*City of Seal Beach*

# TRAFFIC IMPACT STUDY GUIDELINES

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Engineering Division

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## TRAFFIC IMPACT STUDY OVERVIEW

The following are minimum requirements for a Traffic Impact Study for submittal to the City of Seal Beach, California. In order to maintain consistency with the traffic reports submitted by various applicants, these requirements must be fulfilled in addition to any other special requirements, as will be discussed later in this document, before a Traffic Study Report can be reviewed and/or accepted by the City. While a considerable amount of details are presented below, the following will serve as a general overview of the City's current Traffic Study Report requirements. It should be noted that the City reserves the right to modify these guidelines as necessary.

The City Engineer or his designee, in conjunction with these guidelines, will make a determination on the need for a Traffic Impact Study. Once this need is determined, the City will formally notify the applicant. At this point, the applicant is required to have a professional traffic engineer conduct the traffic study and prepare the report.

Once a Traffic Engineer has been selected, the selected traffic engineering shall contact the City Engineer or his designee at (562) 431-2527 to define the scope and the parameters of the traffic study. Any special requirements and elements to be studied beyond the scope of the minimum requirements will be determined at this point. It is again noted that these minimum requirements must be met before the report is deemed complete.

## WHEN IS A TRAFFIC IMPACT STUDY REQUIRED?

The determination of whether a Traffic Impact Study will be required is based on five basic factors. These factors are:

1) A Traffic Impact Study is required for new developments or for the expansion of existing developments which are forecast to generate a minimum of 50 vehicles per hour (total two-way) during the greater of the A.M. or P.M. peak hours. In general, this lower limit includes:

    - Single family residential developments of 20 or more dwellings.
    - Multi-family residential developments of 30 or more dwellings.
    - Commercial developments of 5,000 square feet or more building area[1].
    - Office developments and industrial developments of 5,000 square feet or more.
    - All mixed use developments.

[1] All commercial developments, regardless of size, which include any type of restaurant, will require a TIS.

- All car washes of any type.
- Gas stations/convenience stores.

2) A Traffic Impact Study will also be required for all developments, regardless of size, located within 300 feet of the intersection of two arterial streets as defined in the General Plan or for any developments fronting on two different streets, regardless of classification.

3) The presence of an existing or future traffic safety problem will require a Traffic Impact Study.

4) The location of the developments in an environmentally or otherwise sensitive area, or in an area that generates controversy will require a Traffic Impact Study.

5) The presence of a near-by sub-standard intersection or street will require a Traffic Impact Study. The sub-standard condition is normally considered to be level of service “D” or worse.

Note that other developments at or below these thresholds may be required by the City Engineer or his designee to submit a letter analysis.

**TYPICAL TRAFFIC IMPACT STUDY OUTLINE**

Each Traffic Impact Study submitted to the City of Seal Beach shall contain each of the following elements unless the topic is entirely not applicable:

1. Executive Summary
2. Introduction
3. Area Development
4. Existing Street Systems
5. Project Description and Location
6. Traffic Generation Forecast
7. Traffic distribution and Assignment
8. Traffic Impact Study
9. On-Site Parking and Circulation
10. Truck Service Impacts
11. Construction Period Impacts
12. Mitigation Measures

Detailed descriptions of the above elements are presented below.

**Executive Summary**

This portion of the report should present factual and concise information relative to the major issues. Pertinent information in this regard will include a brief overview of the project, a short discussion of the projects traffic generation potential, the expected impacts of the project and a summary of measures necessary to mitigate resultant project impacts.

**Introduction**

A detailed description of study procedures, plus a general overview of the proposed project site and study area boundaries, existing and proposed site uses, and existing and proposed roadways and intersections within in the defined study area (defined study area to be determined by City Engineer or his designee). Exhibits required for this section includes a regional map showing the project vicinity and a site layout map.

**Area Development**

A specific description of existing and proposed land uses surrounding the proposed project site need to be provided. If the land uses differ from the general plan designation for a particular parcel, it needs to be indicates in this section.

