



TRAFFIC IMPACT STUDY GUIDELINES

***ADOPTED: 14 July 2004
LAST UPDATE: 7 November, 2005***

Prepared
By:

Richard J. Blair, P.E.
Director of Public Works / City Engineer
City of Sedro-Woolley

Why a Traffic Impact Study Is Needed

A Traffic Impact Study (TIS) is an important tool in the overall development planning process (residential, commercial, industrial, institutional, etc.). It provides information which identifies impacts of proposed developments on the existing, short range and long range roadway/circulation networks. It also identifies mitigation measures for the impacts identified.

When Is a Traffic Impact Study Required

Some development applications may require Traffic Impact Studies. A threshold should be established to ensure that projects which are anticipated to create traffic impacts will be required to mitigate those impacts, while those smaller projects in less congested areas are not unduly burdened with a requirement to perform a traffic study.

A TIS shall be required by the City for:

1. Projects which produce 50 peak hour (AM, PM, or Midday) two-way trips or more; or
2. Projects which produce 500 daily (24 hour) two-way trips or more; or
3. Expansion of an existing project may also be subject to a traffic study. When determining whether the project meets the threshold, trips from the existing land use should be included in the trips which are considered “produced” by the project.

If it is determined by the City that a TIS is required, a Scoping Meeting may be held with the applicant and the City’s Engineer and/or Planner prior to initiation of the TIS. At this time:

1. Guidelines for the TIS shall be provided and discussed to ensure understanding by both the City and the Applicant;
2. The limits of the study area for the TIS shall be determined (The extent of the study area will be based on the location, size and potential impact of the proposed project.);
3. The locations for Average Daily Traffic Counts shall be identified;
4. All intersections to be evaluated will be identified;
5. Background projects and an annual growth rate to be included in No-Build Condition will be provided;
6. The Land Use Code used for trip generation and any adjustments will be approved;
7. Peak-Hour (AM, PM and/or Midday) counts and analysis will be designated; and
8. Any additional *project specific* requirements will be established.

A TIS shall be required by WSDOT any time WSDOT determines that a study is necessary.

Revisions to the TIS shall be provided as required by the City and/or WSDOT. The need for revisions will be based on the completeness of the traffic study, the thoroughness of the impact evaluation and the compatibility of the study with the proposed access and development plans.

Traffic Impact Study Area Establishment

The limits of the study area (which include roadways and intersections to be evaluated) for

the Traffic Impact Study shall be determined by the City's Engineer and Planner. The extent of the study area will be based on the location, size, and potential impact of the proposed project. If the applicant does not concur with the study area established by staff, the applicant may request that the City's Planning Commission determine the study area to be analyzed.

If required by the City, the study shall include all affected projects identified in the City's six-year Transportation Improvement Program (TIP) and 20-year Capital Facilities Plan (CFP).

If required by WSDOT, the study shall include all projects identified by WSDOT. Contact Roland Storme, WSDOT Development Services Manager at 360-757-5961 or Lee Conrad, Area Operations Manager at 360-757-5960.

Traffic Impact Study Review

The City and WSDOT shall each perform an independent review the Traffic Impact Study. The City Engineer may review the TIS or may designate a consultant to perform the review on behalf of the City. Actual costs for the TIS review shall be borne by the applicant.

The Planning Commission may, at the applicant's request, review the Traffic Impact Study for any proposed development at a regularly scheduled meeting.

Mitigation Measures/Recommendations

If the initial computerized analysis indicates that the City's adopted traffic Level of Service (LOS) goal will be exceeded, mitigation must be included in the study based on at least one additional analysis. This improvement must depict how the City's adopted traffic service level goals will be addressed. Acceptable roadway mitigation measures include, but are not limited to, the following:

- Dedication of Right-of-Way based on current functional classification, WSDOT 20-year plan, City standards, and special concerns of the City Engineer;
- Traffic signal timing adjustments;
- Traffic signal phasing adjustments;
- Restriping of the intersection;
- Adding traveled way width;
- Adding additional intersection turn lanes; and
- Installation of a signal.

Applicants will be responsible for the cost and implementation of identified improvement which mitigates the traffic impact of their proposed development. Because some improvements will not be implemented until the Build year, funding, in current dollars, for the identified improvements will be placed into an escrow account, specific for that improvement.

