Traffic Impact Analysis Preparation Guidelines

Prepared by:
The Department of Public Works/Engineering and the Development Services Department

March 2021

1.0 INTRODUCTION

A fundamental role of a City is the construction and maintenance of public infrastructure facilities including roadways, transit and bus facilities, bicycle and pedestrian infrastructure, water lines, sanitary sewer lines, stormwater treatment facilities, parks, and other public facilities.

When private development occurs, it is the responsibility of local governments to ensure that there are adequate public facilities available to serve the potential population and employment growth that could result from the development. For the transportation system, one way to address this issue is the preparation of a Traffic Impact Analysis (TIA).

For the past several decades, the preparation of a TIA was integrated into the California Environmental Quality Act (CEQA) process, typically in the City as part of a development project application, in which the TIA was used primarily to analyze a project's transportation impacts under CEQA. However; with the passage of Senate Bill (SB) 743 regarding transportation impacts, changes to the TIA process are necessary. Specifically, a TIA may be needed as a stand-alone document which is a requirement of project approval and will include information for the decision makers that is not required as part of the CEQA process.

The purpose of these TIA Preparation Guidelines is to provide general instructions for analyzing the potential transportation impacts of a proposed development project (e.g., a General Plan Amendment, a Zone Change, or a Specific Plan) in the City of Murrieta. These guidelines present the recommended format and methodology that should generally be utilized in the preparation of a TIA in conformance with the City of Murrieta Public Works/Engineering Department requirements. These recommendations are based on the City's General Plan Update and the Western Riverside Council of Governments (WRCOG) recommended TIA Guidelines and Pathway Implementation Study with updates and local considerations to comply with the state of the practice advances and new CEQA expectations prompted by SB 743. These recommendations are general guidelines and the City has the discretion to modify the TIA requirements on a case by case basis pursuant to the unique characteristics of a particular project.

To avoid unnecessary delays or revisions and to streamline the TIA preparation and review process, the City requires that the applicant submit and have approved a scoping form prior to the preparation and submittal of a draft TIA. A version of the scoping form in Word format is attached to this document as Exhibit A and includes a process for both LOS assessment and VMT assessment. When required, a TIA must be prepared, signed and sealed by a Traffic Engineer or a Civil Engineer registered in the State of California, qualified to practice traffic engineering ("Engineer"). The TIA is subject to the review and the approval of the City of Murrieta Traffic Engineer.

CEQA CHANGES

Since the last TIA Guidelines update, SB 743 was signed into law. A key element of this law is the elimination of auto delay, level of service (LOS), and other similar measures of vehicular capacity or traffic congestion as a basis for determining significant impacts under CEQA. This change is intended to assist in balancing the needs of congestion management with statewide goals related to infill development specifically for housing, promotion of public health benefits through active transportation, and the reduction of greenhouse gas emissions from transportation uses.

SB 743 contains amendments to current congestion management law that allows cities and counties to effectively opt-out of the LOS standards that would otherwise apply in areas where Congestion Management Plans (CMPs) are still used (including Riverside County). Further, SB 743 required the Governor's Office of Planning and Research (OPR) to update the CEQA Guidelines and establish criteria for determining the significance of transportation impacts. In December 2018, OPR released the final recommended guidelines based on feedback with the public, public agencies, and various organizations and individuals. OPR recommended Vehicle Miles Traveled (VMT) as the most appropriate measure of project transportation impacts for land use projects and land use plans. For transportation projects, lead agencies may select their own preferred metric but must support their decision with substantial evidence that complies with CEQA expectations. SB 743 does not prevent a city or county from continuing to analyze delay or LOS outside of CEQA review for other transportation planning or analysis purposes (i.e., a general plan, impact fee program, corridor study, congestion mitigation, or ongoing network monitoring); but these metrics may no longer constitute the sole basis for CEQA impacts.

Determining the significance of transportation projects as it relates to SB 743 and VMT is defined in CEQA Guidelines section 15064.3. The City has the discretion (per CEQA Guidelines section 15064.3) to choose the most appropriate methodology to evaluate a project's VMT, including whether to express the change in absolute terms, per capita, per household or in any other measure; in addition, the City may use models to estimate a project's VMT and may revise those estimates to reflect professional judgment based on substantial evidence. These guidelines were initially prepared with the City's most recent General Plan Update in 2020, which overall included a decrease in VMT compared to the previous 2011 General Plan citywide and therefore a less than significant transportation impact. It is the City's intent to utilize the City's General Plan Update EIR and traffic model in order to allow for project streamlining for those projects below screening criteria and/or that are consistent with the General Plan Update. These updated TIA Guidelines have been drafted to comply with the new CEQA Guidelines and may be updated and modified should additional changes in CEQA occur in the future as appropriate.

2.0 NEED FOR TRANSPORTATION IMPACT ANALYSIS

The need for a TIA may stem from CEQA compliance, general plan consistency, or both. Discretionary actions of public agencies all trigger CEQA review, but whether a TIA is required depends on the findings of the local agency initial study and the potential for the project to cause an impact. General plan consistency is required for all discretionary actions as well but the City has discretion as to how consistency is determined. To aid development review, the City has established an early review process for determining whether a TIA is required and what type of TIA should be prepared with respect to CEQA compliance and general plan consistency.

Need to Complete LOS as part of the TIA Analysis

The following activities generally will not require a TIA that includes LOS analysis. This presumption is based on the activities associated with the project (e.g. they are local serving) or the limited trip generation of the project (e.g. projects that generate less than 100 peak hour trips, as projects that generate 100 or less trips typically do not affect LOS significantly once distributed to the local roadway network).

- A residential parcel map
- A single family residential tract of less than 100 lots
- An apartment and multi-family project of less than 150 units
- A Development Plan or Use Permit project with an area of one acre or less
- Preschool, local serving elementary school and local serving middle school
- Local serving church, lodge, community center, neighborhood park and community park
- Mini storage yard
- Congregate care facility that contains significant special services, such as medical facilities, dining facilities, recreation facilities and support retail services
- Any use which can demonstrate trip generation of less than 100 vehicle trips in the peak hour

The City reserves the right to require an applicant to prepare an LOS analysis in a TIA or require an additional traffic analysis based on:

- Presence of an existing or potential safety problem
- Location of the development in an environmentally or otherwise sensitive area, or in an area that is likely to generate public controversy
- Presence of a nearby substandard intersection or street
- Need for a focused study for access/operational issues
- Request from an affected agency, such as Caltrans or adjacent City; if the request is deemed reasonable and appropriate

Need to Complete VMT as part of the TIA Analysis

The following activities generally will not require a TIA that includes VMT. This presumption is based on the substantial evidence provided in the City's General Plan Update and/or the OPR Technical Advisory supporting SB 743 implementation or is related to projects that are local serving which, by definition, would decrease the number of trips or the distance those trips travel to access the development (and are therefore VMT-reducing projects).