**Existing Street System**

This section will contain a definition of Regional and Local access roadways including any CMP roadway which will serve the proposed project. This includes all major access routes to the site with descriptions of the most likely routes to be utilized.

Minimum information in this section shall include generalized geometric descriptions, i.e. the particular roadway as classified by the Seal Beach General Plan with the pavement and the right-of-way widths. A description is also required of existing traffic volumes that use the particular facility (include the source of your traffic count information).

An exhibit showing the various roadways in the study area and presenting peak hour traffic count information, as well as a table showing daily (24-hour) volumes and Master Planned roadway configurations, is required. All traffic counts used need to have been surveyed within 12 months of the traffic study completion date unless otherwise approved by the City Engineer or his designee.

## Project Description and Location

This section shall expand on information presented in the introduction giving a detailed development scenario and specific project location. Exhibits in this section shall include, at a minimum, a clear illustration of the project in terms of a site plan, its density, adjacent roadways, on-site parking supply, proposed traffic circulation within the project, gross square footage, number of rooms/units, phasing and other descriptions as appropriate. Any changes in these descriptors during the permitting and construction processes will require an amendment to the study report.

## Traffic Generation Forecast

The traffic generation section of the report will include trip generation estimates for the project based on standard trip generation values established by the City Engineer or his designee. Typically, these values will be derived from Trip Generation, latest Edition, published by the Institute of Transportation Engineers (ITE), but can be modified if the applicant proposes specific and permanent measures that will reduce the traffic generation potential of the project.

However, to achieve reductions in estimated generation factors, the applicant must describe, accurately and completely, the proposed measure, the estimated reduction in trip generation that will result, and the basis for the estimate. It is not sufficient to state that information is based on “past studies” without first presenting and reviewing these studies with the City Engineer or his designee prior to preparing the report. The applicant’s Traffic Engineer should submit the proper documentation to prove the proposed reduction.

In all cases, the generation values must be displayed in terms of A.M., P.M. and afternoon peak hour volumes as well as daily (24-hour) volumes. Some uses may require traffic counts and studies during hours other than the peak hours, as determined by the City Engineer or his designee. Documented reductions to generated values as discussed above or for “passer-by” and transit trips must be presented in the generation forecast as well.

## Traffic Distribution and Assignment

Traffic distribution shall be consistent with the distribution patterns currently being used in the City. On that basis, the prospective applicant should consult with the City Engineer or his designee for this information particularly in regard to the different distribution patterns for uses such as commercial, industrial, and residential. The City Engineer or his designee prior to starting the study must approve any deviations from this concept.

The section is to include a description of the utilization of study area roadways by site-generated traffic. An exhibit must be supplied with this section which presents projected daily link volumes between intersections, as well as morning and afternoon peak house turning movement volumes at intersections. All of this information is usually presented on two exhibits: one presenting daily link volumes between intersections and the second illustrating morning and afternoon peak hour turning movement volumes within the study area. However, with concurrence from the City, one exhibit could be acceptable depending on the size of the report.

**Traffic Impact Study**

The traffic study will be the key to the report. Unless directed otherwise by the City Engineer or his designee, all reports will include a study of intersection operation as well as midblock operation. The intersection analysis will be performed via the Intersection Capacity Utilization (ICU) procedure as outlined in the appendix “B” to this document. The link analysis shall follow the highway capacity manual method.

In all cases, the analysis of intersection operation must be formulated for existing conditions, and existing plus project conditions. Cumulative conditions need to be addressed and will be utilized to assess impacts relative to development of additional approved or in the process of being approved projects.

Three time frames will be addressed in the TRAFFIC IMPACT STUDY. These are:

- Existing year
- Project completion year (One for each completed phase for multi-phase project)
- General Plan target year (20 years in the future)

Additional time frames as designated by the City Engineer or his designee may be required for large multi-phased developments.

Also, a table is to be included which identifies the forecast Level of Service (LOS) for each intersection within the defined study area. This summary table shall present LOS for both the background and background plus project conditions for all scenarios.

Regardless of the location (i.e. either at or removed from the project location), specific mitigation measures must be clearly identified in the text with supporting information presented in the above table as well as on exhibits. These exhibits

will show proposed lane configurations, modified right-of-way requirements, signal modifications, and other measures as required.

