MEMORANDUM

FROM: Jesse Hannahs, P.E. – Traffic Engineering Manager

DATE: December 22, 2021

SUBJECT: City of Marysville - Traffic Impact Analysis Guidelines

All major new developments within City boundaries will require a Traffic Impact Analysis (TIA). Developments generating trips greater than defined Impact Thresholds shall have a TIA prepared to analyze impacts to the transportation system and to identify appropriate mitigation measures, if necessary.

Purpose of TIA:

The required Traffic Impact Analysis (TIA) has the following purposes:

1. Ensure that City policy for the provision of safe and adequate access and allocation of responsibility for immediate or future road improvements necessitated by new development is fairly and consistently applied to all developments.
2. Establish impact on road system capacity.
3. Establish impact on specific level of service deficiencies.
4. Establish impact on specific inadequate road condition locations.
5. Establish and/or evaluate access and transportation system circulation requirements.
6. Establish impact on other jurisdictions' roadway system.
    a. The City has an inter-local agreement (ILA) with Snohomish County which sets standards and requirements for City development TIA's to satisfy county data and analysis requirements.
    b. WSDOT and/or surrounding jurisdictions such as Cities of Lake Stevens and Arlington may be provided information relevant to their roadway systems for review.
7. Establish transportation demand management measures including:
    a. Establish pipeline trip values for development projects at key City intersections.
    b. Identify locations which need to be addressed within the City six (6) year TIP and GMA concurrency horizon.
    c. Establish if there is a project nexus for improvements.

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Definitions:

- *Major New Developments* are defined as any development generating ten (10) or more trips (total of entering and existing) during the p.m. peak hour or other hours as defined by the City.
    - Developments generating less than ten (10) or more trips (total of entering and existing) during the p.m. peak hour or other hours as defined by the City shall perform trip generation only unless TIA scoping deems distribution and analysis necessary, such as proximity to other jurisdictions, known inadequate roadway condition, etc.
- *Impact* is defined as any intersection including site access driveways in which the development generates ten (10) or more trips during the designated peak hour in the horizon year or as defined within TIA scoping.
- *Opening Year* is defined as the anticipated year in which the development will be complete and open to the public.
- *Horizon Year* is defined as the future forecast year at which the future conditions without the proposed development and compared to future conditions with the proposed development in order to determine the impacts of the proposed development on levels of service and capacity. The horizon year for each phase of the development shall be six (6) years from anticipated opening/completion of the development.
- *Mitigation Measures* are defined as any combination of street improvements or reduction of development size which reduces the number of trips generated by the development at an impacted intersection below the impact threshold values in Table 1.
- *Level of Service* are defined by the current version of the Highway Capacity Manual and are shown in Table 2.

TABLE 1: INTERSECTION ANALYSIS IMPACT THRESHOLDS

SR529/State Avenue/Smokey Point Blvd. Corridor		Threshold for intersection Analysis/LOS Criteria
Site Generated Traffic		25 vehicles transversing through intersection during any defined peak hour
Minimum Level of Service	Signalized, Roundabout or Stop Controlled Intersection	E (mitigated)
State Route 528 (4th Street/64th Street NE		**Threshold for intersection Analysis/LOS Criteria**
Site Generated Traffic		25 vehicles transversing through intersection during any defined peak hour
Minimum Level of Service	Signalized, Roundabout or Stop Controlled Intersection	E (mitigated)
State Route 531 (172nd St NE)*		**Threshold for intersection Analysis/LOS Criteria**
Site Generated Traffic		25 vehicles transversing through intersection during any defined peak hour
Minimum Level of Service	Signalized, Roundabout or Stop Controlled Intersection	D
All other intersections of two arterial/arterial or functionally classified streets on signalized/roundabout intersections		**Threshold for intersection Analysis/LOS Criteria**
Site Generated Traffic		25 vehicles transversing through intersection during any defined peak hour
Minimum Level of Service	Signalized, Roundabout or Stop Controlled Intersection	D

* = WSDOT intersections which prior to a development submittal have an existing LOS failure of E, shall be required to mitigate only upon falling below a LOS E, such as the historical case for the intersection of SR 531 (172nd St NE) & 27th Ave NE.

