

# REQUIREMENTS FOR TRAFFIC STUDIES WITH FUTURE LEVEL-OF-SERVICE ANALYSIS

## OVERVIEW

- Developments that generate more than 50 peak-hour trips (“large developments”) are required to attend a traffic study scoping meeting prior to submittal. This document is provided to applicants at these scoping meetings to provide a detailed description of the elements that will be required in their traffic studies.
- Note that the requirements shown below are in addition to any to any other traffic information and/or analysis that is required pursuant to county code, rules, interlocal agreements, and presubmittal checklists. *And*, to facilitate review, it is highly recommended that the entire traffic study be bound in one document.
- As much as possible, to facilitate review and to establish a clear “paper trail,” all supporting documentation should be included in the traffic study including, but not limited to, signed traffic study scoping sheets, pre-approved distributions, e-mail exchanges, traffic counts, travel time studies, pipeline reports, traffic signal timing sheets, and all other supporting documentation that may help facilitate review.

## COUNTY CONTACTS FOR INFORMATION AND SUPPORT

Contact the following staff in Public Works and PDS for data and other information.

### Traffic Data including counts, travel time studies, signal timing sheets

- Maxine Ponds, (425) 388-3117, [maxine.ponds@co.snohomish.wa.us](mailto:maxine.ponds@co.snohomish.wa.us).
- Beth Burch, (425) 388-3488 ext. 4540, [beth.burch@co.snohomish.wa.us](mailto:beth.burch@co.snohomish.wa.us).
- Don Wisehart, (425)388-3488 ext 4593 or [don.wisehart@co.snohomish.wa.us](mailto:don.wisehart@co.snohomish.wa.us).

### Pipeline Inventory Reports

- Deb Werdal, 425 388-3184, [debra.werdal@co.snohomish.wa.us](mailto:debra.werdal@co.snohomish.wa.us)
- Maria Dobson-Schmidt, (425) 388-3099, [Maria.Schmidt@co.snohomish.wa.us](mailto:Maria.Schmidt@co.snohomish.wa.us)

### Concurrency Coordination

- Mark Brown, 425 388-3311 ext 4536, [mark.brown@co.snohomish.wa.us](mailto:mark.brown@co.snohomish.wa.us)
- Ann Goetz, 425 388-3311 ext. 4580, [ann.goetz@co.snohomish.wa.us](mailto:ann.goetz@co.snohomish.wa.us)

### Scheduling a 30.66B Pre-submittal Appointment

- 425 388-6440

## SUPPORTING DOCUMENTS / OTHER INFORMATION\*\*

- Required Format for Trip Distributions
- Synchro Calibration Revision
- State Highways of Statewide Significance as Designated by WSDOT
- Additional Traffic Submittal Requirements for Large Developments
- Information to Provide Developers Doing Traffic Studies
- Critical Arterial Units
- Key intersections (Lists and Maps)
- Arterial Unit Categories
- List of Six-Year Network Assumptions

\*\*On the web at [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/TES/ProgramPlanning/3066B/](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/TES/ProgramPlanning/3066B/)

## REQUIRED TRAFFIC STUDY ELEMENTS

Upon submittal, the applications for large developments must include future level-of-service analysis with all of the traffic study elements identified below (Preferably clearly marked with the same headings as shown below, A – G, and in the same order).

### \_\_\_ A. Project Identification

Name of Project, Applicant's Name

Identify the preparer of the traffic study: Name, Address, Phone Number, E-Mail, FAX Number

### \_\_\_ B. Location and Access:

1. 8 ½" by 11" vicinity map showing location of subject parcels and nearby arterials

2. Access Descriptions. Describe all possible access locations in broad terms as in the following example:

*"One possible access will be from the west side of 4th AV W between 108th ST SW and 112th ST SW. Another possible access will be from the north side of 108<sup>th</sup> ST SW between 4<sup>th</sup> AV W and Meridian."*

3. Access Scenarios. Describe the access scenario(s) used to evaluate level of service.

Option A. Access Worst-Case Scenario. Describe the "worst-case" access scenario in terms of impacts on the level-of-service of the road system. Use the same broad format for describing access as in the following example.