If the applicant wishes to propose quantifiable improvements or changes to the circulation system, which may not appear to be strictly consistent with the Circulation Element, or special assumptions as a basis for the traffic study, he shall provide a description of such proposals in writing to the City, along with supporting data justifying their use.

Unless otherwise defined by the City Engineer or his designee, the following intersections will be analyzed:

- All signalized intersections within 1/2 mile of the project.
- All intersections on arterial streets within 1 mile of the project where project traffic represents 1% or more of the peak hour critical volumes entering the intersection.
- All project site driveways

The capacity of individual lane type to be used in the ICU calculations are as shown below.

| | |
|---|---|
| * Left Turn Lanes | 1600 vehicles per hour |
| * Through Lanes | 1700 vehicles per hour |
| * Right Turn Lanes | 1700 vehicles per hour |
| * Shared Lanes | 1600 vehicles per hour |

Yellow clearance/lost time should always be 0.100.

Link analysis shall be performed on all sections of arterial highways and collector streets within the project area where the daily project traffic after distribution to the street system represents 1% or more of the total directional volume. For the purposes of this report, links will be started and ended at each traffic signal and project entrance. High accident locations significantly impacted by the project are to be analyzed and mitigated. For the purpose of the high accident location, the level of significance is as defined for the links and intersections.

## On-Site Parking and Circulation

This section will assess the on-site parking supply versus the parking required per City codes. If the proposed development is of mixed-use type, a table shall be included presenting each land use, its size and the code parking requirement.

This table should clearly indicate how the code parking was calculated and include the proposed on-site parking supply together with the resultant surplus or deficit from code requirements.

Should the on-site parking supply be less than required by the City code, a detailed explanation justifying a reduction to the code requirement must be included. Note that this does not eliminate the need for any zoning code variance.

A discussion of on/off-site circulation shall be included in this section complete with descriptions of the proposed access points, turn prohibitions, number of lanes proposed, proposed bus stop locations, deceleration or acceleration lanes provided, turn pocket requirements, vehicle storage length requirements, and any other applicable circulation issues.

## Truck Service Impacts

A discussion of on/off-site delivery truck circulation shall be included in this section complete with descriptions of the proposed access points, turn prohibitions, number of lanes proposed, deceleration or acceleration lanes provided, turn pocket requirements, vehicle storage length, most probably routes to the site requirements, and any other applicable circulation issues.

This section will also address the on-site delivery docks versus the requirement based on City code. This discussion should clearly indicate how the code requirement was calculated.

Should the number of docks be less than required by the City code, a detailed explanation justifying a reduction to the code requirement must be included. Note that this does not eliminate the need for any zoning code variance.

## Construction Period Impacts

This section shall include a discussion of any unusual circumstances anticipated during construction. Proposed roadway lane closures, construction signage, safety features, and detours shall be included. Note that the City of Seal Beach, in general, requires that all lanes on arterial roads shall be open to traffic during the periods from 6 to 9 AM and from 4 to 7 PM.

At no time will any street capacity be reduced or closed without written permission of the City Engineer or his designee.

**Mitigation Measures**

All measures required to mitigate intersection or roadway links with a significant impact on the Level-of-Service or high accident rate must be presented in this section. A table presenting resultant Level-of-Service for existing plus project conditions with and without mitigation shall be included. Appropriate text along with the sketches must be provided detailing each mitigation measure assumed in the study and method(s) of implementing those measures described. Unless otherwise prescribed by the City Engineer or his designee, the following increases in Intersection Capacity Utilization (ICU) shall be deemed as "significant" and require mitigation:

| Existing ICU | Project Related Increase in ICU |
|---|---|
| 0.00 – 0.69 | 0.06 |
| 0.70 – 0.79 | 0.04 |
| 0.80 – 0.89 | 0.02 |
| 0.90+ | 0.01 |