Exceptions to Intersection Analysis Impact Thresholds for developments meeting the following criteria:

1) Development having a total net building square footage of greater than 1 million square feet and/or
2) Any peak hour required for analysis having greater than 1000 development generated trips after determination of any acceptable trip reductions.
3) Developments meeting these criteria may be allowed to utilize the following to determine intersections for Intersection Analysis:
    a) Intersections greater than 3 miles from development boundary as measured upon roadways (not straight line) may utilize a Intersection Analysis Impact threshold of:
        i) 50 Development generated trips for each analysis periods required, unless

(1) If greater than 50% of the intersection trips are turning rather than through trips, an intersection between 25 and 50 trips shall be evaluated.

b) Intersections greater than 5 miles from development boundary as measured upon roadways (not straight line) may utilize a Intersection Analysis Impact threshold of:
   i) 100 Development generated trips for each analysis periods required, unless
      (1) If greater than 50% of the intersection trips are turning rather than through trips, an intersection between 50 and 100 trips shall be evaluated.

c) Intersections in which a project is identified and included within the Traffic Impact Fee (TIF) calculation formula yet analysis beyond 3 miles from development is warranted may at the discretion of the City be excluded from Intersection Analysis.

TABLE 2: LEVEL OF SERVICE

Level of Service	Unsignalized Intersections (Average Delay per Vehicle in Seconds)	Signalized Intersections (Average Delay per Vehicle in Seconds)
A	< 10.0	< 10.0
B	10.0 – 15.0	10.0 – 20.0
C	15.0 – 25.0	20.0 – 35.0
D	25.0 – 35.0	35.0 – 55.0
E	35.0 – 50.0	55.0 – 80.0
F	> 50.0	> 80.0

Traffic Impact Analysis (TIA) Contents:

- Review and approval of Traffic Impact Analysis (TIA) shall be subject to meeting the criteria set forth by the City.
- The TIA shall be prepared under the direction of a Professional Civil Engineer with experience in traffic engineering and registered in the State of Washington. Final documents shall bear the seal of the responsible Professional Engineer.
- TIA review shall be a stepped process with the first step being review and approval of trip generation and distribution to evaluate “Intersection Analysis Impact Thresholds” and determine full TIA requirements.

The following outline should be used in order to facilitate review by the City:

Existing vs. Proposed Conditions:

1) Inventory Existing and Proposed Land Use
    a) Existing Land Use
        i) Proposed Site's Land Use
        ii) Proposed Site's Physical Location
        iii) Proposed Site's Physical Characteristics.
        iv) Design constraints to proposed development.
    b) Proposed Land Use
        i) Change in Land Use.
        ii) Other developments approved within the vicinity. City will provide this listing.
2) Inventory Existing and Planned Transportation System
    a) Scope of Impact Analysis
        i) Describe the location of new facilities and existing facilities impacted by increased traffic. Increased traffic is defined as ten (10) or more trips during the p.m. peak hour, unless other timeframes are required, including all intersections created by driveways serving the site, local street segments used by the development to access the collector and arterial street network and all intersections of arterial streets.
    b) Existing Transportation System
        i) All pertinent data in the City's possession will be supplied by the City upon request.
        ii) All other data required for the TIA shall be provided by the applicant.
        iii) The TIA shall address all or a combination of the following:
            (1) Street Network by Functional Classification
            (2) Geometrics of network and intersections
            (3) Traffic control locations.
            (4) Signal timing and operations
            (5) Site access points
            (6) Existing right of way (ROW)
            (7) Traffic Counts
                a) Traffic counts shall be no more than 18 months old and include peak hour factors and percentage of trucks.
            (8) Collision data - Three (3) calendar years of data.
            (9) Transit Service - Existing and planned facilities including bus stop locations.
            (10) Bicycle facilities - Existing and planned.
            (11) Pedestrian facilities - Existing and planned.

Trip Generation and Distribution:

