CITY OF CYPRESS

TRANSPORTATION OPERATIONAL ASSESSMENT

(LEVEL-OF-SERVICE TRAFFIC STUDY) GUIDELINES

April 2023

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PURPOSE

The purpose of these following guidelines is to provide a consistent methodology for traffic engineering consultants to use in preparing Transportation Operational Assessments ("transportation assessment") for proposed development projects in the City of Cypress to guide the development review process. These guidelines present the recommended format and methodology to be utilized in the preparation of the transportation assessment.

APPLICATION OF GUIDELINES AND PROCEDURES

Generally, a Transportation Operational Assessment ("transportation assessment") is required if the proposed development is forecast to generate 50 or more vehicle trips in the morning (AM) or afternoon (PM) peak hour. The forecast project traffic volume shall generally be based on trip generation rates contained in the latest edition of the *Trip Generation Manual* published by the Institute of Transportation Engineers. Other derived trip rates supported by empirical/site-specific studies may also be acceptable or may be required in cases where the tenant is atypical for their specific land use (determination will be made by the City Traffic Engineer). Any derived trip generation rates will need to be submitted and approved for use by the City Traffic Engineer. The following summarizes the criteria when an assessment is required:

- Proposed project development trip generation of 50 or more vehicle trips in the weekday AM or PM peak hour
- Project trip generation of 25 or more peak hour trips through any single signalized intersection
- Proposed project development for all truck terminals and warehouse type uses
- Smaller projects or any unique combination of land use and study location per the discretion of the City Traffic Engineer.

The transportation assessment mainly focuses on accurate field inventory of the existing circulation system and an assessment of the proposed project's effects on the system in order to provide recommendations and measures that would be implemented into the design of the project to promote safety and compatibility with the built system. The transportation assessment should be prepared under the direction and/or by a registered Traffic Engineer, registered Civil Engineer, or certified Transportation Planner. Prior to the preparation of the transportation assessment, the analyst and project applicant shall coordinate with the City Traffic Engineer to identify the study area, assumptions, and methodologies of the transportation assessment. Traffic modeling may be required for larger projects, at the discretion of the City Traffic Engineer. All assumptions and methodologies are to be outlined in the Transportation Assessment Scoping (TAS) form (see Attachment A) and submitted to the City Traffic Engineer for review and approval, prior to commencement of the preparation of the transportation assessment.

City staff reserves the right to use professional judgement to provide exemptions and/or to modify requirements for specific projects at the time of the review application. Additionally, **the City may perform the traffic assessment itself at the City Traffic Engineer's discretion**, which shall be determined on a project-by-project basis.

TRANSPORTATION OPERATIONAL ASSESSMENT – REPORT CONTENT

A. Cover Page

The Transportation Operational Assessment cover page shall be consistent with the cover page template found in Attachment B, and must contain the project name and address, as well as the date and the contact information of the preparer. The cover page shall be signed and stamped by the preparer.

B. Executive Summary

The executive summary shall include a summary of the project description, general scope of the transportation assessment conducted and the conclusions of the assessment and any proposed measures to improve any identified deficiencies with the project.

C. Project Description

The transportation assessment shall include a detailed project description at the beginning of the study with the following project information:

- Location of the project site, address, and any cross street
- Proposed size (total square footage) for each type of land use and/or the number of residential units, and any net changes for each type of use
- Project buildout and occupancy year
- Include any sequence of phasing or any unusual conditions
- Any transportation demand management measures proposed as part of the project

Maps and figures for this section shall include the following at a minimum:

- Site vicinity map showing the study locations and project site including identification of major streets/corridors.
- Project site plan showing proposed buildings, pedestrian pathways, driveway locations, on-site parking areas, loading/unloading areas, existing and/or proposed easements, etc.

D. Transportation Circulation Setting

1. Existing Project Site – A general description including the size of the existing project site, identification of any on-site uses, surrounding land uses, existing site access, etc.