After analysis of the links using the HCM methods, unless otherwise prescribed by the City Engineer or his designee, the following decreases in the speed of vehicular traffic on the impacted links shall be deemed as "significant" and require mitigation:

| Existing Links LOS | Project Impact<br>Percent Decrease in Existing Roadway Link Speed |
|---|---|
| A | 3.5% |
| B | 3.0% |
| C | 2.5% |
| D | 2.0% |
| E | 1.5% |
| F | 1.0% |

Unless otherwise prescribed by the City Engineer or his designee, intersections or roadway links having five or more reported accidents within the most recent 12 month period within significant influence of the project shall be analyzed and will require mitigation. The level of significance is as listed above. This figure of five accidents is a generalized figure used by the City as an indication of potential problems. The requirement for mitigation will depend on the location, i.e. intersection or midblock, and configuration, i.e. roadway width, number of lanes, sight distance, signalization, and the like.

Sketches illustrating proposed mitigation must be included, either in this section, the appendix, or accompanying the report. These sketches shall include, as a minimum, the existing intersection geometrics, striping, right-of-way and building locations (as applicable) and the proposed modifications.

Recommended signal phasing shall be provided for suggested mitigation measures, which will affect existing traffic signals as well as new traffic signal locations.

It should be noted that traffic improvements necessary as a result of project-related impacts could become conditions of approval for the subject development. Improvement of the roadways adjacent to the project, to at least half-width configuration, could also be a condition of approval. Additional off-site traffic related improvements may be required as determined by the City Engineer or his designee on a project by project basis.

## APPENDICES

Detailed appendix material is to be supplied as part of the report. If the main report is too large to include an appendix, such material shall be provided under a separate and identifiable cover. Typical material in this regard includes traffic counts, ICU calculation work sheets, HCM Link Analysis worksheets, fully completed signal warrants, accident diagrams at high accident locations, sketches of proposed mitigation measures, and other information necessary for the City's review of the report.

# APPENDIX A

LEVEL OF SERVICE DEFINITIONS

For intersections, Level of Service is described in terms of Intersection Capacity Utilization (ICU). This ICU calculation, shown in Appendix B, quantifies the delay experienced by drivers at the intersection.

**Table 1 – Intersection Level of Service Definitions**

| LEVEL OF SERVICE | OPERATING CONDITION | ICU VALUE |
|---|---|---|
| A | Free flowing, virtually no delay. Minimal traffic | <0.60 |
| B | Free low and choice of lanes. Delays are minimal. All cars clear intersection easily. | 0.60-0.69 |
| C | State flow. Queue at signal starting to get relatively long. Delays starting to become a factor but still within "acceptable" limits. | 0.70-0.79 |
| D | Approaching unstable flow. Queues at intersection are quite long but most cars clear intersection on their green signal. Occasionally, several vehicles must wait for a second green signal. Congestion is moderate | 0.80-0.89 |
| E | Severe congestion and delay. Most of the available capacity is used. Many cars must wait through a complete signal cycle to clear the intersection. | 0.90-0.99 |
| F | Excessive delay and congestion. Most cars must wait through more than one on one signal cycle. Queues are very long and drivers are obviously irritated. | >1.00 |

For areas of roadways situated between intersections, LOS is described via a "mid-block roadway link" analysis. Highway capacity manual-Chapter 15 is used to find the Level-of-Service provided under section "Mitigation Measures' and duplicated here for quick reference. The impact of the project is measured in terms of the projected reduction in speed of traffic on the segment being analyzed.

| Existing Link LOS Speed | Project Impact Percent Decrease in Existing Roadway Link |
|---|---|
| A | 3.5% |
| B | 3.0% |
| C | 2.5% |
| D | 2.0% |
| E | 1.5% |
| F | 1.0% |

