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Appendix B

Memorandum – SR 99 Lynnwood and Unincorporated Snohomish County Pre-Design Study

Methods and Assumptions

December 17, 2025

TO: **April Delchamps Planning Manager, WSDOT Management of Mobility**

FROM: **Jeanne Acutanza, Dillon Zang, WSP USA**

CC: **Gregory Mallon, Riya Debnath, Catherine Schmidt, WSP USA**

SUBJECT: **SR 99 Lynnwood and Unincorporated Snohomish County Pre-Design Study MP 45.7 to 52.3**

Purpose

This memorandum outlines multi-modal methods and assumptions as the basis for transportation and planning analysis of complete streets improvements considered in the SR 99 Lynnwood and Unincorporated Snohomish County Pre-Design Study. The methods described herein may be applied to the evaluation and screening of complete streets concepts, addressing both current and future needs of the study corridor. In addition to transportation modal analysis, it defines the environmental, land use and socio-demographic context priorities within which concepts can be assessed. Additionally, this memo confirms coordination between WSDOT and their agency partners, aiming to gain concurrence before conducting analysis.

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Acronyms and Abbreviations

Acronym / Abbreviation	Definition
AADT	Average Annual Daily Traffic
ACS	American Community Survey
ADA	Americans with Disabilities Act
APC	Automated Passenger Count
BAT	Business Access and Transit lanes
BLTS	Bicycle Level of Traffic Stress
BRT	Bus Rapid Transit
GIS	Geographic Information System
GPS	Global Positioning System
GTFS	General Transit Feed Specification
LOS	Level of Service
Mph	Miles Per Hour
MUGA	Municipal Urban Growth Area
OSM	OpenStreet Map
PLTS	Pedestrian Level of Traffic Stress
PSRC	Puget Sound Regional Council
PTI	Planning Transportation Index
R	A programming language for statistical computing and data visualization.
RCW	Revised Code of Washington
RDI	Route Directness Index
TRB	Transportation Research Board
TWG	Technical Working Group
USDOT	United States Department of Transportation
WSDOT	Washington State Department of Transportation
Crash Types	**Definition**
K	Fatality
A	Suspected Serious Injury (Also known as SI)
B	Suspected Minor Injury
C	Possible Minor Injury

Acronym / Abbreviation	Definition
O	No Injury; Property Damage Only
KABCO	Fatalities, Serious Injuries, Minor Injuries or No Injuries (Or All Crashes)
KABC	Fatalities, Serious Injuries and Minor Injuries
KSI (KA)	Serious Injuries and Fatalities

1 BACKGROUND

The State Route (SR) 99 Lynnwood and unincorporated Snohomish County Pre-Design Study is intended to identify a long-term vision and near-term, forward-compatible investments that enhance the safety and mobility for all users of the SR 99 corridor. The study seeks to improve mobility for those walking, biking and accessing transit along this Swift Bus Rapid Transit (BRT) corridor by applying complete streets strategies that can eventually be operationalized alongside maintenance investments and corridor investments. In 2022, the Washington State Legislature introduced a Complete Streets requirement (Revised Code of Washington, RCW 47.04.035), mandating Washington State Department of Transportation (WSDOT) to incorporate complete streets principles in state projects with budgets of $1,000,000 or more. This directive ensures that facilities provide access for all users, including pedestrians, bicyclists and public transportation users, while integrating state routes into the local network. By enhancing safety and mobility needs, the study aims to develop improvement options that provide safe and convenient connections for people walking, biking, rolling and accessing transit. These improvements align with the safety goals outlined in WSDOT's Strategic Highway Safety Plan (2024) and Active Transportation Programs Design Guide (February 2024).

This memo describes methods and assumptions that will be used to analyze the existing and future transportation contexts along the study corridor to support the project purpose and need aligned with project goals. The full purpose and need statement is provided in Appendix A, with the purpose statement and summarized need statements below.

Project Limits

In Washington, SR 99 is an access-managed, principal arterial and extends 49 miles from Fife in Pierce County to Everett in Snohomish County, passing through several incorporated cities including Lynnwood and Everett in Snohomish County. SR 99 was originally a section of the U.S. Route 99 (US 99) and was the state's primary north–south highway before the construction of Interstate 5 (I-5). US 99 was ultimately replaced by the Tacoma–Everett section of I-5, which opened in stages between 1965 and 1969. US 99 was decertified in 1969, and SR 99 was created and retained under state control.

The study area extends on SR 99 from Airport Road in unincorporated Snohomish County to 212th Street Southwest in the city of Lynnwood (Lynnwood). The corridor lies largely within unincorporated Snohomish County and Lynnwood with a small portion in Edmonds. The corridor is being analyzed in 14 segments as shown in Figure 1. The SR 99 corridor experiences numerous challenges

, particularly for pedestrians and bicyclists, including those accessing transit. SR 99 has long stretches without signal-controlled crossings. It lacks sidewalks in some segments, and dedicated pathways for biking, making it difficult for people walking, biking, rolling and accessing transit to navigate the area. There are many locations that are not fully ADA compliant, making travel challenging for those with disabilities. The goal of this study is to address these deficiencies and identify complete streets improvements that enhance mobility and safety for all users, ensuring that future developments are integrated with ongoing maintenance, safety and multimodal capacity investments. The study will provide a comprehensive evaluation of opportunities to improve access to transit, promote active modes of transportation, and align with long-term regional transportation plans.

