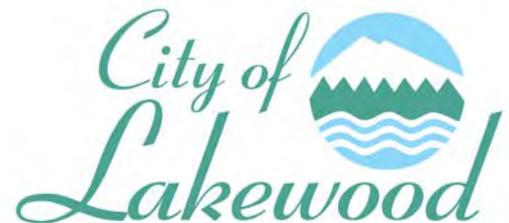


Fort Lewis and McChord AFB Growth Coordination Plan

INTERSTATE 5 TRANSPORTATION ALTERNATIVES ANALYSIS AND OPERATIONS MODEL

FROM MOUNTS ROAD TO SR 512

Prepared for:



Prepared by:



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Introduction

The City of Lakewood is preparing a Growth Coordination Plan that will identify and analyze community “gaps” that exist in the region in regards to accommodating anticipated growth at Fort Lewis and McChord Air Force Base (AFB). The I-5 Alternatives Analysis and Operations Model project is the first phase of this larger study effort. This initial phase primarily focuses on developing an operations model and identifying potential transportation improvements for I-5 and adjacent arterials. The operations model and alternatives analysis will include a number of recommendations to alleviate congestion and will provide Fort Lewis, McChord AFB and the region with technical numbers to support recommended transportation improvements to help address I-5 traffic impacts resulting from base growth.

The operations model and recommendations from this effort will compliment and be incorporated into the broader transportation element that will be prepared for the Growth Coordination Plan. The City of Lakewood and Washington State Department of Transportation (WSDOT) are partnering together on this study effort. Funding is primarily provided by the Office of Economic Adjustment (OEA) at the Department of Defense (DOD). This analysis represents the first phase of work necessary to inform the City of Lakewood, WSDOT, Pierce County, and other key agencies as to potential improvements that should be considered to address impacts from additional base growth. These improvements could potentially be incorporated into the Washington Transportation Plan (WTP), the Puget Sound Regional Council’s (PSRC’s) Regional Transportation Plan (Transportation 2040), and when funding is secured, in the regional transportation improvement program (TIP).

Purpose and Need

In 2005, the Department of the Army announced that the number of troops stationed at Fort Lewis would expand as part of the DOD new initiatives. It is projected that these initiatives will result in an additional 8,200 active duty personnel at Fort Lewis and nearly 2,000 new civilian positions by 2011. This anticipated growth exceeds the population and employment projections developed by local jurisdictions prior to this announcement. This additional growth will likely impact the interstate and local arterials in the vicinity of the base. In addition, an Environmental Impact Study is currently underway for Fort Lewis evaluating the potential impacts of additional growth in military personnel, dependants and support services as part of the Grow the Army Initiative. This increase in base personnel will likely impact an already congested corridor that serves as the primary highway corridor for the movement of goods and people travelling north and south on the west coast of North America.

To assess the potential impacts to I-5 and the adjacent local street system due to the base growth, the City of Lakewood along with WSDOT will develop an operations model for I-5 and the adjacent arterial intersections. The operations model will be used to conduct a transportation alternatives analysis focusing on developing long term transportation improvement alternatives for I-5 and the adjacent arterial intersections to support the DOD’s new growth initiatives. The alternatives will evaluate an integrated set of improvements to maintain safe, efficient and acceptable I-5 operations and address safety and current and future mobility deficiencies directly related to military growth. In addition to the long-term improvement alternatives, short-term strategies to address military demand will be developed and summarized for consideration by local agencies.

Growth Coordination Plan

The Growth Coordination Plan will provide a detailed analysis of issues and strategies specific to the challenges of supporting growth at Fort Lewis and McChord AFB. A Growth

Coordination Workshop was held April 9, 2009 and was attended by over 90 study area stakeholders. At the meeting, participants identified ten functional areas as elements that needed to be analyzed in detail as part of the overall planning effort.

The plan seeks to address such questions as:

1. *Where is the future growth going?*
2. *Do the communities like where future development is headed, and do they have the tools to shape more desirable growth patterns?*
3. *Are the communities doing what is necessary to accommodate the needs of the soldiers, airmen and their families?*

The objectives of the Growth Coordination Plan are to:

1. Identify and assess existing conditions
2. Determine future needs of an increased military population
3. Develop short term and long term priorities and potential funding sources to accommodate this growth
4. Develop planning, coordination and implementation strategies that help achieve the long term strategic goals of the stakeholders during this period of growth and change.
5. Maintain a central point of coordination for all major stakeholders who are impacted by the expansion of Fort Lewis.
6. Promote regular communication with all local and regional groups and committees that discuss military installation infrastructure and service issues and concerns.
7. Establish a clear set of action steps to local communities about managing future growth and demands for services.

To meet these objectives, the Growth Coordination Plan will assist in coordinating the planning efforts for all the participating agencies. This could result in the opportunity to leverage local, state and federal funds to provide the military with local services in an effective manner according to region-wide needs and possible special districts.

The Growth Coordination Plan is not intended to supersede existing procedures and policies governing the mandates of the different service providers, but to provide an assessment and coordinated action plan to address the needs of the area specifically related to growth at the bases. It is envisioned that the Growth Coordination Plan will be used to facilitate implementation of specific action steps at both the regional and local level and therefore may be adopted in a manner as deemed appropriate by each local government agency and service provider to meet their specific implementation needs.

Transportation Element

As mentioned, the I-5 Alternatives Analysis and Operations Model project is the first phase of a larger study effort. What remains to be studied is the future transportation needs outside the I-5 corridor, such as improvements along local arterials and streets, or other state highways. This second phase will build off the work being performed as part of the I-5 Alternatives Analysis and Operations Model, but will also include other regional facilities off the I-5 corridor. The results of both study phases will be included as part of the Transportation Element of the Growth Coordination Plan. Among the transportation issues the Transportation Element will address include improvements needed to support increased travel demand in the entire study area resulting from base growth, along with regional and local community growth. For example, on the east side of Fort Lewis, the Roy "Y" interchange at Highway 507 / Highway 7 experiences significant congestion following the PM release of military personnel. Infrastructure needs at this newly utilized access point and other gate access bottlenecks in the study area will be evaluated as part of the Transportation Element.

This future effort will also identify regional transportation opportunities and an assessment of the long-term viability of implementing such opportunities, costs, and funding options. A list of strategies, prioritized alternatives, and new types of transportation systems/routes that would address transportation impacts by growth at the bases will be included. The work developed for the I-5 corridor will compliment the larger regional list of transportation needs.

Finally, recommendations should be made on how Fort Lewis and McChord AFB staff can best work with the Puget Sound Regional Council, the Pierce County Regional Council and the Thurston County Regional Council to promote regional solutions to all the identified transportation challenges.

Technical Review/Stakeholder Involvement

As part of the I-5 Alternatives Analysis and Operations Model project, the City of Lakewood created a Technical Review Committee (TRC) to review and provide input on project approach, assumptions, and outcomes. Since this initial phase is primarily technical in nature, the group is composed of representatives from local agencies and jurisdictions that could be impacted by growth at the bases. These local agencies and jurisdictions have a first hand interest in the outcome and/or conclusions of this study. TRC members include representatives from the following agencies:

- City of Lakewood
- Federal Highway Administration (FHWA)
- Washington State Department of Transportation (WSDOT)
- Puget Sound Regional Council (PSRC)
- Pierce County
- Thurston County Regional Planning
- City of DuPont
- City of Lacey
- City of Roy
- Fort Lewis
- McChord AFB
- Camp Murray
- Nisqually Tribe
- Pierce Transit
- Sound Transit
- Clover Park School District
- Office of Congressman Norm Dicks

The purpose of the TRC is to review basic analysis methodologies, evaluation criteria, and key findings. TRC meetings occur throughout the life of the project as directed by the City. In addition to the TRC meetings, interviews were conducted with some of the agencies to further discuss specific issues and outcomes they would like the study to address. Interviews were conducted with staff from the City of DuPont, Pierce Transit, Fort Lewis, McChord, and FHWA. The following summarize the key issues/concerns that were common among the agency interviews:

- Congestion along the I-5 corridor and interchanges has worsened.
- Peak congestion and volume periods have spread across a larger time period.
- Transit reliability (on-time service) is affected by increased congestion.
- Transit service to the military installations is challenging due to security requirements.
- High Occupancy Vehicle (HOV) lanes should be extended through the study area.

As the corridor study moves forward, these issues/concerns will be considered in examining existing study area conditions and in developing improvement strategies to address existing and future conditions.

Study Area

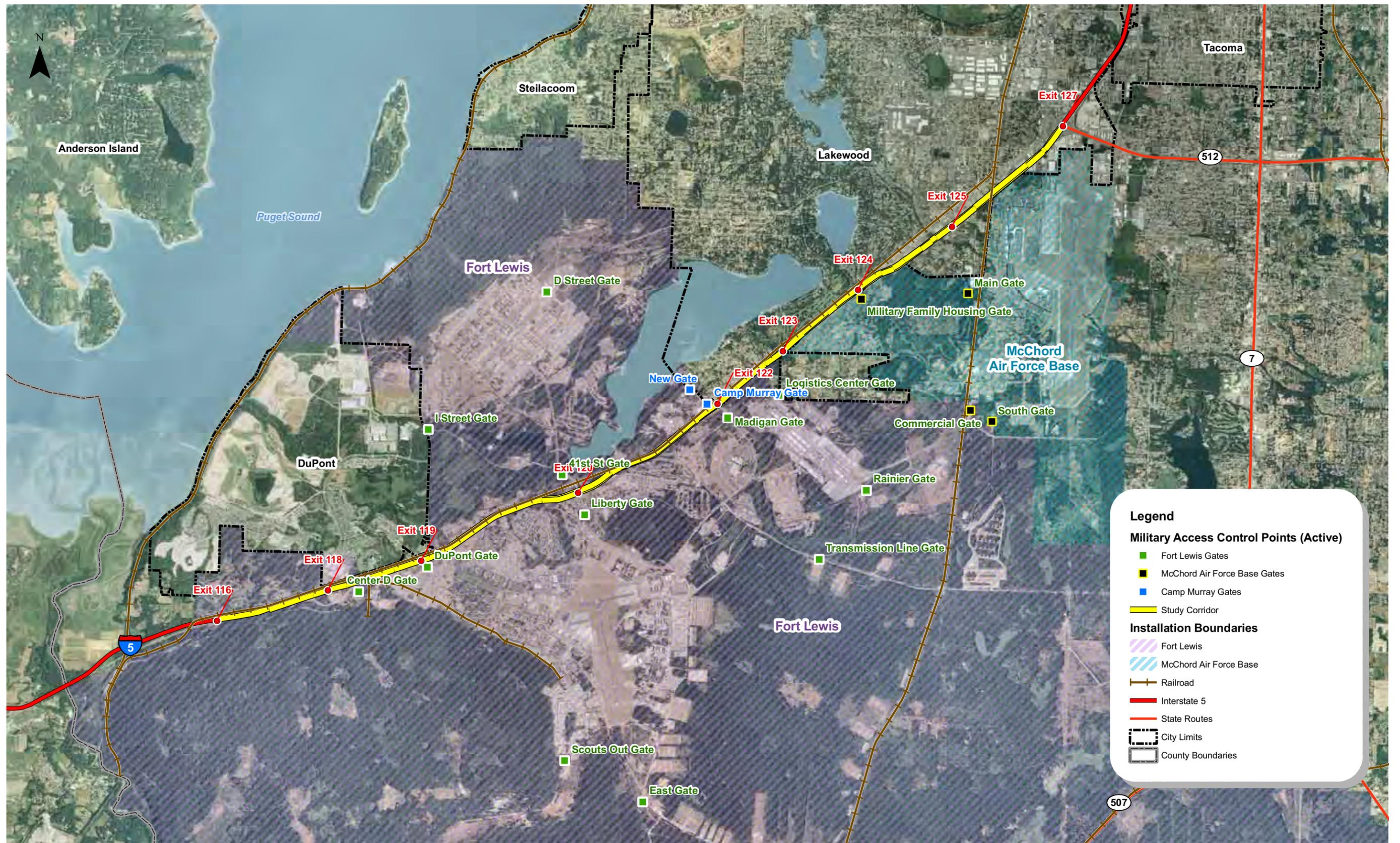
The study area will extend along the I-5 corridor from the Mounts Road interchange, exit 116, to the State Route (SR) 512 interchange, exit 127 (mileposts 116.41 to 127.48) as shown in Figure 1. A total of nine interchanges have been identified and will be evaluated along with the mainline segments, ramp merge and diverge operations, and ramp terminal/arterial intersections. The study area represents an 11 mile section of I-5.

The study area was chosen based on a review of the military gate locations, usage, and resulting potential levels of impact. Recent studies have been completed by WSDOT evaluating HOV lanes through Tacoma, so further analysis of that section of I-5 was not needed. Furthermore, as the purpose of this study is to address the growth as it relates to the military, the further from Fort Lewis and McChord the study area extends, the reduced level of impact from the military bases and the greater the impacts from regional traffic and anticipated regional growth. As part of the study is to examine the local street system adjacent to I-5 and potential improvements to the east/west connectivity, several arterial intersections adjacent to I-5 have also been included in the study area.

Study Methodology

Technical analyses conducted for this study area are based on accepted industry standards and will include an evaluation of traffic operations and traffic safety when assessing existing deficiencies and developing future improvement strategies. The traffic operations analysis was conducted using methodologies outlined in the Highway Capacity Manual, 2000. The assessment of safety deficiencies along the I-5 corridor is based on collision history data maintained by WSDOT.

Consistent with local and regional transportation plans, the traffic analysis will be based on a 2030 horizon year. While the primary analysis will focus on the weekday PM peak hour conditions, additional analysis will be conducted for the AM peak hour at key locations. Due to the scheduled physical training activities for Fort Lewis soldiers, unique peaking characteristics are also observed in the morning. This morning surge of inbound base personnel results in congestion and queuing along I-5 that will be considered in the development of improvement alternatives.



Study Area

Interstate 5 Transportation Alternatives Analysis and Operations Model

M:\08\08301 Lakewood I-5 Growth Study\Graphics\GIS\MXD\I-5 Corridor Basemap.mxd



FIGURE

1

Literature Review

Several studies have been conducted in the area that could be used to identify existing or future issues and/or improvements that should be reflected or considered as part of this current study effort. Through discussions with TRC members and other key agency staff, a list of past studies was developed and is summarized below. These studies include:

- I-5/Fort Lewis Congestion Study – WSDOT (December 2005),
- Fort Lewis/McChord Crash Analysis – Gannet Flemming (2007),
- Pierce Transit Park & Ride Study – Fehr & Peers/Mirai (December 2008),
- Cross-Base Highway Final EIS: Transportation Discipline Report – WSDOT (September 2003),
- Point Defiance Bypass Project: Traffic & Transportation Discipline Report – WSDOT & HDR Engineering (March 2008),
- 2007-2026 Highway System Plan – WSDOT (December 2007),
- Final Comprehensive Traffic Study at McChord Air Force Base – CH2M Hill (August 2006),
- Freeway Access Report: Interstate 5 at DuPont, Washington – CH2M Hill (October 1995),
- East-West Corridor Study – Parametrix/Thurston County (1998),
- Woodbrook Business Park Master Plan (not yet complete).

These studies are discussed in the following sections focusing on the scope of the study and key conclusions and recommendations as it relates to the segment of I-5 currently being studied.

I-5/Fort Lewis Congestion Study, WSDOT (2005) – The limits of this congestion study fall within those of this current I-5 corridor study, and include I-5 mainline traffic and interchanges from the DuPont-Steilacoom Road interchange to the Thorne Lane interchange. The study concludes that future traffic volume growth and large improvement costs prohibit anything other than short-term improvements. Recommended improvements along the I-5 corridor to consider include the installation of ramp-meters at interchanges and construction of an auxiliary lane between the Berkeley Street and Thorne Lane interchanges.

Fort Lewis/McChord Crash Analysis, Corp of Engineers (2007) – This study examined collision rates and types along I-5 from Lacey to downtown Tacoma to determine if traffic to/from Fort Lewis and McChord AFB increased collision rates. The limits of the current I-5 corridor study fall within the limits of this current I-5 corridor study. Collision rates are lowest in Lacey and highest in Tacoma with a fairly linear increase between these two cities. The collision rate within the vicinity of Fort Lewis and McChord AFB is higher than the rate in Lacey but is not higher than the average overall rate for the study area. The study also noted that while collision rates are not above the average for the study area, congestion associated with gates to/from Fort Lewis and McChord AFB may increase the number of collisions at the interchanges. No specific recommendations were made to improve safety in the vicinity of Fort Lewis and McChord AFB, but additional study of congestion related collisions was recommended.

Pierce Transit Park & Ride Study, Pierce Transit (2008) – The need for new or expanded park & ride facilities throughout Pierce Transit's service area were examined within this study. Within the I-5 corridor study area, forecast person-trips from Fort Lewis and McChord AFB showed relatively low growth. Based on projected demands and previously planned expansions including the Lakewood Station, no additional park & ride facilities were identified. However, enhanced transit service (Sounder commuter rail to Lakewood and increased bus service throughout the County) would increase park & ride demand countywide beyond

baseline assumptions. Within the I-5 corridor study area, additional transit service would increase commuter demand at the DuPont Park & Ride. This additional demand would result in the need for additional 175 parking stalls. No additional service is planned for the military bases.