*"In terms of impacts on the level-of-service of the road system, the worst case scenario would be if the only access was onto 108<sup>th</sup> ST SW between 4<sup>th</sup> AV W and Meridian."*

Option B. Alternative Access Scenarios. Instead of describing one "worst-case" access scenario, an applicant may also do all of the level-of-service analysis for different access scenarios as in the following example:

*Alternative One: Access Only from 4<sup>th</sup> AV W.*

*Alternative Two: Access Only from 108<sup>th</sup> ST SW.*

*Alternative Three: Access from both 4<sup>th</sup> AV W and 108<sup>th</sup> ST SW.*

### \_\_\_ C. Trip Generation

1. Clearly identify all assumptions used for trip generation.

*Calculate trip generation for the peak hours of the adjacent street system*

*Describe type of land use (e.g., SFR, MFR, retail, school, church,...)*

*Assume maximum Size (e.g., 100 lots, 10,000 square feet,...)*

*Other assumptions discussed at scoping meeting*

2. Provide clear rationale for any trip reduction percentages proposed.

- *Transportation Demand Management (TDM)*

- *Passer By*
- *Internal Trip Capture*
- *Existing trips from site*
- *Other*

3. Number of Peak-Hour Trips. Calculate net, maximum, new, peak-hour trips generated for:

*AM peak hour of adjacent road system*  
*PM peak hour of adjacent road system*

\_\_\_\_\_ Maximum AM peak-hour trips  
 \_\_\_\_\_ Maximum PM peak-hour trips

4. Number of Trips for Other Time Periods. Also provide trip generation for average daily trips (ADT) for calculation of county impact fees, and trip generation for any special time periods that may be required by the county for "special" uses such as schools or heavy weekend generators.

**\_\_\_ D. Trip Distribution and Assignment**

1. Propose horizon year for traffic forecast *if other than six years* in the future.

*Public Works will determine the expiration date for the certificate of concurrency for the subsequent application based on the analysis. In almost all cases this will be six years in the future. The applicant will be told if, for some reason, Public Works has determined that a different horizon year should be used. The applicant may propose a different horizon year, provide justification, and Public Works will consider it.*

2. Determine trip distributions and assignments.

*Use format for trip distributions and assignments (See instructions provided by Public Works)*

*List future network assumptions for year of proposed expiration date of certificate of concurrency*

- DPW has identified County arterials for which a funding commitment is in place and which will be constructed within six years. (Attach copy of "Six-Year Network Assumptions" Provided by DPW.) That list also identifies other agency projects that DPW has identified, but should not be considered as a definitive list for other agency projects.
- List any other network assumptions. The applicant is ultimately responsible for identifying projects in other jurisdictions or WSDOT projects for which funding is committed and project completion will be within six years.

*AM trip distribution and assignment*  
*PM trip distribution and assignment*

3. Determine Transportation Service Area (TSA). \_\_\_\_\_

**\_\_\_ E. Identify Critical Arterial Units and Critical Movements on Critical Arterial Units**

1. Attach the list of critical arterial units for TSA provided by Public Works.

2. List any other critical arterial units identified by Public works on Traffic Study Scoping Sheet as needing analysis.

Number	Name of Arterial	Limits (From / To)	Category

3. List all “impacted” critical arterial units.

*“Impacted arterial unit” means that based on the development’s peak-hour trip assignments, that 3 or more AM or PM peak-hour trips (PHT) are added to the arterial unit in one direction. For each impacted critical arterial unit, show the critical movement(s), e.g., AM NB, PM NB, AM SB, and/or PM SB. See sample list below for recommended format.*