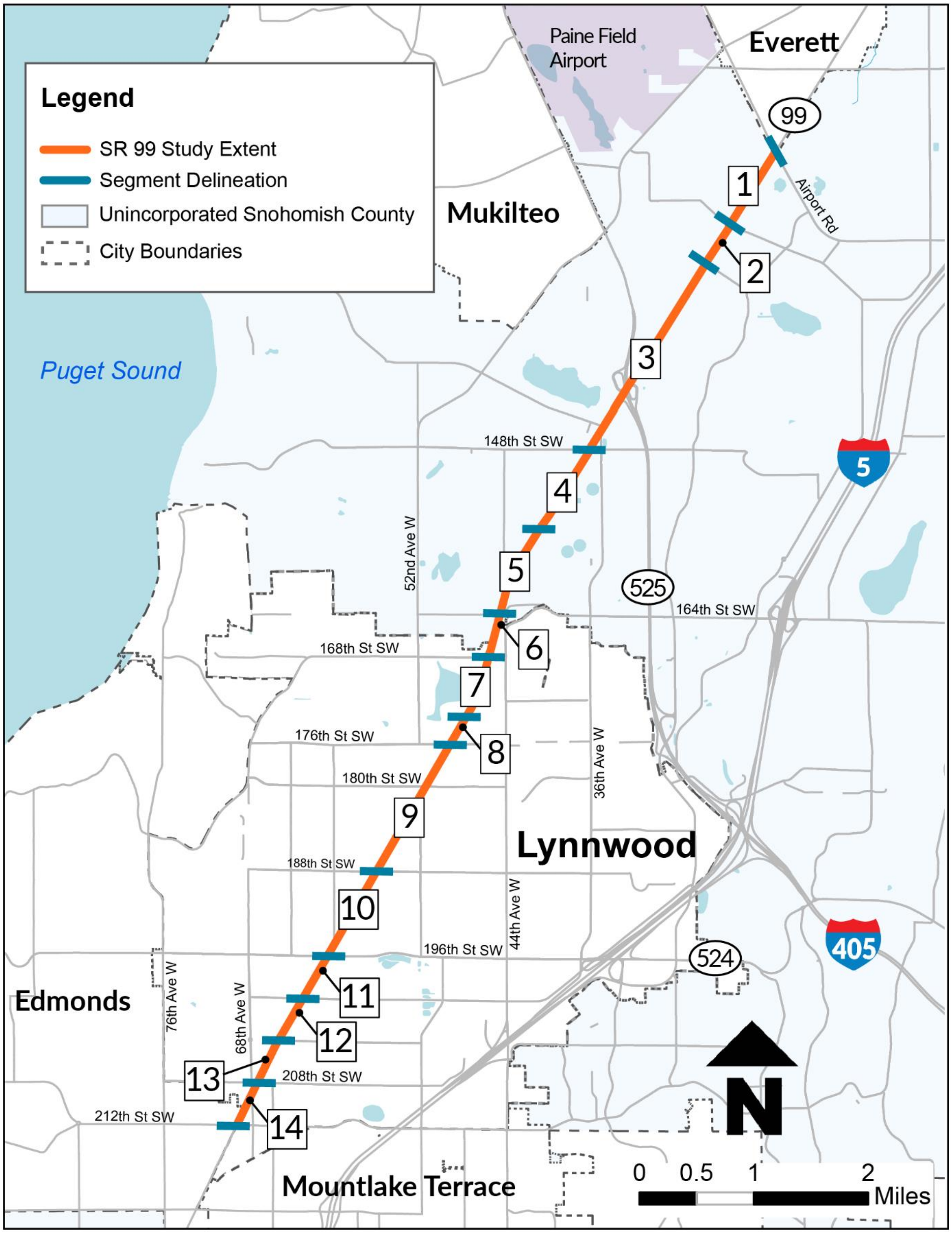

Figure 1. SR 99 Study Extent and Corridor Segmentation

1.1 Purpose and Need

The purpose and need of the SR 99 Lynnwood and Unincorporated Snohomish County Pre-Design Study is fully defined in Appendix A Purpose and Need.

With the focus of this study on complete streets, the methods and assumptions will focus less on operational analysis for vehicles and vehicle capacity along the corridor and more on safety and mobility for people walking, biking and rolling, and the reliability of transit as a mode of access to opportunities for lower-income, and historically underrepresented communities. This memo further describes methods and assumptions to address these emphasis areas.

Methods are described herein; however, not all measures will be used.

2 AGENCY PARTNERS

Agency partners will be critical to implement investments into the future. Their concurrence on these methods is important to the overall success of this process. A Technical Working Group (TWG) has been assembled that includes technical staff from partner agencies. These methods and assumptions have been reviewed in early coordination meetings. Planning and transportation staff from Tribal partners from the Muckleshoot, Samish, Sauk-Suiattle, Snoqualmie, Stillaguamish, Tulalip and Yakama Tribes have also been invited to attend TWG meetings.

Table 1. Technical Working Group

Agency/Organization	First Name	Last Name
City of Edmonds	Rob	English
City of Edmonds	Bertrand	Hauss
City of Everett	Daniel	Enrico
City of Everett	Corey	Hert
City of Everett	Yorik	Stevens-Wadja
City of Everett	Klayton	Leingang
City of Everett	Robert	McFarlane
City of Lynnwood	Karl	Almgren
City of Lynnwood	Maisha	Mahmud
City of Lynnwood	David	Kleitsch
City of Lynnwood	Paul	Coffelt
City of Lynnwood	Catherine	Kato
City of Lynnwood	David	Mach
City of Lynnwood	Ben	Wolters
City of Mukilteo	Gael	Fisk
City of Mukilteo	Matthew	Nienhuis
Community Transit	Kathryn	Boris
Community Transit	Britton	Kavanaugh
Community Transit	Robert	Rich
Community Transit	Rashid	Dolor
Community Transit	Kevin	Futhey
Community Transit	Shawn	Nakano
Community Transit	Chris	Simmons
Community Transit	Robert	McFarlane
PSRC	Jennifer	Barnes

Table 1. Technical Working Group		
Agency/Organization	**First Name**	**Last Name**
Snohomish County	Stephen	Phillips
Snohomish County	Nathan	Howard
Snohomish County	Max	Phan
Snohomish County	Mike	McCrary
Snohomish County	Kelly	Snyder
Snohomish County	Mohammad	Uddin
Sound Transit	John	Evans
Sound Transit	Betsey	McLaughlin
Sound Transit	Miranda	Redinger
Sound Transit	Eric	Widstrand

3 MEASURING QUALITY OF SERVICE

3.1 Pedestrians

Future improvements along the SR 99 corridor in Lynnwood and unincorporated Snohomish County aim to increase connectivity, enhance safety and promote sustainable, active transportation choices for those walking, biking or taking transit along the corridor. To evaluate the effectiveness of proposed concepts, this assessment uses a set of key performance indicators to measure pedestrian accessibility and facility adequacy. These indicators were developed in alignment with the WSDOT Design Manual Chapters 1510 (Pedestrian Facilities), 1300 (Intersection Control Type) and 1515 (Shared Use Path Design).