- Projects generating less than 110 daily vehicle trips.[1] This generally corresponds to the following "typical" development potentials:
  - A residential parcel map
  - 11 single family housing units
  - 16 multi-family, condominiums, or townhouse housing units
  - 10,000 sq. ft. of office
  - 15,000 sq. ft. of light industrial
  - 63,000 sq. ft. of warehouse
- Local-serving retail that primarily serves the City and/or adjacent cities
- Office and other employment-related land uses that reduce commutes outside the local area
- Local-serving day care centers, pre-K and K-12 schools
- Local parks and civic uses
- Local-serving gas stations, banks and hotels (e.g. non-destination hotels)

- Local-serving community colleges that are consistent with SCAG RTP/SCS assumptions
- Student housing projects

Projects that are not screened out as listed above shall perform a limited analysis of the VMT expected to be generated by the project and compare that to the VMT expected to be generated by the land use assumed in the General Plan. A more detailed analysis of VMT would be required for those projects with more VMT than assumed for the land use in the General Plan. See the VMT sections of these guidelines for additional information.

[1] This threshold is from the OPR technical advisory and notes that CEQA provides an exemption for existing facilities, including additions to existing structures of up to 10,000 square feet, so long as the project is in an area where public infrastructure is available to allow for maximum planned development and the project is not in an environmentally sensitive area. (CEQA Guidelines, § 15301, subd. (e)(2).) Typical project types for which trip generation increases relatively linearly with building footprint (i.e., general office building, single tenant office building, office park, and business park) generate or attract an additional 110-124 trips per 10,000 square feet. Therefore, absent substantial evidence otherwise, it is reasonable to conclude that the addition of 110 or fewer trips could be considered not to lead to a significant impact.

Coordination with Public Works/Engineering

To streamline the TIA preparation and review process, the TIA preparer shall solicit input and approval from the City of Murrieta Public Works/Engineering Department prior to the preparation and submittal of a draft TIA document. A TIA "Project Scoping Form", attached to these guidelines, shall be prepared by the Engineer and submitted to the City Engineer for approval prior to the preparation of a draft TIA. The Project Scoping Form provides for agreement of the following key points before initiating the TIA.

- Determination of study area, intersections, and roadway links to be analyzed.
- Project trip generation, distribution, and assignment.
- Presentation of screening criteria used to screen the project from VMT assessment or proposed methodology/metrics that will be applied to estimate VMT.
- Use of other approved projects for background traffic, traffic growth assumptions, or integration with the City of Murrieta travel demand model or with RIVCOM[2] when available.
- Coordination with adjacent agencies.
- For projects within one mile of a state highway, or any project that may add traffic on the state highway, the Engineer shall also coordinate with Caltrans.
- For Those projects located within the City's Sphere of Influence or adjacent to another city or the county, the Engineer shall also solicit comments on the above from the other agency. The Engineer shall submit all comments received to the City of Murrieta Public Works/Engineering Department for review and consideration.

[2] Note – At the time these guidelines were updated in mid-2020 RIVCOM was under development with an anticipated completion date in 2020. Once finalized, RIVCOM should be utilized for all forecasting activity. Please coordinate with WRCOG to ensure that the preparer utilizes the most recent travel demand forecasting model.

3.0 METHODOLOGIES

The following LOS analysis, when applicable to a project, is required to meet general plan consistency requirements.

Intersections

The most recent version of the *Highway Capacity Manual* (HCM) published by the Transportation Research Board should be utilized for both signalized and unsignalized intersections. The following parameters should be included in the analysis.

- Saturation Flow Rate consistent with field measurements *or* 1,900 passenger cars/hour/lane
- Heavy Vehicle Factor based on count data or provided by the City; analyst may use a Passenger Car Equivalent (PCE) conversion to reflect heavy vehicles in the volume *or* incorporate the heavy vehicle factor in the capacity calculation consistent with HCM requirements.
- Grade based on existing or proposed grade of the facility.
- Minimum green time should be based on existing signal timings (timing sheets provided by the local agency or collected in the field).
- Cycle lengths should be based on existing signal timings or measured in the field.
- Lost time should be based on existing signal timings or consistent with the recommendations from the HCM.
- Peak hour factors should be based on count data; future peak hour factor should be 0.95
- Intersections must be evaluated with HCM-consistent software; for locations where closely spaced intersections occur or queues build over space and time (extending to upstream or downstream intersections), microsimulation should be utilized to accurately evaluate the intersections as a system. This may require inclusion of freeway facilities.

When developing mitigation, the following recommendations should be considered.

- Exclusive left-turn lanes should be considered when peak hour volumes exceed 100
- Dual left-turn lanes should be considered when peak hour volumes exceed 300
- Protected left-turn phasing should be considered when the peak hour left turn volume exceeds 240 vehicles

Roadway Segment Assessment

The City may require roadway segment evaluation in addition to intersection analysis. In those instances, roadway segment capacity should be based on the City requirements as documented in the General Plan, General Plan EIR and Appendices, or applicable document. If capacities are not identified, then the capacities utilized for roadway segment evaluation should be based on the HCM.

4.0 STUDY AREA BOUNDARIES FOR LOS ASSESSMENT

In general, the minimum area to be studied shall include any intersection of “Collector” or higher classification street, with “Collector” or higher classification streets, at which the proposed project will add 50 or more peak hour trips. In general, the study area should not exceed a 5-mile radius from the project site unless evidence is available to justify a larger area. The City Department of Public Works/Engineering may require deviation from these requirements, or may expand or contract the study area based on area conditions or at the City’s discretion.

5.0 ANALYSIS SCENARIOS

The following study scenarios should be included for intersection capacity analysis:

a) Existing Conditions
b) Background Conditions – Defined as Opening Year Conditions with traffic from approved projects in the area (note, if there are no or limited approved projects in the area of the project, an ambient growth rate could be considered in lieu of assigning traffic from approved projects in the area)
c) Background Plus Project Conditions – Defined as background conditions plus traffic from the proposed project
d) Cumulative No Project Conditions – Defined as ambient growth to the Cumulative Horizon (typically coinciding with the forecast horizon of the RIVTAM/RIVCOM travel demand forecasting model) that includes traffic from approved and pending projects in the area
e) Cumulative Plus Project Conditions – Defined as Cumulative No Project Conditions plus traffic from the proposed project

All projects within the study area that have received approvals for development (approved development plans, approved tentative tracts, approved conditional use permits, etc.,) shall be identified, and their traffic generation included as cumulative traffic in the study. Proposed projects in the study area that have been submitted to the City for processing, but not yet approved, may also be included at the discretion of the City. The Engineering Department will also specify an ambient growth rate to be applied to existing volumes to account for other general traffic growth in and around the study area.

Phased projects could be evaluated in three ways. First, the analyst can identify which phase of a project triggers a needed improvement based on the comparison of background conditions to background plus project conditions. Alternatively, they can provide a phased assessment looking at opening years of each phase. Finally, for large phased projects, the project as a whole could be evaluated initially; however, subsequent traffic studies would have to be completed for each proposed phase implementation to ensure that improvements are implemented when they are needed. The City should be consulted to identify which approach is most appropriate for a proposed project if phasing is proposed; however, the first option noted above is recommended for most phased projects.

Recommendations for developing Ambient Traffic and Cumulative Traffic are provided in the next section of this document.