2. Existing Roadways and Intersections – Identification of street designations/classifications, number of lanes, curb-to-curb width, right-of-way, any on-street parking information, median types, etc. Details of the study intersections will need to include the overall intersection lane configurations, type of controls, and any traffic-related features for each intersection.

3. Traffic Counts – Any traffic counts utilized in the transportation analysis shall not be more than one year old without prior approval of the City Traffic Engineer. If traffic counts conducted within the last year are unavailable, then new traffic counts shall be conducted by a qualified data collection firm. The turning movement data must include vehicles, pedestrian volume and bicycle volume counts. Turning movement data at the study intersections should be collected in 15-minute time intervals between the hours of 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM, unless specified by the City Traffic Engineer for other reasons (e.g., weekend analysis, etc.). The peak hour is identified is the highest one-hour period in both AM and PM periods as determined by four consecutive 15-minute count intervals. All traffic counts shall be conducted when local schools are in session, during mid-week days (i.e., Tuesdays through Thursdays), and exclude holidays and the first weekdays before and after the holidays. The traffic counts should also be taken on days of good weather and avoid atypical conditions (e.g., road construction, detours, major incidents, etc.)

This section of the study shall include the following maps and figures, at the minimum:

- Street map of the study area indicating street names, traffic control, lane configurations at each of the study intersections
- Figure/diagram illustrating the existing AM and PM peak hour traffic volumes utilized in the analysis at the study intersections
- Raw traffic count data worksheets shall be included in the Appendix of the study

E. Site Access and On-Site Circulation Analysis

A review of the project's site access points and on-site circulation shall be provided and analyzed. Based on coordination with the City Traffic Engineer, the analysis could include details of the following pertaining to the site access and on-site circulation:

- Number of access points proposed for the project
- On-site stacking distance. If a drive-through lane is proposed, identify the stacking distance for the drive-through lane including the maximum vehicles that can remain in queue. If the proposed project provides privacy gates, the stacking area outside the privacy gates will need to be identified to ensure that queuing would not spill out onto the adjacent roadway.
- Any shared access points with an adjacent property
- Potential turn restrictions at each of the site driveways
- Adequate sight distance provided at the site driveways
- Driveway and drive aisle widths
- Any operational characteristics (as identified by City staff)

1. Truck and Service Vehicle Circulation and Access Review

For proposed project developments which include trucks, service vehicles, on-site passenger vehicle loading or queuing facilities such as valet services, porte cocheres, or drive-through service lanes,

additional analysis of vehicle maneuvering and circulation on-site, loading and/or queuing may be required on a case-by-case basis, at the discretion of the City Traffic Engineer.

F. Active Transportation Network Review

Potential impacts to public transit, pedestrian and bicycle facilities and travel will need to be identified as part of the active transportation network review. Pedestrian facilities that could be affected by project-related traffic or users traveling between the project and surrounding destinations shall be identified. The inventory of the pedestrian infrastructure shall include any of the following, at a minimum, within a one-quarter mile (1,320 feet) radius from the project site:

- Sidewalk and sidewalk widths
- Marked and unmarked crosswalks
- Crosswalk marking design (solid, standard parallel, continental, yellow school crossing, etc.)
- Pedestrian push-button
- Curb access ramps
- Tactile warning strips
- Curb extensions
- Pedestrian amenities (bus benches, street trees)
- Pedestrian lighting

The study shall also identify/describe any existing bicycle facilities in the study area, existing bicycle racks/parking on or adjacent to the site, and any proposed on-site bicycle amenities (i.e., long-term/short-term bicycle parking). An inventory of the existing transit lines, bus stops, transit stations and transit facilities within a one-half mile (2,640 feet) radius of the project site shall be summarized in table/figure diagram for inclusion in the study. The description of the transit routes will need to include the hours of service, peak period headways, route number, and service provider.