Traffic Improvement Implementation

If traffic mitigation is part of an approved Traffic Impact Study, all approved traffic improvements shall be **implemented prior to receipt of an occupancy or Final Plat approval**, whichever is appropriate, unless otherwise provided for as part of the approved Traffic Impact

Study.

The TIS shall be the responsibility of the applicant. The TIS shall be prepared in accordance with the Guidelines and format adopted by the City of Sedro-Woolley. All traffic studies must be prepared under the supervision of, and signed, stamped and dated by, a professional Civil Engineer registered in the State of Washington. The applicant will be required to submit five (5) copies of the TIS and one (1) camera ready copy.

Traffic Engineering Firm Selection

The Traffic Impact Study shall be prepared for the applicant by a qualified traffic engineering firm selected from a list of traffic engineering firms maintained by the City. The list shall be created through the solicitation by the City, or its representative, of professional traffic engineers qualified to perform this service. The list shall contain the names of at least three traffic engineering firms, along with statements of qualifications on each. The list shall be updated periodically and approved by the City Engineer.

If the applicant desires to use a traffic engineering firm other than one listed on the City's preferred list, the desired firm must submit a letter (identifying the applicant/study it would be preparing), a qualifications package (maximum of ten pages) and a sample Traffic Impact Study (without appendices) completed within the last 3 months. The information should be submitted to the City's Transportation Engineer for approval. Upon approval from the City's Engineer, the firm may proceed with the study.

TRAFFIC STUDY OUTLINE

I. Executive Summary

- A. Project Description
- B. Existing Conditions
- C. Probable Impacts of the Project (No-Build and Build Conditions)
- D. Traffic Operations Analysis (Existing, No-Build and Build Conditions)
- E. Mitigation Measures/Recommendations
- F. Conclusions

II. Introduction

- A. Project Description

III. Existing Conditions

- A. Geometric and Traffic Control
- B. Traffic Volumes
- C. Sight Distance
- D. Accidents

IV. No-Build Condition (Future Traffic Without Proposed Development)

- A. Background Traffic Volumes (Projected Traffic)
 - 1. Annual Growth
 - 2. Site Specific Development (Other approved developments located within the designated study area scheduled for completion prior to proposed project)
- B. Planned (Funded) Roadway Improvements

V. Build Condition (Future Traffic With Proposed Project)

- A. Trip Generation
- B. Adjustments to Trip Generation (When Applicable)
- C. Trip Distribution and Trip Assignment
- D. Phasing of Project
- E. Build Traffic Volumes
- VI. *Traffic Operations Analysis*
 - A. Methodology
 - B. Analysis Results
 - 1. Existing Condition
 - 2. No-Build Condition
 - 3. Build Condition
- VII. *Special Analyses/Issues (At City of Sedro-Woolley's or WSDOT's Option)*
 - A. Traffic Signal Warrants
 - B. Others, as appropriate
- VIII. *Mitigation Measures/Recommendations*
 - A. Off Site Improvement Needs
 - B. Proposed Site Access
 - C. WSDOT Mitigation
- IX. *Conclusions*
- X. *Appendix*
 - A. Traffic Count Data
 - 1. Average Daily 24-Hour Traffic Volumes
 - 2. Peak Hour Turning Movement Volumes (AM, PM and/or Midday)
 - B. Capacity Analysis Summary Sheets
 - 1. Existing Condition
 - 2. No-Build Condition (per phase)
 - 3. Build Condition (per phase)
 - 4. Build Mitigated Condition (per phase)

LIST OF FIGURES

1. Vicinity Map (Site Location Map)
2. Conceptual Site Plan
3. Existing Geometrics
4. (Year) Existing Weekday Morning Peak-Hour Traffic Volumes *
5. (Year) Existing Weekday Evening Peak-Hour Traffic Volumes *
6. (Year) Existing Saturday Midday Peak-Hour Traffic Volumes *
7. (Year) No-Build Weekday Morning Peak-Hour Traffic Volumes *
8. (Year) No-Build Weekday Evening Peak-Hour Traffic Volumes *
9. (Year) No-Build Saturday Midday Peak-Hour Traffic Volumes *
10. Project Trip Assignment (Percentages)
11. Weekday Morning Project-Generated Peak-Hour Traffic Volumes *
12. Weekday Evening Project-Generated Peak-Hour Traffic Volumes *
13. Saturday Midday Project-Generated Peak-Hour Traffic Volumes *
14. (Year) Build Weekday Morning Peak-Hour Traffic Volumes *
15. (Year) Build Weekday Evening Peak-Hour Traffic Volumes *
16. (Year) Build Saturday Midday Peak-Hour Traffic Volumes *