Data Collection, Project Trip Generation, and Forecasting Methodologies

The following recommendations pertaining to traffic count collection, project trip development, and traffic forecasting methodologies have been developed to maintain consistency across different TIAs and reflect current state of the practice.

Traffic Counts

Data for existing traffic conditions should be collected for the project using the following guidelines.

- Peak period turning movement counts at all study intersections, roadway segments (if required) and/or driveways, including bicycle and pedestrian counts at intersections with high non-automotive use, should be collected. For intersections with high percentages of heavy vehicles, turning movement counts should count heavy vehicles separately.
- Average Daily Traffic (ADT) for all roadways within study area (if required) and vehicle classification counts in areas with a high percentage of heavy vehicle use.
- Traffic counts should not be used if more than one year old without prior approval.
- Traffic data should not be collected on weeks that include a holiday and non-school session time periods unless approved by the local agency.
- Traffic data should not be collected between the week of Thanksgiving and the first week of the new year without prior approval.
- Traffic counts should be conducted on Tuesdays, Wednesdays, or Thursdays.
- For congested conditions, back of queue estimates by approach (and turning movement) should be conducted every 15 minutes.

Unless directed otherwise by the City, counts should be collected during the following time frames presuming the time period captures the beginning and end times of any congested conditions.

- Morning (7:00 a.m. to 9:00 a.m.)
- Afternoon/evening (4:00 p.m. to 6:00 p.m.)
- Midday and “School-Release” peak hours – If directed by the City
- Other peak hours, off-peak, weekend or special event, may also be required depending on the project location and type of use

Count data should be included in the study appendices.

Trip Generation

Local trip generation surveys should be conducted for at least three similar project sites following the methodology contained in the Institute of Transportation Engineers (ITE) Trip Generation Handbook. If locally valid trip generation surveys cannot be conducted, then use of the ITE trip generation rates is allowed but limitations of the data should be fully disclosed especially related to land use context. Trip

generation for high truck generating uses such as high cube warehouses, logistics space, etc. shall be determined with the City's input on a case-by-case basis. The proposed trip generation should be listed in the scoping form for review and approval prior to study initiation.

Trip internalization for mixed use developments (if applicable) should be calculated using state of the practice methodologies. At the time of this memorandum, the EPA's mixed-use trip generation (or MXD) methodology or ITE's mixed use trip generation method are the state of the practice and should be approved by the City prior to use in any studies. Trip internalization calculations (including gross trips, net trips after internalization, and MXD input assumptions (such as intersection density, TOD assumptions, acres, etc.)) should be documented in the TIA.

For projects that anticipate the generation of significant truck traffic, all truck trips should be converted into passenger car equivalents (PCE) for the capacity analysis or the analyst should adjust the heavy vehicle percentage in the capacity assessment appropriately.

Trip Distribution

The project's trip distribution should be based on expected origin-destination patterns related to the project's land uses. Preferred methods include the use of mobile device data measuring trip distribution for similar sites or land uses (a minimum of three locations) and select zone assignments from RIVCOM. Other data may be used to help refine trip distribution patterns including the relative location of population, commercial, recreational and employment centers; existing peak hour link and turning movement volumes; ADT volumes; proximity to regional transportation corridors; and knowledge of the City's local and regional traffic circulation. A preliminary trip distribution pattern map should be submitted in the scoping form for review and approval by the City.

The trip distribution may be further refined, after consultation with the City, based on consideration of following factors:

- Type of proposed development
- Location and intensity of development
- Conditions on the roadway network in the vicinity
- Similar land use in the vicinity
- Truck route system
- As directed by the City

Trip Forecasts

For Cumulative Conditions, the adopted Riverside County Travel Demand Model or City of Murrieta model should be used to develop future traffic volume forecasts for the cumulative horizon year. Prior to running the model, the Traffic Study preparer should review the land use growth allocations in the study area to verify that the allocations are representative of the available land supply created by previously approved projects, the general plan, and applicable zoning.

6.0 INTERSECTION GENERAL PLAN CONSISTENCY REQUIREMENTS

Consistent with the acceptable LOS in the City's General Plan, the City considers the following criteria for application in a traffic study to identify infrastructure improvements required to provide acceptable operations. Please note that this analysis will be completed to demonstrate general plan consistency. Specific CEQA thresholds, which are based on VMT requirements, are described later in these guidelines and shall be the sole basis for determining CEQA-related impacts.

Signalized Intersection Operating Requirements

- Any signalized study intersection operating at an acceptable LOS D or better without project traffic in which the addition of project traffic causes the intersection to degrade to a LOS E or F shall identify improvements to improve operations to LOS D or better.
- Any signalized study intersection that is operating at LOS E or F without project traffic where the project increases delay by 5.0 or more seconds shall identify improvements to offset the increase in delay.

Unsignalized Intersection General Plan Consistency Requirements

Consistent with the acceptable LOS for the City's General Plan, the City considers the following unsignalized intersection criteria when identifying operational deficiencies:

An operational improvement would be required if the study determines that either section a) or both sections b) and c) occur:

a) The addition of project related traffic causes the intersection to degrade from an acceptable LOS D or better to LOS E or F.

OR

b) The project adds 5.0 seconds or more of delay to an intersection that is already projected to operate without project traffic at a LOS E or F,

AND

c) The intersection meets the peak hour traffic signal warrant after the addition of project traffic.

If the conditions above are satisfied, improvements should be identified that achieve the following:

- LOS D or better for case a) above or to pre-project LOS and delay for case b) above.

7.0 ROADWAY SEGMENT GENERAL PLAN CONSISTENCY REQUIREMENTS

Intersections typically provide the transportation constraint on vehicle capacity. As such, these guidelines focus on the evaluation of intersections. However, in some instances, roadway segment evaluation could be appropriate and may be requested by the City.

Consistent with the acceptable LOS for the City, the following roadway segment requirements should be considered and improvements recommended if the project exceeds the noted operational goals:

- Any study roadway segment operating at a LOS C or better without project traffic in which the addition of project traffic causes the segment to degrade to an LOS E or F should identify improvements to achieve LOS C.
- As an exception, LOS "D" may be allowed in the North Murrieta Business Corridor, Clinton Keith/Mitchell, Golden Triangle North (Central Murrieta), South Murrieta Business Corridor, or other Focus Areas, or other employment centers
- Any roadway segment that operates unacceptably in the no project scenario where the project adds traffic in excess of 5% of the roadway capacity (e.g. a volume-to-capacity ratio increase of 0.05) should identify improvements to add capacity to the segment.

8.0 SITE ACCESS, SAFETY, AND OTHER ANALYSES

A project's TIA should analyze site access and safety around the project and on adjacent streets. The recommended analyses are summarized below.