*Sample List of Impacted Critical Arterial Units and Critical Movements*

Arterial Unit ID#	Arterial Unit Description	Critical Movements	
		Peak Hour	Directions
332	39 <sup>th</sup> AV SE between 228 <sup>th</sup> ST SE and SR-524	AM	northbound and southbound
		PM	northbound and southbound
333	228 <sup>th</sup> ST SE between 39 <sup>th</sup> AV SE and 35 <sup>th</sup> AV SE	AM	eastbound and westbound
		PM	eastbound and westbound

**\_\_\_ F. Level of Service Analysis for Impacted Critical Arterial Unit Movements**

1. List key Intersections for impacted critical arterial unit (indicate Intersection ID#, Major Leg, Minor Leg)

*Sample List of Key Intersections for Impacted Critical Arterial Units*

Arterial Unit ID#	Key Intersection ID#	Major Leg	Minor Leg
332	190	228 ST SE	39 AVE SE
	191	SR 524	39 AVE SE
	393	39 AVE SE	212 ST SE
333	190	228 ST SE	39 AVE SE
	373	35 AVE SE (BTHL)	228 ST SE

2. Obtain current AM and PM peak hour counts for each key intersection on impacted critical arterial units. The count date should not be more than one year prior to the submittal date of the report. An older count is only acceptable with prior written permission from the department (e-mail exchange OK). If counts are not available from Public Works then they must be provided by the applicant.

- Attach count sheet (8 ½ by 11”) with traffic study
- Provide Electronic copy of raw data and summaries if available

- Show source and date of count

Many counts are available from DPW. To request a count from DPW provide the following information:

- Intersection ID#,
- TSA,
- Major Leg, and
- Minor Leg.

3. Attach copy of pipeline inventory reports obtained from Public Works for each key intersection. The information in the pipeline forecast report will be valid for ninety days from the date of the report, except as shown in the next section:

4. Adjustments to the Pipeline Inventory

1. DPW will provide the developer with trip distributions from any other large developments (over 50 PHT) added to the inventory during the 90-day period. To be deemed concurrent, the subject developer will have to either add these other large developments to the forecast, or provide with the submittal of the traffic study other analysis showing that the additional trips will not cause the LOS to fall below the adopted standard, PROVIDED, the subject developer will not have to consider any other large developments whose concurrency inventory date is less than 30 days prior to the subject development's submittal date. The traffic study needs to document compliance with this section.
2. The applicant can propose subtractions from the pipeline Inventory with written supporting documentation. For example, a copy of a certificate of occupancy for a development showing that it was occupied as of the date of the traffic count for a particular key intersection.

5. Traffic Volumes for Three Scenarios: Calculate traffic volumes for all turning movements at each key intersection for impacted critical arterial unit movement for three different scenarios:

1. Current Traffic Volumes: Existing traffic volumes from recent counts
2. Future Traffic Volumes without Development: Existing traffic volumes plus future traffic volumes from the pipeline inventory
3. Future Traffic Volumes with Development: Existing traffic volumes plus future traffic volumes from the pipeline inventory plus future traffic volumes from the development.

6. Show future traffic volumes in tabular format as in the following example.

Future Traffic Volumes for Intersection #169, SR-9 @ Marsh Road, AM Peak Hour												
Intersection ID# 169	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Current Counts	25	35	22	54	65	18	38	156	65	25	458	237
Pipeline Forecasts	5	7	4	11	13	4	8	31	13	5	92	47
Subtotal (Total without Project)	30	42	26	65	78	22	46	187	78	30	550	284
Project Trips	0	2	0	4	6	2	0	0	3	1	0	0
Total Forecast with Project	30	44	26	69	84	24	46	187	81	31	550	284

7. Show classification of impacted critical arterial unit (provided by County)  
(e.g., Cat 2 > 40, Cat 1 Sub, etc.)
8. Determine which LOS standard applies to each impacted critical arterial unit.  
*For urban arterial units the following applies:*

