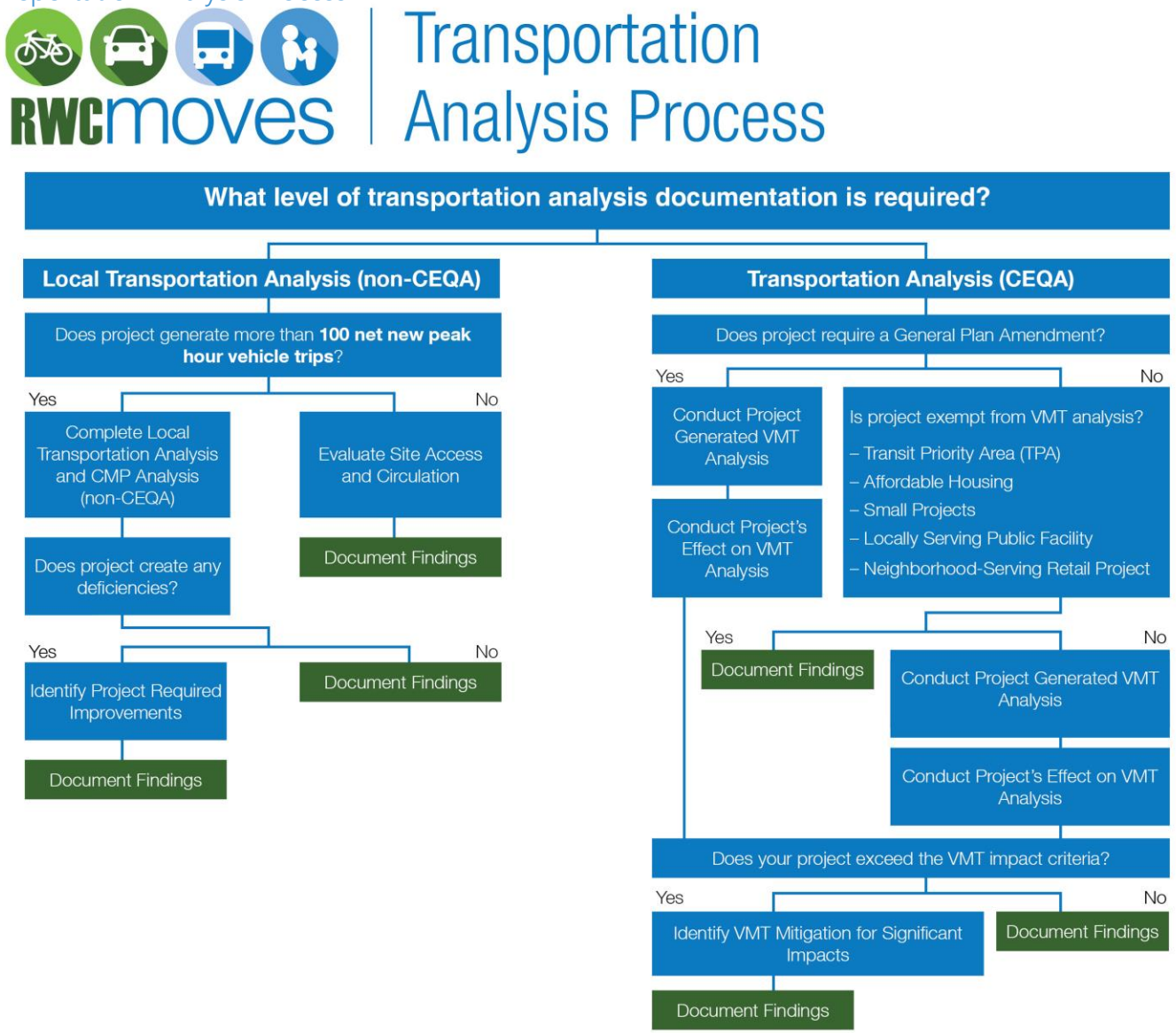
CMP Consistency Screening

Projects should reference the most recent C/CAG guidelines to determine the need for a traffic impact analysis consistent with CMP guidelines. Currently, projects that generate fewer than 100 net new peak hour vehicle trips are not required to conduct a CMP analysis.

CEQA Screening

Projects that can be presumed to cause a less-than-significant impact without conducting a detailed study can be screened out and would

Figure F-1: Transportation Analysis Process



not require a VMT analysis for CEQA purposes. However, even if a project is exempt from VMT analysis, it may still be required to evaluate the following CEQA requirements:

- Conflicts with a plan, ordinance, or policy addressing the circulation system, including transit, roadways, bicycle lanes, and pedestrian paths; or
- Substantially increases hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Results in inadequate emergency access.

CEQA screening criteria for land use and transportation projects are listed below. Projects that do not meet the screening criteria must conduct a VMT analysis [see *Transportation Analysis (CEQA) for Land Use Projects* and *Transportation Analysis (CEQA) for Transportation Projects* chapters].

Land Use Project Screening

Based on suggestions from the State of California's Office of Planning and Research (OPR) *Technical Advisory* (December 2018, pages 13-15), land use projects that meet at least one of the following screening criteria are presumed to not require CEQA transportation analysis:

- **Transit Priority Areas (TPA)**: Projects located within ½-mile walkshed around major transit stops[1] (i.e., Redwood City Transit Center Station) or within ¼ mile walkshed around high-quality transit corridors[2] (i.e., El Camino Real) in Redwood City as shown on **Figure F-2**. However, TPA screening would only apply if the project meets all of the following criteria:
  - Floor Area Ratio (FAR) of 0.75 or more; and
  - Total square footage of 500,000 square feet or less; and
  - Proposed parking does not exceed minimum required by the Zoning Code or applicable plan; and
  - Project is consistent with the *Redwood City's General Plan*, applicable Specific Plan, or applicable Sustainable Communities Strategy (as determined by the lead agency, with input from MTC); and
  - Existing on-site affordable residential units are maintained or increased; and
  - Less than significant levels of VMT are expected due to project-specific or location-specific information.

[1] "Major transit stop" is defined in Public Resources Code 21064.3 as a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.

[2] "High-quality transit corridor" is defined in Public Resources Code 21155 as a corridor with fixed-route bus service with service intervals no longer than 15 minutes during peak commute hours.

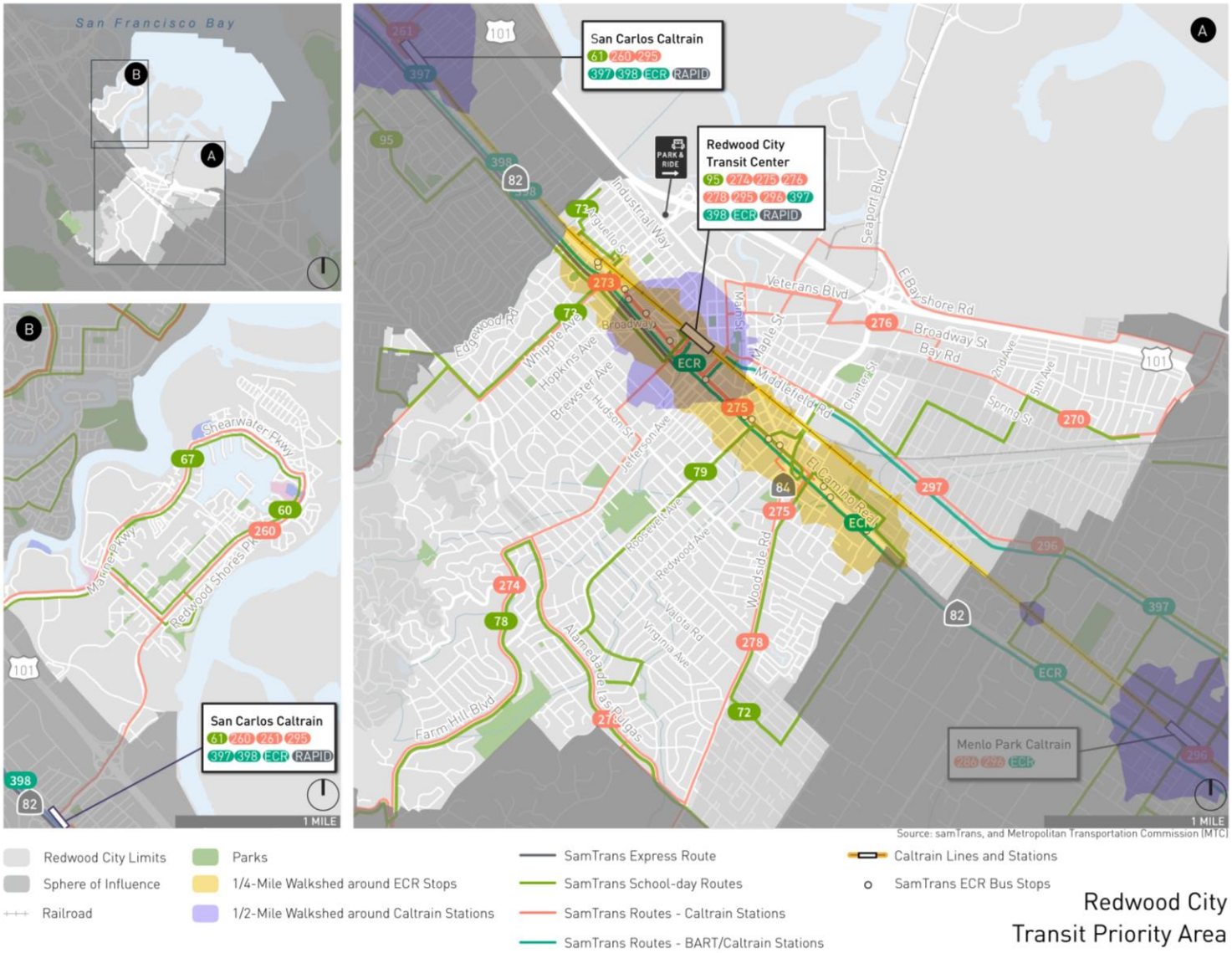
- **Affordable Housing**: 100% restricted affordable residential projects in infill locations (i.e., development within unused and underutilized lands within existing development patterns) and near transit (i.e., is within half a mile of a transit stop).
- **Small Projects**: Projects defined as generating 150 or fewer average daily vehicle trips, absent substantial evidence indicating that a project would generate a potentially significant level of VMT. Examples of projects that may generate 150 average daily trips include:
  - ~15 units of single family residential
  - ~20 units of multifamily residential
  - ~15,000 s.f. office
  - ~20,000 s.f. industrial