Site Access Analysis

The following analyses are recommended to improve the project access circulation and to limit driveways and local street access on arterial streets:

a) **Intersection Sight Distance –** All on-site intersections, project access driveways or streets to public roadways should provide adequate sight distance. Adequate intersection sight distance should be determined using the City's Standard Drawings.
b) **Driveway Length and Gated Entrance –** Primary project driveways should have a throat of sufficient length to allow vehicles to enter the project area without causing subsequent vehicles to back out onto the public street system.
c) **Limit Driveway Impacts –** Driveways and local streets access on arterial streets should be limited to minimize the impacts on arterial streets. Driveways should be located to maintain a reasonable distance from an adjacent intersection and/or driveway. Whenever possible, driveways should be consolidated with adjacent properties.
d) **Corner Clearance –** A driveway should be a sufficient distance from a signalized intersection so that right-turn egress movements do not interfere with the right-turn queue at the intersection.

In addition, every effort should be made to provide right-turn egress movements with sufficient distance to enter the left-turn pocket at the adjacent intersection.

e) **Right-Turn Lane/Deceleration Lane Analysis -** Right-turn lanes/deceleration lanes shall be installed at any intersection or driveway where any of the following conditions exist:
   - Developments with more than two hundred (200) parking stalls, that are located on an Arterial or a larger street, shall provide deceleration lanes adjacent to their major entry per City standards (Municipal Code Section 16.10.030.B.3.b).
   - The installation of a driveway creates a weaving condition with an adjacent intersection along an Arterial roadway.
   - Right-turn lane requirements are met per Exhibit E.
   - Right-turn lane requirements are subject to the approval of the City Engineer.

f) Adequacy of pedestrian facilities to/from the project site providing convenient and direct access for those users.

g) Bicycle accessibility from nearby bike routes to the project site.

h) Accessibility from adjacent transit stops to/from the project site providing convenient and direct access for those users.

Traffic Signal Warrant Analysis

A traffic signal warrant analysis should be performed for all unsignalized study intersections for the project opening year (if applicable) and build-out year conditions. It may be limited to a peak hour analysis. The traffic signal warrant analysis should be performed using the latest edition of the California MUTCD. The warrant analysis should be included in the study appendices.

In determining the location of a new traffic signal on an arterial street or approaching an arterial street, traffic progression and simulation analysis may be required using Synchro/SimTraffic software or equivalent at the direction of the local agency.

Queuing Deficiency Analysis

A queuing deficiency is identified in the no-Project condition if the calculated 95th -percentile queue length exceeds the storage length by more than 25 feet (the average storage length for one additional vehicle) since the bay taper can typically store at least one vehicle. A significant queuing impact is determined if the Project causes the calculated 95th-percentile queue length to exceed the existing or planned storage capacity at a signalized intersection by more than 25 feet. If storage lanes that are already deficient without the Project, a significant queuing impact is determined if the Project increases the calculated 95th –percentile queue length by at least 25 feet. Where left-turn lanes connect to two-way left-turn lanes, although the calculated queue may exceed the length of the painted left-turn pocket, the presence of the two-way left-turn lane provides additional storage and allows the queue to avoid spilling into through lanes. Therefore, queues exceeding the painted storage length in these situations are not highlighted as existing deficiencies because they do not contribute to operational problems.

10.0 IMPROVEMENTS FOR TRANSPORTATION IMPACTS

As part of the final acceptance of a TIA, the City should review and approve any required improvements and/or fair share contributions necessary to improve the transportation-related deficiencies caused by the proposed development. These should be included as part of the conditions of approval and should be in addition to any improvements required by any other departments. Any transportation improvements based on a transportation study will be in addition to any other fees related to the existing fee programs (unless the needed improvement is already included in an existing fee program (such as TUMF).

Fair share contributions identified in the TIA and subsequently listed in the conditions of approval shall be required before a building permit will be issued. Improvements required in a TIA and subsequently listed in the conditions of approval shall be completed prior to occupancy.

Level of Service Improvements

Improvements for project level impacts should focus on providing operations that offset the project impact (e.g. achieve a “no project” level of service). Improvements could consist of signal timing improvements, lane restriping, or new lanes to study facilities.

Cumulative deficiencies should include a fair-share contribution toward achieving acceptable levels of service as noted below. Alternatively, if a cumulative location is included in an existing traffic impact fee program (such as TUMF), payment of those fees would constitute an appropriate contribution.

Finally, the project applicant could revisit the project description in an effort to reduce the project impacts if viable.

For improvements that are needed where the applicant is not solely responsible, a fair share computation should be computed and reported for each such mitigation. The fair share amount should be calculated using the following formula:

Fair share = project trips / project trips + future development trips

Trips noted above should correspond to the peak hour where the deficiency occurs for intersection assessment or daily trips for roadway segment impacts. If a project degrades operations during both peak hours, then the analysis should identify the peak hour for fair share assessment that has the highest project burden for fair share contribution.

11.0 CEQA ASSESSMENT - VMT ANALYSIS

A key element of SB 743, signed in 2013, is the elimination of automobile delay and LOS as the sole basis of determining CEQA impacts. The most recent CEQA guidelines, released in December 2018, recommend VMT as the most appropriate measure of project transportation impacts. However, SB 743 does not prevent the City from continuing to analyze delay or LOS as part of other plans (i.e., the general plan), studies, or ongoing network monitoring. The following recommendations assist in determining VMT impact thresholds and mitigation requirements for a land use project's TIA.

Analysis Methodology

For purposes of SB 743 compliance, a project-level VMT analysis should be conducted for land use projects as deemed necessary by the Public Works/Engineering Department. In general, for projects that are not screened out using the project screening process below, the VMT expected to be generated by the project will be compared to the VMT expected to be generated by the land use assumed in the General Plan. A significant transportation impact will be assumed to occur if the proposed project would be expected to generate more VMT than the land use assumed in the General Plan. In these cases, VMT will need to be analyzed and VMT mitigation will need to be considered. It is the City's intent to typically analyze VMT and address VMT impacts at the General Plan level.

These guidelines were based on the City's General Plan Update and draft WRCOG guidelines that provided options for methodologies and VMT screening. The methodologies and significance thresholds presented below are based on the General Plan Update and the WRCOG regional recommendations; the City may modify these thresholds with alternative thresholds of significance and methodologies as appropriate.

Project Type Screening

There is an initial type of screening that the City can apply to effectively screen an individual project from a project-level assessment, if the project does not meet project type screening, then it should be considered with the General Plan in the following section.

Local serving retail projects less than 50,000 square feet may be presumed to have a less than significant impact absent substantial evidence to the contrary. Local serving retail generally improves the convenience of shopping close to home and has the effect of reducing vehicle travel.

In addition to local serving retail, the following uses can also be presumed to have a less than significant impact absent substantial evidence to the contrary as their uses are local serving in nature:

- Projects generating less than 110 daily vehicle trips regardless of whether consistent with the General Plan or not.[3] This generally corresponds to the following "typical" development potentials:
  - A residential parcel map
  - 11 single family housing units
  - 16 multi-family, condominiums, or townhouse housing units
  - 10,000 sq. ft. of office
  - 15,000 sq. ft. of light industrial[4]
  - 63,000 sq. ft. of warehouse[4]

- Local-serving retail that primarily serves the City and/or adjacent cities
- Office and other employment-related land uses reducing commutes outside the local area
- Local-serving day care centers, pre-K and K-12 schools
- Local parks and civic uses
- Local-serving gas stations, banks and hotels (e.g. non-destination hotels)
- Local serving community colleges that are consistent with SCAG RTP/SCS assumptions
- Student housing projects

[3] This threshold ties directly to the OPR technical advisory and notes that CEQA provides a categorical exemption for existing facilities, including additions to existing structures of up to 10,000 square feet, so long as the project is in an area where public infrastructure is available to allow for maximum planned development and the project is not in an environmentally sensitive area. (CEQA Guidelines, § 15301, subd. (e)(2).) Typical project types for which trip generation increases relatively linearly with building footprint (i.e., general office building, single tenant office building, office park, and business park) generate or attract an additional 110-124 trips per 10,000 square feet. Therefore, absent substantial evidence otherwise, it is reasonable to conclude that the addition of 110 or fewer trips could be considered not to lead to a significant impact.