This section of the study shall include the following maps and figures, at a minimum:

- Map of public transit routes/stops provided in the study area
- Map of existing and proposed bicycle routes in the study area
- Map/diagram of pedestrian infrastructure inventory within one-quarter mile (1,320 feet) of the project site

1. Conformity with Adopted Policies, Plans or Programs

Potential impacts to pedestrian and bicycle facilities and circulation will need to be evaluated using the following criteria below:

A significant impact occurs if the project conflicts with adopted policies, plans or programs regarding pedestrian and bicycle facilities or otherwise decreases the performance or safety of the active transportation network. The safety review should evaluate whether a project is consistent with adopted policies, plans or programs regarding pedestrian and bicycle facilities or otherwise increases or

decreases the performance or safety of such facilities in order to determine if it has the potential to conflict with any existing or proposed pedestrian and bicycle facilities.

2. Pedestrian/Bicycle Circulation and Safety Review

The pedestrian and bicycle circulation and safety review evaluates the proposed development project's effect on the pedestrian and bicycle network in the study area. A development project would result in a negative effect on the active transportation network if it resulted in the removal or degradation of existing infrastructure which supports bicycle or pedestrian travel modes. Examples include but are not limited to:

- Removal of bicycle lanes or public bicycle parking
- Removal or obstruction of sidewalks, pedestrian paths, or crossings
- Degradation of street buffering elements such as street trees, parkway strips and bike lane buffers
- Degradation of visibility and lines of sight
- Degradation of appropriate-scale lighting

A development project would also have a negative effect on the active transportation network if it resulted in increased pedestrian or bicycle demand on facilities which are missing, damaged or not to current standards. Examples include but are not limited to:

- Increasing pedestrian demand where there are missing curb ramps/crosswalks, narrow or broken sidewalk
- Increasing bicycle demand where there are no bicycle lanes, poor quality pavement or lack of secure and well-lit parking

If a development project is found to result in negative effects on the circulation and safety of the active transportation network, improvement measures shall be identified.

G. Analysis, Methodology and Thresholds

1. Project Trip Generation

The project trip generation will generally need to be determined based on the latest edition of the *Trip Generation Manual* published by the Institute of Transportation Engineers. However, analysis for a proposed project with trip generation rates not provided in the ITE Trip Generation Manual, may use rates from other agencies or locally approved studies for specific/unique land uses. Trip rates supported by empirical/site-specific studies may also be acceptable or may be required in cases where the tenant is atypical for their specific land use, as determined by the City Traffic Engineer.

Projects with speculative or unknown/undisclosed land uses or tenants must use a conservative method of selecting potential land uses, as approved by the City Traffic Engineer, for the purposes of trip generation.

If applicable, the project trip generation will need to include PCE factors/conversion and truck splits with acceptable studies and documented sources for this data. Documentation supporting the use of these trip generation rates will be required and must be approved by the City Traffic Engineer prior to use in the analysis. Trip generation credits will be allowed for existing active use/s to be removed by the proposed project. Below provides a summary of the acceptable adjustments that may be applied to the project trip generation:

- Pass-by credit – Any claim for "pass-by" trip generation adjustments must apply pass-by adjustments as based on those published in the most current edition of Institute of Transportation Engineers *Trip Generation Handbook*. For purposes of analyzing project driveways, the pass-by trip adjustment does not apply to the project driveway trips and site adjacent intersections.

- Existing/Prior Use credit – When estimating the Project's net new trips, any claim for trip credits for an existing or prior use generally requires that the use must have been active at the time the base year traffic counts were collected and the counts must conform with **Subsection D.3.** of these guidelines. For any existing or prior use, direct traffic counts of the existing use (exclusively) must be collected for two (2) sample days under typical site operations in order to be eligible for trip credits, unless other methods are established and accepted for use by the City Traffic Engineer. The applied existing/prior use trip credit based on direct traffic counts shall not exceed any applicable trip generation credits as determined based on the ITE Trip Generation Manual.

- Internal Capture credit – Internal trip credits are a reduction to the trip generation estimates for individual land uses within a mixed-use development to account for trips internal to the site. The internal capture credit adjustments may be determined based on the Institute of Transportation Engineers *Trip Generation Handbook* and the Transportation Research Board's (TRB) National Cooperative Highway Research Program (NCHRP) Report 684: *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*.