The following criteria for pedestrian-focused design concepts along SR 99 establish benchmarks to assess how well proposed improvements enhance safety, connectivity and accessibility for all users.

3.1.1 Pedestrian Level of Traffic Stress (PLTS)

Pedestrian Level of Traffic Stress (PLTS) quantifies the safety and comfort levels experienced by pedestrians based on roadway characteristics. Lower PLTS scores represent more comfortable, more pedestrian-friendly conditions, while higher scores indicate areas less comfortable for pedestrians and requiring improvement.

Measurement Method

Pedestrian Level of Traffic Stress (PLTS) will be assessed using the WSDOT PLTS matrix from WSDOT Design Manual Chapter 1510, which integrates factors such as number of lanes, average annual daily travel (AADT), speed limit and separation of sidewalks from vehicular traffic.

The PLTS of a shared-use path will be assessed by confirming it meets all the requirements of WSDOT's Design Manual (Chapter 1515). If a shared-use path meets all criteria, it meets the requirements of a PLTS 2 or better facility for pedestrians.

SR 99 in the study area currently rates PLTS 4. WSDOT targets PLTS of 1 or 2 on state facilities subject to the Complete Streets requirement.

Data Used

- Recent and future projected traffic volumes, including Average Annual Daily Traffic (AADT) from local agencies and WSDOT
- Posted speed limits from WSDOT Geoportal – for the SR 99 corridor all segments have a current posted speed of 45 mph, except for the segment between 212th Street Southwest and 208th Street Southwest which is posted as 40 mph
- Sidewalk widths, conditions and buffers from virtual field surveys on Google Earth

3.1.2 Route Directness Index (RDI)

Route Directness Index (RDI) measures the ratio of actual walking distances to the straight-line distance between destinations, highlighting inefficiencies caused by barriers or limited signal-controlled crossing opportunities.

Measurement Method

A lower RDI indicates more direct pedestrian routes, while values exceeding the threshold reflect detours that discourage walking. Route Directness Index (RDI) will be calculated using Geographic Information System (GIS) tools to compare pedestrian travel distances with straight-line (as the crow flies) distances.

WSDOT's Active Transportation Plan has set an RDI of 2.0 or lower as acceptable. Higher values significantly increase travel time and effort. Lack of controlled crossings, barriers and detours will be identified and evaluated to determine the effectiveness of concepts in improving route directness. Given the limited number and long spacing between signal-controlled pedestrian crossings along the corridor, the analysis will also assess where additional signal-controlled crossings may be needed to enhance safety, accessibility and connectivity. Multimodal linkages, such as shared-use paths and connections to transit stops, will also be assessed to reduce out-of-direction travel. A secondary consideration may be the quality of the proposed route (considering conflicts, volumes, etc.).

Data Used

- Existing pedestrian pathways and barriers from WSDOT Geoportal and Google Earth/Maps
- Crosswalk locations and driveway densities from WSDOT Geoportal
- Driveway exposure (i.e., width and frequency of driveways) from Google Earth/Maps to assess pedestrian crossing distances and potential conflicts
- Key destinations such as schools, transit stops and commercial centers from WSDOT Geoportal
- Pedestrian and bicycle counts may be used to prioritize pathways, subject to availability from Lynnwood and Snohomish County traffic data
- Automated Passenger Count (APC) or boarding/alighting data for transit stations and stops from Community Transit

3.1.3 Sidewalk Coverage and Americans with Disabilities Act (ADA) Accommodation

Sidewalk coverage evaluates the continuity, connectivity and adequacy of pedestrian pathways along SR 99, ensuring safe and accessible routes for all users. The Americans with Disabilities Act (ADA) accommodation focuses on infrastructure elements that provide equitable and efficient mobility for individuals with disabilities, such as curb ramps, tactile strips and unobstructed pathways.

Measurement Method

Sidewalk coverage will be assessed against WSDOT Design Manual Chapter 1510 standards, which define minimum sidewalk widths and buffer requirements. The evaluation will emphasize concepts that eliminate sidewalk gaps, ensure continuity and meet PLTS standard 2 or better. WSDOT, Lynnwood and Snohomish County ADA Transition Plans will guide the identification of existing deficiencies and priorities. WSDOT recommends a minimum sidewalk width of 5 feet, but providing wider sidewalks is encouraged. Wider sidewalks are desirable on major arterials, in central business districts, and along parks, schools and other major pedestrian generators. For the urban core, the suggested sidewalk width is 10 feet, for other urban areas it is 8 feet and for suburban it is 6 feet.

Data Used

- Sidewalk width, conditions and buffers from virtual field surveys and WSDOT Geoportal
- ADA features from WSDOT, Lynnwood and Snohomish County ADA Transition Plans
- Existing sidewalk networks, gaps and barriers from WSDOT Geoportal and Google Earth/Maps
- WSDOT 2019-2023 crash data to identify locations that have experienced pedestrian crashes.
- Planned developments along SR 99 from Snohomish County Buildable Lands Report and local plans that could influence the pedestrian realm in the future.

3.2 Bicyclists

Future improvements along the SR 99 corridor in Lynnwood and unincorporated Snohomish County aim to enhance safety, connectivity and accessibility for cyclists of all skill levels. To evaluate proposed design concepts, this assessment uses key performance indicators developed in alignment with WSDOT Design Manual Chapter 1520 (Bicycle Facilities) and Chapter 1515 (Shared-Use Path Design).

The following list of criteria for bicyclist-focused design concepts along SR 99 establish benchmarks to assess how well proposed improvements could enhance safety, connectivity and accessibility for cyclists.

3.2.1 Bicycle Level of Traffic Stress (BLTS)

Bicycle Level of Traffic Stress (BLTS) quantifies the comfort and safety levels experienced by bicyclists based on roadway characteristics such as traffic speeds, vehicle volumes and the degree of separation between cyclists and vehicular traffic. Lower BLTS scores indicate safer and more comfortable cycling conditions for users, particularly those with less experience.

