

**CITY OF HAYWARD INTERIM TRAFFIC STUDY GUIDELINES**  
**October, 2015; Revised December 2015**

**Background:** This document is intended to serve as a general guide to aid in the preparation of traffic studies for projects located in the City of Hayward. The information contained in this document provides an overview of what is generally required by the City of Hayward for traffic studies. City staff may revise, modify or add requirements depending on the project, its location, or other factors.

**Initial Steps:** The following steps should be taken **prior** to beginning work on a traffic study:

1. Project applicant must submit a completed Project Application to the City of Hayward Planning Department.
2. Upon review of the Project Application, City of Hayward Department of Public Works-Transportation Division staff will make a determination as to whether or not a traffic study will be required for the project. Note that some projects may not require a traffic study, while others may only require an abbreviated study in the form of a traffic memorandum to address specific concerns.
3. If a traffic study is required, the project's traffic consultant must contact City of Hayward Department of Public Works-Transportation Division staff to discuss the scope of work and any questions related to the project. If a traffic memorandum is required, contact Public Works-Transportation staff for specific requirements.
4. The traffic consultant must submit the project's transportation/traffic scope of work, trip generation rates and proposed trip distribution to Public Works-Transportation Division staff for review and approval.
5. The traffic consultant may proceed with the traffic study once the Scope of Work, Trip Generation and Trip Distribution are approved by Public Works-Transportation staff.

**Trip Generation:** To estimate project trips, use the methodologies and rates published in the ITE Trip Generation Manual, 9<sup>th</sup> Edition.

*Trip Reductions:* Trip reductions may be taken for mixed-use developments, if the project is located within reasonable distance from Hayward or South Hayward BART, or other major transit facilities. Trip reductions may also be taken if the project proposes strategies to encourage alternative modes of transportation by implementing transportation demand management (TDM) program(s). All trip reductions shall be documented, explained and submitted to City staff for review and approval. Any trip reduction for proposed TDM program(s) will be a condition of approval for the project.

*Pass-by/Diverted Link Trips:* Use the methodologies and data published in the ITE Trip Generation Manual, 9<sup>th</sup> Edition to determine pass-by/diverted link trips. All trip reductions shall be documented, explained and submitted to City staff for review and approval.

**Trip Distribution:** Trip distribution methodology varies from project-to-project. As such, it is advised that the project's traffic consultant contact Public Works-Transportation staff to discuss project specific requirements.

If it is determined by City staff that trip distribution percentages would need to come from the travel demand model, conduct a select-link analysis using the Hayward General Plan Update model. If you need copies of the model files, please contact Public Works-Transportation staff.

**Study Intersections** - A list of study intersections will be provided to the traffic consultant by City staff. In addition, the traffic study shall include all proposed project access driveways as study intersections. City will require that the traffic consultant, at minimum, conduct weekday AM and PM peak hour vehicular turning movement, pedestrian and bicycle counts. AM and PM peak hour turning movement counts should be conducted on a Tuesday, Wednesday or Thursday during a non-holiday week when school is in session and under normal weather conditions. If counts cannot be conducted during these times, it is highly advised that the traffic consultant contact Public Works-Transportation staff to determine alternative options.

Off-peak counts may be required for some projects.

**Analysis Methodology:** Evaluate LOS/delay and 95th Percentile Queue (for all movements, compare to existing available storage) for the weekday AM and weekday PM peak hours, and any additional off-peak scenarios (if required), using the Synchro 8.0 software package and 2000 Highway Capacity Manual methodology for the following conditions:

- Existing
- Existing plus Project
- Background (5-year interpolation between Existing and Cumulative model runs using the Hayward General Plan Update travel demand model)
- Project (project trips added to Background)
- Cumulative
- Cumulative plus Project

Document LOS/delay, queue results and identify any significant impact(s) (refer to LOS/Delay Impacts section). Queuing analysis shall also analyze left-turn pocket storage capacity, right-turn pocket storage capacity, need for and/or adequacy of acceleration/deceleration lanes.

**Forecasting future-year (turning movement) volumes:** Using the Hayward General Plan Update travel demand model, forecasting shall be conducted using the “incremental method” consistent with the methodologies and practices outlined in the Transportation Research Board’s (TRB) NCHRP 255 report and as follows:

1. Compile Current Year Model Volumes.
2. Compile Future Year Model Volumes.
3. Calculate Increment from Current Year Model to Future Year Model.
  - a.  $[Future\ Year\ Model] - [Current\ Year\ Model] = Increment$
  - b.  $Add\ Increment\ to\ Count \rightarrow [Increment] + [Count] = Adjusted\ Volume$
  - c. *Check for Negative Increments*

4. Negative Increments: traffic consultant shall use engineering judgement to determine whether to allow traffic to decrease consistent with model assumptions, or to reset the negative increments to zero so that no future forecasts are lower than current year traffic counts. Document the reasoning in the traffic study.
5. Add increment to traffic count.
6. Intersection Turn Volumes: Adjust the link volumes entering and exiting the intersection, then, factor the existing turn movement counts to match the adjusted entering and exiting volumes. Use the Furness factoring algorithm (“Turns” software or spreadsheet).

Note: Land uses in the General Plan model shall **not** be modified without consultation and consent from Public Works-Transportation staff.