- * Some of the figures listed above will *not* be required in all TISs. Figures depicting peak-hour conditions (All Figures exclusive of #1, #2, #3, & #10) which will be required will be specified at the Scoping Meeting.

LIST OF TABLES

1. Existing Average Daily Traffic Volume Summary
2. Summary of Sight Distance Analysis (Stopping Sight Distance and Corner Sight Distance)
3. Accident History Summary
4. Project Trip-Generation Summary
5. Trip-Distribution (Assignment) Summary
6. Peak-Hour Traffic Volume Increases
7. Level-of-Service Criteria for Unsignalized Intersections
8. Level-of-Service Criteria for Signalized Intersections
9. Level-of-Service Capacity Analysis Summary (Existing, No-Build and Build Conditions)
10. Level-of-Service Capacity Analysis Comparison Summary for Build Mitigated Conditions

TRAFFIC STUDY FORMAT

In order to provide consistency and facilitate review of traffic studies, the format identified below must be followed. Under each heading, the content and methodologies to be utilized are discussed.

I. Executive Summary

The Executive Summary of the report shall be a clear, concise description of the study findings. It shall include a general description of the project scope, existing conditions, probable impacts of the project, traffic operations and conclusions, mitigation measures, and recommendations.

Technical publications, calculations, documentation, data reporting, and detailed design should not be included in this section. The Executive Summary should not be longer than *five (5) pages*, complete in itself, and not dependent on supplementary data included by reference.

II. Introduction

Project Description

The Introduction shall supply the reader with the location of the project site. As part of the description, a site location map (*Figure #1 - Vicinity Map*) shall be provided. The map shall include roadways which afford access to the site, and are included in the study area.

The limits of the study area for the traffic study shall be determined by the City's Transportation Engineer and/or Planner prior to initiation of the study. The extent of the study area will be

based on the location, size, and potential impact of the proposed project.

In addition, a detailed description of the project shall be provided. This description shall include the size of the parcel, general terrain features, access to the site, anticipated completion date, and the existing and proposed uses of the site (including phasing). This information shall include the square footage of each use or number and size of units proposed. Parking and internal circulation should also be discussed in this section. A figure which presents the site development as proposed should be included in the report (*Figure #2 - Site Plan*).

The intent of the traffic study is to evaluate worst case traffic impacts. If several different uses are permitted, the land use with the greatest overall traffic impact shall be assumed in the study, unless the applicant specifies the uses for the site.

III. Existing Conditions

Geometrics and Traffic Control

The TIS must identify the existing conditions in the vicinity of the project site, including a description of the area to be affected by the development. This is to provide a comparison of the impacts over time on land use and circulation.

A comprehensive field inventory of the site and study area should be conducted. The field study shall include collection of geometric data (number of lanes, intersection configurations, etc.), traffic controls and traffic volumes. Results of the inventory shall be described in detail within the report and geometric data and traffic controls shall be depicted graphically (*Figure #3 - Existing Geometrics*).

Traffic Volumes

In order to determine the existing traffic demands and flow patterns within the study area, automatic traffic recorder (ATR), manual turning movement, and vehicle classification counts (24 hour) need to be compiled.

Average daily traffic count data shall be current (less than 1.5 years old). Count data may be obtained from the Washington Department of Transportation (WSDOT). If current data is not available, the applicant will be required to perform the counts.

Peak hour counts shall also be current (less than 1.5 years old). They shall be conducted at study area intersections during weekday morning (7-9 AM) and evening (4-6 PM) peak hours for residential, lodging, industrial, medical and office developments; and during weekday evening (4-6 PM) and Saturday midday (11 AM-1 PM) peak hours for retail and recreational developments. Traffic volume data required for institutional developments will be determined by the City Transportation Engineer and/or Planner at the Scoping Meeting.