Cross-Base Highway Final EIS: Transportation Discipline Report, WSDOT (2003) – The impacts of the proposed Cross-Base Highway, which would extend from approximately the Thorne Lane interchange with I-5 to SR 7 east of the military bases, was examined within this study. Currently, little connectivity is provided between the I-5 corridor and mid-Pierce County. The proposed highway is intended to and would improve regional circulation and congestion. The study assumed that the Thorne Lane interchange would be reconstructed as a single-point urban interchange to accommodate the increase in traffic volumes from construction of the new highway. In addition, a frontage road along the north side of I-5 between Thorne Lane and Gravelly Lake Drive would also be constructed. Specific impacts to the I-5 study corridor, beyond the Thorne Lane interchange, were not presented. However, improvements to the Thorne Lane interchange would impact mainline and ramp operations within the vicinity of Thorne Lane. This interchange improvement, and the regional improvements associated with the construction of the new highway, will be considered when developing improvement strategies along the I-5 corridor.

Point Defiance Bypass Project: Traffic & Transportation Discipline Report, WSDOT Rail (2008) – This study documented the impacts of improved passenger rail service along the rail line immediately north of, and parallel to, the I-5 corridor study area. This rail line will experience an increase in rail service due to the extension of the Sounder commuter rail line to the Lakewood Station and from rerouting existing passenger rail service from the Burlington Northern Santa Fe rail line along the Puget Sound shoreline. These passenger rail services would result in approximately one train passing through the study area during each AM and PM peak period. Resulting vehicle queues at rail crossings would extend through adjacent study intersections at Bridgeport Way, Thorne Lane, Berkeley Street and DuPont-Steilacoom Road intersections. Mitigation of these impacts would include interconnecting all north-south corridor traffic signals with one another, and installation or activation of traffic signals and turn-pocket improvements at both the Union Avenue/Thorne Lane and Union Avenue/Berkeley Street intersections. Improvements to arterial intersections to improve corridor operations along I-5 will need to consider the effects of vehicle queuing caused by the bypass project and increased rail activity.

2007-2026 Highway System Plan, WSDOT (December 2007) – The statewide Highway System Plan provides broad policy goals throughout all of Washington State, including improving congestion and safety. No details or plans are described to specifically address the I-5 study corridor.

Final Comprehensive Traffic Study, McChord Air Force Base (2006) – This study examined the ability of the infrastructure on-base and in the vicinity of McChord AFB to serve existing and future traffic demands. Within the I-5 corridor study area, the study documented poor operations at the Thorne Lane interchange. Interim improvements at the Thorne Lane interchange to address deficiencies that would exist until either widening of I-5 or construction of the Cross-Base Highway and associated Thorne Lane improvements occurs, would be supported and partially funded by McChord AFB. These short-term improvements will be considered when developing improvement strategies along the I-5 corridor.

Freeway Access Report: Interstate 5 at DuPont, WSDOT (1995) – This study documents the need for additional access to I-5 with the planned development within the City of DuPont. This study assumed that Fort Lewis would ultimately relocate the DuPont gate to align with the proposed Center Drive interchange. The ultimate configuration and improvements at the Center Drive interchange would include a half-diamond for the northbound ramps and a full diamond for the southbound ramps, and would provide access to the Fort Lewis Center Drive

gate. The study recommended that the DuPont (DuPont-Steilacoom Road) interchange be reconstructed to accommodate forecasted traffic volume growth and noted that if inter-city passenger rail service were extended along present rail line (i.e. Sounder or Amtrak service), substantial alignment and grade separation improvements would be necessary. The DuPont interchange reconstruction recommendations will be considered in the current I-5 corridor study.

East-West Corridor Study, Thurston County (1998) – This study examined the need for improved east-west mobility within Thurston County between Lacey and Yelm. Several alternatives were considered, from constructing a new highway to improving the existing corridors. While the study does have regional significance, it did not examine any impacts within the I-5 study corridor but does illustrate the desire for increased mobility outside of the I-5 corridor.

Woodbrook Business Park Master Plan, City of Lakewood (not yet complete) – This study is not yet complete, but identifies the need for interim improvements to the northbound I-5 ramp intersection at Thorne Lane and improvements to Murray Road and 150th Street SW to accommodate increased development in the Woodbrook Business Park. Since much of the access to the area would be improved with completion of the Cross-Base Highway, the study evaluated improvements necessary to support redevelopment in the area before the Cross-Base Highway is constructed. The recommendations of the Master Plan will be considered as part of the current I-5 corridor study.

Environmental Review

A preliminary environmental review of the study area has been performed with the aid of geographic information systems (GIS). This review is not intended to take the place of a more thorough environmental assessment that might be needed in the future. Instead, the purpose of this review is to provide an indication of where environmentally sensitive areas might exist within the study area. This information can be used to raise any “red flags” or concerns in the development of improvement recommendations for the study corridor. Should any of the recommendations move forward to implementation, this review will be the first step in understanding any environmental challenges that may exist within the study corridor and that will need to be addressed for a recommendation to be implemented.

I-5 through the study area traverses a landscape that is rural at the south terminus of the study area (Mounts Road) to a more developed, semi-urban landscape at the north end of the study area (SR 512). In between this approximately 11 mile stretch of freeway lays Fort Lewis, McChord Air Force Base and suburban and commercial development. The terrain is overall flat with some bodies of water (lakes and Puget Sound) nearby.

Several maps have been prepared and are included in the appendix of this document. These maps cover items such as:

- Steep Slopes
- Floodplains
- Wetlands
- Liquefaction
- Bike and Pedestrian Facilities
- Environmental Justice
- Historic Districts
- Sensitive Areas

An overview of each of these issues is summarized below in the following text.

Steep Slopes

There are no slopes alongside I-5 within the study area and there are no areas directly adjacent to the interstate that are classified as either 100 year or 500 year flood zones. However, there are some locations within the study area itself that are classified as 100 year flood zones. These locations are located mostly on the McChord and Fort Lewis installations.

Wetlands/Liquefaction/Fish Passages

The wetlands that are not classified as lakes are classified as freshwater forested/shrub wetlands that exist on the military installations themselves. Any improvements to the I-5 corridor are not likely to impact any wetland locations as they are located away from the interstate facility. The entire corridor is classified as being in either “Low” or “Very Low” risk areas for liquefaction and as such the structural designs will not likely require special seismic retrofitting for liquefaction. There are no known fish passage barriers along the corridor.

Historic Districts

There are historic sites within the study area that are located both on and off the military bases. Within the bases are the following historic districts: The McChord Field Historic District contains 31 buildings and 3 structures that date to the establishment of McChord Field and its role in World War II. Additionally, the historic district is also significant for its architecture representative of the period from 1938 through 1952. On December 12, 2008 it was listed on the National Register of Historic Places.

The DuPont Historic Village, near Exit 119 (DuPont-Steilacoom Road) is comprised of approximately 430 acres and 110 structures such as homes, etc. and marks the founding of the City of DuPont. In 1987 the village was placed on the National Register of Historic Places.

Sensitive Areas

The study area contains some of wildlife sensitive areas, plant or ecosystem sensitive areas and large swaths of wet prairie swales. The wet prairie swales are a subset of the prairie landscape and occur in areas with a seasonally high water table. Due to development in the South Puget Sound area many of the original plant and animal species have been exterminated or reduced in the areas designated as wet prairie swales. Nearly all of the I-5 corridor passes through designated wet prairie swales but has minimal to no contact with wildlife or plant/ecosystems sensitive areas.

Environmental Justice

Environmental Justice requires that fair treatment and meaningful requirement be given to all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws and policies. Census data from 2000 was used to determine the proportion of minority and low-income groups in census tracts in or near the study area.

As indicated by the maps in Figure 2 and census data, African-Americans comprise 0 to 30-percent of the population for Lakewood, 6 to 15-percent of the population for McChord AFB and 31 to 50-percent of the population at Fort Lewis. American Indians comprise 0 to 5-percent of the population both on the bases and in the surrounding jurisdictions. Asian residents comprise 0 to 5-percent of the population on the bases and between 0 to 50-percent of the population of the surrounding communities; depending upon location. The Hispanic population also varies depending upon location. On the bases they comprise 6 to 15-percent of the population while in the surrounding communities they are 0 to 30-percent of the population.

Figure 3 shows those census tracts that fall below the national poverty level. There are no census tracts below the poverty level on the bases but there are a number of census tracts in the surrounding communities that fall below the poverty level.

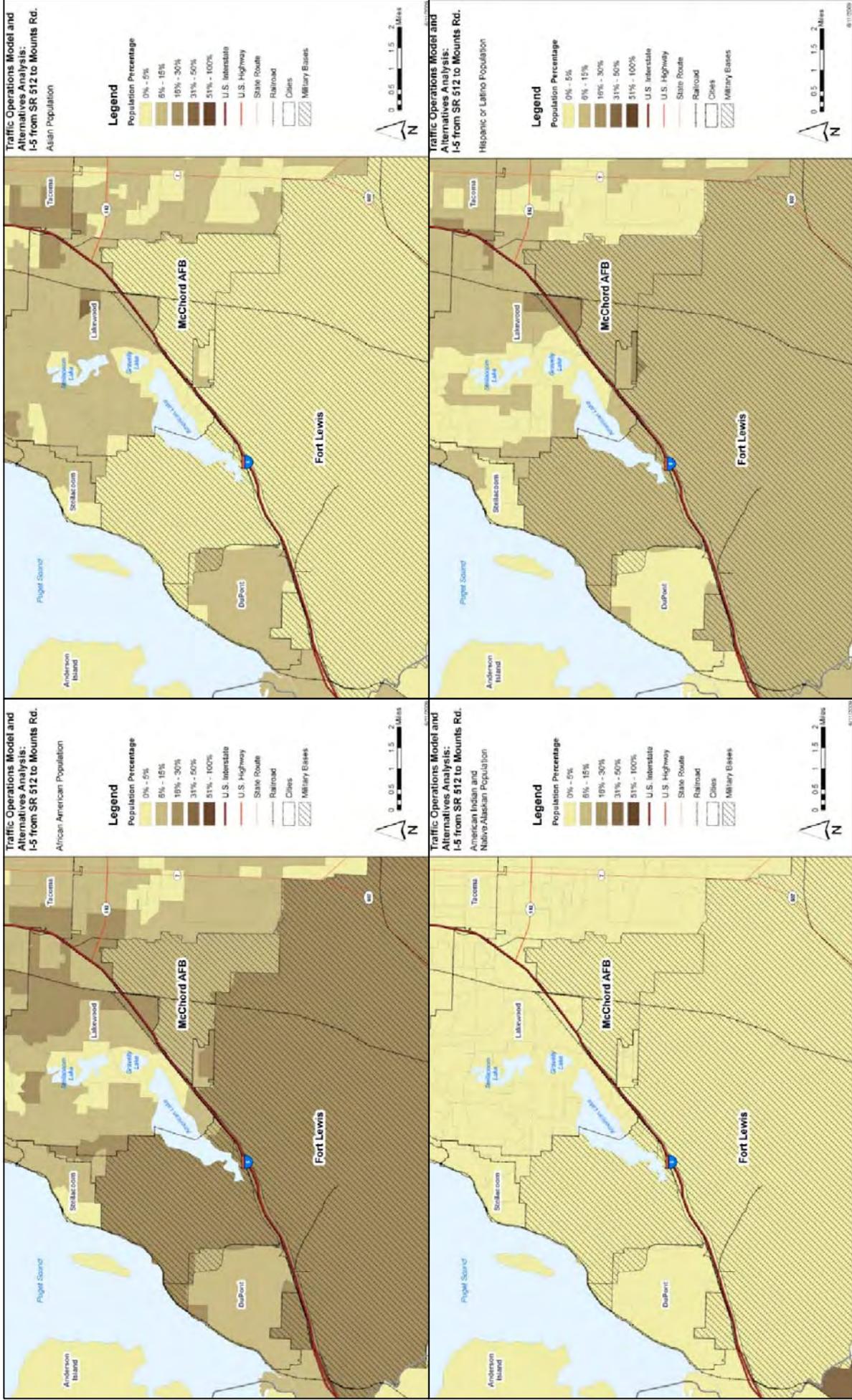


FIGURE 2

Census Data Summary

I-5 Transportation Alternative Analysis & Operations Model

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Assessment of Existing Transportation Conditions

This section assesses the existing transportation conditions within the I-5 corridor study area. The assessment identifies those transportation facilities and services currently being provided, while also evaluating their current performance. The results of the assessment will be considered in developing the future improvement strategies for the I-5 corridor. The assessment included a review of the following items:

- Inventory of Roadway Facilities
- Freight and Rail
- Transit Facilities & Service
- Collision Analysis
- Traffic Volumes
- Traffic Operations
- Military Travel Patterns & Trends

The assessment of existing conditions builds off of the prior studies conducted in the area and is supplemented with new information such as traffic counts, collision history, and military travel patterns.

Inventory of Highway Facilities

I-5 was built in the 1950's and 1960's as part of the Interstate Highway system to accommodate the movement of military personnel and equipment. The freeway begins in southern California and runs through California, Oregon and Washington and ends at the Canadian border. The early use of the interstate system focused more on the interstate movement of freight as well as people. As the Puget Sound region has changed in the past 50 years, so has the use of the facility. Although I-5 is still the major freight route from Mexico to Canada, it also serves as the primary commute corridor for many communities. It is estimated that almost 65-percent of the population in the state of Washington lives within 15 miles of the I-5 corridor.

The inventory of highway facilities focuses on key characteristics related to I-5 such as interchange spacing, lane and shoulder widths, bridge inventory, and functional classification.

Highway Characteristics

The study corridor extends approximately 11 miles and includes a total of 9 interchanges. Most of the interchanges are spaced between one to two miles apart, with the Thorne Lane and Berkley Street interchanges spaced the closest at approximately 0.9 miles. The access points along the study corridor between the interstate and local system are shown in Table 1.

Table 1. Interchange Summary

Exit #	Interchange Name	Distance from previous Exit (south to north)
116	Mounts Road / Old Nisqually Road	2.8 miles
118	Center Drive	1.3 miles
119	Steilacoom-DuPont Road	1.1 miles
120	Fort Lewis / N Fort Lewis	1.9 miles
122	Berkeley Street	1.8 miles
123	Thorne Lake	.9 miles
124	Gravelly Lake Drive	1.1 miles
125	Bridgeport Way	1.2 miles
127	State Route 512	1.6 miles

Source: WSDOT, 2009

From Mounts Road to Thorne Lane, the interstate has 3 travel lanes in each direction with a concrete barrier that separates the two directions of travel. From Thorne Lane north to SR 512, I-5 widens out to 4 travel lanes in each direction with a concrete barrier separating the travel directions. The median varies from asphalt to soil depending on the width of the median, but the majority of the median is asphalt surface. This entire stretch of I-5 currently has standard lane widths of 12 feet and 10 foot outside shoulders. A more detailed breakout of the lane and shoulder widths is shown in Table 2.

Table 2. Lane and Shoulder Widths

Begin Milepost	Ending Milepost	# of Lanes		Width (in feet)			Median	
		NB	SB	Inside Shoulder	Lanes	Outside Shoulder	Width (in feet)	Type
116.48	116.71	3	3	6	12	10	300	Guardrail
116.71	118.20	3	4	6	12	10	36	Jersey Barrier
118.20	118.70	3	4	-	12	10	12	Jersey Barrier
118.70	120.05	3	3	-	12	10	12	Jersey Barrier
120.05	121.35	3	3	6	12	10	24 to 36	Jersey Barrier
121.35	124.00	3	3	-	12	10	12	Jersey Barrier
124.00	127.54	4	4	-	12	10	12 to 16	Jersey Barrier

Source: WSDOT, 2009

1. No median. Total width between the two directions of travel is the median width with barrier in between.

The posted speed limit for this stretch of I-5 is 60mph and the terrain for the entire area is classified as level to rolling. The interstate is classified as an Urban Interstate for almost the entire corridor. The only exception to this is in the immediate vicinity of Mounts Road where it is classified as being a Rural Interstate.

Bridge Inventory

There are twenty seven bridges in this 11 mile stretch of I-5. Of these twenty-seven, 10 bridges are considered functionally obsolete and 1 bridge is considered structurally deficient. Table 3 shows how many bridges were built in each decade. In all, 18 of the 27 bridges were built on or before 1960.

Table 3. Date of Bridge Construction

Date Range	Number of Bridges
Before 1960	18
1960 to 1970	4
1970 to 1980	1
1990 to 2000	0
Total Bridges	27

Source: WSDOT, 2009

A bridge that is classified as being functionally obsolete does not have structural issues but it may no longer meet standards for items such as lane or shoulder widths. A structurally deficient bridge is still safe to travel on, but it may have design loads that exceed the recommended loading of the bridge. This would be an issue if an over-weight vehicle used the bridge and is generally the reason behind load restrictions. The only bridge in the study area that is considered structurally deficient is the DuPont Interchange crossing. The DuPont overcrossing, built in 1957, is inspected on a routine schedule and is listed as structurally deficient due to load restrictions.