Measurement Method

Bicycle Level of Traffic Stress (BLTS) will be assessed using the WSDOT BLTS matrix from WSDOT Design Manual Chapter 1510, which integrates factors such as number of lanes, AADT, speed limit and separation from vehicular traffic.

The BLTS of a shared-use path will be assessed by confirming it meets all the requirements of WSDOT's Design Manual (Chapter 1515). If a shared-use path meets all the criteria it meets the requirements of a BLTS 2 or better facility for bicyclists.

SR 99 in the study area currently rates BLTS 4. WSDOT targets BLTS of 1 or 2 on state facilities subject to the Complete Streets requirement.

Data Used

- Posted speed limits (WSDOT Geoportal)
- Vehicle volumes, including AADT and turning movement data (WSDOT and local agencies)
- Roadway lane widths, shoulder availability and buffers (virtual field surveys, GIS tools)

3.2.2 System Connectivity and Completeness

This metric evaluates how well proposed bicycle facilities create a continuous, integrated network that connects neighborhoods, regional bike routes, trails and major destinations along SR 99. The goal is to close existing gaps and improve overall usability for cyclists traveling within and across the corridor.

Measurement Method

System connectivity will be assessed using GIS-based network analysis to identify gaps, evaluate proximity to destinations and measure connections to multimodal facilities such as regional trails. The evaluation will prioritize concepts that provide seamless links to opportunities including Swift BRT stops, Link light rail stations, local agency administrative centers, libraries, hospitals and schools.

Data Used

- Regional bike network and trail maps (WSDOT Geoportal, Snohomish County maps)
- Existing network barriers and gaps (GIS tools, virtual field surveys)
- Key destination proximity (schools, hospitals, transit hubs and stations, employment centers, commercial centers) from local plans
- Development data along SR 99 (Snohomish County Buildable Lands Report)

3.3 Transit

Transit-focused design concepts for SR 99 will be evaluated for their ability to enhance reliability, efficiency and multimodal connectivity while addressing the needs of transit-dependent populations. The assessment will use key performance indicators aligned with WSDOT Design Manual Chapter 1730 (Transit Facilities), Community Transit's Service Metrics, and Sound Transit Service Standards and Performance Measures.

The following list of criteria for transit-focused design concepts along SR 99 establish benchmarks to evaluate how effectively proposed improvements address the corridor's transit reliability, schedule adherence, route efficiency and service frequency:

3.3.1 Transit Service Reliability

Transit service reliability measures the consistency of on-time service, a key indicator of operational efficiency and rider satisfaction. It evaluates how effectively concepts minimize delays under varying conditions, including reduced speeds caused by congestion or speed limit changes. Future access to the planned Link light rail station at Airport Road will be considered to identify gaps in service connections and potential improvements to transit linkages on the corridor.

Measurement Method

On-time performance will be evaluated based on the percentage of trips arriving within the acceptable range of published schedules, complemented by detailed analyses of actual arrival delays and service reliability. Metrics such as average arrival delay and variability statistics will be included to capture both punctuality and reliability. In addition, segment-level speed profiles will be derived by peak-hour period to highlight temporal variations in overall transit service performance.

WSDOT's guidelines for transit facilities and operational metrics, alongside Community Transit standards, will provide the framework for analysis. Business Access and Transit (BAT) lane effectiveness will be assessed through comparisons of on-time performance between segments with and without BAT lanes, focusing on differences between unincorporated Snohomish County and Lynnwood. The assessment will also review future connection opportunities to the planned Airport Road Link light rail station.

Proposed improvements to the corridor will also be evaluated on whether they add additional delay to transit. This analysis will focus on areas and types of improvements that may cause delay.

Data Used

- Route schedules and on-time performance records from Community Transit
- Real-Time General Transit Feed Specification (RT-GTFS) data
- Traffic volumes, including peak direction volumes sourced from WSDOT Geoportal and local transportation agencies.
- BAT lane configuration, management and operational conditions from WSDOT and local agencies responsible for transit priority policies.
- Field observations of transit operations along SR 99.
- Automatic Passenger Counter (APC) ridership data, including boarding and alighting counts and time logs from Community Transit operational reports.
- Transit stop delay data for all transit modes, including Swift BRT and Link light rail services (Sound Transit databases).
- Local intersection signal timing as well as transit priority to assess transit delay factors.

3.3.2 Quality of Transit Environment

This metric evaluates the physical and functional attributes of transit stops and stations along SR 99, focusing on features that enhance safety, comfort and accessibility for all users. High-quality transit environments integrate transit vehicles with pedestrian and cyclist needs, minimizing modal conflicts.

Measurement Method

Transit stops will be evaluated based on their amenities (e.g., standing area, shelters, lighting, signage, accessibility and ADA accommodations) and their ability to reduce conflicts with pedestrians and cyclists through controlled crossings, boarding islands and bicycle lanes. Alternatives with well-integrated multimodal features and seamless transitions between modes will score higher, particularly in areas with high pedestrian and cyclist activity.

Data Used

- Transit stop data, including locations, amenities and accessibility features (GIS platforms such as ArcGIS Online, WSDOT Geoportal).
- Pedestrian and cyclist activity levels at transit stops (GIS-based multimodal activity mapping).
- Crash data involving transit users at multimodal intersections (WSDOT, PSRC, 2019–2023).

- Operational transit data, including stop-level boarding and alighting counts (APC data).

3.4 Safety

The safety analysis for SR 99 will align with the goals of the Washington State Highway Safety Plan and the Target Zero initiative, to eliminate fatalities and serious injuries by 2030. Safety measures will be evaluated based on two aspects: nominal safety, which assesses how well the study aligns with design standards, and substantive safety, which reflects the actual performance of an area in terms of crash history and risk reduction. The evaluation of proposed design concepts will prioritize improvements that reduce risks for people walking, biking and rolling (nominal safety) and address high-crash locations (substantive safety). Proven safety countermeasures will be applied where evidence supports their effectiveness. The analysis will assess corridor characteristics that influence risk. Examples include a 45-mph posted speed, frequent driveways, long crossing distances, wide intersections, long spacing between signalized crossings and channelized right turns without signal protection. Frequent transit along SR 99 increases pedestrian and bicycle activity near stops, so the analysis will review access to bus stops and the need for protected crossings and speed management.