[4] Threshold may be higher depending on the tenant and the use of the site. This number was estimated using rates from ITE's Trip Generation Manual.

VMT Assessment for Non-Screened Development

Projects that are not screened out using the process above shall perform a limited analysis of the VMT expected to be generated by the project and compare that to the VMT expected to be generated by the land use assumed in the General Plan. This should result in one of two outcomes as follows:

- VMT is less than the land use assumed in the General Plan – Less than Significant VMT impact and no need for further analysis in a TIA for VMT
- VMT is more than the land use assumed in the General Plan - Likely Significant VMT impact and need for full analysis in a TIA for VMT

For those projects where VMT is less than assumed in the General Plan, a memo to the project file with an analysis of the comparison data (between the project and land use in the General Plan) should be provided for the record to complete this process. A significant transportation impact will be assumed to occur if the proposed project would be expected to generate more VMT than the land use assumed in the General Plan. In these cases, VMT will be analyzed and VMT mitigation will need to be considered.

A complete VMT analysis and forecasting may be done through the City's model or the RIVCOM model to determine if they have a significant VMT impact. This analysis should include 'project generated VMT' and 'project effect on VMT' estimates for the project TAZ (or TAZs) under the following scenarios:

- Baseline conditions - This data is already available in the web screening map.

- Baseline plus project for the project - The project land use would be added to the project TAZ or a separate TAZ would be created to contain the project land uses. A full base year model run would be performed and VMT changes would be isolated for the project TAZ and across the full model network. The model output must include reasonableness checks of the production and attraction balancing to ensure the project effect is accurately captured. If this scenario results in

a less-than-significant impact, then additional cumulative scenario analysis may not be required (more information about this outcome can be found in the Thresholds Evaluation discussion later in this chapter).

- Cumulative no project - This data is available from WRCOG.

- Cumulative plus project - The project land use would either be added to the project TAZ or a separate TAZ would be created to contain the project land uses. The addition of project land uses should be accompanied by a reallocation of a similar amount of land use from other TAZs; especially if the proposed project is significant in size such that it would change other future developments. Land use projects will generally not change the cumulative no project control totals for population and employment growth. Instead, they will influence the land use supply through changes in general plan land use designations and zoning. If project land uses are simply added to the cumulative no project scenario, then the analysis should reflect this limitation in the methodology and acknowledge that the analysis may overestimate the project's effect on VMT.

The model output should include total VMT, which includes all vehicle trips and trip purposes, and VMT per service population (population plus employment). Total VMT (by speed bin) is needed as an input for air quality, greenhouse gas (GHG), and energy impact analysis while total VMT per service population is recommended for transportation impact analysis.

Both "plus project" scenarios noted above will summarize two types of VMT: (1) project generated VMT per service population and comparing it back to the appropriate benchmark noted in the thresholds of significance, and (2) the project effect on VMT, comparing how the project changes VMT on the network looking at Citywide VMT per service population or a subregional VMT per service population and comparing it to the no project condition.

Project-generated VMT shall be extracted from the travel demand forecasting model using the origin-destination trip matrix and shall multiply that matrix by the final assignment skims. The project-effect on VMT shall be estimated using a subregional boundary (such as the City limit or WRCOG TUMF Zone boundary) and extracting the total link-level VMT for both the no project and with project condition.

CEQA VMT Impact Thresholds

The City of Murrieta has selected VMT thresholds of significance based on the guidance/substantial evidence prepared in the City's General Plan Update and EIR as well as the WRCOG Implementation Study. Related to the City's approach to VMT in comparing a project to the City's General Plan Update and EIR and the potential analysis of CEQA VMT Impact Thresholds, two sections of CEQA are important to consider first:

15183. PROJECTS CONSISTENT WITH A COMMUNITY PLAN OR ZONING
(a) CEQA mandates that projects which are consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified shall not require additional environmental review, except as might be necessary to examine whether there are project-

specific significant effects which are peculiar to the project or its site. This streamlines the review of such projects and reduces the need to prepare repetitive environmental studies.

The use of Section 15183 also addresses cumulative impacts as acknowledged in Section 15130(e).

15130. DISCUSSION OF CUMULATIVE IMPACTS
(e) If a cumulative impact was adequately addressed in a prior EIR for a community plan, zoning action, or general plan, and the project is consistent with that plan or action, then an EIR for such a project should not further analyze that cumulative impact, as provided in Section 15183(j).

As such, and as noted above projects that are consistent with the General Plan Update EIR do not typically require additional environmental review, except in certain situations. Therefore impacts, whether in the local context or cumulative would start with consideration of the land use in the General Plan. Additionally, projects should consider whether a potential impact is addressed in the City's General Plan.

VMT Impacts

An impact under CEQA begins with a change to the existing or baseline environment. There are a range of approaches to use as a starting point for VMT impact analysis. At one end of the spectrum is 'total daily VMT' generated under baseline conditions. Setting this value as the threshold for a jurisdiction could result in a fixed budget that would limit increases such that even small increases could result in a significant impact. Alternatively, the baseline VMT per resident, VMT per employee, or VMT per service population could be used to establish an efficiency metric basis for impact evaluation. Using this form of VMT would mean that future land use projects would be expected to perform no worse than existing land use projects consistent with the General Plan and only projects that cause an increase in the rate of VMT generation would cause significant impacts. Since VMT will increase or fluctuate with population and employment growth, changes in economic activity, and changes in vehicle travel choices (i.e., car share, Lyft, AVs, etc.), expressing VMT measurement in an efficiency metric form allows for more direct comparisons to baseline conditions when it comes to land use projects, land use plans, and transportation projects. Setting a threshold based on baseline levels should consider how the threshold complies with the SB 743 statute provisions described in these guidelines as well as whether VMT reduction strategies are feasible in the City.

A project would result in a significant project-generated VMT impact if either of the following conditions are satisfied:

1. The baseline project-generated VMT per service population exceeds the City's baseline VMT per service population, or
2. The cumulative project-generated VMT per service population exceeds the City's baseline VMT per service population.

The project's effect on VMT would be considered significant if it resulted in either of the following conditions to be satisfied:

1. The baseline link-level boundary VMT per service population (City or subregional boundary) to increase under the plus project condition compared to the no project condition), or

2. The cumulative link-level boundary VMT per service population (City or subregional boundary) to increase under the plus project condition compared to the no project condition).