Table 4 highlights the bridge rating information for all 27 bridges in the corridor.

Table 4. Bridge Inspection Summary

Bridge Number	Location (milepost)	Intersects with	Structure Type	Last Inspection Date	Inspection Frequency (months)	Year Built	Operating/ Inventory Rating (tons)	Sufficiency Rating	Structurally Deficient/ Functionally Obsolete
5/405E	116.38	BNRR	Steel Girder	11/14/2000	60	1967	60/60	N/A	N/A
5/405W	116.38	BNRR	Pre-Tensioned Concrete Girder	11/9/2001	24	1936	60/60	N/A	N/A
5/406	116.7	Old Nisqually Rd OC	Pre-Tensioned Concrete Girder	8/4/2008	24	1967	43/26	89.24	N/A
5/406A	116.7	Mounts RD/BNRR OC	Concrete Slab	11/8/2007	48	1960	78/46	92.97	N/A
5/407	117.45	Center Dr OC	Pre-Tensioned Concrete Girder	2/24/2009	24	1997	67/40	76	Functionally Obsolete
5/407.5	118.33	Laundry Spur OC	Concrete Box Girder	8/4/2008	24	1957 ¹	60/45	85	N/A
5/407A	117.45	Truck Ramp UC Fort Lewis	Pre-Tensioned Concrete Girder	5/31/2005	48	1997	94/56	98.99	N/A
5/407S-N	117.45	SB Deceleration Ramp	Pre-Tensioned Concrete Girder	4/4/2007	24	1997	73/44	99.53	N/A
5/407S-S	117.45	SB Acceleration Ramp	Pre-Tensioned Concrete Girder	4/4/2007	24	1997	53/32	97.31	N/A
5/408	119.01	DuPont OC	Concrete Slab	8/4/2008	24	1957	74/44	59.71	Structurally Deficient
5/409	119.368	Pendleton OC	Concrete Slab	12/3/2008	24	1957	61/36	80	Functionally Obsolete
5/411E	120.87	Fort Lewis Rd OC	Pre-Tensioned Concrete Girder	4/4/2007 ⁸	24	1969	87/51	73.53	N/A
5/411NCD	120.87	NBCD Fort Lewis Rd OC	Pre-Tensioned Concrete Girder	4/4/2007	24	1969	96/57	92	N/A
5/411SCD	120.87	SBCD Fort Lewis	Concrete T-Beam	4/4/2007	24	1954	60/36	92	N/A
5/411W	120.87	Fort Lewis RD OC	Concrete T-Beam	4/4/2007	24	1954*	60/35	86.14	N/A
5/413	122.68	Freedom Bridge	Concrete T-Beam	9/25/2007	24	1954	54/3.2	75.96	Functionally Obsolete
5/414	123.58	Thorne Rd OC	Concrete T-Beam	12/11/2007	24	1954	54/32	61.66	Functionally Obsolete
5/415	124.64	Gravelly Lake Dr OC	Concrete Slab	12/11/2007	24	1954	79/46	78.87	N/A
5/415A	124.64	BNRR OC	Concrete Slab	12/11/2007	24	1959	49/29	74.27	N/A
5/416	125.23	New York Ave Over I-5	Concrete Slab	9/25/2007	24	1957	91/54	76.1	Functionally Obsolete
5/417	125.64	Clover Creek	Concrete Slab	7/9/2007	24	1957 ²	61/36	85	N/A
5/418	125.86	Bridgeport Way OC	Concrete Box Girder	12/11/2007	24	1958	88/52	75.06	Functionally Obsolete
5/419	126.19	47 th Ave SW OC	Concrete Box Girder	12/11/2007	24	1957	55/32	62.47	Functionally Obsolete
5/420	126.41	BNRR Lakeview OC	Steel Girder	11/12/2002	24	1958	60/60	N/A	N/A
5/421	127.316	S. Tacoma Way over I-5	Concrete Box Girder	12/16/2008	24	1958	54/32	71.56	Functionally Obsolete
5/421A	127.48	Union Ave SBCD OC	Pre-Tensioned Concrete Girder	5/24/2005	48	1974	68/40	79.37	Functionally Obsolete
512/1	0	I-5 OC	Concrete Slab	12/10/2007	24	1958	57/34	79.22	Functionally Obsolete

Source: WSDOT, 2009

1. Bridge re-built in 1969
2. Bridge re-built in 1974

Route Classification

In order to employ appropriate development and design standards, all state and interstate routes in Washington are organized within various classification systems. A brief discussion of the classification systems relative to the study area follows.

Highways of Statewide Significance (HSS)

Highways of Statewide Significance (HSS) include interstate highways and other principal arterials that are needed to connect major communities in the state. This designation assists with the allocation and direction of funding and was mandated by the 1998 legislature.¹ In 1999 the legislature requested² that WSDOT, with the assistance of Regional Transportation Planning Organizations, update the HSS at least every five years. I-5 and SR 512 are both HSS routes that connect rapidly developing communities in Pierce and Thurston Counties.

National Highway System (NHS)

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) established the National Highway System (NHS). The NHS provides an interconnected system of interstate, principal arterial and other routes that serve major population centers, international border crossings, ports, airports, public transportation facilities, and other intermodal transportation facilities. In addition, these routes meet national defense requirements.

I-5 is designated as an NHS route and supports the United States strategic defense policy by providing access to McChord Air Force Base, Fort Lewis, and Camp Murray. I-5 also provides access to intermodal transportation facilities and accommodates interstate and interregional travel. Designation as an NHS route influences the level of design standards applied to a route and establishes greater opportunities for federal funding.

Access Management Classification

Highway access management standards were developed in 1991.³ The intent of the standards is to balance the competing needs of traffic movement and local land use. This goal is accomplished by minimization of disruptions to through traffic via selective placement of driveways. In an access managed section of state highway, access from private property is gained via permit and associated fees only. Five classifications have been established for access management on state highways and range from modified to full access control. Modified control provides some restrictions on access to highways but allows access where potential commercial developments preclude the implementation of partial or full control. Full access control provides almost complete freedom from disruption by permitting access connections only through interchanges at selected public roads, rest areas, viewpoints, or weighing stations.

Access control is established to preserve the safety and efficiency of specific highways and to preserve the public investment. Highway facilities with established access control are termed either limited access or access controlled highways. Facilities are further distinguished as having full, partial or modified access control. The number of access points per mile, spacing of interchanges or intersections, and the location of frontage roads or local road connections are determined by the functional classification and importance of the highway, the characteristics of the traffic (commute, freight, recreational, etc.), the present and future land

¹ RCW 47.06.140

² House Joint Memorial 4006

³ per RCW 47.50

use, the environment and aesthetics, and the highway design and operation, and the economic considerations involved.

I-5 and SR 512 are both classified as full access controlled facilities. All access to and from the facilities within the limited access designation is controlled by WSDOT. Any new or modified access to the federal interstate system will require consultation and approval from the Federal Highway Administration (FHWA). The process requires an Interchange Justification Report (IJR) where elements such as safety, operational performance, and consideration of local plans are used to help determine if a change in access should be granted.

Functional Classification

Functional classification is the grouping of highways, roads, and streets that serve similar functions into distinct systems or classes within the total existing or future highway network. The objective of functional classification is to define the appropriate role, (mobility vs. access), of various roadways in providing service and influencing development. Higher functional classification routes provide high volume capacity mobility, accommodate higher travel speed, serve long distance travel, and place less emphasis on local access.

In general, the functional classifications used by WSDOT include: Interstate, freeway, principal arterial, minor arterial, and collector. Within the study area, I-5 is classified as an Interstate. SR 512, located at the northern end of the study area, is classified as freeway. SR 7 is classified as a principal arterial throughout the study area and is located east of McChord AFB and Fort Lewis and travels through the Spanaway area. Figure 4 shows the functional classification of these and other major roadways within study area.

In general, there are few high-capacity alternative routes to I-5 within northern Thurston County or southern Pierce County. While alternative routes do exist, all are of lower functional classification (arterials and collectors) and have a relatively dense number of access locations on intersection controls. Due to the high volume north-south travel route demands, these alternative routes do sometimes experience significant congestion as drivers seek to avoid congestion along the I-5 corridor. However, due to the access restrictions of the military bases few alternative routes provide significant improvement over traveling along I-5.

Freight and Goods Transportation System

A principal function of the Washington State highway system is to promote efficient movement of freight and goods. In 1990, the Legislative Transportation Committee (LTC) requested a study that examines use, benefits from, and damage to the state's highway transportation system by truck borne freight movement.

In response to this study, a law⁴ was passed directing the Transportation Commission to adopt a Freight and Goods Transportation System (FGTS) including state highways, county roads and city streets. In addition, the Commission was directed to review and provide recommendations to the legislature regarding policies governing weight restrictions and road closures that affect the transportation of freight and goods in conjunction with local governments. The Commission adopted the final FGTS System on March 16, 1995 that was developed jointly by WSDOT pavement engineers and local government engineers. Figure 5 shows the FGTS rankings for all state highways as well as the local arterials in the study area.

Truck Routes

Interstate 5 is classified as a T1 freight route, meaning that it carries more than 10 million tons of freight per year. Trucks make up 10-percent to 13-percent of the total daily volume of traffic on I-5 within the study area. This equates to almost 15,000 trucks per day using this stretch of interstate.

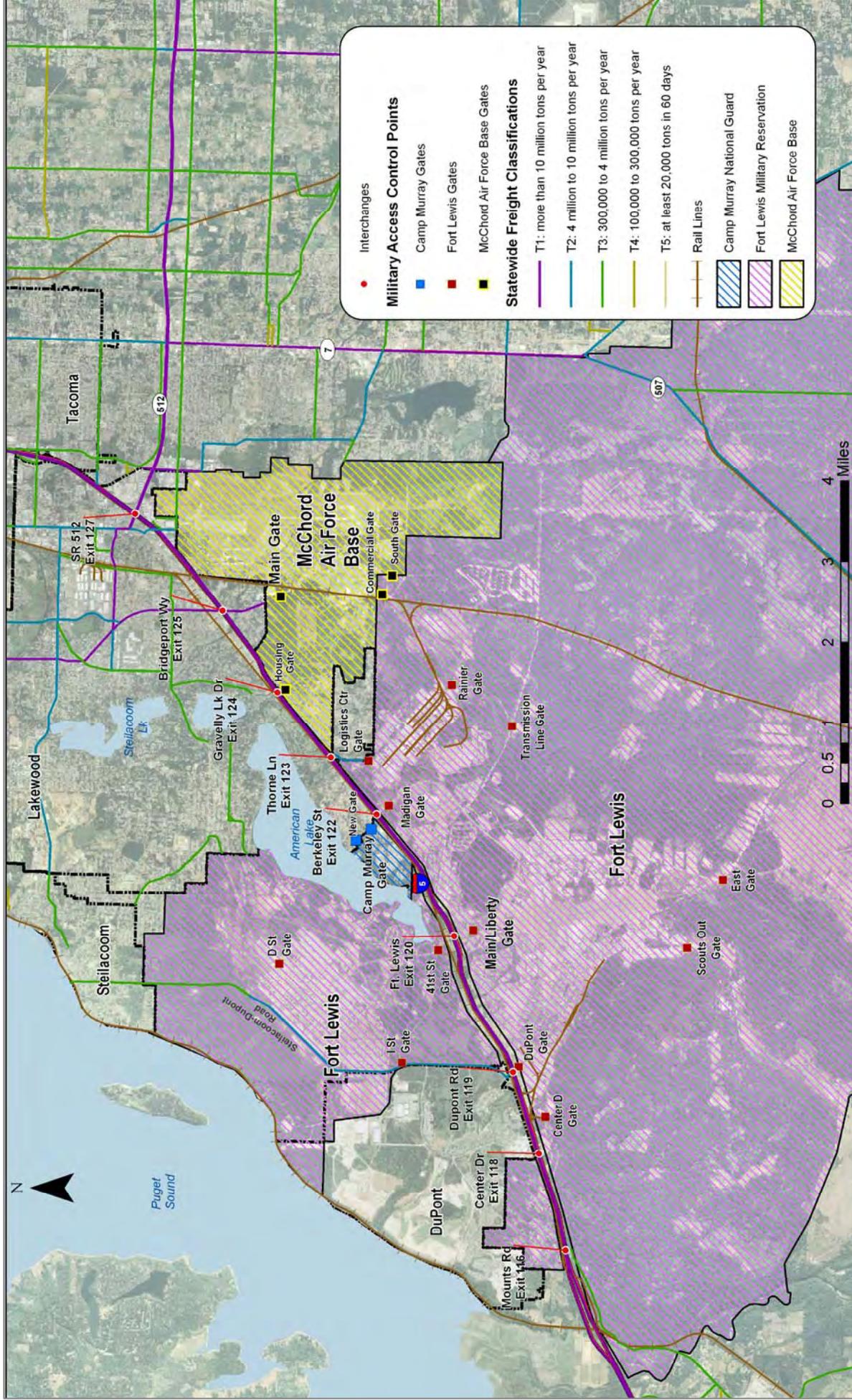
State Route 512 is also classified as T1 route, but most of the remaining transportation system within the study area is either T2 or T3.

Rail

There are four rail operators who use rail lines located within the study area or the region immediately surrounding the study area: Burlington Northern Santa Fe (BNSF), Tacoma Rail, Amtrak, and Sound Transit. Within the study area these rail operators use three sets of rail tracks. One rail line travels along the coast of Puget Sound (mainline) and merges at Nisqually with a second line that runs parallel to I-5 (Lakeview). The third rail line runs through east Fort Lewis (between I-5 and SR 7) between Roy to South Tacoma. A map of the existing rail lines within the study area vicinity is shown in Figure 5. Later sub-sections provide a more detailed description of each of these rail operators and the services they provide and are followed by a discussion of the Point Defiance Bypass Project.

Currently BNSF and Amtrak regularly use the mainline tracks along Puget Sound. Amtrak currently operates 10 trains per day along the mainline tracks while Tacoma Rail operates two to three trains per week on the Lakeview tracks adjacent to I-5. In addition, Sound Transit will increase rail operations within the study area by extending its existing commuter rail service to the Lakewood Station, located at the northern end of the study area, by 2012.

⁴ The Revised Code of Washington (RCW) 47.05.021



Freight and Goods Transportation System

FIGURE 5

With completion of the Point Defiance Bypass Project that is currently under construction (described, Amtrak service will be shifted from the mainline tracks to the Lakeview tracks along I-5. This will result in increased rail crossings occurring at each of the I-5 interchanges from DuPont-Steilacoom Road to Thorne Lane. Additional information on specific impacts of this project are presented in the *Point Defiance Bypass Project: Traffic & Transportation Discipline Report* and are discussed in further detail in the earlier Literature Review section (see p 7) or later within this Rail section (p 23).

BNSF Railway

BNSF Railway is the major rail freight carrier in the Pacific Northwest. It operates freight trains on two separate tracks in the study area. The first set of tracks is the mainline that originates in Portland, Oregon. Near the Nisqually River the track branches off into two directions: the mainline and the Lakeview Line (for the Lakeview Line see Tacoma Rail description directly below this discussion.) The mainline tracks veer to the north and continue along the coast through DuPont, Steilacoom, Lakewood and Tacoma. Another set of tracks, from Roy to Lakeview, travel through Fort Lewis land mainly carrying shipments about once a week from the Wilcox Farms. This set of tracks also serves MoBase, (southeast of McCord AFB). MoBase traffic varies based on deployments from Fort Lewis and returning deployments.

The mainline tracks are also used by Amtrak but Amtrak service will eventually be rerouted onto the Lakeview tracks (see the Pt. Defiance Bypass Project further down in this section.)

The amount of freight tonnage shipped on BNSF tracks is not readily available because the company is guarded about releasing such information.

Tacoma Rail

This rail operator is owned by Tacoma Public Utilities and operates 2 to three times per week. Tacoma Rail's three divisions, Capital, Mountain and Tidelands move more than 20 million feet of rail equipment along 204 miles of track and serve major industries in the Puget Sound region. Most of the goods carried by Tacoma Rail have the Port of Tacoma as their origin or destination. In total, Tacoma Rail carries about 330K gross tons/year.

The Port of Tacoma is one of the largest container ports in North America; handling more than two million TEUs (20-foot equivalent units) per year. Tacoma Rail serves shipping companies such as Evergreen, K Line, Yang Ming and Hyundai through the Port. In addition to containerized cargo, Tacoma Rail's freight includes chemicals, automobiles, scrap metal, feed, grain, frozen food, lime, petroleum products and lumber products.

Capital Division

On November 16, 2004, Tacoma Rail started providing service on three of the Burlington Northern Santa Fe (BNSF) distribution lines. These distribution lines are:

- Lakeview Line
 - The Lakeview Line, which parallels the I-5 corridor from Nisqually to just before SR 512 and then on to South Tacoma, consists of 15 miles of track and carries animal feed, plastic pellets, polyethylene and sand. These tracks are owned by BNSF Railway but are leased to Tacoma Rail.
- Belmore/East Olympia Line
 - The Belmore/East Olympia Line runs from East Olympia to Belmore. Products shipped on this line range include lumber, bricks and aluminum.
- Quadlok Line

- The Quadlok Line is the smallest of the three lines. It starts in St. Claire and heads Northwest three miles to Quadlok. It currently serves one customer who receives pulp board.