  Each project is required to document the estimated number of trips it will generate.
- **Locally Serving Public Facility**: Locally serving public facilities that encompasses government, civic, cultural, health, and infrastructure uses and activity which contribute to and support community needs. Locally serving public facilities include police stations, fire stations, passive parks (parks designed for use in an informal way and typically less developed), branch libraries, community centers, public utilities, and public schools. Public facilities will generally have a maximum intensity of 1.0 FAR and a maximum height of three stories: higher structure heights are permitted for facilities within Downtown per the Downtown Precise Plan.
- **Neighborhood-Serving Retail Project**: Neighborhood-serving retail projects that are less than 30,000 square feet, which serve the immediate neighborhoods and have a similar use within three miles. Examples include dry cleaners, coffee shops, convenience markets, pharmacies, tutoring centers and daycare centers.[3]

Each component of a mixed-use project is considered separately; therefore, each of the project's individual land uses should be compared to the screening criteria. It is possible for some of the mixed-use project's land uses to be screened out and some to require further analysis.

[3] Daycare centers of 15,000 square feet or less would qualify for screening out.

Figure F-2: Redwood City Transit Priority Areas



Recommended Process and Documentation

The project applicant shall retain a transportation professional consultant to conduct the required transportation analysis. The applicant's consultant should seek City acceptance of the scope of work before initiation. In some cases, review by other affected jurisdictions will be required. **Attachment B: Transportation Analysis Report Outline** contains a recommended outline for the transportation analysis documentation.

Each transportation analysis will begin by preparing a scope of work that describes the project, site location, analysis methods, area-wide assumptions, study elements, study time periods, and transportation data collection methods. The transportation analysis scope of work along with initial estimates of the project trip generation, trip distribution, and VMT screening evaluation should be submitted to City staff for review and approval.

Role of City Staff

The transportation analysis will be prepared at the direction of City transportation and planning staff. This will ensure that potential transportation improvements and environmental impacts are considered as early as possible in the planning process. Development of a transportation analysis should include:

- Pre-application coordination, which will include a discussion of the TAM requirements.
- Approval of the scope of work, which includes trip generation, study area, analysis scenarios and parameters, data requirements, and provisions for pedestrian, bicycle and transit modes.
- Approval of the project trip generation (person and vehicle), trip distribution and VMT estimates.
- Review of all assumptions and the results of Existing Conditions analysis.
- Review of the administrative draft report, with adequate time for comments.
- Review of a draft report, with adequate time for comments.

If information from a transportation analysis will be incorporated into the transportation and circulation section of an environmental document (e.g., Initial Study, Mitigated Negative Declaration or Environmental Impact Report), the format of the transportation analysis report should be coordinated with the environmental consultant and City staff.

Consultation with Other Jurisdictions

Section 15086 of the *CEQA Guidelines*[4] shall be followed as the basis for satisfying consultation requirements. In most cases, overlap will occur for roadway system analysis (i.e., not VMT) but may also include impact analysis of active transportation modes (bicycling and walking), as well as transit system facilities and services. If the study area overlaps with other jurisdictions, staff from those jurisdictions must be consulted to verify study locations, analysis methodologies, and the substantial effect thresholds. As appropriate, adjacent jurisdictions should be contacted to provide current development applications. Caltrans should be consulted for projects that affect the state highway system, including US 101, Interstate 280, State Route (SR) 82 (El Camino Real), and SR 84 (Woodside Road). Roadway crossings of rail lines are another overlap area that require coordination with the California Public Utilities Commission (CPUC). The focus of any analysis related to rail crossings should be on whether the current crossing complies with current design standards.

[4] *The California Environmental Quality Act Guidelines*, California, 2019.

Trip Generation and Forecasting Tools

The local transportation analysis for General Plan and CMP consistency is based on vehicle trip generation, while CEQA analysis is based on VMT generation. This section describes how vehicle trip generation and VMT can be estimated, and how cumulative traffic forecasts are developed.

Project Trip Generation

How do I Estimate the Project's Trip Generation Characteristics?

Person and vehicle trip generation rates are a way to estimate the number of expected pedestrian, bicycle, transit, and vehicle trips a proposed development will generate. These rates establish the basis of analysis for a proposed project and its effects on the transportation network. Person trip generation should be reported for walking, bicycle, and pedestrian trips; and vehicle trip generation should be reported for single-occupant, carpool and transportation network company (TNC) (i.e., Uber/Lyft) trips.

Vehicle Trips

The state-of-the-practice is deriving vehicle trip generation rates from local empirical data, as this will provide the most accurate forecast for future land use vehicle trip making. This typically requires surveying a similar existing land use at three unique locations to quantify the number of daily and morning, mid-day, and evening peak period person and vehicle trips generated. *RWCmoves* includes local empirical trip generation rate data for housing and office land use types that should be used, where appropriate.

The City understands that trip generation surveys may not be practical in all cases and that the latest Institute of Transportation Engineers' (ITE) *Trip Generation Manual* is a reasonable alternative when local data is not available. In the absence of empirical studies, the most recent vehicle rates published by ITE in the *Trip Generation Manual*[5] or other relevant sources may be used to estimate trips. When using ITE rates, the time period selected should reflect peak travel periods on adjacent streets and care shall be exercised in utilizing rates developed from a small study size (fewer than 20 studies) or with a low R^2 value (less than 0.75).[6]

[5] *Trip Generation Manual* (10th Edition), Institute of Transportation Engineers, 2017.

[6] R^2 is the coefficient of determination defined as the percent of variance in the dependent variable (number of vehicle trips) associated from the independent variable (size of the project).

In some cases, the peak hour of the generator may occur outside the typical peak commute hours and may require additional analysis (e.g., a regional shopping center on a Saturday).

The City reserves the right to require the project sponsor to conduct local trip generation surveys for select projects depending on land use and conditions in the field.

Person Trips

As applicable, person trip generation should be presented for single occupant vehicles (SOV), carpool, rideshare, transit, bicycle, and pedestrian trips. Person trip generation rates should be developed from empirical studies, person travel survey data, or conversion of vehicle trip rates to person trip rates using a vehicle occupancy factor. In addition, person trip generation by mode may be derived using an approved analysis tool that incorporates data from the above sources.

Establishing Trip Generation Rates for an Unknown or Unique Use

For projects where the ultimate land-use is not certain (for example, a large subdivision of flexible commercial-industrial parcels), there are two options for establishing the trip generation rates:

- **Option 1:** City staff will recommend the use of the highest traffic intensity among all permitted uses to establish traffic impacts.
- **Option 2:** Estimates can be made using a lower traffic intensity use if the City and developer establish a maximum trip allowance. Once a proposed land use has been identified, then 1) the subdivision trip generation allowance must be monitored by the City as development occurs; and 2) the transportation analysis may need to be updated.

Trip Rate Credits for Existing Uses

The estimate of new trips generated by the proposed development project may include credit for trips associated with existing uses on the site. Uses are considered as existing if they are actively present on the project site at the time data is gathered for the transportation impact analysis. Additionally, if a planned (but not constructed) use was already permitted for the site and an improvement(s) was identified and funded, the new transportation analysis only needs to assess the effects of additional trips above and beyond the trips for the permitted use.

Trip Rate Reductions for ITE Rates

Standard rates published by ITE are generally developed for suburban sites where access is primarily made via personal automobile. Redwood City recognizes that the rates may overstate the traffic impact for developments that contain a mix of uses (and

"capture" some vehicle trips internally) or are in denser areas such as downtown Redwood City. Additionally, certain commercial land uses attract vehicles on the roadway, rather than generating new trips. This section discusses reductions that may be taken under these circumstances.

The residential and office rates included in *RWCmoves* already take into consideration the mix of uses, multimodal access, and availability of Transportation Demand Management (TDM) strategies. *RWCmoves* rates should not be further reduced unless, at the City's discretion, the applicant can demonstrate the justification for further reductions.