**APPENDIX B**
SAMPLE ICU CALCULATIONS

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

PROJECT:[A] Any Project

N-S STREET[B] Any Street E-W STREET[C] Any Avenue

TIME[D] ☐AM PEAK HOUR ☐PM PEAK HOUR ☐_____ ANALYST[E] Semore Green

DATE[F] February 28, 2003

TRAFFIC:[G] ☐BACKGROUND ☐PROJECT ☐_____ TIME FRAME:[H] ☐CURRENT ☐BUILDOUT ☐YEAR_____

| APPROACH DIRECTION | MOVEMENT | VOLUME[I] (VPH) | LANES[J] | CAPACITY[K] | V/C RATIO[L] | CRITICAL VALUE[M] | |
|---|---|---|---|---|---|---|---|
| NB | LEFT | 242 | 2 | 3200 | 0.076 | *** | N |
| | THRU | 830 | 2 | 3400 | 0.258 | | |
| | RIGHT | 47 | 0 | | | | |
| SB | LEFT | 138 | 2 | 3200 | 0.043 | | |
| | THRU | 871 | 2 | 3400 | 0.345 | *** | |
| | RIGHT | 302 | 0 | | | | |
| EB | LEFT | 280 | 1 | 1600 | 0.175 | *** | O |
| | THRU | 286 | 2 | 3400 | 0.084 | | |
| | RIGHT | 237 | 1 | 1700 | 0.139 | | |
| WB | LEFT | 149 | 1 | 1600 | 0.093 | | |
| | THRU | 548 | 2 | 3300 | 0.232 | *** | |
| | RIGHT | 217 | 0 | | | | |
| | | | | | | | |
| SUM OF CRITICAL MOVEMENTS[P] | | | | | | 0.827 | |
| YELLOW CLEARANCE[Q] | | | | | | 0.1 | |
| ICU VALUE[R] | | | | | | 0.927 | |
| LEVEL OF SERVICE | | | | | | **E** | |

**A** Enter the name of the development being studied at the location.

**B** Enter the name of the North-South street of the intersection being analyzed.

**C** Enter the name of the east-west street of the intersection being analyzed.

**D** Enter an ”X” to indicate the time being analyzed. If the time is other than the AM or PM peak period, enter the time period being analyzed.

**E** Enter the name of the person doing the analysis at this intersection.

**F** Enter the date on which the traffic count was taken. Note that this is not the date that the analysis was performed.

**G** Enter an “X” to indicate the type of traffic being used in the study. If the traffic type is not listed, indicate the type.

**H** Enter an “X” to indicate the time frame of the traffic listed. If the time is for some year other than the current year or build out year, indicate the year.

**I** Use this column to enter the traffic volume for each turning movement on each approach for the time period being analyzed.

**J** Enter the number of lanes for each movement on each approach. Do not use “1/2” lanes to indicate shared lanes. For example, the westbound approach in the example CU worksheet has three lanes. The left lane is an exclusive left-turn lane, the center lane is a through movement only lane, and the curb lane is a shared through/right turn lane. This column indicates 1 for the left turn lane, 2 as the number of through lanes and no right turn lanes. Traffic volumes for the right turns would be added to the through movement in the calculations.

**K** Enter the capacity for each movement as the sum of the lane capacity for that type of movement times the number of lanes. Use the following capacities:

Left turn lanes – 1600 vehicles per lane per hour
Through lanes – 1700 vehicles per lane per hour
Right turn lanes – 1700 vehicles per lane per hour
Shared lanes – 1600 vehicles per lane per hour

Referring to the westbound approach in the example, you will note that the capacity for the through movement is 3300 vehicles per hour, reflecting 1700 for the exclusive thorough lane, and 1600 for the shared through/right turn lane.

**L** Enter the Volume to Capacity ratio (V/C) for each movement in this column. In the sample problem, the V/C ratio of the northbound through movement is (830+47) divided by 3400, or 0.258. The V/C ratio of the westbound through movement is (548 + 217) divided by 3400, or 0.225.

**M** Indicate if the V/C ratio is the critical V/C ratio for this approach.

**N** The critical V/C ratios for the north-south street are determined by comparing the sum of the northbound left turn V/C ratio plus the larger of the southbound through movement V/C ratio or the south bound right turn V/C ratio to the sum of the south bound left turn V/C ratio plus the larger of the northbound through movement V/C ratio or the northbound right turn V/C ratio and determining the greater. In this case, 0.076 + 0.345 = 0.424 which is greater than 0.043 + 0.258 = 0.301, meaning that the former V/C ratios are the critical movements. Note that since the through movements and the right turn movements can be made at the same time, only the larger of these two is critical.

**O** The critical V/C ratios for the east-west street are determined by comparing the sum of the eastbound left turn V/C ratio plus the larger of the westbound through movement V.C ratio or the westbound right turn V/C ratio to the sum of the westbound left turn V/C ratio plus the larger of the eastbound through movement V/C ratio or the eastbound right turn V/C ratio and determining the greater. In this case, 0.232 + 0.175 = 0.408 which is greater than 0.093 + 0.139 = 0.232, meaning that the former V/C ratios are the critical movements. Note that since the through movements and the right turn movement can be made a the same time, only the larger of these two is critical.

**P** Sum the critical movement values determined above. In the sample, this would be 0.076+0.345+0.175+0.232=0.828.

**Q** Add in the time allowance for lost time/yellow clearance. This will always be 0.100.

**R** Sum the critical movement values and the yellow clearance and indicate the level of service. In the sample, 0.828 + 0.100 = 0.928. This would be a level of service “E”.

| | CY W/OUT PROJECT | | | | CY WITH PROJECT | | | | | | CY+ PROJECT+ACCUMALATIVE PROJECTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM PEAK | | PM PEAK | | AM PEAK | | PM PEAK | | CHANGE IN ICU | | AM PEAK | | PM PEAK | | CHANGE IN ICU | | SIGNIFICANT |
| INTERSECTION | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | AM | PM | ICU | LOS | ICU | LOS | AM | PM | IMAPCT? |
| ALTNTIC AT | | | | | | | | | | | | | | | | | |
| HELLMAN | | | | | | | | | | | | | | | | | |
| W/OUT IMPRMT | | | | | | | | | | | | | | | | | |
| WITH IMPRMT | | | | | | | | | | | | | | | | | |
| GARVEY | | | | | | | | | | | | | | | | | |
| W/OUT IMPRMT | | | | | | | | | | | | | | | | | |
| WITH IMPRMT | | | | | | | | | | | | | | | | | |



| | PCY W/OUT PROJECT | | | | PCY WITH PROJECT | | | | | | PCY+ PROJECT+ACCUMALATIVE PROJECTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM PEAK | | PM PEAK | | AM PEAK | | PM PEAK | | CHANGE IN ICU | | AM PEAK | | PM PEAK | | CHANGE IN ICU | | SIGNIFICANT |
| INTERSECTION | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | AM | PM | ICU | LOS | ICU | LOS | AM | PM | IMAPCT? |
| ALTNTIC AT | | | | | | | | | | | | | | | | | |
| HELLMAN | | | | | | | | | | | | | | | | | |
| W/OUT IMPRMT | | | | | | | | | | | | | | | | | |
| WITH IMPRMT | | | | | | | | | | | | | | | | | |
| GARVEY | | | | | | | | | | | | | | | | | |
| W/OUT IMPRMT | | | | | | | | | | | | | | | | | |
| WITH IMPRMT | | | | | | | | | | | | | | | | | |

| | GPTY W/OUT PROJECT | | | | GPTY WITH PROJECT | | | | | | GPTY+ PROJECT+ACCUMALATIVE PROJECTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM PEAK | | PM PEAK | | AM PEAK | | PM PEAK | | CHANGE IN ICU | | AM PEAK | | PM PEAK | | CHANGE IN ICU | | SIGNIFICANT |
| INTERSECTION | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | AM | PM | ICU | LOS | ICU | LOS | AM | PM | IMAPCT? |
| ALTNTIC AT | | | | | | | | | | | | | | | | | |
| HELLMAN | | | | | | | | | | | | | | | | | |
| W/OUT IMPRMT | | | | | | | | | | | | | | | | | |
| WITH IMPRMT | | | | | | | | | | | | | | | | | |
| GARVEY | | | | | | | | | | | | | | | | | |
| W/OUT IMPRMT | | | | | | | | | | | | | | | | | |
| WITH IMPRMT | | | | | | | | | | | | | | | | | |

CY CURRENT YEAR
PCY PROJECT COMLETION YEAR
GPTY GENERAL PLAN TARGET YEAR