Mountain Division

In November 1998, Tacoma Rail began operating the Mountain Division to provide freight rail service between Tacoma, Frederickson in South Pierce County, Morton and Chehalis; a total of 132 miles. The City of Tacoma owns the line and has contracted with Tacoma Rail to operate it.

Current customers include Boeing, Hardie Building Products, MacMillan-Piper, Medallion Foods and Harris Rebar. The Mountain Division also provides storage services for the Union Pacific and BNSF Railroads.

The Mountain Division interconnects and interchanges with the Union Pacific and BNSF railroads in Tacoma and at Centralia/Chehalis. The Mountain Division is also connected with the Puget Sound and Pacific Railroad that serves Elma, Bangor, Bremerton, Shelton, Aberdeen and Hoquiam.

Tideland Division

The Tidelands Division services are concentrated solely at the Port of Tacoma's docks and do not operate in or near the I-5 corridor study area.

Amtrak

Amtrak, the national passenger rail service operates trains between Seattle and Vancouver, B.C and between Seattle, Portland and Los Angeles. There are a number of stops along each route. The service between Seattle, Portland and Los Angeles operates on BNSF railway near Point Defiance. Eventually, this service will be rerouted from the section of track that hugs the coast between Nisqually and Tacoma onto tracks that are parallel with the I-5 corridor and the bases (see Pt. Defiance Bypass Project discussion further below.)

Currently, there are 10 trains per day; four round trips between Seattle and Portland and two Starlight Trains between Seattle and Los Angeles. It is anticipated that by 2014 another round trip train between Seattle and Portland will be added.

Sound Transit

Sound Transit currently operates commuter rail service between Tacoma and Seattle. As part of ST2, which was approved by voters on November 4, 2008, commuter rail will be extended to Lakewood, serving the Lakewood Station. Commuter rail service is expected to begin by 2012. This new commuter rail service will operate on tracks that are being upgraded as part of the Pt. Defiance Bypass Project. Service will operate to Tacoma and Seattle and from the new Lakewood Station (see Public Transit discussion on page 22)

Point Defiance Bypass Project

The Pt. Defiance Bypass Project, a joint effort by WSDOT and Sound Transit, will reroute passenger trains operating on BNSF tracks between Nisqually and Tacoma to an inland route. Currently, trains must slow down due to curves and single-track tunnels on the BNSF Railway main line tracks near Point Defiance and along southern Puget Sound. The bypass is on an existing rail line that runs along the west side of Interstate 5 (I-5), through south Tacoma, Lakewood and DuPont. It reconnects back to the BNSF Railway main line near Nisqually on the east side of I-5.

These improvements will enable the Amtrak Cascades service avoid being delayed by freight or Sounder trains; resulting in faster and more reliable service for Amtrak and its passengers. This bypass will also allow travel speeds will be increased up to 79 mph, reducing travel times between Seattle and Portland by six minutes. BNSF will benefit by being able to operate more freight trains on the existing route. Part of the proposed route will also be used by Sound Transit to extend Sounder commuter rail to Lakewood.

The project is located along an 18-mile corridor owned by Sound Transit. Improvements to be made are:

- A new second track between South Tacoma and Lakewood.
- New rails, ties, and ballast along the west side of I-5 between the City of Lakewood and Nisqually.
- Improved connection to the main line near Nisqually.
- Safety and upgrade improvements at ten road and rail at-grade crossings.

This \$100 million project is funded through various sources such as vehicle weight fees, vehicle sales tax and federal funds.

Transit Facilities and Service

This section provides an overview of transit service and transit facilities available within the study area. The information describes which transit agencies operate within the study area, the type of transit service they provide such as bus routes, destinations and frequencies. Lastly, this section also gives a description and location of park and ride facilities within the study area.

There are currently three transit providers that provide transit service along this stretch of the I-5 corridor. They are:

Sound Transit Bus Service

Sound Transit operates four regional express bus routes on the I-5 corridor within the study area. Sound Transit does not provide local bus service within the study area. The Sound Transit routes are:

- Route 592: This route serves DuPont/Lakewood/Seattle operating only on weekdays mainly during the morning commuter peak period to Seattle and late afternoon and early evening back to Lakewood and DuPont.
- 594: Lakewood to Seattle providing weekday and weekend service from the early morning to late evening.
- 574: Lakewood to SeaTac Airport operating on weekdays and weekends from the early morning to the late evening.
- 599: Lakewood to Tacoma operating during the morning and afternoon peak periods. This is a temporary service that will end in 2012 when commuter rail service to Lakewood begins.

Commuter Rail

Sound Transit currently operates commuter rail service between Tacoma and Seattle. As part of ST2, which was approved by voters on November 4, 2008, commuter rail will be extended to Lakewood, serving the Lakewood Station. Commuter rail service is expected to begin by 2012. With the exception of the 599 bus service, Sound Transit is anticipating

retaining the other parallel bus routes in the study area after commuter rail service is implemented.

Pierce Transit

Pierce Transit is responsible for the local bus service and operates four routes within the study area. Three of these routes also serve the bases. The four routes are:

- Route 204: Parkland to Lakewood via S 112th Street and serving the SR 512 park and ride. Service on this route is provided seven days a week from the early morning to late evening.
- Route 206 operates between the Lakewood Transit Center and Madigan Hospital. Service is provided from seven days a week from the early morning to late evening.
- Route 207B: This route operates within in Fort Lewis between Madigan Hospital and Cemetery Road and 22nd Street. Service is provided on weekdays only from mid-morning to mid-afternoon.
- Route 207G: This route serves Fort Lewis and operates between the DuPont Park and Ride and Madigan Hospital with a stop at the Fort Lewis bus depot. Service operates only during the weekend between the early morning and early evening.
- Route 207P: This route also operates as a loop within Fort Lewis, serving the airfield and commissary. Service is provided only on the weekdays between late morning and late afternoon.
- Route 300: This route serves McChord Air Force Base operating between the Tacoma Mall Transit Center and McChord Commissary with stops at the SR 512 park and ride and the Lakewood Station (commuter rail).

Due to security requirements at the bases, providing transit service for the general public to the bases is a challenge for Pierce Transit because it is not permitted to carry non-military personnel through the gates. The agency has been working with the bases to develop a method that would serve both the general public's needs of wanting to take transit to the bases and satisfying the military's need for base security.

One option being considered is a transit center adjacent to one of the Fort Lewis gates with access for military personnel to be discharged and walk through the gate and transfer to a bus inside the gate. Though this would not enable Pierce Transit to carry non-military personnel onto the base, it would enable Pierce Transit to co-mingle military and non-military personnel on the same bus from distant locations; increasing the riders per hour.

Pierce Transit has also undertaken a two year study to examine its bus system (routes, schedules, etc). The results of that study should be available by 2010 and any changes or modifications to the system will occur after that date.

Inter-City Transit

Inter-City transit provides three routes, 603, 603A and 620, between Tacoma and Thurston County. None of these routes directly serve the bases. The Intercity Transit routes serving the study area are as follows:

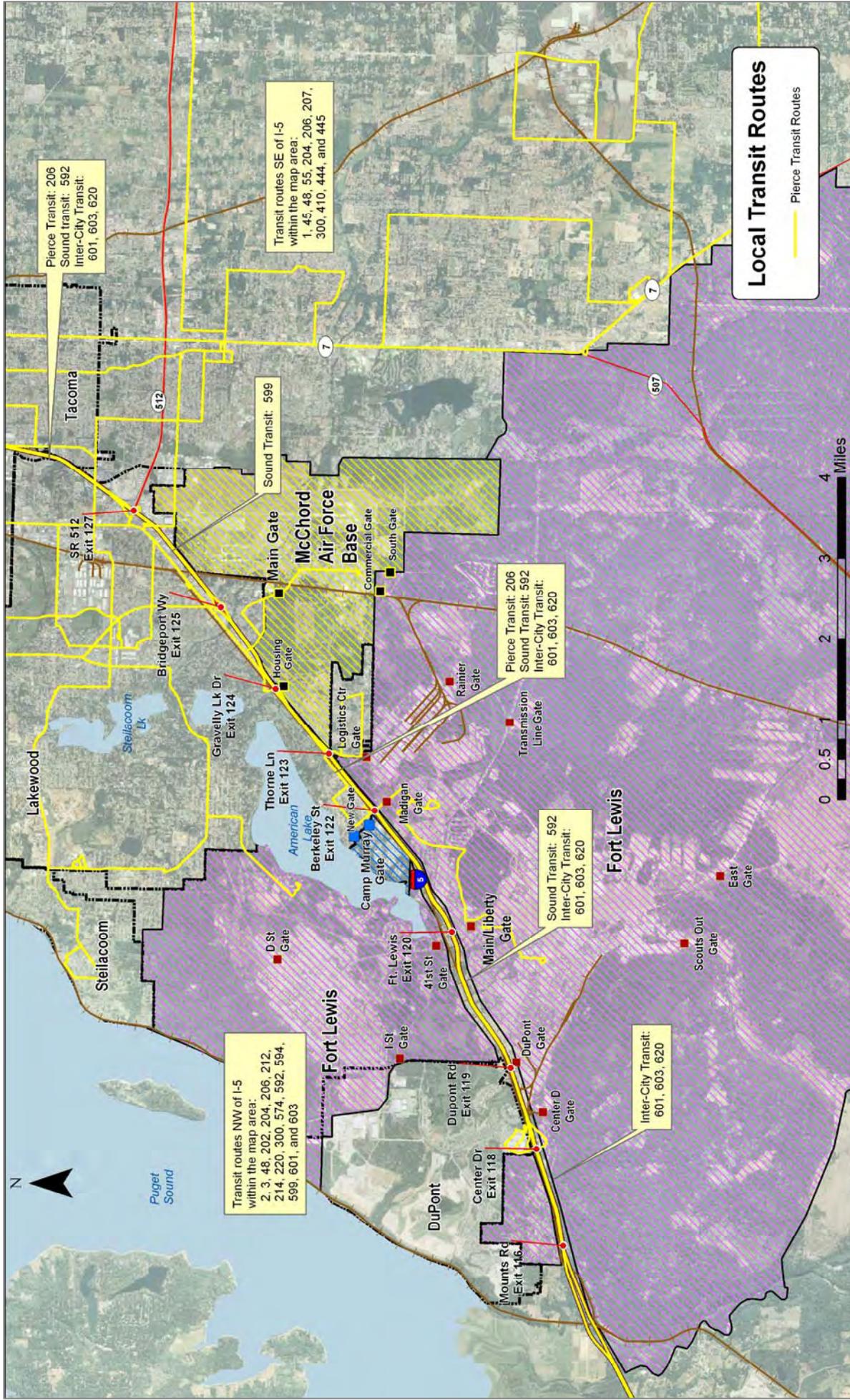
- Route 601: Weekday, peak hour service only between Gig Harbor, Lakewood and downtown Olympia with stops at the SR 512 park and ride.
- Route 603: Weekday service only between downtown Olympia, Lakewood and Tacoma. The service is provided from early morning to mid-evening with stops at the SR 512 park and ride.
- Route 603A: Weekday service only between downtown Olympia, Lakewood and Tacoma. The service is provided in the early morning to Lakewood and Tacoma and in the mid to late afternoon from Tacoma and Lakewood to Olympia; making stops at the SR 512 park and ride.
- Route 620: Weekend service only between downtown Olympia, Lakewood and Tacoma, making stops at the SR 512 park and ride. The service is provided from mid-morning to mid evening.

Park and Ride Lots

There are three park and ride lots in or near the study area. They are:

- SR 512, located one half block east of the intersection of South Tacoma Way & Pacific Highway South, adjoining I-5 at exit 127 (SR 512). This park and ride is served by Pierce Transit Routes 204 and 300; Sound Transit routes 574, 592, 594; and InterCity Transit routes 601, 603, 603A and 620. It has 493 stalls and is typically at or over capacity. Its over capacity rate is about 3 per cent.
- Lakewood Sounder Station, located at 11424 Pacific Highway South and 47th Avenue SW, approximately 4/10th of a mile north of the I-5/Bridgeport Way interchange (Exit 125) and approximately 1.3 miles south of the I-5/SR512 interchange (Exit 127). The facility opened in September 2008 and contains 620 parking stalls plus shelters and kiosk ticket machines. The station is currently serving regional and local bus routes and will eventually be the south terminus for commuter rail. It is served by Pierce Transit routes 300; Sound Transit route 599 and InterCity Transit routes 601, 603, 603A and 620 and has a utilization rate of approximately 40 per cent. This rate is expected to increase after Sound Transit commuter rail service commences in 2012.
- DuPont, located at Wilmington Drive and Palisade Boulevard, DuPont. It has 125 stalls and is served by Pierce Transit route 207G and Sound Transit route 592. This facility is approximately 10 percent overcapacity.

An overview of transit service within the study area is shown in Figure 6.



Transit Service

I-5 Transportation Alternative Analysis & Operations Model

MA108108301 Lakewood I-5 Growth Study\Graphics\08301_graphic01 <Fig 6> jesseb 09/01/09 10:43

FIGURE

Collision Analysis

Safety is the number one goal for the WSDOT. Collisions exact a heavy toll on lives, the public's health, the economy and the operational efficiency of public roads. The WSDOT has outlined in its Highway System Plan and the Strategic Highway Safety Plan measures and strategies to reduce the number of collisions and the severity of collisions on state owned and operated roadways. While the geometrics of a roadway may be a contributing factor in collisions, analysis by WSDOT indicates impaired driving (alcohol and drug influence), speeding, and failure to wear seat belts continue to be major contributing factors to highway fatalities.

The measures WSDOT has taken to reduce collisions include committing pre-existing funds (PEF), Nickel, and Transportation Partnership Act (TPA) funds to the statewide effort to reduce the frequency and severity of collisions on the state highway system.

Building upon these measures the WSDOT has implemented strategies such as "Target Zero," which identifies Washington State's traffic safety needs and guides investment decisions to achieve significant reductions in fatalities and serious injuries on all public roads. This strategy incorporates four traditional highway safety components commonly referred to as the "four Es": enforcement, engineering, education, and emergency services.

Additionally, through Tier 1, Tier 2 and Tier 3 strategies the WSDOT can more effectively target its investments. Tier I focuses on low-cost projects such as active traffic management, turn lanes and ramp modifications that deliver a high return on capital investment and have short delivery schedules. Tier II focuses on moderate to higher-cost improvements such as auxiliary lanes and direct access ramps while Tier III focuses on the highest-cost projects that deliver corridor-wide benefits. These would include commuter rail, HOV/HOT lanes, and adding general purpose lanes and interchange modifications.

An analysis of the number, type, and location of collisions was conducted for I-5 and the interchanges within the study area. Figure 7 summarizes the total number of collisions over the past several years within the study area, and also includes average daily volumes. With the exception of 2007, the total number of collisions increased between 2002 and 2008 along the I-5 corridor and its connecting ramps and arterial approaches in the study area. In 2002, there were 331 collisions on I-5 between Mounts Road and State Route 512. By 2008, there were 507 collisions for the same stretch of I-5, a 53-percent increase over this seven year period. This increase is significantly more than the 6.4-percent growth in traffic volumes over the same time period; the number of collisions has increased at a rate approximately 9 times faster than traffic volumes along the corridor.

The reduction in collisions in the year 2007 appears to be a temporary dip in the data that does not appear to fit the overall trend of increasing traffic volumes. Traffic volumes in 2007 were fairly flat between 2006 and 2007 and total collisions in 2008 appear to have returned to levels that match the trends seen from 2005 and 2006

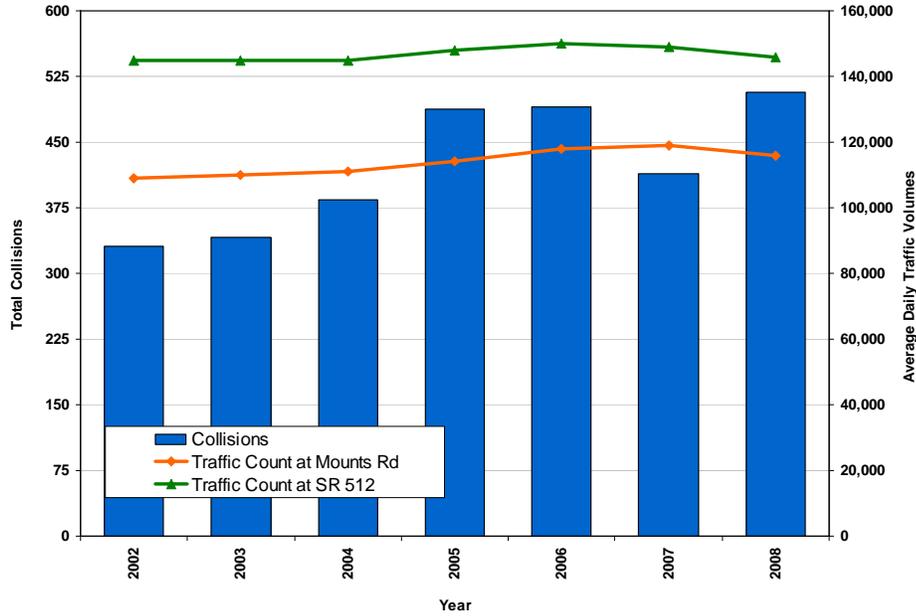


Figure 7. Total I-5 Mainline Collisions by Year

Collisions by Severity

Collision severity is characterized by type, such as fatality, severe injury, injury, property damage only, or otherwise unknown. Table 5 below shows the total number of collisions between 2002 and 2008 by type of collision severity.