This section of the study shall include the following table at a minimum:

- A table summarizing the trip generation rates along with the calculated weekday daily, AM and PM peak hour trips and any applied trip credit adjustments for the project shall be included in the study. The project trip generation table shall be included in the TAS for review and approval prior to commencement of the study.

2. Project Trip Distribution

A description of trip distribution and assignment for vehicle trips to/from the site along with specific roadways that will be utilized by project-generated traffic is required. The general methodology and assumptions used to develop trip distribution and assignments must be stated and included in the TAS for approval by the City Traffic Engineer. The project trip assignment should be based on existing and projected travel patterns and the existing/future roadway networks. The trip assignment should include the project trips minus the appropriate credits.

This section of the study shall include the following maps and figures at a minimum:

- Figure illustrating the inbound/outbound project trip distribution percentages at each of the study intersections.
- Figure illustrating the total project trips assigned at each of the study intersections and the project driveway/s.

3. Related/Cumulative Projects List

The transportation assessment shall consider trip generation for other known development projects within a one-half mile radius of the farthest outlying study intersection. Consultation with the City of Cypress Community Development Department or other Planning agencies will be required to compile a list of related projects. Any vacant buildings or land uses that are less than 50% occupied and are located within a 1,500-feet radius from the project site will need to be incorporated in the related/cumulative projects list as a related project with 75% occupancy. The related projects trip assignment should be based on existing and projected travel patterns and the existing/future roadway networks based on the nature of the uses.

This section of the study shall include the following maps, figures, and tables at a minimum:

- Area map showing location of the project site and the related projects corresponding with the related projects list. The related projects list will need to be summarized in tabular format indicating the project status, location, project name, size, description, and trip generation for each of the related projects.

4. Ambient Growth Factor

The future forecast baseline volumes shall include application of an annual ambient growth factor adjustment (i.e., typically at two percent) to the existing traffic volumes in order to forecast the future baseline traffic volumes for project buildout projection year. The ambient growth factor to be utilized shall be determined as part of the TAS process at the discretion of the City Traffic Engineer.

5. Level of Service Analysis Methodologies

a. Analysis Conditions and Parameters
The intersection LOS analysis scenarios (including the corresponding worksheets and figure diagrams) shall be included in the report for the following traffic conditions. Future conditions

are defined as the year of the project buildout and occupancy. A phased project development may require additional study scenarios.

i. Existing traffic
ii. Existing plus project traffic
iii. Future pre-project traffic (existing plus ambient growth and related/cumulative projects traffic)
iv. Future with project traffic (existing plus ambient growth, related/cumulative projects, and project traffic)
v. Future with proposed mitigation measures (if necessary)

Maps and figures for this section shall include the following at a minimum:

- Figures illustrating the AM and PM peak hour traffic volumes at the study intersections for each of the traffic conditions noted in this section.

The following parameters should be utilized in determining the LOS at the study intersections:

- Saturation flow rate of 1,700 vehicles per hour per lane or 2,880 vehicles per hour of green for dual-turning lanes.
- The adjustment for lost time shall be 0.05.

b. Highway Capacity Manual (HCM) Methodology
For all development projects requiring preparation of a transportation assessment, the intersection LOS and exclusive turn-lane queuing calculations shall be prepared using the latest edition of the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) methodology at signalized and unsignalized study intersections. The latest version of the Synchro software suite (or other appropriate analysis software approved for use by the City) shall be used to prepare the HCM calculations.

c. Intersection Capacity Utilization (ICU) Methodology
For those development projects requiring discretionary review and approval through the CEQA process, the intersection traffic analyses shall also be prepared using the Intersection Capacity Utilization (ICU) methodology to evaluate the AM and PM peak hour LOS.