Internalization/ Walking, Bicycling or Transit Trips

Internal or captured trips are trips that do not enter or leave the driveways of a project within a mixed-use development. They are similar to active transportation trips (e.g., walking or bicycling) or transit trips in a setting like Redwood City, where destinations may be reached on foot (a "park once" environment). These trips do not add vehicle traffic to the local roadway system. Trip rate reductions are allowed for internalization for internal trips at mixed-use sites or in downtown Redwood City. Specifically, trip generation estimates may use trip adjustments due to land use variables such as **D**ensity, **D**iversity, **D**esign and **D**estination to enhance its sensitivity to the built environment. These four most commonly discussed built environment factors and their effects on vehicle trips are summarized as follows:

- Net Residential and Employment **D**ensity – A wide body of research suggests that, all else being equal, denser developments generate fewer vehicle trips per unit than less dense developments.
- Jobs/Housing **D**iversity – Research suggests that having residences and jobs in close proximity will reduce the vehicle-trips generated by each land use by allowing some trips to be made on foot or by bicycle.
- Walkable/Bikeable **D**esign – Many pedestrian and bicycle improvement projects are based on the assumption (supported by some research findings) that improving the walking/biking environment will result in more active travel trips (e.g., walking, bicycling, etc.) and a resulting reduction in vehicle travel.
- **D**estination Accessibility – Research shows that, all else being equal, households situated near regional centers of activity generate fewer vehicle trips and VMT.

Other built environment factors such as demographics, distance to transit, and employment within 30 minutes by transit also affect vehicle trip making. Reductions shall be based on empirical and peer-reviewed data, and quantitatively supported in the transportation analysis report. If trip rates are derived from a local survey of a similar land use or derived by a mixed-use trip generation estimator, additional trip reductions may be permitted based on location and other factors. Tools are available from ITE and other sources to estimate these reductions. City staff may provide direction

on which analysis tools are most appropriate for a particular project's transportation analysis.

Pass-by / Diverted Link

Restaurants, convenience stores, gas stations, banks, and similar commercial land uses often locate on high traffic volume roads to attract motorists already on the street. These attracted trips are not new traffic to the adjacent street system, but simply access a new use as part of their current travel path. These trips are known as pass-by trips. For commercial land uses on arterial or collector streets, a reduction for pass-by trips supported by analysis may be used. Analysis resources may include the *ITE Trip Generation Handbook* Chapter 10 or a documented and relevant study. To ensure adequacy of project driveways, the access analysis at these locations should reflect total site-generated trips, and not include any pass-by or similar reductions.

Diverted link trips are similar to pass-by trips in that they are vehicle trips already on the roadway network. However, the key difference is that diverted link (link meaning roadway) trips pull traffic from other roadways (not adjacent to the project site) onto the roadway(s) serving the development. Thus, these trips *do* add traffic to adjacent streets serving the site and should not be included as a reduction.

As an example, a new gas station is proposed on a minor street one block away from a major arterial street. The trips that are attracted to the station site from existing traffic on the major arterial are diverted link trips. Those trips attracted to the site from existing traffic on the minor street in front of the new gas station are defined as pass-by trips. In both cases, these are not new trips to the overall network but come from existing volumes on adjacent or nearby roadways.

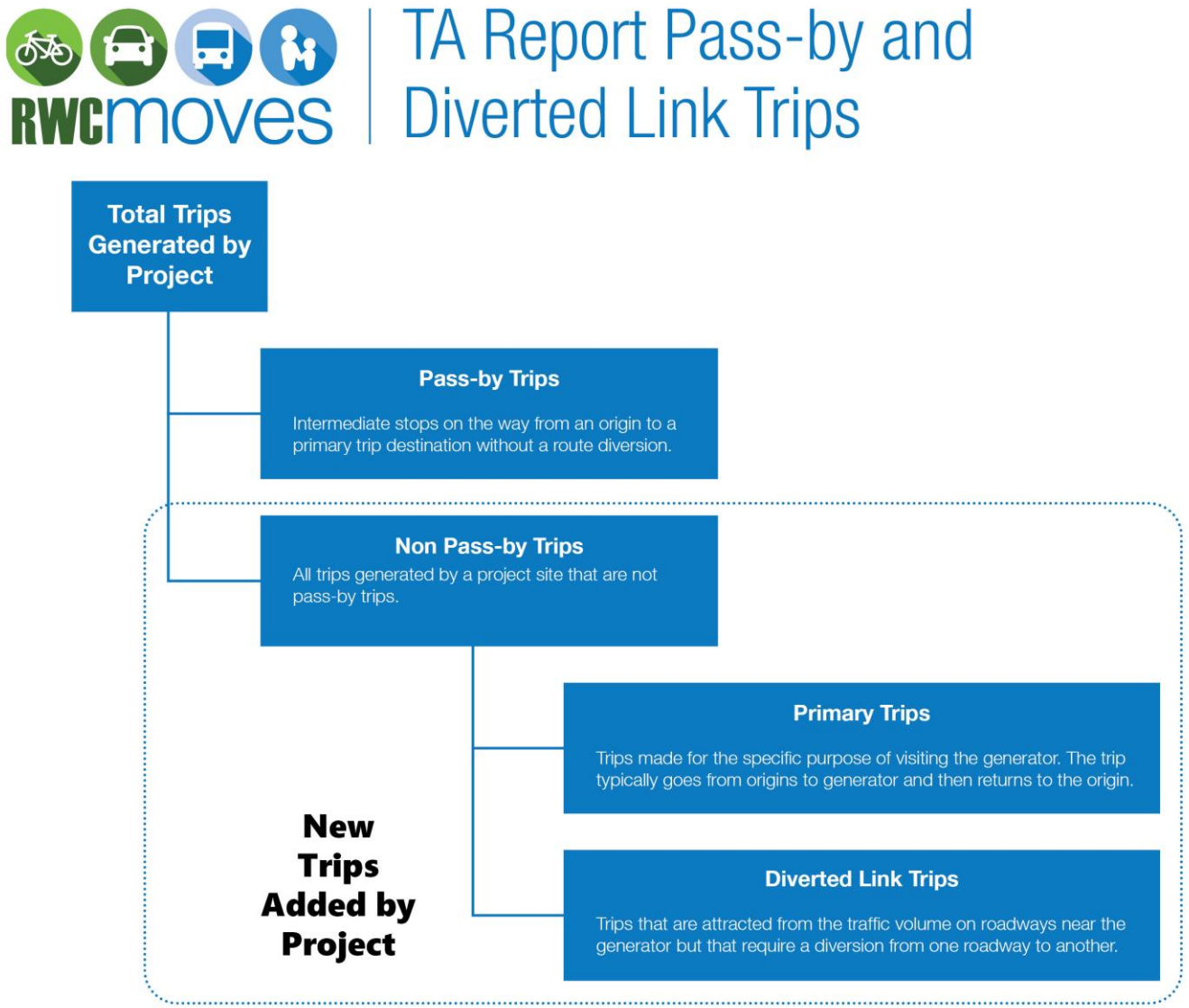
Transportation Demand Management Reductions

In addition to compact land use development (characterized by density, diversity, design, destination accessibility, transit accessibility, and affordable housing), TDM strategies for transportation can further reduce the vehicle trips from a project site such as:

- **Neighborhood / Site Enhancement** – Bicycle and pedestrian network, car sharing programs, traffic calming, and site design to support other travel modes;
- **Parking Policy / Pricing** – Parking supply limits, unbundling parking cost from property cost, and public parking pricing;
- **Transit System Improvements** – Built environment and access transit stop improvements;
- **Commute Trip Reduction** – Transit fare subsidy, employee parking cash-out, alternative work schedules, priced workplace parking, shuttles, and employer sponsored vanpools.

TDM strategies planned for the project should be included in the analysis, with the corresponding recommended reduction in vehicle trip generation for each element clearly stated. Any trip rate reductions claimed for a TDM strategy is subject to approval by City staff.

Figure F-3: TA Report Pass-by and Diverted Link Trips



VMT Estimation and Cumulative Travel Forecasts

To conduct transportation forecasts and VMT analysis that meets environmental regulatory conditions and provides a high level of confidence in the analysis results, analysts should follow state-of-the-practice or best practice methods for transportation forecasting.

For consistency, analysts are required to use the San Mateo County and Santa Clara County Travel Forecasting Model (C/CAG model) and ensure it is sufficiently accurate and sensitive within the study area and for the types of land use and transportation changes associated with the project.

- Conduct sub-area validation of the community being studied, if necessary
- Prepare the following model runs
  - Baseline without Project
  - Baseline with Project
  - Cumulative without Project
  - Cumulative with Project

Depending on the specific year represented by "base year" conditions, model output may need to be adjusted to represent "baseline" conditions for CEQA purposes.

Local Transportation Analysis (non-CEQA)

What is included in a local transportation analysis?

The contents and extent of a local transportation analysis depend on the location and size of the proposed development, the prevailing transportation conditions in the surrounding area, and questions being asked by decision makers and the public.

The City is committed to a balanced level of analysis for all modes of travel. The methods presented in this chapter include robust data collection and analysis techniques for pedestrian, bicycle and transit networks, in addition to vehicle circulation. In general, **a local transportation analysis is needed if a project generates more than 100 net new peak hour vehicle trips**.

Study Area

The study area can be thought of as the area of influence of a project, and is determined by evaluating the project location and how it may affect all transportation modes and facilities. It is not simply a map showing where the project is located. Each local transportation analysis will consider the adjacent transportation system for site access and circulation of land development projects and street modifications for transportation projects.

To properly assess the site access, the City may require off-site intersection analysis or other multimodal analysis. Generally, intersections within a one-mile radius that are known to currently operate at LOS D (or LOS E in Downtown) or worse based on previous studies, and where the project adds at least 30 or more peak hour trips per lane to any movement should be considered for analysis. The study area may include the nearest CMP facility to evaluate the proposed project's conformity with the CMP.