1) Trip Generation:
    a) The latest version of the ITE Trip Generation Manual shall be used.
    b) Trip Generation shall be based upon “average rate” for “peak hour of adjacent street traffic”.
        (1) Trip Generation Values:
            a) Values for City TIF and other impact fee calculations shall be carried to one (1) figure past the decimal point.
                (i) Examples:
                    1. 20.657 = 20.7
                    2. 15.146 = 15.1
            b) Values for operational analysis should be rounded to the nearest whole number.
    c) Identify Critical Hours:
        i) Typically p.m. peak hour.
        ii) In conjunction with City staff, if the hours of largest impact are outside of the p.m. peak hour, other hour analysis may be required:
            (1) A.M. Peak Hour
            (2) Generator Peaks
            (3) Saturday Peak
            (4) Sunday Peak
    d) City Adopted Trip Generation Rate Policy exceptions to ITE Trip Generation Manual:
        i) The following residential units per MMC Chapter 22A.020 definition shall generate 1.0 PM Peak Hour trips per unit:
            (1) Accessory dwelling units
            (2) Attached housing (triplex, Quadplex, etc.)
            (3) Duplex
            (4) Single-family, detached
        ii) Apartment developments shall be per Edition 11 of the ITE Trip Generational Manual – Land Use Code 220, Multifamily housing (Low-Rise)
        iii) Townhome developments shall be per Edition 11 of the ITE Trip Generational Manual – Land Use Code 215, Single Family Housing - Attached
        iv) For Hotel Type developments, Business Hotel may only be utilized for proposals consistent with the ITE description for Business Hotel and use shall require:
            (1) Occupancy rate study shall be performed consisting of:
                a) Four (4) similar style hotels within Marysville or surrounding vicinity within the I-5 corridor of central/northern Snohomish County.
                b) At least two (2) of study locations must be located within City of Marysville or Tulalip Tribes jurisdictional boundaries.

v) For land uses not listed in the ITE Trip Generation Manual, the following shall be required:
(1) Trip generation study to include at least three (3) sites of similar type/style development in similar regions/locations.
(2) Comparison sites must be reviewed and approved by City staff.

e) Development project proposals, in which phased development or contiguous parcel ownership are proposed or present, shall include the entire project and/or all contiguously owned parcels within the trip generation for the development project.
i) If only a portion of the subject property is proposed for development, trip generation shall include full buildout of the remainder of the property under current zoning.
ii) Or, if the proposal involves a zoning change, buildout under the proposed zoning.

2) Trip Distribution:
a) The applicant shall provide trip distribution data for approval of City staff BEFORE doing extensive TIA analysis.
b) Trip Distribution Maps have been developed by the City based upon the adopted City Transportation Comprehensive Plan for the highest probability development locations.
i) Some Developments may need to provide a hybrid trip distribution proposal utilizing multiple maps based upon proposed development location which shall be reviewed and approval by the City.

3) Redistribution of Existing Traffic:
a) Lakewood Neighborhood Area Projects:
i) For Horizon Year Analysis, with planned roadway network and 156th ST NE Interchange construction assumed complete existing traffic may be assumed to divert from 172nd ST NE east of 19th Ave NE (designation of 172nd St NE Interchange and south), south through Lakewood Neighborhood arterial roadways to 156th ST NE Interchange and south at rate of 25% diversion.

Trip Reduction Policy:

1) The City should be consulted on the acceptability of any proposed trip reductions or the appropriateness of a proposed ITE trip generation code BEFORE doing extensive TIA analysis.
2) Pass-by Trips:
    a) Pass-by trip rates will be allowed only based on rates in the latest version of the ITE Trip Generation Manual or
    b) those set forth based upon Snohomish County ILA (PM Peak pass-by rates) as follows:
        i) Drive Thru Only Espresso Stands = 100%
        ii) Daycare (located on Arterials only) = 75%
        iii) Specialty Retail = 25%
        iv) Health Club = 54%
        v) Drive-In Bank = 47%
    c) City policy based upon past precedent dating prior to 2013 allows following pass-by rates:
        i) Automobile Sales = 25%
3) Diverted Link Trips will not be allowed.
4) Multi-use development shall be reviewed based upon Chapter 7 of the ITE Trip Generation Handbook.
    a) Internal Capture:
        i) May only be used for projects over 100,000 square footage of total floor space constructed at one time by a single owner conforming to criteria cited in ITE (multiple, differing land uses with applicable capture rates), or
        ii) For projects having mixed use zoning with multiple use types.
5) Relocation of Existing Business:
    a) A development project that relocates from an existing building to a new building shall not receive traffic mitigation credits if the existing building is not demolished or removed.
    b) Credits shall be based upon the latest version of the ITE Trip Generation Manual for the demolished or removed building.