3.4.1 Conflict Points

Drivers make more mistakes and are more likely to have collisions when they are presented with complex driving situations created by numerous conflicts including with bicycles and pedestrian pathways. Reducing and separating conflicts can help enhance safety. Conflicts are simply defined as merging, diverging and crossing with vehicles and additionally as conflicts with bicycles and/or pedestrians crossing vehicle pathways

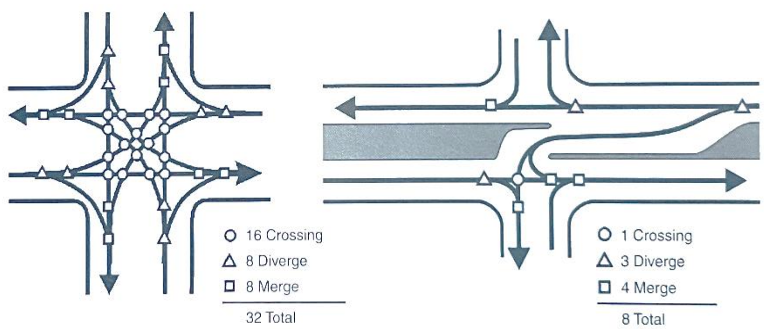

Figure 2. Vehicular Conflict Points at a Typical Four-Way Intersection v. a Directional Median Opening

Measurement Method

Figure 2 from the TRB Access Management Manual shows that a traditional intersection can have as many as thirty-two (32) conflict points – sixteen (16) crossing, eight (8) diverging and eight (8) merging, with median control for left turns, the number of conflict points can be reduced to 8 (eight). Crossing conflicts are anticipated to result in more severe crashes with higher numbers of fatalities and serious injuries. The median alternative reduces the number of crossing conflicts from sixteen (16) to one (1).

Figure 3 compares a standard four-way intersection with the same location redesigned with a raised median and right-in right-out turns. The symbols mark potential conflict points where a person walking or biking could meet a vehicle path. In the standard layout there are 24 pedestrian-vehicle conflict points and 24 bicycle-vehicle conflict points, 48 in total. With the median treatment those counts drop to 9 for pedestrians and 5 for people biking, 14 in total. Fewer conflict points and shorter crossings are why medians and turn restrictions are common safety tools on high-volume corridors like SR 99. Conflict points will be counted at each intersection to quantify existing safety and evaluate potential improvements. Concepts that reduce the number of conflict points, especially conflicts between vehicles and people walking, biking and rolling, will be prioritized for evaluation.

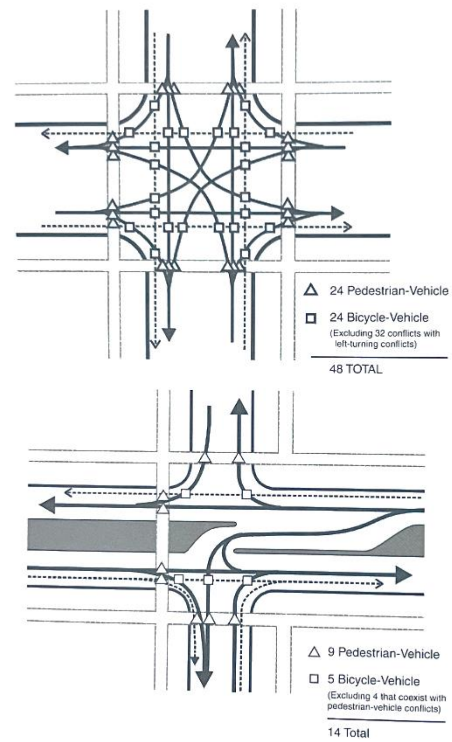

Figure 3. Bicycle and Pedestrian Conflict Points

Data Used

- Intersection conflict diagrams
- Pedestrian and cyclist current and future pathways and anticipated use
- Vehicle conflicts with other vehicles and pedestrians and bicyclists

3.4.2 Access Management

Access management is the systematic control of the location, spacing, design and operation of driveways, median openings, interchanges and street connections. Access management is intended to provide vehicular access to land development in an organized manner to enhance safety and the efficiency of the roadway system. Along SR 99 in the study area, SR 99 is designated as an Access Classification 4 south of 164th Street Southwest, and Access Classification 3 between 164th Street Southwest and 35th Avenue West and north of Lincoln Way past Airport Road. Between 35th Avenue West and Lincoln Way, SR 99 is designated as a limited access facility with a higher classification of access management.

Measurement Method

For each access classification, WSDOT has defined preferred driveway/access spacing in the WSDOT Design Manual Chapter 540 Table 1 and summarized below:

For Class 3 the desired spacing of driveways is 330’ and allows one access connection only to contiguous parcels under the same ownership. Where parcels can be connected with driveways or internal roadways such as residential subdivisions, combined driveway access connections are preferred. Non-public access connections are allowed with justification. For Class 4 the desired spacing of driveways is 250’ and allows one access connection only to contiguous parcels under the same ownership, except with justification. Access is also conditional to account for grandfathered access. Access will be measured from driveway edge to driveway edge as shown in Figure 4.