Applicants should consult with the City early regarding the study area and need for off-site multimodal analysis based on local or site-specific issues, especially those related to pedestrians, bicycles, rail crossings, and transit.

Multimodal Access and Circulation

A detailed, multimodal site access and circulation plan review is required for all projects. The transportation analysis should include a review and summary of findings of the following qualitative and quantitative features included in the checklist in **Attachment A: Site Access and Circulation Plan Review**.

An important aspect of a transportation analysis is to provide sufficient information for the City to determine if a project is consistent with the *General Plan*, other applicable City plans, and

relevant design standards. Individual projects must be reviewed against relevant policies contained in the *General Plan* and other plans, policies, and standards. The *Introduction* chapter presents the guiding principles for Redwood City. Applicants should review the full policy statements in the latest *Circulation Section* of the *General Plan – Built Environment Element*.

If the study area extends into an adjacent jurisdiction, the applicant may be responsible for analyzing project-generated operational impacts in these jurisdictions. These include intersection or segment locations in any other jurisdiction, including Caltrans-maintained facilities. The applicant shall refer to current policies in the respective jurisdiction to identify the appropriate significance criteria.

Details on how intersection and roadway segment LOS will be analyzed, and operations addressed, are discussed in the deficiency sections toward the end of this chapter. Per the *General Plan*, physical improvements focus on operational efficiencies (i.e., signal coordination, modified timings) and enhancements to improve bicycle and pedestrian travel as needed, but generally do not include roadway expansion to address overall LOS.

Key Study Elements

The extent and complexity of a transportation analysis can vary greatly. **Table F-2** summarizes the basic requirements for every project requiring a complete transportation analysis. Specific significance criteria for each of the listed elements are described in further detail in the *Transportation Analysis (CEQA) for Land Use Projects* and *Transportation Analysis (CEQA) for Transportation Projects* chapters. To avoid substantial off-site improvements or changes to the project site plan/description after the transportation analysis is completed, a preliminary site plan shall be included for a "fatal flaw" evaluation.

Table F-2: Local Transportation Analysis – Key Study Elements and Evaluation Criteria

Study Element	Evaluation Criteria
***General Plan* and *RWCmoves* Consistency**	Evaluate the project against goals, policies, and actions set forth in the *General Plan, RWCmoves,* and *Congestion Management Program*.
Parking	Compare the project parking plan with City and local precise plan and specific plan standards and discuss how the proposed supply will affect demand for walking, bicycling, and transit modes. If a mix of land uses is proposed on-site, or complements adjacent land uses, justify how the development will make use of shared on-site parking.
On-Site Circulation	Review and evaluate site access locations, turning radii, truck loading areas, emergency access, and other site characteristics with respect to operations and safety for all modes of transportation.
Pedestrian Facilities	Identify any existing or planned pedestrian facilities that may be affected by the project. Document how the project will affect local pedestrian circulation (e.g., disclose how widening a road or adding a driveway will affect pedestrian safety and walking times).
Bicycle Facilities	Identify any existing or planned facilities (per *RWCmoves*) that may be affected by the project.
Transit	Identify any existing or planned transit facilities that may be affected by the project. If appropriate, document how the project improves access to or utilization of transit. For system planning, use crush load as capacity, not seated capacity.
TDM Program Consistency	Evaluate project against mode split targets and other elements outlined in *RWCmoves* or in the latest TDM Program ordinance.
Safety Assessment	Evaluate project trips added to intersections or street segments that have safety enhancement projects identified within the study area that are proposed as part of *RWCmoves* or other future safety studies, such as Vision Zero.
Trucks (or Other Large Vehicles)	For relevant industrial projects, identify the number of truck trips that will be generated, and design facilities necessary to accommodate these trucks.
Autonomous Vehicles or Transportation Network Company Pick-up/Drop-Off	For projects where autonomous vehicles and/or transportation network companies may have a large number of pick-ups/drop-offs, the project site circulation and pick-up/drop-off areas must be reviewed to identify opportunities and constraints of the project site. Modifications to the site circulation and/or pick-up/drop-off may be recommended.
Off-Site Traffic Operations	Roadway facilities within one mile that are known to operate at LOS D (or according to the LOS standard as set by the *CMP* or the *General Plan*) or worse under Existing Condition based on previous studies and the project adds 30 or more peak hour trips may be required to be analyzed. The City reserves the right to define the study area. All roadway facility analysis should be conducted using the latest version of the *Highway Capacity Manual* (HCM).
Intersection Traffic Control	Evaluate unsignalized intersections located within the study area to determine appropriate traffic control under project conditions. Analysis should consider the appropriateness of roundabouts as an alternative to traffic signals.
Other Issues	Consider other issues on a case-by-case basis (e.g., construction deficiencies, queuing between closely spaced intersections, emergency access, special event traffic)
Other Jurisdictional Requirements	In situations where several agencies must approve a development or are responsible for affected roadways, the applicant must contact lead and responsible agencies to determine issues to be addressed, scope of study, etc. In general, the applicant will be responsible for analyzing project impacts against appropriate jurisdictional thresholds; however, the analysis method will be determined by the City in compliance with CEQA and the impacts will be mitigated consistent with City standards.

Data Collection

Accurate data is essential to achieve a high level of confidence in transportation analysis results. Existing transportation data shall be collected using the requirements set forth below. Data should be presented on maps or figures where appropriate. To address the specific needs of each project, the extent of data collected shall be at the discretion of City staff.

- **Pedestrian/Bicycle Facilities** – The report will document the existing pedestrian and bicycle facilities serving the project site. Elements will include presence and width of sidewalks, curb ramps, crosswalks or other pedestrian facilities within ½-mile walking distance of the project site, and bicycle facilities (e.g., routes, lanes or shared use paths) within a two-mile bicycling distance of the project site. Document barriers, deficiencies and high-pedestrian demand land uses including schools, parking, senior housing facilities, parks, and transit stops or centers. Consider using evaluation tools such as ***www.walkscore.com*** or similar tools to quantify walkability. The report will note any deficiencies or enhancements planned or recommended in *RWCmoves* or future planning documents.
- **Transit Analysis** – The report will document transit lines that serve the project site (e.g., within ½-mile walking distance), including stop locations, frequency of service, and any capacity issues. It will also describe transit stop amenities (e.g., benches, shelters, etc.).
- **Multimodal Peak-Period Turning Movement Counts** – Turning movement counts, including vehicles, bicycles, and pedestrians, will be collected for each study time period at all study intersections. The following parameters will be followed (fall and spring days while school is in-session are preferred):
  - Data collection will cover at least two hours to ensure the peak hour is observed.
  - As applicable, 48-hour machine counts will be used to identify the peak period before conducting other counts or analysis.
  - Traffic volumes should not be influenced by a holiday, weather, construction, or other temporary change.
  - The percent of traffic that consists of heavy trucks will be noted/estimated during data collection.
  - Some projects may require vehicle classification or occupancy counts. Consult with City staff on a case-by-case basis.
  - Traffic counts that are older than two years at study initiation will not be used without consultation and approval by City staff. These counts may need to be adjusted to reflect current year traffic volumes.
- **Roadway Geometry** – Document existing roadway and intersection geometries and lane configurations. Information from aerial photography and street views should be verified with a site visit(s).

- **Intersection Controls, and Signal Timings** – For use in intersection analysis, intersection control types and signal timings and phasing should be based on signal timing sheets (available from Redwood City or Caltrans) and verified during site visits.
- **Mode Split** – Summarize daily and peak hour mode split for the study area land uses. Data could include *RWCmoves*, U.S. Census journey-to-work data, empirical surveys, or any other available surveys.

Scenarios for Local Transportation Analysis (non-CEQA)

How many local transportation analysis scenarios are required?

When a LOS analysis is required, the range of analysis scenarios is dependent on several factors:

- Project size and complexity
- Planned construction schedule (i.e., phasing)
- Location and potential impact relative to other approved development
- Consistency with the *General Plan*
- Consistency with the CMP

The range of scenarios includes Existing Conditions, Background Conditions, and Cumulative Conditions. Projects consistent with the *General Plan* will only be required to complete the Existing and Background conditions analysis; where Existing Conditions looks at the effect of the proposed project on the existing system within the next year or two, and Background Conditions typically looks at a longer time frame of about three to five years. Inclusion of all three analysis conditions (e.g., Existing, Background, and Cumulative), would typically occur for large development projects, General Plan Amendments, Precise Plans, and Specific Plans (and related amendments), with Cumulative Conditions having a time horizon of 10 to 20 years.

The following analysis scenarios will document existing or future conditions, any deficiencies, and identify deficiencies that will result from the addition of the project. Each scenario will include a qualitative description of transportation facilities for all modes (and any planned enhancements), traffic volumes, and a quantitative analysis of intersection LOS. Key study elements are identified in the *Multimodal Analysis Methods* section of this chapter. Details regarding each transportation analysis scenario are presented below.

Existing Conditions

Existing without Project

These conditions are based on recent field observations and recent (less than two years old) traffic count data.

Existing with Project

Traffic volume forecasts for roadway analysis reflecting Existing Conditions with traffic generated by the proposed project. For re-use or conversion projects, this will involve accounting for any existing use of the site that remains or will be removed. It should also qualitatively describe how the project will affect transportation for other modes including compliance or relation to other City documents.

Background Conditions

Background without Project

Traffic volume forecasts for roadway segment and intersection analysis should reflect Existing Conditions with growth due to approved development that is expected to be operational before or concurrently with the proposed project. This scenario may not be needed if the study area has limited or no approved developments.