6. Thresholds of Deficiency

a. Thresholds of Deficiency for HCM Analysis
For signalized intersections, the traffic operations deficiency shall be determined in accordance with the following table:

Thresholds for Signalized Intersections

With Project Level of Service	Project-Related Increase in Delay (in seconds)
C or better	> 6 seconds
D	> 4 seconds
E, F	> 2 seconds

To determine whether the project's added traffic would result in a deficiency at a study area unsignalized intersection in accordance with the City's HCM methodology, the following criteria shall be applied:

a) Worsens the level of service at an unsignalized intersection from LOS D or better to LOS E or F;
b) Causes an increase in the delay equal to or more than three (3.0) seconds at an unsignalized intersection that operates at LOS E or F with project.

b. Thresholds of Deficiency for ICU Analysis

The Circulation Element of the City's General Plan has established that LOS D be the minimum goal of acceptable LOS within the City's transportation system. As determined through the ICU analysis, a traffic operations deficiency at a signalized/unsignalized study intersection shall be determined in accordance with the following table:

ICU Thresholds for Intersections

Without Project Level of Service	With Project Volume/Capacity (V/C) Ratio	With Project Level of Service
D	>0.900 or greater	LOS E or F
Without Project Level of Service	**With Project Volume/Capacity (V/C) Ratio**	**Project-Related Increase in V/C**
E, F	>0.900 or greater	Equal to or greater than 0.03

7. Corrective Measures/Improvements

Any decrease beyond the minimum acceptable LOS due to the addition of project traffic requires alternative corrective measures to return the intersection to an acceptable LOS. For intersections operating below the minimum acceptable LOS prior to the addition of project traffic, and the LOS would be worsened with the addition of project traffic, corrective measures should be identified, if feasible, to return to "without project" condition LOS or V/C (volume/capacity ratio), whichever is greater. Alternative corrective measures to roadway widening which may include the reduction of project traffic volumes through application of TDM strategies, signal system upgrades, phasing

changes, synchronization, and/or project design improvements which are expected to change vehicular travel demand on the transportation network (e.g., changes to a project's site access or internal circulation scheme) shall be identified with concurrence from the City Traffic Engineer.

H. Safety Analysis for Signalized Intersections

A safety analysis review shall be performed for each signalized study intersections, or as directed by the City Traffic Engineer. The collision history at the study intersection and roadway segments near the intersection shall be evaluated for any crash trends. Collision history data may be obtained through the Statewide Integrated Traffic Records System (SWITRS). If the collision history report indicates five (5) or more accidents per year within any of the last three (3) years at the signalized study intersection, in-person field observations shall be conducted as part of the intersection safety review selected for analysis, and shall include the following, as applicable:

- Qualitative descriptions of traffic flows during peak and off-peak time periods
- Document repeated violations of existing restrictions at adjacent intersections (e.g., violations of posted signage, violations of turning-restrictions/diverters, or other restrictive measures)
- Document any safety concerns at the intersection for other user groups (e.g., minors/school-age children, seniors, pedestrians, bicyclists, handicap accessible, etc.)
- Propose safety improvements/corrective measures

I. Traffic Signal Warrants Analysis for Unsignalized Intersections

Unsignalized study intersections that are noted to be deficient as part of the LOS analysis shall prepare at a minimum the peak hour and four-hour volume signal warrants analysis in accordance with the current version of the California *Manual on Uniform Traffic Control Devices* (MUTCD). The traffic signal warrants analysis calculations shall be prepared based on the traffic volumes for the future with project scenario. The completed warrants worksheets will need to be included in the Appendix of the report.

Unsignalized project driveways may also be required to perform a signal warrant analysis, at the City Traffic Engineer's discretion.

Evaluation of signal warrants does not relieve a project from evaluating other appropriate improvements at unsignalized intersections operating at unacceptable LOS.

J. Left-turn Queuing Analysis

For any study intersection where the project is anticipated to contribute 25 or more net new trips during the AM or PM peak hour, a left-turn queuing analysis shall be prepared for the subject study intersection to evaluate the project's potential effects on queuing in the public right-of-way with respect to safety and the overall intersection operations. The queuing analysis will be based on the project's peak hour vehicular trip generation forecasts and shall be prepared based on the Highway Capacity Manual (HCM)

method. The 95th percentile queue for the left-turn movement at the study intersection will need to be identified during the peak hour time periods included in the LOS analysis. The analysis will need to identify the length of the left-turn storage and evaluate if an adequate storage area exists to accommodate the maximum forecast back of queue for the future with project condition.