Data Used

- Driveway density and crosswalk data collected through Open StreetMap (OSM) and WSDOT Geoportal
- Access frequency measured as shown in Figure 4 below for segments on each side of SR 99
- Additional driveway information including crash data noting locations where poor access control may contribute to crashes.
- Crash types and locations in contrast to driveways/medians/intersections

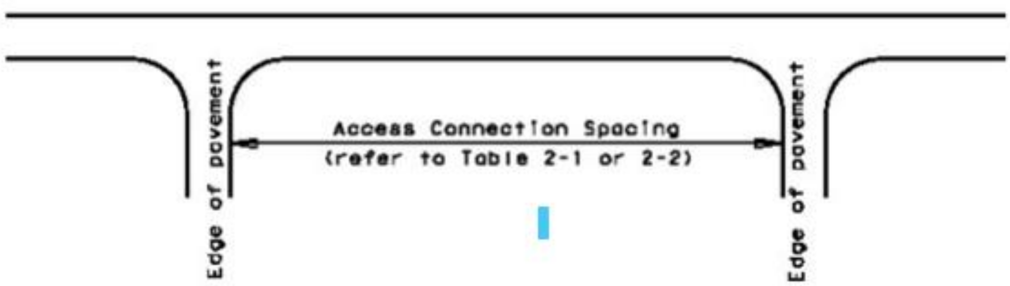

Figure 4. Access Connection Spacing Diagram (Source: TxDot Manuals)

3.4.3 Crash Rates and Severity

This criterion evaluates the rate and severity of crashes, focusing on fatalities and serious injuries (KSI) for all users, with an emphasis on people walking, biking and rolling.

Measurement Method

Crash severity will be measured using WSDOT categories KABC and KSI. KABC are crashes with a fatality or injury (K, A, B, or C[1]) and excludes property-damage-only crashes (O). KSI means a crash with a death or a serious injury. Crashes will be geospatially aggregated within 300-foot buffer zones using GIS tools. Custom R program language scripts will cluster crash locations within a 75-foot radius to identify high-crash zones. Fatal and serious injury crash rates per mile will be calculated to compare safety performance across study segments.

Data Used

- WSDOT crash records (2016–2023 for trends; 2019-2023 for existing conditions) for fatal and serious injury and fatal crashes involving all roadway users.
- Geospatial clustering of crashes using R programming.

[1] K – Fatality; A – Suspected Serious Injury (Also known as SI); B – Suspected Minor Injury; C – Possible Minor Injury

- Study segment lengths to determine fatal and serious injury crashes per mile.
- Crosswalk and median data from WSDOT and OSM to identify locations contributing to crash severity.

3.4.4 Collision Types and Contributing Factors

This criterion analyzes the types of collisions and contributing factors, such as driver violations, speeding and roadway conditions, to identify trends and patterns.

Measurement Method

Crashes will be categorized by type (e.g., vehicle-vehicle, vehicle-pedestrian, vehicle-bicycle) and analyzed for contributing factors. Locations with recurring crash types will be identified as priorities for improvements. Concepts will be evaluated on their ability to address high-frequency crash contributors (e.g., driveway density, crossing gaps).

Data Used

- WSDOT crash factor and type analysis (2019–2023).
- Driveway density and crosswalk data collected through OSM and WSDOT Geoportal.
- Corridor-specific safety conditions, including intersection design and midblock crossing data.

3.5 Arterial Reliability

Arterial reliability along SR 99 is essential for maintaining efficient traffic flow and safety. This involves evaluating travel time reliability and segment operations or Level of Service (LOS), as guided by the WSDOT Design Manual standards.

3.5.1 Travel Time Reliability

This metric evaluates the consistency of travel times along SR 99. High reliability indicates that users can accurately predict travel times, aiding in travel planning. WSDOT highlights the significance of travel time reliability in its practical design approach, advocating for its use as a performance metric to address specific conditions and operations.

Measurement Method

Using travel time data collected during peak and off-peak periods, variability will be analyzed to identify bottlenecks and congestion patterns. Reliability will be assessed using the Planning Time Index (PTI), which compares the 95th percentile travel time to the free-flow travel time. A PTI of 1.5 or lower is desirable, indicating relatively predictable travel durations.

Data Used

Travel time data will be sourced from tools such as INRIX, WSDOT's Traffic Geoportal and WSDOT Traveler Information API: Travel Times or GPS-based datasets from transportation agencies. Peak and off-peak travel time patterns will be analyzed to calculate the PTI and identify segments with high variability.

3.5.2 Segment Level of Service (LOS)

Level of Service (LOS) is a qualitative measure that evaluates segment performance based on traffic volumes and safety. It ranges from 'A' (free flow) to 'F' (overcapacity). Assessing LOS along segments of SR 99 helps identify areas where travel time and reliability may be impacted by traffic volumes and new signal control.

Measurement Method

Link or segment level of service (LOS) near corridor intersections will be evaluated based on forecasted directional Link volumes, assumed number of lanes and intersection spacing. Where these elements change, LOS will be reported for that condition for comparison using the Florida Quality of Service Tables (2002). Tables in this 2002 version of the Florida Quality of Service provide a convenient comparison of arterial segment operations in a look up table with different intersection spacings, lanes, speeds and volumes. It can provide an easy comparison. SeeA.A.1.1.1.1Attachment A.

Data Used

Existing condition will be based on local agency and WSDOT traffic counts from 2023 Future conditions will be based on future segment level peak hour directional volume projections from the Snohomish County Model (2019 and 2044) and PSRC SoundCast Model (2018 and 2050) which assume extension of Link light rail to Everett by 2035. In the Puget Sound Regional Transportation Plan, 2022-2050, Appendix D2 Regional Capacity Project List the Everett Link Extension is Project ID 2519.

3.6 Freight Movement and Access

According to the 2019 Freight Master Plan, the SR 99 study corridor is designated as a T3 freight route corridor, handling between 300,000 and 4 million tons of freight annually. As a parallel route to I-5, SR 99 offers an alternative during times of congestion. Primarily, SR 99 facilitates freight accessing the many commercial businesses along the corridor.

Measurement Method

Freight access to parcels will be considered for commercial properties using driveway locations and access to parcels. Delivery difficulties will be considered if diversions are proposed for freight requiring intersection U-turns for freight or other circuitous travel.

Data Used

Average travel data and comparison of routings with different driveway configurations, medians and driveway closure/consolidation.

3.7 Equity

Equity is a foundational criterion in evaluating design concepts for SR 99, ensuring that proposed concepts address transportation inequities, serving the needs of historically underrepresented and overburdened communities including addressing environmental inequities. This evaluation functions as a pass/fail metric, where any concept advancing must demonstrate its ability to improve mobility and access for underserved populations while improving the environmental quality for those communities.