Background with Project

This scenario represents the Background Conditions with vehicle trips added by the proposed project. This scenario provides decision-makers and the public with a view of conditions with all recently approved development and physical improvements including the proposed project.

Cumulative Conditions (General Plan Amendments and Specific Plans)

Cumulative without Project

Transportation conditions for all travel modes in the study area reflecting all approved projects, pending projects, or expected development of other areas of Redwood City designated for growth under the *General Plan,* a Precise Plan, or a Specific Plan. In most cases, the project site will likely be vacant under this scenario. In some cases, this scenario may need to account for any existing uses on the site that could continue, and potential increases in development allowed by ministerial approvals.

Cumulative with Project

This scenario represents the cumulative future transportation conditions with anticipated changes to the transportation system and the additions of project trips, and provides the long-range view of future traffic operations.

Analysis Time Periods

What time periods need to be analyzed?

Based on the land use of the proposed project and upon consultation with City staff, the study shall analyze traffic operations during the peak one-hour of the following time periods for the CMP time periods.

- Weekday morning peak (7:00 – 10:00 AM)
- Weekday evening peak (4:00 – 7:00 PM)

For some projects, the City may substitute or require additional peak hour analysis for the following time periods.

- Weekday afternoon peak (2:00 – 4:00 PM)
- Friday evening peak (4:00 – 7:00 PM)
- Weekend mid-day peak (11:00 AM – 1:00 PM)
- Sunday or holiday evening peak (4:00 – 7:00 PM)

For example, retail commercial projects that are 100,000 square feet or larger should evaluate operations for Saturday mid-day peak hour conditions, in addition to the standard weekday morning and evening peak periods. The determination of study time periods should be made separately for each proposed project based upon the peaking characteristics of the project-generated traffic and peaking characteristics of the adjacent street system and land uses.

Multimodal Analysis Methods

The report should provide a qualitative evaluation of the project's potential adverse or beneficial effects on transportation facilities and services related to pedestrians, bicycles, transit, and rail crossings.

For some projects, more detailed multimodal analysis may be required. Such analysis shall be decided upon in consultation with City staff and consider new tools, methods, and performance measures such as those listed below.

- **Multimodal LOS** – The *Highway Capacity Manual* (6th Edition) contains methods for multimodal LOS. Alternatively, simulation models can be used to measure performance (i.e., person-delay) for all modes within a transportation network.
- **Level of Stress (LTS)** – There are several methodologies for evaluating LTS for bicycle facilities. These methodologies generally rely on street widths/number of vehicle lanes, vehicle speeds, daily volumes, and type of bicycle facility to evaluate "low stress" bike networks.
- **Transit Capacity** – The project's person trip estimates can be used to forecast transit demand and evaluated against available transit capacity.
- **Activity Connectedness** – Travel time for each mode (e.g., walking, bicycles, transit, and vehicles) between the project and surrounding land uses can be used to gauge the degree of accessibility for a project. The City desires to minimize

travel time to necessary destinations while minimizing unnecessary vehicle travel.

Tools such as geographic information systems or online tools (e.g., Index and Walk Score) can be used to gauge this measure specifically for walking. The main idea is to evaluate activity centers and destinations around projects to ensure that walk times to necessary destinations are minimized and the walking experience is comfortable.

- **Mode Split** – *RWCmoves* has a goal to achieve over 50 percent of trips made by non-driving modes by the year 2040 (*RWCmoves* Goal 5). Local transportation analysis reports should describe how the project will strive to achieve the citywide mode split target and compare to available travel surveys.
- **Safety Assessment** – Evaluate whether the project adds vehicle trips to an intersection or roadway segment within the study area that was identified for safety improvements in *RWCmoves* or other future safety studies, such as Vision Zero.
- **Speed Management** – Desired travel speeds for each mode should be considered in project evaluation where new transportation facilities are being constructed. For urban areas, the City desires roadways to achieve target speeds that would help reduce the number and severity of collisions. Desired speeds for commuter bikeways and pedestrian ways will depend on the surrounding context, but the intent is to minimize barriers or obstructions to bicycle and pedestrian movements.

Traffic Operations Analysis

Traffic operational deficiencies shall be analyzed using standard or state-of-the-practice professional procedures. The main issues related to traffic operations analysis are the method, input data, and assumptions. These three items influence the level of confidence and the associated level of defensibility of the transportation analysis. For traffic operations, this requires following the procedures and techniques published in the most recent *Highway Capacity Manual* (HCM).

Traffic Signal Parameters

Traffic signal parameters are as important as accurate turning moving counts for determining intersection LOS. As summarized in **Table F-3**, the following intersection data should be collected and/or calculated along with the traffic counts. Traffic signal timing information should be collected from City or Caltrans staff, and verified in the field.

Table F-3: Traffic Signal Parameters

Parameter	Recommendation
Peak Hour Factor (PHF)	PHF for Existing Conditions should be collected and calculated from the traffic count data. It should be calculated individually for each isolated intersection, and grouped for closely spaced intersections. For cumulative scenarios or Existing Conditions where the PHF is not available, refer to the most recent *Highway Capacity Manual* (HCM) and maintain consistency throughout the analysis periods. If a simulation model is used for analysis, the PHF should be applied over more than a 15-minute period.
Saturation Flow Rate	A field measurement of the saturation flow rate is recommended in accordance with procedure in the HCM, Chapter 31, Signalized Intersections: Supplemental. For Cumulative Conditions, use the value recommended in the most recent HCM unless physical conditions and traffic controls warrant a change. The HCM recommends 1,900 vehicles per hour per lane.
Yellow Phase	Ranges from three to six seconds, with longer values in this range used with phases serving high-speed movements. If a traffic signal is present under Existing Conditions, use existing yellow phase (HCM, Chapter 19).
All Red Phase	One second per phase (if a traffic signal is present under Existing Conditions, use existing length of all red phase). This phase may be greater on high-speed roadways.
Pedestrian and Bicycle Conflicts	Pedestrian and bicycle signal calls and crossing conflicts at intersections can increase delay for vehicles. Outside of dedicated phases, they generally conflict with right-turning motorists and motorists making permitted left turns. The volume of each should be collected during traffic counts and used in the analysis. Otherwise refer to the most current version of the HCM.

Table F-3: Traffic Signal Parameters

Parameter	Recommendation
Cycle Lengths	Replicate existing cycle length and phasing (e.g., leading left turns) when possible. For new signalized locations, use the cycle lengths of the following three categories unless other cycle lengths can be justified through the traffic operations analysis. • In and around downtown – limit signal cycle lengths to 60 seconds or less. • In and around suburban areas – limit signal cycle lengths to 90 seconds or less. • Near freeway interchanges/regional commercial areas – limit signal cycle lengths to 120 seconds or less. Ensure that minimum pedestrian crossing times and bicycle clearance intervals are satisfied.
Heavy Truck Percentages	Based on the existing heavy-truck percentage and adjusted to account for future planned development. In general, heavy-truck percentages should be greater on truck routes and main thoroughfares than on local streets. Minimum recommended value is 2%.
Lane Utilization Factor	If applicable, adjust lane utilization factors based on field observations.

Evaluation of Side Street Stop-Controlled Intersections

In addition to reporting the worst individual approach delay, the delay for the overall intersection shall be calculated and reported. This information will allow reviewers to gauge potential impacts to individual approaches against those for the entire intersection.

Methodology and Software

Intersection operations shall be analyzed using HCM methodology. **Table F-4** provides a matrix of software options for analysis. Redwood City does not require use of a particular software suite for analysis. However, the preferred method of analysis for signalized and unsignalized intersections is Synchro or a similar program that considers specific timing and phasing parameters, as well as the number of pedestrian calls and bicycles present. Special conditions related to congested conditions, state highway facilities, and roundabouts are discussed in more detail below.

Congested Conditions

Analysts should note that the HCM recommends the use of simulation models to analyze congested conditions or closely spaced intersections. Because simulation tools (e.g., VISSIM, SimTraffic, etc.) can simultaneously evaluate vehicle interactions across a complete network (including the interaction of multiple modes), they can provide a more complete understanding of traffic operating conditions during peak congested periods and what may happen when a specific bottleneck is modified or eliminated. Specifically, care should be taken in analyzing intersection LOS at closely spaced intersections. In such cases, standard intersection analysis does not adequately show the compound effects of intersection delay. If study intersections are within 300 feet of upstream or downstream intersections, or if the estimated 95% queue lengths exceed the distance between intersections, microsimulation using the average of 10 or more runs should be used to calculate delay.

State Highway Analysis

The analysis of state highways, including freeways and on- and off-ramps, should be conducted consistent with C/CAG CMP Guidelines.

Roundabout Analysis

Typically, roundabout operations are analyzed in conjunction with a conceptual roundabout design. Different roundabout analysis methods (FHWA, Australian Gap Acceptance, UK Empirical, HCM 2010, and microsimulation) provide different delay results and corresponding capacities. The deterministic roundabout analysis methods described in the HCM can be used for roundabouts operating under low volume and isolated conditions (without influence from nearby intersections). HCM methods allow the use of calibration factors to reflect regional differences in roundabout capacity. Calibration factors specific to California are available in the report *Roundabout Geometric Design Guidance*, 2007, California Department of Transportation Division of Research and Innovation. Roundabout queue lengths should also be reviewed to ensure they do not spill beyond available storage or interfere with overall operations of the roundabout and/or transportation system.