Category #	R/U	DESCRIPTION	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Cat 1 Urb	Urban	Category 1, Urban	>= 30	>= 24	>=18	>=14	>=10	< 10
Cat 1 Sub	Urban	Category 1, Suburban	>= 35	>= 28	>= 22	>= 17	>= 13	< 13

*For Rural Arterial Units see Attachment C to Procedure 4210 available from DPW.*

9. Describe methodology and/or software to be used for each impacted critical arterial unit  
 \_\_\_\_\_ *Synchro*  
 \_\_\_\_\_ *Highway Capacity Software*  
 \_\_\_\_\_ *Other with written permission of Concurrency Manager* \_\_\_\_\_

10. For each impacted critical arterial unit movement, estimate current average peak hour directional travel speeds based on travel time studies using average car method. Attach copy of summary sheet. **The study date should not be more than one year prior to the submittal date of the report.** An older study is only acceptable with prior written permission from the department.

Travel Time Studies will be provided by Public Works if available.

11. Demonstrate the calibration of current conditions.  
*Base the link speeds in the arterial LOS models (e.g. SYNCHRO “Flow Speed”) on measured speeds between intersections from the travel time studies discussed in step 10 above as opposed to posted speed. Free-flow speeds (50<sup>th</sup> percentile speeds) may be used absent better information.*  
*Research, document and use in the modeling the current signal phasing and timing for any key intersections that are already signalized. Contact DPW for timing sheets for county intersections.*  
*Provide DPW with worksheets showing final calibrated base run and network assumptions. Note: for some arterial units with significant improvements programmed for the next six years, (e.g., 35<sup>th</sup> AV SE from SR-96 to Seattle Hill Road), and with prior approval from Public Works, a “qualitative” calibration of existing conditions may be acceptable.*  
*See also document available from Public Works titled, “Synchro Calibration Revision”*

12. Estimate future travel speeds for:  
*Future Traffic Volumes without Development:* Existing traffic volumes plus future traffic volumes from the pipeline inventory  
*Future Traffic Volumes with Development:* Existing traffic volumes plus future traffic volumes from the pipeline inventory plus future traffic volumes from the development.

13. Document the assumptions and results. Provide the applicable reports from the modeling software including, but not limited to:

*Attach all counts, travel time studies, signal timing sheets, etc.  
Intersection reports for key intersections.  
Arterial-level reports*

14. Provide the final LOS model in electronic format (e.g., Synchro model for the different scenarios)

15. Summarize level-of-service (LOS) determination for all three scenarios. Indicate whether or not LOS meets the adopted County standard.

**Sample Table Showing LOS Determinations**

LOS Determination Scenario Three: Future Volumes with Development								
Arterial Unit ID#	Critical Peak Hours	Critical Directions	Category of Arterial Unit	LOS Standard	Speed Threshold to Achieve LOS Standard	Estimated Travel Speed (miles per hour)	Meet or Exceed Standard?	Estimated Level of Service
332	AM	Northbound	Cat 1 Sub	LOS E	>= 13	25	Yes	LOS C
		Southbound	Cat 1 Sub	LOS E	>= 13	15	Yes	LOS E
	PM	Northbound	Cat 1 Sub	LOS E	>= 13	10	No	LOS F
		Southbound	Cat 1 Sub	LOS E	>= 13	35	Yes	LOS A

**\_\_\_ G. Required Attachments**

- Critical Arterial Unit List. The list of critical arterial units is signed and dated by the County and the traffic consultant at the time of the traffic study scoping meeting. It is valid for 90 days.
- Pipeline Inventory Reports
- Copies of presubmittal checklists
- Copies of E-mails to/from County, including information about other large developments deemed concurrent subsequent to traffic study scoping meeting
- Traffic Counts
- Travel Time Studies
- Signal Timing Sheets
- Model Outputs (e.g., Synchro Reports)