Table 5. Total Collisions by Severity Type

Severity Type	2002	2003	2004	2005	2006	2007	2008	Total
Injury	139	141	118	183	175	139	146	1,041
Severe	1	2	2	7	11	5	5	33
Fatal	0	0	1	1	0	0	0	2
Property Damage Only	186	193	255	284	292	262	348	1,820
Unknown	5	6	8	13	12	8	8	60
Total Collisions	331	342	384	488	490	414	507	2,956

The largest numbers of collisions for any given year are property damage collisions. These are collisions that usually occur at slow enough speeds so that no injuries occur and typically occur in congested conditions. Over this seven year period, 62-percent of the collisions were property damage only. In contrast, approximately 1-percent of the collisions were severe or fatal, with two fatal collisions occurring over this seven year period. Severe collisions are more likely to occur at higher speeds.

Figure 8 shows the relative share of the total collisions by severity type. As traffic volumes have increased, so has the share of the total collisions that resulted in property damage only. In 2002, the share of property damage collisions was approximately 56-percent. In 2008 when traffic volumes were 3.6-percent higher, approximately 68-percent of the total mainline collisions in 2008 were property damage only. Between 2002 and 2008 traffic volumes increased 3.6-percent while property damage collisions increased 87-percent.

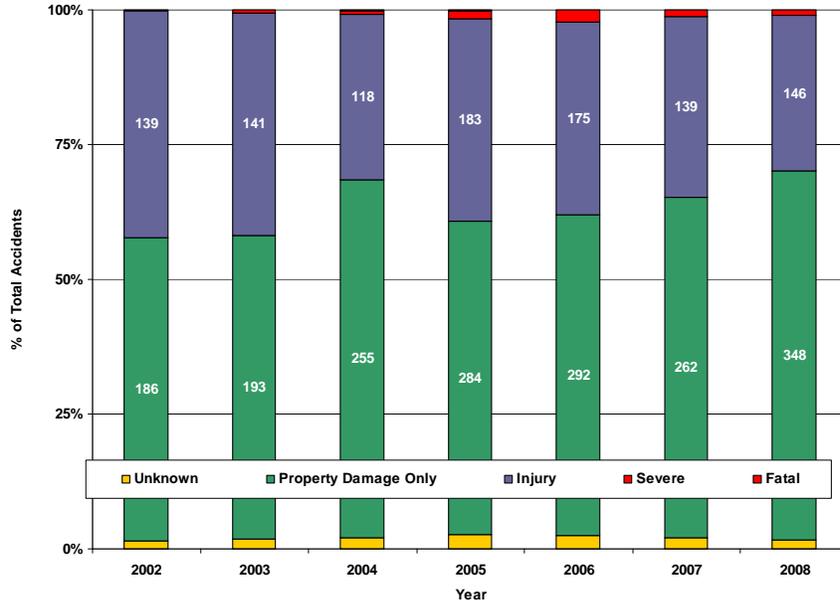


Figure 8. Total I-5 Mainline Collisions by Severity

Collisions by Type

Another way to analyze collisions is by the type of collision. As with property damage collisions, a clear sign of congestion related collisions are the presence of rear-end and side-swipe collisions. As traffic volumes grow and speeds slow, vehicles begin to queue and any sudden changes in speed for a vehicle have a greater likelihood of impacting the vehicles nearby.

As shown in Table 6 and Figure 9, a majority of the collisions on the I-5 mainline are rear-end collisions. Between 2002 and 2008, 61-percent of all collisions were rear-end collisions and the percentage of rear-end collisions has remained fairly constant through these years.

The next highest percentages of collisions by type are those that involve a single vehicle and include things like running off the roadway, striking median barriers, etc. These collisions comprise approximately 20-percent of the total collisions.

In the seven years analyzed, 6 collisions involved vehicles hitting one another head on. Of these collisions, six occurred in the late night or early evening with one occurring in the late afternoon.

Table 6. Total Collisions by Type

Severity Type	2002	2003	2004	2005	2006	2007	2008	Total
Head On	1	1	3	0	0	1	0	6
Sideswipe	43	54	57	76	85	57	79	451
At-Angle	19	9	18	17	15	15	19	112
Rear-End	189	190	219	309	290	278	321	1,796
Other	6	2	3	4	5	1	1	22
Single-Vehicle	73	86	84	82	95	62	87	569
Total Collisions	331	342	384	488	490	414	507	2,956

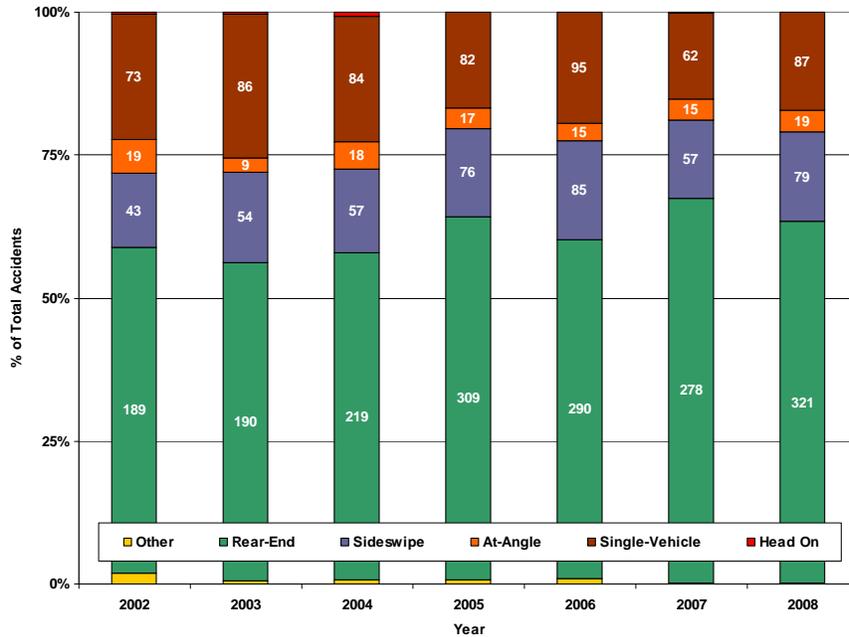


Figure 9. Total I-5 Mainline Collision by Type

Collisions by Location

Analysis of the collision data shows a correlation between the ramps and the total number of mainline collisions. In Figure 10, the total number of mainline collisions for every 0.25 miles is shown in red with the corresponding ramp collisions shown in green. The peaks for the mainline collisions correspond with the green spikes showing the locations of the ramps. From this, it would appear that the merging and diverging at the interchange areas with the mainline volumes affect the number of total collisions.

It should be noted that 80 collisions at the SR 512 interchange in 2008 with 60 of these occurring on the SR 512 interchange crossing or ramps and not the I-5 mainline. In 2008, the highest spikes for the collisions were on the ramps at the Thorne Lane and Bridgeport Way interchanges with over 25 collisions occurring at each of these locations. The ramps that feed the main Fort Lewis gates had between 10 and 20 collisions in 2008.

The concentration of collisions at the interchange ramp areas appear related to the influence of ramp activities and the presence of congestion. As shown in Figure 10, the interchange areas have the highest number of collisions but a majority of these appear to be property damage only which is indicative of collisions at lower speeds. With the exception of one severe collision, 80-percent occurred in areas with much lower overall total collisions and in areas in between the interchanges.

Figure 11 illustrates how the location of collisions can vary year by year. The top chart in the figure is from 2006 and the lower chart from 2008. The number of collisions throughout the corridor does vary, but general trends are similar. More variance can be seen for the severe collisions, but with a low number of severe collisions occurring each year, annual variations are not unexpected.

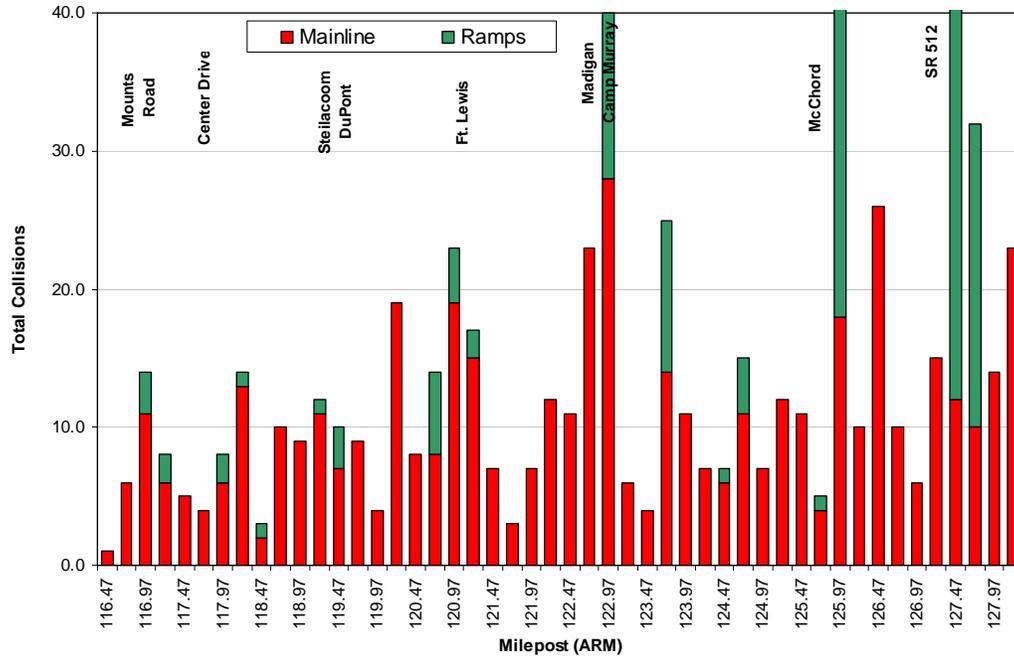


Figure 10. 2008 I-5 Mainline and Ramp Collision Analysis by Location

The greatest number of collisions on the freeway ramps and interchange crossings are at the SR 512 and at Bridgeport Way interchanges. These two interchanges have seen 5 to 6 times more collisions per year than any of the other interchange in the study area. The majority of collisions occurred on the crossings of the facility at the ramp terminals.

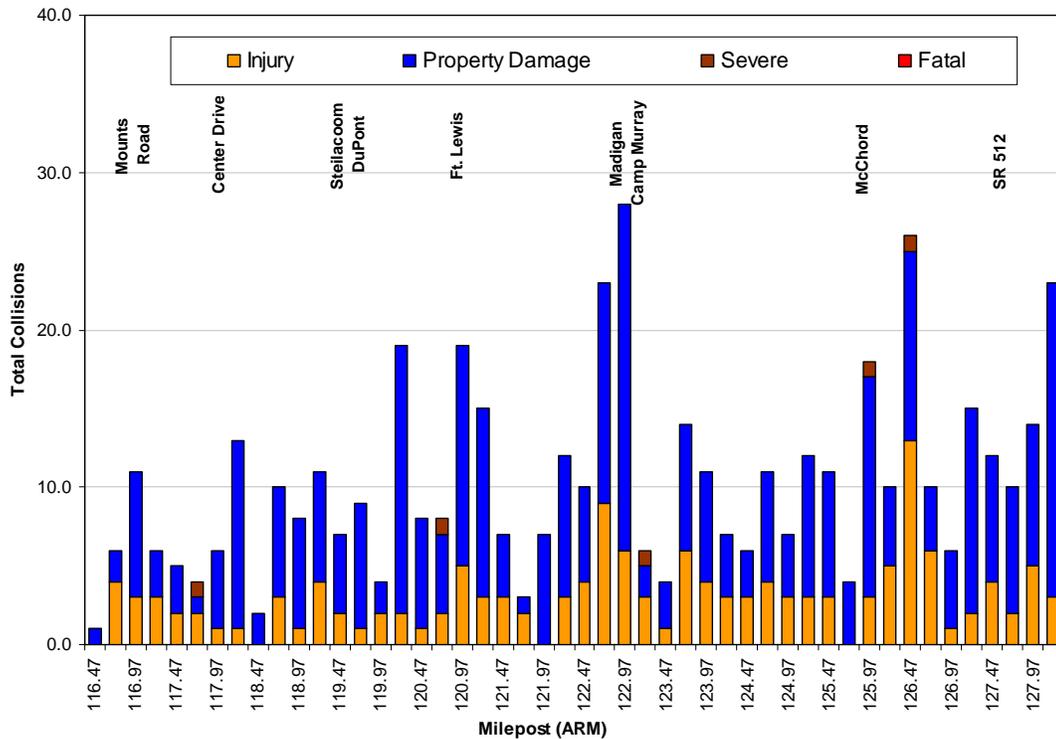


Figure 11. 2008 Mainline Collisions by Severity and Location

In 2003, one fatal collision occurred on the I-5 ramps within the study area. There have been, on average, 2 severe collisions per year on the ramps in the study area. However, their location has varied amongst the various interchanges on an annual basis. A summary of ramp collisions during 2008 by severity and location within the study area is provided in Figure 12.

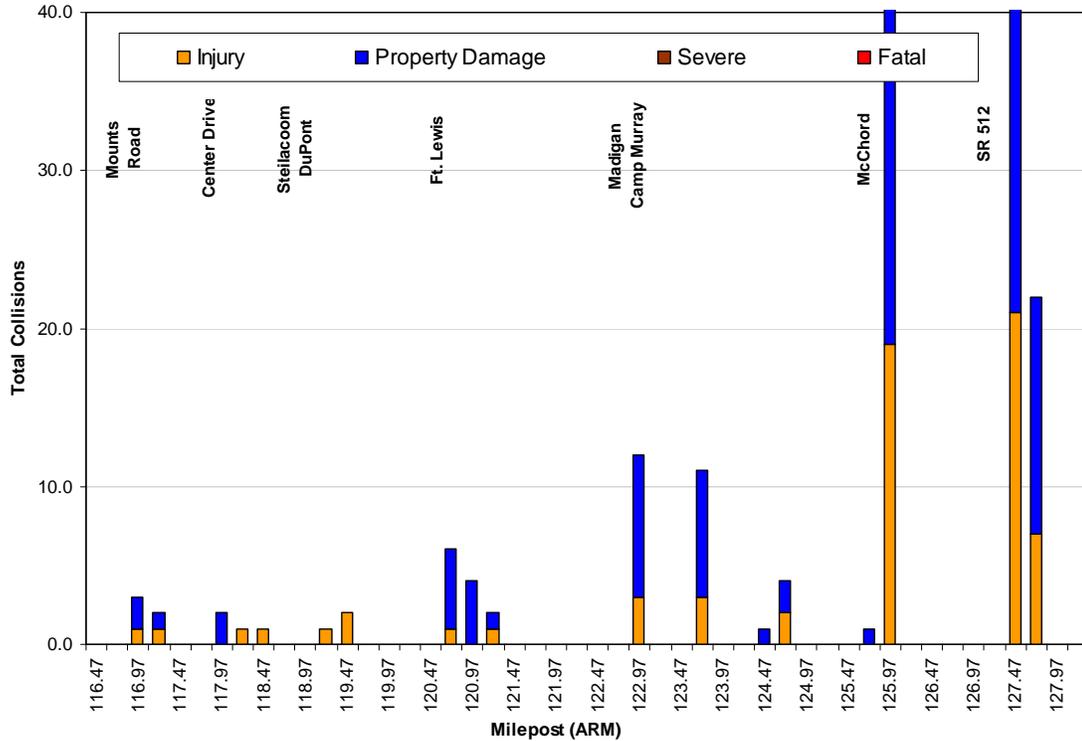


Figure 12. 2008 Ramp Collisions by Severity and Location

Collision Summary

- Collisions have increased faster than traffic volumes
- Rear-end and Property Damage collisions account for the greatest number of collision type and severity, respectively.
- The type and severity of collisions are consistent with urban stop and go traffic.
- Fatalities are low.
- The greatest frequency of collisions occurs at Exit 127 (SR 512); McChord (Exit 125); Exit 123 Madigan/Camp Murray.

Traffic Volumes

Regional traffic volumes on I-5 fluctuate from year to year and are affected by population and employment trends and economic cycles within the region as a whole. The rapid population growth in Washington State over the past 20 years has led to some significant changes in traffic volumes, especially on urban interstates in the Puget Sound region. Until 2007, traffic volumes have historically increased on an annual basis in the region, but recent economic

conditions have led to reductions in traffic volumes across the state. Although recent data shows reductions in both traffic volumes and congestion levels, it is important to understand that the current downward trends are likely to reverse course as the economy begins to recover and employment returns to traditional levels.