As described in the HCM, the use of alternative analysis methods is needed for complex multi-lane roundabout designs, roundabouts operating near or at capacity, high pedestrian and/or bicycle volume,

and at roundabout locations where upstream or downstream operation may interact with adjacent roundabouts or signals. Microsimulation of the roundabout and surrounding intersections may also be useful. Care must be taken in coding and calibrating the microsimulation models to accurately reflect the proposed roundabout design and operational characteristics.

When comparing roundabout versus signal control at a given location, long-term maintenance costs should be estimated and considered in the evaluation.

Table F-4: Software Analysis Options

Software/ Method[1]	Traffic Studies		Roundabouts		Arterial/ Interchange Operations	Microsimulation Analysis[4]		
	Operations[2]	Signal Coordination[3]	Planning	Design		Unique Geometrics	Heavily Congested Conditions	Multimodal
Synchro/SimTraffic	X	X	X		X	X		
VISTRO/TRAFFIX	X		X					
HCS	X				X			
SIDRA Intersection			X	X				
FHWA Roundabout Guidelines			X					
Microsimulation[5]		X		X	X	X	X	X

Notes:

1. The most current version of analysis software (with updated software patches) should be used.
2. Appropriate for isolated intersection operations or for signal systems that are not coordinated.
3. Mandatory for coordinated signal systems to maximize vehicle progression.
4. Should be applied to analyzing operations of congested conditions or non-standard conditions where traditional analytical approaches may not be appropriate.
5. Specific software program selection should be conducted in consultation with the City and consider the types of technical questions being asked in the study and the modes to be included.

Mobility Deficiency Criteria

Transportation Analysis Deficiencies

A transportation analysis evaluates all modes of transportation and includes analysis of study elements such as parking and traffic operations that are not considered environmental impacts.

The overall goal of the *General Plan Built Environment Element Circulation Section* is to "[m]aintain a local transportation system that balances the needs of bicyclists, pedestrians, and public transit with those of private cars." Redwood City evaluates each transportation mode to identify deficiencies. Transportation analyses evaluate intersection operations focused on specific traffic issues such as queuing and safety. A greater emphasis is placed on pedestrian, bicycle, and transit facilities and services, in part to reduce traffic congestion and air quality impacts associated with automobile use. **Table F-5** outlines deficiency criteria for each mode. The mobility deficiency criteria can be used to identify conflicts with existing or planned multimodal facilities.

Table F-5: Mobility Deficiency Criteria

Study Element	Deficiency Determination
Parking	Project increases off-site parking demand above a level required by the City Zoning Code.
On-Site Circulation	Project designs for on-site circulation, access, and parking fail to meet City design guidelines. Where City standards are not defined, industry standards (*Highway Design Manual*, MUTCD, etc.) should be referenced, as appropriate. Failure to provide adequate accessibility for service and delivery trucks on-site, including access to loading areas. Project will result in a hazard or potentially unsafe conditions without improvements.
Pedestrian Facilities	Project fails to provide safe and accessible pedestrian connections between project buildings and adjacent streets, trails, and transit facilities. Project adds trips to an existing facility along the project frontage that does not meet current pedestrian design standards.
Bicycle Facilities	Project disrupts existing or planned bicycle facilities or is otherwise inconsistent with *RWCmoves* or future plans. Project adds bicycle trips along project frontage to an existing facility that does not meet current bicycle design standards.
Transit	Project disrupts existing or planned transit facilities and services or conflicts with City adopted plans, guidelines, policies, or standards.
TDM Program	A project does not comply with the City's TDM ordinance, including specified mode split goals.
Heavy Vehicles (Trucks and Buses)	A project fails to provide adequate accommodation of forecasted heavy traffic or temporary construction-related truck traffic consistent with City or industry standards (*Highway Design Manual*, MUTCD, etc.).

Table F-5: Mobility Deficiency Criteria

Study Element	Deficiency Determination
Off-Site Traffic Operations	95th percentile vehicle queues exceed the existing or planned length of a turn pocket. The proposed project introduces a design feature that substantially increases safety hazards.
Signalized Intersection Traffic Control	Addition of project traffic causes a signalized intersection to 1) operate at LOS E or F overall or the worst-case movement, or 2) adds five seconds of delay to intersections already operating at LOS E or F under the comparable "no project" scenario.*
Unsignalized Intersection Traffic Control	Addition of project traffic causes an all-way stop-controlled or side street stop-controlled intersection to 1) operate at LOS E or F overall or for the worst-case movement, and 2) meets the Caltrans signal warrant criteria.*
General Plan Consistency	Project creates conditions that are inconsistent with mobility, safety, and other related goals, policies, and actions set forth in the *General Plan*.
Other Subject Areas	Consider other areas on a case-by-case basis (e.g., construction impacts, queuing between closely spaced intersections, emergency access, special event traffic, etc.).
Requirements for Other Jurisdictions	The project exceeds established deficiency thresholds for transportation facilities and services under the jurisdiction of other agencies.

* For intersections located in the Downtown Precise Plan Area, deficiencies are triggered when project trips result in the intersection operating at LOS F or that add five or more seconds of delay if the intersection is operating at LOS F.

CMP Deficiency Criteria

To determine consistency with the CMP, off-site intersection analysis may be needed. **Table F-6** presents the C/CAG CMP deficiency thresholds.

Table F-6: Congestion Management Program (CMP) Deficiency Criteria

Study Element	Impact Determination
Transportation Demand Management	When a project generates more than 100 new peak hour trips on the CMP network, developer and/or tenants must reduce the demand for all new peak hour trips (including the first 100 trips) projected to be generated by the development through TDM measures. C/CAG provides guidance on the TDM reduction strategies and associated reduction in vehicle trips.
Signalized CMP Intersection	CMP intersection currently in compliance with the adopted level of service (LOS) standard: • A project will be considered to have a CMP deficiency if the project will cause the CMP intersection to operate at a LOS that violates the standard adopted in the current CMP. • A project will be considered to have a CMP impact if the cumulative analysis indicates that the combination of the proposed project and future cumulative traffic demand will result in the CMP intersection operating at a LOS that violates the standard adopted in the current CMP, and the proposed project increases average control delay at the intersection by four seconds or more. CMP intersection currently not in compliance with the adopted LOS standard: • A project is considered to have a CMP impact if the project adds additional traffic to the CMP intersection that is currently not in compliance with its adopted LOS standard as established in the CMP.
CMP Freeway Segment	Traffic impacts on CMP freeway segments in San Mateo County are determined to occur when: • The addition of project traffic causes the freeway segment to operate at a LOS that violates the standard adopted in the current CMP; or • When the cumulative analysis indicates that the combination of the proposed project and future cumulative traffic demand will cause the freeway segment to operate at a LOS that violates the standard adopted in the current CMP, and the proposed project increases traffic demand on that freeway segment by an amount equal to one percent or more of the segment capacity, or causes the freeway segment volume-to-capacity (v/c) ratio to increase by one percent. Freeway segments currently not in compliance with the adopted LOS standard: • A project is considered to have a CMP impact if the project adds traffic demand equal to one percent or more of the segment capacity or causes the freeway segment volume-to-capacity (v/c) ratio to increase by one percent, if the freeway segment is currently not in compliance with the adopted LOS standard.

Notes:

1. In cases where the region is substantially larger than the geography over which most workers would be expected to live, it might be appropriate to refer to a smaller unit of geography, such as county.
2. Other development project types can include hotels/motels, entertainment, education, medical, industrial/warehouse, ports, airports, public services.

Source: C/CAG Congestion Management Program (CMP) for 2019 (https://www.ccag.ca.gov/programs/transportation-programs/congestion-management/)

Improvements

The *Circulation Section* of the *General Plan Built Environment Element* notes in its development policies (Policy BE-25.4, BE-26.6, BE-27.5, and Program BE-44, BE-45, BE-46, BE-48, BE-53, BE-54) that developers shall be responsible for the provision of off-site improvements, where necessary (see Program BE-55), to address transportation deficiencies created by a development project (see Policy BE-29.5). It also includes the responsibility for payment of transportation fees as adopted by the City Council or as required for mitigation identified through an environmental review process.

All project deficiencies should be addressed consistent with the policies of the *Circulation Section* of the *General Plan Built Environment Element*. Under these circumstances, the applicant should meet with City staff to identify transportation improvements that address the deficiencies. **Table F-7** shows example types of improvements to address transportation deficiencies.

Potential improvements may require a more detailed review, often including traffic operations, to demonstrate how they address a specific deficiency.

It should be identified when selected improvements will be implemented, according to whether the need for the improvement is under Existing Conditions, Background Conditions or Cumulative Conditions. Background Conditions generally reflect conditions at the time of full occupancy of a project.

If a transportation improvement is selected to address a deficiency, it should include a description of the benefit to traffic reduction generated by a proposed development and how the improvement contributes to the multimodal transportation system in Redwood City. In addition, all transportation improvements need to consider whether they have secondary effects to VMT [i.e., whether the improvement is VMT inducing per guidance in **Attachment C: List of Transportation Projects Exempt from Environmental Analysis (CEQA)**].