The cumulative no project condition shall reflect the adopted Regional Transportation Plan Sustainable Communities Strategy; as such, if a project is consistent with the regional RTP/SCS, then the cumulative impacts shall be considered less than significant subject to consideration of other substantial evidence.

VMT Mitigation Measures

To mitigate VMT impacts various options can be considered, the following choices are some of those available to the applicant:

1. Changing the Project - Modify the project's built environment characteristics to reduce VMT generated by the project.
2. TDM - Implement transportation Demand Management (TDM) measures to reduce VMT generated by the project. TDM measures need ongoing monitoring and performance metrics to be implemented, this must be a required condition of a project that selects this measure.
3. Impact Fee or Exchange - Participate in a VMT fee program and/or VMT mitigation exchange/banking program (if they exist) to reduce VMT from the project or other land uses to achieve acceptable levels.

TDM measures that are appropriate to the City are identified in the Development Code and assist in implementation of the City's Climate Action Plan. Evaluation of VMT reductions should be evaluated using state-of-the-practice methodologies recognizing that many of the TDM strategies are dependent on building tenant performance over time. As such, actual VMT reduction cannot be reliably predicted and monitoring may be necessary to gauge performance related to mitigation expectations. Additional TDM measures appropriate to the region were identified in the WRCOG Implementation Pathway Study.

CEQA Assessment – Active Transportation and Public Transit Analysis

Potential impacts to public transit, pedestrian facilities and travel, and bicycle facilities and travel can be evaluated using the following criteria.

- A significant impact occurs if the project conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decreases the performance or safety of such facilities.

Therefore, the TIA should include analysis of a project to examine if it is inconsistent with adopted policies, plans, or programs regarding active transportation or public transit facilities, or otherwise decreases the performance or safety of such facilities and make a determination as to whether it has the potential to conflict with existing or proposed facilities supporting these travel modes.

Transportation Impact Study Format

The recommended TIA format is as follows:

1. Executive Summary
    a. Table summarizing significant impacts and mitigation measures
2. Introduction
    a. Purpose of the TIA and study objective
    b. Project location and vicinity map (Exhibit)
    c. Project size and description
    d. Existing and proposed land use and zoning
    e. Site plan and proposed project (Exhibit)
    f. Proposed project opening year and analysis scenarios
3. Methodology and Impact Thresholds
4. Existing Conditions
    a. Existing roadway network
    b. Existing traffic control and intersection geometrics (Exhibit)
    c. Existing traffic volumes – AM and PM peak hour and ADT (Exhibit)
    d. Existing level of service (LOS) at intersections (Table)
    e. Existing bicycle facilities (Exhibit)
    f. Existing transit facilities (Exhibit)
    g. Existing pedestrian facilities
5. Project Traffic
    a. Trip generation (Table)
    b. Trip distribution and assignment (Exhibit)
    c. Project peak hour turning movements and ADT (Exhibit)
6. Background Conditions or Near Term (Opening Year) Analysis
    a. No Project analysis
        i. Committed (funded) roadway improvements
        ii. Approved project trip generation (Table, if required)
        iii. Approved project trip assignment and distribution (Exhibit, if required)
        iv. Peak turning movement and ADT (Exhibit)
        v. Intersection level of service (Table)
        vi. Roadway segment level of service (Table)
    b. Plus Project analysis
        i. Plus Project peak turning movement and ADT (Exhibit)
        ii. Intersection level of service (Table)
        iii. Roadway segment level of service (Table)
        iv. Identification of intersection and roadway segment deficiencies
7. Cumulative Year or Long Term/Horizon Year Analysis
    a. No Project analysis
        i. Committed (funded) roadway improvements
        ii. Pending projects and verification of how they are included in the travel demand forecasting model
        iii. Cumulative Year peak turning movement and ADT (Exhibit)
        iv. Intersection level of service (Table)
        v. Roadway segment level of service (Table)

b. Plus Project Analysis
    i. Plus Project peak turning movement and ADT (Exhibit)
    ii. Intersection level of service (Table)
    iii. Roadway segment level of service (Table)
    iv. Identification of intersection and roadway segment deficiencies
8. Traffic Signal Warrant Analysis
9. Site Access Analysis
10. Safety and Operation Improvement Analysis
11. Active Transportation and Public Transit Analysis
12. Improvements and Recommendations
    a. Proposed improvements at intersections
    b. Proposed improvements at roadway segments
    c. Recommended Improvements categorized by whether they are included in fee plan or not. (Identify if these improvements are included in an adopted fee program)
13. Vehicle Miles Traveled (VMT) Analysis
    a. Project VMT per person/employee for all analysis scenarios
    b. Project effect on VMT for all analysis scenarios
    c. Identification of VMT impacts
    d. Proposed VMT Mitigation Measures
14. Appendix
    a. Approved scope of work
    b. Traffic counts
    c. Intersection analysis worksheets
    d. VMT and TDM calculations
    e. VMT and TDM mitigation calculations
    f. Signal warrant worksheets

SUBMITTAL REQUIREMENTS AND PROCEDURE

a) A project scoping form must be submitted for approval prior to preparation of the traffic study. Identification of a Planning case number must be included in order to process the agreement. A Traffic Study Submittal Form, shown as Exhibit F, shall be completed and submitted at the time of scoping along with the appropriate fee.

b) Upon approval of the scoping agreement and completion of the traffic study report, submit two bound copies of the Traffic Impact Study report to the City of Murrieta case planner. Clearly identify the project case number on the cover of the report. Copies of the approved scoping agreement and cumulative projects list as provided by the City of Murrieta shall be included with the copies of the traffic impact study.

c) If revisions to the Traffic Impact Analysis are necessary, re-submit two (2) complete bound copies along with a copy of the comments provided by the City of Murrieta case planner.

Exhibits

A. Scoping Agreement for Traffic Impact Analysis

B. Signalized Intersection Analysis Input Parameters

C. Traffic Study Submittal Form

D. VMT Forecasting

E. Right-Turn Lane Requirements

Exhibit A

SCOPING AGREEMENT FOR TRAFFIC IMPACT ANALYSIS

This letter acknowledges the City of Murrieta Public Works/Engineering Department requirements for traffic impact analysis of the following project. The analysis must follow the City Traffic Impact Analysis Preparation Guidelines dated May 2020.

Case No. (Required for submittal)_____
Related Cases - _____
SP No. _____
EIR No. _____
GPA No._____
CZ No. _____
Project Name: _____
Project Address: _____
Project Description: _____

	Consultant	Developer
Name:	_____	_____
Address:	_____	_____
Telephone:	_____	_____

A. Trip Generation Source: (ITE 9th Edition or other)

Current GP Land Use _____ Proposed Land Use _____
Current Zoning _____ Proposed Zoning _____

	Current Trip Generation			Proposed Trip Generation		
	In	Out	Total	In	Out	Total
AM Trips	_____	_____	_____	_____	_____	_____
PM Trips	_____	_____	_____	_____	_____	_____

Internal Trip Allowance ☐Yes ☐No (_____% Trip Discount)
Pass-By Trip Allowance ☐Yes ☐No (_____% Trip Discount)

A pass-by trip discount of up to 25% is allowed for appropriate land uses. The pass-by trips at adjacent study area intersections and project driveways shall be indicated on a report figure.