Regional Population Trends

Population in the central Puget Sound region has experienced steady growth since 1990. Table 7 summarizes the population estimates for Pierce and Thurston Counties, and provides statewide estimates for comparison. In 2008, Pierce County had the second largest population in the state. Over the last 18 years, the population of Pierce County alone has increased by almost 220,000 people; this increase is greater than the entire population of Thurston County in the 2000 census. As of April 2008, the Puget Sound region's population was estimated to have reached 3,633,000, over 55-percent of the entire state population. Since the 2000 Census, Pierce County has grown by an annual average rate of 1.8-percent and Thurston County by 2.1-percent. This compares with approximately 1.4-percent annual growth for the state as a whole.

Table 7. Historic Population Trends

County	Population Estimates			Annual Growth Rate		
	1990 Census	2000 Census	2008 Est.	1990 to 2000	2000 to 2008	1990 to 2008
Pierce	586,203	700,818	805,400	1.8%	1.8%	1.8%
Thurston	161,238	207,355	245,300	2.5%	2.1%	2.4%
Washington	4,866,669	5,894,147	6,587,600	1.9%	1.4%	1.7%

Source: 2008 Population Trends for Washington State from Office of Financial Management, Tables 2 and 3

Table 8 summarizes the annual population growth between 2000 and 2008 for municipalities adjacent Fort Lewis and McChord AFB and demonstrates the variation between each jurisdiction. As the table shows, the City of Tacoma grew at 0.6-percent, the Town of Steilacoom at 0.4-percent, and City of Lacey at 2.5-percent. Since 2000, the City of Lakewood's population has increased by 0.1-percent, from 58,293 to 58,780. The rate of population growth in the south Puget Sound region has been fairly steady since the 2000 Census but shows discernible population spikes after 2005 that correspond with the defense-related growth at Fort Lewis. Much of the growth in Pierce County over the past decade has occurred in the unincorporated areas of Pierce County east of the bases such as South Hill, Graham, and the city of Puyallup as well as DuPont and Roy.

Table 8. Historic Population Trends by Local Jurisdiction

Jurisdictions	2000	2008	Net Change (2000 to 2008)	Annual Average Growth Rate
City of Tacoma	193,556	202,700	9,144	0.6%
City of Lakewood	58,293	58,780	487	0.1%
City of Lacey	31,226	38,040	6,814	2.5%
City of DuPont	2,452	7,390	4,938	14.8%
Town of Steilacoom	6,049	6,255	206	0.4%
Town of Roy	260	875	615	16.4%
City of Yelm	3,289	5,150	1,861	5.8%
Fort Lewis	48,104	77,616	29,512	6.2%

The Pierce County communities of Roy and DuPont were the second and third (respectively) fastest growing areas in the entire state of Washington, and Yelm in Thurston County was 15th overall. A significant portion of this growth is attributable to residential developments

that have specifically catered to military personnel. For example, data shows that of the 5,150 people living in Yelm, 2,211 (41-percent) are Fort Lewis soldiers, family members or civilians employed on post. Of the 7,390 citizens of DuPont, 2,985 (40-percent) are Fort Lewis soldiers, family members or federally employed civilians. Thus the tremendous growth experienced in both DuPont and Yelm can be directly correlated to personnel growth at Fort Lewis and related employment.

As shown in Table 8, the on-base population of Fort Lewis personnel and their families residing on base has increased by over 29,000 people since the year 2000. This is nearly 30-percent of the total change in the population for Pierce County. The Department of the Army is conducting an Environmental Impact Statement (EIS) for options that could double the active-duty population over 2009 conditions. This growth will lead to opportunities and challenges for Fort Lewis, McChord AFB, and the communities in the surrounding region.

Traffic Volume Trends

Since 1990, the state's population has grown an average of approximately 1.7-percent per year (Table 7, p34). Historical data from various Automatic Traffic Recording (ATR) stations located on I-5 throughout the Central Puget Sound shows that over a similar time period (1986 to 2008), travel on I-5 in the Central Puget Sound has grown at an annual average rate of 1.8-percent. This annual average growth rate is consistent with the population growth in the region. Several locations were reviewed in the study area as well as stations north and south of the study area limits. Table 9 below summarizes the traffic volumes and growth rates throughout the I-5 corridor, including the study area and extends further north into King County for comparison purposes. Figure 13 presents a more detailed comparison of locations within the study area.

Table 9. Historic I-5 Traffic Volume Trends

Location	Annual Average Daily Traffic (both directions)				Annual Average Growth Rate			
	1986	1996	2006	2008	1986 to 1996	1996 to 2006	2006 to 2008	1986 to 2008
SR 510 (MP 110.84)	59,600	87,080	110,780	110,010	3.9%	2.4%	-0.3%	2.8%
Mounts Rd (MP 114.65)	66,900	87,600	109,130	109,310	2.7%	2.2%	0.1%	2.3%
DuPont-Steilacoom Rd (MP119.01)	60,690	82,890	108,520	108,700	3.2%	2.7%	0.1%	2.7%
SR 512 (MP 126.77)	104,200	131,310	145,340	142,790	2.3%	1.0%	-0.9%	1.4%
SR 167 (MP 135.32)	110,500	168,320	191,640	188,030	4.3%	1.3%	-0.9%	2.4%
SR 18 (MP 142.49)	98,200	142,180	158,030	163,490	3.8%	1.1%	1.7%	2.3%
S 188th (MP 151.96)	139,650	195,510	223,520	218,360	3.4%	1.3%	-1.2%	2.1%
Columbian Wy (MP 162.53)	184,300	215,930	232,470	223,520	1.6%	0.7%	-1.9%	0.9%
Ship Canal Bridge (MP 151.96)	217,120	278,575	277,630	272,930	2.5%	0.0%	-0.9%	1.0%
NE 145th St (MP 175.1)	153,900	177,040	198,830	188,630	1.4%	1.2%	-2.6%	0.9%
SR 104 (MP 177.17)	144,400	168,770	191,460	183,240	1.6%	1.3%	-2.2%	1.1%
SR 524 (MP 182.04)	118,300	160,670	193,070	189,700	3.1%	1.9%	-0.9%	2.2%
SR 526 (MP 189.97)	100,600	145,750	169,060	164,920	3.8%	1.5%	-1.2%	2.3%
SR 528 (MP 198.9)	76,100	108,320	137,450	134,080	3.6%	2.4%	-1.2%	2.6%
SR 520 (MP 208.99)	38,990	56,990	77,730	75,380	3.9%	3.2%	-1.5%	3.0%
Total for all segments	1,673,450	2,206,935	2,524,660	2,473,090	2.8%	1.4%	-1.0%	1.8%

Over this 22 year time horizon, traffic volumes on I-5 in King County have averaged approximately 1.5-percent annual increases and Snohomish County has experienced a 3-percent annual change. It should be noted that a substantial amount of High Occupancy Vehicle (HOV) lane expansion occurred in Snohomish County over this time horizon. This

expanded capacity, along with slightly more population growth than Pierce County, might be one reason that I-5 traffic grew faster in Snohomish County. The first expansion of HOV lanes in Pierce County has now begun and the system is planned to extend as far south as SR 512 in the future.

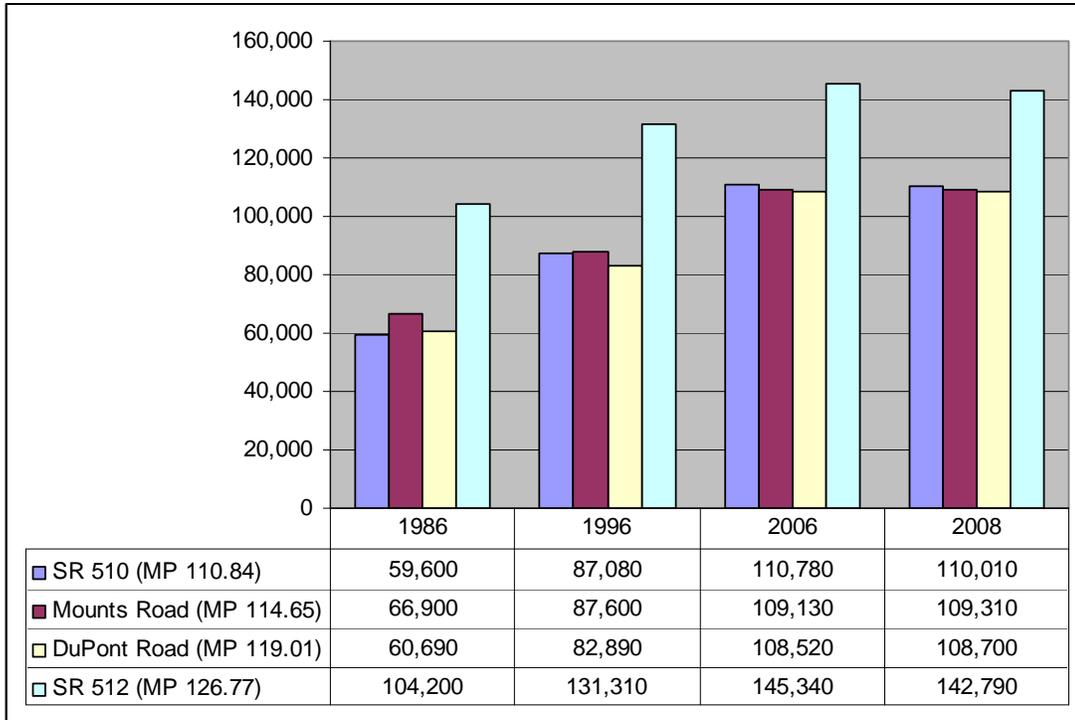


Figure 13. I-5 Mainline Historical Annual Average Daily Traffic Volume

*The daily average number of vehicles for a given year.

The data highlights a variety of issues. In general, traffic growth on I-5 in the Central Puget Sound over the past 20 years has been greatest in Pierce and Snohomish Counties. Since 1986, Pierce County has averaged 2.7-percent annual average traffic volume growth on I-5. Over this 22 year period this annual average growth equates to over 160-percent more traffic is on I-5 today than in 1986, or an increase of over 48,000 additional vehicles on I-5 near DuPont. This level of demand requires significant additional capacity and the additional capacity has not been constructed as the demands have increased. If population growth continues at approximately 2-percent per year until 2030, traffic volumes on I-5 near DuPont could reach levels that currently exist on I-5 north of SR 512, a location that currently provides an additional lane of capacity in each direction of travel.

From 2006 through 2008, many locations around the Puget Sound have experienced traffic volume reductions, and some locations have even reported congestion reductions, due to the economic downturn. For locations north of Seattle in King County, traffic volumes on I-5 have dropped by over 2%. In Snohomish County, these reductions are on the order of 1½%. These percentage decreases in volumes are on the order of 5,000 to 10,000 vehicles per day on some stretches of I-5. This has led to some improvement in travel time for a few locations.

The same trend has not occurred on I-5 in the Study area. Instead of reductions in traffic volumes, there was actually a minor increase in traffic at a few locations on I-5 in the study area between 2006 and 2008. This flattening of traffic would help explain why travelers on this stretch of I-5 have not seen the congestion improvements that have been reported in other areas of the region. This difference is very likely the result of the influence of the bases

on I-5 traffic. Base year model results have shown that at some locations, over 50% of the traffic on I-5 is military related. With the current and future base expansions, it is likely that the travel trends on I-5 in the study area will continue to increase. As the economy recovers and the rest of the region also begins picking up again, it is highly likely that traffic growth will resume a steady climb upward.

Existing 2009 weekday PM peak hour traffic volumes throughout the I-5 corridor are summarized in Figure 14 and Figure 15.

Operations Analysis

Traffic operations are characterized through a level of service (LOS) analysis. LOS is a widely applied analysis technique for measuring the quality of traffic flow along freeway segments and through intersections. LOS values range from LOS A, which is indicative of free-flow conditions to LOS F, indicating extreme congestion and long delays. The LOS for each freeway segment and study area intersection (ramp terminals and some intersections immediately adjacent to interchanges) was calculated using methodologies presented in the *Highway Capacity Manual (HCM)*, 2000.

One inherent limitation of the traffic volume data used to estimate LOS is that only the actual number of vehicles traveling through the study area during the peak hour is known while the methodology calls for the number of vehicles that *want* to travel through the study area (the demand). Under congested or over-capacity conditions the flow rate of vehicles decreases significantly and long queues and congestion make it difficult to observe the vehicular demand, thus the volumes used in the LOS analysis may underestimate the magnitude of traffic. Because of this limitation, the estimated LOS values for some study area locations may be worse than reported. While the magnitude of the congestion may be underestimated depending on the daily fluctuations in volume, the LOS analysis is indicative of existing bottlenecks in the system.

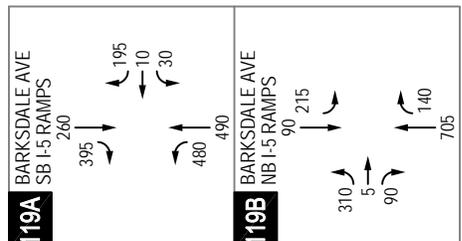
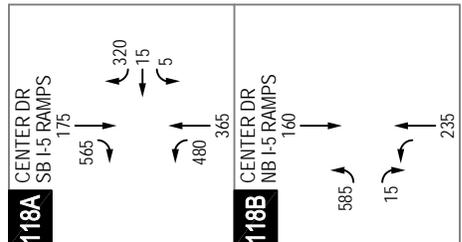
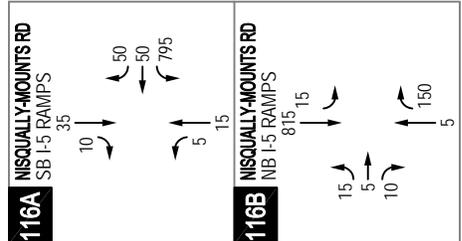
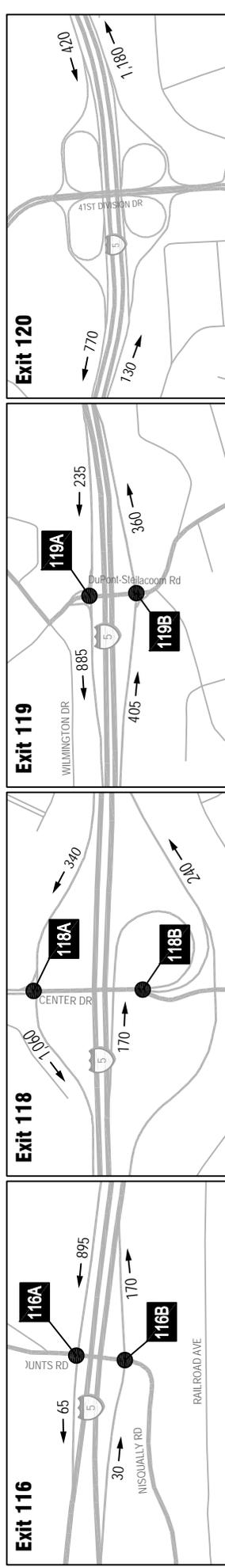
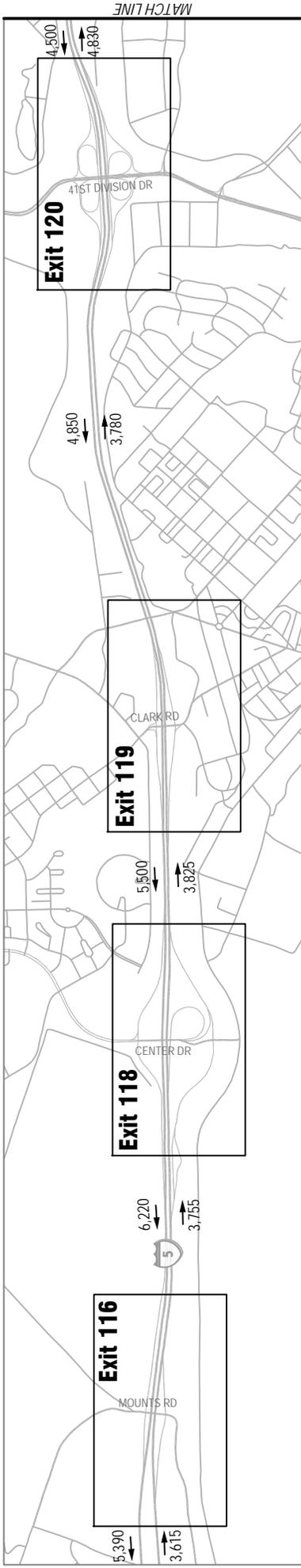
For this analysis, the Highway Capacity Software program was used to evaluate freeway segments and the Synchro software program (version 7.0) was used to evaluate intersection operations. A more detailed description of the LOS criteria has been included in Appendix A. Discussion of mainline freeway and arterial operations is presented in the following sections. The WSDOT applies a LOS E standard along urban freeways and at ramp intersections.

Mainline Operations

Mainline PM peak hour LOS results are summarized in Figure 16. As shown in this figure, in the northbound direction, the mainline is shown to operate at LOS D or better up to the Berkely Street interchange (exit 122). Berkely Street is one of the primary interchanges used by both Fort Lewis and Camp Murray to access I-5 and a high volume of traffic attempts to merge onto mainline I-5. As shown, the merge and mainline operations north of the ramp are shown to operate at LOS E or worse. North of Gravelly Lake Drive interchange, an additional northbound lane is provided and conditions improve until the SR 512 interchange. The northbound merge and diverge operations at SR 512 are also currently operate below LOS D.