TIA Analysis:

1) Highway Capacity Manual procedures shall be used.
2) Opening Year of the development or each phase shall be analyzed for capacity and level of service with and without the development traffic.
3) Horizon Year of the development or each phase shall be analyzed for capacity and level of service with and without the development traffic.
    a) Planned and Committed Improvements on Affected Transportation Network:
        i) All WSDOT funded projects may be assumed to be completed in Horizon Year, however WSDOT impact fees may be required to be paid by the developer.
        ii) All City projects contained within the Transportation impact Fee (TIF) calculation may be assumed are completed in Horizon year.
        iii) Only funded or approved development projects may be assumed to be completed.
    b) If Mitigation Measures are required:
        (1) Signal/Roundabout Revisions/Construction Required:
            a) If required mitigation of transportation impacts for any phase of the development includes new/modified intersection control or a signal/roundabout, Horizon Year conditions shall be forecast and analyzed.
        (2) Comprehensive Plan revisions required:
            a) If required mitigation of transportation impacts for any phase of the development requires revisions to the most current approved version of the City Comprehensive Plan, conditions shall be analyzed for the Horizon year and the currently adopted City Transportation Comprehensive Plan.
4) Annual Growth Rate:
    a) When available the City will supply pipeline traffic data and a growth rate of 2% per year shall be used for operational analysis.
    b) Where pipeline data does not exist or cannot be provided by the City, a growth rate of 3% per year shall be used.
5) Added impacts of Adjacent Major Developments:
    a) Only funded or approved development projects may be used for future condition analysis to establish that a project has no adverse traffic impacts.
    b) Pipeline data will be provided by the City in the form of available copies of applicable TIA's.
        i) Pipeline data will consist of approved development projects distributing 25 or more trips to an arterial/arterial or signalized intersection.

ii) PDF's, or other electronic medium, will be required of each development for inclusion into the pipeline database.

6) Intersection Analysis Tools:
   a) Synchro Version 10 for stop controlled and signalized intersection analysis.
   b) Single lane roundabouts can be analyzed in Synchro, however locations on State Routes shall require analysis utilizing Sidra or other WSDOT approved software.
   c) Multi-lane Roundabouts shall be analyzed in Sidra.
      i) Comparison of signalized alternatives to a multi-lane roundabout shall also be performed in Sidra.
7) Intersection Analysis Guidelines:
   a) Ideal saturation flow rates greater than 1900 vehicles per hour of green per lane should not be used unless otherwise measured in the project vicinity.
   b) Signal Timing for Analysis:
      i) Existing timings must be used for existing conditions.
      ii) Optimization for future conditions is accepted practice.
         (1) Where a coordinated signal system exists or is to be implemented, optimization for future conditions must include all coordinated signals.
         (2) Optimized cycle lengths must not create queuing that exceeds available storage lengths unless an accompanying proposal is presented to lengthen the storage length.
      iii) Pedestrian Clearance Times:
         (1) Minimum phase lengths for future operational analysis shall allow for adequate pedestrian crossing time per MUTCD/ITE standards.
         (2) Left Turn Phasing:
            a) Minimum phase lengths for future operational analysis shall allow for a minimum of 15 seconds for protected only left turns.
            b) Minimum phase lengths for future operational analysis shall allow for a minimum of 10 seconds for protected/permitted left turns.
            c) Lead/lag optimization shall only be allowed for coordinated systems at intersections with flashing yellow arrow (FYA) or protected only left turn phasing.
      iv) Existing Condition Peak Hour Factors (PHF):
         (1) Signalized intersections:
            a) Existing PHF's by approach, or
            b) Utilize the peak 15 minute period for the entire intersection and multiple those volumes by 4.
         (2) Unsignalized intersections:
            a) Approach PHF's.
      v) Queuing:

(1) Queuing analysis may be required in areas of known queue constraints.
(2) Queue lengths shall be calculated at the 95th percentile.
(3) All impacted intersections shall be analyzed.

c) Access Management Standards:
   i) City standards are summarized in EDDS Section 3-201..
   ii) On State Highways, the minimum spacing is 250 feet or as shown in Table 3, whichever is greater.

8) Identify Safety Related Constraints:
   a) Any road condition whether existing or created by a development which jeopardizes the safety of road users including pedestrians and bicyclists.
   b) Warranted left and/or right turn lanes.
   c) Sight distance deficiencies.
   d) Collision History:
      i) Identify all collisions within past 3 calendar years.
      ii) Safety Inadequacies:
         (1) Collision rate of more than 1.0 collisions per million entering vehicles at an intersection.
         (2) Collision rate of more than 10.0 collisions per million entering vehicles on a roadway segment.

Mitigation Measure Evaluation:

1) Issues to be Considered:
    a) Design vehicle Requirements.
    b) New Facilities (all modes).
    c) Geometric Modifications.
    d) Traffic Control Modifications.
    e) Timing of Implementation with Respect to Phases of Development.
    f) Sight Distance Requirements.
        i) When required by the City, sight distance analysis per City Engineering Design & Development Standards (EDDS) shall be performed.
2) On Site Improvements:
    a) Improvements to streets abutting the development shall be in accordance with City ordinances and design standards.
3) Off Site Improvements:
    a) All improvements shall be in accordance with City ordinances and design standards.
    b) If a development project is assessed for a portion of a Local Improvement District that constructs a project that the traffic mitigation fees are based on, the payment of the fees shall be credited toward the development's mitigation fees.
4) Local Streets & Collectors:
    a) The use of traffic control devices to reduce impacts on residential streets is encouraged within City EDDS 3-525.
    b) Traffic calming devices should be negotiated with City staff with the goal of reducing neighborhood infiltration of development generated spillover traffic.
    c) City policy does not allow installation of new speed humps however allows for speed tables, traffic circles, curb bulb outs, etc..
5) New or Modified Traffic Signals:
    a) Signals proposed as mitigation shall meet at least one MUTCD warrant for signalization in the applicable horizon year.
    b) Left turn phasing shall be provided for new or modified signals at all locations where left turn lanes are present or warranted.
    c) Left run phasing shall be via flashing yellow arrow (FYA) displays unless for purposes of safety, protected only left turn phasing is required.
6) Turn Lanes:
    a) Left Turn Lanes:
        i) Warrants shall be per ASHTO 9-75 or the Harmelink source graphs.

ii) WSDOT Design Manual Figure 910-12 shall be used for storage length calculations.
iii) Generally, all signalized approaches should have left turn lanes where left turns are permitted on two-way streets.

b) Right Turn Lanes:
i) WSDOT Design Manual Figure 910-12 should be used for right turn lanes at unsignalized intersections, ignoring the note exempting multi-lane approaches.
ii) Guidelines for Right Turn Treatments at Signalized Intersections published within the February 1995 ITE Journal should be used for right turn lane warrants at signalized intersections.

7) Internal (On Site) Transportation System:
a) All systems shall be in accordance with City ordinances and design standards.
b) Consideration should be given to:
i) Design Vehicle Requirements:
(1) Turning radii.
(2) Vertical clearances.
ii) Facility Requirements (all modes)
iii) Traffic Control Requirements:
(1) Signing.
(2) Striping.
iv) Driveway Design:
(1) Width.
(2) Throat length.
v) Parking Requirements.
vi) Special Features.

Appendices:

1) Maps not contained in the body of the report.
2) Count data used for analysis.
3) Level Of Service (LOS) calculations:
   a) Detailed summary sheet from HCS signalized is ok.
   b) Software output must explicitly state all input and phase lengths used in the analysis.
4) Warrant worksheets for signals, all-way stops, protected turn phasing, right and left turn lanes, intersection sight distance, etc.
5) Signal progression analysis.
   a) All input and output.

Concurrency:

1) The department shall make a concurrency determination for each development application.
2) The determination may change based upon revisions in the application.
3) Any change in the development after approval will be resubmitted to the director, and the development will be re-evaluated for concurrency purposes.
4) Concurrency shall expire 6-year after the date of the concurrency determination, or, in the case of approved residential subdivisions, when the approval expires or when the application is withdrawn or allowed to lapse.
5) If concurrency expires prior to building permit issuance, the director shall at the request of the developer consider evidence that conditions have not significantly changed and make a new concurrency determination.

Reference Document Recommendations (Not all inclusive and in no particular order):

- ITE Trip Generation Manual
- ITE Trip Generation Handbook
- City of Marysville Engineering Design and Development Standards (EDDS)
- City of Marysville Municipal Code
- WSDOT Standard Specifications for Road, Bridge and Municipal Construction 2012
- WSDOT Design Manual
- WSDOT Standard Plans
- MUTCD as adopted by State of Washington
- ITE Journal
- AASHTO “Green Book”
- City of Marysville Comprehensive Plan and Sub-Area Plans

- Snohomish County EDDS Chapter 30.66B – Concurrency & Roadside Impact Mitigation
- Highway Capacity Manual