Weekday (Tuesday - Thursday) counts should be completed. The counts should be conducted during weeks which have no holidays and if possible during the school year. In situations when traffic counts must be conducted while school is not in session, a seasonal adjustment shall be applied to daily and peak hour volumes collected for use in the study. The seasonal adjustment

can be obtained from either the City's Transportation Engineer and/or Planner, or from the WSDOT.

Average daily traffic volumes shall be summarized in tabular form within the report. Existing peak hour traffic volumes shall be depicted graphically within the traffic study (*Figures #4 - #6*). Actual count summary sheets shall be submitted within the appendix.

Sight Distance

To identify potential safety concerns associated with site access and egress, sight distance at intersections (stopping sight distance and corner sight distance) measurements shall be conducted at the proposed site driveway/driveways. The measured sight distance shall be compared to minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO) and the WSDOT Access and Roadside Management Standards. A summary of sight distance analysis should be presented in tabular form.

Accidents

Three years of the most current accident data shall be obtained from the WSDOT or Department of Public Safety for intersections within the study area. This data shall be summarized within the report in tabular form along with a brief written description at each critical location.

IV. No-Build Condition (Future Traffic Without Proposed Development)

Background Traffic Volumes

The No-Build condition evaluates projected future traffic without the proposed development. It includes at a minimum an annual growth rate and future traffic from other proposed (approved) developments to be located within the vicinity of the site. Both the annual growth rate and list of approved developments will be discussed and furnished to the Applicant by the City. The traffic study shall specify the No-Build volumes associated with the daily and AM and PM peak hour conditions. Results shall be presented in both graphic (*Figures #7 - #9*) and tabular form.

Planned Roadway Improvements

Any planned (*funded*) roadway improvements to be completed within the study area should be identified and discussed within the TIS. These improvements shall be reflected in the No-Build and Build analyses.

V. Build Condition (Future Traffic With Proposed Project)

Trip Generation

Traffic volumes expected to be generated by the proposed development shall be forecast using the latest edition of the Institute of Transportation Engineers' (ITE), Trip Generation manual. The calculation of traffic volumes used to determine impacts of the development shall be based on the maximum land use intensity allowed under the existing (or proposed) Zoning Ordinance or the General Plan.

A summary table listing each type of land use, corresponding size or number of units (sq. ft., dwelling units, etc.), the average trip generation rates used (total daily traffic and AM, PM and/or Midday peak hours of the street) and the resultant total trips generated must be provided for the project site.

Adjustments to Trip Generation

Internal capture and pass-by traffic adjustments are important factors in projection of site impact. Internal capture is described as trips which are satisfied on the site which do not need to utilize the external roadway network. A pass-by trip is considered a “non-diverted” trip which is already on the roadway which now stops at the site. Such adjustments may be permitted for developments with the approval of the City’s Transportation Engineer and/or Planner.

Trip Distribution and Trip Assignment

Traffic generated by the site must be distributed and assigned to the roadway network in order to determine the project's impacts. Trip distribution refers to the direction a vehicle will take to access or leave the project site and can vary depending on:

- Type of proposed development surrounding the site;
- Similar land uses in the vicinity;
- Size of the proposed development; and
- Conditions on the roadway network in the vicinity.

Trip assignment identifies the actual routes taken by project traffic to and from the site. Trip assignment should typically be rounded to the nearest five percent (5%). Graphic presentations (*Figure #10*), as well as discussions in text, of the trip assignment shall be provided in the report.

Phasing of Project

For each horizon year, the distribution of project trips shall be shown in graphic format (*Figures #11- #13*) using percentages of project traffic by geographical direction. The text should describe the methodology and assumptions which are used in the determination of trip distribution.

Build Traffic Volumes

In order to develop mitigation measures for development, conditions with the project in place must be known. Project generated and distributed traffic shall be added to the No-Build traffic volumes. Resulting Build traffic volumes shall be depicted graphically (*Figures #14 - #16*).

VI. Traffic Operations Analysis

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity analyses are required under the following conditions:

- Existing
- No-Build (per project phase)
- Build (per project phase)

Capacity analyses provide an indication of how well the study area intersections serve existing

and future traffic demands. A primary result of capacity analyses is the assignment of Levels of Service (LOS) to traffic facilities under various traffic flow conditions. The capacity analysis methodology used shall be based on the concepts and procedures in the most current edition of the Highway Capacity Manual, Special Report 209; Transportation Research Board; Washington, D.C. A description of the methodology and level of service definitions shall be included within the report.