In the southbound direction, generally the mainline operates at LOS D or better with the exception of the following areas:

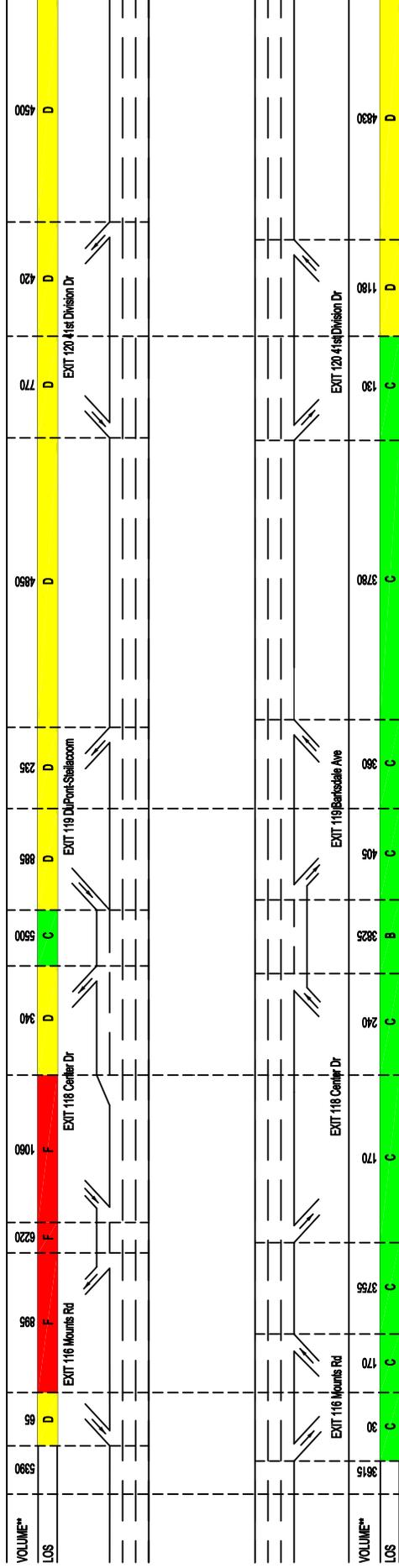
- Southbound diverge at SR 512
- Southbound diverge at Thorne lane
- Mainline and ramp operations between Center Drive and Mounts Road



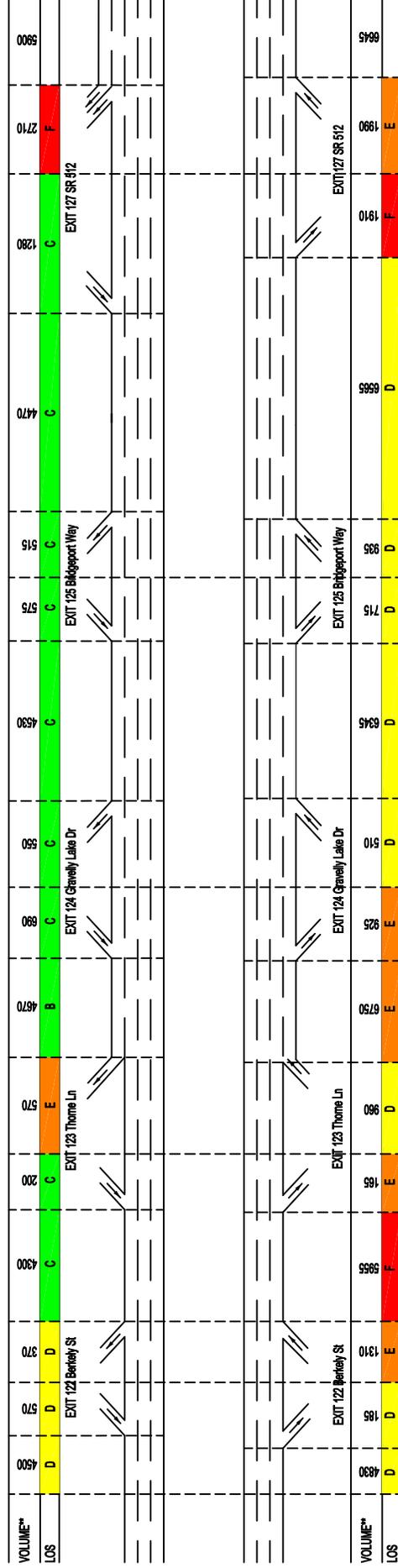
2009 PM Peak Hour Volumes (1 of 2)

FIGURE 14

Lakewood I-5: Exit 116-Exit 120



Lakewood I-5: Exit 122-127



I-5 Mainline PM Peak Hour LOS Results

I-5 Transportation Alternative Analysis & Operations Model

MA\08108301 Lakewood I-5 Growth Study\Graphics\08301_graphic01 <Fig 16> Jesseb 09/01/09 10:54

FIGURE

In addition to the PM peak hour congestion, operational deficiencies at the Berkely Street interchange during the AM peak hour results in queuing onto the mainline. WSDOT has installed signage and congestion warning systems to alert drivers along the corridor to this condition as it occurs.

Arterials/Ramp Terminals

Existing operations results for the weekday PM peak hour at arterial intersections (ramp terminals and adjacent arterial intersections) are summarized in Table 10 (p 41).

Table 10. Existing (2009) Arterial/Ramp Terminal PM Peak Hour Operations Summary

I-5 Interchange Exit No.	Intersection	2009 PM Peak Hour		
		LOS ¹	Delay ²	V/C ³ or WM ⁴
117	SB I-5 Ramps/Mounts Rd	D	34.4	WB-LT
	NB I-5 Ramps/Mounts Rd	C	20.6	EB
118	SB I-5 Ramps/Center Dr	E	36.6	WB
	NB I-5 Ramps/Center Dr	F	107.7	EB
119	SB I-5 Ramps/DuPont-Steilacoom Rd	B	13.2	0.78
	NB I-5 Ramps/DuPont-Steilacoom Rd	C	34.9	0.80
122	Union Ave/Berkeley Ave	D	29.3	-
	SB I-5 Ramps/Berkeley Ave	C	32.8	0.76
	NB I-5 Ramps/Berkeley Ave	C	21.6	0.80
123	Union Ave/Thorne Ln	B	11.6	EB
	SB I-5 Ramps/Thorne Ln	D	43.0	0.60
	NB I-5 Ramps/Thorne Ln	D	41.0	0.59
124	Pacific Hwy/Gravelly Lake Dr	B	15.4	0.74
	SB I-5 Ramps/Gravelly Lake Dr	E	78.4	0.89
	NB I-5 Ramps/Gravelly Lake Dr	F	90.5	0.71
125	Pacific Hwy/Bridgeport Way	C	30.9	0.63
	SB I-5 Ramps/Bridgeport Way	D	40.3	0.84
	NB I-5 Ramps/Bridgeport Way	C	22.7	0.75
127	South Tacoma Way/SR 512	C	29.9	0.68

1. Level of service, based on 2000 Highway Capacity Manual methodology.

2. Average delay in seconds per vehicle.

3. Volume-to-capacity ratio reported for signalized intersections.

4. Worst movement reported for unsignalized intersections.

As shown in Table 10, the ramp terminal intersections at Center Drive and Gravelly Lake Drive operate poorly at LOS E or F. The LOS standard applied by WSDOT for all urban arterial/ramp terminal intersections is LOS E. Field observations at Union Avenue/Berkeley Avenue showed operations are worse than the results shown in Table 10 due to queues from the adjacent ramp intersection that extend through Union Avenue/Berkeley Avenue. The queue impacts are caused by operations and the very close proximity to the Berkeley Avenue interchange.

Southbound I-5 off-ramp queues at the Berkeley Avenue interchange (aka – Madigan Army Medical Center) have been observed to extend the full length of the off-ramp and onto mainline I-5 during weekday mornings. Based on this, an operations analysis of the AM peak hour at the Berkeley Avenue ramp terminals was also completed and results are shown in Table 11.

Table 11. Existing (2009) Arterial/Ramp Terminal AM Peak Hour Operations Summary

I-5 Interchange Exit No.	Intersection	2009 AM Peak Hour		
		LOS ¹	Delay ²	V/C ³ or WM ⁴
122	SB I-5 Ramps/Berkeley Ave	D	43.8	0.78
	<i>Southbound Off-Ramp</i>	<i>D</i>	<i>45.4</i>	<i>0.84</i>
	NB I-5 Ramps/Berkeley Ave	C	20.3	0.77

1. Level of service, based on 2000 Highway Capacity Manual methodology.
2. Average delay in seconds per vehicle.
3. Volume-to-capacity ratio reported for signalized intersections.
4. Worst movement reported for unsignalized intersections.

Although the analysis does not show poor operations at the southbound Berkeley Avenue off-ramps, field observations indicate that the vehicle queuing on the southbound off-ramp extends onto the shoulder of mainline I-5. Thus, future capacity improvements will focus on this condition despite the LOS reported for the weekday AM peak hour (Table 11).

Military Travel Patterns & Trends

In addition to regional background demands on I-5, traffic to and from the military bases is a significant contribution to traffic volumes along the I-5 corridor within the study area. Variations of these impacts can sometimes be felt on a day-to-day basis and are dependent upon military operations. These operations can change depending on troop deployments, varying security levels, or holiday leave. In addition to the short-term changes, longer-term impacts also occur. Over the past several years the overall number of troops based at Fort Lewis has increased, and as previously discussed, is anticipated to continue to increase during the next several years. This general increase contributes to the need for this current study. Because of variable short-term military operations, a look at broad and long-term military travel patterns and trends is necessary to better understand how to best address any identified impacts.

Travel Patterns

The travel patterns and distribution of traffic from the military bases throughout the regional roadway network are important considerations when evaluating likely impacts to the I-5 corridor. Impacts from military travel demand are more noticeable at interchange ramps located near access gates (Access Control Points). Traffic to and from Fort Lewis and McChord AFB have differing distribution patterns due to the number and location of access control points. Based upon data from Fort Lewis⁵ and McChord AFB the following general travel patterns are known:⁶

- 50-percent of Fort Lewis personnel and their families, and 60-percent of McChord AFB, reside and access the installations from the north (i.e. Lakewood, Tacoma, Kitsap and King Counties).
- 30-percent of Fort Lewis personnel, and 15-percent of McChord AFB, reside and access the installation from the south (i.e. Lacey, Olympia, Thurston County),
- 10-percent of Fort Lewis personnel, and 5-percent of McChord AFB, reside and access the installations from the east (i.e. Yelm, Spanaway, Pierce County), and

⁵ *Fort Lewis Growth Overview* - Tom Knight, Deputy Garrison Commander. Presentation slides (April 9, 2009)

⁶ Mailing address zip-code data for McChord AFB personnel (civilian & military) provided by McChord AFB (email, June 10, 2009)

- 10-percent of Fort Lewis personnel, and 15-percent of McChord AFB, reside and access the installations from the west (i.e. DuPont and Steilacoom).⁷

The significant distribution of traffic to the north and south of the military installations (80-percent of Fort Lewis, 75-percent of McChord AFB) results in the majority of military traffic utilizing the I-5 corridor to access the installations via the gates along I-5.

Gate Access

Multiple access points are provided for the three military installations as shown in Figure 18. The estimated total entering traffic at each gate is shown in Figure 17.

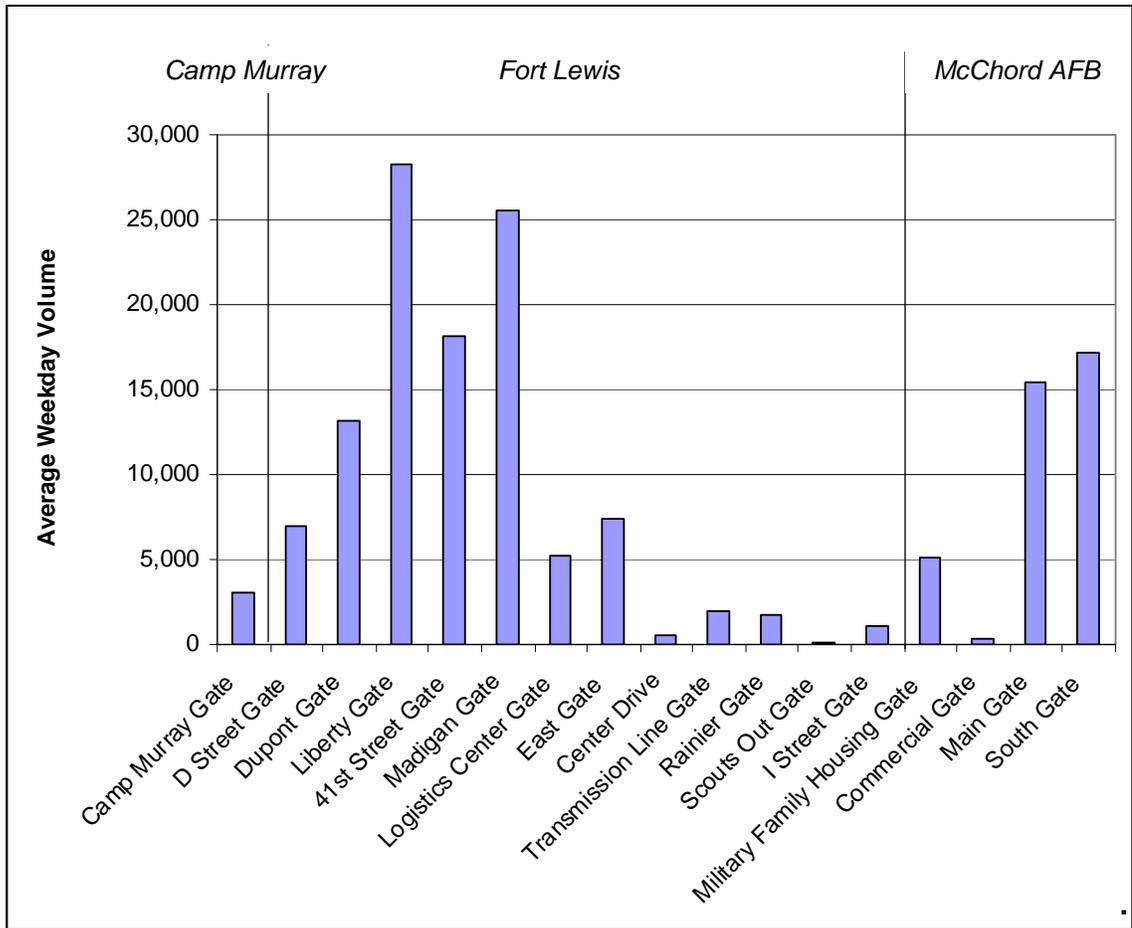
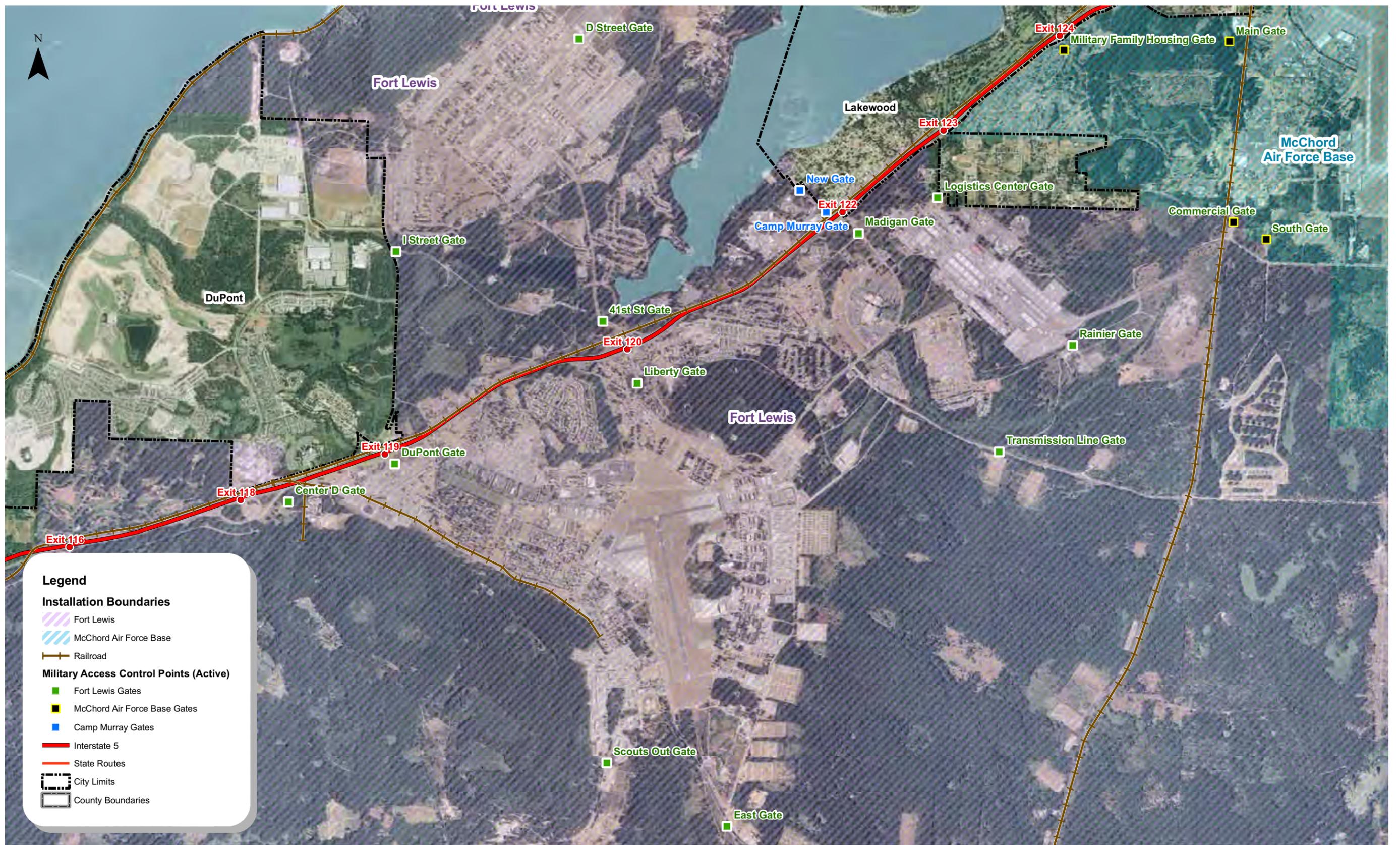


Figure 17. Total Entering Gate Volumes (2009)

⁷ The remaining 5-percent of McChord AFB personnel are classified as “other” within the provided data.



Military Gate Locations

Interstate 5 Transportation Alternatives Analysis and Operations Model

M:\08\08301 Lakewood I-5 Growth Study\Graphics\GIS\MXD\Fort Lewis Gates.mxd



FIGURE

18

As Figure 17 shows, the majority of traffic from Fort Lewis accesses via DuPont, Liberty, 41st Division, and Madigan gates while the majority of McChord AFB traffic accesses via the Main and South gates. As Figure 18 shows, all four of the high volume Fort Lewis gates are located in close proximity to the I-5 corridor (DuPont, Liberty, 41st Street, and Madigan) and one of the high volume McChord AFB gates is located near I-5 (Main). In particular the DuPont, Liberty, and Madigan gates are located immediately adjacent to, or are accessed directly, via adjacent I-5 interchanges. Because of the high volumes and close proximity to I-5, operations at the four Fort Lewis gates, and particularly the three immediately adjacent to I-5, are likely to have the greatest impact to I-5 mainline and ramp operations. McChord AFB gates are all located a further distance from the I-5 corridor and do not directly impact mainline I-5 or ramp operations.

Historically, poor gate operations have sometimes resulted in gate queues extending through ramp intersections and onto mainline I-5. Recent changes to gate operations have improved queuing at the gates such that queues infrequently extend back through adjacent ramp intersections or impact ramp and mainline traffic. However, due to the high variability of day-to-day base operations (i.e. troop deployments, security level changes) and anticipated increase in future troop levels, gate operations may impact mainline and ramp operations. As improvement alternatives are developed, potential impacts from day-to-day changes should be considered.

Historical Trends

To better understand potential long-term future military conditions, historical information can be used to show general trends.

Fort Lewis

Over the past several years the number of military personnel and supporting civilian employees at Fort Lewis has increased. The most current available data, from the first half of 2009, shows approximately 47,500 vehicles entering Fort Lewis on an average day. This includes military personnel, families residing on base, and civilian employees.

To assess the overall historical trends observed at Fort Lewis, weekly entering traffic volumes at all gates was summarized and are shown in Figure 19. As shown, traffic to Fort Lewis has generally increased over the past several years. During this time, volumes have increased and decreased as various troop deployments occurred. From 2005 to mid-2006, traffic can be seen to generally increase. Between mid-2006 and the end of 2007 traffic volumes decreased as deployments increase. From the end of 2008 through today, traffic volumes have again increased as deployed troops have returned and the total number of troops based at Fort Lewis has also increased.

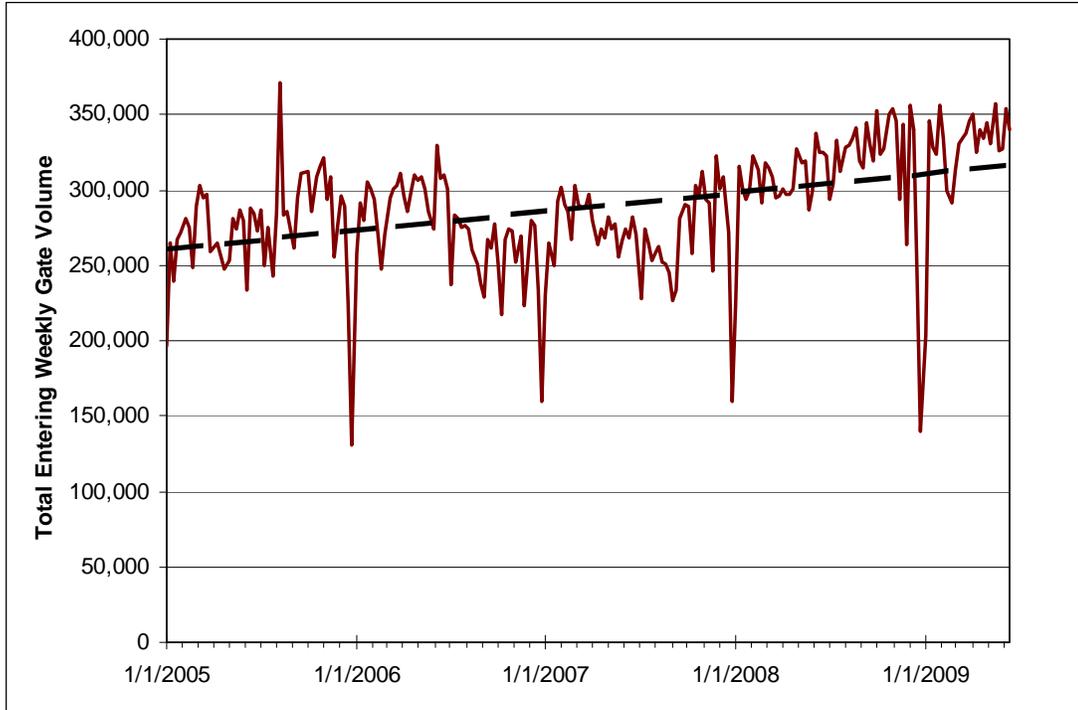


Figure 19. Fort Lewis Total Entering Weekly Volumes

*Volumes are the total for entire week for each year. Dips in volumes around the Christmas and New Years holidays occur due to holiday base operations.

McChord AFB

In contrast to Fort Lewis, military personnel levels at McChord AFB have remained relatively constant over the past several years. Limited data is available for McChord AFB traffic volumes, but estimated volumes for 2009 show approximately 19,000 vehicles enter McChord AFB on an average weekday. This includes military personnel, families residing on base, and civilian employees. McChord AFB impacts to the I-5 corridor have not seen any appreciable change over the past several years.

Summary of Military Impacts

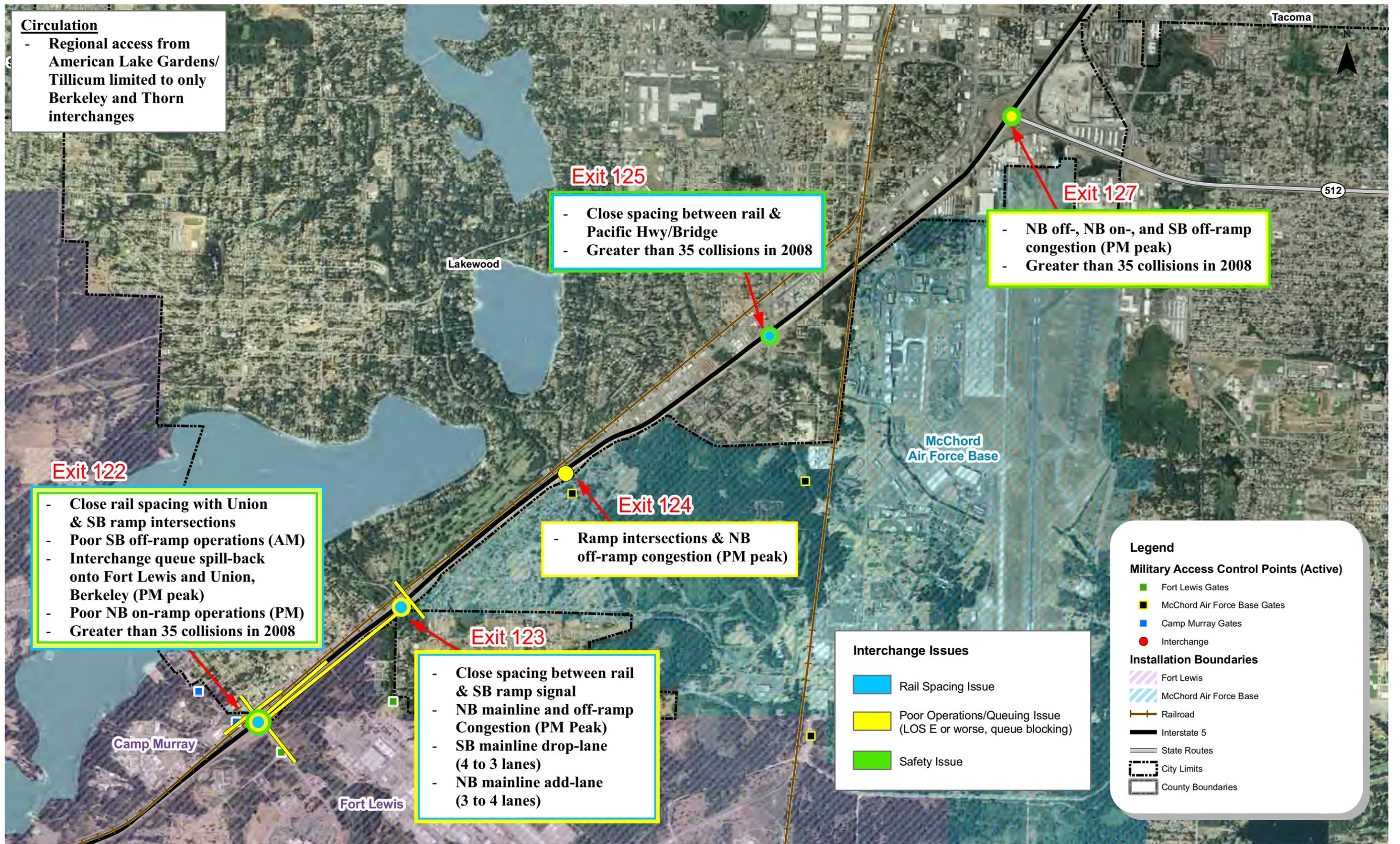
The close proximity and high volume of traffic at four of the Fort Lewis gates (Liberty, 41st Division, Madigan, and DuPont) increases the likelihood that gate operations and volumes impact traffic along I-5 ramps or mainline. At McChord AFB, gate access is provided a further distance from I-5 and as a result, gate operations and volumes have much less impact than Fort Lewis.

Should any significant troop deployment or military needs alter operations on Fort Lewis or McChord AFB, traffic volumes and congestion levels could quickly change for better or worse. Anticipated troop levels at McChord are not anticipated to change significantly for the foreseeable future while troop levels at Fort Lewis are expected to continue to grow. Given these troop levels, the corresponding traffic volumes, and the location of the Fort Lewis and McChord AFB gates, the interchanges in close proximity to Fort Lewis gates should draw the focus for future analysis.

Existing Conditions Issues Summary

A summary of existing issues throughout the study area, including collisions, geometric constraints and transportation facilities, and operations, are provided in Figure 20 and Figure 21. Throughout the study area, several key issues shown in these figures are:

- Close spacing between the rail line, adjacent arterial intersections, and I-5 ramp interchanges at Thorne Lane, Berkeley Avenue, 41st Division Drive, and DuPont-Steilacoom Road. Poor operations at Union Avenue/Berkeley Avenue due to the close proximity to Berkeley Avenue interchange.
- PM peak hour I-5 mainline and ramp congestion at the SR 512 interchange, northbound Gravelly Lake Drive off-ramp, between the Berkeley Avenue northbound on-ramp and Thorne Lane off-ramp.
- AM peak hour I-5 ramp congestion at the southbound I-5 off-ramp at Berkeley Avenue.
- Poor out-bound Fort Lewis operations at Berkeley Avenue (to northbound I-5), DuPont gate/DuPont-Steilacoom Road (to southbound I-5), and Center Drive (to DuPont and southbound I-5).
- Greater than 35 annual collisions at the SR 512/I-5, Bridgeport Way, and Berkeley Avenue interchanges.
- Poor Fort Lewis access configuration at Center Drive.



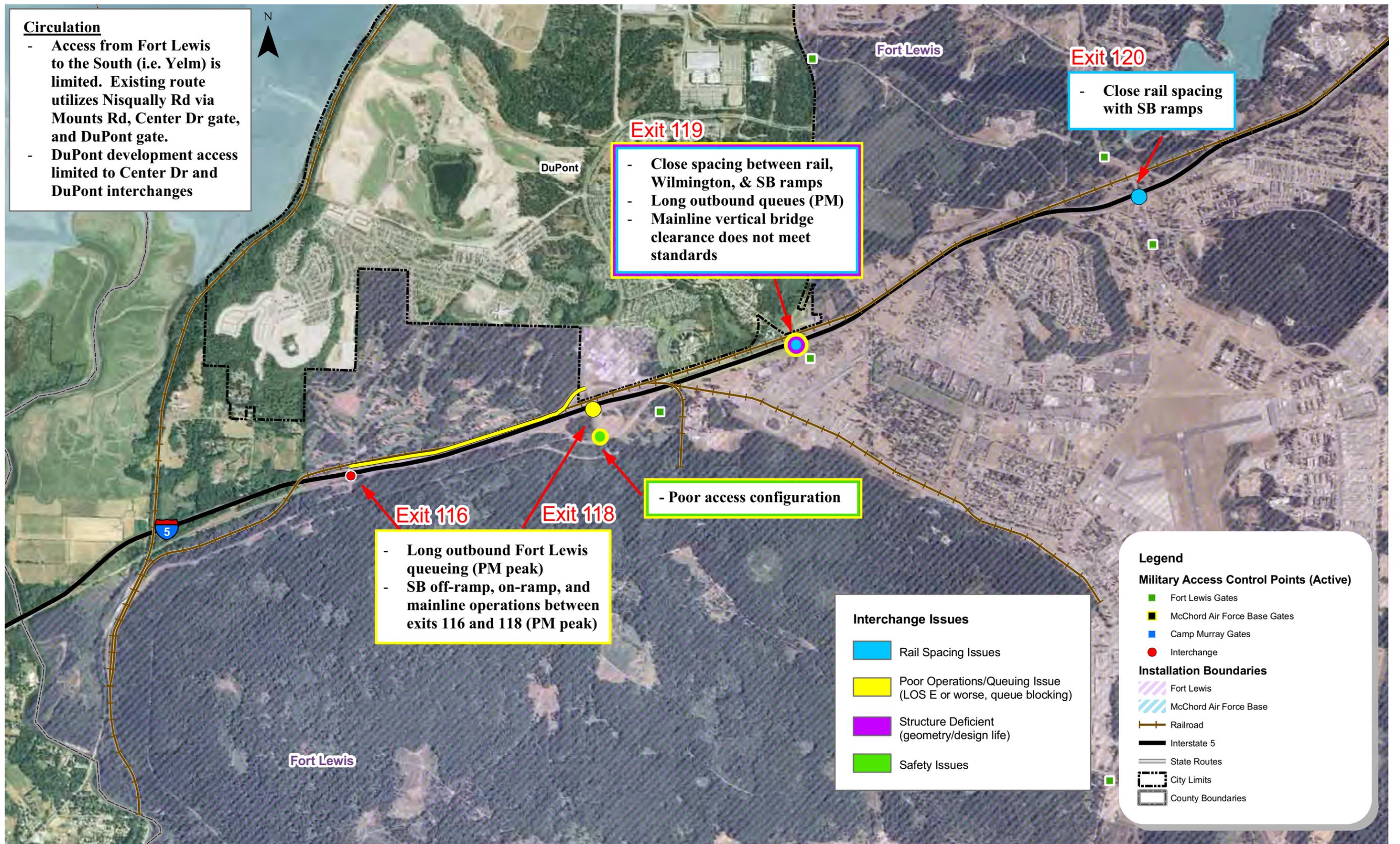
I-5 Corridor Issues Summary (North)

Interstate 5 Transportation Alternatives Analysis and Operations Model

M:\08\08301 Lakewood I-5 Growth Study\Graphics\GIS\MXD\Segment Map_North.mxd



FIGURE



I-5 Corridor Issues Summary (South)

Interstate 5 Transportation Alternatives Analysis and Operations Model

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FIGURE

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