Proposed development projects which are expected to cause or contribute towards exclusive turn-lane queuing which spills back into adjacent travel lanes or blocks adjacent intersections should identify corrective measures to improve queue management and/or storage, if feasible. For intersections which experience excessive exclusive turn-lane queuing prior to the addition of project traffic, and the queuing would be worsened with the addition of project traffic, corrective measures shall be identified, if feasible, including measures to reduce vehicle trips.

K. Analysis Conclusions and Findings

The transportation assessment shall contain sections that detail the analyses conducted, summarize the results and identify any operational deficiencies and the corresponding improvement measures, as necessary.

L. Submittal Procedure

The transportation assessment scoping form and traffic study reports must be submitted through the City's online submittal portal at **https://cypressca.viewpointcloud.com/categories/1092**. Fees will be assessed based on time and material costs for the review and approval of the documents.

M. Appendix

The Appendix of the report shall contain all the detailed calculations, such as the traffic counts data, LOS calculation worksheets, collision history reports, queuing worksheets, completed traffic signal warrants, sketches of any proposed improvements, and a copy of the submitted TAS.

ATTACHMENT A –
TRANSPORTATION ASSESSMENT SCOPING FORM

City of CYPRESS

Attachment A

TRANSPORTATION ASSESSMENT SCOPING FORM

This Transportation Assessment Scoping Form acknowledges that the transportation assessment for the following project will be prepared in accordance with the latest version of City's Transportation Operational Assessment Guidelines. **The completed form must be submitted via the City's online portal at:** https://cypressca.viewpointcloud.com/categories/1092/record-types/6520

Project Name: _____

Project Address: _____

Project Description: _____

Project Trip Generation Rate(s): ITE 11th Edition / Other _____

The project trip generation table with a summary of the proposed and existing land uses, ITE trip rates and forecast morning and afternoon peak hour trips are attached.

	IN	OUT	TOTAL	TOTAL
Net AM Trips	_____	_____	_____	Net Daily Trips _____
Net PM Trips	_____	_____	_____	

Trip Generation Adjustments: Exact amount of credit subject to acceptance by the City of Cypress Traffic Engineer.

	Yes (% applied)	No	Existing/Prior Use Counts Collected?
Existing/Prior Active Land Use			Yes / No
Internal Trip Capture			
Pass-By Trip			

Project Geographic Distribution: N _____ % S _____ % E _____ % W _____ %
Attach graphic illustrating project trip distribution (inbound and outbound) percentages at the studied intersections.

Project Buildout Year: _____ **Ambient Growth Rate**: _____ % Per Yr.

Related Projects: To be researched by the consultant. The related projects trip generation table and map are attached as part of the TAS.

Proposed Study Intersections: (May be subject to revision after initial impact analysis.)

1.	4.
2.	5.
3.	6.

Other Analysis/Assumptions or Exceptions:

_____

_____

Consultant Name: _____ Submitted by: _____

Phone: _____ Consultant Signature / Date

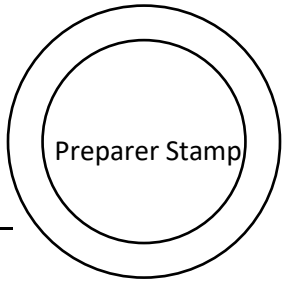
E-Mail: _____

ATTACHMENT B –
TRANSPORTATION ASSESSMENT COVER SHEET TEMPLATE

Project Name
Project Address

Date

Prepared By:



Preparer Signature
Preparer Name
Consultant Firm
Address
Phone, Email

Prepared For:
Project Manager / Title
Applicant / Owner / Agency
Address
Phone, Email

Approved by: _____
City Traffic Engineer

Date: _____