B. Trip Geographic Distribution: N___% S___% E___% W___%
(attach exhibit for detailed assignment)

C. Background Traffic

Project Build-out Year: _____ Annual Ambient Growth Rate: % _____

Phase Year(s) _____
Other area projects to be analyzed: _____
_____

Model/Forecast methodology: _____
_____

D. Study intersections: (NOTE: Subject to revision after other projects, trip generation and distribution are determined, or comments from other agencies.)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

E. Study Roadway Segments: (NOTE: Subject to revision after other projects, trip generation and distribution are determined, or comments from other agencies.)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

F. Site Plan (please attach reduced copy)

G. Specific issues to be addressed in the Study (in addition to the standard analysis described in the Guideline) (To be filled out by Engineering Department)

H. Existing Conditions
Traffic count data must be new or recent. Provide traffic count dates if using other than new counts.
Date of counts_____

I. Potential Screening Checks

Is your project screened from specific analyses (see Pages 6-13 of the guidelines related to LOS assessment and Pages 14-18 related to VMT assessment)

Is the project screened from LOS assessment? ☐Yes ☐No

LOS screening justification (see Pages 6-13 of the guidelines):

_____
_____
_____

Is the project screened from VMT assessment? ☐Yes ☐No

VMT screening justification (see Pages 14-18 of the guidelines):

_____
_____
_____

J. VMT Scoping

For projects that are not screened, identify the following:

• Travel Demand Forecasting Model Used: _____

• Attach proposed Model Land Use Inputs and Assumed Conversion Factors (attach)

Recommended by:

_____ _____

Consultant's Representative Date

Scoping Agreement Submitted on _____

Revised on _____

Approved Scoping Agreement:

_____ _____

City Of Murrieta Engineering Department Date

Exhibit B

SIGNALIZED INTERSECTION ANALYSIS INPUT PARAMETERS

PARAMETER	VALUE
Base Saturation Flow Rate	1900 pc/hr/ln
Heavy Vehicle factor	Determine % heavy vehicle in existing traffic stream based on count data or consultation with City Engineering Dept. projects with truck intensive uses must convert project rips to passenger car equivalents (PCE=2). Truck intensive uses include heavy industrial, warehousing or as determined by the Engineering Department.
Grade	Include as appropriate
Exclusive Left- Turn Lane	Peak hour volume > 100
Exclusive Right-Turn Lane	See Site Access, Safety and other Analysis
Dual Left-Turn Lanes	Peak hour volume > 300
Protected Left Turn Phasing	Left turn volume > 240 vph
Minimum Green Time	7 seconds each movement in areas of light pedestrian activity. In areas of heavy pedestrian activity, the minimum green shall be calculated based on the methodology in the HCM.
Cycle Length	60 sec to 140 sec
Lost Time	Per HCM Exhibit 10-17 (below)

Major street	Minor Street	Number of Phases	L (s)
Protected	Protected	4	16
Protected	Permitted	3	12
Permitted	Protected	3	12
Permitted	Permitted	2	8

* Any deviation from these parameters requires prior approval from City of Murrieta Engineering Department. Refer to the HCM for any default values not specifically identified here.

Intersection analyses should be conducted utilizing acceptable software based on HCM methodology. Closely spaced intersections are to be analyzed using analysis tools capable of accounting for turn lane storage, queue length, coordination, blockage, etc. such as Synchro.

Actual signal timing and peak hour factors should be collected in the field and utilized in the existing and near-term analyses. In cases where traffic is added from a significant number of cumulative projects, the consultant shall use their engineering judgment in the application of peak hour factors to maintain consistency with the existing conditions analyses. A peak hour factor of 0.95 shall be applied to buildout traffic conditions.

Exhibit C

TRAFFIC STUDY SUBMITTAL FORM

Date _____

Case# _____

Related Cases _____
(If Applicable)

Fast Track Authorization _____
(If Applicable)

ST # _____
(Department Use Only)

APN # _____

OWNER
Name _____ Phone _____
Address _____
City, State, Zip _____

APPLICANT
Name _____ Phone _____
Address _____
City, State, Zip _____

ENGINEER
Name _____ Phone _____
Address _____
City, State, Zip _____

PROJECT
Description _____
Location _____
Land Use _____
Section(s) _____ Township _____N/S Range _____E/W
Supervisorial District _____Road Book Page/Grid _____Thomas Bros Page/Grid_____
Nearest Major Intersection _____

The Traffic Study, this submittal Form and check need to be submitted to the Planning Department case planner. If mailed, please mail to 1 Town Square, Murrieta, CA 92562

Exhibit D

Detailed VMT Forecasting Information

Most trip-based models generate daily person trip-ends for each TAZ across various trip purposes (HBW, HBO, and NHB, for example) based on population, household, and employment variables. This may create challenges for complying with the VMT guidance because trip generation is not directly tied to specific land use categories. The following methodology addresses this particular challenge among others.

Production and attraction trip-ends are separately calculated for each zone, and generally: production trip-ends are generated by residential land uses and attraction trip-ends are generated by non-residential land uses. OPR's guidance addresses residential, office, and retail land uses. Focusing on residential and office land uses, the first step to forecasting VMT requires translating the land use into model terms, the closest approximations are:

- Residential: home-based production trips
- Office: home-based work attraction trips

Note that this excludes all non-home-based trips including work-based other and other-based other trips.

The challenges with computing VMT for these two types of trips in a trip-based model are 1) production and attraction trip-ends are not distinguishable after the PA to OD conversion process and 2) trip purposes are not maintained after the mode choice step. For these reasons, it not possible to use the VMT results from the standard vehicle assignment (even using a select zone reassignment). A separate post-process must be developed to re-estimate VMT for each zone that includes trip-end types and trip purposes. Two potential approaches to tackle this problem are described below.

Quick and Easy

This approach uses standard model output files and requires minimal custom calculations. It is based on a regional MPO trip-based model with peak (PK) and off-peak (OP) skims and person trip production-attraction (PA) matrices.

- Calculate custom vehicle trip PA matrices from PK and OP person trip matrices
  - Keep trip purposes and modes separate
  - Use average vehicle occupancy rates for drive-alone and shared ride trips
- Use the final congested drive-alone PK and OP skim matrices to estimate trip length between zones
- Multiply the skim matrices by vehicle trip matrices to estimate VMT
- Sum the PK and OP results to estimate daily VMT and aggregate mode trip purpose and mode
- Calculate automobile VMT for individual TAZs using marginal totals:
  - Residential (home-based) - row total

- Office (home-based work) - column total

Detailed and Complicated

The quick and easy process described above simplifies the approach but does not account for different congestion patterns throughout the day (AM, MD, PM, and NT), the direction of travel (all productions are origins and all attractions are destinations), or the benefits of exclusive lanes (HOV or HOT lanes). This more detailed approach attempts to address these limitations and better estimate the VMT produced by the vehicle assignment model.