Demographic Assessment

Improvements to SR 99 will be assessed based on their alignment with the demographic needs of vulnerable populations along SR 99. Using 2024 American Community Survey (ACS) 5-Year Estimates, the evaluation will identify whether proposed improvements serve populations with high proportions of low-income households, limited English proficiency and households without vehicle access. Initially, the analysis considered the USDOT Justice40 Maps from CEJST (Climate and Environmental Justice Screening Tool) to identify historically disadvantaged communities. However, as CEJST is no longer available, the assessment has been adjusted to rely on alternative data sources. The demographic evaluation integrates the following dataset:

- Washington Environmental Health Disparities Map (state-level data).

Serving Overburdened Communities

This assessment will evaluate whether the proposed concept directs meaningful investments to improve conditions for overburdened communities. This includes:

- Ensuring improved transit access to increase reliability and frequency for transit-dependent and low-income riders.
- Enhancing safety for people walking, biking and rolling by reducing crash risks for pedestrians and bicyclists in areas heavily used by these populations.
- Addressing infrastructure gaps such as missing sidewalks, crosswalks and bicycle facilities in historically underserved areas.

3.8 Land Use

Land use considerations along the SR 99 corridor will serve as a pass/fail criterion, ensuring that proposed design concepts align with comprehensive plans and sub-area strategies to support planned growth and regional objectives. The Snohomish County Comprehensive Plan (2024), Imagine Lynnwood Comprehensive Plan (2024) and sub-area plans such as the Highway 99 Sub-Area Plan, South Lynnwood Plan and College District Plan all emphasize transforming SR 99 into a higher-density, multimodal corridor that supports housing, jobs and transit-oriented development.

Alignment with Regional Plans

Concepts will be evaluated for their ability to support the planned transition of SR 99 from an auto-oriented, low-density corridor to a more vibrant mixed-use hub. The corridor's redesignation to a Mixed-Use Corridor under the Snohomish County Comprehensive Plan highlights opportunities for mid-rise development near Swift BRT stops and the provisional Airport Road Light Rail Station. Similarly, the Highway 99 Sub-Area Plan identifies hubs at 176th Street Southwest and 196th Street Southwest as key nodes for mixed-use and transit-oriented projects, leveraging the proximity of new and existing transit services.

The Buildable Lands Report (2021) and Lynnwood's Metropolitan Urban Growth Areas (MUGA) expansion into SR 99 further highlight the redevelopment potential of underutilized parcels, with goals to create walkable, compact growth centers near transit hubs. The College District Plan also underscores the importance of integrating mixed-use housing and amenities near Edmonds College, while improving active transportation connections to the Swift Blue and Orange Lines.

Proposed alternatives will be assessed for their ability to:

- Align with designated growth strategies, such as Mixed-Use Corridor zoning, Countywide Growth Centers and MUGA expansions, supporting higher-density development and multimodal infrastructure.
- Facilitate transit-oriented development around hubs identified in the Highway 99 Sub-Area Plan and other local plans, enhancing connectivity and walkability in these areas.
- Support infrastructure that enables redevelopment of underutilized parcels, as identified in the Buildable Lands Report, while maintaining compatibility with surrounding land uses, such as Paine Field Airport's operational constraints.

ATTACHMENT A EXCERPTS 2002 FLORIDA QUALITY LEVEL OF SERVICE HANDBOOK

TABLE 4 - 7

GENERALIZED **PEAK HOUR DIRECTIONAL** VOLUMES FOR FLORIDA'S **URBANIZED AREAS***

UNINTERRUPTED FLOW HIGHWAYS

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	100	340	670	950	1,300
2	Divided	1,060	1,720	2,500	3,230	3,670
3	Divided	1,600	2,590	3,740	4,840	5,500

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	220	720	860	890
2	Divided	250	1,530	1,810	1,860	***
3	Divided	380	2,330	2,720	2,790	***
4	Divided	490	3,030	3,460	3,540	***

Class II (2.00 to 4.50 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	100	590	810	850
2	Divided	**	220	1,360	1,710	1,800
3	Divided	**	340	2,110	2,570	2,710
4	Divided	**	440	2,790	3,330	3,500

Class III (more than 4.5 signalized intersections per mile and not within primary city central business district of an urbanized area over 750,000)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	280	660	810
2	Divided	**	**	650	1,510	1,720
3	Divided	**	**	1,020	2,330	2,580
4	Divided	**	**	1,350	3,070	3,330

Class IV (more than 4.5 signalized intersections per mile and within primary city central business district of an urbanized area over 750,000)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	270	720	780
2	Divided	**	**	650	1,580	1,660
3	Divided	**	**	1,000	2,390	2,490
4	Divided	**	**	1,350	3,130	3,250

NON-STATE ROADWAYS

Major City/County Roadways

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	480	760	810
2	Divided	**	**	1,120	1,620	1,720
3	Divided	**	**	1,740	2,450	2,580

Other Signalized Roadways
(signalized intersection analysis)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	250	530	660
2	Divided	**	**	580	1,140	1,320

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

Interchange spacing ≥ 2 mi. apart

	Level of Service				
Lanes	A	B	C	D	E
2	1,270	2,110	2,940	3,580	3,980
3	1,970	3,260	4,550	5,530	6,150
4	2,660	4,410	6,150	7,480	8,320
5	3,360	5,560	7,760	9,440	10,480
6	4,050	6,710	9,360	11,390	12,650

Interchange spacing < 2 mi. apart

	Level of Service				
Lanes	A	B	C	D	E
2	1,130	1,840	2,660	3,440	3,910
3	1,780	2,890	4,180	5,410	6,150
4	2,340	3,940	5,700	7,380	8,380
5	3,080	4,990	7,220	9,340	10,620
6	3,730	6,040	8,740	11,310	12,850

BICYCLE MODE

(**Note**: Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	170	720	>720
50-84%	**	130	210	>210	***
85-100%	160	380	>380	***	***

PEDESTRIAN MODE

(**Note**: Level of service for the pedestrian mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not the number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	330	810
50-84%	**	**	**	520	990
85-100%	**	120	590	>590	***