Table F-7: Example Improvements

Study Element	Improvement
Project Modifications and Transportation Demand Management	• Alter density or diversity of project uses • Encourage flexible employee working hours • Allow parking "cash out" or require employee paid parking* • Institute preferential parking for carpools* • Encourage employees to use carpools and public transportation • Provide employee walk/bike incentives
Pedestrian and Bicycle Facilities	• Provide for access to, from, and through the development for pedestrians and bicyclists • Construct Class I bicycle paths, Class II bicycle lanes, and other facilities • Provide secure bicycle parking and shower amenities • Reduce travel lanes on a street to install a two-way left-turn lane and Class II bicycle lanes • Add corner bulbouts, reduce curb radii, add pedestrian refuges or implement other walking-related improvements
Transit Facilities	• Provide bus turnouts, bus shelters, additional bus stops, and park-and-ride lots • Fund increases in transit service
Parking Facilities	• Design parking facilities to allow free-flow access to and from the street • Provide off-street parking per City standards or recommendations • Implement shared parking among complementary land uses
Traffic Control Modifications	• Provide for yield or stop control • Evaluate unsignalized intersections with substandard LOS for conversion to roundabout intersection control or for signalization • Provide coordination/synchronization of traffic signals along a corridor • Provide turn-lane channelization through raised islands • Restrict selected turning movements
Street Operations Modifications	• Optimize location of access driveway(s) • Provide improvements to traffic signal phasing, or lengthen existing turning pocket • Provide additional through traffic lane(s), right-turn lane(s), and left-turn lane(s) if they do not adversely impact other modes or induce additional vehicle travel • Reduce travel lanes on a street to install a two-way left-turn lane • Congestion pricing on roads or within a specific area

* These improvements may require implementing ordinances prior to use for specific projects.

Transportation Analysis (CEQA) for Land Use Projects

Does my land use project result in an environmental impact?

On September 27, 2013, Governor Jerry Brown signed SB 743 into law and started a process intended to fundamentally change transportation impact analysis as part of CEQA compliance. Specifically, **SB 743 removes the use of automobile delay, LOS, and other similar measures of vehicular capacity or traffic congestion for determining transportation impacts in environmental review**. According to the legislative intent contained in SB 743, the move away from LOS is necessary to more appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of greenhouse gas emissions.

The legislation also directed the State of California's Office of Planning and Research (OPR) to look at different metrics for identifying transportation impacts and make corresponding revisions to the *CEQA Guidelines*. OPR settled upon VMT as the preferred metric for assessing passenger vehicle-related impacts and issued revised *CEQA Guidelines* in December 2018, along with a *Technical Advisory: On Evaluating Transportation Impacts in CEQA* (December 2018) to assist practitioners in implementing the *CEQA Guidelines*. The VMT methodology and thresholds presented here are consistent with OPR's *Guidelines and Technical Advisory*.

Methodology

The following section provides details on if and how a VMT analysis should be conducted for land use plans and projects.

Initial Screening

The chapter on *Determining the Need for a Transportation Analysis* details Redwood City's VMT screening process for projects that can be presumed to cause a less-than-significant impact without conducting a detailed study. However, even if a project is exempt from VMT analysis, it may still be required to evaluate the following CEQA requirements:

- Conflicts with a plan, ordinance, or policy addressing the circulation system, including transit, roadways, bicycle lanes, and pedestrian paths; or
- Increases hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Results in inadequate emergency access.

All projects also need to document and justify the applied VMT screening criteria.

Assessment for Non-Screened Projects

Projects not screened out through the criteria listed in the *Determining the Need for a Transportation Analysis* chapter are required to complete a VMT analysis using the San Mateo County and Santa Clara County Travel Forecasting Model (C/CAG model) to determine if there would be a significant VMT impact. The impact analysis includes two types of VMT:

1. **Project generated VMT** per service population. The project generated VMT method relies on tracking trips to/from an individual project. In simple terms, it looks at the total number and distance each trip travels divided by the service population (i.e., residents, employees, etc. as appropriate).
2. **Project effect on VMT** compares how the project changes VMT on the network looking at total citywide VMT per service population. This VMT applies what is known as the boundary method, which captures all VMT on a network within a defined boundary (i.e., Redwood City). This VMT captures the project's overall influence on the VMT generation of surrounding land uses.

The types of VMT analysis should be evaluated for the following scenarios:

- **Baseline Conditions** evaluates project generated VMT. For the project scenarios the VMT generation by land use is compared back to the countywide average.
- **Year 2040 Cumulative Conditions** evaluates project effect on VMT. The citywide total VMT per service population is compared between the "no project" and "plus project" scenarios.

The model output should also include total VMT, which includes all vehicle trips and trip purposes.

Total VMT (by speed bin) may also be needed as an input for air quality, greenhouse gas (GHG), and energy impact analysis. For VMT estimates by speed-bin, the daily VMT estimate should be the sum of discrete time periods throughout the day. This will allocate VMT to slower speed-bins during congested travel, and faster speed-bins during less congested times.

Scenarios for Transportation Analysis (CEQA)

Baseline Conditions

Baseline without Project

For compliance with CEQA Section 15125(a), the transportation impact analysis must include a description of the physical

environmental conditions near the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. Baseline VMT estimates will be prepared based on the most recent base year C/CAG model.

Baseline with Project

All projects that do not meet the VMT screening criteria are required to estimate project generated VMT for each land use type under Baseline Plus Project conditions. The project's land use characteristics will be entered into the model in the appropriate location, a model run will be completed, and the relevant VMT values will be generated.

Year 2040 Cumulative Conditions

Year 2040 Cumulative without Project

Projects requiring a General Plan Amendment are also required to evaluate the project effect on VMT under Year 2040 Cumulative Conditions. This scenario buildout of the region's land use and transportation system also provides the long-range view of future travel patterns. Cumulative without Project VMT estimates should be based on the horizon year of the most recent C/CAG model, ensuring the model does not already contain the land uses or transportation improvements associated with the Project.

Year 2040 Cumulative with Project

The environmental analysis also must evaluate a project's effect on VMT (*CEQA Guidelines* Section 21100(b)(5)). The project-generated VMT analysis considers all trips as new trips and does not consider how the project influences travel within Redwood City. The project's effect on VMT under Year 2040 Cumulative Conditions considers the project's influence on the VMT generation of surrounding land uses.

The cumulative project effect on VMT shall be estimated using the City limit boundary and extracting the total link-level VMT for both the no project and with project conditions.

VMT Impact Criteria for Land Use Projects

The following outlines the VMT impact criteria for land use projects that do not meet the City's VMT screening criteria.

Project Generated VMT Impact Thresholds (Baseline Conditions)

Listed in **Table F-8** are the land use project-level impact criteria under the Baseline scenarios.

Table F-8: VMT Impact Criteria for Land Use Projects under Baseline Conditions

Project Type	Significance Criteria	Current Level	Impact Threshold
Residential	A project exceeds existing countywide home-based VMT per capita minus 15 percent.	12.3 Home-based VMT per Capita (Countywide Average)	10.5 Home-based VMT per Capita
Office	A project exceeds countywide home-based work VMT per employee minus 15 percent.	17.6 Home-based work VMT per Employee (Countywide Average)	15.0 Home-based work VMT per Employee
Retail/Hotel	A net increase in total countywide VMT per service population.	32.0 Total VMT per service population	32.0 Total VMT per service population
Mixed-Use	Evaluate each component of a mixed-use development independently, taking credit for internal capture, and apply the significance criteria for each project type.		
Other Land Use Types	The City's TAM explicitly addresses residential, office and retail/hotel projects because those are very common land use types. Applicants should coordinate with the City to develop appropriate, project-based VMT thresholds for other land uses such as entertainment, education, medical, and industrial/warehouse.		

Projects Effect VMT Impact Threshold (Year 2040 Cumulative Conditions)

The cumulative threshold for the project effect on VMT is no change to the City's per capita VMT applying the boundary method.

Mitigation Measures

When VMT impacts are identified, there are currently two project-based mitigation measures to consider:

- Physical Design (land use or transportation)
- Transportation Demand Management (TDM)

Project-based features consider whether modifying the project in some way could reduce VMT. The two basic modifications include changing the physical land use or transportation network design of the project or transportation demand management (TDM) strategies such that residents, workers, or visitors of the site could make fewer or shorter vehicle trips.

When VMT impacts are identified, applicants shall coordinate with the City on the most appropriate VMT mitigation measure. To reduce an impact to less-than-significant levels the applicant would need to demonstrate, through substantial evidence, that the VMT would be reduced to the City's identified thresholds. C/CAG is in the process of developing a VMT mitigation tool that would evaluate the

effectiveness of TDM measures on VMT. Once a C/CAG tool is available, projects can consider using that tool.

It should be noted that program-based mitigation measures such as VMT impact fees, exchanges, and banks, are an emerging concept that will likely evolve over the next few years. Since these are newer concepts and the City and/or County has not implemented such program-based mitigation measures, these are currently not valid options for consideration in Redwood City. The City will update these guidelines to incorporate program-based mitigations measures as they become available.

Transportation Analysis (CEQA) for Transportation Projects

Does my transportation project result in an environmental impact?

Transportation projects have the potential to change travel patterns and may lead to additional vehicle travel on the roadway network, also referenced as induced vehicle travel. This is particularly true for roadway capacity expansion projects.

Project types that would likely lead to a measurable and substantial increase in vehicle travel generally include addition of through lanes on existing or new highways, including general purpose lanes, HOV lanes, peak period lanes, auxiliary lanes, or grade separated interchanges. For transportation projects that increase roadway capacity, the VMT estimates and forecasts will also need to include induced travel effects. However, not all roadway projects will lead to induced travel.