- Re-skim final loaded congested networks for each mode and time period
- Run a custom PA to OD process that replicates actual model steps, but:
  - Keeps departure and return trips separate
  - Keeps trip purpose and mode separate
  - Converts person trips to vehicle trips based on auto occupancy rates and isolates automobile trips
  - Factors vehicle trips into assignment time periods
- Multiply appropriate distance skim matrices by custom OD matrices to estimate VMT
- Sum matrices by time period, mode, and trip purpose to calculate daily automobile VMT
- Calculate automobile VMT for individual TAZs using marginal totals:
  - Residential (home-based) - row of departure matrix plus column of return matrix
  - Office (home-based work) - column of departure matrix plus row of return matrix

Appropriateness Checks

Regardless of which method is used, the number of vehicle trips from the custom PA to OD process and the total VMT should match as closely as possible with the results from the traditional model process. The estimated results should be checked against the results from a full model run to understand the degree of accuracy. Note that depending on how each model is setup, these custom processes may or may not include IX/XI trips, truck trips, or special generator trips (airport, seaport, stadium, etc.).

When calculating VMT for comparison at the study area, citywide, or regional geography, the same methodology that was used to estimate project-specific VMT should be used. The VMT for these comparisons can be easily calculated by aggregating the row or column totals for all zones that are within the desired geography.

Exhibit E
Right-Turn Treatment

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 279

INTERSECTION CHANNELIZATION DESIGN GUIDE

TIMOTHY R. NEUMAN
Jack E. Leisch & Associates
Evanston, Illinois

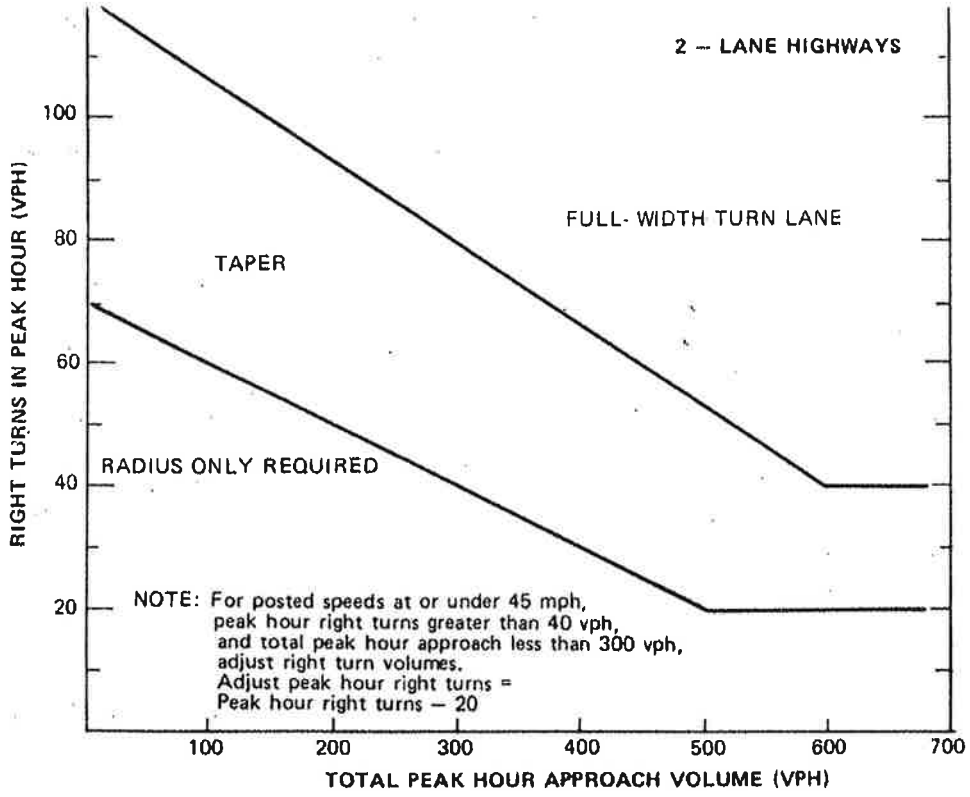
RESEARCH SPONSORED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS IN COOPERATION WITH THE FEDERAL HIGHWAY ADMINISTRATION

AREAS OF INTEREST:

FACILITIES DESIGN
OPERATIONS AND TRAFFIC CONTROL
(HIGHWAY TRANSPORTATION)

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C.

NOVEMBER 1985



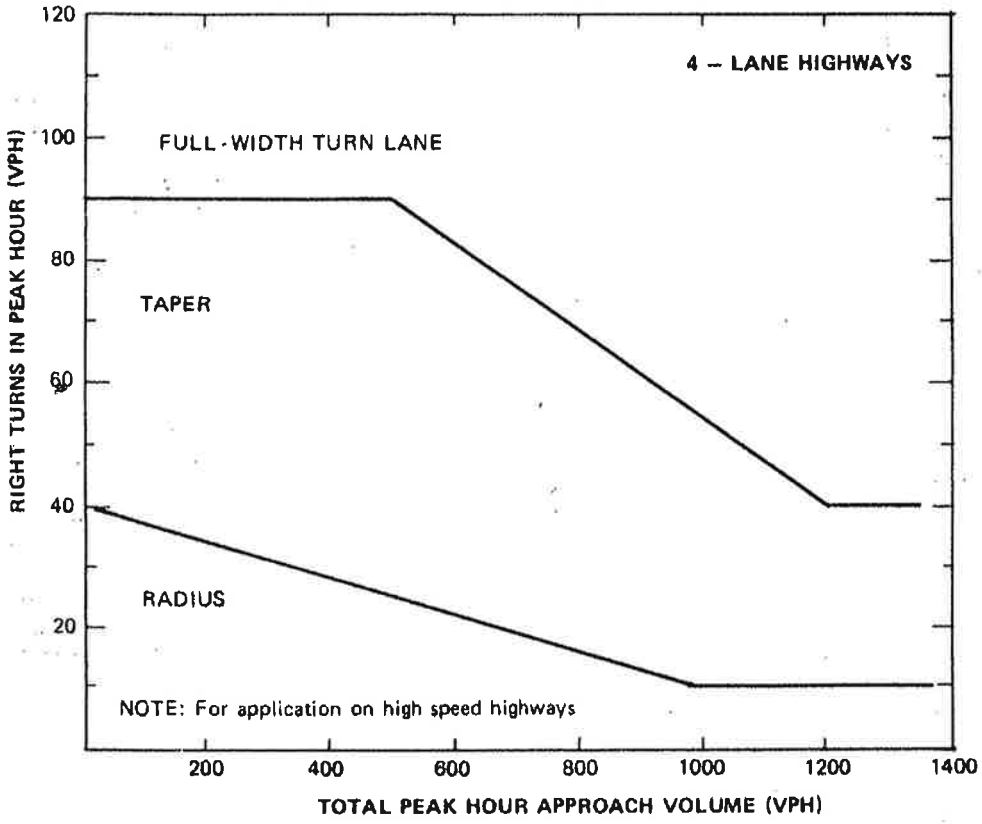


Figure 4-23. Traffic volume guidelines for design of right-turn lanes. (Source: Ref. *4-11*)