BUS MODE (Scheduled Fixed Route)
(Buses per hour)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-84%	**	>5	≥4	≥3	≥2
85-100%	>6	>4	≥3	≥2	≥1

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED
(alter corresponding volumes by the indicated percent)

Lanes	Median	Left Turns Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE WAY FACILITIES
Increase corresponding volume 20%

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly directional volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. To convert to annual average daily traffic volumes, these volumes must be divided by appropriate D and K factors. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, Pedestrian LOS Model and Transit Capacity and Quality of Service Manual, respectively for the automobile/truck, bicycle, pedestrian and bus modes.
**Cannot be achieved using table input value defaults.
***Not applicable for that level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 – 8

GENERALIZED **PEAK HOUR DIRECTIONAL** VOLUMES FOR FLORIDA'S **AREAS TRANSITIONING INTO URBANIZED AREAS** OR **AREAS OVER 5,000 NOT IN URBANIZED AREAS***

UNINTERRUPTED FLOW HIGHWAYS

Level of Service

Lanes	Divided	A	B	C	D	E
1	Undivided	100	330	620	870	1,200
2	Divided	980	1,590	2,300	2,980	3,390
3	Divided	1,470	2,390	3,460	4,470	5,080

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

Level of Service

Lanes	Divided	A	B	C	D	E
1	Undivided	**	210	690	820	860
2	Divided	240	1,470	1,730	1,810	***
3	Divided	370	2,260	2,600	2,710	***

Class II (2.00 to 4.50 signalized intersections per mile)

Level of Service

Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	560	760	810
2	Divided	**	200	1,290	1,620	1,700
3	Divided	**	320	2,000	2,430	2,560

Class III (more than 4.5 signalized intersections per mile)

Level of Service

Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	260	620	770
2	Divided	**	**	620	1,440	1,630
3	Divided	**	**	970	2,220	2,450

NON-STATE ROADWAYS

Major City/County Roadways

Level of Service

Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	370	720	770
2	Divided	**	**	870	1,550	1,630
3	Divided	**	**	1,360	2,330	2,450

Other Signalized Roadways
(signalized intersection analysis)

Level of Service

Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	230	490	630
2	Divided	**	**	540	1,070	1,270

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

Level of Service

Lanes	A	B	C	D	E
2	1,290	2,130	2,890	3,420	3,800
3	2,000	3,290	4,460	5,280	5,870
4	2,700	4,450	6,030	7,140	7,940
5	3,400	5,600	7,610	9,010	10,010

BICYCLE MODE

(**Note:** Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
0-49%	**	100	170	720	>720
50-84%	**	130	210	>210	***
85-100%	170	380	>380	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometric at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

Level of Service

Sidewalk Coverage	A	B	C	D	E
0-49%	**	**	**	330	810
50-84%	**	**	**	520	990
85-100%	**	120	590	>590	***

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED

Lanes	Median	Left Turn Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Increase corresponding volume 20%.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 – 9

GENERALIZED **PEAK HOUR DIRECTIONAL** VOLUMES FOR FLORIDA'S **RURAL UNDEVELOPED AREAS AND CITIES** OR **DEVELOPED AREAS LESS THAN 5,000 POPULATION***

RURAL UNDEVELOPED AREAS

FREEWAYS

Lanes	A	B	C	D	E
			Level of Service		
2	1,220	2,020	2,740	3,240	3,600
3	1,890	3,110	4,230	5,000	5,560
4	2,560	4,210	5,720	6,770	7,520

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	A	B	C	D	E
				Level of Service		
1	Undivided	120	250	410	650	1,060
2	Divided	940	1,540	2,200	2,830	3,140
3	Divided	1,410	2,310	3,330	4,240	4,710

PASSING LANE ADJUSTMENTS
(alter corresponding two-lane LOS A-D volumes indicated percent)

Passing Lane Spacing	Adjustment Factors
5 mi.	+25%
10 mi.	+10%

ISOLATED SIGNALIZED INTERSECTIONS

Lanes	A	B	C	D	E
			Level of Service		
1	**	100	430	580	650
2	**	160	940	1,240	1,360
3	**	240	1,460	1,910	2,320

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 55 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by directional roadway lanes to determine maximum service volume.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
0-49%	**	**	**	**	340
50-84%	**	**	**	**	950
85-100%	**	**	210	>210	***

CITIES OR RURAL DEVELOPED AREAS LESS THAN 5000

FREEWAYS

Lanes	A	B	C	D	E
			Level of Service		
2	1,220	2,020	2,740	3,240	3,600
3	1,890	3,110	4,230	5,000	5,560
4	2,560	4,210	5,720	6,770	7,520

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	A	B	C	D	E
				Level of Service		
1	Undivided	120	350	600	820	1,120
2	Divided	950	1,540	2,230	2,890	3,280
3	Divided	1,430	2,310	3,350	4,330	4,920

INTERRUPTED FLOW ARTERIALS

Lanes	Divided	A	B	C	D	E
				Level of Service		
1	Undivided	**	120	590	740	800
2	Divided	**	290	1,360	1,570	1,660
3	Divided	**	450	2,100	2,360	2,500

NON-STATE SIGNALIZED ROADWAYS

(signalized intersection analysis)

Lanes	A	B	C	D	E
			Level of Service		
1	**	**	100	410	540

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 45 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
			Level of Service		
0-49%	**	**	150	370	>370
50-84%	**	110	180	930	>930
85-100%	150	210	>210	***	***

PEDESTRIAN MODE

(Note: Level of service for the pedestrian mode in this table is based on roadway geometric at 45 mph posted speed and traffic conditions, not number of pedestrian using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	A	B	C	D	E
			Level of Service		
0-49%	**	**	**	240	760
50-84%	**	**	**	430	960
85-100%	**	**	500	>500	***

02/22/02

Source: Florida Department of Transportation
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450

http://www11.myflorida.com/planning/systems/sm/los/default.htm

NON-FREEWAY AND SIGNALIZED INTERSECTION ANALYSES DIVIDED/UNDIVIDED ADJUSTMENTS

(alter corresponding volumes by the indicated percent)

Lanes	Median	Left Turn Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.