**LOS/Delay Impacts:** Use the following criteria to determine LOS/Delay impacts at study intersections:

**For signalized intersections:** Refer to City of Hayward General Plan Goal M-4.3 which states:

*“The City shall maintain a minimum vehicle **Level of Service E** at signalized intersections during the peak commute periods except when a LOS F may be acceptable due to costs of mitigation or when there would be other unacceptable impacts, such as right-of-way acquisition or degradation of the pedestrian environment due to increased crossing distances or unacceptable crossing delays.”*

**For unsignalized intersections:** Report the LOS and delay and determine if any of the following are met:

- a.) Traffic Signal Warrant (peak hour)
- b.) Pedestrian Signal Warrant
- c.) STOP-sign Warrant

Note that meeting any of the above warrants does not necessarily result in a significant impact. However, the City of Hayward has the discretion to require that the project applicant install traffic, pedestrian or STOP sign(s) if warrants are met. See “Project Contribution” on Page 4 for additional details.

In addition for **both signalized and unsignalized intersections**, the project would result in a potentially significant impact if:

*The intersection operates at **Level of Service F** without the project under Existing, Background or Cumulative conditions and the addition of the project under Existing plus Project, Project or Cumulative plus Project conditions results in an increase in the average control delay of 5.0 seconds or greater when compared to the associated no project condition.*

The traffic study must include a summary of the project impacts and proposed mitigation measures.

**Specific Plans:** Please note that projects in some areas of the City may be subject to additional or different criteria outlined in their respective Specific Plans. It is recommended that the traffic consultant check with City staff to determine if there are specific plans applicable to the project.

**Project Contribution:** When a significant impact is identified, or when the project causes a study intersection to meet any signal or STOP-sign warrant(s), project contribution shall be determined as follows:

- a.) **Project results in impact, warrant or City requirement for traffic signal(s), pedestrian signal(s) or STOP-sign(s) at project driveway(s) or any project roadway(s) or facilities located within the project site:** Project contribution is 100%.
- b.) **Project results in impact or warrants being met in the Existing plus Project conditions:** Project contribution is 100%.
- c.) **Project results in impact or warrants being met in the Project conditions:**

$$P = T / T b - T e$$

Where:

P = The project contribution for the proposed project's traffic impact

T = The vehicle trips generated by the project during the peak hour of adjacent facility in vehicles per hour, vph.

T b = The forecasted traffic volume on an impacted facility under Project conditions.

T e = The traffic volume existing on the impacted facility under Background conditions.

- d.) **Project results in impact or warrants being met in the Cumulative plus Project conditions:**

$$P = T / T b - T e$$

Where:

P = The project contribution for the proposed project's traffic impact

T = The vehicle trips generated by the project during the peak hour of adjacent facility in vehicles per hour, vph.

T b = The forecasted traffic volume on an impacted facility under Cumulative + Project conditions.

T e = The traffic volume existing on the impacted facility under Cumulative conditions.

**Cost Estimate:** If the Project is found to have a significant impact to any of the study intersections, mitigations are required. The traffic consultant shall provide a separate letter to City of Hayward Public Works-Transportation staff which shall include "planning-level" cost estimates, including estimated right-of-way acquisition costs, for all proposed mitigations. Conceptual drawings and support documents of the proposed mitigations may also be required by City staff.

**Site Circulation:** Provide site circulation analysis, including emergency vehicle access, loading/docks/moving vans access (if applicable), and AutoTurns analysis for EVA and Loading/Moving Truck ingress/egress and internal site circulation.

**Pedestrian and Bicycle Facilities:** Document an inventory of existing (and any proposed) pedestrian and bicycle facilities in the project vicinity, including sidewalks, crosswalks, bike lanes, etc., analyze and document any potential project impacts to these facilities.

**Transit:** Conduct and document an inventory of existing (and any proposed) transit routes and facilities in the project vicinity, analyze and document any potential project impacts to these facilities.

**Parking:** Review on-site parking and compare to current City of Hayward off-street parking code requirements. Analyze off-site parking in project vicinity and document any potential project impacts.

**Neighborhood Cut-Through & Traffic Calming:** If the project is located adjacent to a predominately residential area, or located near an area where there have been historical traffic-related concerns, the Traffic Study shall include a chapter discussing and identifying traffic calming measures to adequately manage cut-through traffic, speeding, pedestrian safety and other concerns.

**Figures:** At minimum, the traffic study shall include the following figures:

1. Map illustrating Project Vicinity, Location and Study Intersections
2. Project Site Plan (must be consistent with the Site Plan submitted as part of the Project Application)
3. Existing Conditions Lane Geometries
4. Existing Conditions Turning Movement Volumes
5. Map illustrating Project Trip Distribution percentages
6. Project Trips (turning movement volumes)
7. Existing + Project Conditions Turning Movement Volumes
8. Background Conditions Turning Movement Volumes
9. Project Conditions Turning Movement Volumes
10. Cumulative Conditions Turning Movement Volumes
11. Cumulative + Project Conditions Turning Movement Volumes
12. Existing Conditions Transit Network
13. Existing Conditions Bicycle and Pedestrian Network

**Appendices:** At minimum, the traffic study's technical appendices shall include the following:

1. Turning Movement Count Sheets (including vehicular turning movements, bicycle and pedestrian counts)
2. Signal Timing Sheets for all signalized intersections
3. Level of Service calculation sheets (Synchro 8.0 outputs) for all scenarios, including mitigations

4. Signal, Pedestrian or STOP-sign warrants for all unsignalized intersections under all scenarios
5. Project Trip Distribution Model Output and Calculation Sheets
6. Forecasting Calculation Sheets and Model Output for all applicable scenarios
7. AutoTurns output

**Synchro Files:** Along with the report, please submit Synchro 8.0-readable Synchro files for all scenarios, including mitigations, to Public Works-Transportation staff for review and approval.

**Questions:** If you have any questions, please contact:

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