Methodology

The following sections provides details on if and how a VMT analysis should be conducted for transportation projects.

Screening Criteria

OPR's *Technical Advisory* identifies specific types of transportation projects that would likely lead to an increase in VMT, and, therefore, should undergo analysis. Transportation projects relevant to the City of Redwood City include:

- Added through lanes
- New roadway connections, including new roads or freeway overpasses
- Lanes through grade-separated interchanges

Specific types of transportation projects are presumed to have a less-than-significant transportation impact because they "would not likely lead to a substantial measurable increase in VMT." Projects that would not require a VMT analysis fall into four categories:

- Transit project (except for on-demand transit)
- Bicycle projects, such as bike lanes, projected bike lanes, or bike paths
- Pedestrian projects, such as added sidewalks, crosswalks, or new trails
- Roadway reconfigurations that are not intended to add vehicle capacity or substantially reduce vehicle delay, such as signal modifications, traffic calming projects, or intelligent transportation system (ITS) improvements

Attachment C: List of Transportation Projects Exempt from Environmental Analysis (CEQA) includes a complete list provided in the OPR *Technical Advisory* for transportation projects that would **not** likely lead to a substantial or measurable increase in vehicle travel, and therefore generally should not require an induced travel analysis and are presumed to have a less-than-significant impact on VMT.

However, even if a project is exempt from VMT analysis, it may still be required to evaluate the following CEQA requirements:

- Conflicts with a plan, ordinance, or policy addressing the circulation system, including transit, roadways, bicycle lanes, and pedestrian paths; or
- Substantially increases hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Results in inadequate emergency access.

All projects need to document and justify the applied VMT screening criteria.

Assessment for Non-Screened Projects

Projects not screened out through the criteria outlined above are required to complete a VMT analysis. Analysis methods and thresholds to evaluate the VMT effect of roadway projects will be assessed on a case-by-case basis, since the appropriate tool and methodology will vary based on the type and scope of transportation project proposed.

Mitigation Measures

When VMT impacts are identified for roadway expansion projects, mitigation measure should consider and evaluate the reduction in scope of the capacity increase and/or enhancement to active transportation components.

ATTACHMENT A: SITE ACCESS AND CIRCULATION PLAN REVIEW

A detailed site plan review is required for all projects. The transportation analysis should include a review and summary of findings of the following qualitative and quantitative features.

- Existence of any current traffic problems in the local area such as a high-collision location, non-standard intersection or roadway, or an intersection in need of a traffic signal.
- Applicability of context-sensitive design practices compatible with adjacent neighborhoods or other areas that may be impacted by the project traffic.
- Proximity of proposed site driveway(s) to other driveways or intersections.
- Adequacy of the project site design to convey all vehicle types.
- Number and type of parking provided, including vehicle and bicycle parking.
- On- and off-street loading requirements.
- Adequacy of on-site vehicle, bicycle, and pedestrian circulation and provision of direct pedestrian paths from residential areas to school sites, public streets to commercial and residential areas, and the project site to nearby transit facilities.

ATTACHMENT B: TRANSPORTATION ANALYSIS REPORT OUTLINE

Sections for All Transportation Analysis Reports

1. Introductory Items

- Front Cover/Title Page
- Table of Contents, List of Figures, and List of Tables
- Executive Summary

2. Introduction/Background

- Project description
- Project sponsor/contact info
- Type and size of development
- Site plan (include proposed driveways, roadways, traffic control, parking facilities, emergency vehicle access, and internal circulation for vehicles, bicyclists, and pedestrians)
- Location map (include major streets, study intersections, and neighboring zoning and land uses)
- Scope of transportation analysis

3. Project Screening

- Description of whether the project meets General Plan Consistency screening criteria
- Description of whether the project meets CMP Consistency screening criteria
- Description of whether the project meets VMT screening criteria

4. Current Conditions

- Description of existing street system within project site and surrounding area
- Location and routes of nearest public transit system serving the project
- Location and routes of nearest pedestrian and bicycle facilities serving the project
- Off-site intersection analysis for site access and circulation evaluation and CMP evaluation (if General Plan or CMP consistency screening criteria are not met)
    - Figure of study intersections with peak hour turning movement counts, lane geometries, and traffic control
    - Map of study area showing average daily traffic (ADT) of study roadways
    - Table of existing peak hour average vehicle delay and level of service (LOS)

- Environmental Analysis (if VMT screening criteria are not met)
    - Description of baseline VMT estimates (may include site and regional VMT estimates)

5. Project Trip Generation and Vehicle Miles Traveled

- Table of project generated trip estimates
- Figure/map of trip distribution (in percent)
- Table of project generated vehicle miles traveled estimates

6. Project Site Access and Circulation Evaluation

- Summary of a detailed site review for all modes of travel
- Mobility deficiency analysis for vehicle, transit, bicycle and pedestrian facilities (under Existing, Background, and Cumulative Conditions)
- Summary of transportation improvements

CEQA Transportation Analysis Report Section

7. VMT Analysis (For projects not meeting VMT screening criteria)

- Summary of project generated VMT under Baseline Conditions
- Summary of project's effect on VMT under Year 2040 Cumulative Conditions
- Identification of significant impacts
- Discussion of mitigation measures
- Evaluation of impacts of mitigation measures

8. Other CEQA Requirements

- Summary of conflicts with a plan, ordinance, or policy addressing the circulation system, including transit, roadways, bicycle lanes, and pedestrian paths. Present mitigation measures, as needed.
- Evaluation of hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). Present mitigation measures, as needed.
- Emergency access evaluation. Present mitigation measures, as needed.

Local Transportation Analysis Report Section (Project Requiring Off-Site Analysis)

9. Existing with Project Conditions

- Maps of study area with applicable peak hour turning movements (Project Only and Existing with Project)
- Table of Existing and Existing with Project intersection peak hour average vehicle delay and LOS (or other multimodal performance measure)

- Traffic signal and other warrants
- Changes/Deficiencies to bike, pedestrian, and transit networks
- Findings of project deficiencies
- Improvements for project deficiencies (include a map showing physical improvements)
- Scheduling and implementation responsibility of improvements
- Deficiencies of proposed improvements

10. Background without Project Conditions

- Table of trip generation for approved project(s)
- Figure and/or table of approved projects trip distribution (in percent)
- Map of study area with applicable peak hour turning movements (Background without Project)
- Table of intersection peak hour average vehicle delay and LOS (or other multimodal performance measure)
- Changes/deficiencies to bike, pedestrian, and transit networks
- Traffic signal and other warrants

11. Background with Project Conditions

- Similar content to Existing with Project Conditions

12. Cumulative without and with Project Conditions

- Map of study area with Cumulative without Project peak hour turning movements
- Map of study area with Cumulative with Project peak hour turning movements
- Table of Cumulative without Project and Cumulative with Project intersection peak hour average vehicle delay and LOS (or other multimodal performance measure)
- Changes/Deficiencies to bike, pedestrian, and transit networks
- Traffic signal and other warrants
- Findings of project deficiencies
- Improvements for project deficiencies (include a map showing physical improvements)
- Scheduling and implementation responsibility of improvements
- Deficiencies of proposed improvements

As Needed Sections for Transportation Analysis Reports

13. Construction Deficiencies

- Trips due to construction workers
- Truck trips and truck access routes

14. Phasing Deficiencies (For Large Projects Only)

15. Appendices

- List of references
- List of authors
- Pedestrian, bicycle, and vehicle counts
- Technical calculations for all analyses

ATTACHMENT C: LIST OF TRANSPORTATION PROJECTS EXEMPT FROM ENVIRONMENTAL ANALYSIS (CEQA)

The following complete list is provided in the OPR *Technical Advisory* (December 2018, Pages 20-21) for transportation projects that "would **not** likely lead to a substantial or measurable increase in vehicle travel, and therefore generally should not require an induced travel analysis:"

- Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity
- Roadside safety devices or hardware installation such as median barriers and guard rails
- Roadway shoulder enhancements to provide "breakdown space," dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes
- Addition of an auxiliary lane of less than one mile in length designed to improve roadway safety
- Installation, removal, or reconfiguration of traffic lanes that are not for through traffic such as left, right, and U-turn pockets, two-way left turn lanes, or emergency breakdown lanes that are not utilized as through lanes
- Addition of roadway capacity on local or collector streets provided the project also substantially improves conditions for pedestrians, cyclists, and, if applicable, transit
- Conversion of existing general purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel
- Addition of a new lane that is permanently restricted to use only by transit vehicles
- Reduction in number of through lanes
- Grade separation to separate vehicles from rail, transit, pedestrians or bicycles, or to replace a lane in order to separate preferential vehicles (e.g., HOV, HOT, or trucks) from general vehicles
- Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority (TSP) features
- Installation of traffic metering systems, detection systems, cameras, changeable message signs and other electronics designed to optimize vehicle, bicycle, or pedestrian flow
- Timing of signals to optimize vehicle, bicycle, or pedestrian flow
- Installation of roundabouts or traffic circles

- Installation or reconfiguration of traffic calming devices
- Adoption of or increase in tolls
- Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase
- Initiation of new transit service
- Conversion of streets from one-way to two-way operation with no net increase in number of traffic lanes
- Removal or relocation of off-street or on-street parking spaces
- Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)
- Addition of traffic wayfinding signage
- Rehabilitation and maintenance projects that do not add motor vehicle capacity
- Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of-way
- Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve non-motorized travel
- Installation of publicly available alternative fuel/charging infrastructure
- Addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor