

## **Traffic Impact Study Requirements for Development within the City of Corvallis**

### **Purpose**

The City requires traffic impact studies (TIS) in order to assess transportation impacts associated with development and to demonstrate compliance with Comprehensive Plan (CP), Land Development Code (LDC) and Transportation System Plan (TSP) criteria.

### **General Requirements and Thresholds for Traffic Studies**

Level I Study - Less than 30 total peak hour trips to an intersection or access

Level II Study - 30 to 75 total peak hour trips to an intersection or access

Level III Study - Greater than 75 total peak hour trips to an intersection or access, Zone Changes\*, Comprehensive Plan Amendments\* or when mitigation is required.

Topic	Level I	Level II	Level III
I. Introduction	✓	✓	✓
II. Executive Summary		✓	✓
III. Proposed Development	✓	✓	✓
IV. Existing Conditions		✓	✓
V. Traffic Forecasts		✓	✓
VI. Traffic Analysis		✓	✓
VII. Other Items to Address			✓
VIII. Mitigation Alternatives			✓
IX. Recommendations and Conclusions		✓	✓
X. Appendices		✓	✓

If there are specific safety or capacity issues associated with a site, the City Engineer may require they be addressed, regardless of the number of site trips generated.

An outline of City requirements for a traffic study is provided on the following page. Submit a proposal for the scope of the traffic study to the City Engineer for review based on guidelines in this document. Prior to or concurrent with the scope proposal, the applicant must also submit a preliminary trip generation and trip distribution analysis.

### **Other Jurisdictions**

There are streets within City limits that are under the jurisdiction of ODOT or Benton County. Where development will impact their facilities, ODOT or Benton County may have additional requirements for a traffic study. Prior to approval of a final traffic study scope, a meeting with all impacted agencies is required to verify that the proposed scope addresses each agency's concerns.

\* Unless there is no significant effect as determined by the City Engineer.

**CITY OF CORVALLIS  
GENERAL OUTLINE FOR TRAFFIC IMPACT STUDIES**

- I. Introduction
  - A. Cover Page **(All Levels)**
  - B. General Project Description **(All Levels)**
  - C. Table of Assumptions **(Level II and III Studies)**
  - D. Mobility Standards
  
- II. Executive Summary **(Level II and III Studies)**
  
- III. Proposed Development **(All Levels)**
  - A. Trip Generation
  - B. Trip Distribution
  - C. Development Phasing/Schedule
  - D. Access Locations, Configuration and Vision Clearance
  - E. Site Circulation and Parking
  - F. Study Area
  
- IV. Existing Conditions **(Level II and III Studies)**
  - A. Existing Street Network and Street Classifications
  - B. Existing Traffic Volumes and Turn Movements
  - C. Existing V/C
  - D. Pedestrian and Bicycle Facilities
  - E. Existing Transit Routes and Facilities
  - F. Collision History / Safety Analysis / Crash Analysis
  
- V. Traffic Forecasts
  - A. Study Scenarios **(Level II and III Studies)**
  - B. Non-site Traffic **(Level III Studies)**
  - C. Site Generated Traffic **(Level III Studies)**
  
- VI. Traffic Analysis **(Level II and III Studies)**
  - A. Analysis Standards (V/C)
  - B. Intersection Analysis
  - C. Warrants, Turn Lanes, Traffic Signals
  - D. Queuing and Storage
  - E. Sight Distance
  - F. Traffic Calming
  
- VII. Other Items to Address **(Level III Studies)**
  - A. Applicable TPR Criteria
  - B. TSP Identified Improvements within the Study Area
  - C. Known Improvement Projects within the Study Area (City, County, State)
  
- VIII. Mitigation Alternatives **(Level III Studies)**
  
- IX. Recommendations and Conclusions **(Level II and III Studies)**
  
- X. Appendices **(Level II and III Studies)**

## I. Introduction

- A. Provide a cover page with the project name, address or location, land use case/building permit number and study consultant. A professional engineer registered in the state of Oregon must prepare all level I studies requiring engineering analysis or judgement, all level II and all Level III traffic studies.
- B. The general description must include any existing and proposed site uses including square footage, current zoning and any proposed zoning changes. Project phasing, if any, must be identified. The description of uses must be adequate to determine the applicable ITE code for trip generation. In addition to the general site description, the surrounding land uses and zoning must be documented. A map showing the site and surrounding area is required.
- C. Table of assumptions

Assumption	Explanation	Location/ page reference
Trip generation rate	Justification for assumed rate	
Independent variables	Identify reasoning for variable used	
Study area	How was study size and area determined	
Trip distribution/ modal split	Explain; was modal split considered	
Worst case analysis	For Comp Plan amendments and Zone Changes how was 'worst case' determined	

- D. CP Policy 11.3.9 states that adequate capacity should be provided and maintained on arterial and collector streets to accommodate intersection mobility standards and to avoid traffic diversion to local streets.
- The City mobility standard is volume to capacity ratio (V/C) of 0.85 or better during peak hours (TSP p. 98).
  - The LOS, based on delay, may be provided for information.

## II. Executive Summary

The executive summary provides a concise one or two page brief and should focus on major section findings, mitigation options including safety concerns, existing problems, issues resulting from development and preferred alternatives.

## III. Proposed Development

- A. ITE trip rates are typically used by the City to project traffic. Trip rates and code(s) for the development must be provided based on the latest version of the ITE Trip Generation Manual. The gross trips, in addition to any adjustments for internal site, pass-by, or diverted link trips, must be documented. With the approval of the City Engineer, trip generation studies from a similar site may be used instead of the ITE manual. If the development does not fit within an ITE category, alternative trip generation methodology may be required including a separate trip generation study of similar sites. Daily AM and PM peak trip generation must be provided. Facilities in the vicinity that have a peak hour outside the typical AM or PM peak, such as schools,

must also be studied. See the example trip generation tables at the end of this Guide.

- B. Trip distribution for the proposed development must be addressed both in the narrative and as a diagram in the study. Reasoning for the trip distribution must be included and based on existing count information or a logical explanation of expected origins and destinations based on the proposed uses. In some instances it may be appropriate to use origin and destination information from City approved or adopted transportation plans.
- C. The specific year(s) of opening is required including years for any subsequent phases. The year of opening must be based on a realistic schedule of when all public improvements and building construction will be complete and ready to occupy. The applicant may provide trip generation and distribution information for each phase and for build-out of the project. Mitigation for impacts may be done consistent with an approved phasing plan if mitigation based on phasing is clearly identified in the TIS.
- D. Existing and proposed access locations must be identified in the study. The location of access points must consider the classification and design standards of the adjacent street, applicable access control requirements (LDC and TSP), vision clearance/sight distance, number of lanes, vehicle storage and queuing, signage and striping and pedestrian and bicycle facilities.
- E. On-site circulation and parking facilities must be explained in adequate detail to document any impacts to adjacent public streets and development sites and compliance with applicable City code and development standards. Variances to geometric parking standards should be addressed in this section. Particular attention should be provided for applicable delivery, loading and drive-thru facilities and emergency vehicle access.
- F. The study must cover the entire area of influence from the proposed development including any intersections or accesses receiving 30 or more trips, access points within 150 feet of any major street and any other items that need to be considered such as nearby school zones or transportation projects. A map and description/justification of the study area must be provided. For studies addressing the Transportation Planning Rule (TPR), the study area must include any transportation facilities that are significantly affected as defined in OAR 660-12.

#### **IV. Existing Conditions**

- A. Provide a description and map of the existing conditions in the study area such as: street classifications, speed limits, ROW and pavement widths, bike lanes, planter strips, sidewalks, lane configurations, intersections, traffic control, bicycle and pedestrian facilities, schools and transit routes. Also identify any known capacity or functional deficiencies (review the TSP).
- B. Describe the methods used to quantify non-site generated trips. Traffic counts must be taken Tuesday, Wednesday or Thursday when OSU is in regular session. Counts taken during vacations, dead week, finals week or on a holiday will not be accepted. Recent counts (within one year) from a government agency such as the City or CAMPO may be used with prior approval. Counts must accurately reflect existing intersection or access conditions, including turn movements. Classification of counts may be required to identify truck traffic. Cite reference sources and document the date, time of day and location of counts. Include bicycle and pedestrian counts when required. Please

notify the City prior to mounting traffic counting devices on City infrastructure.

- C. Existing V/C must be provided for each intersection identified for analysis in the traffic study scope. More information is provided in *Section VI Traffic Analysis*.
- D. A summary of existing pedestrian and bicycle facilities must be provided to document how the development will be served and any connectivity issues to existing facilities. Missing or substandard sections of sidewalks (including ADA ramps) along or adjacent to the site must be identified.
- E. Transit routes serving the site and the distance to the closest transit stop or shelter must be documented.
- F. Crash data for the past three years, and any other safety issues, must be identified and evaluated within the study area for potential impacts to the study scenarios. Collision history must be analyzed to document if there are any existing safety conditions that may be impacted or aggravated by the development or development mitigation.

## V. Traffic Forecasts

Any modal split should be addressed for *Section V.B* and *Section V.C* including documentation and justification. Documentation must include reference to any standards or prior studies. Any modal split must be approved prior to initiation of the traffic study.

- A. The study scenarios for traffic forecasts and analysis must include the following:
  - **Level II and Level III** - Existing conditions
  - **Level III** - Existing plus proposed (each applicable phase and build out)
  - **Level III** – 20-year horizon plus development when mitigation is required to meet mobility standards (Mitigation design life is 20 years).

The planning horizon is 20 years. Variations to the planning horizon may be allowed on a case by case basis depending on the size of the development and the potential need for mitigation. A 20-year analysis must be used where the TPR is addressed. The growth rate assumption used in TSP Technical Memo 11 is 40% over 30 years, or 1.13% per year (p. 11, Table 3) for City facilities. Use ODOT growth rates for their facilities.

For land use actions such as a zone change, annexation or comprehensive plan amendment, the traffic forecasts and analysis must include the reasonable worst case scenario of the area subject to the land use action, i.e. the total acres and maximum density. A proposed development plan, typically, doesn't provide the worst case scenario. Per the LDC, a full range of development potential (min. to max.) under current vs. proposed land use designations must be addressed in the analysis. Reasonable worst case analysis must have justification and should be based on maximum viable development. ODOT's *Development Review Guidelines, 2005 and 2013 editions* provide guidance on reasonable worst case analysis.

- B. Non-site traffic includes existing traffic plus proposed or approved development in the area not accounted for in existing traffic counts. If other traffic studies for surrounding developments are used to estimate non-site traffic, those sources must be adequately

documented. Trips need to be adjusted for each scenario based on the approved growth factor. Any assumptions for trip generation must be documented.

- C. ITE trip generation rates are generally used as noted in *Section III.A* and adjusted by approved growth rates. Explanation of trip distribution and assignment must include any assumptions. Provide a diagram noting percentages and trip numbers from both the proposed development and non-site trips. Directional distribution for both the AM and PM peak hours must be included. Trip distributions under different scenarios should be adjusted based on any anticipated improvements or new street connections associated with the development or identified within the planning horizon in the TSP or Capital Improvement Program (CIP). For example, new streets in a phased subdivision may impact the distribution, or, a planned CIP project that occurs five years out could change the distribution between the build out and 20-year scenarios.

**VI. Traffic Analysis** (study scenarios are defined in *Section V.A*)

- A. Intersections and site accesses which are impacted with at least 30 trips from the proposed development during the AM or PM peak hours, and have trip volumes increase by at least 10% and are within expected routes of travel are typically reviewed.
- B. Highway Capacity Manual methodology must be used for traffic analysis. V/C must be provided for any intersection significantly impacted by the proposal, as described above, or if the intersection is suspected of operating at a V/C greater than 0.85 in the build year with build year background traffic. An analysis is required for each study scenario, including each cumulative sequence of phasing through the build-out condition. The analysis needs to clearly show the V/C of the intersection with and without the development.

Intersection analysis needs to balance signal timing based on the traffic demand. Existing and proposed signal timing needs to be documented and suggested timing improvements identified. The intersection V/C, critical movements and worst movements must be identified. Evaluation of the intersections needs to document expected queue lengths and available vehicle storage. Deficiencies in existing storage and lane configuration needs to be identified. This would include lane widths and curb radii where truck traffic is expected.

- C. Applicable warrants for turn lanes and traffic signals must be identified. Where analysis shows a turn lane or signal may be needed, applicable warrants must be evaluated to justify the need.
- D. Queuing analysis must include both the average queue length and the 95<sup>th</sup> percentile queue length. The 95<sup>th</sup> percentile must be used for design and for determining the required storage for turn lanes. Conflicts with queued vehicles must be addressed, such as, street or driveway accesses, adjacent vehicle lanes, RR tracks, etc.
- E. Sight distance for new intersections, streets and access points must meet the requirements of the City's Off-Street Parking and Access Standards. Deficiencies in site distance with the proposed development plan must be identified and discussed. This must also address sight distance to crosswalks and traffic control devices such as proposed signals, stop signs and road signs. The tree planting plan must be reviewed for conflicts with proposed traffic control devices/signs.

- F. Analysis must be consistent with Council Policy 9.07 Neighborhood Traffic Calming. There may be a need for traffic calming with development. The minimum thresholds of vehicle counts and speeds must be identified to determine if traffic calming is consistent with City policy and would provide a significant benefit. Potential locations and types of traffic calming must be evaluated.

Graphics including tables, lane configurations and turning movements should be included to supplement and summarize the traffic analysis.

In summary, the traffic analysis must encompass the evaluation of intersection and access V/C, traffic signals, additional travel lanes, turn lanes, intersection functional areas, access control, bicycle movements, pedestrian movements, signal coordination, transit facilities, acceleration and deceleration lanes, merge lanes, weaving sections, future extension of transportation facilities through surrounding properties, etc.

## VII. Other Items to Address

Other items that must be addressed include: nearby school zones, any TPR criteria, pending improvements from other nearby developments or nearby State, County, TSP or CIP identified improvement projects.

- A. The TPR is discussed in OAR Section 660-012-0060, *Plan and Land Use Regulation Amendments*. Addressing the TPR is required for any CP amendment or zone change application. The traffic study must provide a worst case scenario comparison between the existing and proposed zones to satisfy applicable criteria.
- B. The TSP is available on the City website. Discuss any existing or proposed improvements identified in the TSP for the area surrounding the proposed development. The location of new arterial, collector, neighborhood collector and other transportation (including pedestrian and bicycle) improvements must conform to the TSP.
- C. The CIP is available on the City website. Discuss any existing or proposed City, County or State capital transportation projects identified for the area surrounding the proposed development. The analysis must account for any pending projects.

## VIII. Mitigation Alternatives

Possible mitigation identified in the above analysis sections should be discussed here. If the traffic study identifies safety concerns or V/C conditions less than the minimum standard, improvements and funding strategies must be considered concurrent with a development proposal. Mitigation must be addressed for each phase of a development. Any ROW required for mitigation also must be identified.

Examples of mitigation to be addressed includes, but is not limited to:

- Site access lane configuration, access restrictions / right in, right out
- Center turn lanes / dedicated turn lanes
- Additional vehicular lanes / left turn lanes / revised lane configurations
- Geometric changes such as vertical or horizontal curves
- Speed limit investigations
- Bike lanes, sidewalks and multi-use paths

- Traffic control devices and signage
- Traffic signals, signal timing, phasing and coordination
- Traffic calming
- Transit facilities

## **IX. Recommendations and Conclusions**

This should be a list of recommendations by the Engineer and include key findings of the study. Any required improvements must be identified. If there is a phasing plan, improvements must be clearly identified by phase with the expected year for completion of mitigation. Additionally, any improvements that are not required of the development, but recommended to mitigate traffic issues in the study area, must be identified for City consideration and transportation planning purposes.

## **X. Appendices**

Appendices to the traffic study should include:

- Definitions, applicable references and standards
- Traffic count data
- Maps
- Warrant worksheets
- Signal progression worksheets, where applicable
- Software analysis printouts

Software analysis printouts, must be clearly labeled with consistent background/phasing nomenclature and applicable time period. Printout lane numbers, geometries and vehicular volumes must all be consistent with other sections of the TIS and the land use application.

## TRANSPORTATION ASSUMPTIONS

### *[Development Name]*

#### Zone Change and Comprehensive Plan Amendment (land use case)

<b>Trip Generation for Existing Zoning</b>							
				Trips			
Land Use	Acres	Units/Acres	Units	Daily Trip Rate	Daily	AM Peak	PM Peak
Single Family <sup>1</sup> Residential (RS-6)	57.75	6 / Acre	347	9.44 / unit	3276	256	344
Open Space (AG-OS)	36.87						
<b>Total</b>	94.62		347		3276	256	344

Note: <sup>1</sup> ITE Trip Code 210, Single Family Detached Housing

<b>Trip Generation for Proposed Zoning</b>							
				Trips			
Land Use	Acres	Units/Acres	Units	Daily Trip Rate	Daily	AM Peak	PM Peak
Apartment <sup>1</sup> (RS-12)	25	20 / Acre	500	7.32 / unit	3660	230	280
Public Park <sup>2</sup> (C-OS)	69.62			.78 / Acre	54	1	8
<b>Total</b>	94.62				3714	231	288

Note: <sup>1</sup> ITE Trip Code 220, Multifamily (Low –Rise), (other land use codes for apartments may be 221, 222, or 225 as applicable)  
<sup>2</sup> ITE Trip Code 411, Public Park

<b>Trip Generation Comparison (Existing and Proposed Zoning)</b>				
Zoning		Total Daily Trips	Total AM Peak Trips	Total PM Peak Trips
Existing		3276	256	344
Proposed		3714	231	288
<i>Difference (Proposed - Existing)</i>		438	-25	-56

## TRANSPORTATION ASSUMPTIONS

**[Development Name]**

Proposed Development (land use case)

<b>Trip Generation for Proposed Development</b>							
				Trips			
Land Use	Acres	Units/Acres	Units	Daily Trip Rate	Daily	AM Peak	PM Peak
Apartment <sup>1</sup>	25	11.84	296	7.32 / unit	2167	136	166
<b>Total</b>	<b>25</b>	<b>11.84</b>	<b>296</b>		<b>2167</b>	<b>136</b>	<b>166</b>

Note: <sup>1</sup> ITE Trip Code 220, Multifamily (Low –Rise), (other land use codes for apartments may be 221, 222, or 225 as applicable)

<b>Assumed Trip Distribution</b>		
North on Circle	35%	10% Witham to Grant 25% Circle N. of Witham Hill
South on Circle	65%	10% Harrison to 53rd 20% Harrison to 35th 20% Harrison east of 29th 15% Harrison to Arnold Way

  

<b>Assumed Mode Split</b>
Vehicle trips estimated using the Institute of Transportation Engineers (ITE) trip generation manual were not reduced to account for multi-modal trips.