For existing and future conditions, Level of Service (LOS) at all study intersections, inclusive of the project driveway/driveways, shall be calculated using the latest edition of the Highway Capacity Manual for signalized and unsignalized intersections.

An overall intersection Level of Service (*LOS*) *D* shall be considered acceptable for signalized intersections within the City. For unsignalized intersections, the LOS for the critical movement shall be identified. Additionally, volume to capacity (V/C) and average stopped delay must also be presented for both signalized and unsignalized intersections.

The traffic study shall specify the Existing, No-Build and Build LOS, V/C and delays associated with the peak hour conditions. Results shall be presented in tabular form. Actual calculations shall be submitted in the Appendix of the TIS.

VII. Special Analyses/Issues

Signal Warrants

Unsignalized intersections experiencing significant deficiencies (delays) shall be evaluated for potential signalization. Signal Warrants should be completed for these locations using the latest edition of the Manual On Uniform Traffic Control Devices for Streets and Highways (MUTCD), published by the U.S. Department of Transportation Federal Highway Administration. Results of these analysis should be discussed and recommendations established and presented in this section of the TIS.

VIII. Mitigation Measures/Recommendations

Off Site Improvement Needs

The final phase of the analysis process is to identify the improvement measures necessary to minimize the impact of the “project” on the transportation system. Intersections must be mitigated if the Build Condition is expected to operate below the City’s acceptable service level standard. Measures considered necessary to mitigate future roadway system deficiencies under Build Conditions shall be recommended as they relate to impacts of the proposed project within the designated study area. These intersections should be mitigated at a minimum to operate *better than or equal* to the No-Build condition based on the calculated V/C and average stopped delay of the overall intersection (signalized) and critical movement (unsignalized).

Proposed Site Access

A complete description of the access/egress of the site should be explained and depicted. It

should include number of driveways, their locations, distances between driveways and intersections, types of driveways (two-way, one-way, etc.), traffic controls, etc. As discussed under the Traffic Operations Analysis section of the TIS, capacity analysis shall be completed for all project driveways.

WSDOT Mitigation

Address all WSDOT mitigation issues, including pro-rata share of affected WSDOT projects.

IX. Conclusions

This section of the traffic study shall summarize the required improvements and the proposed mitigation measures. This should include at a minimum:

- Existing and future LOS results;
- Recommended Roadway improvements; and
- Resultant LOS with proposed improvements in place.

X. Appendix

The final section of the TIS shall include average daily and peak hour turning movement traffic count data collected and/or obtained from other sources. Summary sheets for all capacity analyses completed shall also be included within the appendix of the TIS.

**LIST OF FIRMS QUALIFIED TO CONDUCT TRAFFIC IMPACT STUDIES
Within the
CITY OF SEDRO-WOOLLEY**

The TRANSPO Group
11730 118th Ave. N.E., Suite 600
Kirkland, WA 98034
(425) 821-3665

DKS Associates
719 2nd Avenue, Suite 1250
Seattle, WA 98104
(206) 382-9800

Bucher, Willis & Ratliff (BUR)
2003 Western Avenue, Suite 100
Seattle, WA 98121
(206) 448-2123

Perteet Engineering, Inc.
2707 Colby Avenue, Suite 900
Everett, WA 98201
(425) 252-7700

David Evans and Associates
119 Grand Avenue, Suite D
Bellingham, WA 98225
(360) 647-7151

Reid Middleton
728 134th Street S.W., Suite 200
Everett, WA 98204
(425) 741-3800

Entranco
10900 NE 8th Street, Suite 300
Bellevue, WA 98004
(425) 454-5600

Gray & Osborne, Inc.
701 Dexter Avenue N., Suite 200
Seattle, WA 98109
(206) 284-0860

Jake Traffic Engineering (JTE), Inc.
7731 8th Ave. SW
Seattle, WA 98106-2007
(206) 762-1978

Gibson Traffic Consultants
1712 Pacific Avenue
Everett, WA 98201
(425) 339-8266